DEVELOPMENT OF BRAIN UPTO 72-HOURS OF INCUBATION IN CHICK EMBRYO

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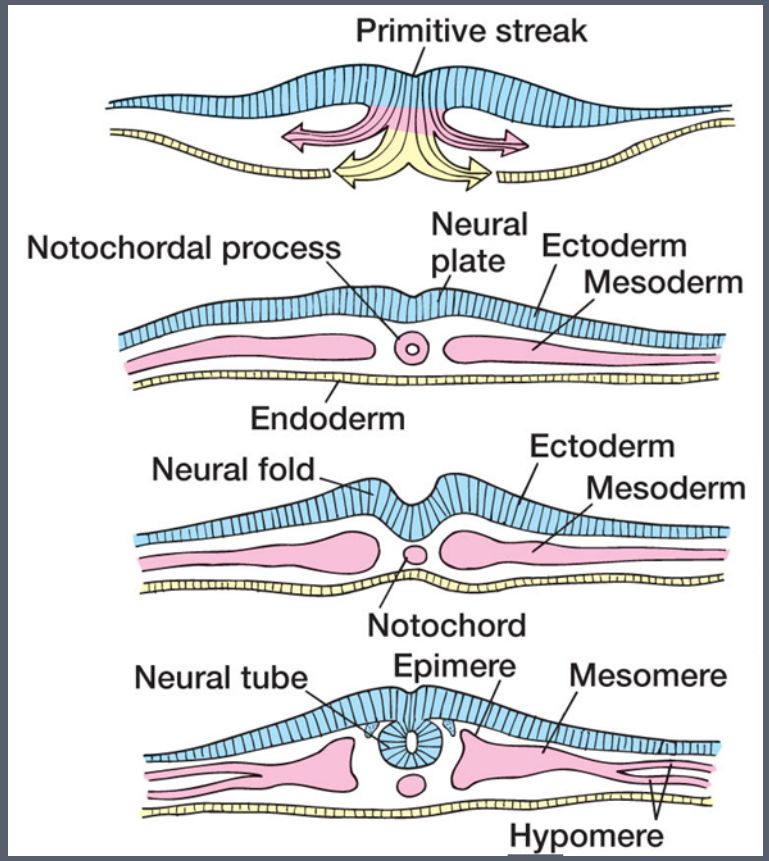
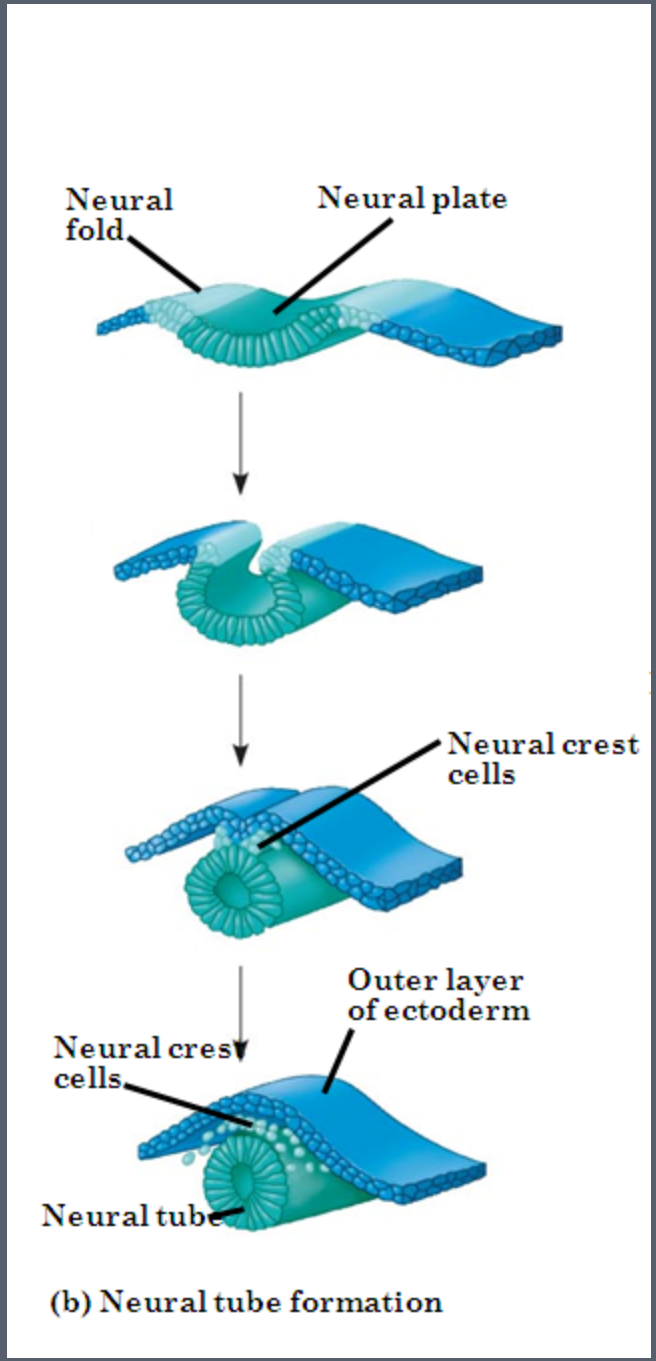
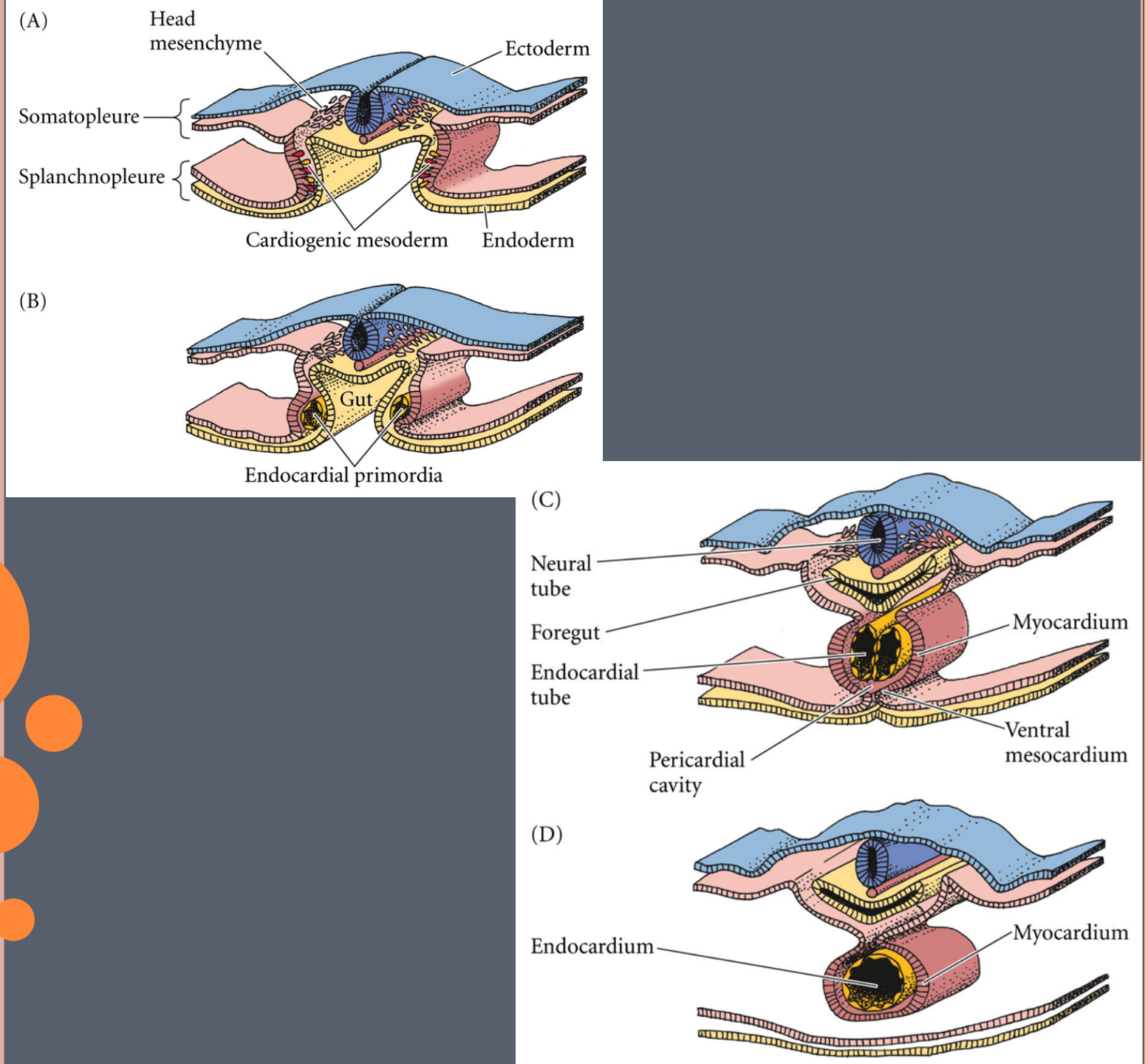
There are complex changes observed in formation of nervous system and other organ systems during the development of 72 hours chick embryo. After the 48 hours of incubation the process become faster. During this changes occurs in internal structure of embryo hence external or morphological changes are also observed.

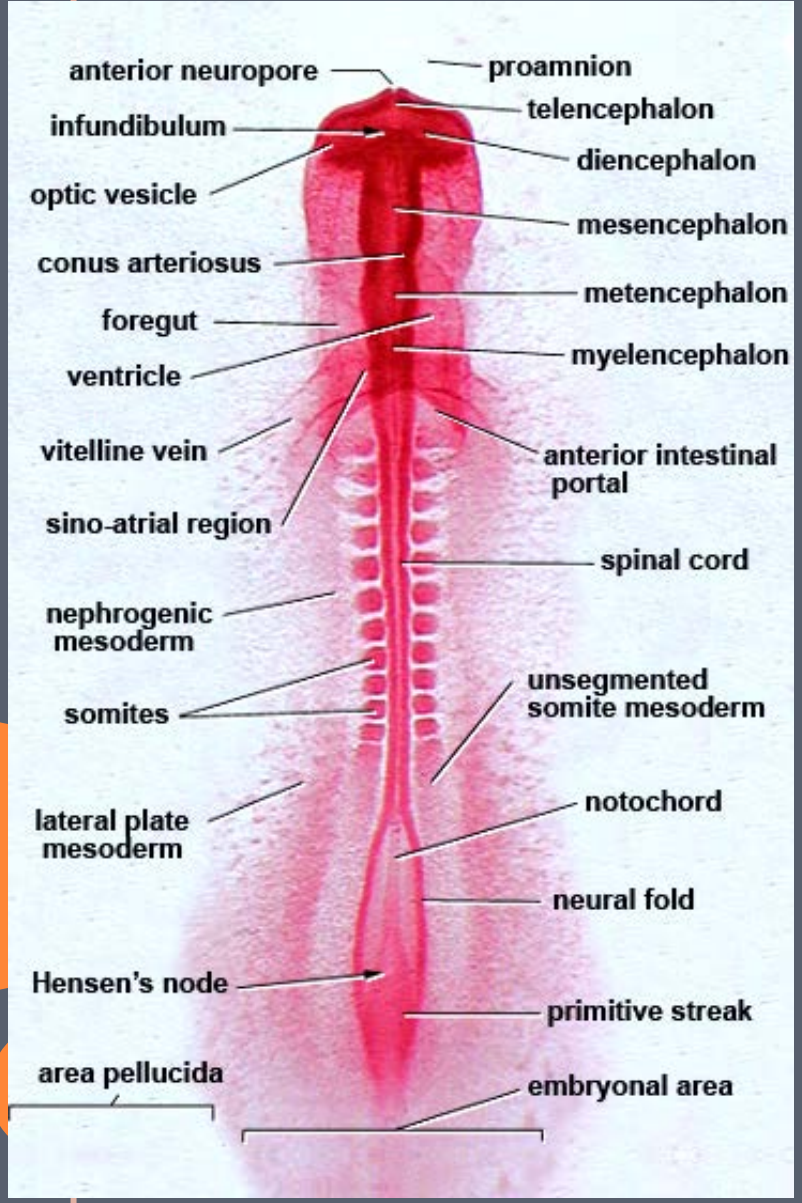


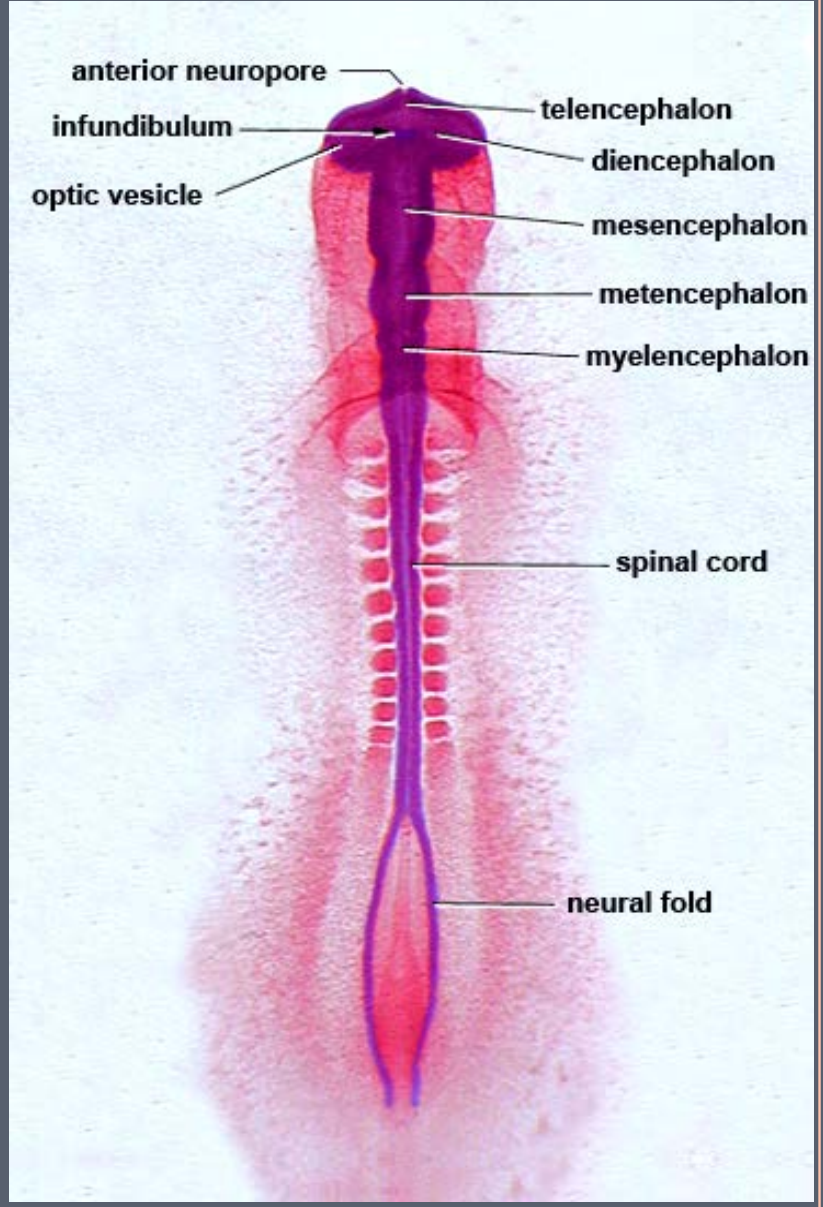
About 18 hours of incubation the ectodermal cell differentiate into neural plate, Neural groove and Neural fold.

About 27 hours of incubation Neural tube and Neuropore develop. At 33 hours of incubation neuropore closed.




(A)
Head mesenchyme
Ectoderm
Somatopleure
Splanchnopleure
Cardiogenic mesoderm
Endoderm
(B)
Gut
Endocardial primordia
(C)
Neural tube
Foregut
Endocardial tube
Myocardium
Ventral mesocardium
Pericardial cavity
(D)
Endocardium
Myocardium

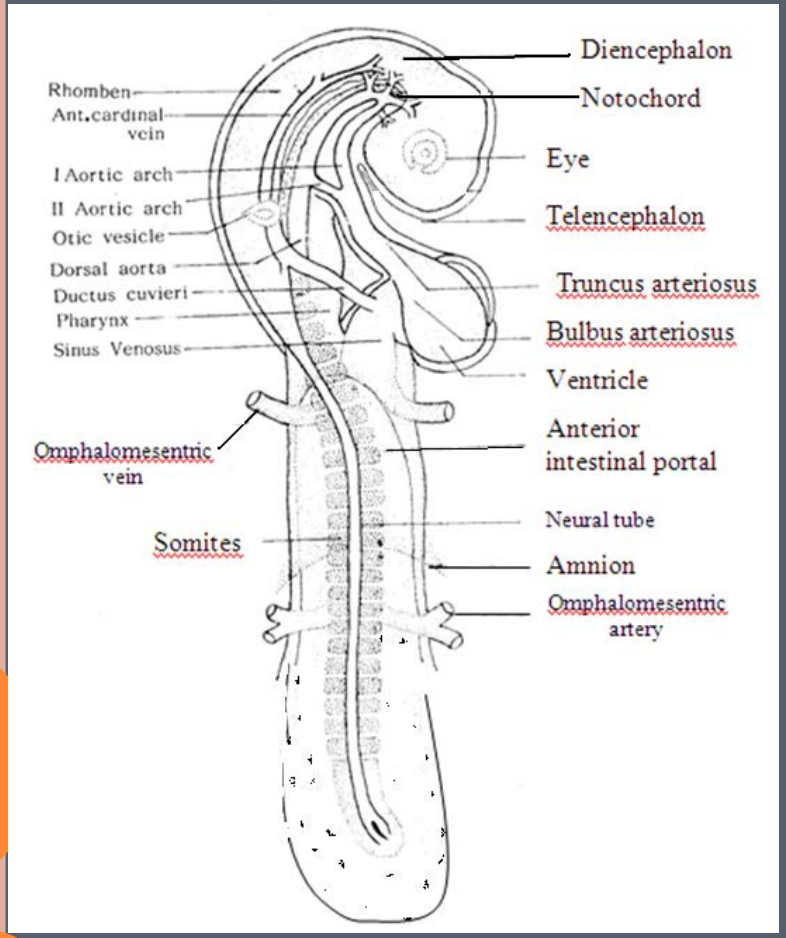


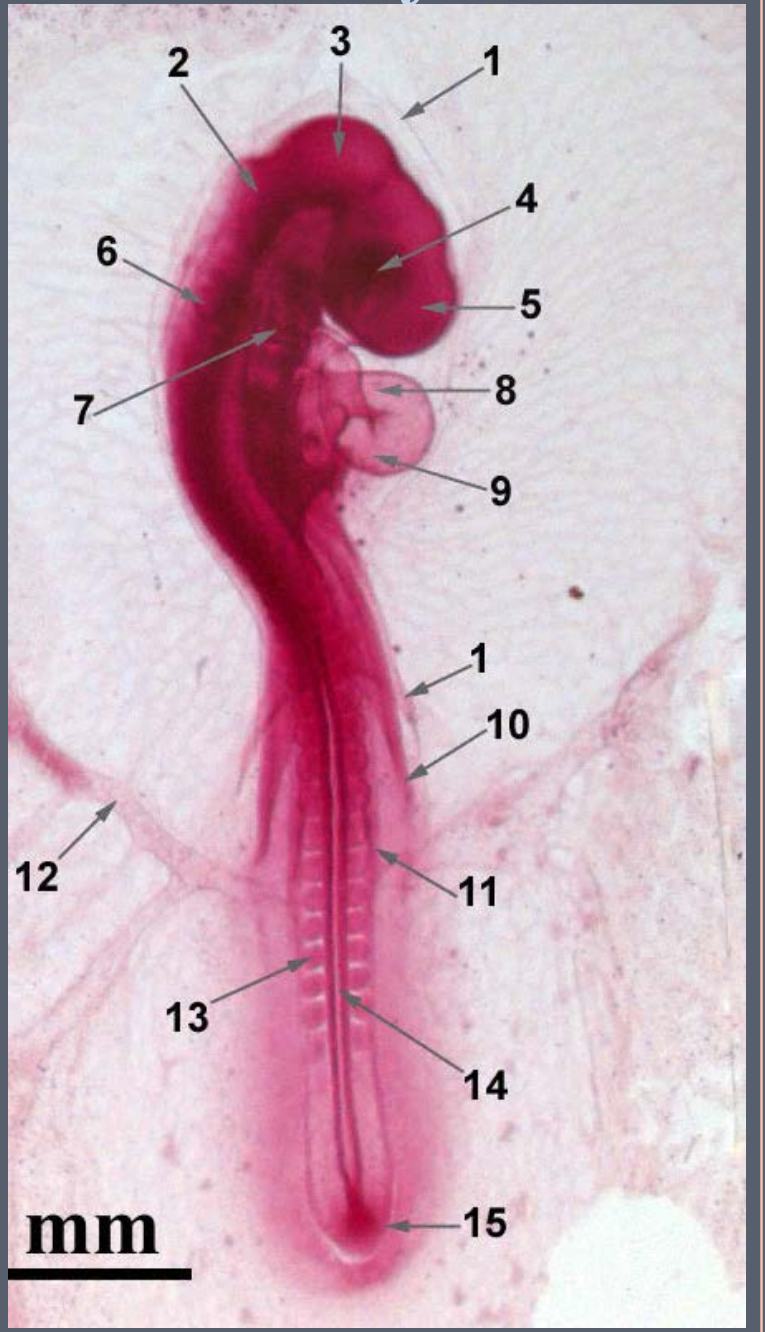


Development of brain in 33-hours chick embryo

The neural tube is completed in the anterior half of the embryo. It opens anteriorly by the anterior neuropore. Sinus rhomboidalis and primitive streak still remain. The three divisions of the brain **prosencephalon, mesen-cephalon** and **rhombencephalon** are marked. The prosencephalon is produced into two large optic vesicles.

48-hour old Chick Embryo





The forty eight hour old chick embryo is obtained after 48 hours (two days) of incubation. It has the following salient features:

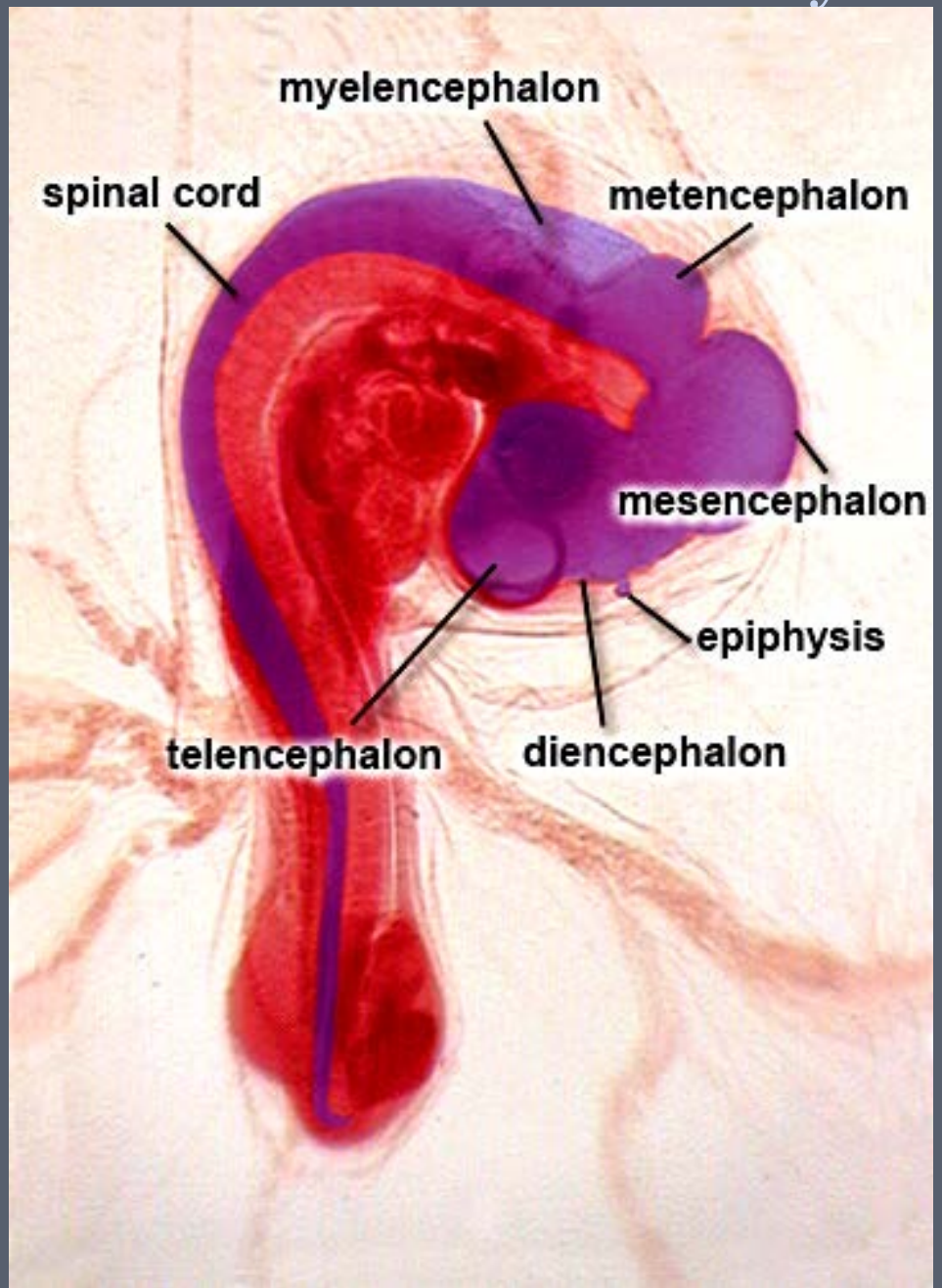
Flexure: The bending of the embryo to the right side is called flexure. The bendings turn the anterior end to the right. Two flexures are noticeable in the 48-hour old chick embryo. One flexure is seen at the level of **mid-brain** and this flexure turns the fore-brain backwards. This flexure is called cranial flexure. The second flexure appears at the level of hind-brain and it is called **cervical flexure.** The cervical flexure turns the head towards the right.

Torsion: This process of the twisting of the entire embryo along the antero-posterior axis is called torsion. In 48 hours it has progressed posteriorly as far as the posterior end of the cervical flexure i.e., approximately to the level of the **13th** somites.

Eye: The prosencephalon develops two outgrowths called optic vesicles. The optic vesicle invaginates to form a double--walled cup called optic cup. The two walls of the cup develop into the retina and the opening of the cup develops into the pupil. The optic cup is attached to the brain by a stalk called optic stalk.

Lens: The lens develops from the ectoderm lying opposite to the optic cup. The ectoderm in this region thickens to form lens placode. The placode invaginates to form a lens vesicle.

72-hour old Chick Embryo



Toraion: Torsion is the twisting of the embryo in such a way that the left side of the embryo comes to lie on the yolk. This twisting starts from the anterior end. In the 72 hour old chick embryo it reaches upto the level of omphalomesenteric arteries. As a result of torsion only the tail region lies flat with its ventral side on the yolk. The remaining portion of the embryo rests on its left side.

Flexures: A 72-hour old chick embryo has four flexures. They are as follows:

1. **Cranial flexure:** It appears at the level of mid-brain. (38-hours of incubation)
2. **Cervical flexure:** It appears at the level of hind-brain. (48-hours of incubation)
3. **Dorsal flexure:** It appears in the region of 10^{th} to 12^{th} somites, (60-hours of incubation). It continues with cervical flexure anteriorly. The cervical and dorsal flexures give a semicircular shape to the embryo.
4. **Caudal flexure:** It develops in the tail region. (72-hours of incubation).

Brain: The brain has three main divisions, namely the **prosencephalon,** the **mesencephalon** and the **rhombencephalon.** Further, the prosencephalon is divided into an anterior **telence-phalon** and a posterior **diencephalon.** Similarly, the rhomben-cephalon is divided into an anterior **metencephalon** and a post-erior **myelencephalon.** The brain develops a pair of optic vesicles, optic stalks, an optic recess, optic chiasma, infundi-bulum, epiphysis and all the four ventricles. In addition, the brain develops telencephalic vesicles, corpora quadrigemina and crura cerebri.

Spinal cord: The germinal cells of spinal cord multiply and their descendants migrate outward. In their new position, they are transformed into neuroblasts and primordial glia cells. The neuroblasts develop axons and dendrites. The region of the spinal cord containing the central part of neuroblasts and glia cells constitutes the grey matter while the region of the spinal cord containing the axons constitutes the white matter.

Thank you

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