ON A CASE OF AMNESIA,

WITH

POST-MORTEM EXAMINATION.

BY

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(Received December 20th, 1877—Read February 26th, 1878.)

IN Vol. LV of the Society's 'Transactions' for the year 1872 there is a paper by the writer on the "Mechanism of Speech and Thought," some of the hypothetical conclusions of which it will be necessary to restate very briefly, in order that the bearing of the case, which forms the subject of this communication on the question of the cell and fibre apparatus concerned in intellectual operations, may be understood.

Dr. Bastian's hypothesis was accepted which assumes that there will be a certain district or area of the surface of the cerebral hemisphere in relation with each sense, in which the sensory impression undergoes the intellectual elaboration by which it is translated, so to speak, into a perception or recognition of the external cause of the sensation. These are called "perceptive centres." At that time nothing was known of their situation, but investigations into the distribu-

tion of the fibres passing from the crus and central ganglia in the "internal capsule" and "corona radiata" to the convolutions, had led to the inference that these "perceptive centres" would be found in certain convolutions in which the radiating fibres terminated. Ferrier and Hitzig have since identified these "perceptive centres," and the former, experimenting on a monkey, localises the perceptive visual centre in the angular gyrus, the auditory centre in the infra-marginal gyrus of the temporo-sphenoidal lobe, smell and taste in or near the uncinate lobule, touch in the uncinate gyrus. These are all in the marginal convolutions, which anatomical research had indicated as receiving radiating fibres, and as being thus in direct relation with the outer world, either receptively through the senses or through the muscles. These particular convolutions, moreover, all receive their fibres from that part of the thalamus which may be called extra-ventricular, namely, the process which bends round the posterior edge of the internal capsule. It having been found that certain other convolutions were not directly connected with the central ganglia or crus, but only with other convolutions by arcuate fibres, the speculation was pursued further. It appeared probable that the association together of the different perceptions of a given external object, which would by their combination constitute the complete idea of the object, would be represented structurally by the convergence of arcuate fibres from each of the perceptive centres to some of these "superadded" convolutions. Since, moreover, the fully formed idea implies the attaching of a "name," the convolution in which the perceptions were combined into an idea would also be the *naming* centre, and would be concerned with *words* as auditory impressions and intellectual symbols.

It was not attempted to follow the mechanism of thought further than this rudimentary step, but the study of words was taken up from the opposite aspect as motor processes. With this, however, the present communication is not concerned.

On the above view of the structural arrangements for the

formation of an idea, it was pointed out as a possible occurrence that the fibres of communication from one or other of the "perceptive centres" to the "naming centre" might be destroyed by disease. Supposing this to occur in the case of the visual perceptive centre, the sight of an object would then no longer recall the name. This condition was actually illustrated by a remarkable case.

A very intelligent man, who talked fluently and well on any subject, and who wrote correctly, spontaneously or from dictation, had completely lost the power of naming anything shown to him. He could not after prolonged and painful effort name so familiar an object as a hand, or coat, or table, or recognise a letter of the alphabet, or read a word even of what he had himself written a moment before. The lesion giving rise to this condition was situated in the white substance of the left hemisphere, between the posterior extremity of the fissure of Sylvius and the lateral ventricle, where this gives off the descending cornu.

With this illustration in mind let it be supposed that there had occurred a similar rupture of the communication between the auditory perceptive centre and the *name* centre, or *idea* centre, as it may indifferently be called. It will be seen that the effects will be of a far more complex character. If a spoken word conveyed no more idea to the mind than the written word in the case alluded to, the subject of the lesion would understand absolutely nothing that was said to him; a more serious and perplexing difficulty, however, would be that he would not know what he himself was saying, his own speech would be as unintelligible to him as his own writing was to the patient whose case has been quoted. This condition was supposed to be illustrated in Case 9 of the former communication, but the patient was seen only once in consultation, and no post-mortem examination was permitted.

Another condition may be imagined, that is, lesion in the name or idea centre itself, and this is what is believed to be illustrated by the case now to be related.

James S—, æt. 60, an omnibus driver, was admitted into

St. Mary's Hospital on Oct. 16th, 1877. He had been a fairly healthy man, and was described as having been particularly intelligent, a good talker, reading much, and able to write well. He had been addicted to drink in the form of heavy bouts from time to time with sober intervals. In May, 1877, he lost his wife, and had been drinking hard, with little intermission, ever since.

A fortnight before his admission he had some sort of fit, of which no reliable description could be obtained, and from that time had been unable to speak intelligibly, and had kept his bed.

On admission he was well nourished, had a good colour, a dark complexion, and curly dark hair turning grey. The expression of his face was rather anxious and inquiring.

He walked into the hospital and up the stairs to the ward guided and assisted by friends, and had free use of both upper extremities. There was thus no hemiplegia, but slight paresis of the right side of the face was observed. Later, it was discovered by the clinical clerk, Mr. Handfield Jones, from whose careful and able notes the account of the case is abstracted, that there was decided impairment of sensibility in the right half of the body.

The most striking feature in the case was that the speech was for the most part an inarticulate jargon. When questions were asked he replied, but as a rule nothing at all resembling a word could be detected in what he said. The voice was inflected naturally, and he appeared to think that he was understood. Besides answering questions he would go on talking, addressing himself to one or another of those present, the whole being an incomprehensible ramble, but at times a distinct word or phrase would slip out. He was emotional and often cried, and it was not difficult to make out that he was begging for something—probably drink; the word rum was distinguished once or twice, and he would become excited as he went on and end by crying. When excited the phrase "If you please" was several times heard distinctly.

It was difficult to make out how far he understood what

was said to him, his answers being unintelligible. He turned over in bed when told, but probably he was assisted by signs and by assistance offered him. When questioned about his symptoms he did not appear to comprehend at all what was asked. He was, moreover, obviously quite unconscious of the fact that his own speech was gibberish, and appeared to have some idea in his mind and to think that he was giving expression to it.

The pulse rate was 140, but many beats failed to reach the wrist. There was no cardiac impulse anywhere. The heart sounds were feeble; and near the apex the first was short and sharp, and either it was reduplicated or there was a slight presystolic murmur; the second sound was inaudible at the apex. The breathing was hurried and jerky. Urine high coloured, acid, sp. gr. 1021, containing no albumen or sugar.

He was put on simple diet with milk and beef tea. An aperient was ordered, and carbonate of ammonia 4 grains and tincture of digitalis 10 minims were given every four hours. His general condition improved rapidly.

On the 19th the pulse was 120, weak, soft, and regular; the respirations 40.

On the 22nd.—Pulse 96, soft, but more full and slightly irregular; resp. 28.

On Nov. 3rd the pulse had fallen to 60.

My own interviews with the patient were so perfectly similar that the indications obtained may be summarised.

The speech had the same peculiarities throughout. When asked a question he would make a brief reply as if he understood and answered; the modulation of the voice and the emphasis were perfectly natural, and corresponded with the facial expression and gestures, but as a rule there was not the least semblance to words in what he said. He never even gave a simple yes or no. He would often address a long story to us, sometimes argumentative in tone, with much appropriate gesture and corresponding changes of facial expression; or he would obviously be making some request, and would plead with great earnestness, going on to

crying and beseeching. We sometimes guessed that he wanted alcohol, and once he apparently wished to leave the hospital. It was when he was excited and emotional that words and phrases would slip out in the torrent of inarticulate sounds, such as "If you please," "Thank you—thank you."

It was a matter of great interest and importance in the estimation of the mental condition of the patient, and of the loss of intellectual faculties he had sustained, to make out how far he understood what was said to him. His replies were often so suitable in length and emphasis that had there been no other means of forming a judgment it must have been supposed that he had comprehended the question. When, however, he was told to do anything it was seen that he did not understand the simplest phrase. He sat up in bed once or twice when required to do so, but as this was not made a test question, there would be other indications of what was wanted, and he was extremely ready in comprehending signs. When told to give his hand he invariably put out the tongue, and would do this several times during the same visit. When told to shut his eyes he sometimes obeyed and sometimes did not, but whether he closed the eyes or not, he put out his tongue.

The direct question whether he would like any of the intoxicating drinks he was known to be fond of was avoided, as there was no intention of allowing him any, and it would have been cruel to tantalise him, but when they were mentioned in his presence, or when allusion was made to his habits, there was no indication that he understood what was said; the opportunity was not seized of manifesting his desire when the name was mentioned, as in ordinary aphasia. On one occasion only, when the sister asked him what he had had for tea, he is said to have answered "Bread and butter."

Other interesting particulars were obtained by Mr. M. Handfield Jones. It has already been stated that sensation was found by him to be impaired in the right half of the body and limbs. At almost every visit the patient implored

him for something, and the word "Drink" could sometimes be made out; "If you please," "Thank you," also were distinguished; he frequently cried, but less after he had been in the hospital for ten or fourteen days than at first.

Mr. Jones one day handed him a letter addressed to him at the hospital; he took it, appeared to read the name and address, and then put it down. Not attempting to open it, Mr. Jones then wrote on a piece of paper "Give me your hand," and called the patient's attention to it; he took it, held it so as to get a good light on it, and then, having apparently read it, laid it aside without giving his hand, though asked to do so by word of mouth as well as in writing.

He lay in bed and manifested no desire to rise. He would sit up in bed and appear to watch with interest what was going on in the ward, but did not seek to enter into conversation with other patients. When the meals were brought in he looked for his, and ate his food naturally. When the bowels were about to act he called the attention of the nurse by knocking on his locker, and then pointed to the commode. There was never anything extraordinary in his behaviour.

On Nov. 3rd he was got out of bed and dressed. He walked with rather a tottering gait to the fire and sat there for a short time; after which he rose from the chair, walked back to bed, and got in with his clothes on.

His death was sudden and unexpected. During the night, Nov. 5th and 6th, the resident medical officer was called to him. Before his arrival the patient had got out of bed and taken a large dose of his medicine (about 30 minims of Tinct. Digitalis); he had then tried to reach the stool, but could not. He was found in a state of extreme dyspnoea, and blue and livid in the face. Artificial respiration was tried, but he died in a very short time asphyxiated.

Post-mortem examination.—The head only was allowed to be examined. When the skull-cap and dura mater, which presented nothing remarkable, had been removed, the pia mater was seen to be white and opaque over the convexity

of the hemispheres generally, and to be raised from the convolutions by a considerable amount of fluid. This gave an opalescent appearance to the convexity of the brain. On careful examination a yellow discoloration could be seen through the membranes and fluid at the situation of the postero-parietal lobule near the longitudinal fissure, and could be traced downwards towards the posterior end of the fissure of Sylvius. This part was also soft to the touch.

When the brain was removed from the skull it was found to weigh 47 oz. The vessels at the base were almost free from disease. The membranes here were transparent, and when the fissures of Sylvius were explored nothing abnormal was detected till the extreme end of that on the left side was reached, and here the middle cerebral artery was found to be occluded by a fibrinous plug.

The two hemispheres being separated it was seen that the ventricles were in a slight degree distended by clear fluid, but all the parts seen in them were normal, and the septum lucidum intact.

The right hemisphere, except that the membranes on the convexity were opaque, and that there had been fluid beneath them, was sound.

The left hemisphere presented obvious disease, limited to its posterior half. The frontal and ascending parietal convolutions and the anterior part of the temporo-sphenoidal lobe were healthy in appearance and consistence.

Above the posterior end of the fissure of Sylvius the convolution forming the supra-marginal lobule was yellow in colour, shrunken in volume, and soft. This condition extended upwards and backwards to within about half an inch of the longitudinal fissure just in front of the external parieto-occipital fissure, involving, therefore, the postero-parietal lobule. Extending backwards the morbid change implicated the angular gyrus, and nearly reached the occipital lobe; in a downward direction the adjacent parts of the temporo-sphenoidal lobe, the posterior end of the infra-marginal, and parallel gyri, were soft, but not wasted or discoloured on the surface.

(1) Examined by a succession of vertical transverse sections from the frontal extremity of the hemisphere backwards, softening was first encountered in the lower end or foot of the posterior ascending parietal convolution, quite at its posterior part; it did not here extend into the fissure of Sylvius, and there was no external discoloration. On the lower side of the fissure in the temporo-sphenoidal lobe, there was softening in the infra-marginal gyrus to a depth of half an inch. (2) Half an inch further back, and about three quarters of an inch from the end of the fissure of Sylvius, the section found the substance of the supra-marginal lobule soft and almost diffuent, and its surface in the fissure of a brownish-yellow colour; the temporo-sphenoidal lobe was also softened nearly to its inferior surface. (3) A section across the extremity of the Sylvian fissure passed through the maximum of softening, which here extended from near the longitudinal fissure, across the convexity of the hemisphere, to within half an inch of the inner and inferior border of the temporo-sphenoidal lobe; the greatest depth of the softening was midway, and measured about three quarters of an inch. In successive sections behind this point, the area of softening became narrower and its depth less; it extended backwards midway between the upper and lower borders to within an inch of the occipital extremity, being very shallow at its posterior part. It involved of course the angular gyrus and the middle *pli de passage*. The softening did not at any part reach the central ganglia or the ventricle.

The part of the hemisphere affected was thus the regions supplied by the third and fourth branches of the middle cerebral artery, and the convolutions softened were the postero-parietal lobule, incompletely and superficially; the supra-marginal lobule throughout its extent, and in depth down to the oval white centre; the entire angular gyrus profoundly; the annectent gyrus behind it superficially; the posterior half of the infra-marginal or first temporo-sphenoidal gyrus; and opposite the termination of the fissure of Sylvius almost the entire thickness of the temporo-sphenoidal lobe. The frontal lobe and the oblique ascending

parietal convolutions, in which the motor centres have been localised, were, as has been already said, free from disease.

Whatever may ultimately be the interpretation placed upon them, cases like this are worthy of careful study. A definite lesion is found, to which, from the history of the attack, there can be no hesitation in assigning the symptoms. It is important, therefore, that a definite idea should be formed as to the nature and extent of the loss of function sustained. Under each of the general descriptive terms in common use, such as coma, delirium, unconsciousness, insensibility, are included conditions essentially different, and an analysis of them may be as fruitful of results as a "study of convulsions" has proved to be in the hands of Dr. Hughlings Jackson. Even words like aphasia and amnesia, brought into use for the express purpose of defining a single invariable condition, become snares and hindrances by being employed to designate by the same name affections which a careful description would have shown to be different.

The patient in the case under consideration had lost the faculty of understanding words spoken or written by himself or others, so much so that he was not even aware that his own attempts to talk were simple gibberish; the question is whether this alone would account for his condition, or whether there was not some further and more general impairment of the mental powers. It was of course impossible to test his memory, but he recognised his friends, and knew what he might expect from his medical attendants and from the nurses, addressing to the former his inarticulate requests, and summoning the latter when he required their assistance. He manifested great disappointment also when any resident medical officer or clerk passed through the ward without noticing him. Again, he had obviously ideas in his own mind to which he thought he was giving expression, and his gestures and changes of facial expression were remarkably significant and appropriate. On superficial observation he might have been set down as simply imbecile or demented, but a far greater degree of imbecility is seen without any approach to his want of comprehension of words or to the

inarticulate character of his speech, and it is not difficult to conceive the helplessness and bewilderment of a man who suddenly finds himself unable to understand what is said, and sees that those around him fail to understand him, while he supposes himself to be speaking as well as ever. Had the patient been an Asiatic, and his only language one of which we were absolutely ignorant, we should not have discovered that he was suffering from any impairment of the mental faculties.

It seems probable, then, that the complete loss of comprehension of words exhibited by this patient would account for his mental condition, and the interpretation here placed upon this loss is that it was due to destructive lesion of an area of the cerebral cortex, in which perceptions derived through the different senses are combined and elaborated into ideas of the objective causes of sensation, which ideas, again, are in this centre associated with and symbolised by names or words. If the interpretation is correct, we have at some part of the cortex involved in the softening the centre in which "concepts" are formed, "naming" takes place.

It may be considered fortunate that the problem was not complicated by extension of the softening to the third frontal convolution. Had this been the case it would have been impossible to exclude the hypothesis that the amnesia was represented structurally by lesion involving the same cortical area as aphasia, but more extensive, and that thus amnesia was an aggravation of aphasia. There being, however, no lesion to which aphasia could be attributed, the distinction, arrived at by analysis, between words considered as intellectual symbols, the elaborated product of sensory impressions, and words considered as motor processes, is confirmed by disease. Dr. Hughlings Jackson has aptly called the third left frontal gyrus the "way out" for words; in the case related it was the "way in," and the centre in which words are formed as "concepts," which were damaged or destroyed.

It is important to note the fact that an affection of language other than aphasia is produced by disease in the *left* hemisphere. The softening was extensive, including the auditory perceptive centre of Ferrier or a part of it (the posterior half

of the infra-marginal gyrus), the visual perceptive centre (angular gyrus), as well as the more hypothetical centre for concepts and names not yet localised; but affecting one hemisphere only the observed results go beyond the anticipations we should have formed. Still more remarkable is the case mentioned in which a limited lesion in the white substance underlying the angular gyrus of the left hemisphere, and presumably isolating it from this centre for concepts and names, abolished the power of naming an object at sight. With regard to these, as in aphasia, there arises the question—What would be the effect of a similar lesion in the opposite hemisphere? Destruction of the third frontal convolution on the left side of the brain gives rise to aphasia; on the right side it does not. The precise results of lesion of the right third frontal gyrus, if not simply negative, are not definitely known. Apparently the employment of this convolution in the left hemisphere as the “way out” for language involves the predominant, if not exclusive, employment of this hemisphere at other stages in the complex process by which language becomes the vehicle or, it might almost be said, the instrument of thought. This, again, according to the hypothesis of Broca and Moxon, is a secondary consequence of right handedness, the dextral pre-eminence of the hand implying sinistral pre-eminence of the brain. It may already be taken as established that there is a marked functional difference between the two hemispheres, which in structure and arrangement are so nearly alike, but whether this consists simply in a relative superiority of the left, or whether there is thrown upon the right some compensatory superiority in a less conspicuous function than that of language, cannot yet, in the opinion of the writer, be determined. A comparison of the results of lesions in similar parts of the right and left hemispheres will afford information of extreme interest and value. To this Mr. Callender has made an important contribution in the ‘St. Bartholomew’s Hospital Reports’ vols. iii and v, 1867 and 1869. The question is, however, too large to be opened in the present communication.