

by convection on the score of its economy. The whole question of warming and the means would require much greater space than our limits will permit; for though barracks do not require the warming to be so nicely adjusted, asylums and hospitals for the insane need much greater attention to this point, and to do justice to so important a subject a separate article of many pages would be requisite.

We have written enough, we trust, to convince our colleagues that this work is one which will be singularly useful to each in their daily duties, and would be a most valuable addition to their library. Every chapter and every line contains most useful information, and if the book has its faults it arises from an extreme deference to the opinions of others, which we cannot help feeling prevents the author from stating boldly his own opinions when they clash with others; but the profession generally has as high an opinion of the author's impartiality as they have of his learning, and, at all events, speaking for ourselves, we should have preferred to have on several occasions had an expression of his own views than the catalogue of opinions broached by others. His own conclusions on any subject connected with the physical sciences or with medicine would be universally received by his professional brethren with the fullest confidence.

On the Brain of a Bushwoman; and on the Brains of two Idiots of European Descent. By JOHN MARSHALL, F.R.S., Surgeon to University College Hospital.

THIS is an elaborate paper, describing the *convolutions* of a Bushwoman's brain, and also those of the two smallest human idiots' brains yet on record. It is one of the most complete and philosophical anatomical memoirs in this or any other language, and is enriched with several admirable lithographs, from photographs of the brains described. Difficult as it is to give a summary of so careful a paper, we shall endeavour to direct attention to certain leading points of interest, referring those who wish to study the subject scientifically to the original description.

The total capacity of the entire cranial cavity of the Bushwoman was 60·64 cubic inches, while the corresponding capacity of the largest skull measured by Morton was 114 cubic inches, and that of the largest skull measured by Wagner 115 cubic inches. Mr. Marshall calculates that the recent brain of this woman would have weighed 30·75 oz.; the weight of the smallest

healthy European female brain, recorded by Wagner, being 31·7 oz. It appears, however, from Dr. Boyd's tables that, height being considered, the European average weight of brain of a female 5 feet high, which was the Bushwoman's height, would be 40 oz.

"The ratio of the cerebrum to the body in the Bushwoman, assumed with a height of 5 feet to weigh 90 lbs., would therefore be as 1 to 52, whilst that of the cerebellum to the body would be as 1 to 418; whereas, allowing 6 lbs. additional weight (96 lbs.) to the average European females of 5 feet 1½ inch high, the corresponding ratios would be 1 to 41, and 1 to 328.

"Without claiming for these numbers a perfect accuracy, and even subjecting them to certain small corrections, they support the statement that, in reference to the body, the cerebrum and cerebellum are both inferior in the Bushwoman as contrasted with the European aged female; and it will be seen that both organs are about equally defective, *i. e.* in a proportion of about ·78 to 1.

"Imaginary lines drawn from the centre of the medulla oblongata, where it intersects the pons, to the extreme occipital, frontal, parietal, and vertical points of the cerebrum, lines which I have elsewhere designated *cerebral radii*,* measure, in the Bushwoman, respectively 34, 40, 35, and 41 tenths of an inch; whilst in a European female they measure 33, 43, 39, and 46 tenths. Accordingly the occipital radius, owing evidently to the length of the temporal lobe backwards, is slightly in excess, the frontal radius is a little defective, the parietal a little more so, whilst the *vertical radius is the most so*, as compared with the European brain.

"The final result of these measurements, as well as of others given in Table I, at the end of this paper, and of the facts elicited by the examination of the several aspects of the brain, is to show that in this Bushwoman the cerebrum is small but long, defective in width, and especially so in *height*; that its outlines and surfaces are angular and flat, instead of rounded and full as in the European; that, of its several regions, the frontal, though long, is very narrow and *shallow*, much excavated below, and compressed laterally in a remarkable manner behind its angles, in front of the Sylvian fissure; that the parietal region is *low*, though, relatively to the surrounding parts, prominent; that the occipital region is long, but narrow, and also remarkably defective in *height*; and, lastly, that the temporal region is long, though somewhat narrow."

Mr. Marshall next goes on to give a detailed description of

* 'Nat. Hist. Review,' 1861, p. 304.

the fissures, lobes, and convolutions. The condition of the fissure of Sylvius "recalls to mind the foetal state of the human cerebrum, but, so far as I am aware, is not present in any adult quadrumanous brain." The hinder border of the frontal lobe, constituting the anterior margin of the fissure, was very defective; this being the anatomical reason of a remarkable constricted form, which appears to be characteristic of the Bosjesman. "Coupled with the infantile features noticeable in the Bushwoman's skull, this peculiarity becomes very interesting."

"With a few exceptions, these primary fissures are somewhat more complex than those represented in Gratiolet's figures of the brain of the Hottentot Venus; but nevertheless they are far more simple and more easily distinguished amongst the numerous secondary sulci than in the ordinary European brain. In this greater simplicity and definition of the fissures generally, in the slightly more vertical direction and step-like course of the Sylvian fissure, and in the decidedly more upright position of the internal perpendicular fissure, the Bushwoman's brain approaches somewhat the quadrumanous characters; but it deviates more widely from them by the special interruption of the external perpendicular fissure, by the greater length and inclination backwards of the fissure of Rolando, by the more marked want of symmetry on the two sides of the brain, and by the greater number and complexity of the secondary sulci."

After an exact description of each convolution, and a careful comparison of each with the like convolution in the brain of the so-called Hottentot Venus, as described by Gratiolet, Mr. Marshall deduces the following important conclusions, which we cannot better give than in his own words:

"1. All the primary convolutions which exist in the human brain, viz., the orbital convolutions, the three frontal rows, the two ascending parietal and the parietal lobule, the supramarginal with its lobule and the bent convolution, the three external temporal, the three occipital rows, those of the island of Reil, the marginal and callosal convolutions, the quadrate and occipital lobules, and the three internal temporal convolutions, are present in the Bushwoman's brain; but, as compared with the same parts in the ordinary European brain, they are smaller, and in all cases so much less complicated as to be far more easily recognised and distinguished amongst each other. This comparative simplicity of the Bushwoman's brain is of course an indication of structural inferiority, and indeed renders it a useful aid in the study of the more complex European form. On contrasting the several regions of the cerebrum, the primary convolutions of the upper frontal and outer parietal regions are, on the whole, the best developed; those of the middle and

lower frontal regions, the temporal region, the central lobes, and the inner surface the next; whilst those of the orbital surface and occipital lobe are the least developed.

"2. Of the connecting convolutions, those highly important and significant folds, the external connecting convolutions are, in comparison with those of the European brain, still more remarkably defective than the primary convolutions. All four of these convolutions are present; but all are characteristically short, narrow, and simple, instead of being complex, and occupying a large space; hence, though the external perpendicular fissure is soon filled up, the parietal and occipital lobes are more easily distinguishable from one another than in the European brain. The upper external connecting convolution on the left side does not superficially join the parietal lobule, but sinks beneath it and the bent convolution. Of the internal connecting convolutions the arrangement is normal.

"The numerous secondary sulci and convolutions, which so complicate the larger ones in the European brains, are everywhere decidedly less developed in the Bushwoman—but especially so in the occipital and orbital organs, on the bent convolution, and on the external connecting convolutions. This is a further sign of structural inferiority.

"3. Compared with the brain of the Hottentot Venus, as that is represented by Gratiolet, the Bushwoman's brain is, in nearly all cases where comparison is possible, a little, though a very little, more advanced and complex in its convolitional development—the one exception being in regard to the size of the occipital and external connecting convolutions, which are smaller in the Bushwoman. It is possible, however, that some of the apparent simplicity of the Hottentot Venus brain may be due to the unavoidable loss of form and detail incidental to its long period of preservation, as compared with the more recent and comparatively uninjured Bushwoman's brain. This may account, for example, for the comparative breadth and smoothness of the upper frontal and of the middle and lower temporal convolutions in the figures of M. Gratiolet. Allowance being made for this, the resemblance between the convolutions of the two brains is very close, and serves to confirm the demonstration by that author of the relative simplicity of the Hottentot Venus brain—a simplicity which he has only seen partially paralleled in normal European brains, but which, in my own more limited experience, I have never even seen approached in healthy brains.

"4. Whilst, then, the difference between the Bushwoman's brain and the European brain, not merely as to size, but as to convolitional development, is very marked, that between the Bushwoman and the Hottentot Venus is very small; and, indeed,

if we regard the relative general development of the convolutions as a gauge of proximity or separation, it is turned into a near resemblance; and since no suspicion either of idiocy or other defect exists as concerns the Bushwoman, this would go far towards proving that the inferiority in the cerebrum of the Hottentot Venus is not due, as has been suggested, to an arrest of development of a personal or individual kind, but that, whilst undoubtedly both brains show an infantile or fetal leaning, this is to be attributed partly perhaps to sex, but in the main to the characterisation of the race itself.

“ 5. As regards the question of the symmetry of the convolutions, it may be said that, although it is certainly easier to compare those of the two hemispheres in the simpler brains of the Bushwoman and Hottentot Venus than in the more highly developed European brain, still a very cursory examination shows that in numerous particular points, already mentioned in our description, there is just as frequent an occurrence of asymmetry in the two former as in the latter, by which circumstance therefore they manifest a truly human character.

“ 6. Although not only in size, but in every one of the signs of comparative inferiority manifested in the lower convolutional development of the Bushwoman's cerebrum, it leans, as it were, to the higher quadrumanous forms; yet, as regards the sum of its convolutional characters, judged of by the presence or absence, the individual and relative size and position, the comparative complexity or simplicity, and the symmetry or asymmetry of particular fissures and convolutions, there is a greater difference between it and the highest ape's brain yet described, viz., the adult orang's brain, than between it and the European brain (compare plates xx and xxiii, figs. 7, 9, and 20). This difference is, as one evidently would expect, especially marked in the regions peculiarly developed in man, viz., in the anterior outer and upper parts of the frontal lobe, in the prominent part of the parietal lobe (that is, in the characteristically human supramarginal lobule), and in the regions of the external connecting convolutions, especially of the two upper external ones. It is almost needless to add that there is far less difference in convolutional development between the Bushwoman's brain and the European brain, than between the lowest and highest quadrumanous brains. If, indeed, we disregard the general differences of size and complexity, and look only to those which have been considered as special peculiarities, such as the existence of the supramarginal lobule and the joint relative development of the two upper connecting convolutions, there is less difference between the Bushwoman and the European than between the chimpanzee and the orang. But perhaps it is pre-

mature yet to decide this latter point. It is certain, however, that there is less difference in convolitional development between the Bushwoman and the highest ape, than between the latter and the lowest quadrumanous animal.

“7. Finally, the establishment of the conformable development of the brains of the Bushwoman and Hottentot Venus (herself believed by G. Cuvier to have been a Bushwoman of small stature) is a step gained in cerebral anatomy; and their common inferiority to the European brain may justify the expectation that future inquiries will show characteristic peculiarities *in degree* of convolitional development in the different leading races of mankind.”

The internal structure of the cerebrum of the Bushwoman's brain also exhibits evidence of its inferior development, especially in the deficiency of the system of transverse commissural fibres.

“Compared with the area of the internal surface of one hemisphere, the sectional area of the corpus callosum is in the Bushwoman's brain as 1 to 25, in the European as 1 to 12·5, and in the chimpanzee as 1 to 28·5; so that the corpus callosum, thus estimated in proportion to the cerebrum, is in the Bushwoman only *half as large* as in the European, and not much larger proportionally than in the chimpanzee. The anterior commissure (*a*) is also singularly small; the posterior commissure is very slender, whilst (probably an individual peculiarity only) there is no trace of the so-called soft commissure. On the whole, therefore, the system of transverse commissural fibres is defective; and as the size of the medulla oblongata, in proportion to the unusually narrow cerebrum, is larger even than in the European (so that the radiating system is probably not so much diminished), it would seem as if the relative deficiency of white substance within the hemispheres was owing in a great degree to the fewness of the transverse as well, perhaps, as of other commissural systems of fibres. I have elsewhere pointed out the same condition in the chimpanzee's brain, and it doubtless is associated, in the Bushwoman's brain, with its inferior bulk and less convoluted surface. The proportional size of the corpus callosum, thus considered, offers, I believe, a not inconvenient test of the relative perfection of any given normal brain of certain plan. Comparative anatomy supports this view. Of the longitudinal system of commissures, the fornix is thin, the tænia semicircularis slender, and the striæ longitudinales plainly visible.”

“The cranial nerves generally appear small; the olfactory nerves, however, are well developed. The optic nerves, commissure, and tracks are small and flattened, even the nerves having an unusually thin oval section. The small size of the optic tracks and corpora quadrigemina is interesting in con-

nection with the defective development of the occipital lobes of the cerebrum, a part to which many of their fibres have been traced by Gratiolet."

The cerebellum was very well developed on the whole, and, as an organ, far more completely evolved than the cerebrum.

Of the brains of the two idiots which are described by the author, one was that of a female, about five feet high, who died of phthisis, aged forty-two; the other was that of a boy, thirty-nine and a half inches high, who died from spinal abscess, aged twelve. The weight of the recent brain of the female idiot, without its membranes, was 10 oz. 5 grs.; and the weight of that of the boy, with its membranes, 8½ oz.; the respective weights of normal brains at the same ages being, for the female 42 oz., for the boy 44 oz.

In regard to general form, dimensions, and relative position of parts, it was found that, in the female, the cerebellum was far from being concealed by the cerebrum, but projected largely behind its posterior lobes, the relative preponderance of the cerebellum being a very striking feature. In fact, the encephalon resembled at first sight, in size and general form, that of the young chimpanzee, although a closer examination revealed great differences.

"The preceding description, and the tabulated measurements of the brains, given at the end of this paper, show that in the idiot woman the temporal regions manifest the greatest relative size, whilst the parietal, occipital, and frontal are very small; whereas in the chimpanzee's cerebrum the occipital lobes have a larger relative development; the frontal lobes stand next, whilst the temporo-parietal are defective.

"The cerebrum of the idiot boy, as seen from above, the only view of which we have an intracranial cast, differs from that of the idiot woman in being at once narrower and somewhat angular in its outlines. The frontal region is more pointed (indeed, singularly so), the occipital region flatter, and the parietal regions longer and more compressed. The widest part corresponds with the centres of the parietal regions, and is somewhat behind the middle of the mass. The ratio between the width and length of the cerebrum is 1 to 1.23; so that the idiot boy's cerebrum is longer, in proportion to its width, than the idiot woman's—not from any actual superiority as to length, but rather owing to a deficiency in width of the whole cerebrum. As in the idiot woman, the cerebellum is not covered by the cerebrum behind; but probably it was not so much exposed. In shape the idiot boy's brain is so long and narrow as not to be comparable with the ape's.

"In the idiot woman the forms of the convolutions are scarcely

traceable at any part of the intracranial cast, excepting some slight undulations about the frontal region. In the idiot boy they are remarkably distinct on the parietal regions, whilst the frontal and occipital regions are perfectly smooth. Gratiolet regards this marking of the cranium by the convolutions as a sign of inferiority or degradation. This would appear to be, to a certain extent, an individual character, as it is not noticeable in the idiot woman."

After a minute description of the fissures, lobes, and convolutions of these idiots' brains, and a systematic comparison between them and the normal brain, and between the two defective brains, and between them again and the brains of the higher apes, Mr. Marshall enunciates the following general conclusions, which, long as they are, we cannot forbear giving in his words :

"1. In the first place it is obvious that the idiots' cerebra are not merely diminutive brains possessing every convolution, both primary and secondary, proper to the perfect human cerebrum, each having its natural shape, proportion and position, though on a diminished scale; but, on the contrary, that they are profoundly modified in their convolitional forms, which are not merely smaller in bulk, but are fewer in number, of simpler shape, and different in proportion and position, as compared with those of the perfect cerebrum.

"2. Nevertheless all the primary and connecting convolutions belonging to the perfect cerebrum are represented by definite corresponding parts in these brains, mostly by actual convolitional foldings of the cerebral substance of a comparatively more simple kind, but sometimes by scarcely convoluted, or even by entirely smooth though slightly elevated portions of the cerebral substance.

"3. The parts which can be easily detected as actual convolutions in the idiots' brains are the three frontal rows, the two ascending parietal convolutions, with the lobule of the posterior one, the supramarginal and bent convolutions, the external and internal temporal convolutions, the marginal and callosal convolutions on the inner surface, with the quadrilateral and occipital lobules, and all the connecting convolutions proper to the human cerebrum. The parts which are less easily distinguished are the orbital convolutions, and especially the three rows of occipital convolutions. The central lobe, or island of Reil, is distinguishable, as a distinct smooth eminence, in the idiot woman, but only as a smooth indistinctly elevated surface in the idiot boy. In neither does there exist such an expansion of the supramarginal convolution as would form a prominent supramarginal lobule, a part so characteristically human.

“On the whole, the temporal convolutions, in both brains, are the boldest and best marked; then the convolutions of the parietal lobes, especially in the idiot boy; next stand the connecting convolutions and frontal rows, and those of the inner surface; afterwards the orbital and occipital convolutions; and lastly the island of Reil.

“4. On contrasting the idiots' brains with one another, the convolutions generally are seen to be decidedly more developed in the idiot woman than in the idiot boy—the marked exception being in the parietal region of the latter, where the lobule of the posterior ascending parietal convolution, the supra-marginal convolution on the left side, the bent convolution, and the adjacent second external connecting convolution are more fully developed.

“5. Agreeably to the opinions already expressed by other anatomists in regard to similar examples, the condition of the cerebra in these two idiots is neither the result of atrophy, nor of a mere arrest of *growth*, but consists essentially in an imperfect evolution of the cerebral hemispheres or their parts, dependent on an arrest of *development* (*agénésie, asthénie-génie*) occurring at some stage or other of their metamorphosis from a simpler to a higher form.

“6. On comparing the condition of the cerebral convolutions of these brains with the representations of the brains of two fœtuses at about six and a half and seven months, published by Leuret and Gratiolet, it would appear that in both idiots the convolutions are more complex than in the former, but less so than in the latter fœtus. From this, one might hastily suppose that in both idiots the development of the convolutions, and indeed of the entire cerebra, had been arrested in the latter part of the seventh month of intra-uterine life; those of the idiot boy a little earlier than those of the idiot woman.

“But on further reflection such a supposition does not appear to be tenable, and it is not supported by facts. It necessarily assumes that, up to a certain period of development, the evolution of all the parts of the cerebrum had been normal in rate and in character; whereas, in the first place, there is nothing at present to show why that rate may not, in such cases as these, be more or less retarded, so that any given stage is attained at a much later period than usual, and the ultimate condition of development be reached perhaps some time after birth; and, in the second place, there is evidence in the brains themselves, of such a disproportionate development of parts as to prove that the normal character of the evolutionary changes has been profoundly disturbed at some period or other, by at least one *local*

departure from, or interference with, the regular mode and order of development.

“A comparison of the size of the cerebellum and cerebrum in the idiots’ brains, and in the brain of a foetus at the seventh month, shows most strikingly that the development of the former organ had continued to progress long after the latter had experienced its final arrest; but, what is more essential to the present inquiry, even within the idiots’ cerebra themselves there is proof that all the parts are not equally and normally developed.

“Fully to appreciate the importance of the diminutive size of the frontal lobes, we must take into account certain facts to be hereafter stated in detail, regarding the internal structure of the cerebral hemispheres. The corpora striata in the idiots’ brains are very small; not merely absolutely, but also relatively to the size of the optic thalami, the ordinary proportions between these two ganglia being actually reversed, the former being usually much larger than the latter, whilst in the idiots’ brains they are much smaller. Since in a series of normally developed foetuses the corpora striata, at all periods, form larger masses than the optic thalami, we have further evidence, within the idiots’ brains themselves, of the fact already announced of an irregular and disproportionate development of their parts. There is, indeed, an obvious correspondence between the diminutive size of the corpora striata and that of the frontal lobes; whilst the relatively larger optic thalami are associated with a larger growth of the hinder portion, especially of the temporo-parietal regions.

“The conclusions which we would draw from the preceding facts are these:—First. Instead of the idiots’ cerebra having been uniformly and normally developed up to a certain date—say the latter part of the seventh month—and having then been subjected to a general cessation of development, they have experienced an inequality or irregularity of evolution in certain of their parts. Secondly. Whilst all parts have been more or less arrested, the frontal and occipital lobes have suffered more than the temporal and parietal. Thirdly. Whilst both the large ganglia at the base of the cerebrum—those cores or nuclei of the cerebral hemispheres, the corpora striata and optic thalami—have participated in this disturbance of the ordinary course and degree of evolution, the corpora striata have been more especially involved. Fourthly. The original vice of formation, in all probability, affected these two pairs of ganglia primarily; and this entailed, as a necessary consequence, an interrupted, irregular, defective, and perhaps retarded evolution of the convolutions of the hemispheres themselves. Fifthly. The primitive starting-point of the future idiotic condition dates from a period far

earlier than that at which all further evolution ceases; and in fact, as regards the optic thalami and, especially, the corpora striata, probably from a very early period of development indeed. This conclusion is obviously more acceptable to the physiologist—because more consistent with the radical deficiency in cerebral power manifested by idiots—than the supposition that the idiotic state should be due to a sudden arrest of a previously normal development at some later period of foetal life. Sixthly. The anatomical connection which, by the comparison of these idiots' brains with healthy foetal brains, has been shown to exist—in human brains at least—between the development of the corpora striata and the frontal lobes, and the optic thalami and the temporal and the parietal lobes, has a considerable general interest, and probably has a physiological significance which may hereafter throw light on the functions of the convolutions of those several parts. Lastly. The deficiency in the corpora striata and the associated frontal lobes becomes particularly interesting when we reflect on the special connection of those ganglia with the anterior or motor columns of the cord, and on their probable intimate concern in the execution of voluntary movements—*i. e.* in the mechanical expression by the body of those numerous acts which are the outward exponents of that important psychical faculty commonly designated 'the will.' Now, it is the inadequate performance or entire abrogation of those acts, whether locomotive, manipulative, or articulate, which constitutes one of the most striking characteristics of the idiotic state.

"7. It is impossible, in the present state of our knowledge, to determine the interesting question whether some parts of the idiots' cerebra had undergone, after the general arrest of ordinary morphological changes, further local development, as the result of use or ordinary training.

"8. There are, however, certain evident grounds for inferring that, after the cessation in these cerebra of all further evolutionary changes, they experienced an increase of size, or a mere growth of their several parts. Thus the idiots' cerebra are considerably larger than foetal cerebra in which the convolitional development is at a similar stage; whilst the individual convolutions themselves, the same in number, are necessarily broader and deeper. Again, from Dr. Boyd's observations, it appears that in a certain number of foetuses prematurely born, with an average height of 14 inches for males and 13.5 for females, whose brains would about correspond with the idiots' degree of convolitional development, the average weight of the cerebrum in the former was 5.33 oz., and in the latter 4.42 oz.; whereas, as we have seen, the idiot boy's cerebrum weighed 5.85 oz., and the idiot woman's 7.63 oz. The greatest difference is in the case of the woman,

who lived to an adult age, whilst the boy, it must be remembered, died at the age of 12.

“9. It has been shown that the temporal region preponderates in the idiot woman, and the parietal in the idiot boy; the frontal lobe is also relatively a little larger in the woman. There can be no doubt also that the emotions, intelligence, and voluntary power of the woman were in advance of those of the boy; but at present it would be premature to attribute too much importance to these probably individual anatomical differences, or to endeavour to associate them with peculiarities of psychological endowment.

“10. On contrasting the cerebral convolutions of the two idiots' brains with those of a female and male idiot, each four years of age, represented by Leuret, there appears a very close and remarkable resemblance between them. There is the same paucity, simplicity, and breadth of the convolutions, the same deficiency in the frontal lobes, though in one of them—the second referred to in the foot-note—to a less degree. The details of the convolutions are also nearly similar; but in some slight particulars they are superior to those of the idiot woman, and especially so to those of the boy. For example, in both, the anterior ascending parietal convolution has passed beyond the stage of an intrusive convolution to that of an oblique smooth ridge of cerebral substance. There are also more numerous secondary sulci in most regions of the cerebrum, and the convolutions themselves are somewhat more tortuous.

“11. Lastly, on comparing the convolutions of the idiots' cerebra with those of the orang and chimpanzee, they appear in the human idiots to be fewer in number than in the apes, because, although the primary foldings correspond in each, they are individually less complex, broader, and smoother in the former than in the latter. In this respect the idiots' brains are even more simple than the brain of the gibbon, and approach that of the baboon (*Cynocephalus*) and sapajou (*Ateles*).

“As special and interesting results of this general simplicity of the primary convolutions, are the absence, as in the quadrumanous brains, of such a development of the supramarginal convolution as to constitute its so-called lobule, and the partial concealment of the upper external connecting convolution, as well as the imperfect development of the anterior ascending parietal convolution, and the extreme simplicity of the bent convolution. Of these, the non-development of a distinct supramarginal lobule is the most interesting defect, since it indicates the late appearance in the brain of a part whose presence is regarded by Gratiolet as peculiarly characteristic of man.

“On the other hand, the points of special difference between

the idiots' and the quadrumanous brains, both general and particular, are even more numerous. First, as a general difference, there is a remarkable want of symmetry even in these imperfectly developed cerebra, as if already preparations were being made to establish that higher and almost exclusively human character; this point has been so frequently exemplified in the previous descriptions that we may refer to them for abundant illustration of it. Secondly, the special differences, which likewise exhibit the decidedly human character, are the superficial position of all four of the external connecting convolutions; the consequent speedy interruption of the external perpendicular fissure and complete obliteration of its posterior border or operculum; the concealed position of the lower internal connecting convolution, and the absence of the upper one; and lastly, the great breadth of the connecting ridge which joins the callosal and uncinatate convolutions.

"Although, therefore, so defective in developmental detail, these microcephalic cerebra are still human, and differ as much from the ape's cerebrum, or constitute as little an intermediate step towards it, as any other bodily defect in man is found to differ from a truly quadrumanous form, or manifest a serial approximation to it. Just as in a case of webbed human fingers, the digits are still human and not gorilla-like, and just as in the deformity named talipes valgus, though the foot is inverted and the weight of the body is supported on its outward border, still the member is human and not ape-like, so these brains, though simplified by defect, possess characteristics which distinguish them as imperfectly human yet not quadrumanous. The community of plan observable in the brains of all the primates, including man himself, necessitates a general conformity to that plan, even in these defective human brains; but the special marks of human divergence from that plan have already been set upon them at some very early, probably at the earliest moment of their development."

The cerebellum was very defective in both idiots, but especially in the idiot boy, although the organ in him was much larger than in the woman. The imperfect gait and feeble power of control over the muscles generally, so common in idiocy, were noticeable in both cases; and this, as Mr. Marshall observes, might appear explicable, on the hypothesis that the cerebellum is concerned in co-ordinating muscular movements, by the obvious deficiency in that organ; but, on the other hand, the fact that the cerebellum was larger in the idiot boy—who could neither articulate, handle anything, nor walk—is contradictory. One of the cerebellar commissural systems of fibres was, however, much more deficient in him than in the idiot woman. In both,

the laminae of the cerebellum were not only fewer in number, but shorter and narrower than in the healthy cerebellum.

Since the paper was written the author has, as he states in a postscript, inspected two idiots' brains in the museum of St. Bartholomew's Hospital, and examined various wax models and drawings in Guy's Hospital Museum. The broad results he thus announces :

"The condition of the convolutions in these models confirms the history above given of the conversion of the intrusive convolution into the anterior ascending parietal; for the change is traceable through a certain number of the foetal brains. It also supports the views expressed as to the early arrest of the evolution of the corpora striata, and of the special effect of this on the development of the frontal lobes; for, with certain fluctuations, the corpora striata, where shown in the models, are always larger than the optic thalami; and the proportions of the frontal to the hinder regions of the cerebrum, as marked off by the fissures of Rolando, vary, from the first appearance of this fissure to the full term of development, between the ratios of 37 to 63 and 58 to 42. Lastly, these models show that idiot brains must grow a little after they have ceased to be further evolved; for the convolutions, and indeed the cerebral hemispheres themselves, are broader and larger in the idiot brains than in the models of brains of equally forward convolutional development. It is certainly true that, taking the four idiots' brains, viz., the two hereinbefore described and the two in the museum at St. Bartholomew's, their respective sizes and their degrees of evolution correspond; but this does not disprove the occurrence of a growth in them after the cessation of development, an event shown to occur on other grounds.

"The model and drawings of the idiot's brain at Guy's also confirm all our previous notions; and indeed it may be concluded that the idiotic condition is produced in all cases by conformable influences, affecting the cerebrum in slightly different degrees in different examples."

Time and Space: a Metaphysical Essay. By SHADWORTH H. HODGSON. Longman & Co., 1865, pp. 587.

It is not without considerable interest and some surprise that we observe such a vigorous revival of metaphysical thought as has been recently manifest in England; the interest lying in the question as to what may be the correct interpretation of