The Brain of
Ictiolcus bubalus
By
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The work on the brain of Ictiobus bubalus as first outlined was to extend over a period of two years and was to comprise a thorough study of its coele, membranes, parietee, and more especially the tracing of nerve tracts. This preliminary thesis presents the work that has been done as a preparation for more extensive study next year.

The success of the work above outlined, depending almost wholly upon the preparation of the material, it was deemed expedient to begin a series of tests on methods of hardening, staining, etc. The results of these tests are as follows:

**Hardening.** Potassium bichromate was used in 1, 2, 3, and 4% solutions successively. Ammonium bichromate was used in 1 and 2% solutions successively. Solutions of each grade were changed at least once.

Picric Acid was used as a saturated aqueous solution. Of these hardening agents the Potassium and Ammonium bichromate gave the best results. The brains hardened in Ammonium
bichromate were not sectioned, but from all external appearances are excellent. The picric acid caused a shrinkage of the tissue surrounding the ganglion cells, thus producing vacuoles or the "Hof" of Stieda.

Embedding: Paraffin and celloidin methods were employed a described in Dees'"Vade Mecum." In hardening the celloidin, alcohol of about 85% gave the best results as to cutting consistency and transparency.

The celloidin sections were placed between successive layers of filter paper of a convenient size and stacked like coins. The stacke were placed into 85% alcohol in patch boxes, until used. The sections adhering to the paper were then readily transferred to the slide previously coated with 12% aqueous solution of albumen. After treatment with 95% alcohol, a mixture of equal parts alcohol and ether was poured upon them. The slide was allowed to remain in a horizontal position until the celloidin had dissolved sufficiently to stick the sections to the slide and avoid displacement of parts. The slide was then so tilted as to cause the superfluous celloidin to drain to the label end.

After the removal of this celloidin, the slide was again placed into a horizontal position and once more flooded with the mixture of alcohol and ether.
After the celloidin had set, the slide was placed into 85% alcohol.

Stains. - A series of tests made with Weigert's Method for Medullated Nerves as described in "Vade Mecum" 688, showed that the best results were obtained by staining the tissue 36 hrs. and then decolorizing until alba and cinerea were distinctly differentiated. A fresh stain used as above stated gave excellent differentiation of longitudinal medullated nerves (cut in transection). A stain giving excellent results when used for the first or second time, was found upon repeated use to show less and less differentiation and selective power. After the fourth use it was absolutely useless.

Weigert's Improved Method as given in "Vade Mecum" 703 was next tried. Eighteen hours staining with decolorization until alba and cinerea were distinctly differentiated gave results far surpassing the best stained sections of the old method. Both transverse and longitudinal fibers could be traced with perfect ease. The stain, like that of the old method rapidly deteriorates and should not be used a second time.

Sections stained by this method and cleared by turpentine and carbolic acid clearer, are found to fade. This may be prevented by using the pyrol and
and carabolic acid clearer recommended by Miigert. From a series of tests made with Bendal's Modification of Miigert's method, no definite conclusions could be drawn. After a number of trials the best results were obtained by mordanting 20 min., staining 3 min., and decolorizing until alba and cinerea were differentiated. But a later series treated as above stated showed no action of the stain. Good results, however, were obtained by mordanting 20 min., staining 16 hr., and decolorizing 50 min.

The tests with alum carmine were unsatisfactory.

The Brain.

Beginning with the myelocoele, I shall describe the encephalic coelae in their succession cephalad.

The myelocoele is small and circular in section. It slightly increases in size as it approaches the metencephal, and after passing the caudal extremity of the latter, rapidly enlarges ventro-dorsad, breaking through the dorsal wall some distance cephalad of the caudal prolongation of the metacoele. The metacoele is extremely large, occu-
pying almost the entire dorsal surface of the metencephalon. It extends lateral into the cerebellar peduncles. These lateral expansions are, in turn, prolonged cephalad and caudal as cavities appearing first oval and then circular in section. Cephalad, upon meeting the trigeminal tubers under which it passes, it rapidly decreases in size, forming first a rather wide slit and finally contracting laterally extends cephalad as the epicoele. The epicoele passes under the cerebellum as a rather small cavity and sends into it a narrow arm. This arm extends into the cerebellum for about ¾ of its height in a more caudal direction. It enlarges at first gradually, then quite rapidly, to form a club shaped coele. (See reconstruction). Cephalad of the vallecula, the epicoele enlarges as forms the mesocoele which at first is more or less diamond shaped with its longer axis extending laterad. As it passes cephalad the lateral axis extends farther and farther dorsolaterad in a slight curve, until it communicates with the more spacious cephalic end of the ventricle of the optici. (Fig. Plate VI). Before reaching the cephalic border of the optici the mesococele suddenly sends a branch ventrad reaching very
nearly to the surface. In its course ventrad it sends two branches lateral into the hypoarca, slightly expands in the cinerium, and extends as a very fine coele into the infundibulum. The lateral ventricles of the protocele are in communication for the whole length of the cerebrum. Fig. The rhinocoele is formed like the ventricles of the cerebrum, by the enveloping pallium. Fig. II, Plate V.

Metencephalon. — The great size of the lateral lobes makes the metencephal the most prominent region of the brain. This great development is due, in part at least, to the great development of the two pairs of dorsal tuberosities from which the trigeminal and vagal nerves arise. These tuberosities known as the vagal and trigeminal are situated in the caudal and cephalic extremities, respectively. The trigeminal tubers are the larger and are fused along the meson. They are intraventricular, being covered by the metatele. Reconstruction and Fig. II, Plate. The vagal tubers are much smaller and lie in close contact with the myel. They are for the most part extraventricular. The metatele arises from their cephalic extremities.

Ependymal. — As is seen in Fig. II and reconstruction, both ental
and oral divisions of the ependymal are well developed. The ental division or valvula, is a prolongation of the deeper layer of the ependymal and extends cephalad into the ventricles of the optic lobes. Anteriorly it bifurcates and projects for some distance into the lateral divisions of the optic ventricles formed by the tori longitudinalenes. Fig. II. Plate II.

Mesencephalon. — Owing to the intrusion of the valvula, the mesencephalon is greatly developed. The roof for the most part is thin along the sence, gradually becoming thicker laterad. Its base nowhere reaches the ventral surface of the brain. Fig. II. Plate II.

Diencephalon. — From the dorsal aspect nothing can be seen of this region. Its base, however, is largely developed. The hypothalam are two large bean-shaped bodies, slightly flattened dorso-ventrad, and diverging cephalad. Within this divergence lies the tuber cinereum. Projecting cephalad from the tuber cinereum and connected to it by the infundibulum is the large hypophysis. Fig. II. Plate II.

Prosencephalon. — The prosencephalon appears as two solid masses surrounded by a delicate membrane — the pallium. The pallium is free
from the basal masses laterad and dorsad forming a canted - the ventricles communicate. The pallium presents a slight groove along its meson in which lies the epithysis. Fig. II. The surface of the basal portion of the cerebrum is marked by several rather distinct sulci to which Herrick has applied the following terms: - To a slight sulcus extending dorsad and caudad near the middle of the lateral surface - fissure of Sylvius; the sulcus extending along the base of the cerebrum and at the point of separation of the pallium - fissure rhinalis; the sulcus beginning at the caudo-ventral surface and extending to the dorsal surface - occipital fissure.

The pallium envelops the olfactory crura as it does the cerebi, i.e., is attached ventrally, free at the sides and above. Fig. II. Plate V.
Description of Plates.


Plate II. Fig. I. Dorsal view of brain. Fig. II. Lateral view of brain.

Plate III. Fig. I. Ventral view of brain. Fig. II. Transaction showing epiphysis at a.

Plate IV. Fig. I. Transaction showing vagal tubers a. Fig. II. Transaction showing trigeminal tubers a. Metacoel b. c. Metatele d.

Plate V. Fig. I. Transaction showing pallium a. Cocke b. Optic nerve c. Fig. II. Transaction through olfactory crus a. Radix medialis b. Radix lateralis.

Plate VI. Transaction showing valvula a. Torus longitudinalis b.

Fig. II. Transaction showing valvula a. Torus longitudinalis b.