suggest, illustrate, or apparently contravene some morphological idea.*

§ 162. *Fig. 713 illustrates:* A. The possibility that an individual should reach maturity with a cerebrum so nearly undivided. Substantially, the prosencephalic vesicle has not only increased in size and in parietal thickness, with but slight differentiation into a mesal and lateral mass, but the entire mass has developed fissures and gyres after the usual pattern, in general, excepting that certain gyres cross the meson; *a priori*, indeed, it is not clear why such a brain should not be efficient for mental as well as bodily manifestations.

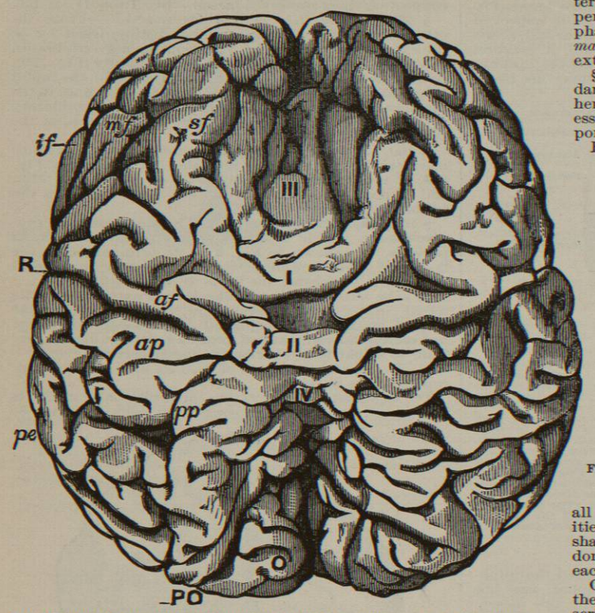

FIG. 713.—Dorsal Aspect of an Imperfectly Divided Cerebrum. × .7. (From Turner, *Journal of Anatomy and Physiology*, xii., January, 1878, pp. 241-253.) *af*, Precentral gyre; *ap*, postcentral gyre; *if*, subfrontal gyre; *mf*, medifrontal gyre; O, occipital lobe; *pe*, "convolution of parietal eminence"; PO, occipital fissure; *pp*, "postero-parietal convolution"; R, central fissure; *sf*, superfrontal gyre; I, II, mesal transverse gyres, nearly at the level of the adjoining hemicerebrum; III, sloping cortical surface; IV, mesal gyres at a lower level than I and II.

Preparation.—The brain was taken from an epileptic imbecile, male, forty-eight years of age, 146.7 cm. (four feet ten inches) high, and weighing 55.7 kgm. (123 pounds). The entire brain weighed 1,111.7 gm. (39.25 ounces), of which the cerebrum constituted 978 gm. (34.5 ounces). Most unfortunately this rare, if not actually unique, specimen was simply placed in alcohol, which was not changed; hence the base was ill-preserved, and the ental features, although described in some detail by Turner, cannot be fully understood. A transection disclosed a single mesal, cerebral cavity, about 5 cm. wide, the floor of which is said to have been "formed of the upper surfaces of the corpora striata and optic thalami, which bodies were related to each other and to the *tænia semicircularis* as in a normal brain"; yet "the third ventricle opened freely into the cerebral cavity along the middle of the floor." It is to be hoped that figures and more detailed descriptions may be published respecting the structure of this remarkable specimen. A good abstract of the original paper is given in *Brain*, i., 133-134, April, 1878.

§ 163. "*Third Ventricle.*"—The cavity commonly so-called really represents the mesal portions of the cavities of three segments; so much as lies between the thalami is the diacele; but the portion cephalad as far as the terma and fornix, although relatively small, pertains to the prosencephal and rhinencephal; in some lower vertebrates (*e.g.*, *Chimæra*, my paper, 1877, *a*) it is much more extensive.

§ 164. *Fig. 715 illustrates:* A. The fundamental morphological relation of each hemicerebrum as a lateral outgrowth, process, diverticulum, or "wing" of the mesal portion of the prosencephal.

B. The non-formation or obliteration of all the fissural corrugations and inequalities, excepting the Sylvian, which is a mere shallow depression extending obliquely dorso-caudad along the lateral aspect of each hemicerebrum.

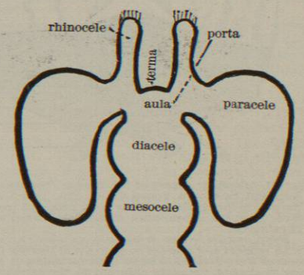

FIG. 714.—Diagram of the Prosocele and Adjoining Cavities.

C. The enormous size of the porta, yet the maintenance of its complete circumscription.

D. The tenuity of most of the parietes; in the occipital region they are no thicker than a sheet of ordinary paper, and are really exaggerated by the two ink lines and intervening space.

E. The extraordinary distinctness of the mass named *caudatum*, of which another view is given in Fig. 722.

F. The peculiar form and relations of the rounded mass intervening between the caudatum and the lateral wall, and which may represent the lenticula.

G. The non-appearance of the thalamus in the floor of the paracele.

H. Upon the whole, the retention, substantially, of a condition of the cerebrum comparable with the normal state at a much earlier period of development; it is, as it were, an expansion of such a cerebrum as exists at twelve weeks (see Fig. 667).

§ 165. *Paraceles* ("lateral ventricles").—But the lateral extensions speedily become so considerable as to warrant the specification of a mesal portion, *aula*, a pair of *paraceles* ("lateral ventricles"), and constricted communications, the *portas* ("foramina of Monro") (see Figs. 678, 684, 690, 723).*

§ 166. *Cornua.*—Each paracele is primarily subspherical and simple as in Figs. 667 and 678; in hydrocephalus this condition may be maintained approximately till birth (Fig. 715). But normally, by the unequal thickening of the parietes, by their encroachment upon the cavity, and perhaps by the further extension of the latter, there are somewhat vaguely demarcated a central *cella*, continuous through the *porta* with the *aula*, and three "horns," a ventral *medicornu*, a cephalic *precornu*, and a caudal *postcornu*. The last exists only in Primates (man, apes, monkeys, and lemurs) and a few other mammals, mostly members of the seal family. The cornua appear in Figs. 684, 720, 726, 735, and 736.

§ 167. *Fig. 716 illustrates:* A. The great extent of the paraceles at this period, relatively to the entire cerebrum, and to the mesal part of the prosocele, the aula.

B. The less difference in the thickness of the parietes than in the adult.

C. The distinct collocation of the hippocamp with the hippocampal fissure.

D. The topographical relation of the Sylvian fossa, the first stage of the Sylvian fissure, to the caudatum.

E. The extension of the postcornu farther caudad of the aula than the precornu extends cephalad.

F. The absence of the insula at this period.

G. The outgrowing margin of the operculum.

H. The depth and peculiar shape of the lambdoidal fissure (see Fig. 750).

§ 168. The *porta*, in a little modified condition, may be seen in the large salamander, *Cryptobranchus*. When the lateral wall of the alinjected hemicerebrum is removed (Fig. 717), the paracele is seen to communicate with a mesal space (aula) and thereby with its opposite and with the diacele, through a considerable orifice, the porta. Its caudal end is narrower than the cephalic, but it is seen to be completely circumscribed by ordinary nervous walls.

§ 169. *Fig. 717 illustrates:* A. The simple condition of the prosencephal in this amphibian; each hemicerebrum is an elliptical, thin-walled sac, the cavity of which, the paracele, communicates through a porta with the aula and so with the diacele.

B. The large size of the porta, its length equalling

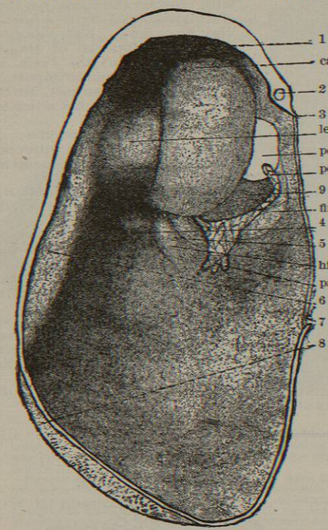

FIG. 715.—The Left Paracele (Lateral Ventricle) of a Female New-Born, (7 Months?) Hydrocephalus. No. 2,131. × 1. 1, One of several slight undulations of the ental surface in the frontal region; 2, slight pit, probably artificial; 3, cephalic margin of a break, apparently natural, in the mesal parietes; the ventral margin of this break is indicated by 7, and the corresponding caudal margin projects slightly mesad just caudad of the line; it may be supposed that this interruption of the mesal wall represents the location of the callosum that might have been formed; 4, 5, slight elevations as yet undetermined; 6, distinct though rounded ridge corresponding to the shallow Sylvian fissure, the only recognizable fissure; 7 (see 3); 8, occipital end of the hemicerebrum, projecting slightly beyond the cut surface; 9, membranous portion of the parietes (perhaps an attenuated tenia) through which the thalamus shows.

Preparation.—The child was supposed by the physician and parents to be seven months advanced; it breathed a few times; the weight was 1,618 gm. The neck and scalp were swollen, but the head was not unusually large. Normal salt solution was injected into the umbilical vein and escaped, with blood, from the jugular. Then half a litre of ninety-per-cent. alcohol was injected, the jugular being closed. The scalp, calva, and dura were removed, and the head supported in brine while the brain was extracted; in spite of care there was some separation of the hemicerebrums at the meson. The contained liquid was allowed to escape, the brain placed in ninety-per-cent. alcohol, and the hemicerebrums inflated to their natural size; they were then covered with a thin layer of absorbent cotton to keep them submerged. The alcohol was changed twice at intervals of two days, and on the fifth the various sections were made under alcohol. The mass supposed to represent the caudatum was extremely dense. The pia was firm, and in parts more substantial than the attenuated parietes. The condition of the diencephal was not fully determinable; the mesocele seemed to be wholly occluded, which would account for the condition of the cerebrum. The entire specimen needs further study and comparison with similar cases.

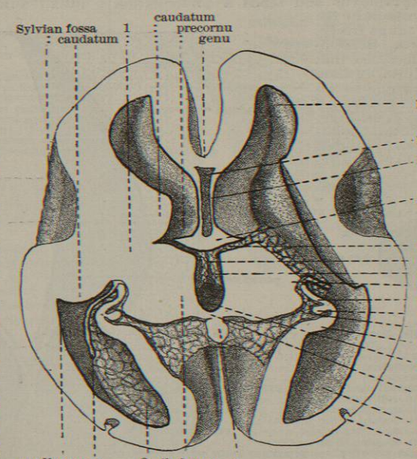

FIG. 716.—Ventral Exposure of the Prosocele of a Fetus about 24 cm. Long, and Estimated to be Twenty Weeks Old; 499. × 1.5. 1, Line of continuity of the thalamus and the caudatum; 2, thin extension of the paraplexus into the postcornu; soon after the preparation was made this became detached and was lost; another specimen must be depended upon to show whether or not such extension exists, and in what way it is disposed of in case it be deciduous; 3, hippocampal fissure; 4, diaplexus.

Preparation.—The brain was hardened in place by arterial alinjection; the scalp and calva were removed piecemeal, and the dorsal part of the cerebrum removed by one sweep of the knife under alcohol. The paraplexus was cut at each side as indicated by the heavy line (endyma) enclosing the lighter area. The left caudatum was removed so as to expose the paracele more completely on that side and make the figure comparable with that of the cat (Fig. 686).

* On this account it is to be the more regretted that so few such specimens are adequately preserved, examined, figured, described, and explained; indeed, no case is known to me in which the best possible use has been made of the opportunity; it is particularly desirable that, when malformation is suspected, the brain be thoroughly hardened by alinjection (injection of alcohol) of both the arteries and the cavities.

* If the rhinencephal is regarded as a segment, the aula and portas must be regarded as pertaining in part to it.

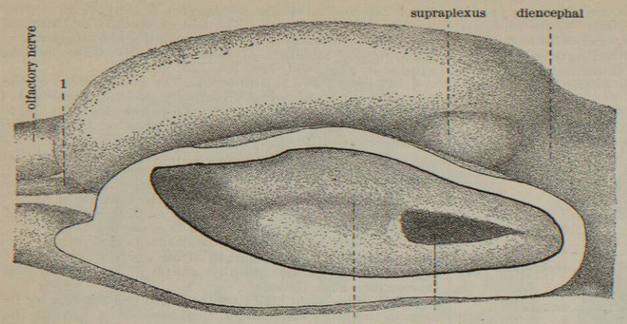

FIG. 717.—Prosencephal of *Cryptobranchus* (a Salamander), the Left Paracele Exposed; 291. × 6.
Preparation.—The fresh brain, while supported by the skull, was alinjected by lifting the metatela (membranous roof of the "fourth ventricle") and pointing the cannula at the broad epicele; the entire brain at once swelled somewhat, and the thinness of the walls caused it to harden almost immediately; the lateral wall of the left hemicerebrum was then sliced off, and the paraplexus cut off where it projected from the aula through the porta into the paracele.

about one-third that of the entire cerebrum; its cephalo-caudal direction as compared with that of mammals, birds, and reptiles, where—especially in mammals—it is dorso-ventral.

C. The absence of a rima; the prosoplexus enters the aula from the supraplexus and sends a prolongation through either porta into the paracele, where it hangs freely.

§ 170. The porta is completely circumscribed, so that a cast has a definite outline, viz., that of an elongated ellipse, its longer diameter, 4–6 mm., its shorter 1–3 (see Figs. 718, 724). The portal boundaries are as follows: caudal, the thalamus (perhaps the tenia); cephalic, the column of the fornix; ventral, the junction of the thalamus and column; dorsal, the endyma reflected from the thalamus and column upon the intruded portiplexus (Fig. 668). So long as this endyma retains its adhesions, so long the circumscription of the porta is complete.

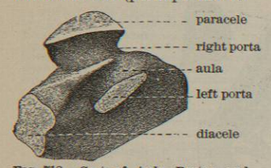

FIG. 718.—Cast of Aula, Portas, and Part of Diacele. × 1.5. The main object of the figure is to demonstrate the complete circumscription of the porta, and its independence of the rima (§ 177). The material used was a mixture of wax and gutta percha. The mesal ridge which represents the aulic recess is just dorsad of the precommissure (Fig. 724). The figure should have been so placed as to make this ridge nearly vertical.

§ 171. The exact conditions and relations of the rima, paraplexus, tenia, fimbria, and thalamus near the porta have not been as yet clearly made out. Preparations should be made with special reference to their elucidation, and figures upon a very large scale. Excepting the metapore ("foramen of Magendie") no part of the brain involves so many and so important morphological questions; see the difficulties and doubts admitted under Fig. 719.

§ 172. *Fig. 719 illustrates:* A. The size, form, and direction of the porta from the mesal aspect.

B. The complete circumscription of the porta, dorsad, by the reflection of the endyma upon the intruded plexus (Fig. 668).

C. The greater length of that part of the prosoplexus which hangs in the porta (portiplexus) than of that which hangs in the aula (auliplexus).

D. The constitution of the velum as a fold of pia, with blood-vessels intervening; one lamina of the fold belongs to the fornix, and the other to the thalamus, or rather to the diatela or primitive diacelian roof (Fig. 710).

E. The relation of the ventral end of the porta to the aulix ("sulcus of Monro").

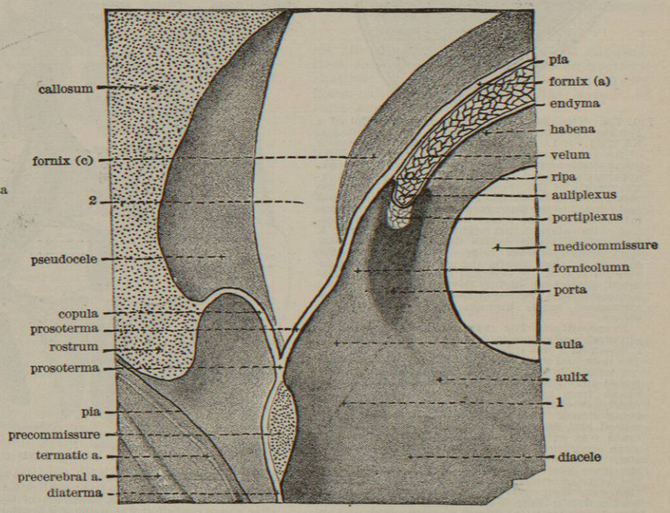

FIG. 719.—The Right Porta and Adjacent Parts, Seen Obliquely from the Caudal Side; 385. × 4. The lateral aspect of the left porta of the same brain is shown in Fig. 720, under which the mode of preparation is described. 1, Dotted line from the ventral end of the porta to the ventral margin of the precommissure, and assumed to demarcate the diacele from the aula; 2, part of the mesal surface of the hemiseptum, unusual and not fully understood (see § 172, H).
Defects.—The area marked 2 is not a cut surface as its plainness would indicate; it was shaded lightly in the drawing, but became blank in the engraving. The extent of the pseudocele and the length of the copula are so unusual as to be anomalous; these peculiarities, however, do not materially affect the porta, which is the important feature of the figure.

F. The thinness of the commissure of the fornix, *a*.

G. The unusual length of the copula connecting the callosal rostrum with the prosoterma.

H. The unusual extension of the pseudocele and of its lateral parietes, the hemiseptums; it is uncertain how far this existed naturally, or was produced by the pressure of alinjection.

§ 173. *Fig. 720 illustrates:* A. The location and general form of the paracele; unfortunately, however, the postcornu is unusually short, and foreshortened by the way in which the preparation is viewed; but the sharp curve of the medicornu is well seen, and the projection of the precornu cephalad from the porta.

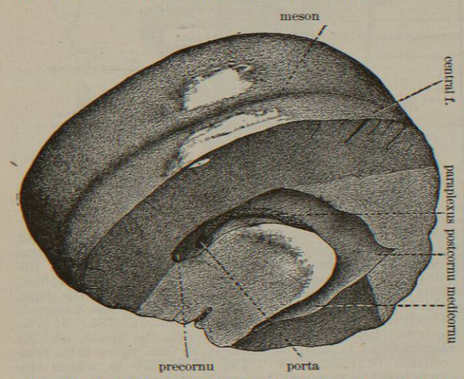

FIG. 720.—The Left Paracele ("Lateral Ventricle"), Viewed Obliquely from the Latero-Cephalic Aspect; 385. × about .5. (This figure was published in the New York *Med. Jour.* for March 21, 1885, and is here reproduced by permission.)
Preparation.—The arteries and cavities were alinjected. When the brain was thoroughly hardened the medicornu was first exposed by removing successive slices of the temporal lobe till it was reached; contiguous parts were then removed till the entire paracele was brought to view; this involved the formation of five cut surfaces, all oblique excepting the most dorsal, which was about 1.5 cm. from the meson. The dura was retained until the preparation was complete and the drawing made; it has since been medisected, so that the left porta may be looked through.

B. The absence of any indication of a rhinocele, which exists in the sheep (Fig. 792), and in mammals generally.

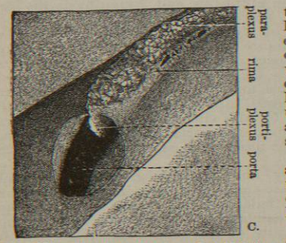

FIG. 721.—The Left Porta and Adjoining Parts of the Alinjected Brain Shown in Fig. 720; 385. × 3. The form of the lateral or paracelian orifice of the porta appears more distinctly, and the endyma is seen clearly to be reflected upon the portiplexus from the adjoining surfaces. Just dorsad of the line from *rima* are a few (presumably) artificial rents in the endyma.

C. The indistinctness of the colliculi, calcar, collateral eminence, and occipital eminence; whether this was due to hydrocephalus or to the pressure of the injected alcohol it is impossible to say.

D. The location and size of the porta, which is shown on a larger scale in Fig. 721.

E. The location of the paraplexus and of the rima through which it enters, covered, however, by the endyma (Fig. 759).

§ 174. *Fig. 722 illustrates:* A. The great size of the porta in this hydrencephal; its ventral half is concealed by the caudatum, but the total length (dorso-ventral dimension) is 19 mm. (three-fourths of an inch) and its width 8–9 mm.

B. The complete circumscription of the porta, notwithstanding the delicacy of the parts and the pressure that may have caused its enlargement.

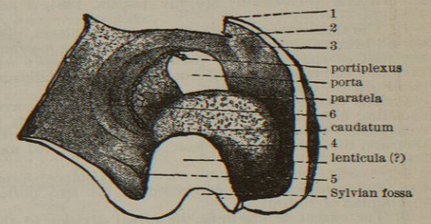

FIG. 722.—Lateral Aspect of the Right Caudatum and Porta (Foramen of Monro) of a New-Born (seven months?) Hydrocephalus. 2131. × 1. 1, Angle between two cut edges of the thin mesal wall; 2, cephalic end of the natural (although presumably abnormal) hiatus in the mesal wall, corresponding with 3 in Fig. 715; 3, ental surface of mesal wall; 4, depression between caudatum and adjoining parietes; 5, triangular depression near tip of medicornu; 6, membranous part of parietes; see § 3, C.
Preparation.—See Fig. 715; the paraplexus on this side was trimmed closely.

C. The great extension of the paraplexus and adjoining portions of the parietes; the parts marked 6 and 7 are membranous; the zone just caudad of 7, and forming part of the upper margin of the figure, may be the fimbria; and the thicker zone just caudad of it may be the hippocamp.

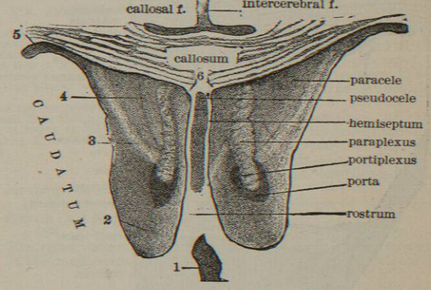

FIG. 723.—The Two Portas, from the Precornua; 2.345. × 1.5. 1, Part of the intercerebral fissure, between the rostrum dorsad and the chiasma ventrad; 2, precornu; 3, tenial vein; 4, undetermined band on the cephalic slope of the thalamus; 5, dorsal part of right paracele; 6, the short diverging lines point to the locations of veins (septal?) at the angle of junction of the hemiseptums with the callosum; dorsad of the junction of the hemiseptums with the rostrum is a small (septal?) vein at either side.
Preparation.—See under Fig. 724. The slice including the portas is 12 mm. thick; the caudal (aulic) aspect is shown in Fig. 724, the cephalic (precornual) in this.
Defects.—The shading does not indicate with sufficient distinctness that the entire surface, and plexus at either side dorsad of the porta, slope dorso-caudad beneath the callosum, and are not continuous with it. As in Figs. 724 and 739, the lines representing the callosal fibres are diagrammatic. Other preparations and figures upon a still larger scale are needed, in order to exhibit the somewhat intricate relations of the parts about the porta. The morphological importance of the entire aulic region can hardly be overestimated.

§ 175. *Fig. 723 illustrates:* A. The existence of the two portas, and their obviously natural condition. This point, already shown in several previous figures, is here

reiterated because this aspect of these orifices is seldom presented, and because a distinguished anatomist has declared (*Progrès Médical*, Nos. 25 and 26, 1879) that when one finds a communication between the middle and lateral ventricles in an adult human brain it results from an artificial perforation; see my papers, 1884, *a* and 1884, *f*.

B. The transection of the callosum in two places, viz., dorsad near the genu and ventrad through the rostrum; the part of the septum or pseudocele here shown was therefore embraced by the genual curve of the callosum (see Figs. 687 and 756).

C. The continuity of the hemiseptum with the corresponding column of the fornix; so far as the porta is concerned, the former may be compared to a thin partition, and the latter to a door-post; see also Figs. 707 and 709.

§ 176. *Fig. 724 illustrates:* A. The existence, form, size, and complete circumscription of the two portas ("foramina of Monro").

B. The extent of the aula, the mesal division of the prosocele, and the cephalic or prosocelian constituent of the "third ventricle." It includes the interval between the portas, extending ventrad so as to include the precommissure, only part of which appears in the figure.

C. The existence of the aulic recess, a subtriangular depression between the precommissure and the two columns of the fornix; the line from the word *aula* ends in this recess; on the cast shown in Fig. 718, it is a ridge.

D. The peculiar curvature of the columns of the fornix. They converge dorsad, curving at the same time caudad,

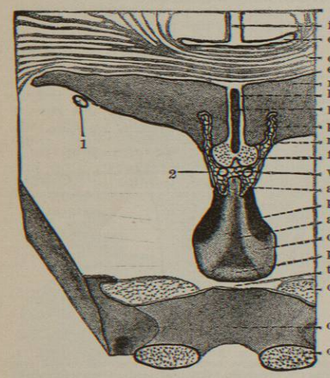

FIG. 724.—The Two Portas, as Seen from the Aula, Looking Obliquely Dorso-Cephalad; 2345. × 1.5. (Compare with Figs. 725 and 730.) 1, Tenial vein; 2, velar vein; the number rests upon the thalamus.

Preparation.—From a brain, the arteries of which had been injected with the red glue mixture, and the cavities with alcohol, a transection was removed, 12 mm. thick, so as to include the chiasma; for security of handling it was trimmed down so as to include little more than the parts represented. The optic nerves were divided obliquely, to show their cut ends more fully.

Defects.—The alba and cinerea are not distinguished, and the figure is not upon a scale large enough to show certain details as to the connections of the velum and plexuses. The divided ventral ends of the columns of the fornix were inadvertently omitted, but may be seen in Fig. 739.

so as to appear as cut ends in this transection; ventrad they diverge, are twisted somewhat, and again curve caudad, so that their cut ends should appear again just dorsad of the optic tracts, as shown in Fig. 739.

E. The relation of the precommissure to the columns, which pass just caudad of it. In a figure including a greater width of this region, the cut ends of the precommissure would appear at the side, as in Fig. 739.

F. The reflection of the endyma upon the plexuses from the fornix and thalami, at two points upon each side; such lines of reflection constitute a ripa.

G. The continuity of the hemiseptums with the callosum dorsad and the fornix ventrad.

§ 177. *Rima.*—The porta is primary, and constant among all vertebrates where the prosocele presents a tripartite condition (§ 60). In reptiles, birds, and mam-

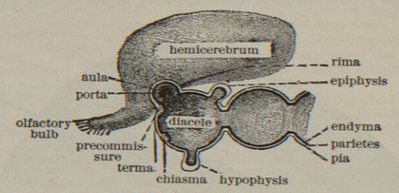

FIG. 725.—Schematic Medisection of the Prosencephal and Two Adjoining Segments; approximately the right half of Fig. 714, seen from the mesal aspect. (See § 178.)

mals (perhaps also among some lower forms) at the dorsal end of the porta there begins a line of greater or less length along which the proper nervous parietes of the paracele are abrogated for the intrusion of a pial extension, the paraplexus; this line of intrusion is the rima (chief part of the so-called "great transverse fissure") shown in Figs. 720, 725 (diagram), 730, and 735. It is to be noted that (1) the paraplexus fills the space, and (2) the endyma is carried before it, so that there is no true solution of continuity. The only way in which the porta and the rima can become continuous is by the artificial rupture of the membranous attachment, but this is by no means infrequent with brains removed and handled in the usual way.

§ 178. *Fig. 725 illustrates:* A. The communication of the paracele (lateral ventricle) with the mesal series of encephalic cavities solely through the porta ("foramen of Monro").

B. The reduction in size of the aula, the mesal division of the prosocele, relatively to the diacele, and to the prosocelian lateral extensions, the paraceles.

C. The location, in man and other mammals, of the aula at the dorso-cephalic side of the diacele, instead of directly cephalad as in Amphibia.

D. The concomitant change in the direction of the diacelian and prosocelian floors; instead of cephalo-caudal, their direction is more or less nearly dorso-ventral.

E. The crowding of the epiphysis caudad by the overlying cerebrum; the epiphysis and hypophysis are retained in the figure, however, mainly as landmarks.

F. The relation of the rima (essential part of the "great transverse fissure") to the porta. The line along the meso-ventral aspect of the hemicerebrum represents a narrow tract where the paracelian parietes are reduced to the lining endyma and the covering pia, and where the latter, or its vessels, intrudes into the paracele, still covered, however, by the endyma. The rima always begins at the margin of the porta, and extends, in man, to near the tip of the medicornu (see § 183 and Figs. 728 and 734).

G. The secondary and morphologically unessential nature of the caudato-thalamic extension, the enormous thickening of the thalamus, the lateral wall of the diacele, and of the caudatum, the wall and floor of the paracele. This feature of the mammalian brain, which is very confusing and not altogether easy to describe, may be ignored in a diagram like the above, where the parietes are represented of nearly uniform thickness, as in the embryo and in adult amphibians.

§ 179. *Fig. 726 illustrates:* A. The close contact and even interdigitation of the mesal aspects of the frontal lobes of the sheep concomitantly with the absence of a falx.

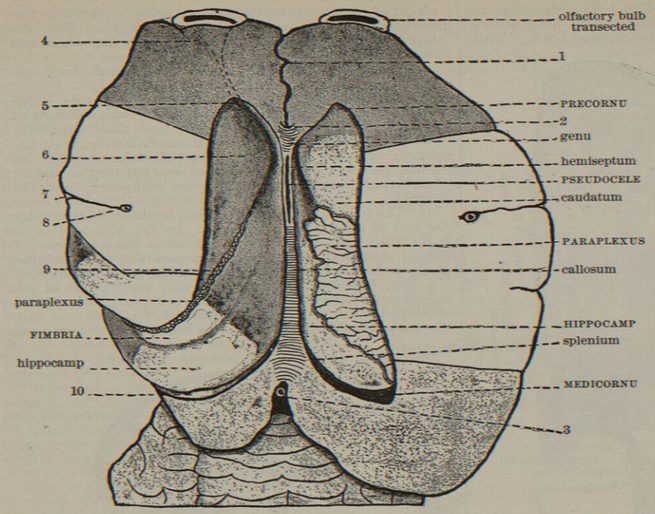

FIG. 726.—Sheep's Brain, the Paraceles ("Lateral Ventricles") Exposed. × 2. (From my "Physiology Practicums.")

Preparation.—By the removal of successive slices the paraceles have been opened; the left has then been more completely exposed by oblique sections, and the paraplexus trimmed off so as to expose the wide fimbria and the furrow between it and the hippocamp. The plane of section did not coincide exactly with the callosum; the caudal three-fifths of this is represented by the transverse lines; also the cephalic end, the genu; but an intermediate portion is wholly removed, exposing the narrow pseudocele ("fifth ventricle") and its thin lateral walls, hemiseptums.

Defects.—The cerebral cortex is not represented. The caudal half of the cerebellum is omitted. 1, Intercerebral fissure; 2, callosal fissure; 3, vessel; 4, interrupted lines indicating the continuation of the paracele into the rhinocele (Fig. 792); 5, precornu; 6, caput of the caudatum; 7, Sylvian fissure crossed by arachnoid; 8, vessel at bottom of fissure; 9, cauda of caudatum; 10, part of caudal wall of paracele.

B. The width of the fimbria and hippocamp, and thence of the entire fornix, as compared with the human.

C. The apparent absence of the tenia.

D. The total exclusion of the thalamus, even in appearance, from the paracelian floor.

§ 180. *Fig. 727 illustrates:* A. That, at this age, the paraceles extend much farther dorsad than in the adult, far beyond the level of the callosum.

B. That the paraplexus is relatively more extensive.

C. That the caudatum is relatively larger.

D. That the margin of the fimbria reaches the groove between the caudatum and the thalamus, which probably represents the tenial sulcus of the adult.

E. That the thalamus is therefore absolutely excluded from the paracelian floor, without even the appearance of representation which exists in the adult.

§ 181. With all mammals other than man, the apes and certain members of the seal family, the margins of the rima are, throughout their whole extent, separated only so far as to permit the intrusion of the paraplexus, *e.g.*, the sheep (Fig. 726); nor does this adhesion yield at all in cases of hydrocephalus, observed by me in dogs and cats. With the human fetus, also, up to the estimated age of four months (Figs. 727 and 734), at least, the tenia and the fimbria are closely apposed—as closely, that is, as they can be and yet allow the plexal intrusion; at this age, therefore, the human thalamus is as perfectly excluded from the paracele as it is in mammals generally.

§ 182. *Paratela.*—But with all human adults (perhaps also with the new-born, and possibly with fetuses during the later months) the tenia and fimbria, for most of their length, are separated by an interval, 2–7 mm. in width, narrowing at the porta and in the medicornu. This interval is filled by (1) the paraplexus, which retains its attachment to the fimbria rather than to the tenia; (2) an extension of the endyma from the margin of the tenia with or without the adhesion of the subjacent pia. This zone of endyma, or endyma and pia, extending from the porta to near the end of the rima is the *paratela* (Figs. 732, 735).

§ 183. *Fig. 728 illustrates:* A. The existence of substantial walls of nervous substance about the medicornu at the distance of at least 1 cm. from the tip of the temporal lobe.

B. The concomitant non-extension of the rima ("great transverse fissure") to the extremity of the medicornu.

C. The existence of digitations at the ventral end of the hippocamp (*pes hippocampi*).

D. The non-extension of the hippocamp to the extremity of the medicornu.

E. The dilatation of the medicornu in hydrocephalus.

F. The efficacy of alinjection in maintaining the size of an encephalic cavity and preserving the contour of its parietes.

G. The nearly typical zygal, or H-shape, of the orbital fissure (see Fig. 778, III.).

§ 184. *The Rima Not Coextensive with the Medicornu.*—The rima extends from the porta to near the extremity of the medicornu, but for about 1 cm. from its extremity

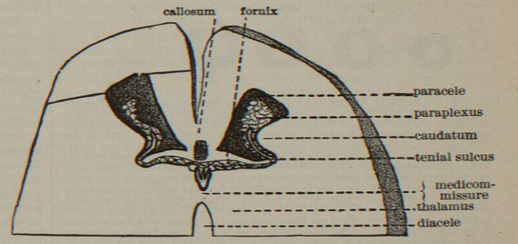

FIG. 727.—Transection of the Brain of a Fetus, About 16 cm. from Nates to Bregma, and Estimated at Four Months; 1816. × 1.3.

Preparation.—The fetus was received in alcohol, not very well preserved. The calva was cut away with scissors, and the dura and pia removed. The entire brain was then transected at the level of the medicommissure, but only the dorsal half of the divided surface is included in the figure; it is the cephalic aspect of the caudal part. The two lines crossing the right hemicerebrum indicate the plane of the section shown in Fig. 761.

the parietes are substantial (Fig. 728). The transition to the rima is constituted by the riparian part, *pala*, which connects the two rimal margins, fimbria and tenia. This

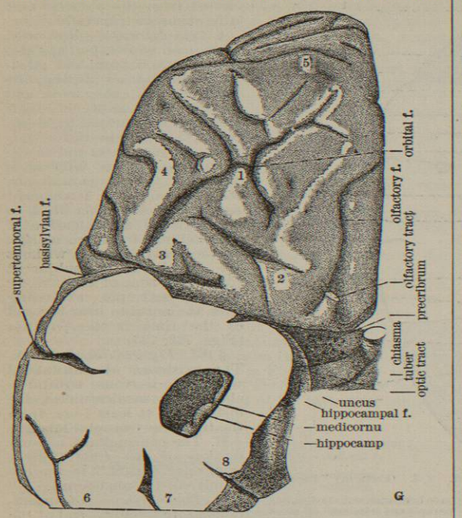

FIG. 728.—Ventral (Orbital) Aspect of the Right Fronto-Temporal Region of the Hydrencephal Shown in Fig. 743, after removal of the tip of the temporal lobe; 747. × 1. 1, Zygon of the orbital fissure (see Fig. 778); 2, 3, 4, undetermined fissures; 5, undetermined fissure, zygal in form, perhaps the orbito-frontal; 6, meditemporal (?) fissure; 7, subtemporal (?) fissure; 8, collateral fissure.
Preparation.—See Fig. 743.

thin portion has, in man, a shape like the blade of a turf-cutter; it is not distinctly shown in any of the figures in this article, but in Fig. 730 it would constitute the thin

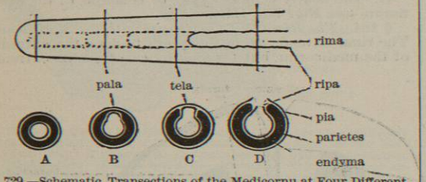

FIG. 729.—Schematic Transections of the Medicornu at Four Different Levels. For simplicity the cornu is represented as tubular and straight, normalized, so to speak (§ 38), and the parietes merely as substantial tissue covered by pia and lined by endyma. For some distance from its extremity (1-2 cm. in man) the medicornal parietes are typical, as at A; this condition of the parts appears in Fig. 728. The proper nervous parietes suddenly become very thin and transparent, so as to resemble the terma and valvula, as at B. At C the proper nervous parietes have entirely disappeared, leaving only the two membranes; this is the normal constitution of a tela, and sometimes exists near the tip of the medicornu, though relatively for a much less distance than on the diagram. Finally, whether or not a plexus is intruded into the cavity, as is the case with the medicornu, the tearing away of the tela leaves a ragged edge which is a ripa at either side of the rima.

lamella at the ventral end of the fimbria. In the diagram, Fig. 729, the pala is seen in transection at B.

§ 185. *Fig. 730 illustrates:* A. The early and distinct formation of the caudatum (see also Fig. 715).

B. The continuity of the two margins of the rima, the fimbria and tenia, near the tip of the temporal lobe, the place of their union, at and after birth, being somewhat distinct, the pala.

§ 186. *Fig. 731 illustrates:* A. The thinness of the fornix at the meson (§ 202).

B. The considerable extent of the pseudocele; since this is not connected with the true encephalic cavities, it cannot be exaggerated by the hydrocephalous condition.

C. The completeness of the paracelian floor after the removal of the thalamus; the interval, rima, between the substantial tenia and the lateral margin of the fornix (fimbria) is completely filled by the paraplexus and the paratela.

D. The greater width of the rima in the cella than near the end of the medicornu.

E. The extension of the calcarine fissure (stem of united occipital and calcarine) across the hippocampal gyre; it does not, however, reach the hippocampal fissure.

§ 187. *Fig. 732 illustrates:* A. The main point is the continuity of the floor of the paracele ("lateral ventricle") irrespective of the dorsal surface of the thalamus, and the concomitant exclusion of this diencephalic mass from

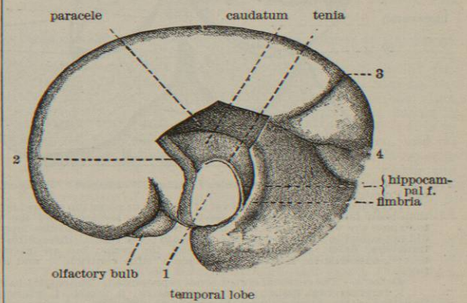

FIG. 730.—Mesal Aspect of a Right Fetal Hemicerebrum, Partly Dissected; 3,000. × 2.5. 1, Transection surface between the caudatum and thalamus; 2, part of cut surface left by removing a section of the mesal wall (including the rudimentary fornix and callosum) in order to expose the caudatum; the paraplexus was also torn from its attachments, leaving the rima open; its margins, the tenia and fimbria, are separated more than is natural; in a fetus of this age they should be closely apposed (see § 181 and Fig. 727); 3, 4, transitory fissures in the places of the future occipital and calcarine.

this portion of the prosencephalic cavity; but so many other points are shown incidentally that the figure will be described in detail.

Beginning at the dorsal side of the figure, the intercerebral fissure is seen to separate the apposed mesal surfaces of the hemicerebrums. The arachnoid dips into this fissure to a certain depth, so as to pass around the ventral margin of the falx (not shown in the figure); since this has (as seen in Fig. 801) a curved margin, and becomes narrower (dorso-ventrally) cephalad, the extent of the arachnoidal fold varies at different levels; in the specimen here figured, for example, which is about 1 cm. thick at the level of the callosum, the arachnoid crosses 5 mm. dorsad of the callosum on the caudal aspect and 8 mm. on the cephalic. The pia, however, follows the apposed hemicerebral surfaces to and into the callosal fissure at either side and is continuous upon the dorsal surface of the callosum. Of the vessels the figure includes only the two parallel precerebral arteries (4). The callosum itself presents a slight mesal elevation, which is more distinct at the cephalic side of the section and of a somewhat different color (§ 217). The callosum extends laterad and likewise dorsad to form the roof of the paracele, and it is to be noted that the lateral portion of this cavity would be opened by a horizontal section at the level of the

dorsal surface of the callosum; hence the appearance commonly described and figured under the name of "*centrum ovale majus*" seldom if ever exists. For the condition of things in fetal brains, see Fig. 727, § 180.

Ventrad of the callosum is the fornix, connected therewith by a thin lamina, the hemiseptum, at either side of a mesal cavity, the pseudocele. The lateral margin of the fornix is formed by the fimbria (corpus fimbriatum).

At the extreme left of the figure the lateral wall of the paracele is seen to be formed by a cinereal mass, the caudatum. By reference to Figs. 707 and 735, it will be seen that this narrows rapidly from the cephalic end (caput) as a slender prolongation (cauda); but this cauda is really folded somewhat upon its longitudinal axis so as to constitute, in at least part of its course, not only the side but a part of both the roof and floor of the paracele; in the figures just mentioned the roof portion and part of the lateral is removed, leaving only the floor portion. Along the mesal border of the cauda there passes a vein (3), the tenial vein, which may be regarded as indicating the boundary between the caudatum and the thalamus.

Projecting mesad of the vein is seen a lamina, consisting evidently of the paracelian endyma, and also, at least near the caudatum, of some nervous substance; this is, or includes, the white band named *tenia* in this article, but commonly called *tænia semicircularis* or *stria cornea*.

All the parts so far described are unquestionably constituents of the prosencephal; the remaining portions shown in Fig. 732 belong to the diencephal. The walls of the diacele are the thalami, of which the figure includes only the portions dorsad of the level of the medi- and postcommissures (see Fig. 687).

The mesal surface is covered by endyma, which is continued over the low ridge called habena ("habenula") seen from the mesal aspect in Fig. 687, and from the dorsal in Fig. 707. Just dorsad of the habena is a slight furrow, the habenal sulcus; here the endyma meets the pia covering the dorsal aspect of the thalamus, and is reflected with it dorsad and then mesad toward the opposite side. Instead of passing horizontally across the interval between the thalami, however, the endyma is deflected over the two vascular plexuses (folds of pia or vessels therefrom) which hang in the diacele. The habena and its sulcus, more accurately, perhaps, the latter, constitute the boundary line between the mesal, entocelian, endymal surface of the thalamus, and the dorsal, ectocelian, and pial surface, which extends dorso-laterad.

Between the dorsal surface of the thalamus and the ventral surface of the fornix (including, of course, the fimbria), the pia is freely separable, and appears to consist of but a single layer; but laterad it is traceable to the paraplexus, and it is almost inconceivable that a plexus should be formed of a single layer of pia as a free edge covered by endyma. When, however, this fornico-thalamic pia is traced mesad, it is found to separate into two layers, a dorsal, belonging to the fornix, a ventral, constituting part of the diacelian roof (diatela) with a pair of arteries, a pair of veins, and numerous smaller vessels in the intervening space. The ventral layer is not separable (in man) from the diacelian endyma, but the dorsal not only may be detached from the fornix in an alcoholic specimen, as may the pia from most of the surfaces which it covers, but here, excepting at the margins, the disjunction was almost spontaneous, and there is a distinct space (8) between it and the commissure, bounded at the sides by the thicker (hippocampal) constituents of the fornix. This double curtain of pia is the velum (interpositum), which belongs equally to the diencephal and to the superposed prosencephal. Were it possible in separating the two segments, the dorsal layer should accompany the cerebrum, and the ventral remain attached to the thalami; the continuity of the two is seen at the aula and the two portas, as well

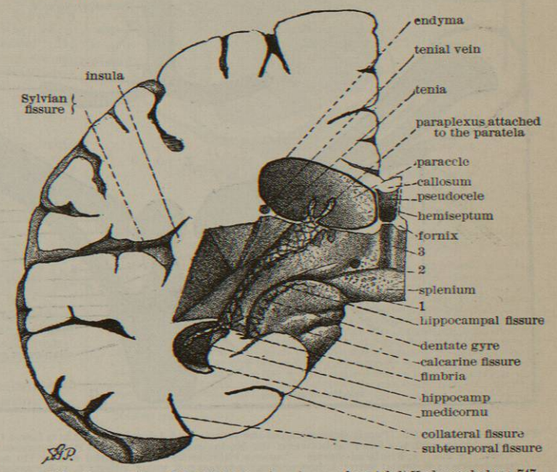

FIG. 731.—Transection of the Right Hemicerebrum of an Adult Hydrocephalus; 747. × 1. 1, Ventral curvature of splenium; 2, groove at cephalic margin of splenium; 3, mesal furrow of fornix (the line does not quite reach it). The furrow between the lines from *hippocampal fissure* and *dentate gyre* is the continuation of the callosal fissure, separated from the hippocampal by a flattened area of cortex. The deep fissure opposite the word *insula* is the central.
Preparation.—This represents the cephalic aspect of the caudal part of the hemicerebrum, the mesal aspect of which is shown in Fig. 743. The transection was along the oblique line *d–p* on that figure. So much of the thalamus as was included was cut away, together with some of the adjoining prosencephalic mass, capsula, lenticula, and perhaps claustrum, leaving little more than the cortex of the insula at that point.
Defects.—The shading does not discriminate sufficiently between the natural and artificial surfaces, but the former are curved while the latter are straight and bounded by sharp lines. The alba and cinerea are not distinguished. The left hemiseptum is added by dotted lines.

as along the entire margin of the paraplexus (see Figs. 710 and 737).

Corresponding with the margin of the fimbria, the dorsal surface of the thalamus presents a shallow groove, the fimbrial sulcus ("sulcus choroideus," Fig. 707); laterad from this the surface is nearly regular, and overlaid partly by the paraplexus and a membrane apparently endyma only, and partly by the thin but more substantial lamina (tenia?) already described as an extension of the caudatum.

The entire dorso-mesal surface of the thalamus, instead of being homogeneous, as it has been sometimes figured and described, may be divided, first and most sharply into a mesal, or entocelian, and a dorsal, or ectocelian, portion, the boundary between the two being the habena and its sulcus. The dorsal surface itself presents a two-fold division into a subfornical (B) and a parafornical (C and D), separated by the fimbrial or choroid sulcus. Finally, the parafornical area is covered partly by the paratela and plexus and partly by the tenia, and may thus be distinguished as subparatelar (C) and subtenial (D), there being occasionally a furrow, the tenial sulcus, between them. The desirability of discriminating between these areas will appear in connection with Fig. 733, where certain different, and perhaps anomalous, conditions are described.