Clinical Cases.

ARREST OF DEVELOPMENT IN THE LEFT UPPER LIMB, IN ASSOCIATION WITH AN EXTREMELY SMALL RIGHT ASCENDING PARIETAL CONVOLUTION.

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IN the number of 'BRAIN' for October 1878, Dr. Gowers has published an account of a case in which congenital absence of the left hand co-existed with unequal development of the ascending parietal convolutions, the right being the smaller. Towards the close of 1879, a case, which has since proved to be very similar, was admitted into University College Hospital, under the care of Dr. Bastian. The following facts concerning this case seem to us worthy of being recorded.

J. M. B., aged 26, a clerk, was admitted into the hospital on October 18th, 1879, suffering chiefly from mitral obstruction and regurgitation. He got rapidly worse (owing in part to rupture of one of the chordæ tendineæ of the mitral valve), and died rather suddenly on October 30th, 1879.

Necropsy, Oct. 31st, 1879. The body, on the whole, showed slight muscular development, especially in and in relation with the left upper limb, both pectoral muscles on that side being absent. Unfortunately, permission to dissect the limb (which was shorter and much slighter than that of the right side) could not be obtained, but the arrangement of the bones in the small and abortive "hand" was readily felt through the skin, and is represented in the accompanying figure (H), copied from a sketch made by the physician's assistant, Mr. B. Pollard. The dotted lines show the outlines of the bones. The position and proportion of the metacarpals bear a close resemblance to the early appearances of segmentation, seen as slight ridges and intervening depressions in the forelimb of an embryo (man)

about 2 cm. in length. In the case of Dr. Gowers, above referred to, in which one of us had the opportunity of dissecting the limb, the theory of intra-uterine amputation was favoured by the condition of the parts; but in the present instance the appearances are strongly in favour of arrest of development.

The brain, on removal, was divided longitudinally, and each half placed on its inner surface in a 2·5 per cent. solution of bi-chromate of ammonia. The membranes were at once removed over the ascending convolutions on each side, when a striking difference appeared (as shown in figs. 1, 2). After 24 hours, the middle three-fifths of each ascending parietal convolution was measured at seven equidistant points between the dots in each figure, and the following results were obtained:

	LEFT A.P.C.	RIGHT A.P.C.
	cm.	cm.
1	1·4	1·5
2	1·6	1·5
3	1·5	1·85
4	1·4	1·7
5	1·3	·8
6	1·9	1·0
7	1·8	1·3

Thus it is seen that at the points 5 and 6, the difference in breadth was almost 2 to 1 in favour of the left asc. par. conv., and that, on the whole, there was a difference of ·2 cm. between the right and left convolutions.¹ There was no such striking asymmetry in the rest of the brain; the basal ganglia and descending motor tracts in the pons and medulla being apparently equal. A careful microscopical examination revealed no appreciable difference in the internal or minute structure of the two convolutions.

From the above facts we see that the regions of the cortex, corresponding with the "centres" "*a, b, c, d*" of Dr. Ferrier,² were but slightly developed on the right side. The actions evoked by stimulation of these centres he gives as, "Individual and combined movements of the fingers and wrist, ending in clenching of the fist." And in this man such movements had certainly been for the most part impossible with the left "hand."

It would seem, then, that we have here another instance tending to corroborate the view that there is a correlation of some kind between the functional activities of these regions of

¹ The drawings were obtained by taking impressions of the sulci by means of tinfoil. The deepest portions of the sulci being marked by punctures, the tinfoil was laid on the paper, and the latter marked through the holes. The accuracy of the drawings was finally verified by numerous comparative measurements. The actual breadth of the convolutions themselves was filled in from the above measurements, and the figures were then reduced one-third.

² 'Functions of the Brain,' pp. 148 and 307.

the ascending parietal convolution, and the movements of the opposite hand and fingers—as indicated by the experimental observations of Dr. Ferrier.

It seems something more than can be accounted for by mere chance coincidence, when precisely the regions of the cortex indicated by him are found to be defective in bulk in two consecutive cases of absence or arrest of development of the hand. Yet those who are still a little sceptical will doubtless await further coincidences of the same kind, and will seek to learn something definite as to the degree of frequency with which a marked asymmetry of the ascending parietal convolutions of the two sides is to be met with in cases where no malformation of one hand is present.

The question of the existence or not of a correlation of this kind is one which does not by any means necessarily associate itself with the view that the particular regions of the cortex indicated contain “motor centres.” A correlation may really exist between the activities of special cortical regions and the performance of particular movements, and yet the commonly received explanation of such a correlation may not be correct.

Thus it is possible to accept as a fact the existence of such correlations, and at the same time wholly to reject the view that anything like a “motor centre” is to be found in the cerebral cortex.

A complex group of ingoing impressions follows or is produced by movements of the hands, as of all other parts of the body, so that we may be said to have a “sense of movement” growing out of the repetition of what one of us has termed kinæsthetic impressions¹—just as our sense of sight is developed from the repetition of visual impressions.

Sensory impressions of both these types, derived from movements, will subsequently, when ideally revived, co-operate as factors in the reproduction of similar movements. The activity of the “kinæsthetic centres,” more especially, would thus be closely related to the reinitiation of movements—and different parts of such centres would have to do with the production of different kinds of movements. Thus stimulation of certain sensory regions of this type may lead to the manifestation of certain movements, whilst destruction of the same sensory regions may abolish the possibility of performing such movements. The so-called “motor-centres” may, therefore, in reality, be sensory regions of the kinæsthetic type, and these cortical areas may in addition take part in the performance of other cerebral functions whose nature cannot be at present specified.

¹ ‘The Brain as an Organ of Mind’ (1880), pp. 543 and 522.
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The fact that the small right ascending parietal did not differ in its microscopical characters from the well-developed left ascending parietal convolution, is not incompatible with the existence of a correlation of some kind between these parts and certain movements of the hand, whether their activities be of the sensory or of the motor type. In such a case as we have now brought forward, there would be no reason to look for atrophied nerve cells, merely because certain movements have never occurred, but rather for a numerical inferiority of nerve cells and a mere inferior bulk of convolution in relation with an abortive limb whose possible movements were notably curtailed.