



STRUCTURAL

ORGANISATION

IN ANIMALS

ORGAN AND ORGAN SYSTEM

These groups of cells having similar structure and functions are called tissues.

Various tissues often group together and form large functional units called organs.

Number of organs work together in a coordinated manner and form an organ system.

A complex organism is a result of the cooperative and integrated activities of various organ systems.

Cells → Tissues → Organs → Organ systems → Multicellular body

Humans have a number of organ systems like digestive, respiratory, circulatory, etc.

Each one of these is made up of specific organs.

FROGS

Frogs can live both on land and in freshwater and belong to class Amphibia of phylum Chordata.

They do not have constant body temperature i.e., their body temperature varies with the temperature of the environment. Such animals are called cold blooded or poikilotherms.

Morphology

Body of a frog is divisible into head and trunk. A neck and tail are absent.

Above the mouth, a pair of nostrils is present. Eyes are bulged and covered by a nictitating membrane that protects them while in water.

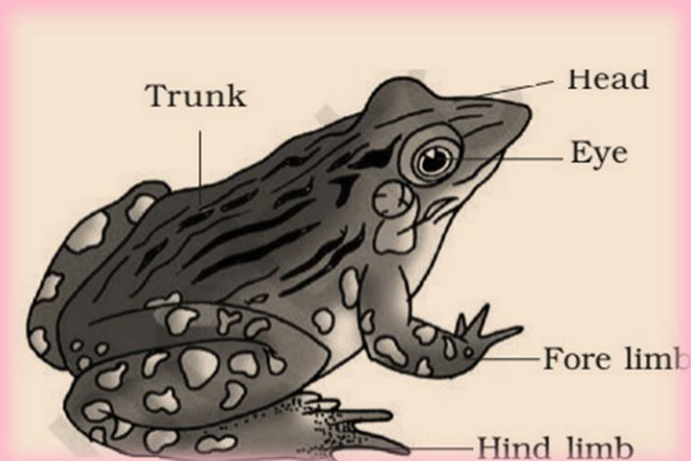
On either side of eyes a membranous tympanum (ear) receives sound signals.

The forelimbs and hind limbs help in swimming, walking, leaping and burrowing.

The hind limbs end in five digits and they are larger and muscular than fore limbs that end in four digits.

Feet have webbed digits that help in swimming.

They exhibit sexual dimorphism. Male frogs can be distinguished by the presence of sound producing vocal sacs and also a copulatory pad on the first digit of the fore limbs which are absent in female frogs.



Anatomy

The body cavity of frogs accommodate different organ systems such as digestive, circulatory, respiratory,

nervous, excretory and reproductive systems with well developed structures and functions

Digestive System

Consists of alimentary canal and digestive glands.

The alimentary canal is short .

The mouth opens into the buccal cavity that leads to the oesophagus through pharynx.

Oesophagus is a short tube that opens into the stomach which in turn continues as the intestine, rectum and finally opens outside by the cloaca.

Liver secretes bile that is stored in the gall bladder. Pancreas, a digestive gland produces pancreatic juice containing digestive enzymes.

Digestion Process

Food is captured by the bilobed tongue. Digestion of food takes place by the action of HCl and gastric juices secreted from the walls of the stomach.

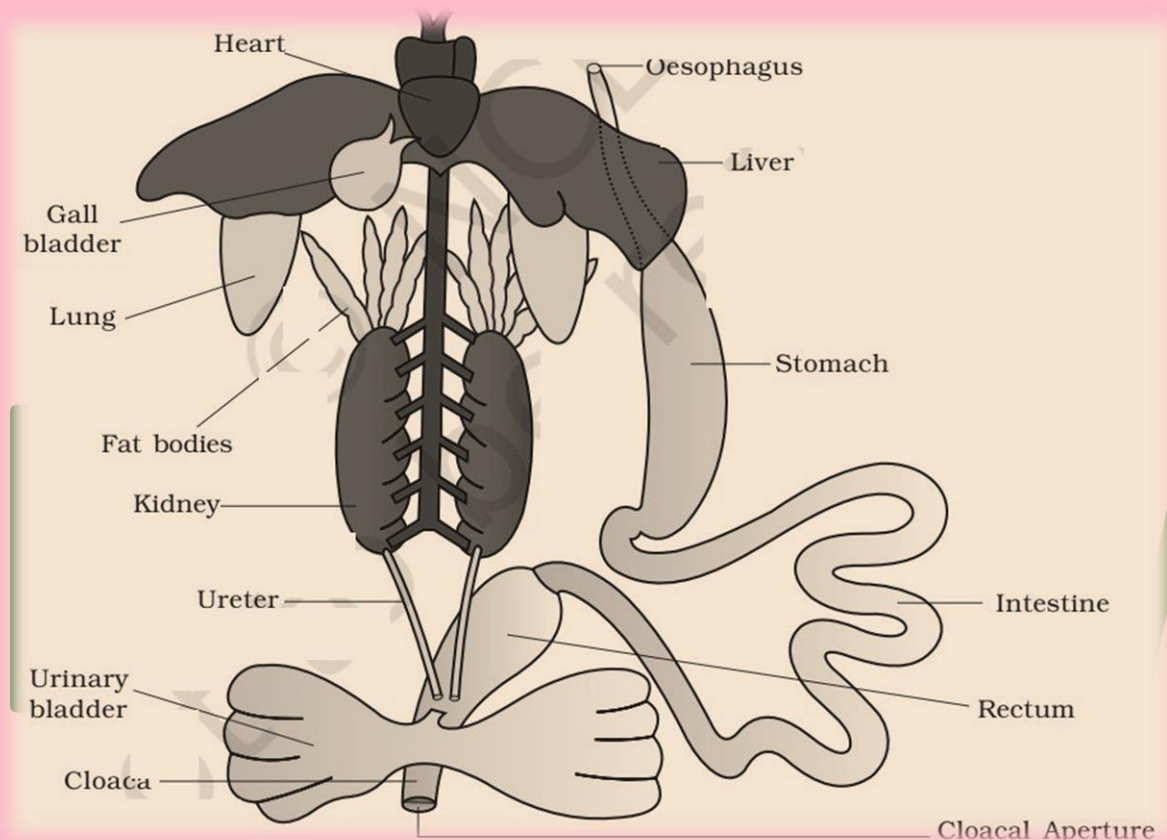
Partially digested food called chyme is passed from stomach to the first part of the small intestine, the duodenum.

The duodenum receives bile from gall bladder and pancreatic juices from the pancreas through a common bile duct.

Bile emulsifies fat and pancreatic juices digest carbohydrates and proteins.

Digested food is absorbed by the numerous finger-like folds in the inner wall of intestine called villi and microvilli.

The undigested solid waste moves into the rectum and passes out through cloaca.



Respiration

In water, skin acts as aquatic respiratory organ (cutaneous respiration). Dissolved oxygen in the water is exchanged through the skin by diffusion.

On land, the buccal cavity, skin and lungs act as the respiratory organs. The respiration by lungs is called pulmonary respiration.

The lungs are a pair of elongated, pink coloured sac-like structures present in the upper part of the trunk region

(thorax). Air enters through the nostrils into the buccal cavity and then to lungs.

During aestivation and hibernation gaseous exchange takes place through skin.

Vascular system

The vascular system of frog is well-developed closed type. Frogs have a lymphatic system also. The blood vascular system involves heart, blood vessels and blood

Lymphatic system

The lymphatic system consists of lymph, lymph channels and lymph nodes.

Heart has three chambers, two atria and one ventricle and is covered by a membrane called pericardium.

A triangular structure called sinus venosus joins the right atrium. It receives blood through the major veins called vena cava.

The ventricle opens into a saclike conus arteriosus on the ventral side of the heart.

The blood from the heart is carried to all parts of the body by the arteries. The veins collect blood from different parts of body to the heart and form the venous system.

Special venous connection between liver and intestine as well as the kidney and lower parts of the body are present

in frogs. The former is called hepatic portal system and the latter is called renal portal system.

Excretory system

The excretory system consists of a pair of kidneys, ureters, cloaca and urinary bladder. Each kidney is composed of several structural and functional units called uriniferous tubules or nephrons.

Two ureters emerge from the kidneys in the male frogs. The ureters act as urinogenital duct which opens into the cloaca.

In females the ureters and oviduct open separately in the cloaca.

The thin-walled urinary bladder is present ventral to the rectum which also opens in the cloaca.

Excretory wastes are carried by blood into the kidney where it is separated and excreted.

Nervous system

The nervous system is organised into a central nervous system, a peripheral nervous system and an autonomic nervous system.

There are ten pairs of cranial nerves arising from the brain.

Brain is enclosed in a bony structure called brain box (cranium).

The brain is divided into fore-brain, mid-brain and hind-brain.

Forebrain includes olfactory lobes, paired cerebral hemispheres and unpaired diencephalon. The midbrain is characterised by a pair of optic lobes. Hind-brain consists of cerebellum and medulla oblongata.

The medulla oblongata passes out through the foramen magnum and continues into spinal cord, which is enclosed in the vertebral column.

Sense organs

Frog has different types of sense organs, namely organs of touch, taste, smell, vision, and hearing.

Out of these, eyes and internal ears are well-organised structures and the rest are cellular aggregations around nerve endings.

Eyes are a pair of spherical structures situated in the orbit in skull.

External ear is absent only tympanum can be seen externally.

Reproductive systems

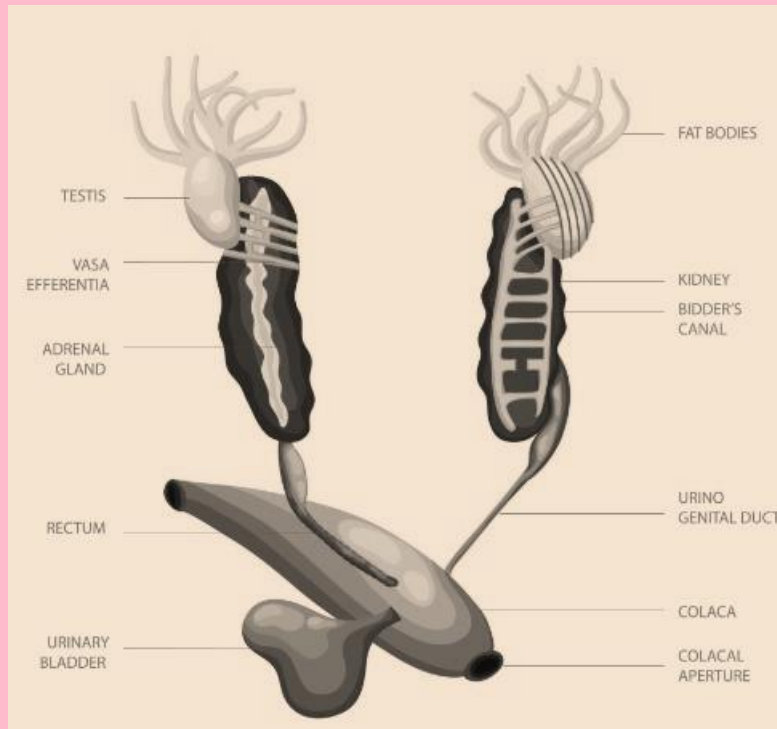
Male reproductive organs consist of a pair of yellowish ovoid testes, which are found adhered to the upper part of kidneys by a double fold of peritoneum called mesorchium.

Vasa efferentia are 10-12 in number that arise from testes.

They enter the kidneys on their side and open into Bidder's canal.

Finally, it communicates with the urinogenital duct that comes out of the kidneys and opens into the cloaca.

The cloaca is a small, median chamber that is used to pass faecal matter, urine and sperms to the exterior



The female reproductive organs include a pair of ovaries.

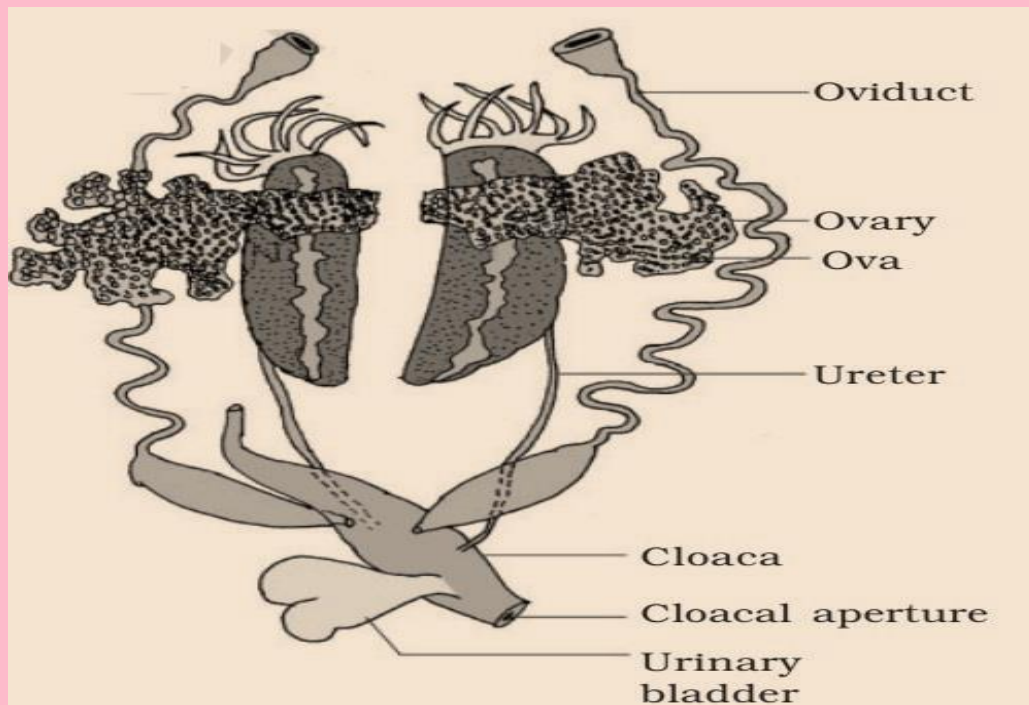
The ovaries are situated near kidneys and there is no functional connection with kidneys.

A pair of oviducts arising from the ovaries opens into the cloaca separately.

A mature female can lay 2500 to 3000 ova at a time.

Fertilisation is external and takes place in water.

Development involves a larval stage called tadpole.



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