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Royal Institution of Great Britain.

WEEKLY EVENING MEETING,

Friday, January 24, 1862.

THE REV. JOHN BARLOW, M.A. F.R.S. Vice-President,
in the Chair.

GEORGE ROLLESTON, M.D.

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On the Affinities and Differences between the Brain of Man and the Brains of certain Animals.

THE speaker having commenced by giving a short explanation of his diagrams of human and other brains, proceeded to enumerate the several sets of opinions which men might bring with them to an investigation of his subject. It was possible to combine either view of the origin of species with either of the two creeds of the idealist or of the materialist; and to the four sets of opinions thus made up, a fifth—that of Positivism—must be added. It was not asserted that these conflicting theories could all be true simultaneously; but the facts to be detailed were elastic enough to bear compression within any one of those formulae.

Beginning with the internal anatomy of the brains which he had to compare and contrast, the speaker said that the question as between man and the ape might be stated thus:—Has the ape such a biradial, two-horned ventricular cavity within its brain as has the dog, or has it not rather such a one as has man himself, triradial and three-horned? By the aid of drawings of dissected brains of the dog, of an old-world and of a new-world monkey, and of man, it was seen that the interior of the simious brain was even more pre-eminently a three-horned cavity than was that of the human brain; and that the new-world monkey contrasted with man to even greater advantage in this, and the disputed point of the closely-allied hippocampus minor, than did the much more anthropomorphous old-world ape. Tiedemann's retractation of his error as to the *processus digitati* of the greater hippocampus was alluded to; the speaker insisting that though such discoveries and rectifications might seem of weight and consequence to persons imbued, as was Tiedemann, with materialistic views, they possessed no anthropological interest whatever for the idealist.

Certain anatomical plates of Eustachius', published some 150 years ago, were shown to give representations of the interior of the human brain which coincided in all points with figures of the interior of the

brain of the orang, which had been published within the current month by two Dutch anatomists, in the English 'Natural History Review.'

Passing, then, from the anatomy of the internal to that of the external surface of the brain, the speaker said that the points of agreement and of difference upon which he should have to dwell could be arranged under two heads—either they were such as the eye could judge of even though its owner were not an anatomist *ex professo*, depending as they did upon general outline and configuration; or they were such as a deeply-going analysis of the convolutions alone could elicit.

Under the first head were enumerated the more elegantly ovoidal and tapering shape, the more accurate semicircularity of the superior, and the irregularity of the inferior boundary line, as signs of defect and diminishment in the ape's brain; but the outcropping of the cerebellum from beneath the overlying cerebral hemispheres, which had been so much insisted upon as a distinctive mark of the inferiority of the simious encephalon, was shown to depend largely upon the changes of relative position which the several masses of nervous matter, comprised under the one term "encephalon," undergo when they are removed from their supporting brain-case.

The absolute necessity of comparing the configuration and proportions of brains preserved in spirits with the configuration and proportions of plaster-casts of the cavities they occupied during life, was dwelt upon with special reference to Mr. Marshall's observations upon this point in the 'Natural History Review' for July, 1861. It was in the gorilla alone of the Simiadæ that M. Gratiolet ('Comptes Rendus,' 1860, p. 803) had found the posterior cerebral lobes doing otherwise than "recouvrant complètement le cervelet;" and it was this peculiarity, together with other characteristics of its encephalon and other structures, which had induced him to speak of it as "the last, the most degraded of all the anthropomorphous apes;" and to class it with the baboons, whilst he ranked the chimpanzee with the macaques, and the orang with the gibbons.

The last point of general configuration and measurement in which the simious was contrasted with the human brain was that of their several altitudes; and it was shown that whilst men differed but little *inter se* as to the height of their brains, it was precisely in this very dimension that they differed, perhaps more widely than in any other, from all apes whatsoever.

After expressing his sense of the obligations which anatomy owed to M. Gratiolet's analysis of the cerebral convolutions, the speaker proceeded to give in detail the points of resemblance and of contrast which that analysis had enabled us to detect as subsisting between human or simious brains. The chief points in which, under this head, the human was seen to contrast to advantage with the ape's brain were two. First: The absence in man of "the external perpendicular fissure," or, in other words, the filling up in him of what is more or less of a chasm in the ape, by a large quadrangular mass of convolu-

tions. Second: The much greater size and complexity of the frontal lobes. But it was shown that these differences affected what have been called "secondary" and "tertiary" convolutions, and indeed the latter of these chiefly, whilst the "primary" convolutions, the great typical lines and ridges, were the same in both classes of brains. The apparatus for the mechanical, (and possibly also physiological,) unification of the hemispheres, which is known as the *corpus callosum*, was stated to have in man just double the sectional area which it had in the apes; whilst the very lowest weight which an adult and healthy human encephalon was recorded to have fallen to, was yet double, and more than double, of the very highest which had ever been attained in the weighing of an ape's brain.

The results of the anatomical investigation were summed up thus. "This doubly and more than doubly greater weight, the doubly greater corpus callosum, that subquadrate lobule, lettered α and β in the diagram, those complexly convoluted frontal lobes, 1, 2, and 3, are, I believe, the four great points in which the human brain asserts its superiority over that of the ape."

The metaphysical or anthropological bearings of the investigation might be summed up thus. How similar soever the simious might be shown to be to the human brain, the argument which Bossuet drew thence for the essential difference between mind and matter, would but be rendered the stronger. If organs are common to man and to brutes, one is necessarily forced to the conclusion that intelligence is not attached to organs; and the cogency of this argument, M. St. Hilaire remarks, increases as the number of organs, common to the two subjects of comparison, becomes more numerous and their resemblance more striking.

The anatomist, however, though not obliged to concede, could yet afford to argue upon, the assumption that mind and matter always vary concomitantly. For, granting this, it by no means followed, that, of the two terms of the comparison, mind was the second, body the first. The effects of prolonged mental states of different natures, the operation of education in marring or in elevating the physical features, the instinctive value which we all give to physiognomy, whether before us in actuality, or reproduced and preserved for us by art, as affording indications of character, were glanced at as lines of evidence to show that the mind might modify, whilst the body was adapted; that the immaterial might fashion, whilst the corporal was conformed into accordance with it. "All alike, when coldly and dispassionately viewed as concomitantly varying phenomena, lead us to hold that our higher and diviner life is not a mere result of the abundance of our convolutions. How harmony may have come to exist between them our faculties are incompetent either to decide or to discover; but this shortcoming of man's intelligence affects neither his duties nor his hopes, neither his fears nor his aspirations."

[G. R.]

