



NEET Biology

Short Notes

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In this article, we are providing **short notes on the Structural Organization in Animals: Frog** which is an important chapter for [NEET 2019](#). This is an important section to pay attention from the Unit Structural Organization in Plants and Animals as every year **2-3 questions** are asked from this chapter. This chapter is completely theoretical and needs a lot of revision. In this article, Morphology and Anatomy of Frog is discussed in brief important for last days revision. Let's begin with a brief introduction about the Frog. Moreover, you can download the Structural Organization in Animals: Frog Notes PDF, we have shared at the end.

FROG

Frogs belong to Phylum Chordata, class Amphibia. They can live in freshwater as well as on land. ***Rana tigrina*** is the species of frog that is most commonly found in India.

Their body temperature is not constant. Hence, they are called **poikilotherms** or **cold blooded animals**.

They are capable of **camouflage**, that is, they can change their colour when on dry land or in grasses for their protection from enemies. This coloration which is for their own protection is known as **mimicry**.

During extreme cold and heat, they take protect themselves by taking shelter in deep burrows. This is referred to as hibernation (winter sleep) and aestivation (summer sleep).

MORPHOLOGY

1. Frogs have mucus present on their **skin** that makes it slippery and smooth. A moist condition is always maintained on skin. Generally, their body's dorsal side is olive green in colour and has irregular dark spots. On the other hand, there is a uniform pale yellow color on the ventral side. The intake of water in frogs occurs as absorption through skin.
2. Frogs' body has a **head** and **trunk**. They do not have a tail and neck. A pair of **nostrils** is found above the mouth.
3. They have bulgy **eyes** and a nictitating membrane covers their eyes that protects their eyes in water.
4. Sound signals are received by the **ear** (a membranous tympanum) present on eyes' either side.
5. They have **hindlimbs** and **forelimbs** that help them in burrowing, leaping, walking and swimming. Webbed digits are found their feet for swimming.

HINDLIMBS	FORELIMBS
End in five digits.	End in four digits.
Muscular and larger than forelimbs.	Less muscular and smaller than hindlimbs.



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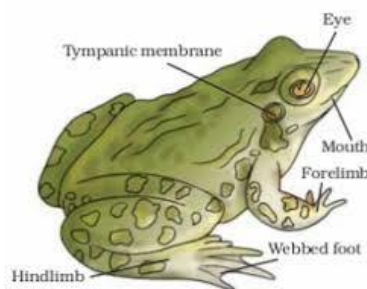


Fig: Morphology of Frog

6. Sexual dimorphism is exhibited by them, that is, male and female frogs can be distinguished from each other.

MALE FROGS	FEMALE FROGS
Vocal sacs that produce sound are present.	Vocal sacs are absent.
The first digit of their forelimbs has a copulatory pad.	Copulatory pad on the first digit is absent.

ANATOMY

Different organ systems are accommodated in the frogs' body cavity. Each of these systems have well developed functions and structures.

1. **DIGESTIVE SYSTEM** – It consists of digestive glands and alimentary canal. Frogs, being carnivores, have short alimentary canal. Therefore, their intestinal length is reduced.
 - a. Their mouth leads to buccal cavity that opens into pharynx, further leading to oesophagus, which is a short tube.
 - b. Oesophagus continues into the stomach and leads to intestine, then rectum. Cloaca is the final opening to the outside.
 - c. Bile juice is secreted by liver and gall bladder stores it. Besides bile, pancreatic juice is produced by a digestive gland, pancreas. Various digestive enzymes are contained in this pancreatic juice.

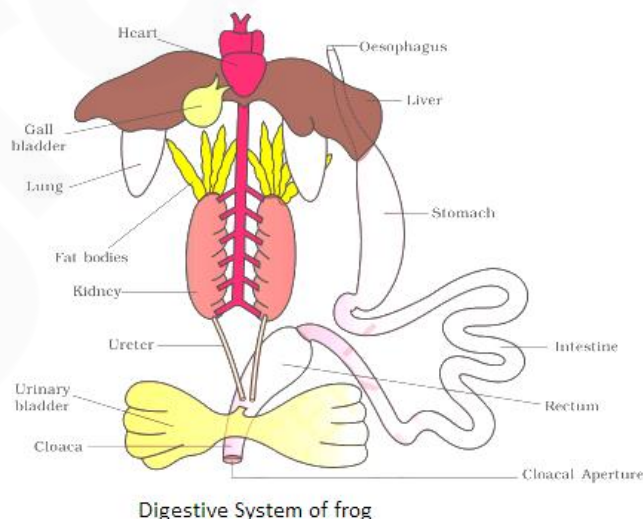


Fig: Digestive System of Frog



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The process of digestion involves the following steps:

- i. Bilobed tongue captures the food.
- ii. The stomach walls secrete gastric juices and hydrochloric acid whose action cause partial food digestion. This food that is digested partially is called chyme.
- iii. From stomach, chyme enters duodenum (first part of intestine). Through a common bile duct, pancreatic juice and bile are received here. Fats are emulsified by bile, and proteins and carbohydrates are digested by pancreatic juices. Complete digestion occurs in intestine.
- iv. Numerous microvilli and villi, that are finger-like folds found in the inner intestinal wall, absorb the digested food.
- v. However, the undigested solid waste enters the rectum and through cloaca, the waste is passed out of the body.

2. RESPIRATORY SYSTEM – There are different methods in frogs for respiration. They respire through skin in water and through lungs, skin and buccal cavity on land. The types of respiration include:

- a. **Cutaneous respiration** or respiration through skin. Skin functions as respiratory organ in water. Skin also helps in gaseous exchange during hibernation and aestivation on land as well.
- b. **Buccal respiration** or respiration through buccal cavity.
- c. **Pulmonary respiration** or respiration by lungs. Lungs are present in pair. They are pink colored, elongated sac-like structures that are found in the upper part of the thorax (trunk region). The entry of air occurs into the buccal cavity through nostrils. The air then enters lungs through buccal cavity.

3. BLOOD VASCULAR SYSTEM – Frog has closed type well-developed vascular system. This system includes blood, blood vessels and heart. Heart is located in the body cavity's upper part. It is a muscular structure. Frog's heart is three-chambered having one ventricle and two atria.

- a. The membrane pericardium covers the heart. The right atrium is joined by sinus venosus (a triangular structure). Vena cava is the major vein that carries blood to the right atrium.
- b. On the heart's ventral side, the ventricle opens into conus arteriosus, which is sac-like.
- c. Arteries form **arterial system** that carry blood to all the body parts from the heart.
- d. Veins form **venous system** that collect blood from different body parts and carry it to the heart.

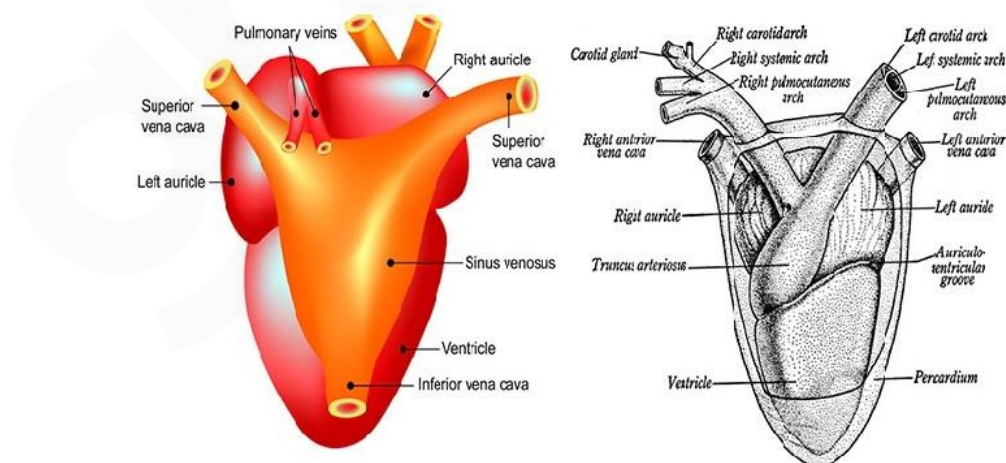


Fig: Structure of Heart in Frog



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- e. In frogs, there is a special venous connection that occurs between the lower body parts and kidney as well as intestine and liver. The former is known as the renal portal system and the latter is known as the hepatic portal system.
 - f. Blood consists of cells and plasma. Blood cells include platelets, erythrocytes (red blood cells or RBCs), and leucocytes (white blood cells or WBCs). Among these, erythrocytes are nucleated and contain haemoglobin, which is a red colored pigment.
 - g. During the circulation, water, gases and nutrients are carried to their respective sites by blood. Heart's pumping action allows the blood circulation.
- 4. LYMPHATIC SYSTEM** – A lymphatic system is also present in frogs. This system includes lymph nodes, lymph channels and lymph. Blood and lymph are different from each other. Lymph do not contain RBCs and a few proteins.
- 5. EXCRETORY SYSTEM** – The excretory system in frogs is well developed. It helps in nitrogenous wastes' elimination from the body. It consists of a kidney pair, urinary bladder, cloaca and ureters.
- a. Kidneys are bean like, dark red, compact structures that are located on both sides of the vertebral column in the body cavity, a little posteriorly. Each kidney consists of several nephrons or uriniferous tubules. Nephrons are the functional and structural units of kidneys.
 - b. In the male frogs, from kidneys emerge two ureters. The ureters opens into the cloaca by functioning as urinogenital duct. However, in females, there is separate opening of the oviduct and ureters in the cloaca.
 - c. The urinary bladder is thin-walled and is found to the rectum's ventral side. It continues into the cloaca.
 - d. Frogs are ureotelic animals as urea is excreted by them. Blood carries excretory wastes into the kidney. The separation and excretion of these wastes occur in the kidney.

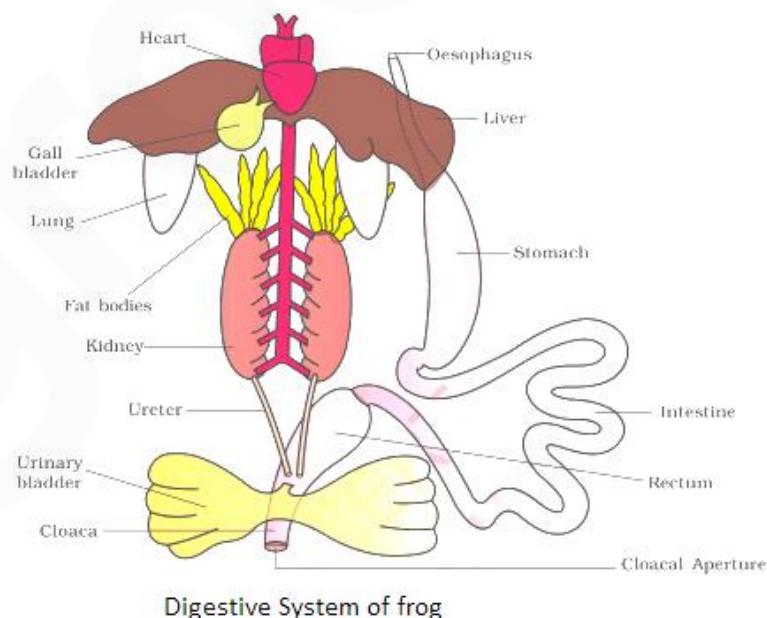



Fig: Digestive and Excretory System of Frog



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6. SYSTEM FOR CONTROL AND COORDINATION – The frog has highly evolved system for control and coordination. Both endocrine glands and neural system are included in this system.

a. Endocrine System – The endocrine glands secrete various hormones that help in coordination of various body organs chemically. In frogs, the endocrine glands that are prominent include thyroid, thymus, pancreatic islets, gonads, pituitary, parathyroid, pineal body, and adrenals.

b. Nervous System – This system is classified into

i. Central nervous system – It includes spinal cord and brain. Cranium (brain box) is the bony structure that encloses the brain. There are three parts of the brain – forebrain, midbrain and hindbrain.

FOREBRAIN	Includes unpaired diencephalon, paired cerebral hemispheres, and olfactory lobes.
MIDBRAIN	Has a pair of optic lobes.
HINDBRAIN	Consists of medulla oblongata and cerebellum. Medulla oblongata continues into the spinal cord through foramen magnum. Vertebral column encloses spinal cord.

ii. Peripheral nervous system – It includes spinal and cranial nerves. From the brain, arise ten pairs of cranial nerves.

iii. Autonomic nervous system – It includes parasympathetic and sympathetic nervous system.

Frog nervous system

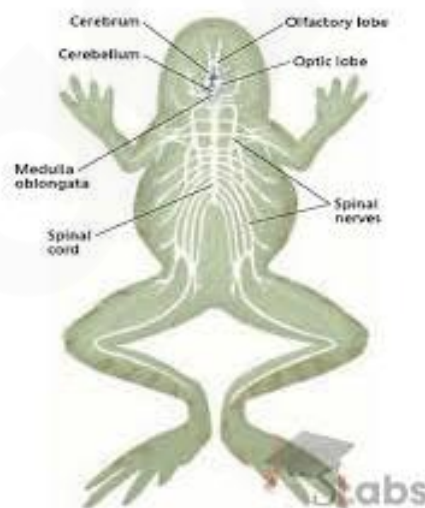


Fig: Nervous System of Frog

c. Sense Organs – The different sense organs in frog are:

- Taste buds (for taste)
- Eyes (for vision)
- Sensory papillae (for touch)
- Tympanum with internal ears (for hearing and equilibrium, that is, balancing)
- Nasal epithelium (for smell)



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All these are aggregations of cells that are found around nerve endings, except internal ears and eyes, which are well-organized.

Their eyes are present in skull's orbit in pair and are spherical structures. They possess single unit and hence are simple eyes.

They lack external ear. Externally, only tympanum can be observed.

7. REPRODUCTIVE SYSTEM – In frogs, female and male reproductive systems are well organised.

- a. MALE REPRODUCTIVE SYSTEM** – It consists of a pair of testes that are ovoid yellowish and are adhered by mesorchium (a double fold of peritoneum) to the kidneys' upper part. From testes, arise vasa efferentia that are 10 – 12 in number. They open into Bidder's canal and enter on the side of the kidneys. This is followed by its communication with the urinogenital duct that leaves the kidneys with its further opening into the cloaca. The cloaca is a median, small chamber that allows the passage of sperms, urine and faecal matter to the outside.
- b. FEMALE REPRODUCTIVE SYSTEM** – It consists of a pair of ovaries that are found near kidneys, but are not functionally connected with them. From the ovaries arise a pair of oviduct that opens separately into the cloaca. At a time, 2500 – 3000 ova can be laid by a mature female.

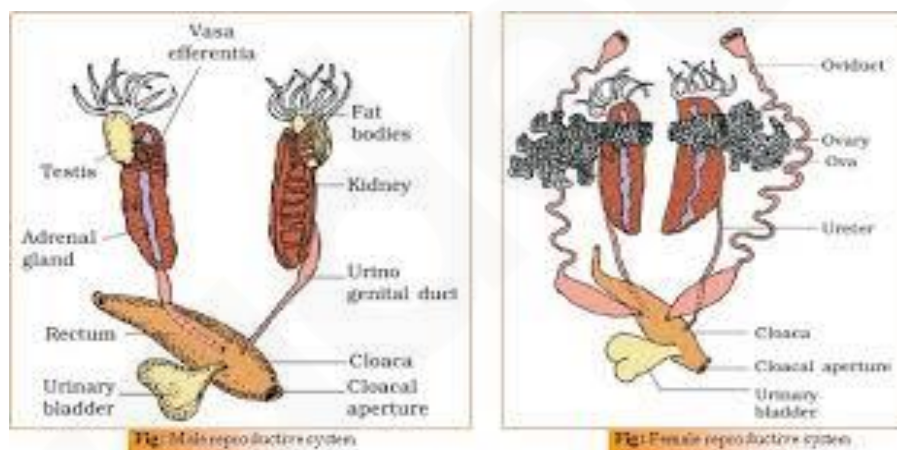



Fig: Male and Female Reproductive System of Frog

Frogs show **external fertilisation** that occurs in water. This is followed by the **development** into tadpole, which is the larval stage. Finally, an adult is formed by the **metamorphosis** of the tadpole.

- 1) Frogs are quite beneficial as they provide protection to the crop and eat insects. In the ecosystem, they provide an important link between the food chain and food web, thereby maintaining the ecological balance. The frogs' muscular legs are eaten by man in some countries.

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