REMARKS

ON A

CASE OF RETURN OF KNEE-JERKS AFTER
HEMIPLEGIA IN A TABETIC.

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THE following is the only case in which we feel certain of the restoration of the knee-jerks after their loss in a tabetic patient. One of us (J. H. J.) brought the patient before the Neurological Society in November, 1888, and again in January, 1891.

The patient (B.), then 49 years of age, was admitted into the London Hospital, February 11th, 1888, just three years ago, for hemiplegia of the right side. He was tabetic as well as hemiplegic. His case was used in clinical demonstration of both kinds of morbid affection. He had had syphilis twenty years before admission, but denied secondary symptoms. He has been married three times, and has had fourteen children, of whom five survive; only one of seven by his first wife is alive.

As to the tabes, he began to suffer from lightning pains twelve years before his admission (February, 1888); he had been subject to occasional severe dyspeptic attacks, and had had occasional double vision for two years. Soon after the lightning pains began he noticed that on shutting his eyes he had "swimming in the head" and a tendency to fall, and, later, difficulty in walking. The tabetic symptoms discovered on admission (1888) were great diminution in the size of the pupils, the left being the smaller; they did not act to light, but acted during accommodation (Argyll-Robertson pupils); absence of knee-jerks (Jendrassik's test). He had had two attacks of hemiplegia.

The first hemiplegia began rather suddenly, January 31st, 1888, 8 P.M., eleven days before admission; he fell down; he could not speak for five hours, but was not insensible; after that time he could move his limbs, and next morning did some work. The second attack occurred on February 3rd, 1888, eight days before admission. As to the hemiplegia on admission, there was the common facial and lingual paralysis; the arm was paralysed, and was so completely, except, to use the reporter's words, for "the muscles going from the trunk to the shoulder—namely, the trapezius, rhomboid, etc." The leg was partially paralysed; he could flex and extend his toes, and had slight power of flexion at the knee; he could extend the leg at the knee with considerable force. He was unable to walk. There was "impaired tactile sensibility of the face, arm, and leg," right side. There was no defect of speech.

According to the report the arm may be said to have suffered more than the leg, but the arm improved much more rapidly, and at his discharge from the London Hospital, May 5th, 1888, the upper limb had advanced far more towards recovery than the leg. He had 10 grains of the sodium iodide three times a day. The dose was increased, so that by April 1st he was taking 30 grains thrice daily, and did so up to the time of his leaving the hospital.

The fact of importance is that by March 21st, forty-seven days after the onset of the second hemiplegia, return of the right knee-jerk was noted. The note about it is "rather difficult to elicit, and is 'slower' than normal in following the stroke." We could not elicit the left knee-jerk. We are indebted to Dr. Hugh Smith, house-physician, for aid in the investigation of this case, and for most of the notes made during the patient's stay in the London Hospital.

Later on the patient was an out-patient, under the care of Dr. Ferrier, at the National Hospital for the Paralysed, and the Epileptic. Dr. Ferrier noted that the knee-jerk could be got on

the right—the paralysed—side, and observed the tabetic symptoms. The man was admitted an in-patient of the National Hospital for the Paralysed and the Epileptic, October 12th, 1888. He could then walk a short distance without support, limping on the right leg; he walked with his legs wide apart, and brought down both heels, it is noted, "with emphasis." Standing with heels together and eyes closed, he tended to fall backwards at once. The right knee-jerk was readily obtained; the left not. There was weakness of all movements of the right arm, and slight blunting of tactile sensibility. With closed eyes he could not touch his nose with the tip of his index finger. No facial paralysis. Pupils small, no reaction to light. He complained of dimness of vision, but there were no abnormal ophthalmoscopic appearances. He left the hospital in January, 1889.

On January 20th, 1890, Dr. Colman, late pathologist and formerly house-physician to the National Hospital, made an entirely new and independent examination of the patient's case. It will be observed that Dr. Colman found that by this time the left knee-jerk was obtainable by reinforcement; he also found optic atrophy. The following is an abstract of his notes:

"The patient's general condition was slightly better than it was at the time of his discharge from the hospital, the pains and unsteadiness having both diminished, but he had become blind in the right eye, and the vision of the left was impaired.

"In the upper limbs ordinary sensibility was natural, and there were no 'subjective' sensations. Muscular sense showed very slight impairment. He could touch his nose readily with the eyes open, and he came near it with his eyes closed. Muscular power in the right arm was less than that in the left. The triceps and wrist-jerks were much exaggerated on the right side, a short clonus being readily obtained at the elbow. The triceps-jerk could not be elicited on the left side. Muscles of both upper limbs were irritable to direct percussion, particularly those on the right side.

"He was able to walk without support, but he straddled and frequently hesitated before putting either foot down, and then he did so with a jerk. There was a slight tendency to drag the right foot. He could stand for seventy-five seconds at a time with his eyes closed, a considerable improvement on his performance of a year before, and the impairment of power in the right leg was less than it was then. No sensory defect was discovered, but he still had occasional shooting pains in the legs.

"The right knee-jerk was obtained readily, without reinforcement. A slight but distinct jerk was repeatedly obtained on the left side by using Jendrassik's method. No ankle-clonus was obtained on either side. All the muscles of the legs were extremely irritable to direct percussion, and this irritability was greater on the right side. The plantar reflexes were much exaggerated, that on the left more than that on the right side; the cremasteric reflex was present on the left, but was not obtained on the right side; the abdominal reflexes were present, and were equal on the two sides. Swallowing, micturition, and defecation were quite normal, and were accompanied by the usual sensations. Sexual power and desire were said to be entirely absent. Sensibility on the trunk was natural. There was a feeling of constriction corresponding to the course of the last dorsal nerve. The pupils were equal and very small. They contracted during accommodation, but did not react to light. There was scarcely any light perception in the right eye, and the disc was atrophic with arteries much reduced in size compared with the veins. The left disc was normal in colour, and the arteries were about half the calibre of the veins. There was no aphasia, but the patient asserted that his 'speech' was less fluent than it used to be. There were no gastric or laryngeal crises."

The patient again came under observation early in this year and was, for the second time, shown to the Neurological Society in January. There was no noteworthy alteration in his condition. The right knee-jerk was easily obtained; the left was elicited with difficulty, but its presence was testified to by Dr. Bristowe, Dr. Buzzard, Dr. Hadden, Dr. Beevor, and many others. Some choroidal change was now detected in the right fundus, and the left disc was paler than normal.

We do not suppose that the hemiplegia in this case was a tabetic symptom; but that it was hemiplegia occurring in a

tabetic subject as it, unfortunately, often does in the non-tabetic. We have seen hemiplegia not a few times in patients already the subject of tabes, but the case of B., and that of another patient, are the only cases in which the knee-jerk was present after that paralysis. (In the other case it cannot be asserted, as it can in the case of B., that the knee-jerk was absent before the onset of the hemiplegia. All that can be said is that it was present on the hemiplegic side after the attack.) Hence it would not be wise to draw any decided inferences from the case of B. In a valuable and interesting thesis,¹ Mademoiselle Edwards has collected a large number of cases in which hemiplegia occurred in the course of various other nervous disorders. Amongst them are several cases of tabes with this complication, but in only one case² are the knee-jerks noted as being present. It is not stated whether the knees had been tested before the onset of the hemiplegia.

Presumably in the case of B., the return of the knee-jerks was contemporaneous with the establishment of sclerosis of fibres of the pyramidal tract, in the bundle of deep fibres of the lateral column. It is well known that in many cases of uncomplicated hemiplegia, there is exaggeration of both knee-jerks. It has been shown by Pitres, Schäfer, Sherrington, Hadden, Tooth, France and others, that at least in some cases of lesion of one internal capsule there follows degeneration of fibres in both lateral columns. If, in the case of B., there has been since January, 1890, double lateral sclerosis, his case anatomically is one of the "ataxic paraplegia" of Gowers.

Before the hemiplegia, or before the lateral sclerosis was well established, it may be that from the sclerosis of the posterior columns there were too few fibres left intact in those columns for strong enough or sufficiently numerous impulses to act on the anterior horns concerned, so as to produce the jerk. Upon the ensuing of lateral sclerosis, according to current doctrine, the anterior horns become more excitable. Thus it may be that after this change in the horns, the few fibres left intact in the posterior columns were sufficient for action on the horns so that the jerk could be elicited. If this be so, and if the posterior sclerosis increases, the presumption is that the jerks will be once more lost. It is not likely that the lateral sclerosis will increase, at any rate so far as the lesion causing the hemiplegia is concerned with it.

PRESIDENTIAL ADDRESS ON THE ENERGY OF THE ANIMAL BODY.

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British Medical Association.

There seems to be in thoughtful minds a growing recognition of the fact that medicine and therapeutics are but in other words applied physiology; and I take it that applied physiology means, broadly, the effort to direct and influence those chemical changes which are continually taking place in the tissues of the body, known under the term "metabolism." Metabolism is defined as a process which goes on in every part of the body by which energy is stored up as well as set free. There are two kinds of metabolism: First, that which refers to the building up of the living substance, and is called "anabolism;" secondly, that which refers to the breaking down of the living substance, and is called "katabolism."

Now, if it be admitted that disease is a deviation from a healthy metabolism, it is but reasonable to conclude that the closer we are acquainted with the working of our organs in a natural state, the better able shall we be to restore harmony when they are out of tune. It is under this impression that I venture to lay before you some remarks on the subject, or I should say a portion of the subject, of the energy of the animal body or how work is done in the animal economy. But it may not be out of place to say a few preliminary words about energy in general, and especially about that great and inexhaustible source of energy—the sun.

Although the sun may not initiate life, still it is the principal source through which life is maintained—directly in the plant and indirectly in the animal kingdom. Were it not for the energy of the sun, the carbon and hydrogen, or raw material which goes to make plant life, might continue their inorganic and barren existence in union with oxygen for ever. But there is a peculiar body in plants, called "chlorophyll" or green stuff, and although this is an exceedingly unstable body, and has perhaps never been successfully isolated, there can be no doubt, as Dr. Halliburton says, "it is always present in vegetable cells, in which the formation of organic matter from carbonic acid and water, with elimination of oxygen, is going on." What the exact function of chlorophyll may be is at present a moot question, but it may be confidently stated that, through the energetic action of the solar rays on the carbonic acid and water surrounding it, carbon is separated from carbonic acid and hydrogen from water, and fixed or stored up in the plant as a hydro-carbon. This may be called the first production of vital capital, as far as we are concerned, inasmuch as this green stuff, through being built up, for instance, into grass, furnishes food for sheep, and sheep, in the form of mutton, furnish food or transmit the capital to man.

Animal life is permanently supported by what are called protein compounds, but these are only generated by plants, and plants can only generate them through the direct energy of the sun.

Now the green stuff of plants consists of carbon, hydrogen, and nitrogen. This last named constituent, nitrogen, is a very important one, for although it forms such a large portion of the atmosphere, and is physically diffused through the bodies of plants and animals, still as free or uncombined nitrogen, it is inert and of no chemical use. But mark the difference when it enters into the composition of the protoplasm of a vegetable cell, or the proteid framework of muscle. Nitrogen then is the pivot on which their metabolism turns, and nitrogenous bodies appear more or less as the products of all metabolism.

In the animal these products are cast out, but in the plant they are stored up, and may be often recognised as vegetable alkaloids, bearing a resemblance, if not closer relationship, to the nitrogenous product of animal metabolism, namely, urea. One word about the indestructibility of the sun's energy. In a potential form it may be locked up for centuries in the wood of the tree; but when the wood is burned the carbon and hydrogen are separated from each other, and again unite, respectively, with oxygen. Energy is set free which may be utilised, as you are aware, in ordinary machinery. Carbonic acid and water are formed, which may be again acted on by the sun and green stuff of the plant. But the potential energy of the sun's rays is likewise stored up in fruits, or food stuffs, and these undergo in the animal economy a process of slow combustion, in which an analogous chemical effect is produced, as when the wood of the tree is burned.

The word energy does not admit of a ready and off-hand definition. It seems to be that which is known by its effect. But, for the sake of convenience, we may say it is the inherent power, or force which, under certain conditions, effects a given work or labour. Energy is of two kinds; actual or active, and potential or latent. It may be familiarly illustrated as follows: The gunpowder in a loaded gun may be viewed as work-stuff, that is, something capable of yielding work, or, in other words something holding within itself energy, and here the energy is termed potential. Now when the gun is fired a great chemical change takes place in the gunpowder, and the energy or power, which was previously dormant and inert in it, is suddenly set free, or becomes actual, and is then called actual energy, because it actually does the work intended, or propels the bullet.

Now, every living child that is born into the world is born possessed of a certain capital, which may be called its physiological patrimony. This capital is stored up in its body in the form of potential energy. And no sooner is the child born, than it must of necessity begin to spend this capital. It is through the potential energy, which may vary in amount according to the health and vigour of the parents that have supplied it, that the child is enabled to begin the great work of life, namely, to breathe. And this is a work, or

¹ *Thèse de Paris.*

² *Obs. ix, p. 35.*