

CONCEPT MAP

FROG

Frog belongs to the **Class Amphibia** of **Phylum Chordata**. Frogs are found around ditches, ponds, marshes, lakes and streams. They can live in water as well as on land hence called **amphibians**. The common Indian frog is *Rana tigrina*.

Morphology

- Body of a frog is pointed anteriorly and rounded posteriorly. It is slightly flattened dorsoventrally, streamlined to swim through water and divisible into head and trunk without neck and tail.
- Skin of frog is thin, moist, smooth, slimy and green coloured with black or brown spots dorsally and lighter pale yellow ventrally. There are no scales or any other hard exoskeleton parts.
- Skin of back has dorsolateral folds or thickenings called **dermal plicae**.
- Head is roughly triangular with a short **blunt** anterior **snout** terminating in a large transverse **mouth**. It bears external nares or nostrils, eyes, brow spot and ear drums on the upper side.
- Frogs have two large and protruding eyes, having an almost immovable upper eyelid and a thin semi-transparent and freely movable lower eyelid. From lower eyelid arises **nictitating membrane** that protects eyes during swimming.
- Vocal sacs** act as resonators to intensify sound of croaking during breeding season.
- Trunk consists of **thorax**, **abdomen** and a pair of forelimb and hindlimb.
- Frog shows **sexual dimorphism** as male frog possesses developed **vocal sacs** and **nuptial pad** during breeding season and their body is somewhat slender and darker in colour than female frog.

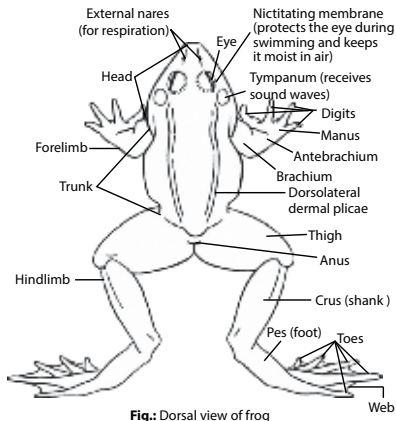


Fig.: Dorsal view of frog

Anatomy

Circulatory System

- Circulatory system of frog is closed and includes **heart**, **arterial system**, **venous system**, **blood** and **lymphatic system**.
- Heart is **three chambered** made up of two anterior **atria** or **auricles** and a single posterior **ventricle**. Two additional chambers are **sinus venosus** and **truncus arteriosus**.
- The two auricles, right (larger) and left, are completely separated from each other by **inter-auricular septum**. Both auricles open into single ventricle by a common large **auriculo-ventricular aperture** guarded by two pairs of **auriculo-ventricular valves**.
- The inner surface of ventricle has irregular ridges called **columnae carneae** or **trabeculae**, with depressions called **fissures**.

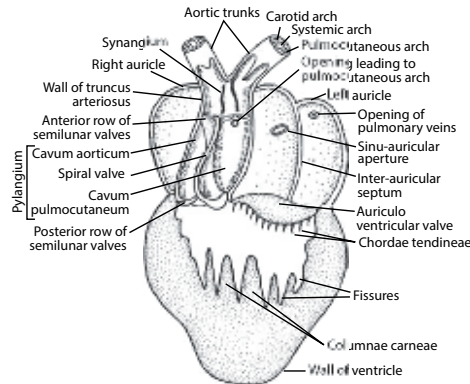


Fig.: Internal structure of heart of frog (ventral view)

Digestive System

- The digestive system mainly consists of **alimentary canal** and its associated **glands**.
- Mouth leads into a buccopharyngeal cavity which opens into oesophagus through gullet.
- Stomach** is situated behind the oesophagus and divisible into cardiac stomach and pyloric stomach.
- The small intestine is divisible into an anterior **duodenum** and a posterior **ileum**. Digestion of food and absorption of digested food occur in the small intestine.
- Ileum leads to **rectum** or large intestine. The rectum opens into the **cloaca** through the **anus**.
- Digestive glands** of frog include liver, pancreas, gastric glands and intestinal glands.

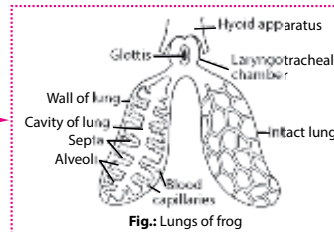


Fig.: Lungs of frog

Nervous System

- It is highly developed and comprises of:
 - Central nervous system (CNS)** includes brain and spinal cord. **Brain** is covered by two meninges; duramater (outer) and pia-arachnoid (inner). Brain is divisible into three parts: Forebrain, midbrain and hindbrain. **Spinal cord** is located in the vertebral column and joins the medulla oblongata via **foramen magnum** of the cranium (brain case).
 - Peripheral nervous system (PNS)** includes 10 pairs of **cranial nerves** and 9 pairs of **spinal nerves**. Rarely 10th (paired or unpaired) spinal nerve is found.
 - Autonomic nervous system** is made up of sympathetic and parasympathetic nerves which controls and coordinates the involuntary activities of the visceral organs.
- Five types of sense organs are **skin** (tangoreceptor), **taste buds** (gustatoreceptor), **nasal chambers** (olfactoreceptor), **eyes** (photoreceptor) and **ears** (stato-acoustic organs).

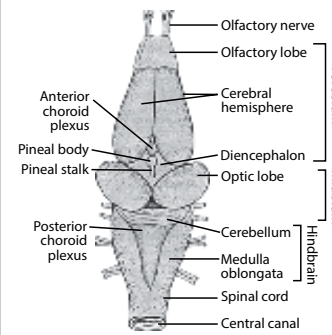


Fig.: Dorsal view of brain of frog

Urinogenital System

- In frogs, the excretory and reproductive systems are closely associated, hence they are together called urinogenital system.
- Excretory system** comprises of kidneys, ureters in females, urinogenital ducts in males, cloaca and urinary bladder. Kidneys are the chief excretory organs which are made up of large number of **uriniferous tubules** or nephrons.
- From the kidneys, arise **ureter** in females and **urinogenital duct** in males.
- Cloaca receives faecal matter, genital products and urine (from kidney). Ventrally it is attached to urinary bladder.
- In **males**, near each kidney there is a cylindrical **testis** from which several thin **vasa efferentia**, connecting the testes to kidneys on each side. The vasa efferentia run transversely through mesorchium and open into the **Bidder's canal** which in turn opens into the **ureter**. Histologically, each testis is a compact mass of seminiferous tubules, the epithelial lining of which produces **sperms**. The sperms when mature are dropped into the lumen to pass into the ureter through vasa efferentia and Bidder's canal.
- Females** have two ovaries where ova are produced by ovarian follicles. On each side of an ovary is an oviduct which starts posteriorly and forms uterus, which opens into the cloaca. During breeding season ova are released into the coelom and then they reach the ovarian funnels from where they pass to the ovisacs, cloaca and then outside.
- Egg of frog is **telolecithal**.

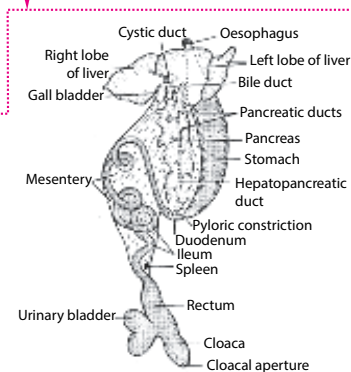


Fig.: Alimentary canal (except buccopharyngeal cavity) of frog

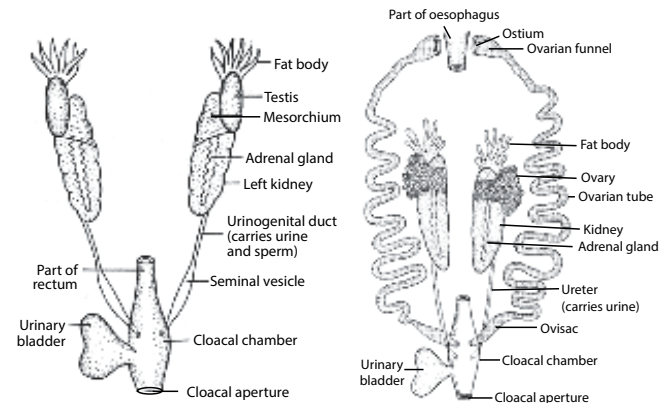


Fig.: Urinogenital system of male frog

Fig.: Urinogenital system of female frog