

BRAIN OF AMPHIBIANS

The brain of frog is divisible into three parts:

- (i) Fore brain or Prosencephalon.
- (ii) Mid brain or Mesencephalon.
- (iii) Hind brain or Rhombencephalon.

(i) **Fore brain.** It is the largest part of brain and is formed of three parts:

(a) **Olfactory lobe or Rhinencephalon:** These are one pair of small sized, oval-shaped anterior most lobes present in frog and have a medium longitudinal groove in between. They almost merge with cerebral hemispheres. Each olfactory lobe has a cavity called olfactory ventricle or rhinocoel and receives in front an olfactory nerve from the nasal sac.

(b) **Cerebral Hemispheres:** These are a pair of large sized, oval shaped but wider posteriorly and are collectively called **Cerebrum**. The cerebral hemispheres are demarcated from the olfactory lobes by a shallow transverse groove. The median longitudinal groove, which separates the two olfactory lobes from each other, extends backward and separates the two cerebral hemispheres also from each other. Each hemisphere encloses a large cavity called **lateral ventricle**. Anteriorly, the lateral ventricles are continuous with the olfactory ventricles. Posteriorly, they open into the third ventricle of the diencephalon by a common passage, the **foramen of Monro**. The floor and ventrolateral walls of the lateral ventricles are thickened to form the **Corpora Striata**. The two corpora striata are interconnected by anterior commissure. Above this commissure is another commissure called **Hippocampal** commissure. The roof and dorsolateral walls of the lateral ventricles are relatively thin and are called pallium. The pallium now has two regions- a dorsal medial archipallium and a more lateral paleopallium. The archipallium is still associated with olfactory nerve fibres.

(c) **Diencephalon or Thalamencephalon.** It is a small-sized and rhomboidal lobe present just behind the cerebrum. It has a small cavity, called **3rd ventricle or diacoel**, which is connected anteriorly with both the lateral ventricles and posteriorly with the 4th ventricle of medulla oblongata through a narrow **iter or Aqueduct of Sylvius** running through mid-brain. Roof of diencephalon is thin and is called **epithalamus**. It is non-nervous and alongwith pia-matar (a vascular connective tissue covering) constitutes **tela choroidea**. The latter gives finger like processes in the paracoel or third ventricle and these processes form

the **anterior choroid plexus**. This plexus is composed of blood vessels and specialized epithelial tissue called **ependyma**. The anterior choroid plexus secretes cerebrospinal fluid. Posterior part of epithalamus is raised into a hollow **pineal stalk**. In tadpoles, a small spherical pineal body is present at the tip of pineal stalk but during metamorphosis, it separates and comes to lie beneath the skin between two eyes in adult frog and is called brow spot. It represents vestigial third eye.

Lateral walls of diencephalon become thickened and are called **optic thalami**. These are interconnected by a band of nerve fibres called **posterior commissure** present at the junction of diencephalon and optic lobes of mid brain. The optic thalami give rise to primary optic vesicles that take part in the formation of eyes.

Floor of diencephalon is thin and is called **hypothalamus**. It gives out a hollow and nervous bilobed downgrowth, called **infundibulum**, which meets a non-nervous pharyngeal upgrowth, called **hypophysis or Rathke's pouch**. The distal part of infundibulum forms the posterior lobe of pituitary and Rathke's pouch forms the anterior and intermediate lobes of pituitary. The pituitary acts as an important endocrine gland. Just in front of pituitary, there is a cross of two optic nerves, called **optic chiasma**.

(ii). **Midbrain**: It consists of two parts:

- a. **Optic Lobes**: The optic lobes are a pair of prominent, oval bodies situated on the dorsal side of the midbrain. Each lobe contains **optic ventricle, or mesocoel**. Both the optic ventricles open into a narrow median passage, the **iter, or aqueduct of Sylvius**, The latter connects with the third ventricle in front and with the fourth ventricle behind.
- b. **Crura Cerebri**: The crura cerebri are a pair of thick bands of nerve fibres running anteroposteriorly below the optic lobes. They connect the diencephalon with the medulla oblongata.

(iii). **Hind brain**: It is the posteriormost part of the brain and consists of two parts:

- a. **Cerebellum or Metencephalon**. The cerebellum is a narrow transverse band placed on the dorsal side immediately behind the optic lobes. It contains a very small **cerebellar ventricle, or metacoel**.
- b. **Medulla Oblongata or Myelencephalon**: The medulla oblongata is well developed. It is slightly broader at the anterior end. Posteriorly, it passes into the spinal cord without any external line of demarcation. It encloses

triangular **fourth ventricle or myelocoel**. The latter communicates with the central canal of the spinal cord behind. The roof of the fourth ventricle forms the posterior choroid plexus (composition and function same as anterior choroid plexus). The floor of the fourth ventricle is very thick.

Meninges The brain of frog is surrounded by two protective membranes called meninges. They are the inner thin **pia-arachnoid membrane** and the outer thick **dura mater**.