FROG

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⇒ Morphology refers to study of form or externally visible features (In the case of plants or microbes, the term morphology precisely mean only this.

⇒ In case of animals, this refers to the external appearance of the Organs or parts of the body.

⇒ Anatomy is used for the study of morphology of internal organs in the animals.

Frogs

⇒ Frogs can live both on land & in freshwater

⇒ Belong to class:- Amphibia
phylum:- Chordata

⇒ Most common Species:- Rana tigrina

⇒ 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.

⇒ Camouflage:- Frogs changes color while they are in grasses & on dry land

⇒ They have the ability to change the color to hide them from their enemies. This protective colouration is called Mimicry

⇒ Frogs are not seen during peak Summer & peak Winter. During this period they take Shelter in deep burrows to protect them from extreme heat & cold. This is Known as Summer Sleep (Aestivation) & Winter Sleep (Hibernation)

Winter Sleep (Hibernation)

Morphology

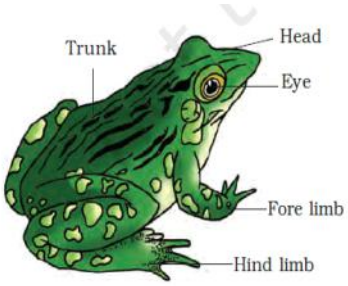

Figure 7.1 External features of frog

⇒ Skin is → smooth & slippery → due to the presence of mucus

⇒ Skin is always maintained in a moist skin

⇒ Body Color
- Dorsal: Coline green with dark irregular spots)
- Ventral: Uniformly pale Yellow

⇒ The frogs never drinks water but absorb it through moist skin.

⇒ Body of frog is divisible into → Head, Trunk

⇒ Neck & Tail are absent.

⇒ Above mouth → Pair of nostrils is present.

⇒ Eyes are → bulged out & Covered by → Nictating Membrane that protects them while in water

⇒ On either side of eyes a membranous tympanum (ear) or Ear Drum recieves Sound Signal

⇒ Fore limbs help in & hind limbs help in swimming

⇒ Forelimbs + Hindlimbs → help in → Swimming + Walking + Leaping (Jump high or longway) + Burrowing

Hind Limbs → end in → 5 digits → they are larger & Muscular → than → Fore Limbs (end in 4 digits)

⇒ Feet → have → Webbed digit → that → help in → Swimming.

Frogs exhibit Sexual Dimorphism

Male Frogs

can be distinguished by the presence of Sound Producing Vocal Sacs & also a copulatory pad on the first digit of the fore limbs.

organ used by male animals to inseminate females.

Female Frogs

All these are absent in female frogs.

Anatomy

The body cavity of frogs accomodate different organ

The body cavity of frogs accomodate different organ systems such as

1) Digestive System
2) Circulatory "
3) Respiratory "
4) Nervous System
5) Excretory "
6) Reproductive "

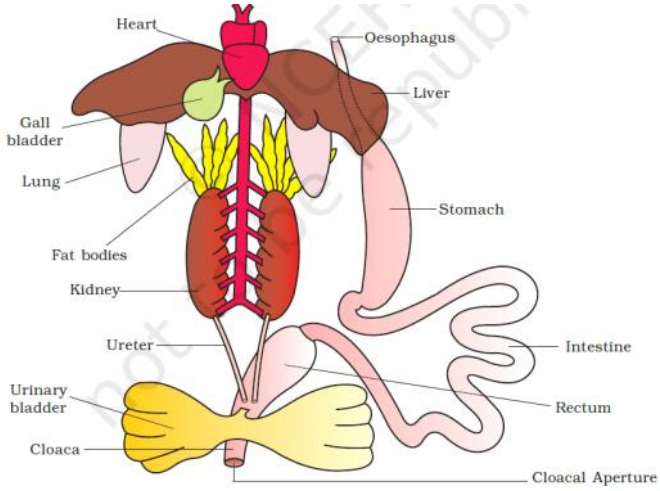

Figure 7.2 Diagrammatic representation of internal organs of frog showing complete digestive system

Digestive System

Digestive System —consist of→ Alimentary Canal + Digestive Glands

⇒ Alimentary Canal —is→ Short —because→ Frogs are Carnivores (Hence the length of intestine is reduced)

⇒ Mouth —opens into→ Buccal Cavity —that leads to the→ Oesophagus —through→ Pharynx

Pharynx

Oesophagus or food pipe → is a → Short tube → that opens into → Stomach → which in turn continues the → Intestine & rectum → & finally open outside → By the Cloaca

Liver → Secretes → Bile → stored in the → Gall Bladder

Pancreas (Digestive Gland) → produces → Pancreatic Juice (containing Digestive enzymes)

Food → is Captured by the → Bilobed Tongue

Digestion of food → takes place by the → Action of HCl + Gastric Juices secreted by the walls of the stomach.

Partially Digested food → called → Chyme → is passed from the → Stomach → to the → First part of the Intestine. (Duodenum)

Gall bladder → Bile

Pancreas → Pancreatic Juice

Bile + Pancreatic Juice → receives to

receives to

Duodenum (part of Intestine)
(through common Bile duct)

⇒ Final Digestion takes place in the intestine.

⇒ Digested food → is absorbed by the → Villi + Microvilli (numerous finger like folds in the inner wall of Intestine)

⇒ Undigested Solid waste → moves into the → Rectum → Passes out through → Cloaca

Respiratory System

Frogs → respire → On land & in the water (By the 2 different Methods)

Water

- Skin act as a aquatic respiratory Organ (Cutaneous Respiration)
- Dissolved Oxygen is exchanged through skin by diffusion

Land

Buccal Cavity (or mouth or Oral) + Skin + Lungs → act as the → Respiratory Organs

⇒ Respiration by lungs → is called → Pulmonary Respiration

Lungs → are a → elongated, Pink Coloured Sac like structures → present in the → upper part of the trunk

Sac like structures in the pair of the trunk region (Thorax)

Air enters through a Nostrils into the Buccal Cavity → Then to Lungs

Owing → Aestivation & Hibernation

Gaseous exchange takes place through Skin

Circulatory System (Well-developed, Closed Type)

Frogs have → Lymphatic System also

⇒ Blood Vascular System involves → Heart + Blood Vessels + Blood

⇒ Lymphatic System consist of → Lymph + Lymph channels + Lymph Nodes

⇒ Heart is a muscular structure situated in the upper part of the body cavity

⇒ 3 chambered → 2 Atria, 1 Ventricle

⇒ Heart is covered by → Membrane (Pericardium)

⇒ Triangular structure called → Sinus Venosus (Joins the RA)

↓

It receives blood through major vein called Vena Cava

⇒ Ventricle → Conus Arteriosus (Sac-like) → On the Ventral

⇒ Ventricle → Conus Arteriosus (Sac-like) → On the Ventral side of the heart.

⇒ The blood from the heart is carried to all parts of the body by Arteries (Arterial System)

⇒ Veins collect blood from different parts of the heart & form the Venous System.

⇒ Special Venous connection between

- Liver & Intestine (known as Hepatic Portal System)
- Kidney & Lower parts of the body (Renal Portal System)

⇒ Blood is composed of → Plasma + Cells → Platelets

Cells:
- RBC or erythrocytes
- WBC or Leucocytes

RBC are Nucleated + Red coloured Pigment (Haemoglobin)

Lymph :- is different from blood.

Lack → Few Proteins + RBC's

⇒ Blood carries → Nutrient + Gases + Water (To the respective sites during the Circulation)

⇒ Circulation of Blood is achieved by the pumping action of the muscular heart

Excretory System

the pumping action of the muscular heart

Excretory System

Excretory System **Consist of** → Pair of Kidneys + Ureter + Cloaca + Urinary Bladder.

all these are ↓

Compact, dark red & bean like structures situated little posteriorly in the body cavity on both sides of vertebral column

Cloaca:- is a common opening for the Urinary, digestive & reproductive tracts.

⇒ Each Kidney **composed of** → Uriniferous tubules or Nephrons (Structural & functional units)

⇒ 2 Ureters emerge from the kidneys (Male frog)

⇒ Ureters **act as** → Urinogenital Duct (carries both urine & semen) **which opens into** → Cloaca

In female frog

Ureters + Oviduct **Open seperately** → In the Cloaca

Urinary bladder (thin-walled) ventrally present to the rectum **also open into** → Cloaca

⇒ Frog excrete Urea (Ureotelic animals)

⇒ Excretory wastes are carried by blood into the Kidney where it is seperated & excreted.

Nervous System

⇒ System for control & co-ordination is highly evolved in frog

~~It involves both~~

in frog

It involves both
- Neural System
- Endocrine Glands

Endocrine Glands

⇒ The chemical coordination of various organs of the body is achieved by hormones which are secreted by the endocrine glands

⇒ Prominent Endocrine Glands found in the frog

1) Pituitary Gland
2) Thyroid Gland
3) Parathyroid Gland
4) Thymus
5) Pineal body
6) Pancreatic Islets
7) Adrenal
8) Gonads

Nervous System

NS is organised into → CNS + PNS + ANS

- CNS → Brain, Spinal Cord
- PNS → Cranial Nerves, Spinal Nerves
- ANS → Sympathetic, Parasympathetic

Cranial Nerves: there are 10 pair arising from Brain

⇒ Brain is enclosed in a → Brain Box (Cranium)

Brain Structure

Brain

1) Forbrain (includes ...)
2) Midbrain characterised
3) + Hindbrain (consist of ...)

1) Forbrain → Includes
- Olfactory lobes
- Paired Cerebral Hemisphere
- Unpaired Diencephalon

2) Midbrain → characterised By → Pair of optic Lobes.

3) Hindbrain → consist of → Cerebellum + Medulla Oblongata (MO)

MO → Passes out through the → foramen magnum → & continues into → Spinal Cord (which is enclosed in Vertebral column)

Sense Organs

⇒ Frogs has different types of Sense Organ

1) Organs of Touch (Sensory Papillae)
2) " " Taste (Taste Buds)
3) " " Smell (Nasal Epithelium)
4) " " Vision (eyes)
5) " " Hearing (Tympanum & Internal Ears)

⇒ Out of these, eyes & Internal ears are well-organised structures & the rest are cellular aggregations around nerve endings

⇒ Eyes (pair of spherical structures) → situated in the → Orbit in Skull

{these are simple eyes (possesing only 1 unit)}

⇒ External Ear is absent only tympanum can be seen externally (or ear Drum)

⇒ Ear is an organ of hearing as well as balancing (equilibrium)

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Male Reproductive System

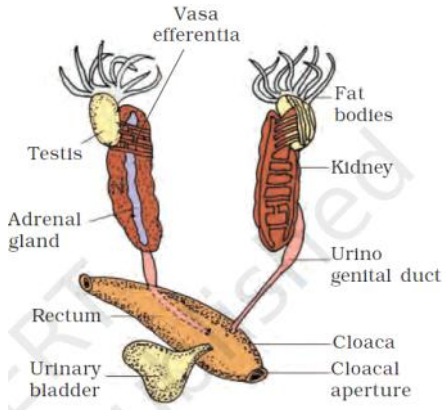


Figure 7.3 Male reproductive system

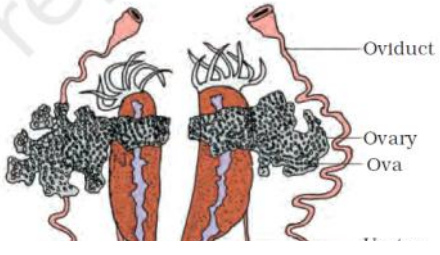
M R organs → consist of a pair of → Yellowish Ovoid testes (which are found adhered to the upper part of Kidneys)

→ By a double peritoneum → called → Mesorchium

⇒ Vasa efferentia → are → 10-12 (in number) → that arise → Testes → enter the → Kidneys on their side → open into → Bidder's canal → communicate with the → Urinogenital tract (that comes out of the kidneys)

→ opens into the → Cloaca (small, median chamber that is used to pass faecal matter, Urine & sperms to the exterior)

Female Reproductive System



⇒ It include pair of Ovaries.

⇒ Ovaries → are situated near → Kidneys (there is no functional connec

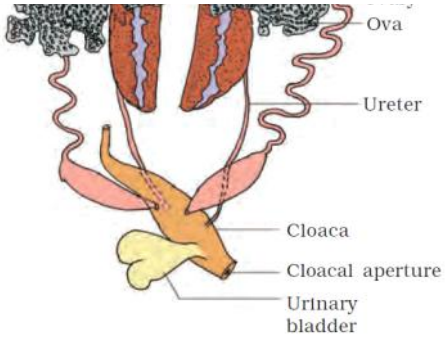


Figure 7.4 Female reproductive system

(There is no functional connection b/w Kidneys)

⇒ pair of Oviduct arising from the Ovaries

Ovaries → opens into → Cloaca seperately

⇒ Mature Female lay → 2000 to 3000 Ova (at a time)

⇒ Fertilisation (take place in Water) is → External

⇒ Development involves a → Larval Stage (Called Tadpole)

⇒ Tadpole undergoes metamorphosis to form the adult.

Benefits

⇒ Frogs are beneficial for mankind because they eat insects & protect the crop

⇒ Frog maintain ecological balance because these serve as an important link of food chain & food web in an ecosystem

⇒ In some countries the muscular legs of frog are used as food by man.

9. Match the following and choose the correct option

	Column I		Column II
A.	Touch	i.	Nasal epithelium
B.	Smell	ii.	Foramen magnum
C.	Cranial nerves	iii.	Sensory papillae
D.	Medulla oblongata	iv.	Peripheral nervous system

4. Identify the sex of a frog in which sound producing vocal sacs are present.

5. Name the process by which a tadpole develops into an adult frog.

9. Give two identifying features of an adult male frog.

11. The digestive system of frog is made of the following parts. Arrange them in an order beginning from mouth.

    Mouth, oesophagus, buccal cavity, stomach, intestine, cloaca, rectum, cloacal aperture

12. What is the difference between cutaneous and pulmonary respiration?

13. Special venous connection between liver and intestine and between kidney and intestine is found in frog, what are they called?

2. Frogs are beneficial for mankind, justify the statement.

16. Frog is a poikilotherm, exhibits camouflage and undergoes aestivation and hibernation, how are all these beneficial to it?

17. Write the functions in brief in column B, appropriate to the structures given in column A.

Column A		Column B	
a.	Nictitating membrane	i.	_____
b.	Tympanum	ii.	_____
c.	Copulatory pad	iii.	_____

5. Draw a neat and well labelled diagram of male reproductive system of a frog.