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Organogenesis of Brain in chick Embryo

or.

Development of Brain in chick embryo.

The Brain of chick embryo develop from the anterior part of neural tube. The brain forming region of the neural tube becomes differentiated at about 72 hours of incubation in chick.

During early development, the neural tube is fairly uniform in nature. At about 33 hours of incubation its anterior part becomes differentiated into a series of enlargement in the form of segments called neuromeres. Neuromeres in chick embryo is 11 (eleven). out of these -

- (a) first three forms prosencephalon (fore brain)
- (b) 4th & 5th forms Mesencephalon (Mid brain)
- (c) Remaining 6, 7, 8, 9, 10, 11th forms Rhombencephalon (hind brain)

Neuromeric constrictions disappear in the last. The Cavities of the brain regions are designated as prosocoel, mesocoel & rhomocoel respectively.

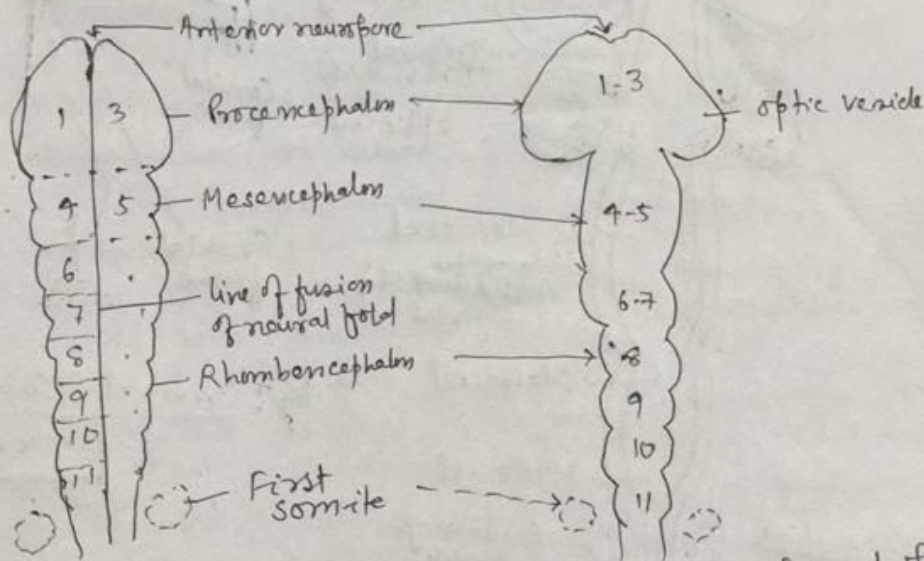


Fig: Formation of neuromeres during development of Brain in chick

- Large volume of brain is accommodated within the small cranium by bending, called Flexures. Two such flexures are (i) Cranial flexure and (ii) Cervical flexure are seen in embryo of 48 hours.

Cranial flexure appears in the mid brain, while cervical flexure occurs in hind brain.

- The three main region of brain undergoes further division at about 38 hours of incubation.

- The prosencephalon is divided into anterior telencephalon and posterior diencephalon. The mesencephalon remains undivided, while the rhombencephalon divides into anterior metencephalon and posterior myelencephalon.

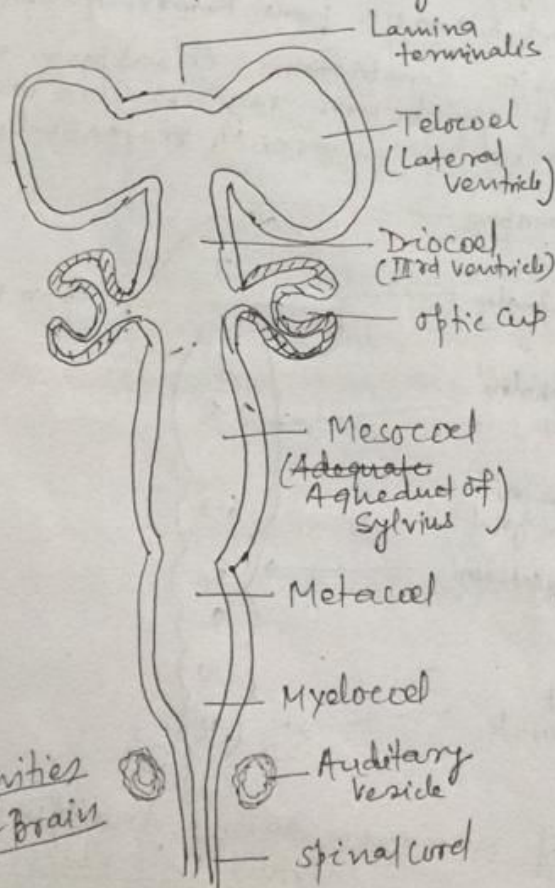


Fig: Cavities of Brain

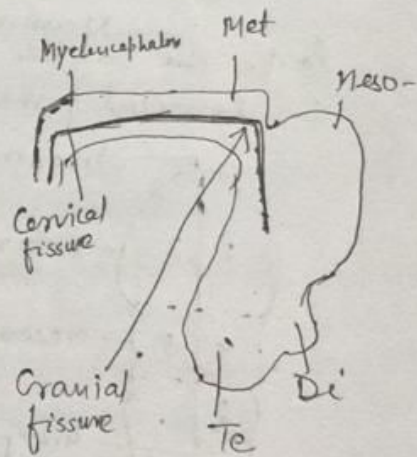


Fig: Cervical & Cranial Fissure

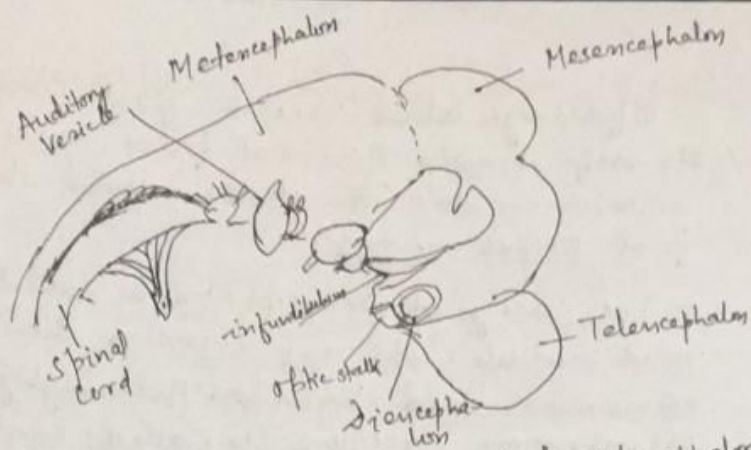


Fig - Differentiation of Brain into Telencephalon, Diencephalon, Mesencephalon, Metencephalon & Myelencephalon.

Differentiation of Prosencephalon.

The appearance of the optic vesicles from the lateral walls of prosencephalon at about 33 hours of incubation differentiates prosencephalon into Telencephalon and Diencephalon.

- The part of the prosencephalon which lies anterior to the level of optic vesicles is termed Telencephalon, and lying between optic vesicles is Diencephalon. The boundary between two regions is marked by shallow groove called Velum transversum at about 48 hours of incubation.

- The antrolateral wall of telencephalon evaginates to form a pair of telencephalic vesicle, which develop into cerebral hemispheres. The cavity of cerebral hemisphere constitutes lateral ventricle or first and 2nd ventricle of brain.

- The lateral ventricles communicate to each other and opens into 3rd or third ventricle by common opening called Foramen of Monro.

- The median anterior wall of Telencephalon called Lamina terminalis

- olfactory lobes receive first cranial nerves. Its roof remains thin and form anterior commissure, while its floor becomes thick and form Corpus striatum.

- The cavity of diencephalon is called diocoel or IIIrd ventricle. Its roof remains thin and develops numerous blood vessels. This highly vascularised membranous structure is called anterior choroid plexus.

- An outgrowth projects behind anterior choroid plexus and forms pineal body or Epiphysis.

- The posterior commissure lies behind pineal body at junctions of forebrain & mid brain.

- The lateral wall of diencephalon is thickened and form optic thalami.

- The floor of diencephalon is thickened.

- The optic nerves of either side cross each other on its ventral face and constitutes optic chiasma.

- Mid ventral floor gives origin to infundibulum & when Rathke's pouch touches it, it constitutes Pituitary gland or hypophysis.

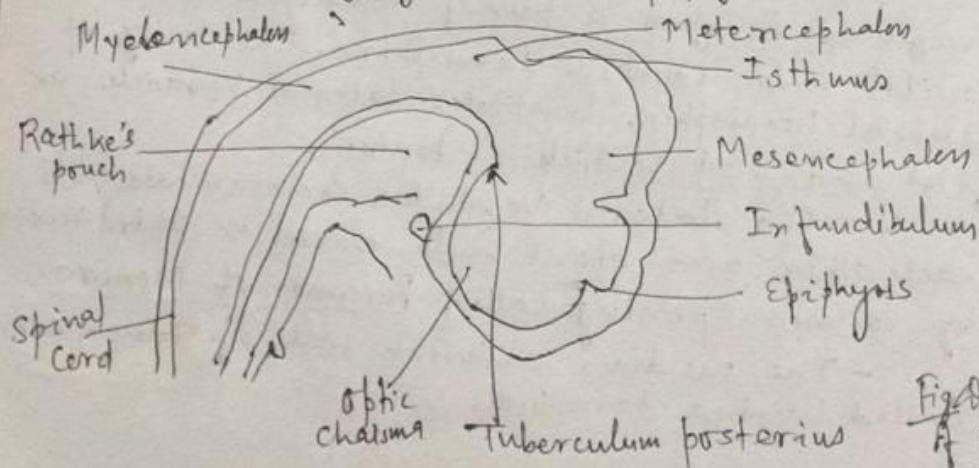


Fig Differentiation of Fore brain

Differentiation of Mesencephalon (Mid brain)

Mid brain differentiates into a pair of optic lobes and crura cerebri. The optic lobes develop as a pair of swelling from its dorsolateral walls while the crura cerebri is formed by thickening of its floor.

It contains a very narrow cavity called 'iter' or 'aqueduct of Sylvius'. It communicates IIIrd Ventricle to IVth Ventricle.

Differentiation of Rhombencephalon (Hind brain)

Hind brain is differentiated into

(a) Anterior Metencephalon

- Its dorso-lateral walls grow extensively and form the cerebellum of the brain. Numerous folds develop on its surface. Three main lobes in the brain of adult birds can be marked, which develop numerous groups of fibres. The transverse fibres located on its ventral face is called 'Pons Varolii'.

(b) Myelencephalon

It forms medulla oblongata of the brain. Its roof becomes thin and membranous. It is highly vascularised and forms posterior choroid plexus.

- Its cavity is called Myelocoel or IVth Ventricle.

