

The motor regions are regarded as essential for the execution of voluntary movements, and as the seat of a corresponding motor memory (motor ideas), the sensory regions being looked upon as the organic seat of ideas derived from sensory impressions. An explanation is attempted of the phenomena of aphasia, and the relation of the memory of words to the ideas they represent.

The theory that a certain action, excited by stimulation of a certain centre, is the result of a mental conception, is considered and disputed. From the complexity of mental phenomena, and the participation in them of both motor and sensory substrata, any system of localisation of mental faculties which does not take both factors into account, must be radically false. A scientific phrenology is regarded as possible.

The paper concludes with a short consideration of the relation of the basal ganglia to the hemispheres. The view is adopted that they constitute a sub-voluntary or automatic sensori-motor mechanism.—*London Medical Record*, March 18th.

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#### THE MECHANISM OF THE BRAIN.

From the "English Mechanic" for March 13th we obtain the following:—

"Several researches have recently been published, which seem to prove the excitability of the cerebral hemispheres, contrary to the opinion generally held by physiologists. In two communications recently made to the Paris Society of Biology by M. Carville and M. Dupuy respectively, it is sought to prove that the experimenters who have advanced this new theory are in error. Both show (by different methods) that weak induced currents are capable of diffusion to a distance in the cerebral substance. According to them, the movements produced must be the result of excitation from a distance of parts deeper and distinct from those to which the electrodes are applied. The effects produced by faradisation which penetrate to the *corpora striata* and the peduncles, arise from direct excitation of these organs, and cannot be attributed to a reflex action. M. Dupuy further seeks to show that one cannot localise, in such a cerebral convolution (as Prof. Ferrier supposes), the nutritive or functional centre of such and such a nerve-conductor; for when the animal is completely anaesthetised, electrical irritation of the cortical layers no longer gives rise to contractions, whereas in the same animal and with the same electric current, direct irritation of a fibre of the sciatic nerve previously laid bare causes contraction of the muscles to which it is distributed. As to Nothnagel and Fourniè's method of intra-cerebral injections of a corrosive liquid, M. Dupuy thinks the excitation is not so limited as the authors suppose. The question of excitability or non-excitability of the cerebral hemispheres is thus still a disputed one."

The same number also contains an abstract of a popular lecture by Dr. Brown-Séquard, copied from the "New York Tribune," on "The Mechanism and the Seat in the Brain of the Volitional, Sensorial, and Mental Phenomena." Dr. Brown-Séquard said that the system can be looked upon as composed of two essential elements—cells, that is, small bladders, and fibrous tubes. These cells exist in almost every part of the brain, as well as in the continuation of it called the spinal cord, and it can be seen that there are an immense number of ramifications which most likely are in all in continuous fibres. We may look upon the system as a contiguous network of fibres, so that no part of it is disconnected, and this is to be kept in view in the consideration of the various means by which propagation takes place from one part of the nervous system to another. Those two modes of action take place through cells as well as through fibres, and both of them consist in what we call irritation. Every part of the nervous system can be a point from which proceeds an irritation which will either stop an activity of the brain or put it in play. The brain itself has the power, as well as the nerves, of acting upon itself, and producing or causing a cessation of activity. If you inject water in your ear you discover that a disorder of movements comes almost at once. There is an effect on certain parts of the brain exerted by nerves in the mucous membrane in the tubes of the ear.

The greatest variety of phenomena may come either from irritation of the brain or nerves. In one case in London a boy was found, on getting out of bed in the morning, to be seized with the most violent convulsions, and an acute attack of mania. On putting him to bed again the morbid symptoms disappeared. Three times this phenomenon was observed, and when the surgeon examined him, the boy told him that while fishing a piece of glass had penetrated beneath the nail of his great toe. By pressing on the skin near the nail the boy had a recurrence of the same symptoms, but after the surgeon had cut away a piece of the flesh the convulsions ceased. It may be seen by this that an irritation in a very minute part of the body may have an immense power. It has been discovered that the irritation of portions of certain muscles of the eye can produce in the brain a condition called catalepsy, or loss of feeling. When we see that a man's thigh may be amputated without any sense of feeling on his part, when we see that irritation may be exerted on the brain by means of irritation of a few fibres of a muscle of the eye, we can understand how immense is the field of important researches, both in a psychological and physiological and also in a therapeutical point of view. There are facts extremely important concerning the kind of influence of the irritation by means of which activity is arrested in the nervous system. We know that respiration can be stopped immediately by the galvanisation of a particular nerve, and so, also, by an act of the will. In reference to the power of the will, I recollect a surgeon who was accustomed, on going into a hospital, to say to the patients that if any man coughed while he was there he would get no food during the day, and the coughing would always cease. We can stop sneezing by pressing on certain parts of the face, and coughing is under the same mechanism. The future of medicine lies very much in the study of those facts in regard to the arrest of activity.

Our consciousness, as you know, ceases during sleep. It is now well-nigh proved that it is through an arrest of activity. Sleep does not appear through a mere cessation of activity, but it is through something active that sleep is caused. The idea that sleep depends on the contraction of the blood-vessels of the brain, which has been put forward in England and here, is absolutely false; for it has been shown, on the contrary, that when they are dilated sleep can take place as well as before. Convulsions can also be stopped, for they are a morbid phenomena due to a certain condition of the cells. A negro, whose master had convulsions through an affection of the spinal cord, which lasted five or six minutes at a time, so that he could not be dressed, made the observation one day that by pressing on the big toe the convulsions ceased; so that afterwards, whenever he dressed him, he simply performed this act and kept his master still.

In a case published by Abercrombie, which is very important as showing that the disease must have existed a long time before death, a lady—who had had previously some trouble with her sight, and had had attacks resembling certain forms of epilepsy, but was at this time apparently in good health—passed the evening with her friends and appeared in excellent spirits, but the same night died. The left side of her brain was found so diseased as to establish the fact that the disease had existed for a long time. Thus, with this lady, one side of her brain had performed all the functions that are usually attributed to that organ. We sometimes find that the reverse is true—that a very slight irritation may cause intense symptoms, and produce the greatest variety of them, while for a considerable disease we see slight indications. We find, thus, that there is no relation between the symptoms and the seat of the disease itself. There are cases showing that diseases in the brain can disappear through what might cause disease of the brain, as in the case of a lunatic who was accidentally cured by getting his cranium broken from the blow of another lunatic. We must admit that the two sides of the brain are completely alike in their functions, and that one of the two alone is entirely sufficient to perform the functions attributed to both. I can show you that the present mode of education develops only one half the brain. It is a very great mistake we commit in not teaching our children to make use of the two sides of the body indifferently. We write with one hand; we should learn to use both. We make use of one side of the body for a great many things, especially in gestures. It is a great pity, because in

developing certain sides of the body we develop certain sides of the brain, and it would be a great gain if we had two brains to work with. In that case we would not then be deprived of the power of speech through disease of the brain, for we could use the unaffected side. It is just so with the body.

The theory has been received almost universally for a long time, and is yet admitted, that the mind, when acting to produce a voluntary movement, performs just the same thing that the pianist does on the piano in making his fingers run on the keys; that in the same way, by striking certain fibres of the brain, the will produces the voluntary movements. It is considered also that the mind, as the recipient of sensations, is very much like a hotel-keeper, who knows, when a bell is struck, what room the disturbance comes from. There is no such prolongation of the fibres from the muscles all over the body to the brain. Two facts, I think, show it; one consists in showing that the number of fibres by which the brain communicates with the body is so extremely small compared with the number of movements we can perform: in the same way the variety of sensations implies an immense number of them, and there is no possibility of such a number of them existing in the upper part of the spinal cord. Another argument is that there are many cases on record by which the bond of union between the spinal cord and the rest of the body was in a great measure destroyed—one-tenth of it existing in some cases—and still the movements were performed more or less completely, and the sensations were transmitted to the sensorium almost as perfectly as in health; so that a very few fibres uniting the brain with the spinal cord are sufficient for communication between the brain and the body.

A startling fact was discovered in Paris a long time ago, that one part of the left side of the brain seems to be the seat of the faculty of expressing ideas by speech. I believe it does not belong to that part. I would not say that a person who is educated to employ indifferently both sides of the body would thereby develop both sides of the brain as regards the mental power, but that is very likely to be the case. The faculty of sight seems to have a better proof of a seat in the brain than the faculty of speech. There are two organs in connection with the optic nerve. The greatest variety of effect may be produced by irritation of any one part of the optic bands, as they are called, and there is no conclusion to be drawn from those facts but this: that an irritation existing in one half of the brain at the place where one of the optic nerves penetrated, a disease there, can either produce the loss of sight in one eye or the other eye, or both eyes, or one-half of either eye or each eye; and still more are cases showing that a disease in that place may not produce any alteration at all in the sight; and the conclusion is that disease in one half of the brain is not necessarily the cause of the loss of sight, and that one nerve only is enough for the sight of two eyes. This is in perfect harmony with the theory that one-half the brain is good for all the functions of two sides of the brain.

It has been considered that certain parts of the brain have the power of acting upon certain parts of the body. This localisation is the greatest attempt at demonstration of the view of certain physiologists that has yet been made. My assistant and pupil has just published in France a system of researches establishing that the means employed by Ferrier were quite inapplicable and untrustworthy. Ferrier applied galvanism, and paid no attention to the fact that the current was distributed over other parts than those he wished to be acted upon, so that there were a great variety of effects of the nerves of the base of the brain. The base of the brain certainly has a great variety of action over certain muscles, but the seat of the will has not that power. The conclusion of Ferrier's theory is just the same as though he had said that the seat of the will was in the soles of the feet, because by tickling them the muscles of the face were affected. The immense field of clinical medicine disproves entirely the theory. So with other localisations. A French physiologist thought he had discovered the seat of vital force in the *medulla oblongata*, but I have had a good many animals deprived of that, and yet they have lived.

The speaker next spoke of the connection between the mind and the body as

regards voluntary action and sensation. What can be done in certain cases by the nervous system without any influence of the will is sometimes immense. The will simply states that a particular movement is to be done; the act of performance does not in the least belong to the will. The mechanism by which the performance takes place is rather complicated, but the facts show that Nature in that respect has been exceedingly provident, providing 1,000 fibres where one would be sufficient.

#### MEDICAL STATISTICS OF THE CENSUS.

(From the "Medical Record" for March 11, 1874.)

The following highly valuable and important particulars with regard to the idiots or imbeciles in Great Britain are extracted from the final report of the Census Commissioners, which have just been issued :—

*Idiots or Imbeciles.*—In conformity with the terms of the Census Act, an attempt has been made for the first time to ascertain the number of idiots or imbeciles amongst the population of England and Wales. This has been done by means of an instruction in the householder's schedules, requiring that if any person therein mentioned were suffering from or under the infirmity of idiocy or imbecility they should be so described. According to the returns, the total number of persons described as idiots or imbeciles in England and Wales is 29,452, the equality of the sexes being remarkable—namely, 14,728 males and 14,724 females. Compared with the entire population the ratio is one idiot or imbecile in 771 persons, or 13 per 10,000 persons living. Whether the returns are defective owing to the natural sensitiveness of persons who would desire to conceal the fact of idiocy in their families, we have no means of knowing; but such a feeling is no doubt likely to exist among those who look upon mental infirmity as humiliating rather than as one of the many physical evils which afflict humanity. As regards the distribution of idiots and imbeciles, the largest proportionate numbers are in the South Eastern Division, which includes the Earlswood Asylum and other institutions containing persons of this class. The numbers are also above the average, in proportion to the general population in the South-Midland, Eastern, South-Western, and West-Midland Divisions, and below the average of England in the London, Northern, York, and North-Western Divisions.

The ratio of idiots or imbeciles to the population in the several divisions was as follows :—London, one in 1,708; South-Eastern, one in 518; South-Midland, one in 641; Eastern, one in 636; South-Western, one in 669; West-Midland, one in 642; North-Midland, one in 666; North-Western, one in 833; Yorkshire, one in 901; Northern, one in 1,028; Wales, one in 739; England and Wales, one in 771.

Idiots and imbeciles seem to be the last class which has obtained the attention of philanthropists and men of science. Less has been done for them than for lunatics, partly because they are a less dangerous and troublesome class, but partly also from the doubt which existed as to the possibility of effecting a cure, or even any material alleviation of their condition. But attention has now been directed to them, and in consequence of the observation and experience of the last twenty-five years it has been ascertained that in a large proportion of cases of congenital mental infirmity, a patient may, by care and training, be made able to contribute, at least in part, to his own support. This and other important results have been accomplished by means of the special institutions established for these unfortunate persons.

At the time of the census there were 3,456 imbeciles—1,998 males and 1,458 females—in special asylums for this class, or in lunatic asylums. This is in the proportion of one in 8.5 of the whole number. In the South Eastern Division the proportion in asylums was one in three; in the Welsh division, one in eight; in the West-Midland and North-Midland divisions, about one in nine; while in London only one in sixteen, and in the North-Western and Northern divisions