

ignorance or of actual charlatany) to "congestion of the base of the brain"—a condition that probably never exists but in a pathological imagination. Needless to say this sweeping assertion is consistent neither with his own findings nor with those of any other observers who have studied the conditions to which he refers.

I have referred frequently to the value of massage of the base of the skull, the neck and spine, to ensure free movement in the veins and lymphatics. This should be conducted rhythmically from above downwards to synchronise with expiration and the draining of venous fluid from the skull. It is sometimes remarkable how this relieves stasis in the basal veins, the petrosal and cavernous sinuses, and not infrequently an anæsthesia, more or less general, improves rapidly with draining of the straight sinus, thereby relieving the intra-commissural areas concerned with cutaneous sensation.

I have also found that rhythmic exercises relieve conditions of venous stasis which hitherto have not yielded to any other form of treatment. In many cases I believe it to be essential to aid the circulation by careful estimation of the internal secretions and adjustment of the balance between the thyroid, pituitary, adrenal, ovarian, and testicular functions.

The Functions of the Basal Ganglia.⁽¹⁾ By J. V. BLACHFORD, C.B.E., M.D.Durh., Medical Superintendent, City Mental Hospital, Fishponds, Bristol, and Lecturer on Mental Diseases, University of Bristol.

In the *Journal of Mental Science*, vol. xlvi, 1902, p. 53, I described a case of degeneration of the optic thalami in a male patient, and pointed to the fact that the symptoms were chiefly those of very advanced dementia.

Some years later a female patient, who had been resident in the asylum for a number of years, died. The following is a short history of her case and the conditions found *post-mortem* :

E. T—, a female patient, æt. 78, had two or three attacks of partial aphasia; the last and worst occurred some months before her death. There was no paralysis, but patient complained of feeling giddy and at the same time was at a loss to remember certain words in conversation. From the first attacks she recovered completely; as regards the last, her aphasia had much improved but she was evidently becoming more childish, and her death was certified as due to old age. *Post-mortem* : The vessels at the base of the brain were noted as very atheromatous, the grey matter pale and firm, the white matter pale and firm, and ependyma of ventricles smooth. There was a fairly large patch of softening in the right corpus striatum and a smaller one in the left. In this case the only lesion to account for the aphasia was softening in the corpora striata.

I have searched the *post-mortem* records of this asylum for the past twenty years, and in all cases in which the lesion could be localised in

(1) A paper read at the Autumn Meeting of the South-Western Division on October 28th, 1921.

the basal ganglia, have ascertained from the case-books, as far as possible the symptoms presented by each, before and after admission. Including the one just described, there are seventeen in all, and the following is a *résumé*, giving the seat of the lesion and the symptoms :

Optic thalamus.—Three cases : All dementia—no paralysis noted—no convulsions or fits.

Optic thalamus and corpus striatum.—Three cases : 1 dementia ; 1 seizures—paralysis—dementia—speech much affected : 1 seizure—strong convulsions.

Corpus striatum.—Ten cases : 4 speech affected ; 1 hallucinations of sight and hearing ; 1 epilepsy—dementia—destructive ; 1 fits, two or three years before admission ; 1 left-sided convulsions ; 1 epileptiform fits ; 1 pupils normal—knee-jerks present.

Internal capsule.—One case : Aphasia—hemiplegia—loss of sensation.

From this analysis it will be seen that in lesions involving the optic thalamus alone, the chief symptoms were those of dementia, or inability to appreciate one's surroundings without epileptiform seizures or convulsions, which, however, sometimes occurred accompanied by dementia if a striate body was also involved ; that injury to the corpus striatum led to epileptiform convulsions, or difficulty of speech ; and that in the only recorded case of involvement of the internal capsule alone, the symptoms were motor and sensory paralysis, but unaccompanied by convulsions or any marked degree of dementia.

The optic thalamus is connected with the centre for sight through its posterior peduncle, with the auditory centre through its inferior peduncle, with the fronto-parietal cortex through its anterior peduncle, and with the olfactory centre through the bundle of Vicq d'Azyr. It is also intimately connected with the mesial fillet, is older than the corpus striatum, and no doubt chiefly concerned in those associations of the primary sensations of sight, touch, hearing and smell which enable us to form perceptions, a perception being the result of the association of two or more sensations, hence in lesions of this ganglion the most elementary appreciation of things in the outside world including our own peripheral parts is at fault, leading to pronounced dementia.

The corpus striatum, on the other hand, is connected chiefly with the optic thalamus and cortex ; with the former through the ansa lenticularis connecting the thalamus with the lenticular nucleus, and fibres passing through the anterior part of the internal capsule connecting the optic thalamus with the caudate nucleus ; with the cortex through the cortico-caudate fibres connecting the frontal cortex with the caudate nucleus, and by three bundles connecting the lenticular nucleus with the frontal region, the insula and the temporal region.

Lesions of the corpus striatum give rise to convulsions, epileptiform seizures and difficulties of speech and but little permanent muscular

paralysis, unless the lesion is sufficiently extensive to involve the internal capsule. The anatomical connections and pathological considerations appear to point to the fact that it is the centre for the association of the muscle sense with the other centres of primary sensation, probably already associated amongst themselves in the optic thalamus.

(a) We can only think in terms of muscular energy ; in other words, all thought is an incipient muscular contraction, due to the mild stimulation of those cells which receive the sense of muscular contraction when certain muscles are used, either to pronounce the name of the thing thought, or to adjust the eyes or other parts of the body in perceiving the object, or, performing the action.

(b) This stimulation, if carried still further, issues in action, *viz.*, the contraction of those muscles used in pronouncing the name or performing the act, of which these cortical cells are the sensory representatives.

(c) Associated sensations giving rise to a perception leave the thalamus and reach the corpus striatum. Here they are associated with the muscle sense, which arises whenever the object is perceived and its name pronounced, a mental picture consisting of this muscle sense being thereby projected on to the cortex. In lesions of this body giving rise to a disassociation, or rather to want of association of these sensations, no picture is so formed, and so there is a forgetfulness of the name required, although the object and its use may be recognised, hence visual aphasia. In the same way, should the part concerned with the association of sound and the muscle sense be involved, word-deafness will result, though the patient hears perfectly well what is said to him, the failure being in that part of the nervous centre in which the sound is associated with the muscle sense, so that the muscle sense cells in the cortex corresponding to the sound are not stimulated and the consequent mental picture is not formed. In those cases in which the lesion is irritative we should expect contraction of the muscles whose sense cells were over-stimulated. But as some of the association cells in the corpus striatum will have been destroyed by the lesion while others are unduly stimulated, instead of an orderly co-ordinated contraction of the corresponding muscles there will arise irregular, unequal contractions ; and should the irritation be sufficiently severe these will spread to other parts, giving rise to one-sided, and sometimes even to general convulsions.

The muscle sense is the most revivable in consciousness ; it is almost impossible to recall a taste, or smell, and, as to sight, colours are very faintly revivable, and then only by thinking at the same time of the name (and so incipiently pronouncing it). The shape and form of objects are much more revivable, this being due to the revivability of the muscular feeling experienced through the musculature of the eye-

balls, etc., when the object has been observed. Musical sounds are easily remembered, but only by that faint feeling of muscular sense which is experienced by the muscles of the larynx, lips, tongue and cheeks when the same tune is sung, hummed or whistled—in fact, whenever a melody is thought over there is always a distinct feeling of strain in the laryngeal muscles. On the other hand a loud report, which cannot be imitated by the voice, is quite incapable of revivability. If, then, the muscle sense is the only sense immediately revivable, the others being not so, or only indirectly through the muscle sense, it follows that it is our only medium for recalling past experiences or forming ideas—in other words for any kind of thought. It is not uncommon to meet with patients having some of the above-mentioned symptoms, especially the difficulty of naming objects, and of calling to mind the words they wish to say, this symptom being frequently recovered from, and, as these symptoms correspond very closely with the cases mentioned, especially that of E. T—, there does not seem to be any reason why the lesion should not be of a similar nature.

To sum up, then, it would appear that :

(1) The optic thalami are chiefly the association centres of the primary senses of sight, touch, hearing and smell, and their involvement is accompanied by impairment of those associations which give rise to the perception of things in the outside world.

(2) The corpora striata are essentially the centres for the association of the muscle sense with the others giving rise to a great part of our subject consciousness, making speech and thought as we know it possible.

In lesions of these structures we have the phenomena of visual aphasia, word-deafness, inability to call up words and names at will, and various difficulties and irregularities of speech and thought due to want of association of the primary senses with the muscle sense. Divided up as these bodies are into nucleus, caudatus, putamen, and globus pallidus, it is probable that they have other functions as well, almost certainly associated with the motor system. Only careful and prolonged investigation will enable this to be solved ; experiments are useless, and we shall have to rely on clinical, pathological and anatomical research.

There is one other point : we are in the habit of speaking of the special senses as five in number—sight, hearing, touch, taste, and smell—omitting the muscle sense, which is of such importance, for without it, thought, as we know it, would be impossible.

There is also a seventh sense, which, though recognised by the physiologist, is seldom mentioned—the sense of position of the body and its parts. It is well known that the special organ for this sense is situated in the vestibule and semicircular canals, and that in disease or injury of these structures there is intense vertigo and inability to stand.

The axons of the vestibular nerve pass to the dorso-internal nucleus, the nuclei of Dieters and Bechterew in the fourth ventricle, and thence fibres pass directly to the cerebellum. The maintenance of the various positions of the body and its members is intimately connected with the association of the sense of position with the muscle sense.

Cortico-pontic fibres, anterior and posterior, reach the pontic nuclei from the fronto-parietal and temporal regions and these fibres pass up to the cerebellum, the latter in all probability being the centre for these associations.

Clinical Notes and Cases.

Paraphrenia.⁽¹⁾ By M. J. NOLAN, Medical Superintendent, District Asylum, Downpatrick.

I AM sure it has been the experience of many other observers to come across certain unusual highly-coloured cases of mental disorder, difficult to place correctly in the jig-saw puzzle of insanity. We take very careful note of such cases and try to fit them into their proper places, but here and there the outlines do not correspond and the colour-tones do not blend in, so it is only after great patience we at last get them to fall exactly into the vacant spaces. And so it was with Kraepelin, who revived and restricted the term "paraphrenia" as suitable to designate "the morbid forms which are distinguished in their whole course by very definite manifestations of peculiar disturbances of intellect, while lacking enfeeblement of volition and especially of feeling, or at least such symptoms are only feebly indicated."

Prof. Kraepelin, at the close of his classical work on dementia præcox, points out that there is a comparatively small group of cases—paraphrenia—in which, in contrast to that wide-spread disease, there is a far slighter development of the disorders of emotion and volition cases in which the inner harmony of the psychic life is considerably less involved, and in which at least the inner unity is essentially limited to certain intellectual faculties. The marked delusions, the paranoid colouring of the morbid picture is common to all these clinical forms, which cannot everywhere be sharply separated. At the same time there are also abnormalities in the disposition, but, till the latest periods of the malady, not that dulness and indifference which so frequently form the first symptoms of dementia præcox. Lastly, activity also frequently appears morbidly influenced, but essentially only by the abnormal trains of thought and moods; independent disorders of volition not connected with these, such as usually accompany dementia

⁽¹⁾ Paper read at the Autumn Meeting of the Irish Division, November 3rd, 1921.