ABBREVIATIONS.

Ch. Pl., Choroid Plexus.
Ep., Epiphysis.
F. B., Forebrain.
Lat. Vent., Lateral ventricle.
M. B., Midbrain.
P., Paraphysis.
Pc., Posterior commissure.
N., Nerve cells.
Sc., Superior commissure.
Ve., Vesicle.
Ves., Vessel.

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CONTRIBUTIONS TO THE ENCEPHALIC ANATOMY OF THE RACES.

First Paper:—THREE ESKIMO BRAINS, FROM SMITH'S SOUND.

BY

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With 20 Text Figures

Introduction.

A problem of great importance in the field of somatic anthropology is the correlation of the intellect of races with brain-structure. There are certain ethnic traits with which education or civilization have had nothing to do, and which are properties inherent in the complex structure of the brain. In fact, the intellectual characters of the races exhibit remarkable differences; capacity and aptitude for learning are very variable; and since these are but the expressions of cerebral activity they naturally lead to attempts at explaining them in terms of correlated anatomical differences. One subdivision in encephalometry alone deserves especial study, that of the speech-centers,—receptive, emissive and associative,—a problem first essayed by Rüdinger in 1882. The profound differences in scope and complexity of the many languages, assiduously studied by linguists and philologists, assumedly depend upon differences in the architecture of those portions of the brain concerned in the mechanism of the faculty of language. Of course, it must be admitted that the proposition is a difficult one to establish, but to assume that in the brains of races typical differences of cerebral surface-morphology exist, is a belief which even the meager amount of material that has so far accumulated, renders justifiable. What is to be attained in this view is the establishment of a systematic anthropological encephalometry. The efforts of our predecessors in this direction may have seemed somewhat fruitless, but the more recent advances in this branch of science evoke increased exertion on the part of interested investigators, increased admiration for the organ pronounced by the great Reil "*die höchste Blüthe der Schöpfung.*"

In a search of the literature in anthropological and anatomical fields of work, descriptions of the brains of races are few in number and often of an unsatisfactory character. Not only is this to be deplored from the view-point of science generally, but it is particularly to be regretted in the case of those races which are rapidly becoming extinct and whose ethnological and anthropological relations would necessarily be incomplete without a well-grounded knowledge of their encephalic anatomy, both macroscopical and histological. The vital necessity of obtaining a large amount of available material to pursue the comparative study of cerebral development from the standpoint of somatic anthropology, is, of course, obvious. The difficulties to be overcome, though less serious than before, are still sufficient to render many of our efforts fruitless. Advances in the extent of our researches can not longer be postponed—if they are to be of value—for in the evolutionary progress of mankind many of the exotic races are rapidly becoming impure or even extinct. Instances of this are numerous. Of the race of Charruas Indians, now extinct, one brain has fortunately been preserved for us by Leuret and Gratiolet. How much longer will the North American Indian remain pure? The recent volcanic outbreak in the Antilles is said to have wiped out nearly every Carib in existence, a few individuals only remaining on St. Lucia and Dominica. The Australian natives, driven to the desiccated wastes of the interior; some African tribes, succumbing in the arid deserts, and the Eskimos, decimated by epidemics of small-pox, measles and pneumonia—all these and many others that might be mentioned, are dying out.

Strong pleas for an extended anthropological encephalometry were made as far back as the first half of the past century by such eminent anatomists as Tiedemann, Huschke, Gratiolet and Leuret. Tiedemann was the first to direct attention to this field of work. In his book, "Das Hirn des Negers mit dem des Europäers und Orang-Outangs Verglichen" (1837), he figured the brain of a negro and that of the famous "Hottentot Venus," comparing these with the European brain. Leuret and Gratiolet (1857) later presented the brain of a Charruas Indian from Uruguay, comparing it with a French brain.

Huschke, in default of available material, conceived the idea of studying intra-cranial casts made of wax and thereby arrived at a rough estimation of the general mass and conformation of the brain in a few races. This mode of study was, however, unsatisfactory as well as crude, as it lacked a description of the surface morphology and microscopical structure. Wagner (1860) made similar studies on intra-cranial casts, deploring at the time that every effort to obtain brains of rarer races was futile.

Perhaps the greatest interest in anthropological encephalometry was stimulated by the case of the classical "Hottentot Venus" (whose name was "Sartjee"), who died in Paris, and whose full-length portrait is now in the Museum of the Anthropological Society of that city. Observed during life by Cuvier, her skeleton and brain were preserved after death, to afford a valuable basis for the work of many investigators. Tiedemann figured the brain in 1837, Gratiolet again in 1854, Bischoff in 1868. Two additional brains of Bushwomen were described by Marshall (1864) and Koch (1867). The interest in the brains of the lower races soon increased and observations began to accumulate. The reader can judge of this from a review of the appended bibliography. In regarding the number of observations made, as well as the importance of the results attained in more recent years, especial mention may be made of the work of Retzius, Cunningham, Sernoff, Weinberg, Manouvrier, Rüdinger and A. J. Parker.

It cannot be hoped, by the few examples of racial brains here presented, to establish very significant facts concerning them, but the purpose of these Contributions is rather to add to those already described, with the hope of having still others added thereto. In time, a large number of specimens cannot fail to be amassed, and useful conclusions may then be derived.

The present paper upon this subject is the first of a series comprising the following:

1. Three Eskimo Brains, from Smith's Sound.
2. A Japanese Brain.
3. Two Brains of Natives of British New Guinea (Papuans?).

All of these brains are in the collection of Professor George S. Huntington's Anatomical Laboratory, Columbia University.

THREE ESKIMO BRAINS, FROM SMITH'S SOUND.

GENERAL REMARKS.

Though widely distributed over Arctic America, and though subdivided into numerous tribes, the Eskimos differ but little in their dress, customs and utensils, and they form a remarkably homogeneous group of people. What is in the present instance of great consequence from the morphological view-point, so far as the surface-markings of the brain are concerned, is the almost complete isolation of the American Eskimo from all other races. Trading is carried on almost exclusively among their own tribes, and the intimate marriage-relation of

the members of this race must be considered as of vital importance in an investigation of this kind. In probably no other race is "in-breeding" so widely prevalent as among the Eskimos, and this it is which makes the conditions for the study of racial characteristics so nearly the ideal as can be.

Of the ethnic traits and the anthropological status of the Eskimo it is admissible to deal only in a general way, within the compass of this article. The Mongolian relation (or rather, the probable Mongolian origin) of this hyperborean race is generally conceded by the anthropologists. As to their mental capabilities, the information given us by the majority of travellers seems to indicate that the Eskimos are sharp-witted, exhibit remarkable aptitudes, and in general possess a considerable intellectual power. A remarkable aptitude in carving and drawing is a characteristic remarked by most travellers, particularly by Klutschak —himself an artist—and by Irving Rosse. Notwithstanding the crudeness of delineation and imperfection in detail, their ivory sculptures of birds, quadrupeds, marine animals and even the human form, display considerable individuality in conception and intelligent perception. Travellers needed merely to place the necessary materials in their hands, in order to profit by their ability to make drawings and maps which were practically as reliable as corresponding efforts of the civilized man unaided by instruments. The drawings, like those of the Chinese, have but one defect, being faulty in perspective.

As a mechanic, the Eskimo is, considering his poor opportunities and materials, very clever and painstaking. With an unbounded curiosity supplemented by intelligent observation he soon learns to imitate the white man in various kinds of handicraft.

Their ideas of property and commerce are distinctive from those exhibited by the lower races. Their sense of morality with reference to truthfulness, honesty and virtue are peculiar but natural and in accord with their traditions and environment. Their diversions and instincts, their social and domestic relations are interesting and distinctive of the race. When brought into civilized surroundings, and when fortunate enough to escape the scourges of tuberculosis and the other diseases to which they are so susceptible, they display an aptitude for learning and a capacity for intellectual development that is of no mean order.

Former Descriptions of Eskimo Brains.—Only four Eskimo brains have hitherto been described; three by Chudzinski, and one by Hrdlicka (see Bibliography). Chudzinski's specimens were those of Eskimos who died of small-pox in the Hôpital de Saint-Louis, Paris. The brains had been placed in very weak alcohol for two weeks before

Chudzinski obtained them, and one of the brains, that of "Paulus Abraham," was in such an advanced state of decomposition that its weight could not be ascertained. Chudzinski made plaster-casts of the brains, and presented these to the Parisian Anthropological Society on May 5, 1881.

Two of the Eskimos were young men, the other was a girl. They were:

1. "Tobias Ignatius," male, age 23, died January 13. Brain-weight, 1398 grams.

2. "Paulus Abraham," male, age 35, died January 14. Brain-weight unknown.

3. "Ulrika Henocq," female, age 24, sister of "Paulus Abraham," died January 16. Brain-weight, 1256 grams.

Chudzinski nowhere states whence these Eskimos came. One must assume that they were from Greenland, and from an inferior tribe, differing in many respects from the inhabitants around Smith's Sound. Chudzinski states emphatically that with the considerable volume of the cerebrum of his Eskimos, there is a "notable simplicity in the fissural and gyral pattern"; not only are the gyres said to be quite broad and little marked by "tertiary fissures and divisions, but they are only slightly flexuous." This simplicity, he maintains, is especially marked in the frontal lobes, which are rather "flattened from above below." The general form was, according to Chudzinski, that of a dolichocephalic brain. The frontal lobe he describes as relatively small, while the parietal especially was considerably well developed. The frontal gyres were of "very simple configuration—especially in 'Tobias Ignatius.'"

Hrdlicka has commented upon this marked difference between the specimens described by Chudzinski and the one by himself, and says with good reason that this dissimilarity makes "a future acquisition of Eskimo brains very desirable."

Brief History of the Brains here Described.—The three individuals whose brains are here presented, "Nooktah," his wife "Atana," and "Avia," belonged to a party of six Eskimos who were brought to New York in 1896 by Lieutenant Peary, from the neighborhood of Smith's Sound. The other three were "Kishu," chief of the tribe, his son "Menee," and a young man whose name is unknown. The last one was sent back to Smith's Sound. "Menee" is now about fourteen or fifteen years old, having recovered from an attack of incipient pulmonary tuberculosis. "Kishu" died in Bellevue Hospital, New York

City, in 1898, at the age of about forty-five years, and his brain has been carefully studied and described by Dr. Ales Hrdlicka.

The writer is indebted to Dr. Hrdlicka for the following measurements of the heads of these individuals during life:

No. 1.—"ATANA."—*Stature*, 146.7 cm. *Head:* max. antero-posterior diam., 18.0 cm.; max. lateral diam., 14.5 cm.; cephalic index, 80.55 (sub-brachycephalic); horizontal circumference, 53.6 cm.

No. 2.—"NOOKTAH."—*Stature*, 155.0 cm. *Head:* max. antero-posterior diam., 18.8 cm.; max. lateral diam., 15.3 cm.; cephalic index, 81.38 (subbrachycephalic); horizontal circumference, 56.2 cm.

No. 3.—"AVIA."—*Stature*, 132.8 cm. *Head:* max. antero-posterior diam., 18.8 cm.; max. lateral diam., 13.7 cm.; cephalic index, 72.87 (very dolichocephalic); horizontal circumference, 53.3 cm.

The skulls measured as follows:

No. 1.—"ATANA."—Max. antero-posterior diam. externally, 17.6 cm.; internally, 16.6 cm.; max. lateral diam. externally, 13.6 cm.; internally, 13.0 cm.; height, basion-bregma, (?); cranial index, 77.27; cerebral index, 78.31.

No. 2.—"NOOKTAH."—Max. antero-posterior diam. externally, 18.3 cm.; internally, 17.35 cm.; max. lateral diam. externally, 14.4 cm.; internally, 13.7 cm.; height, basion-bregma, 14.0 cm.; cranial index, 78.69; cerebral index, 78.96.

No. 3.—"AVIA."—Max. antero-posterior diam. externally, 18.2 cm.; internally, 17.3 cm.; max. lateral diam. externally, 13.0 cm.; internally, 12.3 cm.; height, basion-bregma, 12.9 cm.; cranial index, 71.43; cerebral index, 71.09.

In addition to the three brains here described, and the brain of "Kishu," there is a fifth Eskimo brain in Professor Huntington's Laboratory; namely that of a girl named "Atmahok," who died of tuberculosis in June, 1899, in the Walton Sanitarium, at Mt. Vernon, N. Y.

"Atmahok," with her twin-sister "Zakesino," had been brought to the United States, and exhibited in various cities in connection with lectures, by Capt. Miner Bruce, of Seattle, Wash., an Alaskan trader. The girls were eight years old. The body of "Atmahok" was received at the Anatomical Laboratory of the Medical Department of Columbia University, two days after death, and the autopsy was performed by Dr. Hrdlicka. The heat of the prevailing weather had already brought about an advanced state of decomposition of the bodily tissues, especially of the brain, and beyond its weight little could be ascertained. In its present state, nothing useful can be derived from the specimen. It is a great loss to anatomical science that this brain could not be preserved successfully, as it would have been of considerable interest to compare this Alaskan with the Eastern Eskimo brains; furthermore, in

the event of the twin-sister's brain being obtainable, the opportunity for seeking out evidences of hereditary similarity in the gyral pattern is irretrievably lost. "Zakesino," the twin-sister, is still in New York City, and is reported to be advancing rapidly in her school studies.

An interesting feature of the Eskimo brains so far reported is their weight. (See Table I.)

TABLE I.

ESKIMO BRAIN-WEIGHTS.

	Described by	Age.	Brain-weight.
MALES.			
"Tobias Ignatius."	Chudzinski.	23	1398 gms.
"Kishu."	Hrdlicka.	45?	1503 gms.
"Nooktah."	E. A. Spitzka.	55?	1470 gms.
Averages.....		41	1457 gms.
FEMALES.			
"Ulrika Henocq."	Chudzinski.	24	1256 gms.
"Avia."	E. A. Spitzka.	12	1227 gms.
"Atmahok."	(Weighed by Hrdlicka.)	8	1057 gms.
"Atana."	(Estimated.)	55?	about 1375 gms.

So far as one may venture to express an opinion concerning the weight of the Eskimo brain, it appears safe to say that it is rather above the average of the European brain. This is certainly true of the three male brains whose actual weight is recorded in the table, and the conclusion is further fortified by the results of the numerous cranial measurements of the Anthropologists.[1]

Of the female specimens, the brain-weights of "Avia," "Ulrika," and "Atmahok" are actual figures; while the fourth, that of the old woman, "Atana," is estimated from the present weight. The other specimens, which had been immersed in a similar fluid for the same length of time, lost from 26 to 29 per cent of their original weight. "Atana's" brain may therefore be assumed to have originally weighed about 1375 grammes.

DESCRIPTION OF THE BRAINS.

The description of the fissures and gyres must necessarily be brief, emphasis being laid upon those features which most markedly differentiate these brains from each other as well as from those of other races, European brains in particular. Convinced that figures convey more information than words, and that they occupy less space, the writer

[1] See Topinard's "Anthropologie."

presents a series of drawings showing all possible views, made directly from the specimens by himself, with the incidental aid of a stereograph.

The nomenclature here employed is that proposed largely by Wilder, and accepted by the Association of American Anatomists and the American Neurological Association; a nomenclature unquestionably superior to that of the B N A in consistency, clearness and conciseness. The writer prefers the angloparonym "gyre" (plural "gyres") to the Latin "gyrus" and "gyri." All anfractuosities of the surface are designated "fissures," the term "sulcus" being abandoned entirely.

The fissures and gyres have been uniformly designated in the figures by abbreviations (see list at the end of this article). Where the length of fissures is given, the measurements were made by a moistened string laid along the course of the fissure.

The comparative dimensions of the cerebral parts, as well as the conformation of the cerebellum, pons and oblongata will be discussed in the sequel of this series.

1. Brain of "Atana."

(See Figures 1 to 6.)

Our first specimen is that of an adult female, "Atana," the wife of "Nooktah." Her age is in the neighborhood of fifty-five years, and she is described as having been unusually intelligent, as may be judged from the fact that she was the "medicine-woman" of her tribe. She died of tuberculosis on March 15, 1898, at 2 p. m., and her viscera were removed at 4.30 p. m. of the same day. Unfortunately, the brain was not weighed while fresh. It was placed in a mixture of formal and alcohol. Its weight on May 25, 1901 (i. e. after over three years), was as follows:

Left hemicerebrum, 446 grammes; right hemicerebrum, 439 grammes: cerebellum, pons and oblongata, 163 grammes. Total, 1048 grammes.

It may be assumed that the original weight was in the neighborhood of 1375 grammes.

The Cerebrum.

The cerebrum is quite firm in the deeper parts, but the cortex is exceedingly soft and does not admit of much handling without damage to the surface.

In general, the cerebrum is very well developed. Fissuration is, if anything, rather superior in complexity to that shown by average European brains. This complexity is a trifle more marked upon the left

hemicerebrum and the trend of minor fissures and ramifications is in a transverse direction, so that many of the principal longitudinal fissures anastomose with each other. This is so marked in Eskimo brains that brachycephaly alone hardly seems to account for it, if we may be guided by past experience. The fissures are of good depth, and contain, in many instances, several interdigitating subgyres. A notable feature of all the fissures is the close apposition of the gyres, making all examinations of the depths of the fissures exceedingly difficult.

The gyres exhibit marked tortuosity, and are of intricate yet delicate contour. The maximum width of any gyre is 14 mm.; the average being about 8 mm.

Both insulae are exposed to view; more so on the left than on the right side.

Viewed dorsally or ventrally, the general outline is that of an elongated hexagon, with its maximum width at the junction of the marginal and supertemporal gyres. This region is particularly prominent on the left side. Viewed laterally, the notable features are a pronounced fullness and rotundity of the frontal lobe, while the parieto-occipital boundary is only moderately convex; this with the nearly straight ventrolateral boundary gives the caudal portion of the hemicerebrum a more slender contour than is usually encountered. In all respects the development of the frontal lobe preponderates over that of the remainder of the cerebrum, the parietal area being particularly under the average extent found to prevail in European cerebra.

The callosum is well formed, of average thickness in the genu and splenium, but rather slender in its middle portion or body. Its length is 44.7 per cent of the total cerebral length.

One feature in the shape and position of the cuneus deserves particular mention. In this cerebrum, as in nearly all the others of Eskimos, the calcarine and postcalcarine, whether separate or confluent, do not describe the well-marked curve (convexity dorsad) toward the ventromesial border as seems fairly characteristic of Caucasian brains. In this brain, for example, the calcarine complex passes directly caudad and in a nearly straight line, and reaching the hemicerebral border at a point much further dorsad. This naturally renders the ventral border of the cuneus straight instead of curved, as usual.

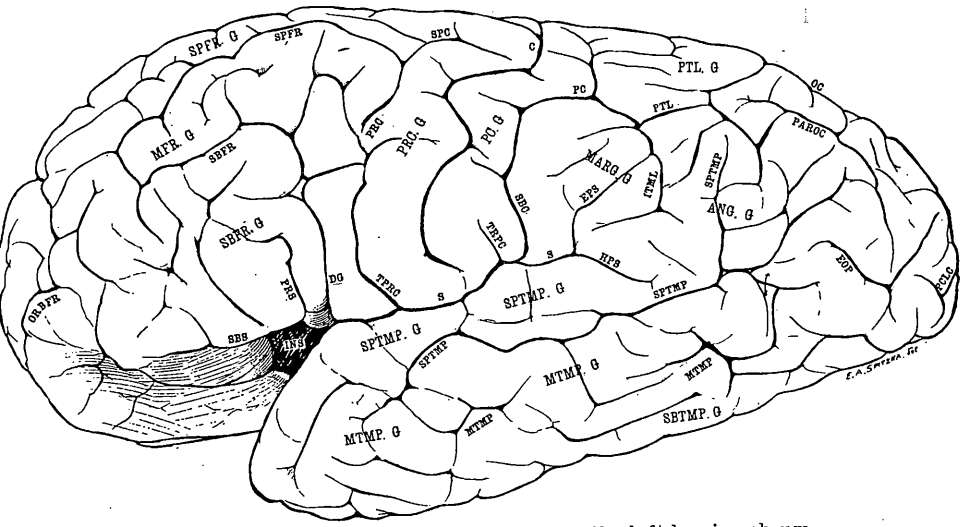


FIG. 1. Brain of "Atana;" lateral view of the left hemicerebrum.

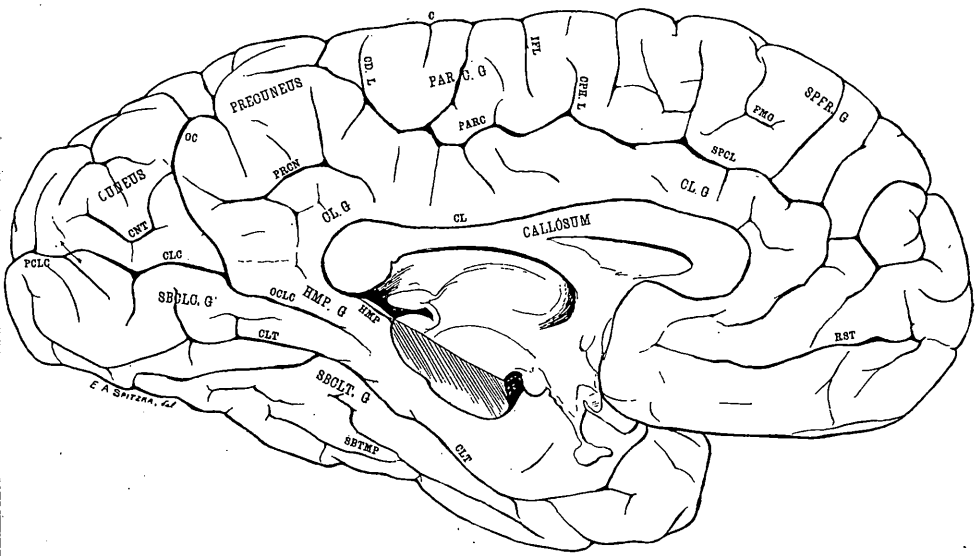


FIG. 2. Brain of "Atana;" mesial view of the left hemicerebrum.

LEFT HEMICEREBRUM.

THE INTERLOBAR FISSURES.—*The Sylvian Fissure and its Rami.*—The sylvian fissure proper is 4.5 cm. in length. It is quite shallow cephalad, as the following measurements of the depth will show: Presylvian depth, 10 mm.; medi-sylvian depth, 18 mm.; post-sylvian depth, 25 mm.

Its course approaches the horizontal very nearly, and it is a little more tortuous than is common.

The basisylvian, measured from the temporal pole, is 20 mm. in depth. The presylvian is simple, and 14 mm. in length. The subsylvian is also 14 mm. long and ends in a bifurcated manner. The episylvian is 25 mm. in length and anastomoses with the intermedial. The hyposylvian is distinct and 14 mm. in length.

The Central Fissure.—The central fissure, 10.5 cm. in length, presents the usual five alternating curves. It does not anastomose with any other fissure. Its dorsal end crosses the dorsi-mesal margin to appear for about 1 cm. on the mesial surface of the paracentral gyre. The dorsal third of the fissure, as will be noted in Figure 3, approaches the intercerebral cleft in a perpendicular manner, not, as is usual, at a distinctly acute angle. From the fissure spring two short caudal and two cephalic rami.

Occipital Fissure.—The occipital fissure has a mesial length of 3.4 cm., and a dorsal length of 2.2 cm. On the mesial surface the fissure describes a compound curve, and anastomoses deeply, cephalad, with what possibly corresponds with Wilder's adoccipital. A superficial anastomosis is effected with the cuneal fissure. Dorsally the fissure ends in a simple manner, limited by a well-developed paroccipital gyre.

Calcarine Fissure.—The calcarine fissure is 3 cm. in length, and is limited dorsally by a slightly depressed transcalcarine isthmus. The postcalcarine passes well upon the occipital polar surface, attaining a length of 4 cm., and bifurcating laterally.

The occipito-calcarine stem is 3.2 cm. in length and joins both the occipital and calcarine fissures at considerable depth.

FISSURES OF THE FRONTAL LOBE (LATERAL SURFACE).—*Precentral Fissural Complex.*—The three integral parts of this complex, namely the supercentral, precentral and transprecentral, anastomose to form a continuous fissure springing out of the sylvian and passing without interruption to the dorsal margin. The supercentral is of irregular zygal shape, and is confluent with the superfrontal and precentral. The precentral is tortuous and ramified, and anastomoses with the sylvian by means of the transprecentral, and also with the subfrontal, the diagonal, and a medifrontal segment. The diagonal fissure is situated between, and runs parallel with the presylvian and the conjoined precentral-transprecentral. The diagonal does not dip into the sylvian cleft as deeply as is common.

The superfrontal fissure springs from the supercentral, is quite long, and is notable for its zig-zag course and transverse ramification.

The marked tendency to transverse anastomosis, particularly in the prefrontal region, renders the interpretation of certain fissures a matter of great difficulty. So far as the representation of the medifrontal is concerned, there exist a few segments in the medifrontal gyre which de-

serve mention. One of these has been described as anastomosing with the precentral. Another springs from the orbitofrontal and joins the superfrontal.

The subfrontal fissure is of unusual form. Arising from the neighborhood of the cortical islet at its junction with the diagonal and an anastomosing ramus of the precentral, the fissure sweeps rather far dorsad, to end in a hook-like manner about 2.5 cm. cephalad of its caudal origin. Dorsad the fissure anastomoses with the superfrontal.

The orbitofrontal is distinct, about 3 cm. in length and is joined by a medifrontal segment.

The radiate fissure is simple, 2.3 cm. in length and anastomoses with a tri-radiate (intra-subfrontal) fissure dorsad. One other fissural element curves around the cephalic hook of the subfrontal (Figure 1).

Mesial Surface.—The supercallosal is 8.5 cm. in length, and freely confluent with the paracentral. Numerous rami springing from it traverse the mesial surface of the superfrontal gyre.

The paracentral fissure is very irregular, sends off several rami, and is confluent with a transparietal fissure as well. The cephalic limb is short. The caudal limb just reaches the dorsi-mesal margin. One intraparacentral ramus is particularly long.

The inflected fissure is distinct and independent. Its dorsal length is 15 mm.; mesial length, 13 mm. Its direction is practically perpendicular to the dorsi-mesal border on both surfaces. Its lateral end is embraced within the dorsal fork of the supercentral. Mesially, its relations are, as usual, caudad of the cephalic paracentral limb.

The rostral fissure is well-marked, 4.5 cm. in length, and bifurcated cephalad. There is no subrostral. The fronto-marginal is represented by but one segment.

Orbital Surface.—The orbital fissure resembles a reversed letter K (Ж) in shape, with numerous ramifications (see Figure 4).

The olfactory fissure is 5 cm. in length, and of simple form.

Gyres of the Frontal Lobe (Lateral Surface).—The postcentral gyre is of bold contour throughout, and generally wider than the precentral. Its connection with the subfrontal gyre is interrupted, as before described, by the confluence of the precentral and transprecentral fissures.

The superfrontal gyre is quite large and richly fissured. There is some uncertainty as to its lateral limits in the prefrontal region, owing to the tendency to transverse communications amongst the various frontal fissures.

The medifrontal gyre is of greater width caudad than cephalad, and contains three small independent fissural segments. There is, however, not a very marked tendency toward a longitudinal subdivision of the gyre into two tiers.

The subfrontal gyre is of unusual width, owing to the high sweep of its limiting fissure—the subfrontal. Its configuration is rendered exceedingly complex by numerous more or less transversely directed fissures and ramifications (Figure 1).

Mesial Surface.—The mesial surface of the superfrontal gyre is wide, richly fissured by transverse pieces. The callosal gyre is more simple, and is marked by several rami of the precuneal, supercallosal and paracentral.

The paracentral gyre is about 4 cm. in length, its dorsal margin is indented by the central, the inflected, and by an intraparacentral piece which joins the paracentral over a vadum.

The orbital surface is very much fissured, rather more so than on the right side; the mesorbital gyre is narrow, the postorbital quite distinct.

Fissures of the Parietal and Occipital Lobes (Lateral Surface).—(For the sake of convenience and clearness, the features of the parietal and occipital lobes are described together.)

The Postcentral Fissural Complex.—The postcentral fissural complex, comprised of the postcentral and subcentral segments in this instance, is a continuous fissure, and anastomoses with the sylvian fissure ventrally, and with the parietal fissure caudally. The main portion of the postcentral describes an angular course more or less parallel with the central, its dorsal end bifurcating to embrace the caudal limb of the paracentral. The whole course of the fissure so much resembles a duplication[2] of the central fissure, that only a careful study of its relations to the other fissures in its neighborhood can settle all doubts.

The transpostcentral is independent.

The parietal fissure springs from the postcentral over a deep vadum, passes caudad in an angular course, anastomosing with the intermedial, a transparietal and the paroccipital. The transparietal is a long fissure which crosses the dorsi-mesal margin to anastomose with what possibly represents Wilder's adoccipital.

The paroccipital presents the usual zygal shape, with the stem curved laterad. Its cephalic ramus joins the parietal over a deep vadum. The caudal ramus is unusually long (27 mm.).

The intermedial fissure is of zygal type, and joins both the episylvian and the parietal. By these anastomoses there exists a confluent series of fissures by means of which one may trace a course from the sylvian to the paroccipital in two ways: one by way of the subcentral-parietal anastomosis, the other by the episylvian-intermedial-parietal.

The complex of fissures in the angular and post-parietal gyres is difficult to describe. One prominent fissure (called by Schäfer (in Quain's Anatomy) the "ascending second temporal," but whose origin is probably traceable to the primitive exoccipital) is confluent cephalad with the supertemporal just where the latter changes its course in the dorsal direction. Its situation is not unlike that in the other Eskimo brains, particularly that of "Nooktah," and the right half of "Kishu." A tri-radiate fissure, doubtless an exoccipital segment (Figure 1, EOP) curves around the caudal ramus of the paroccipital, and is separated from the postcalcarine by a narrow gyre.

Mesial Surface.—The precuneal fissure is a zygon, not confluent with any other fissure. Further dorsad there is a fissure joining the occipital, which traverses the dorsi-mesal margin, previously alluded to as a possible adoccipital.

[2] A similar condition misled Sperino in his description of the brain of the Anatomist Giacomini. See the author's paper, Phila. Med. Jour., August 24, 1901.

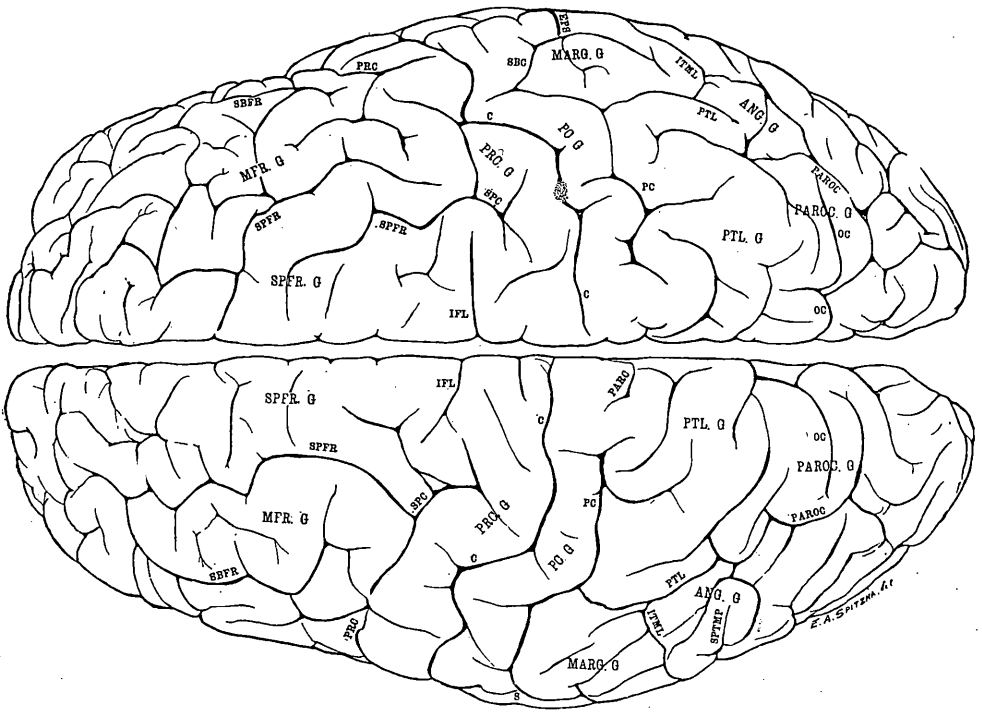
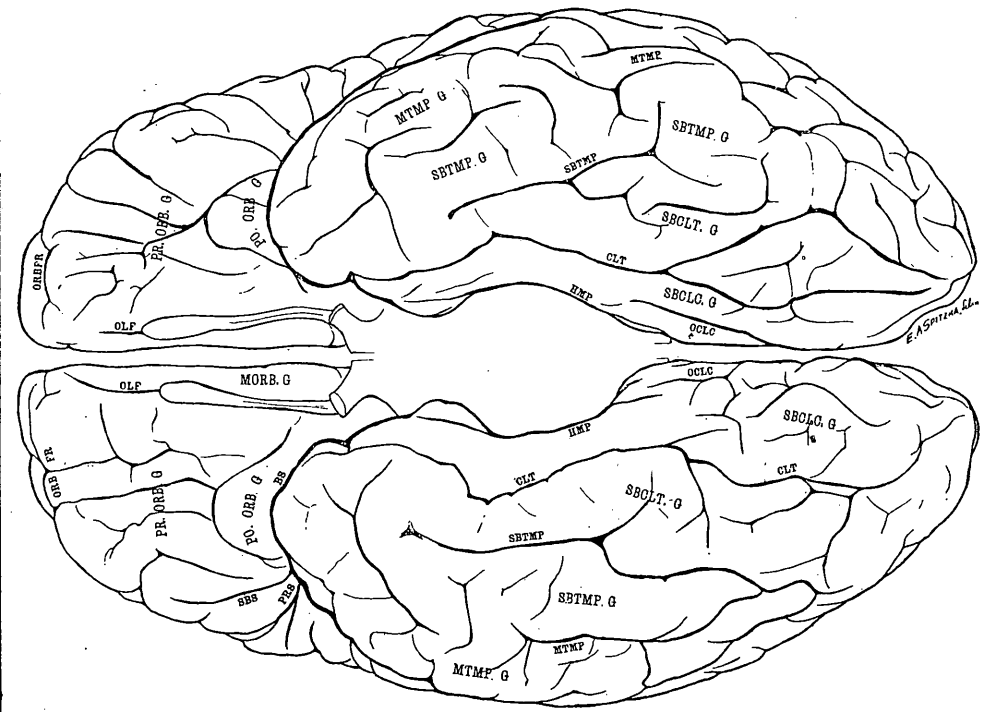


FIG. 3. Brain of "Atana;" dorsal view.



The cuneus is marked by several fissures, the more distinct being a cuneal fissure joining the occipital over a slight vadum, and a much-ramified segment near the dorsal border—an irregular postcuneal.

GYRES OF THE PARIETAL AND OCCIPITAL LOBES (LATERAL SURFACE).—The postcentral gyre is narrower than the precentral, especially in its dorsal portion, and is distinctly demarcated from the adjacent gyres.

The parietal gyre is of fair size and well-fissured, but shorter than common.

The paroccipital gyre is of good size, U-shaped, curving around the simple-ending occipital fissure.

The marginal gyre is of good size, and is traversed by the episylvian, by rami of the intermedial, and by an independent fissure.

The angular and post-parietal gyres are exceedingly complex. Numerous fissures and ramifications often anastomosing in an intricate manner as well as deep vessel-grooves render a description of this region difficult.

The precuneus and callosal gyre present nothing unusual.

The cuneus is of moderate size. Its ventral border, as before stated is rectilinear. Its surface is richly fissured.

FISSURES OF THE TEMPORAL LOBE (LATERO-VENTRAL SURFACE).—The supertemporal describes a very tortuous course. Its length is 13 cm., extending from near the temporal tip well into the angular gyre. Just opposite the ventral end of the central fissure, the supertemporal communicates with the sylvian by means of a fairly deep vadum, and there are other numerous anastomoses.

There are at least four meditemporal segments of irregular ramified shapes. The subtemporal is represented by two pieces separated from each other by a very narrow isthmus.

The collateral fissure attains a length of 12.5 cm., and describes a marked zig-zag course. In the post-temporal region, the fissure divides into two equally long rami, which, diverging at first, again approach each other very closely. The lateral ramus, by comparison with the opposite hemicerebrum seems to represent the usual course of the main stem.

A deep groove, representing the post-rhinal (amygdaline) fissure, arises from the basisylvian cleft, and joins the collateral over a slight vadum.

The transtemporal fissures and gyres are well marked and present nothing unusual.

GYRES OF THE TEMPORAL LOBE.—The supertemporal gyre is very tortuous, due to the tortuous course of the supertemporal fissure, as well as to the numerous indentures of other fissures. In some places the gyre is quite narrow, in others, fairly broad. The meditemporal gyre is of quite as tortuous a contour. The subtemporal is the most massive of all. The subcollateral and subcalcarine gyres are of the usual form.

INSULA.—The insula is rather long and narrow. A portion of the preinsula, as stated before, is not fully covered by the opercula, so that an area of about 1 sq. cm. remains visible on the lateral aspect. The pole of the insula is prominent. The transinsular fissure is long and distinct. The insular gyres are simple; the post-insular gyre is quite narrow; the preinsular gyres are four in number.

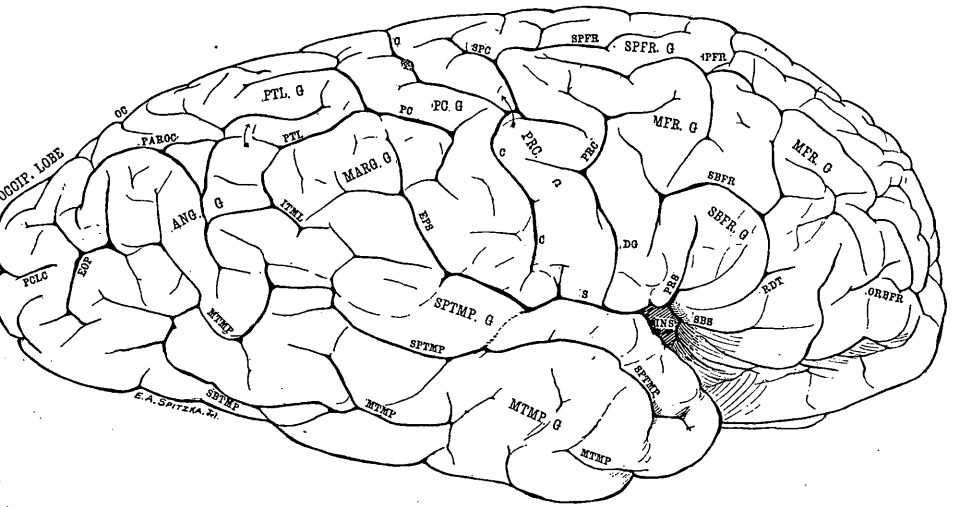


FIG. 5. Brain of "Atana;" lateral view of the right hemicerebrum.

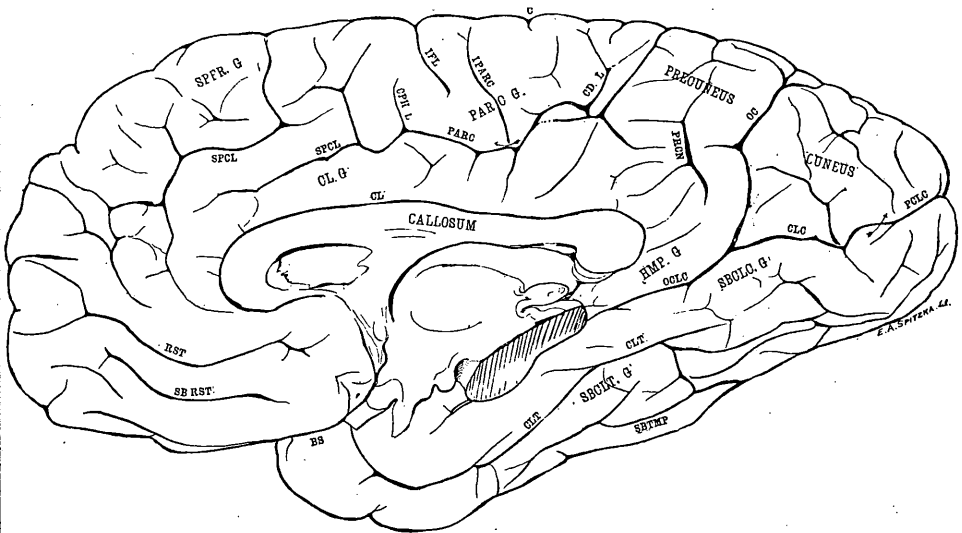


FIG. 6. Brain of "Atana;" mesial view of the right hemicerebrum.

RIGHT HEMICEREBRUM.

THE INTERLOBAR FISSURES.—*The Sylvian Fissure and its Rami.*—The sylvian fissure is 4.3 cm. in length and is deeper cephalad than on the left side: Presylvian depth, 14 mm.; medisylvian depth, 19 mm.; postsylvian depth, 23 mm.

Its course is angular but generally approaches the horizontal. The basisylvian, measuring from the temporal tip, is 20 mm. in depth. The presylvian is bifurcated, the longer limb attaining a length of 15 mm. The subsylvian is simple and 20 mm. long. The episylvian is unusually long (32 mm.) and sends a caudal ramus into the marginal gyre. The hyposylvian is merely indicated by a slight notch.

The Central Fissure.—The central fissure is 10 cm. in length. As on the left half, the dorsal third of the fissure is quite straight and perpendicular to the intercerebral cleft. At 3 cm. from the dorsi-mesal margin, the fissure is interrupted by a hard, probably tubercular growth, adherent to the adjacent walls of the central gyres, indicated in Figures 5 and 3 by a dotted area. Cephalad the fissure anastomoses with the long limb of the supercentral over a vadum. The dorsal end is barely visible on the meson. The ventral end is separated from the sylvian by a slightly depressed isthmus.

Occipital Fissure.—The occipital fissure attains a mesial length of 3.5 cm., a dorsal length of 2.5 cm. The fissure is of fairly uniform depth, and while exhibiting several interdigitating subgyres, shows no definite cuneo-quadrate subisthmuses. On the meson the fissure sends a ramus into the precuneus. Dorsally, just at the dorsi-mesal border, there is an appearance of trifurcation, owing to the presence of two adjacent fissural elements which run into the occipital cleft cephalad and caudad (Figure 3). Closer investigation shows the deep occipital to continue laterad between these two pieces, and end in a simple manner in the paroccipital gyre.

The Calcarine Fissure.—The main stem of the calcarine is 2.1 cm. in length, and bifurcates caudad, the dorsal limb joining the postcalcarine over a slight vadum ("transcalcarine isthmus"). The postcalcarine is 4 cm. long and extends well upon the lateral surface. The straight course of the combined calcarine and postcalcarine fissures, noted in other Eskimo hemicerebra, is quite marked in this case.

The occipito-calcarine fissural stem is 3.5 cm. in length, and is deeply confluent with both the occipital and calcarine. Its cephalic end approaches the hippocampal fissure very closely.

FISSURES OF THE FRONTAL LOBE (LATERAL SURFACE).—*The Precentral Fissural Complex.*—The supercentral is of zygal shape, and is confluent with the superfrontal. Its ventral limb is long and anastomoses with the central, but is separated from the precentral by an isthmus (Figure 5). The precentral is also of zygal type; its ventro-cephalic ramus is confluent with the sylvian by means of the well-marked diagonal. The transprecentral is an independent fissure.

The superfrontal and medifrontal fissures are difficult to trace in definite courses, particularly in the prefrontal region. The marked tendency

of these fissures to anastomose transversely divides the corresponding gyres into several transverse rather than the usual longitudinal gyral portions.

The subfrontal fissure is fundamentally of zygal shape, with its stem curving round the presylvian, and its cephalic limbs anastomosing ventrad with the radiate, dorsad with a medifrontal.

The orbito-frontal is represented by two segments; the mesial one anastomosing with a medifrontal.

MESIAL SURFACE.—The supercallosal is divided into two segments by an oblique isthmus. The caudal segment is confluent with the paracentral at considerable depth, and extends as far cephalad as the splenium. The cephalic segment is the larger piece, and is very much ramified. The two segments for a part of their course run parallel with each other, giving an appearance of duplication.

The paracentral is very flexuous, 3.8 cm. in length, terminating at each end by the usual cephalic and caudal limbs, and anastomosing caudad with an intraprecuneal fissure.

The inflected fissure is deep, well-defined, and both its dorsal and mesial lengths are 15 mm. Its lateral end lies cephalad of the supercentral; its ventral end lies caudad of the cephalic paracentral limb.

The frontomarginal is barely represented. The rostral and subrostral fissures are both well marked.

ORBITAL SURFACE.—The main orbital fissure (Figure 4) is of zygal shape, and distinctly demarcates a post-orbital gyre, with several sagittal preorbital gyres. An independent sagittal orbital fissure lies mesad in the preorbital region.

The olfactory fissure is simple, and 5 cm. in length.

GYRES OF THE FRONTAL LOBE (LATERAL SURFACE).—The precentral gyre is fairly flexuous, and is quite narrow at the site of its interruption by the anastomosis between the central and supercentral fissures.

The remaining frontal gyres, especially the superfrontal and medifrontal are of an exceedingly complex configuration owing to the zig-zag courses and transverse anastomoses of the much-ramified frontal fissures.

The subfrontal gyre in comparison with its fellow of the left side is small.

MESIAL SURFACE.—The mesial surface of the superfrontal gyre is broad, and marked by numerous rami of the supercallosal, as well as smaller fissural segments.

The paracentral gyre is about 4 cm. in length. Its dorsal border is indented by the well-marked inflected, and only slightly by the central. There is a vertical intraparacentral which joins the paracentral over a slight vadum.

ORBITAL SURFACE.—Compared with the left half, the gyres are simpler, and in the preorbital region present fairly regular, sagittally directed gyral tiers.

FISSURES OF THE PARIETAL AND OCCIPITAL LOBES (LATERAL SURFACE).—*The Postcentral Fissural Complex.*—The confluent post- and subcentral together measure 7 cm. in length, running parallel with the central. Several rami spring from the combined fissure, and it anastomoses with a segment of the parietal. There is no transpostcentral.

The parietal is interrupted by a narrow isthmus not far from the paroccipital. In the parietal gyre are several fissures, the most cephalic one (see Figure 3) corresponding with Brissaud's transparietal.

The paroccipital is of very unusual form, owing to the overlapping of the cephalic portion of the paroccipital gyre by a parietal gyral operculum.[3] The overlapping is considerable in extent, hiding from view both the cephalic ramus and stipe of the paroccipital. An independent preparoccipital fissure dips under this operculum, as does a segment which runs parallel with the parietal. The entire arrangement is very unusual indeed, and seems not without significance in its bearing upon the development of the paroccipital from the primate exoccipital. The caudal ramus is short; the caudal stipe long and tortuous and anastomosing with the occipital fissure.

The intermedial fissure joins the supertemporal parietal and an unnamed fissure in the angular gyre, confluent with the paroccipital.

The exoccipital complex is intricate. There is a zygal, much-ramified exoccipital segment whose caudal limbs embrace the lateral extremity of the postcalcarine; a cephalic limb anastomoses with a meditemporal segment.

MESIAL SURFACE.—The precuneal fissure is of zygal shape, but the course of the stem is in an unusual direction, namely, dorso-ventrad instead of caudo-cephalad.

There is a tri-radiate intraprecuneal fissure which anastomoses with the paracentral.

The cuneus is richly fissured.

GYRES OF THE PARIETAL AND OCCIPITAL LOBES (LATERAL SURFACE).—The postcentral gyre is of more uniform width than the precentral, and is rendered quite flexuous by the indenting rami of the adjacent fissures.

The parietal gyre, aside from the peculiar opercular formation by which it partially overlaps the paroccipital gyre, and while shorter than its fellow on the left side, is intricately convoluted.

The paroccipital gyre is of a peculiar form. In the overlapped portion, as described before, there is a preparoccopital fissure, while two other fissures arise from the occipital cleft.

The marginal gyre, curving round the bifurcated episylvian, is very broad. The angular and postparietal gyres present a very complex configuration, being broken up into several areas by numerous confluences of fissures. An imaginary line passing from the occipital, via the exoccipital stem to the distinct postcalcarine, seems to demarcate quite clearly the conventional lateral bounds of the occipital lobe.

MESIAL SURFACE.—The precuneus is rather smaller than usual, and peculiarly fissured. The cuneus is of fair size, and well supplied with fissures. The callosal gyre presents nothing unusual.

[3] This peculiar configuration will be described and discussed in more detailed form in a special contribution upon the paroccipital fissure generally.

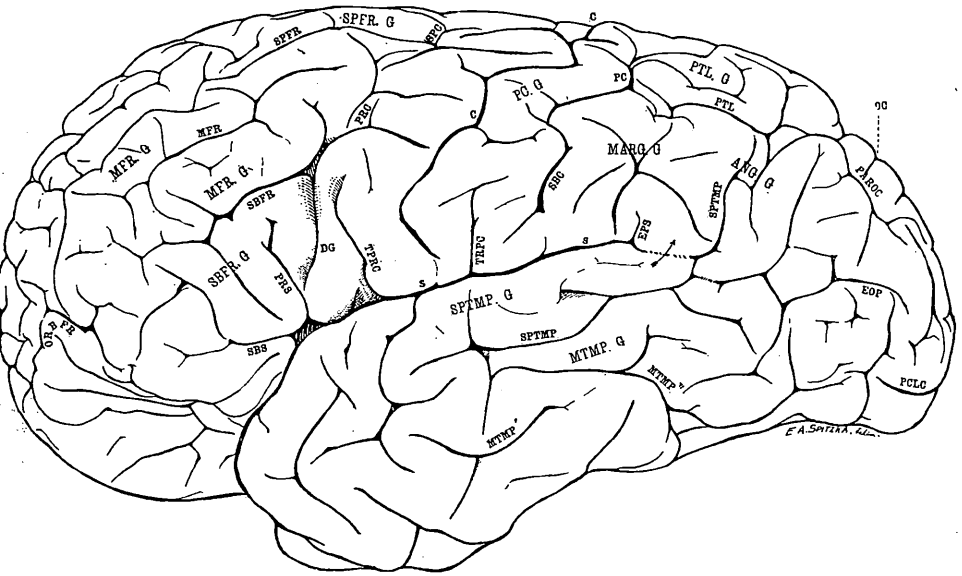


FIG. 7. Brain of "Nooktah;" lateral view of the left hemicerebrum.

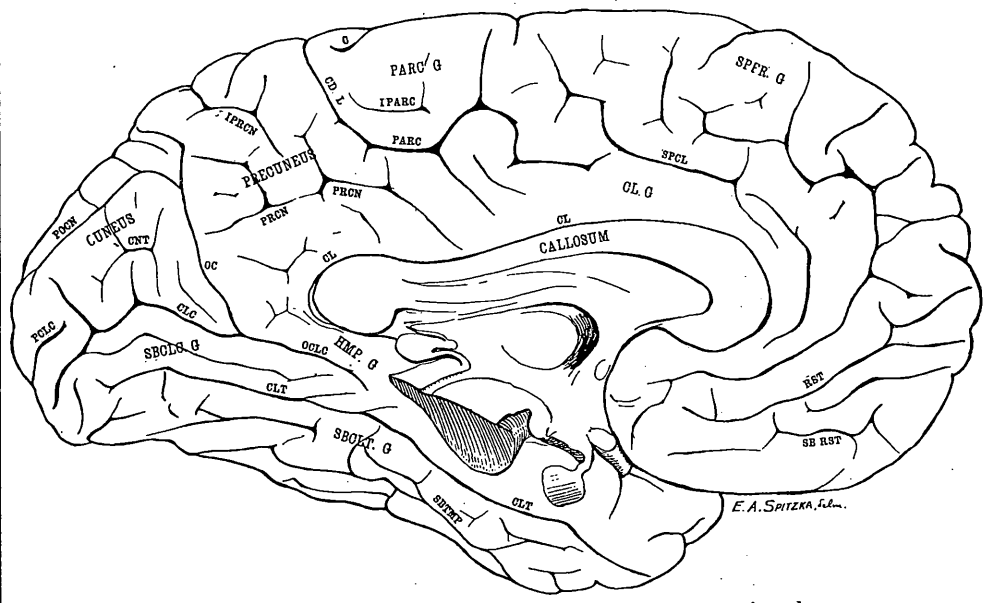


FIG. 8. Brain of "Nooktah;" mesial view of the left hemicerebrum.

FISSURES OF THE TEMPORAL LOBE (LATERO-VENTRAL SURFACE).—The supertemporal fissure sweeps caudad in bold curves, until, near the region of the marginal gyre, it bifurcates, its dorsal limb joining the intermedial, the ventral limb passing on to join a meditemporal segment. Thus the course of fissural confluence may be followed from the tip of the temporal lobe as far as the exoccipital, and dorsad, by means of the intermedial and parietal to the postcentral.

There are at least three distinct meditemporal segments, the caudal one anastomosing with the exoccipital, supertemporal and the subtemporal.

The subtemporal is of good length (10 cm.) anastomosing caudad with the meditemporal, where the fissure sweeps well upon the lateral aspect of the lobe.

The collateral attains a length of 13.3 cm. and presents many flexuosities. In its caudal part it is particularly ramified. Cephalad it anastomoses with the postrhinal (amygdaline) fissure.

GYRES OF THE TEMPORAL LOBE (LATERO-VENTRAL SURFACE).—The supertemporal gyre is broad in its caudal portion, narrow cephalad. The meditemporal and subtemporal are of good width, and each is fairly well demarcated. The subcollateral and subcalcarine gyres are very wide in their caudal portions, and grow narrower toward the temporal tip. The subcalcarine is notable for its rich fissuration.

The transtemporal fissures and gyres present nothing unusual.

INSULA.—The insula seems a trifle better developed—so far as fissuration is concerned—than that on the left side, but it is on the whole less massive. There is the usual long postinsular gyre, and five preinsular gyres.

2. BRAIN OF "NOOKTAH."

(See Figures 7 to 12.)

The second specimen is that of an adult male, "Nooktah," husband of "Atana." His age is likewise in the neighborhood of fifty-five years. "Nooktah" died on May 14, 1898. The brain was removed on May 16, and weighed, while fresh, 1470 grammes. It was placed in a mixture of formal and alcohol. Its weight on May 25, 1901, was as follows:

Left hemicerebrum (plus a piece of callosum belonging to the right half), 474 grammes; right hemicerebrum, 470 grammes; cerebellum, pons and oblongata, 142 grammes; total 1086 grammes.

The loss in weight during a period of over three years amounts to 384 grammes, or 26 per cent of the original weight.

THE CEREBRUM.

The cerebrum is well preserved and quite firm, so that it is difficult to study in detail the depths of the fissures. In general, the fissuration is fully equal in complexity to that exhibited by "Kishu's" cere-

brum. Transversely directed ramifications and anastomoses are very numerous. In the frontal lobes there is a distinct subdivision into five gyral tiers on the left, and four on the right side.

Viewed dorsally and ventrally, the cerebrum appears wider, and a trifle more intricate, in configuration than that of "Atana," resembling that of "Kishu" in many respects. The insulæ are covered in by the opercula. The callosum, 8 cm. in length, on cross-section is seen to be quite thick in the splenium and genu, but unusually thin in the body of this structure.

The combined calcarine-postcalcarine fissures do not take quite as straight a course as noted in "Atana's" cerebrum.

Left Hemicerebrum.

The Interlobar Fissures.—*The Sylvian Fissure and its Rami.*—The sylvian fissure is 5.7 cm. in length and quite straight. Its depths are: Presylvian depth, 14 mm.; medisylvian depth, 17 mm.; postsylvian depth, 24 mm.

The basisylvian, measuring from the temporal pole, is 23 mm. in depth. The presylvian is simple, 20 mm. long, and quite deep. The subsylvian is also simple and 20 mm. in length. The episylvian is exceedingly short (5 mm.) while the hyposylvian is absent.

The Central Fissure.—The central fissure is notably tortuous, and when measured by a wet string laid in its course attains the length of 11.5 cm. There are seven distinct curves, two more than usual. One caudal ramus closely approaches the subcentral fissure, being separated by a slight vadum. Dorsad the fissure reaches the dorsi-mesal margin; ventrad, there is a slight, superficial junction with the sylvian cleft by a vessel-groove.

The Occipital Fissure.—The occipital fissure is deep. Its mesial length is 3.5 cm., its dorsal length, 2 cm. On the mesial surface, near the dorsi-mesal margin, there is an appearance of bifurcation. In reality there springs from out of the true occipital a well-marked adoccipital which extends upon the dorsum for 2 cm., parallel with both the occipital (dorsal part) and the cephalic stipe of the paroccipital. This adoccipital is exceedingly well marked. Its walls slope cephalo-ventrad, so that one may speak of a parietal operculum which partially overlaps a cuneolus.

The Calcarine Fissure.—The calcarine fissure is 3 cm. in length, sends off one dorsal ramus and bifurcates caudally. These limbs embrace a trans-calcarine isthmus, which separates the calcarine from a well-marked, simple postcalcarine ("sulcus extremus" of Schwalbe). The latter fissure, lying almost wholly on the convex surface of the hemicerebrum, is 3 cm. in length. The general direction of the two fissures is less straight than noted in the other hemicerebra.

The occipito-calcarine fissural stem is 2 cm. in length, and completely confluent with both the occipital and the calcarine fissures.

Fissures of the Frontal Lobe (Lateral Surface).—*The Precentral Fissural Complex.*—This complex of fissures is of an extremely unusual arrangement, all its parts being independent of each other. First, the supercentral, essentially of zygal type, is situated unusually distant from the central, and anastomoses with the superfrontal only. Dorsad of the supercentral, is another fissure, simple and independent, and running about parallel with the central. The precentral seems to be made up of two segments, both of zygal type. The dorsal one is a true simple, non-anastomosing zygon. The ventral piece anastomoses with both the diagonal and the subfrontal. The transprecentral, 2.3 cm. in length, is independent, and does not dip deeply into the sylvian cleft.

The diagonal is deep and has a common junction with the precentral and the subfrontal.

The superfrontal may be traced uninterruptedly very far cephalad, nearly to the orbito-frontal, from which it is separated by a very narrow depressed isthmus. In the prefrontal region, the fissure passes somewhat further laterad than usual, leaving the superfrontal gyre quite broad in this region. A series of fissural segments lying in the superfrontal gyre (paramesial fissures?) give, with the division of the medifrontal gyre, five fairly distinct frontal gyral tiers.

The medifrontal fissure is very distinct, attains a length of 4.5 cm., is richly ramified, and serves to divide the medifrontal gyre into two nearly equal tiers. The fissure does not anastomose with any other.

The subfrontal fissure, 3.5 cm. in length, bifurcates cephalad and sends a long ramus into the subfrontal gyre corresponding in its position with the radiate fissure.

The orbitofrontal is 5 cm. in length, very well marked, tortuous and ramified. It joins an orbital fissure superficially.

Mesial Surface.—The supercallosal is in three segments separated from each other by very narrow isthmuses. The caudal segment is confluent with the paracentral. Cephalad, the supercallosal and frontomarginal fissures are arranged in so peculiar a manner that one is in doubt as to how to designate each segment. The appearance is one of duplication similar to that observed hitherto by Manouvrier and others.

The paracentral is simple, sweeping caudad gradually to appear on the dorsal surface for 12 mm. Cephalad it joins a segment of the supercallosal. There is an independent longitudinal intraparacentral.

The inflected is absent.

Both the rostral and subrostral fissures are well marked; the former is 5.5 cm. in length, the latter 3.5 cm.

Orbital Surface.—On the orbital surface, the fissures are complex. There is a lateral triradiate fissure, whose caudal limbs correspond with Weisbach's "transverse orbital," and mesad of this lie a zygal and one sagittal fissure. The last-mentioned anastomoses with the orbitofrontal over a vadum.

The olfactory fissure is 3.8 cm. in length.

Gyres of the Frontal Lobe (Lateral Surface).—The precentral gyre, in general, is much wider than the postcentral gyre, but is unusually tortuous, and indented by numerous fissural rami.

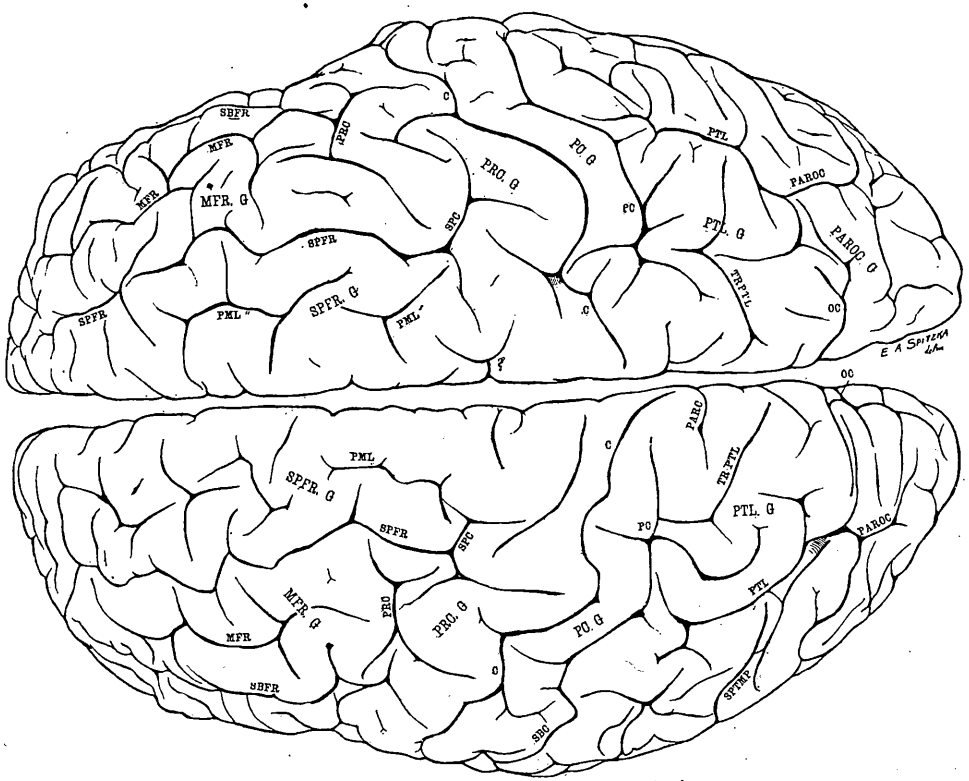
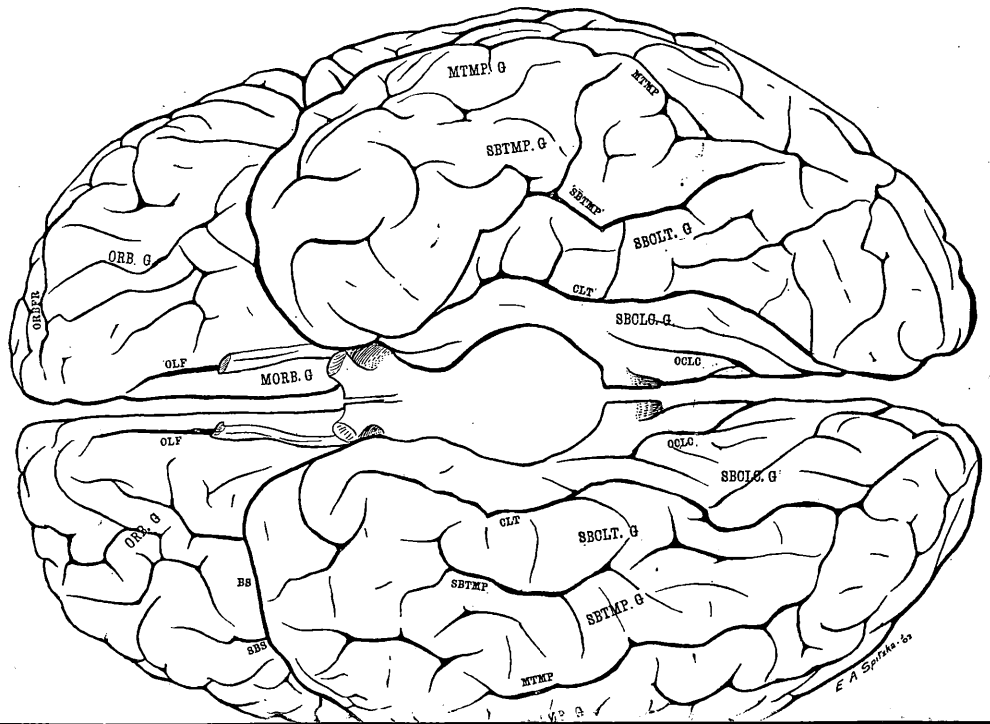


FIG. 9. Brain of "Nooktah;" dorsal view.



The superfrontal gyre is especially broad in the prefrontal region, and more or less regularly divided into two longitudinal tiers by two paramesial fissural segments. Between these two are a triradiate and also a zygal segment; still further cephalad there are numerous transverse triradiate and zygal pieces which make this portion of the gyre of an exceedingly complex configuration.

The medifrontal gyre is massive, tortuous and distinctly divided into two tiers by a long medifrontal fissure.

The subfrontal gyre, while small, is well convoluted, and in general exhibits most strikingly the tendency of fissures and ramifications to assume a transverse direction.

MESIAL SURFACE.—The mesial surface of the superfrontal gyre is broad and traversed by a large number of radiating fissures and rami. The dorsi-mesal margin is particularly marked by numerous fissural segments.

The paracentral gyre is of moderate size, of simple form, marked merely by a short longitudinal intraparacentral, and slightly indented in its dorsal margin by the central.

ORBITAL SURFACE.—On the orbital surface may be distinguished a postorbital portion, and several sagittal preorbital gyres. The mesorbital gyre is very narrow.

FISSURES OF THE PARIETAL AND OCCIPITAL LOBES (LATERAL SURFACE).—*The Postcentral Fissural Complex.*—In this hemicerebrum, the postcentral and subcentral are combined to form a continuous fissure, attaining a length of 8.5 cm. Dorsally, the fissure bifurcates, embracing the gyre indented by the caudal limb of the paracentral. The caudal limb of the postcentral is joined by a transparietal piece. In all, five additional rami spring from the combined fissure. A vadum separates it from the parietal; another from the central.

The parietal, cephalad, is ramified. A narrow isthmus separates it from the supertemporal. Caudad it anastomoses with the cephalic limb of the paroccipital. A deep furcal ramus passes into the parietal gyre.

A transparietal has been described as confluent with one of the postcentral dorsal limbs; another fissure, also confluent with the postcentral, runs somewhat parallel with the parietal.

A quadri-radiate fissure lies in the marginal gyre, just dorsad of the short episylvian. A true intermedial does not seem to be present.

The paroccipital is of the usual zygal shape, with its cephalic stipe passing into the cuneolus, i. e., between the occipital and adoccipital fissures. Laterad in the angular gyre, just caudad of the supertemporal and the cephalic paroccipital ramus, there is a fissure, 3.5 cm. in length, whose walls are markedly inclined caudo-ventrad. If this fissure represents, as it probably does, a segment of the exoccipital, we have here the formation of a partial occipital operculum. There are other zygal pieces on the lateral surface apparently in the course of the primate exoccipital, as well as numerous fissures in the angular gyre and occipital region.

MESIAL SURFACE.—The precuneal fissure is of irregular zygal shape. The ventro-cephalic limb is unusually long. It does not anastomose with other fissures.

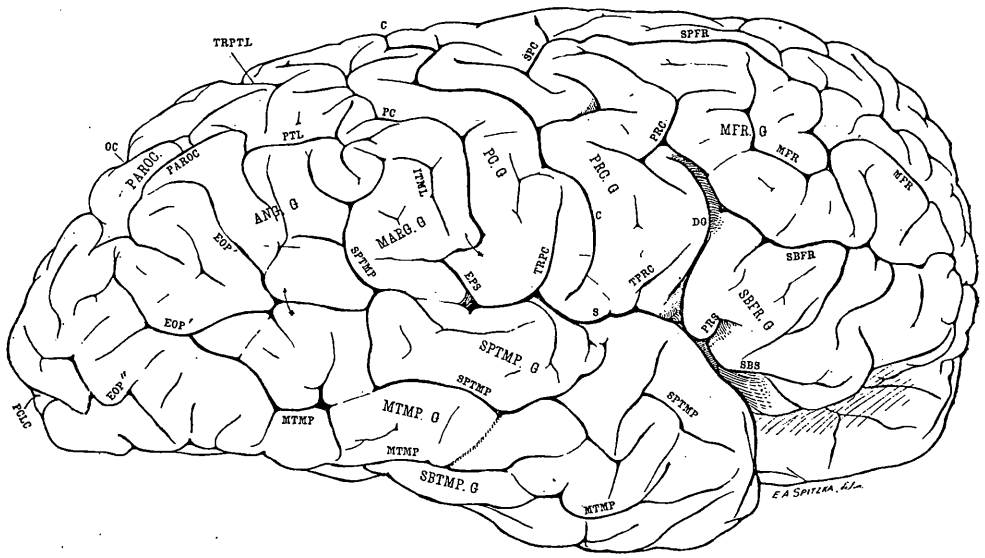


FIG. 11. Brain of "Nooktah;" lateral view of the right hemicerebrum.

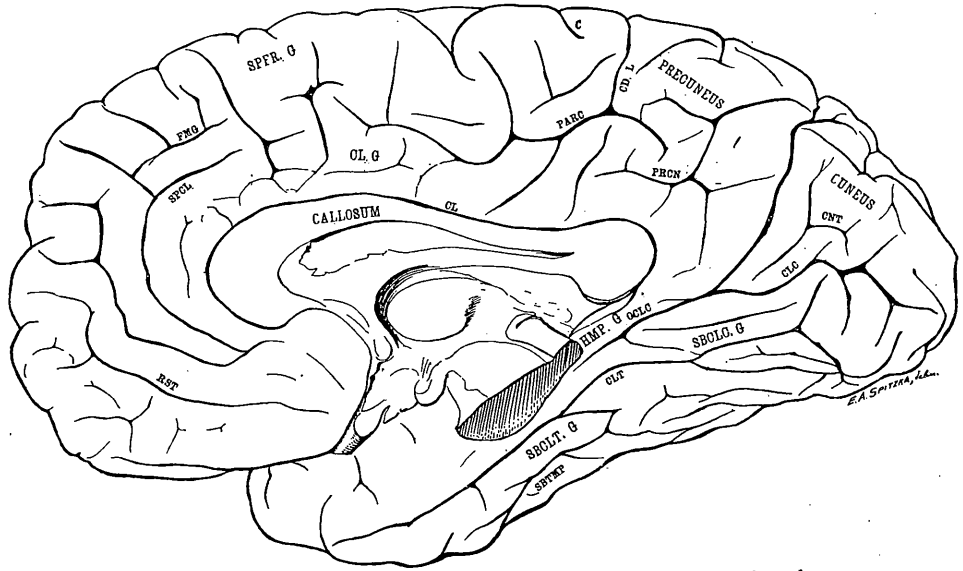


FIG. 12. Brain of "Nooktah;" mesial view of the right hemicerebrum.

There is an irregular zygal intraprecuneal just dorsad of the precuneal, which crosses the dorsi-mesal border.

The cuneal fissure is distinctly zygal. There is an irregular postcuneal fissure which sends a ramus into the paroccipital (possibly a post-paroccipital element).

GYRES OF THE PARIETAL AND OCCIPITAL LOBES (LATERAL SURFACE).—The postcentral gyre is narrow in its dorsal two-thirds, quite broad in its ventral portion, and quite tortuous. The parietal gyre is shorter than on the right side, but richly fissured. The paroccipital gyre is broad in its caudal arm, but quite narrow in its cephalic portion. A ramus of the postcuneal, possibly a postparoccipital piece, lies caudad of the occipital.

The marginal gyre is unusually broad, and curiously marked by the quadri-radiate fissure described before. The angular gyre is very complex.

MESIAL SURFACE.—The precuneus is rather small, probably owing to the existence of an adoccipital separating off a cuneolus. The cuneus is of good size and richly fissured.

FISSURES OF THE TEMPORAL LOBE (LATERO-VENTRAL SURFACE).—The supertemporal fissure presents a curious arrangement. Cephalad there are two independent zygal segments of which the caudal one anastomoses with the sylvian. The larger part of the fissure attains a length of 9 cm., almost reaching the parietal. In its course it anastomoses with a meditemporal. Further caudad, it anastomoses with the (exoccipital ?) complex in the parieto-occipital transition.

The meditemporal is represented by three segments. The subtemporal is 6.5 cm. in length, and richly ramified. The collateral is a distinct, boldly-curved fissure of a length of 11 cm.

There is a short but distinct postrhinal (amygdaline) fissure.

GYRES OF THE TEMPORAL LOBE (LATERO-VENTRAL SURFACE).—The supertemporal gyre, owing to the odd course and formation of the supertemporal fissure, while massive is unusually tortuous. The meditemporal and subtemporal gyres on the whole, are broad, and richly fissured. The subcollateral gyre is well-defined, and considerably fissured, especially in transverse directions.

The subcalcarine is of the usual form, and is marked by one long fissural segment lying between the collateral and calcarine fissures, distinctly dividing the gyre into two longitudinal tiers.

THE INSULA.—The insula is of simple configuration, resembling in its general appearances those of the other Eskimo hemicerebra, and exhibiting one postinsular and four preinsular gyres.

RIGHT HEMICEREBRUM.

THE INTERLOBAR FISSURES.—*The Sylvian Fissure and its Rami.*—The sylvian fissure is 4.3 cm. in length and of the following depths: Presylvian depth, 13 mm.; medisylvian depth, 18 mm.; postsylvian depth, 25 mm.

Its course is irregular. The presylvian is a very short fissure. The subsylvian is simple and 2 cm. in length. The episylvian is 2 cm. in length

and anastomoses with the sub-(post)-central over a slight vadum. The hyposylvian is represented by a mere notch.

The Central Fissure.—The central fissure is 11.5 cm. in length, has the usual five curves and is less tortuous than its fellow on the left side. At about 2 cm. from the dorsi-mesal margin, it anastomoses with a small fissure in the precentral gyre over a vadum 8 mm. deep.

The Occipital Fissure.—The occipital fissure is well-marked, deep, with a mesial length of 4.5 cm., and a dorsal length of 2.5 cm.

The Calcarine Fissure.—The calcarine fissure is exceedingly tortuous and ramified. Its length is 5 cm. Caudally it bifurcates, and in its course sends off three rami. The postcalcarine is triradiate, its two mesial limbs embracing the dorsal limb of the furcal calcarine. The postcalcarine lies almost wholly on the convex surface of the hemicerebrum and anastomoses with an exoccipital piece.

The occipito-calcarine stem is 2.8 cm. in length and sends one ramus into the subcalcarine gyre.

Fissures of the Frontal Lobe.—*The Precentral Fissural Complex.*—The supercentral is of a well-formed zygal type anastomosing freely with the superfrontal. The precentral is separated from the supercentral, is also of zygal shape, and anastomoses with the subfrontal. A depressed isthmus separates the diagonal from both the precentral and the subfrontal. The transprecentral springs from the sylvian cleft, but is otherwise independent.

Communicating with the diagonal over a deep vadum, and dipping deeply into the sylvian cleft, there lies an unnamed fissure.

The superfrontal is divided into two segments in the mid-frontal region by a small isthmus. Both pieces are tortuous and ramified. The caudal, larger piece communicates with the distinct medifrontal by a transverse anastomosis.

There are two distinct paramesial segments in the superfrontal gyre.

The medifrontal fissure is in this case exceedingly well marked. It may be described as consisting of two, freely-confluent segments, attaining a total length of 9 cm. It has a sigmoid course, and is richly ramified. It communicates near its middle with the superfrontal and far cephalad with the subfrontal by means of what may be a segmental representative of the orbitofrontal fissure.

The radiate fissure is represented by a short piece.

Several segments, not very typical, are to be observed in the course of what would be the orbitofrontal.

Mesial Surface.—The supercallosal fissure is distinct for 7 cm. in the cephalic region, but, as one approaches the paracentral the appearances become atypical. The continuity of the fissure is broken by two transverse isthmuses. As for the paracentral, whether this is the short caudal piece so marked in Figure 12, with its cephalic limb caudad of the triradiate piece traversing the dorsi-mesal margin, or whether it is the entire piece, 4 cm. in length with an intraparacentral ramus is a matter of doubt. The author inclines to the latter explanation, judging from the general relations of neighboring fissures. It still remains an important

question whether the tri-radiate piece at the dorsi-mesal margin represents the inflected. It were the first instance in the author's experience (based on studies especially directed to the inflected fissure in over a hundred brains) that the inflected were other than a simple fissure.

The frontomarginal is represented by two segments, both running parallel to the supercallosal, the longer segment joining the latter just ventrad of the splenium.

The rostral fissure is 5.5 cm. in length, while the subrostral is only slightly indicated.

Owing to the narrowness and comparative insignificance of the mesorbital gyre in this hemicerebrum, the olfactory fissure becomes visible on the mesial aspect for 2 cm.

The Orbital Surface.—Two principal, sagittally-directed orbital fissures, and several smaller segments mark the orbital surface. The olfactory fissure is 5 cm. in length.

Gyres of the Frontal Lobe (Lateral Surface).—The precentral gyre is of unusual breadth and is very tortuous. Its surface area is fully twice as great as that of the precentral.

The superfrontal gyre is of good width, except near the frontal pole, where the gyre tapers perceptibly and becomes very narrow. One of the paramesial pieces serves to divide a portion of the gyre into two tiers. Further cephalad the gyre is marked by many transverse segments and incisures.

The medifrontal gyre is particularly massive and of a superior complexity. It is notable for its distinct and long medifrontal fissure.

The subfrontal gyre is smaller than its fellow on the left side and in its configuration much less developed.

Mesial Surface.—The mesial surface of the superfrontal gyre, while well supplied with fissures is a trifle less so than on the left side.

The limits of the paracentral, depending upon the identification of the paracentral rami must remain a matter of doubt for the present at least.

Orbital Surface.—The mesorbital gyre is unusually narrow in this case. The remaining gyres may be resolved into three principal portions, sagittally directed, without any demarcated postorbital gyre.

Fissures of the Parietal and Occipital Lobes (Lateral Surface).—*The Postcentral Fissural Complex.*—The combined postcentral-subcentral attains a length of 7.5 cm., is bifurcated dorsally, to embrace the caudal paracentral limb, and anastomosing ventrally with the episylvian over a slight vadum. From it spring two cephalic and three caudal rami. The transpostcentral springing from the sylvian, is otherwise an independent fissure.

The parietal is separated from the postcentral, and is confluent with the paroccipital. Five rami spring from it. There is a well-marked transparietal. The intermedial fissure is small. The paroccipital is a very irregular zygal fissure, confluent with the parietal by its cephalic ramus. The cephalic stipe is bifurcal. The caudal stipe anastomoses with the postcuneal.

Of the exoccipital complex there may be made out one extensive seg-

ment (EOP′, Fig. 11) irregular and ramified, curving around the caudal ramus of the paroccipital; another segment (EOP″, Fig. 11) ventrad of this, and whose caudal limbs embrace the lateral end of the postcalcarine. Numerous other fissures mark the angular gyre and occipito-parietal transition.

Mesial Surface.—The precuneal fissure, as in the same half of "Atana's" cerebrum, presents a vertical zygon. One of its dorsal limbs anastomoses slightly with the paracentral. The cuneal fissure is zygal and resembles very much that of the other half of this cerebrum. The same can be said of the postcuneal.

Gyres of the Parietal and Occipital Lobes (Lateral Surface).—The postcentral gyre is quite narrow, especially in its dorsal portion. The parietal gyre is short, but broad and richly fissured. The paroccipital gyre is of irregular contour, its caudal arm being many times larger than its cephalic portion.

The marginal and angular gyres present a notable complexity as well as considerable extent of surface. The latter is of especial broadness.

Mesial Surface.—The precuneus is rather better developed than its fellow on the left half. The cuneus of this hemicerebrum bears a striking resemblance to that of the other side. The disposition of its intrinsic fissures is practically the very same as in the left cuneus.

The callosal gyre throughout is more fissured than on the left.

Fissures of the Temporal Lobe (Latero-ventral Surface).—The supertemporal fissure, like that of the left side, runs a very irregular and atypical course. There is a cephalic smaller, tri-radiate segment, and a larger, tortuous caudal piece whose length is 8.5 cm. To understand its appearance, the reader must refer to Figure 11. The dorsal end of the fissure is furcal; from here it sweeps ventro-cephalad, sending one ramus into the supertemporal gyre, another across the angular gyre to anastomose over a vadum with the exoccipital. The fissure proceeds well ventrad, then turns sharply to pass cephalad, and divides into two rami, one closely approaching the sylvian, the other passing just a little ventrad of the cephalic supertemporal segment.

The meditemporal is represented by three segments, the middle one of which is quite long and anastomoses with the collateral fissure far caudad.

The subtemporal is represented by two irregular and much-ramified pieces. The collateral is 11.5 cm. in length and is well-curved. The postrhinal (amygdaline) fissure is slightly indicated.

Gyres of the Temporal Lobe (Latero-ventral Surface).—The supertemporal gyre is particularly massive and very broad, especially in its middle portion, owing to the wide ventral sweep in the course of the supertemporal fissure. The meditemporal and subtemporal gyres are well developed. The subcollateral is comparatively simple. The subcalcarine is narrow in its middle portion but unusually broad and richly fissured caudally.

The Insula.—The insula resembles that of the left side. There is a broad postinsular gyre, and four smaller preinsular gyres. In general it is less developed and smaller than its fellow.

3. Brain of "Avia."

(See Figures 13 to 18.)

The third specimen is that of a young girl, about 12 years old. Her name is variously spelled "Avia," "Ar-wee-ah" and "Aviag"; it is pronounced as if spelled "A-vee-ah." She died in New York City on May 19, 1898, at 7 p. m., and was received at the Anatomical Laboratory, Columbia University on May 21, at 12 m. When fresh, the brain weighed 1227 grammes. It was placed in a mixture of formal and alcohol. (This mixture probably consisted of equal parts of 50 per cent alcohol and 20 per cent formaldehyde solution.) Its weight on May 25, 1901, was as follows:

Left hemicerebrum, 369 grammes; right hemicerebrum, 366 grammes; cerebellum, pons and oblongata, 135 grammes; total, 870 grammes.

The loss in weight during a period of three years amounts to 357 grammes, or 29 per cent of the original weight.

The Cerebrum.

This cerebrum is as well preserved and firm as that of "Nooktah." As is consistent with the youth of the subject, the external configurations are far simpler than exhibited in any of the brains here described. Viewed dorsally or ventrally, the outline is not so markedly hexagonal, the frontal lobes are less broad and more rounded off, and the cerebrum tapers caudad more sharply than do the other Eskimo brains. An asymmetry of the hemicerebral masses is noticeable; the right parietotemporal region is fuller than the left, and the left subfrontal more massive than that of the right side. Further, the convexity of the left occipital lobe is fuller than that of the right. Viewed laterally, the dorsal curve of the cerebrum is more pronounced than that of either "Atana" or "Nooktah," and the hemicerebral mass does not taper so markedly toward the occipital pole. Both insulæ are exposed, the left more than the right. The callosum, whose length is 47.5 per cent of the total cerebral length, presents the same outline on cross-section as noted in the other brains.

The slight curvature and higher dorsal situation of the calcarine-postcalcarine, noted especially in "Atana," is here likewise indicated.

While differing in considerable degree from the other Eskimo brains in that its complexity of fissuration is much less, due doubtless to the subject's youth, this brain must appear to the trained eye as presenting a very different configuration from what one is accustomed to see in the brains of whites. This "cerebral physiognomy"—we may venture

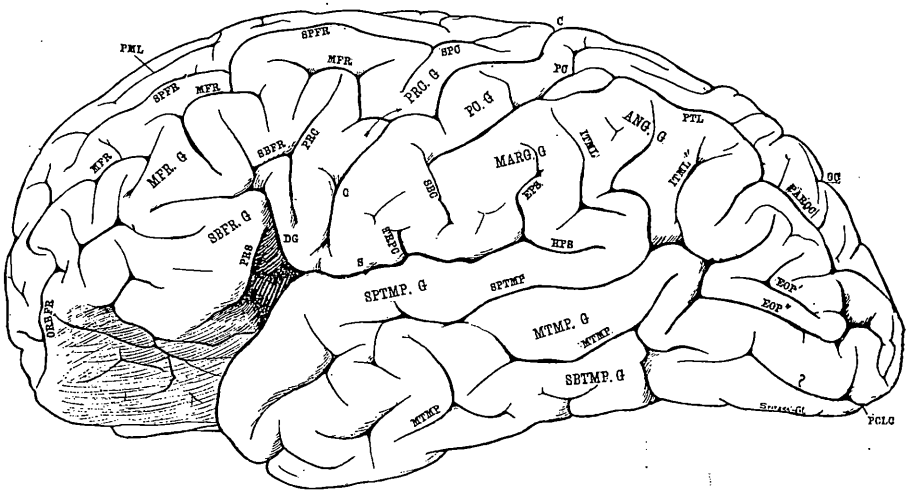


FIG. 13. Brain of "Avia;" lateral view of the left hemicerebrum.

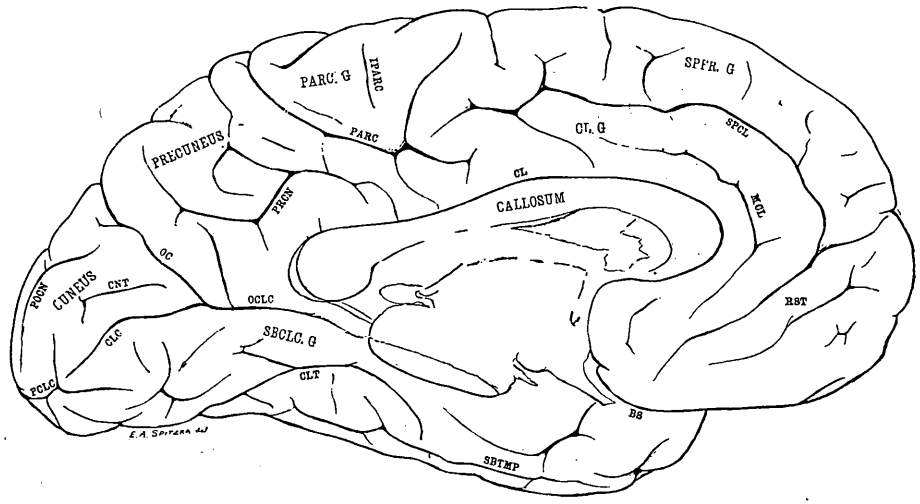


FIG. 14. Brain of "Avia;" mesial view of the left hemicerebrum.

to call it—seems as distinctive of the Eskimo-type as it is seen, better developed, in the brains of "Atana," "Nooktah" and "Kishu," and places it in this category as differing from all other types, quite as the outward characteristics of the race itself do.

LEFT HEMICEREBRUM.

THE INTERLOBAR FISSURES.—*The Sylvian Fissure and its Rami.*—The sylvian fissure is 5 cm. in length, fairly sinuous, opening out cephalad into a distinct sylvian fovea at the bottom of which the insula is visible. The depths of the fissure are as follows: Presylvian depth, 11 mm.; medisylvian depth, 18 mm.; postsylvian depth, 21 mm.

The basisylvian is 20 mm. deep. The presylvian, as determined by its origin from the extreme dorsi-cephalic angle of the insula, is 12 mm. in length and simple. The subsylvian is of the same length. The episylvian is somewhat Z-shaped and 1.5 cm. in length. The hyposylvian is well-marked and of the same length.

Central Fissure.—The central fissure is 11 cm. in length, of the usual contour, anastomosing over a vadum with a precentral-medifrontal segment. It has four short rami, two cephalic, and two caudal.

Occipital Fissure.—The occipital fissure attains a mesial length of 3 cm., and a dorsal length of 1.5 cm. It is deep throughout and of a simple contour. One short ramus is sent into the cuneus, another indents the paroccipital gyre cephalad.

Calcarine Fissure.—The calcarine is an exceedingly simple, slightly-curved fissure, 3 cm. in length. It is separated from the postcalcarine by a narrow but distinct transcalcarine isthmus. The postcalcarine begins on the mesial surface in a furcal piece and is continuous with a fissure (marked by (?) in Figure 13) upon the ventro-lateral margin of the hemicerebrum, the whole attaining a length of 7 cm.

The occipito-calcarine fissural stem is simple, 3 cm. in length, and is joined superficially by an independent fissure in the precuneus.

FISSURES OF THE FRONTAL LOBE (LATERAL SURFACE).—*The Precentral Fissural Complex.*—The supercentral is 4 cm. in length, and unusually simple, running parallel with the central. From its middle springs the superfrontal. Ventro-cephalad of the supercentral and separated from it—lies a segment which partakes of the values of a medifrontal and a precentral piece, and corresponds to what Schäfer (Quain) describes as an "anterior ramus of the inferior precentral." This piece is peculiar in that it is not confluent with the precentral, but anastomoses across the precentral gyre to join the central fissure over a vadum. The third segment is the precentral proper, 3.5 cm. long, from which springs the subfrontal.

The diagonal fissure in this case presents a curious appearance. The fissure is exceedingly deep and opens freely into the sylvian fovea. It completely divides the subfrontal gyre, being deeply confluent with the subfrontal fissure dorsally. Both walls of the fissure are again marked by smaller fissures and grooves.

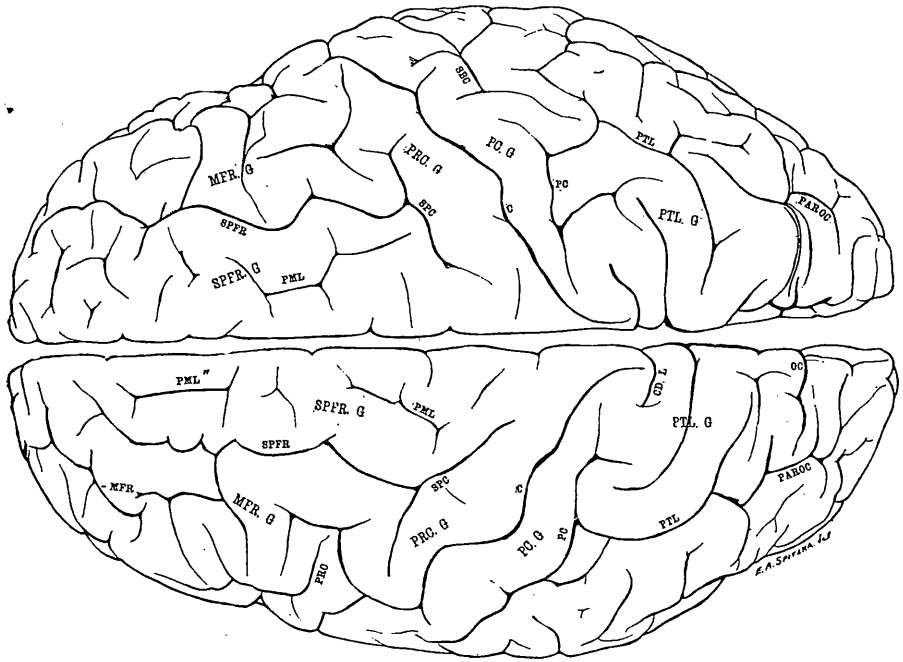


FIG. 15. Brain of "Avia;" dorsal view.

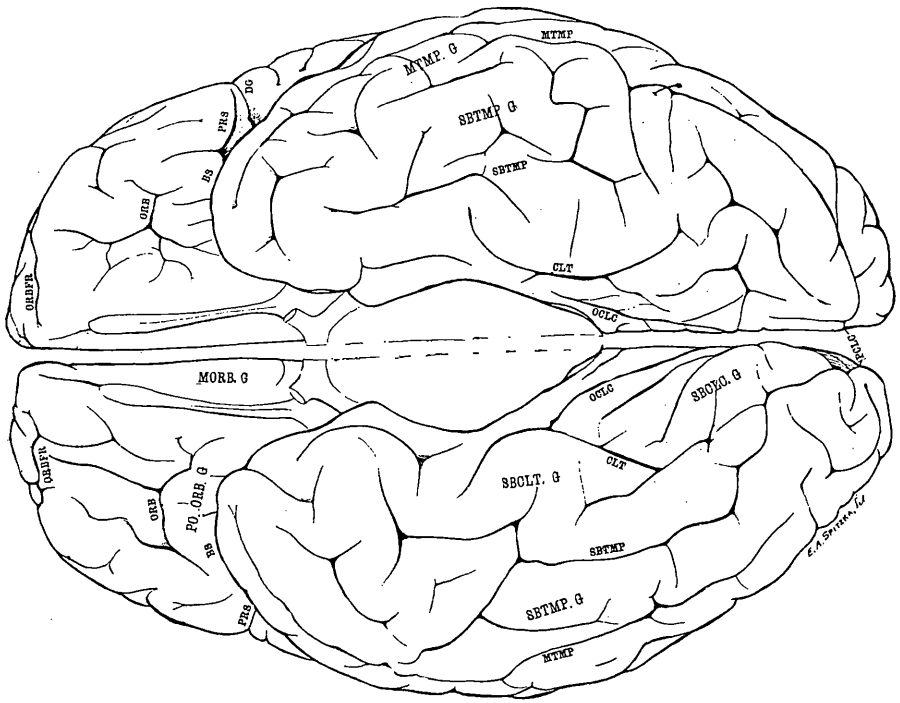


FIG. 16. Brain of "Avia;" ventral view.

The superfrontal fissure is a well-marked one, 7 cm. in length, springing from the supercentral and anastomosing with a medifrontal segment. Its cephalic termination is bifurcated.

The medifrontal is represented by three segments. The caudal one has been described as anastomosing with the central by means of a precentral element. The middle segment has been described as anastomosing with the superfrontal. Its ventral limbs curve around a subfrontal ramus. The most cephalic piece is of a complex, much-ramified contour, anastomosing with the orbitofrontal.

The subfrontal springs from the precentral, terminates in a simple manner at a distance of 2.5 cm. from this origin, and in its course anastomoses with the diagonal. There is one dorsal ramus embraced by the limbs of the middle medifrontal segment. Cephalad of this fissure there is a zygal fissure which, from its topography, might be interpreted as representing an orbitofrontal segment, the radiate, or a subfrontal segment. A distinct orbitofrontal exists further mesad, anastomosing with the medifrontal.

MESIAL SURFACE.—The supercallosal has a total length of 12 cm. Except at its caudal end it has few rami. It is possible that the angular caudal piece is really a segment of the paracentral with its ramus cephalad of the fissure which traverses the dorsi-mesial margin and which possibly represents the inflected. In some respects this arrangement resembles that noted by the writer in the right hemicerebrum of the assassin Czolgosz. The main part of the paracentral slopes in a nearly straight line toward its dorsal terminus. Its cephalic termination is furcal. There is a short, independent intraparacentral.

The frontomarginal is not present. The rostral is 3 cm. in length. In the callosal gyre, just cephalad of the genu there is a medicallosal fissure, running parallel with and between the callosal and supercallosal fissures.

ORBITAL SURFACE.—The orbital fissural complex may be resolved into a quadri-radiate arrangement of which the two caudal limbs form an arched transorbital, demarcating the preorbital from the postorbital regions.

The olfactory fissure is simple and 4.2 cm. in length.

GYRES OF THE FRONTAL LOBE (LATERAL SURFACE).—The precentral gyre is of regular contour, average width, and interrupted by the vadum described as joining the central with the precentral-medifrontal segment.

The superfrontal gyre is well demarcated, tapers cephalad, and is marked by three fissural segments, two of which are distinct paramesials.

The medifrontal gyre is of notable width, and is marked by numerous fissures whose rami tend to a transverse direction. The subfrontal, however, is very poorly developed; of small size, unusual configuration, and traversed completely by the diagonal. It fails to cover in the insula.

MESIAL SURFACE.—The mesial surface of the superfrontal gyre is simple and unusually narrow. The callosal gyre is of the usual form, except cephalad of the genu where it is wider than common, and is marked by a medicallosal fissure. The paracentral, meaning so much as is defined of it, is small.

Orbital Surface.—The orbital surface may be divided into pre- and post-orbital regions, fairly well supplied with fissures of irregular types. The mesorbital gyre is unusually narrow.

Fissures of the Parietal and Occipital Lobes (Lateral Surface).—*The Postcentral Fissural Complex.*—The postcentral and subcentral pieces in this instance anastomose over a vadum to form a continuous fissure whose total length is 8 cm. The postcentral segment is the longer. It is fairly tortuous, and terminates dorsally in a furcal manner to embrace the caudal limb of the paracentral. Caudally it anastomoses with the parietal by two junctions. Its junction with the subcentral takes place at a depth of 10 mm. over an oblique subgyre. The subcentral itself is tri-radiate. The transpostcentral is independent.

The parietal is a deep and well-marked fissure which anastomoses with the postcentral by means of two limbs, enclosing a gyral islet. It is the ventral one of these limbs which is deeper, and which is the ideal continuation of the fissure. One ramus of the parietal is sent into the parietal gyre, another into the angular. Caudad it anastomoses with the cephalic paroccipital ramus. There is a long transparietal which is confluent with the precuneal fissure on the meson. A second transparietal, tri-radiate, lies in the caudal part.

The paroccipital is zygal, with simple stipes and a bifurcating caudal ramus whose mesial limb is very long.

The intermedial proper is 2.3 cm. in length, independent of other fissures and its ventral end furcal. What may be described as a second intermedial (also named "angular fissure" by some authors) (ITML", Figure 13) lies caudad of the supertemporal, demarcating the angular from the postparietal gyre, and running into the anastomosing fissure which joins the supertemporal and "exoccipitalis secundus" (EOP", Figure 13).

In the parieto-occipital transition there exist several fissures which have the value of exoccipital segments. One of these (EOP') is a small tri-radiate piece. Another larger longitudinal piece (EOP") anastomoses cephalad with the supertemporal. Ventrad of this is a third segment marked (?) which is confluent with the postcalcarine.

Mesial Surface.—The precuneal is of the usual zygal shape. The dorsi-cephalic limb anastomoses with the transparietal. The cuneal fissure is short. The postcuneal is a distinct, tri-radiate fissure.

Gyres of the Parietal and Occipital Lobes (Lateral Surface).—The postcentral gyre is of a simple contour, and rather narrow in its dorsal third; ventrad it is broader. The parietal gyre is of good size, wide, and well fissured. The paroccipital gyre is small. The marginal and angular gyres are much simpler than in the other brains and relatively smaller.

Mesial Surface.—The precuneus is large and presents a richly-fissured surface. The cuneus is small and of rather a simple configuration. The hippocampal gyre is quite narrow.

Fissures of the Temporal Lobe (Latero-ventral Surface).—In this hemicerebrum the supertemporal fissure is interrupted at a distance of 3 cm. from the temporal pole by a narrow isthmus. The cephalic segment is quadri-radiate. The longer piece attains a length of 8.5 cm., and anastomoses caudally with an exoccipital (EOP") segment. Its course is in general a simple one.

Four segments, of which three are tri-radiate, and one zygal, represent the meditemporal. The last-mentioned piece sends a ramus well across the subtemporal gyre, and a narrow isthmus separates it from the piece described as confluent with the postcalcarine.

The subtemporal is indifferently represented by four irregular ramified segments.

The collateral is 8 cm. in length and quite sinuous. Its apparent shortness may be due to a division into two segments, the shorter cephalic one being confluent with a small postrhinal.

Gyres of the Temporal Lobe (Latero-ventral Surface).—Especially the supertemporal and to some degree the meditemporal gyres are narrow. The subtemporal is of the usual irregular contour, while the subcollateral is particularly wide in its middle portion owing to the divergence of the collateral fissure. For the same reason the subcalcarine gyre is very narrow in its middle portion but very broad, massive and richly fissured in its caudal part.

The Insula.—The insula is small and of simple configuration presenting the usual postinsular gyre and only three preinsular gyres. Owing to the slight development of the opercular parts the insular gyres are well-rounded, not flattened as is usual when encroached upon by the parts which cover them.

Right Hemicerebrum.

The Interlobar Fissures.—*The Sylvian Fissure and its Rami.*—The sylvian fissure is 5 cm. in length, ends in a simple manner without the usual episylvian or hyposylvian rami. Cephalad, and as described on the left side, the fissure opens out into a sylvian fovea. The depths of the fissure are as follows: Presylvian depth, 12 mm.; medisylvian depth, 16 mm.; postsylvian depth, 23 mm.

Both the subsylvian and the presylvian rami are very short. The central fissure dips into the cleft to a depth of 8 mm. The basisylvian is only 15 mm. in depth.

Central Fissure.—The central fissure attains a length of 10.5 cm., is only slightly tortuous and, reaching the sylvian dips into the cleft to a depth of 8 mm. On the mesial aspect, its dorsal end extends for 1 cm.

Occipital Fissure.—The occipital fissure is of exceedingly unusual form. At a point 2 cm. from its origin at the occipito-calcarine junction, the fissure appears to bifurcate, or what is probably a more correct description, it actually ends here and joins an adoccipital and a postcuneal at once, for the relations of neither arm with the paroccipital justify calling the one or the other the true continuation of the occipital.

Calcarine Fissure.—The calcarine fissure is 3 cm. in length, and is separated from the postcalcarine by a narrow and slightly-depressed isthmus. The postcalcarine is a tri-radiate segment with a long dorsal limb.

The occipito-calcarine stem is 2.7 cm. in length and anastomoses ceph-

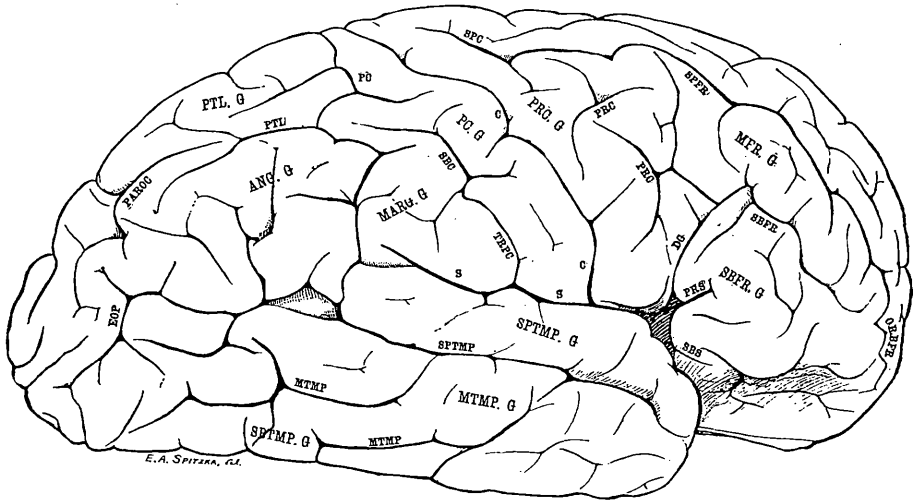


FIG. 17. Brain of "Avia;" lateral view of the right hemicerebrum.

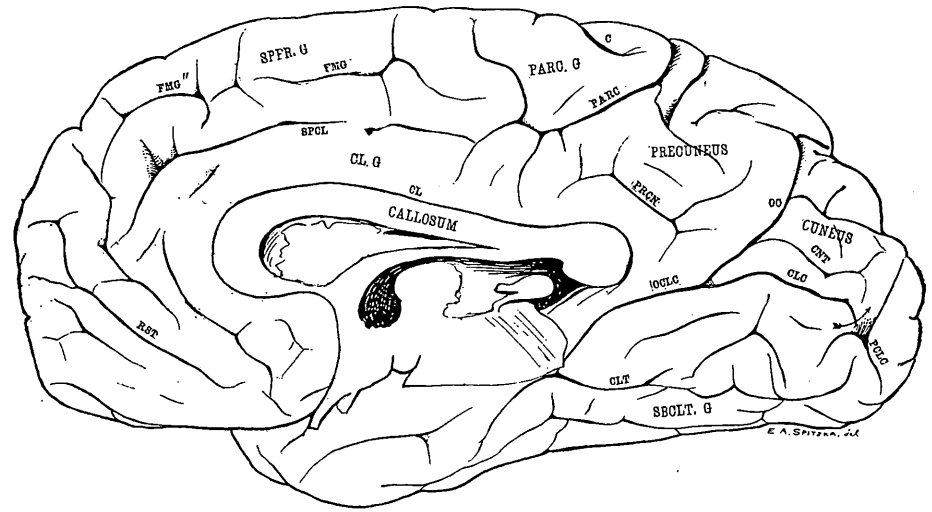


FIG. 18. Brain of "Avia;" mesial view of the right hemicerebrum.

alad with the collateral. It is deeply confluent with both the occipital and calcarine fissures.

FISSURES OF THE FRONTAL LOBE (LATERAL SURFACE).—*The Precentral Fissural Complex.*—As may be seen in Figure 15, the supercentral is practically identical with the one on the left side. Furthermore, there is a similar piece at the site of the precentral-medifrontal segment (Schäfer—Quain's "anterior precentral ramus") which does not, however, anastomose with the central as happens on the left side. It is in this case an independent tri-radiate fissure. Ventrad is another precentral, of a zygal shape, with one of its limbs joining the diagonal-subfrontal junction. Throughout, there may be found not a little resemblance between the two sides (compare Figures 13 and 17).

The diagonal dips deeply into the sylvian fovea, and, traversing the subfrontal gyre, as on the left side, to join the subfrontal as well as the precentral limb. The transprecentral is present, but does not appear on the convex surface.

The superfrontal springs from the supercentral in a similar manner to that of the left, and may be traced as a continuous fissure to its junction with the orbito-frontal. Unlike its fellow on the opposite side, this superfrontal fissure sweeps further laterad in the prefrontal region, and comes to occupy a position corresponding to the cephalic medifrontal piece of the left hemicerebrum. This divergence renders the superfrontal gyre broad and the medifrontal correspondingly narrow. The medifrontal gyre is chiefly traversed by transverse segments.

The subfrontal is a very tortuous fissure springing from the precentral-diagonal junction as described. Its total length is 3.5 cm. The orbitofrontal is a short (2 cm.) piece anastomosing with the superfrontal.

MESIAL SURFACE.—The supercallosal is 7 cm. in length, confluent with the paracentral and ending just cephalad of the genu. (N. B.—The interruption of the fissure in Figure 18 is due to defect in the plate.) Several fissural segments lie in the course of the frontomarginal, of which two are distinct longitudinal pieces. The rostral is 4.5 cm. in length, while the subrostral is quite short and shallow. Between the rostral fissure and the genu lies a medicallosal piece which joins a "transrostral" element. The paracentral fissure is almost the exact counterpart of its fellow on the left side.

ORBITAL SURFACE.—The orbital fissure presents a well-marked transverse stem from which spring two long cephalic rami. Another tri-radiate piece joins the orbitofrontal. The olfactory is 4.8 cm. in length and simple.

GYRES OF THE FRONTAL LOBE.—The precentral gyre is in general wider than its fellow on the left side. The superfrontal is also much broader, while the medifrontal is correspondingly less in width. Both of these gyres are well supplied with fissures tending in a transverse direction. The subfrontal gyre is much larger and better developed in all respects than the left, but like the latter is completely traversed by the diagonal.

MESIAL SURFACE.—On the meson, the superfrontal gyre is broader and more richly fissured than the left. The region marked by the rostral

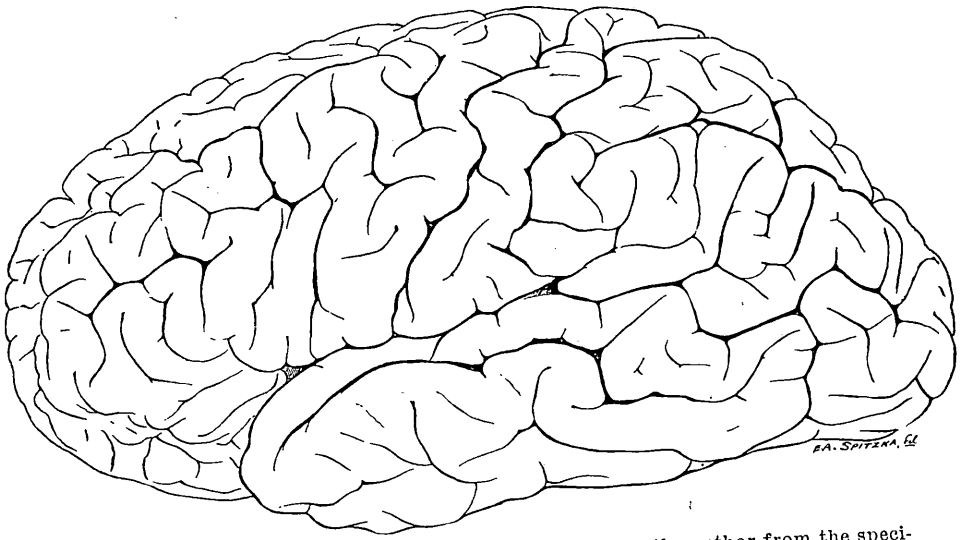


FIG. 19. Brain of "Kishu" (after Hrdlicka; drawn by the author from the specimen); lateral view of the left hemicerebrum.

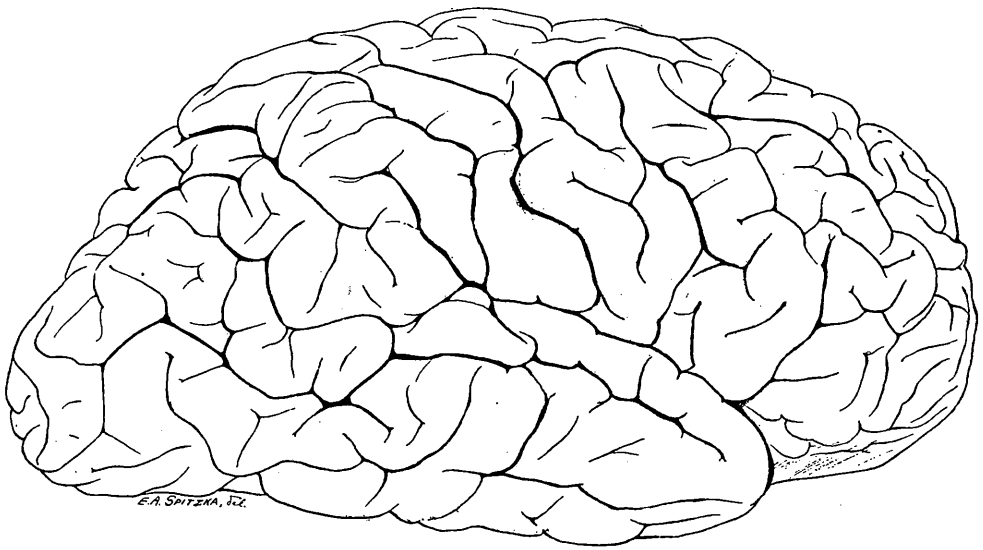


FIG. 20. Brain of "Kishu" (after Hrdlicka; drawn by the author from the specimen); lateral view of the right hemicerebrum.

fissures is also much more intricate in configuration. The callosal gyre is simple. The paracentral gyre is of the same shape and size as its fellow.

ORBITAL SURFACE.—The well-marked transorbital fissure distinctly demarcates the postorbital from the preorbital region. The latter is divided into several sagittal gyres.

FISSURES OF THE PARIETAL AND OCCIPITAL LOBES (LATERAL SURFACE).—*The Postcentral Fissural Complex.*—In this case the postcentral and subcentral elements are separated from each other. The postcentral is triradiate, with its dorsal and caudal limbs embracing the caudal paracentral limb. The longer, ventral limb anastomoses with the parietal. The subcentral and transpostcentral are confluent over a deep vadum, and join the sylvian.

The parietal is a tortuous fissure, 4.5 cm. in length, and separated from the paroccipital. A ventral ramus joins the intermedial and by this the supertemporal superficially. A long dorsal ramus traverses the parietal gyre. There is a transparietal which crosses the margin to join an intraprecuneal.

The paroccipital is an irregular zygal fissure, independent, but with long rami. Its relations to the occipital are difficult to determine with accuracy.

There is one distinct exoccipital zygal fissure which anastomoses cephalad with the supertemporal. A few other irregular, unnamed fissures mark this region.

MESIAL SURFACE.—The precuneal is a simple zygal fissure. Dorsad of this there is an intraprecuneal piece which joins both the paracentral (over a vadum) and the transparietal. The cuneus is marked by a cuneal and a postcuneal fissure, both running parallel with the calcarine and anastomosing with the occipital.

GYRES OF THE PARIETAL AND OCCIPITAL LOBES (LATERAL SURFACE).—The postcentral gyre is of the same form and size as its opposite fellow. The parietal is of moderate size—presenting nothing notable. The paroccipital gyre, though small, is curiously marked by transverse pieces. The marginal and angular gyres are better developed than those of the left half in all respects, the latter being especially massive.

MESIAL SURFACE.—The precuneus is of good size and of the same form as that on the left half. The cuneus is fairly well divided into three longitudinal tiers by the cuneal and postcuneal fissures.

FISSURES OF THE TEMPORAL LOBE (LATERO-VENTRAL SURFACE).—The supertemporal fissure runs in a fairly straight course till, in the region of the angular gyre, it becomes irregular, and turns sharply dorsad. Its total length is 12 cm. In its course it anastomoses with the intermedial, and thence with the parietal, and further caudad with the exoccipital segment.

The meditemporal is represented by several tri-radiate and two longitudinal, ramifying segments. The subtemporal is better defined, attaining a length of 9 cm., and anastomosing with one of the meditemporals.

The collateral is short, and as on the left side there is a separate cephalic segment. The postrhinal is merely indicated by a shallow groove.

Gyres of the Temporal Lobe (Latero-ventral Surface).—The supertemporal and meditemporal gyres are much wider and far more massive than on the left. The subtemporal, however, is correspondingly reduced. As on the left, the subcollateral is wide in its middle portion, and the subcalcarine correspondingly narrow. The anastomosis between the occipito-calcarine and the collateral interrupts the latter gyre.

The Insula.—The insula presents the same configuration as its fellow on the left, having the same number and arrangement of gyres. It is less exposed, however.

Aside from certain peculiar variations of types too numerous to permit of detailed mention within the scope of this article—and perhaps based on too few observations—the natural grouping of the notable appearances of these Eskimo brains determines the existence of prevailing typical differences which distinguish these from the brains of whites. It is difficult to describe this distinction in so many words and one is justified in employing the metaphoric term "cerebral physiognomy" to convey the idea. Were one to place any one of these Eskimo brains next to that of one of the Papuan brains, yet to be described, it would be—not a comparison—but a contrast of the clearest kind. The marked tendency in all these brains to transverse fissuration, numerous anastomoses in a transverse direction, with frequent interruption of some of the longitudinal fissures is a feature which even the pronounced dolichocephaly of little "Avia's" head was not able to efface. It is something more than skull-shape which has determined this and other distinguishing characteristics, borne out also by similar observations on Mongolian brains. In the Eskimo brains here studied such features are the different relative topography and boundaries of the cuneus, the exposition of the insula ("Atana" and "Avia") and the preponderating development of certain features upon the left and of others on the right side. The brain-form in general, too, is of typical kind, if one may judge from the small number of specimens available. The hitherto popular notion that the typical Eskimo skull exhibits a low order of intelligence, and is characterized by a small brain-capacity has been generally refuted, and the fallacy of this idea becomes more apparent with the demonstration of so highly developed a brain as these specimens have shown the Eskimo to possess.

ABBREVIATIONS.

The following abbreviations arranged in alphabetical order, are those of the names used in designating the fissures and gyres in the illustrations:

Fissures.

AMYG., Postrhinal (or Amygdaline).
BS., Basisylvian.
C., Central.
CL., Callosal.
CLC., Calcarine.
CLT., Collateral.
CNT., Cuneal.
DG., Diagonal.
EOP., Exoccipital.
EPS., Episylvian.
FMG., Frontomarginal.
HMP., Hippocampal.
HPS., Hyposylvian.
IFL., Inflected.
IPARC., Intraparacentral.
IPRCN., Intraprecuneal.
ITML., Intermedial.
MCL., Medicallosal.
MFR., Medifrontal.
MTMP., Meditemporal.
OC., Occipital.
OCLC., Occipito-calcarine stem.
OLF., Olfactory.
ORB., Orbital.
ORBFR., Orbitofrontal.
PARC., Paracentral.
CPH. L. (Cephalic Limb).
CD. L. (Caudal Limb).
PAROC., Paroccipital.
PC., Postcentral.
PCLC., Postcalcarine.
PML., Paramesial.
POCN., Postcuneal.
PRC., Precentral.
PRCN., Precuneal.
PRS., Presylvian.
PTL., Parietal.
RDT., Radiate.
RST., Rostral.
S., Sylvian.
SBC., Subcentral.
SBFR., Subfrontal.
SBRST., Subrostral.
SBS., Subsylvian.
SBTMP., Subtemporal.
SPC., Supercentral.
SPCL., Supercallosal.
SPFR., Superfrontal.
SPTMP., Supertemporal.
TPRC., Transprecentral.
TRPC., Transpostcentral.
TRPTL., Transparietal.

Gyres, Etc.

ANG. G., Angular Gyre.
CL. G., Callosal Gyre.
HMP. G., Hippocampal Gyre.
INS., Insula.
MARG. G., Marginal Gyre.
MFR. G., Medifrontal Gyre.
MORB. G., Mesorbital Gyre.
MTMP. G., Meditemporal Gyre.
PARC. G., Paracentral Gyre.
PAROC. G., Paroccipital Gyre.
PC. G., Postcentral Gyre.
PO. ORB. G., Postorbital Gyre.
PRC. G., Precentral Gyre.
PR. ORB. G., Preorbital Gyre.
PTL. G., Parietal Gyre.
SBCLC. G., Subcalcarine Gyre.
SBCLT. G., Subcollateral Gyre.
SBFR. G., Subfrontal Gyre.
SBTMP. G., Subtemporal Gyre.
SPFR. G., Superfrontal Gyre.
SPTMP. G., Supertemporal Gyre.

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Teutonic family.

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English, Scotch and Irish.—See the works of Cunningham, Turner, Marshall and Rolleston.

Latin family.

French.—See the works of Gratiolet, Leuret, Broca, Brissaud, Manouvrier, Chudzinski and Fere.

Italian.—Several articles by Giacomini.

Slavonian family.

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Lybian family.

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Hyperborean Branch.

Lapp family.

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Turk family.

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Siniac Branch.

Chinese family.

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Fellah family.

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Malay Branch.

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RED RACE.

Southern Branch.

PAMPEAN FAMILY.

Patagonians.—SEITZ. "Zwei Feuerlander-Gehirne." Zeitschr. f. Ethnol., XVIII, pp. 237-284. (Three plates.) Reference in Virchow's Jahresber. f. 1886, p. 34, and in Arch. f. Anthropol., Nov., 1893, p. 207.

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Northern Branch.

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BLACK RACE.

Western Branch.

HOTTENTOT FAMILY.

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