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Zwischenzellenräume, aber selbständig im Parenchym des Entoderms entstehen und mit jenen alsbald in Verbindung treten.

Dieses Parenchym oder die ganze nichtepitheliale Zellenmasse des Schwammes hat im Wesentlichen denselben Bau wie in der Larve: die rundlichen oder sternförmigen Zellen sind durch ihre gegenseitigen Verbindungen in einer Flüssigkeit suspendirt, welche anfangs auch die große Entodermhöhle und deren Erzeugnisse erfüllte, später aber innerhalb des Gewebes sich etwas verdichtet, während sie in den nach außen geöffneten Hohlräumen durch das Wasser verdrängt wird. Auch die stets intracellulär entstandenen Nadeln sind schon in den Larven vorhanden.

Eine kurze Wiederholung der geschilderten Thatsachen ergibt:

1) Der zweischichtige Embryo ist eine Sterrogastrula, welche später eine Entodermhöhle erhält.
2) Das Ectoderm geht bei der Anheftung der Larve vollständig verloren; der künftige Schwamm geht mit allen seinen Theilen bloß aus dem Entoderm hervor.
3) Dieser sondert sich früh in eine peripherische Schicht, welche an Stelle des Ectoderms zur Epidermis wird, und eine compacte Innenmasse, die Grundlage aller übrigen Gewebe.
4) In der letzteren entstehen die ein- und ausführenden Hohlräume und die Geißelkammern so wie deren Auskleidungen getrennt von einander, ohne eine gemeinsame Anlage, so daß die Unterscheidung eines Enteroderms (Darmblatt) von einem Mesoderm nicht möglich ist.
5) Die Spongillen so wie überhaupt alle Schwämme stammen von »zweiblättrigen« Ahnen, entwickeln aber gegenwärtig ihre gesammte Organisation aus einem einzigen »Keimblatt«.

5. Observations upon the Urodele Amphibian Brain.

By Henry J. Osborn, Sc. D.

eingeg. 10. October 1884.

My recent microscopic studies of *Menopoma*, *Menobranchus*, *Amphiuma*[1], in comparison with *Rana* relate especially to the following structures: 1) The longitudinal nerve fibre courses, 2) The commissures, 3) The cerebellum, 4) The deep origin and decussation of the optic nerve fibres, 5) the structures representing the pineal stalk (Zirbelstiele, processus pinealis) in the adult brain.

[1] Preliminary observations on *Amphiuma*, Proc. Phil. Acad. 1883.

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The method employed consisted in the preparation of an unbroken series of sections, cut in three planes, horizontal, transverse and vertical to the long axis of the brain.

The brains of these urodeles seem to differ chiefly from those of the Batrachia in the adult retention of the straight tubular condition so characteristic of the embryo. The batrachian brain has undergone a fore and aft shortening and with this arises the greater lateral extension of all its parts, also the following points of contrast. 1) In the Frog the iter is folded backwards into a double cavity by a sigmoid curvature of the loof; in the above Urodeles this ventricle is a straight tube. 2) In the Frog the anterior commissure, as a part of the lamina terminalis, forms the anterior boundary of the unpaired cerebral cavity; in these Urodeles this commissure is in the brain floor some distance behind the lamina terminalis proper. Other variations are simple reflections of the varying proportions of the peripheral organs.

1) The fibre courses composing the main system pass through the pars peduncularis of the mesencephalon, through the lower portions of the thalami and enter the basal portions of the hemispheres. This system is reinforced by fibres descending from the central cell masses both of the optic lobes and optic thalami; these fibres descend obliquely forwards and backwards from each of these bodies. The main system also receives a large bundle of fibres from each of the lobes lying at the sides of the infundibulum. Part of the fibres of the main system enter the hemispheres direct, part can be traced into the lower portion of the anterior commissure to enter the opposite hemisphere. The lower portion of this commissure is simply a decussation system. Finally, oblique fibres, not part of the main system, connect the hemispheres and optic thalami directly.

2) The anterior commissure consists of the decussation system, above mentioned, also, as observed by Stieda[2], of an upper course of fibres connecting the upper mesial walls of the hemispheres. In *Menobranchus* this upper course seems to be completely separated from the lower course and traverses the ventriculus communis as a distinct commissure which might readily be mistaken for the middle commissure. The fibres of the posterior commissure, as observed in the chick by Mihalkovics[3], can be followed into the pars peduncularis (crura) of the mesencephalon. In the *Derotremata*, *Amphiuma* and *Menopoma*, this commissure contains few fibres. In these animals I first observed a powerful commissure, which I may speak of as the superior commissure, passing across the roof of

[2] Zeitschr. f. wiss. Zoologie 20. Bd. p. 308.
[3] Entwicklung des Gehirns p. 73.

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the 3rd ventricle just in front of the pineal stalk. Its fibres pass directly downwards into the thalami. This seems to correspond to the commissure of the pineal stalk which has been observed in the Elasmobranchs, also in mammals, although it is absent in birds[4]. Although much reduced in size, it is present both in the Frog and *Menobranchus* and leaves little doubt as to the disputed position of the pineal stalk.

3) The cerebellum is an extremely degenerate structure in these Urodela. In *Amphiuma* it contains no nerve cells whatever and in diameter it barely equals the valve of Vieussens of the frogs brain. This primitive condition (*Menopoma*, *Amphiuma*) enables us to determine with precision its relations to other parts. *a.* From its lower surface a set of fibres passes directly forwards into the roof of the optic lobes. *b.* It receives a band of fibres from the extreme lateral portions of the medulla oblongata, while anteriorly, *c.* a band enters it from the pars peduncularis of each side. These two sets would appear to correspond to the anterior and posterior peduncles of the mammalian brain and the cerebellum itself seems to be wholly composed of the fibres of these peduncles.

4) I have not as yet traced any fibres from the optic lobes to the optic nerve, but the course of the fibres in the thalami (*Menopoma*) has been followed with interesting results. Each optic nerve is composed of fibres springing, *a.* from the opposite thalamus and, *b.* from the thalamus of the same side. The former *a.* arise from the upper cell areas of the thalami, sweep around the main longitudinal fibre system, (see fibre courses above) and pass through the chiasma to enter the nerve of the opposite side: The latter (*b*) spring from the lower cell areas of the thalami and pass directly into the optic nerve of the same side; they are quite distinct from those of the inferior commissure of Gudden which is here well developed. This shows that, as regards the fibres springing from the thalami, the amphibian and higher mammalian brains are closely similar, and that the decussation is not complete as is generally affirmed[5].

5) My series of sections strongly confirm Goette's[6] statement that in the adult Amphibian brain the pineal process is quite invisible to the naked eye and that most anatomists are wholly mistaken as to the nature and position of this body. The little reddish body lying between the hemispheres, which is usually described and figured as the pineal body is in fact a continuation of the plexus chorioideus medius which in the Amphibia has been thrust upwards in a remark-

[4] Mihalkovics, Entwicklung des Gehirns p. 103.
[5] Wiedersheim, Vergleichende Anatomie 1882. p. 334.
[6] Entwicklung der Unke p. 315.

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able manner. That this body has no connection with the true pineal stalk has been shown by Goette on embryological grounds, and is now further demonstrated by the presence of the newly described superior commissure, which, it is true, is small in *Rana* and *Menobranchus*, but in the *Derotremata* attains a great size and separates the pineal stalk from the plexus by a wide interval. Between the superior and posterior commissures in *Amphiuma* lies a minute flattened sac, composed of a single layer of cells resembling those of the ependyma. It rests upon the upper brain wall, but without the brain cavity proper. In *Menobranchus* and *Rana*, this sac has nearly lost its lumen, and it extends forwards above the superior commissure. In all these forms it is completely without the brain wall, but in *Menopoma* the cavity of the sac retains by a narrow slit its primitive communication with the true brain cavity. These structures are to be regarded as portions of the processus pinealis; they lie wholly within the pia mater. I have not had an opportunity of verifying Goette's embryological history of the pineal body, but the above features of adult structure so far confirm his conclusions that they show it is a positive error to consider the pineal body or its stalk as clearly visible parts of the surface of the brain. They show further that the vascular plexus does not form the anterior wall of the stalk in the Amphibia, as described by Mihalkovics in the chick, but is an independent structure which has an external, not a true resemblance to the pineal body.

Morphological Laboratory, Princeton, N. J. Sept. 24th 1884.

6. Über einen Monotus des süfsen Wassers.

Von Dr. O. Zacharias, Hirschberg i/Schl.

eingeg. 3. November 1884.

Es ist bekannt, daß die Turbellarien-Familie der Monotiden lediglich marine Formen umfaßt, und daß bisher niemals eine *Monotus*-Species im Binnenlande, resp. in süßen Gewässern, angetroffen wurde. Dem gegenüber habe ich nun zu berichten, daß die von mir im Laufe dieses Sommers angestellte Untersuchung zweier hochgelegener Wasserbecken im Riesengebirge die Entdeckung eines unzweifelhaften Süßwasser-*Monotus* zur Folge gehabt hat. Der betreffende, sehr interessante Strudelwurm hat eine Länge von 3—4 mm und eine lorbeerblattförmige Gestalt. Unter dem rothbraunen Augenfleck liegt die Gehörblase (Otocyste) mit dem schön glänzenden runden Otolithen, welcher deutliche Spuren der für die Monotiden so characteristischen »Nebensteinchen« zeigt. Gelappte Dotterstöcke und

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Zeitschrift/Journal: Zoologischer Anzeiger

Jahr/Year: 1884

Band/Volume: 7

Autor(en)/Author(s): Osborn Henry J.

Artikel/Article: 5. Observations upon the Urodele Amphibian Brain 679-682