

# STRUCTURAL ORGANIZATION IN ANIMALS



**Rana tigrana**  
Cold-blooded

**Male Reproductive System**  
- Testes: Pair of yellowish oval structures, adheres to upper part of kidneys by mesorchium.

**Female Reproductive System**  
- A pair of ovaries situated near kidneys.  
- No functional connection with kidneys by mesorchium.

**Fertilization**  
- External in water.  
- Development in larval stage, tadpole.  
- Tadpole.

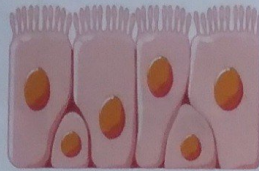
**Circulatory System**  
- Heart: 3-chambered, 2 Atria + 1 Ventricle.  
- Ventricle opens into conus arteriosus on ventral side of heart.  
- Blood from heart is carried to all body parts by arterial system.

**Blood Vascular System**  
- Heart + Blood vessels + Blood.  
- RBCs are nucleated and red in color.

**Lymphatic System**  
- Lymph + Lymph channel + Lymph nodes.  
- Lymph has no RBCs.

**Digestive System**  
- Short alimentary canal + digestive glands.  
- Mouth → Buccal cavity → Stomach → Intestine → Rectum → Cloaca.  
- Digested food is absorbed within intestine and undigested solid waste is removed via cloaca.

**Respiratory System**  
Land - Buccal cavity skin and lungs as pulmonary respiratory organs.  
Water - Skin acts as cutaneous respiratory organ.



EPITHELIAL CELLS



## Animal Tissue

### Cell Junction

Tight - check the flow between cells.  
Gap - help in between cells communication.  
Adh - holds cells together.

- Glandular epithelium: cuboidal or columnar for secretion.
- Simple: made of single layer of cells.
- Compound

**Unicellular** - goblet cells of alimentary canal  
**Multicellular** - Salivary glands  
**Endocrine** - Pituitary, thymus  
**Exocrine** - Sweat & sebaceous glands

### 2) CONNECTIVE TISSUE

- Loose**
  - Areolar
  - Adipose
- Dense**
  - Regular
  - Irregular
- Specialized**
  - Lymph
  - Blood
  - Bones
  - Cartilage

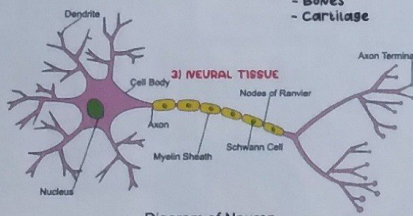
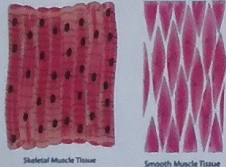


Diagram of Neuron

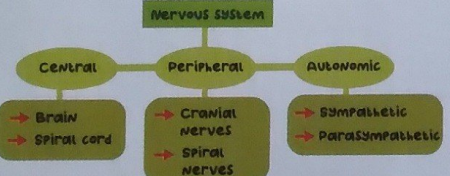
**3) MUSCULAR TISSUE**  
- Skeletal: striated - long & cylindrical present in limbs, tongue & pharynx  
- Smooth / Unstriated - walls of visceral organ  
- Cardiac - long & cylindrical - uninucleate - present in heart



LOREM IPSUM



Cardiac muscle tissue

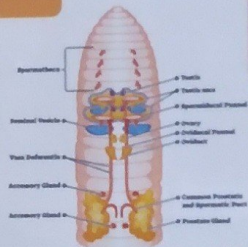


- Brain - present in cranium, has 3 parts -  
1) Fore brain 2) Mid brain 3) Hind brain

## Common Indian varieties of earthworms

**Reproductive System (Hermaphrodite)**  
Male - Pairs of testes (10th and 11th).  
- Vas deferentia upto 18th segment.  
- One pair of accessory glands in 17th and 19th segments.  
- 4 pairs of spermathecae in 6th - 9th segments.  
Female - 1 pair of ovaries in 13th.  
- Intersegmental septa of 10th and 12th.  
- Oviduct funnels beneath ovaries.  
- Oviduct opens on 14th segment as female genital pore.

## REPRODUCTIVE SYSTEM OF EARTHWORM



**Nervous System**  
- Represented by ganglia.  
- Ganglia arranged on ventral paired nerve cord.  
- The bifurcated nerve cord joins the cerebral ganglia dorsally to form nerve ring.  
- Cerebral ganglia commands muscular responses.

**Respiratory System**  
- No specialized breathing organ system.  
- Exchange occurs via moist body surface into blood stream.

## CLOSED CIRCULATORY SYSTEM

- Has blood vessels, capillaries and heart.  
- Contraction helps blood circulation in one direction.  
- Smaller blood vessels supply the gut, nerve cord & body wall.  
- Blood glands in 10th, 11th & 13th segment produce blood cells & haemoglobin.

## Periphrone americana nocturnal enivores



**Male Reproductive System**  
- Pair of testes in 7th-8th segment.  
- Genital pouch has 10 ducts.  
- 10 ducts lead to 10 spermathecae.  
- Ducts have pores.

**Female Reproductive System**  
- Pairs of ovaries in 2nd-3rd segment.  
- Genital pouch has 10 spermathecae.  
- Ducts have pores.

**Respiratory System**  
- Trachea, divided into tracheoles.  
- Tracheoles carry oxygen to all body parts.  
- Trachea opens via spiracles.

**Vascular System**  
- Open type.  
- Blood called haemolymph, has colorless plasma and haemocytes.  
- Alary muscles help in circulation.  
- Heart is dorsal and 13 chambered.

**Alimentary Canal**  
- Divided into - Foregut, midgut and hindgut.  
- Mouth opens into → Pharynx → Oesophagus → Crop (food storing region) → Gizzard where grinding of food occurs → Hepatic caeca → Midgut → Malpighian tubules → Hindgut.  
- Hindgut is divided into ileum, caecum and rectum.  
- Rectum opens out through anus.

**General Features**  
Body: Head, Thorax, Abdomen.  
- Head has compound eye, ocelli and antennae.  
- Has mosaic vision for nocturnal vision.

