4. *Austrian Retrospect.*

The Anatomical Conditions of the Brains of Criminals. An open letter to Mr. Havelock Ellis, by Professor BENEDIKT, Vienna.

New ideas are often opposed because they are not in sympathy with the accepted principles of science, and the scientific world rejoices in the refutation of the novel doctrine. This occurred when Giacomini refuted my book on this subject,* but I am proud of that even if my work had no merit beyond provoking his reply.

Giacomini has enriched and confirmed my studies, and elucidated misunderstandings rather than essential differences. He refuted the proposition that the confluence of fissures is not characteristic of the brains of criminals, which he had erroneously attributed to me. Some years before my book was published I found that it was impossible to utilize the current topographical schemes—such as that of Ecker. In these schemes the principal fissures were represented as isolated, while the numerous, unnamed, tertiary sulci and depressions were neglected as far as possible. But my observations soon led me to the conclusion that many of these unnamed fissures and shallow depressions may be developed and become long and deep. Thus a brain may appear to have numerous and small convolutions. Moreover, this development of tertiary fissures leads to the confluence of the principal fissures by their indirect communication. In other brains the principal fissures are lengthened independently of the secondary fissures, and are connected with neighbouring principal fissures by passing through the separating convolutions.

The first and only absolute proposition I laid down was the "necessity for establishing a type of confluent sulci."† The scheme of Ecker I believe to be the type of a series of brains in which the principal fissures are more or less isolated, and the unnamed fissures are in a low degree of evolution. But it was evident that there is a great number of brains which are characterized by a great development of secondary fissures, and a corresponding tendency to direct or indirect confluence of all fissures. These form a second group typified by confluent fissures,‡ but not (as was supposed) characteristic of criminal anthropology. Giacomini confirmed my observations as to the existence of this typical variety. He is in harmony with my idea, not in opposition.§

* Anatomische Studien an Verbrechergehirnen, Wien, 1879, and New York, 1887, *Benedikt.* Varieta della Circonvoluzione cerebrali dell' uomo, Turin, 1882, *Giacomini.*

† *Vide* German Ed., p. 188; American Ed., p. 155.

‡ German Ed., p. 19; American Ed., p. 32.

§ "It need hardly be remarked that conditions primarily observed in the study of brains of criminals belong exclusively to them," German Ed., p. 109; American Ed., p. 150.

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The second proposition I laid down was "that the brains of criminals represented belong to the last-named, second class; and, as shown by the work, to the extreme section of this class. The characteristics of the type are the marked evolution of fissures of secondary importance, and the direct and indirect confluence of fissures of primary importance."

It has been forgotten that my work was in correction of generally accepted views of the anatomy of the brain, and not exclusively devoted to the anatomy of criminals. I therefore spoke of "Anatomical Studies on the Brains of Criminals," and not of the "Anatomy of the Criminal Brain." Moreover, it has been left unrecognized that Mr. Wladimir Betz, of Kiew, who made the photographs and drawings for the German edition, is one of the first connoisseurs of cerebral anatomy, and acted as a collaborator in thus controlling the plates and propositions of the book.

It is also necessary to note that the greatest part of the arguments used against me were borrowed from the critical reserves made by myself.* I never considered an atypical anatomical condition to be a proof of anomalous function, but only as "entitling one to suspect" that to be the case.

I insisted more clearly in a subsequent memorandum† that a brain is possessed of atypical characteristics, not only by reason of the *quantity* of convolutions, but also by reason of their *confluences*. I shall now enumerate some of these atypical confluences, which are opposed to the type of the genus *Homo Sapiens*.

One of the most important of these confluences is that of the calloso-marginal fissure with the parieto-occipital. The human type of the first-mentioned is that it runs from the anterior end of the

* German Ed., pp. 109-112; American Ed., pp. 155-159, as follows:—"For many of the descriptive details here given, such as are absent in all previous cerebral representations, we are indebted to the special attention which I have bestowed on these brain specimens." . . . "It might possibly be supposed that the type which we have deduced from these brains is exclusively a fact of comparative race anatomy, as the normal types of most of these races and clans are unknown, and, moreover, there exists no comparative race-anatomy of the brain," &c. "For this very reason it—the proposition that the criminals are to be received in an anthropological variety of their species, at least amongst cultured races—should be handled with the greatest prudence, it should not yet serve as a premise; and for the present it should not leave the hands of the expert anatomists." . . . . "In matters of fact it must yet be repeatedly proven, and that from many points of view, until it can finally rank as an undoubted addition to human science." . . . . "The variety of the conditions which we may expect to meet in the different races will assign to this proposition a little halting place in the history of science, and worthless as well as valuable contributions will, for a time to come, give rise to oscillations and opinions." . . . . "He—the criminal with his innate qualities—has the same relation to crime as his next of kin, the epileptic, and his cousin, the insane, have to their encephalopathic conditions."

† Zur Frage der Verbrecher Gehirne, Offenes Schreiben an H. Professor Giacomini, "Wiener Med. Presse," 1883.

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frontal lobe to the anterior margin of the procranial gyrus, with an incision in the outer aspect of the hemisphere immediately behind the central fissure.

Little ramifications not unfrequently enter the præcuneal gyrus and connect with præcuneal fissures. On the other hand ramifications from the parieto-occipital fissures not very uncommonly lead into the præcuneal gyrus. But a large confluence of the calloso-marginal fissure with the parieto-occipital is atypical.

Giacomini has confirmed this observation, having found it only on one brain on both sides (0·6 per cent. of his cases). That he believed the individual to have been normal, only shows that the condition is very exceptional, and that, therefore, the individual must be regarded as atypical. If the person really were normal, it would only prove that such an atypical condition is not necessarily provocative of anomalous cerebral functions. It does not prove that it is not a sign of predisposition to anomalous functions. In my small collection of criminal brains I found that atypical condition eight times, showing that it is of high importance in this connection. And I do not doubt that this abnormality will in the future be recognized as a highly compromising stigma.

A second confluence, which seems to me to have a similar value, is that of the parieto-occipital with the collateral, principally when it takes place at that part of the collateral which lies in the middle vasal lobe. This part of it is not usual, but represents the limbic fissure of the lower animals and its confluence with the occipital, or perhaps a relapse or residue of the transitory fissure of fœtal life.

Giacomini proved this fissure to be atypical, as he only found it in the case of one individual (an epileptic) upon one side of the brain (0·3 per cent.). He attributed the epilepsy to a large morbid degeneration on the right hemisphere, but he does not state whether the fits were congenital or recent, if they presented the symptoms of unilateral lesions, or if the person belonged to a neurotic family. He has forgotten that an atypical condition, which induces an anomaly of function, also predisposes to a corresponding pathological process. But whether or not the anatomical condition caused the fits, it is an atypical case, and therefore possesses the value of a stigma.*

A third important confluence is that of the parieto-occipital with the inter-parietal, and chiefly when this confluence is more complete and runs into the temporal fissure. This also is not absolutely of decisive value, but without doubt is valuable as a stigma.

* I have now under study the skull and brain of a very interesting murderer (Schenk). He was a good-looking, fascinating, intelligent man, but unwilling to work. His livelihood was obtained by making love to old female servants, defrauding them of their money, and murdering them in various ways with the assistance of his low associates. On both sides the occipital fissures communicate with this limbic fissure of the middle vasic lobe, while the limbic fissure is connected with the collateral fissure of the occiput.

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Giacomini found this complete confluence on one hemisphere (0·29 per cent.). It is therefore to be regarded as atypical, and the complete Simmian model.

The confluence of the occipito-parietal with the inter-parietal seems to be of no great importance; but in every case the confluence of the inter-parietal with the temporal is more important. These last do not occur in one per cent. of normal brains.*

The confluence of the central fissure with the first frontal seems to be important, and to possess the value of a stigma.

In the same manner as the confluence of fissures is representative of atypical anatomical conditions, so it is in regard to the separation of fissures. The Russian anatomist, Zernoff, first showed that many sulci of the human brain are sometimes separated and sometimes united. Thus the inter-parietal fissure may consist of one, two, or three sections.

But the confluence of some parts of the fissure may be typical of the human brain. For instance, the forked parieto-occipital fissure consists of three parts—the stem, the calcarine, and the true parieto-occipital which separates the cuneus from the præcuneus. The separation of these three parts is atypical—it can be read in a double sense. Either the superior *pli de passage* becomes superficial and the three parieto-occipital fissures become separated,† or the inferior *pli de passage* becomes superficial and the calcarine fissure is separated.‡ That these two conditions of separation of typical confluent fissures are to be considered as stigmata is surely not doubtful.

I must now return to a very interesting evolution of a fissure—in regard to its excessive and atypical confluence. I refer to the external frontal fissure, which separates the external frontal from the orbital lobe. In man this belongs to the base of the brain, but in most animals it lies partly on the outer surface. This sulcus is usually but slightly developed in man, often divided into two sections, and is connected with the first or the second frontal fissures. A third section, which represents a third (the innermost) incision of the sylvian fossa into the frontal lobe, is generally hardly marked. I have, however, observed this fissure strongly developed in certain brains of criminals, the three sections being united, and thus forming a large sulcus, which separated the internal frontal lobe from the orbital, and ran into the fissure of Sylvius. In my opinion this is the so-called præsylvian fissure of the lower animals, which Broca considered the representative of the central fissure in man.§ I have

* In Schenk's brain, on the left side, the first external *pli de passage* is not on the surface, and the second is much reduced. On both sides the central fissures are confluent with the first frontal; and on the left side the central fissure is also confluent with the retro-central, which form a true operculum.

† See case 5 (left hemisphere of a forger) in my book.

‡ See case in "Mittheilungen des Wiener Med. doct.," 1883. "Demonstration eines Verbrechergehirnes."

§ Germ. Ed., p. 128; Amer. Ed., p. 176.

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proved the correctness of my opinion by sections, by the microscope, and by experiment. But Giacomini agrees with Broca, and adduces very scanty arguments to support that doctrine. Every fissure is characterized by its relation to a certain part of the brain. The central fissure in man and apes has an intimate connection with the so-called psychomotor centres. It is surrounded by characteristic elements, the great cell of Betz at its superior end and along its anterior margin. The præsylvian fissure, on the contrary, lies absolutely above these cells, while another fissure which is found in the lower animals corresponds with the above-mentioned characteristics of the central fissure.* These two anatomical conditions (negative and positive) are confirmed by experiments bearing on the motor centres of the lower animals. Giacomini thinks that these fissures, situated in different cerebral organs, can be identical, and that a fissure which is well developed in the lower animals cannot be less developed in man. This last argument is fundamentally dangerous to comparative anatomy, and requires full discussion. When few fissures exist in one part of the brain of any species, then, though few, one or the other must be well developed. That is true of many frontal lobes and many species. Therefore, one which is but little developed in man (whose frontal lobe is rich in fissures) may be greatly developed in other animals ; and we hold that the præsylvian fissure is nearly the only one which is better developed in many of the lower animals than in man. It is frequently the case that fissures which are well developed in the lower animals are slightly developed in man. For example, the parietal lobe has four convolutions in many animals, but in man only two. That results from the fact of there only being one inter-parietal fissure, while in the lower animals there are two. But my study of the brain of the famous murderer, Schimak†, leads me to the conclusion that the parietal lobe is subdivided into four convolutions in exceptional cases. Also that the traces of this sub-division are, although scanty, generally indicated. No one will maintain that the human parietal lobe is less developed than that of the lower animals. I think that the development of the central fissure in primates saves nature the trouble of developing the parietal fissures.

The cruciate fissure is similarly interesting, as it is also well developed among the lower animals and but slightly marked in man. It is differently developed in different animals. It often forms the anterior arch of the calloso-marginal fissure, the posterior arch of which (surrounding the posterior arch of the gyrus fornicatus) represents the stem of the forked occipital fissure in man. The microscopical examination of sections shows that the cruciate fissure almost forms the anterior margin of the psycho-motor centres in the neighbourhood of the median border. A similar small fissure exists

* Germ. Ed., p. 113; Amer. Ed., p. 160.
† "Wiener Med. Jahrbücher," 1888.

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in the human brain. It surrounds the anterior margin of the paracentral lobe of Betz, having its convexity towards the occiput. Sometimes it is very greatly developed, is confluent from below with the calloso-marginal fissure and reaches at its upper extremity the outer surface of the brain. In such a case there is a complete correspondence with the cruciate fissure of the lower animals.

We must conclude, therefore, that the special study of exceptional and atypical brains leads to a great result; *it is to find analogues of every fissure of the various gyrencephalic brains of the lower animals on the human cerebrum.* And this part of my studies interested me in the highest degree, but it was completely neglected by other writers.

The study of the middle basilar lobe is very difficult. The fissures are very confused in that region, and little is there seen of the limbic fissure of Broca. But a very characteristic fissure is seen on exceptional brains of criminals. It separates the gyrus Hippocampi from the temporal lobe, and in such cases this fissure often reaches through the so-called fissura amygdalesia (Wilda) into the Sylvian fossa. This fissure represents the limbic fissure in the middle basal lobe as it was represented in the famous memorandum of Broca. When existent it is generally confluent with the collateral fissure, and sometimes with the stem of the forked occipital fissure. These conditions will certainly be elucidated by the work of Cunyngham, of Dublin. In this region also there is a typical fissure of lower animals to be found in exceptional human brains.

In the early days of cerebral anatomy there were non-scientific reasons for erecting isolatory barriers between man and the lower animals. My studies convince me that these barriers exist only because of theological timidity. In consequence of my finding one of these barriers disappear I attributed great importance to the discovery of the types of four convolutions in the human frontal lobe. It had formerly been accepted as a true differentiation between primates and the lower animals that the former possessed three and the latter four convolutions of the frontal lobes. This barrier disappeared on investigation, not only in reference to the frontal, but also to the parietal lobe as before stated.

I had never affirmed that this type, which had already been described by Rolando, was characteristic of criminals and of serious atypical value. It is the result of evolution of subordinate fissures, and may appear not only in consequence of scission of the first, as I believed, but also by scission of the second or the third frontal gyrus, as Giacomini showed.

To sum up the results of my investigations. The human brain is represented by two types. (*a*) The first is characterized by a slight degree of evolution of fissures of the lower order, and by rare confluence of principal fissures. The corner stone of this type is represented by Ecker. (*b*) The second is characterized partly by a great development of principal and subordinate fissures, and partly by a great development of fissures of the lower order, and partly by direct

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elongation of all fissures. Thus a more or less complete confluence of all fissures results. The extreme of this type has the value of a stigma. Certain of these confluences are to be considered atypical, and therefore as stigmata. Similarly we must consider certain interruptions of fissures as stigmata. It must be noted also that there are brains of the old-school type which are pathological because of the insufficient development of the principal fissures.

The study of the brains of notorious and professional criminals proves that a great proportion present these stigmata:—(1) By excess of evolution of the fissures; (2) by excessive confluence of the fissures in general; (3) and principally in consequence of the existence of highly atypical confluences; (4) and by atypical separations of fissures. It is also a sign of inferiority, a stigma, when the cerebrum does not cover the cerebellum on removal from the skull. But these stigmata do not represent anything more than inferiority and an atypical condition. They are found not only on the brains of criminals, but also on the brains of epileptics and the insane.

Finally, the study of such exceptional cases has already furnished a clue to the comparative anatomy of the brain, and will in the future unite its scattered facts.

NOTE.—Ueber die næhere Wechselwirkung des Leibes und der Seele mit Anthropologie: Untersuchungen ueber den Moerder Adolf Moll, Bonn, 1825 (Verlag T. Habicht). This highly interesting book by Dr. Josef Ennemoser, Professor of Medicine, and his colleagues the Anatomists Mayer and Weber, sets forth all the stigmata studied by the new school. The physiological part of the book is full of nonsense, Ennemoser being a panpsychist. He localizes the sentiments of pleasure in the organs of the chest; those of disgust in the organs of the abdomen; volition in the bones and the muscles. But, notwithstanding his theological convictions, Ennemoser has set forth with great success the anatomical, social and psychological features of crime, and has noted the "multiplicity and narrowness of the convolutions" in the case described by him.—A. R. U.

PART IV.—NOTES AND NEWS.

MEDICO-PSYCHOLOGICAL ASSOCIATION OF GREAT BRITAIN AND IRELAND.

The forty-ninth Annual Meeting of the Medico-Psychological Association of Great Britain and Ireland was held on Thursday, July 24th, in the Royal Asylum, Gartnavel, Glasgow. At the opening of the meeting the chair was occupied by Dr. Hayes Newington, the retiring President, and among those present were:—Dr. Beach, Dr. Baker, Dr. Beattie-Smith (Ararat), Dr. Buchan, Dr. Barrett, Dr. Bower, Dr. Clapham, Dr. Clouston, Dr. Campbell Clark, Dr. Bonville B. Fox, Dr. Gemmell, Dr. W. W. Ireland, Dr. Johnstone, Dr. Walter S. Kay, Dr. Keay, Dr. J. G. McDowall, Dr. Donald Mackintosh, Dr. Macpherson, Dr. Macleod, Dr. R. B. Mitchell, Dr. Newington, Dr. W. R. Nicholson, Dr. Oswald, Dr. Paul, Dr. Reid, Dr. Rorie, Dr. Rutherford, Dr. Hack Tuke, Dr. A. R. Turnbull, Dr. Urquhart, Dr. W. R. Watson, Dr. Whitcombe, and Dr. Yellowlees. Drs. Collum and Bremner were also present as guests.

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