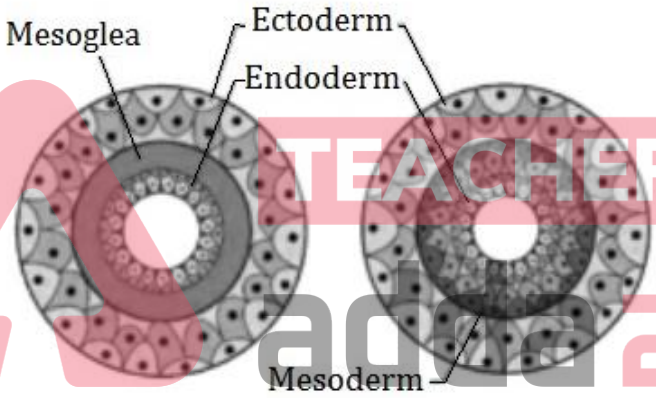
ANIMAL KINGDOM

Animals are classified on the basis of arrangement of cells, body symmetry, and nature of coelom, pattern of digestive, circulatory and reproductive system.

Open circulatory system - blood is pumped out of heart and cells and tissue are directly bathed in it.
Closed circulatory system - blood is circulated through arteries, veins and capillaries.

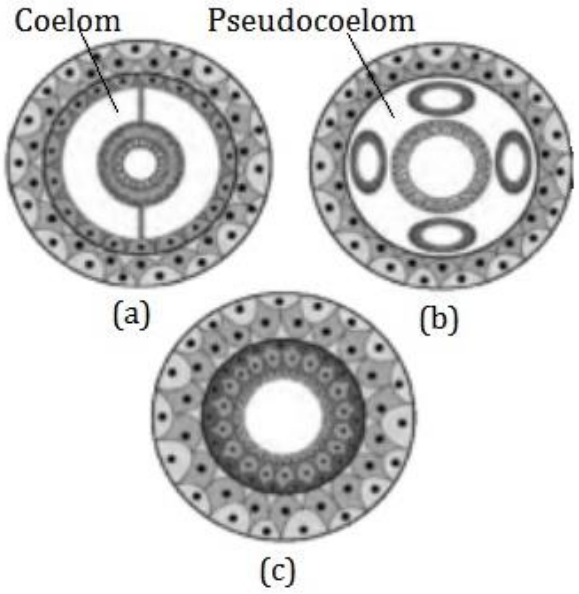
1. The animals in which cells are arranged in two embryonic layer, external ectoderm and internal endoderm are called **diploblastic**. Eg. Porifera and Cnidaria.



2. The animals in which developing embryo has a third germinal layer, mesoderm besides ectoderm and endoderm are called **triploblastic.** Eg. Platyhelminthes, Chordates.

Coelom: The body cavity which is lined by mesoderm is called coelom.

1. **Coelomate:** Animals possessing coelom are called **coelomate** (Annelida, Chordates, Mollusca).
2. **Pseudo coelomates:** In some animals cavity is not lined by mesoderm but scattered as pouches in between ectoderm and endoderm, are called **pseudo coelomates** (Aschelminthes).
3. **Acoelomate:** The animals in which body cavity is absent are called **acoelomate** (Platyhelminthes).
4. In some animals, body is externally and internally divided into segments with serial repetition as in earthworm, called **metameric segmentation**.



CLASSIFICATION OF ANIMALS:

1. Phylum Porifera

- Members of this phylum are commonly known as sponges. Mostly marine, asymmetrical and have cellular level of organization.
- They have water transport or canal system. Water enters through minute pores, **Ostia** into central cavity **Spongocoel**, from where it goes out through **Osculum**.
- Nutrition, respiration and excretion is performed by pathway of water transport system. Skeleton made up of spicules or spongin fibres.
- Egg and sperms are produced by same organism (hermaphrodite). Asexual reproduction by fragmentation and sexual reproduction by gametes formation.
- Example - Sycon, Spongilla.

2. Phylum Cnidaria (Coelenterate)

- They are aquatic, mostly marine, sessile, free swimming, radially symmetrical animals.
- They exhibit tissue level of organization, diploblastic, coelomate with single opening.
- They show two types of body called polyp and medusa.
- Polyp is sessile, fixed, and cylindrical, without gonads such as Hydra, Adamsia and Medusa is free swimming. umbrella like having four gonads like Aurelia and Jelly fish.
- Some cnidarians exhibits both forms (Obelia), polyp produce medusa asexually and medusa produce polyp sexually

3. Phylum Ctenophora

- Commonly known as the Comb Jellies or Sea Walnuts.
- Exclusively marine, diploblastic, radially symmetrical, with tissue level of organization.
- Body bears eight ciliated comb plates which help in locomotion.
- Bioluminescence (to emit light) is present in Ctenophores.
- Hermaphrodite, fertilization external, development indirect,
- Example - Ctenoplana, Pleurobranchia.

4. Phylum Platyhelminthes (The Flat worms)

- Dorso - ventrally flattened body, bilaterally symmetrical, triploblastic, acoelomate with organs levels of organization.
- Hooks and sucker are present in parasitic forms. Flame cells help in osmoregulation and excretion.
- Fertilization is internal, development is indirect, hermaphrodite.
- Example - Taenia, Planaria, Fasciola.

5. Phylum Aschelminthes (The Round Worm)

- They may be free - living, aquatic, terrestrial or parasitic in plants or animals.
- Bilaterally symmetrical, triploblastic, pseudo coelomate.
- Alimentary canal is complete with well - developed muscular pharynx.
- Dioecious, females are longer than male.
- Example - Ascaris (round worm), Wucheriria (filarial worm), Ancyclostoma.

6. Phylum Annelida

- Aquatic or terrestrial, bilaterally symmetrical, segmented with organ system level of organization.
- Aquatic Annelids like Nereis possesses lateral appendages parapodia, for swimming, Nephridia help in osmoregulation and excretion. Neural system consists of paired ganglia.
- Dioecious (Nereis) or monocious (earthworm, leech)
- Example Pheretima (earthworm), Hirunidaria (Blood sucking leech).

7. Phylum Arthropoda

- Largest phylum of animals which includes insects. Organ system of organization, triploblastic, coelomate, bilaterally symmetrical with chitinous exoskeleton.
- Body consists of head, thorax and abdomen, jointed appendages (jointed feet). Respiratory organs are gills, book lungs or tracheal system with open circulatory system.
- Excretion through malpighian tubules, sense organs antenna or eyes. Fertilization internal, mostly oviparous.
- Example - Economically important - Apis (honey bee), Bombyx (silk worm). Vectors - Anopheles, Ades, Culex (mosquito). Living fossils - Limulus (king crab)

8. Phylum Mollusca

- Terrestrial or aquatic, organ level of organization, bilaterally symmetrical, triploblastic and coelomate.
- Body divided into head, muscular foot and visceral hump. Unregimented and covered with calcareous shell.
- Feather like gills are present between hump and mantle.
- Mouth contains file like rasping organ for feeding called radula.
- Example - Pila, Octopus.

9. Phylum Echinodermata (The Spiny Skinned Animals)

- Endoskeleton of calcareous assicles, marine with organ system of organization.
- Triploblastic, coelomate, presence of water vascular system help in locomotion, capture of food and respiration.
- Sexes are separate, fertilization is external and development is indirect.
- Example - Asterias (Star fish), Cucumaria (Sea cucumber), Antedon (Sea lily).

10.Phylum Hemichordata

- Worm - like marine animals with organ system of organization, bilaterally symmetrical, triploblastic and coelomate animals.
- Body is cylindrical, composed of anterior proboscis, a collar and a long trunk.
- Open circulatory system, respiration by gills, excretory organ is proboscis glands.
- Sex separate, fertilization is external, indirect development,
- Example - Balanoglossus, Saccoglossus.

11. Phylum Chordates

- Presence of notochord, a dorsal hollow nerve chord and paired pharyngeal gill slits.
- Bilaterally symmetrical, triploblastic, coelomate with organs system levels of organization.
- Closed circulatory system, ventral heart, post - anal tail is present.
- Subphylums are Urochordata, Cephalochordata, Vertebrata.
- In **Urochordata**, notochord is present only in larval tail.
- In **Cephalochordate** it extends from head to tail and persists throughout the life.
- **Vertebrata** possesses notochord in embryonic period which is replaced by vertebral column in the adults.
- **Sub - phylum Vertebrata** is further divided into two division Agnatha (lacks jaw) and Gnathostomata (bears jaw).
- **Gnathostomata** is further divided into two super class - **Pisces** (bears fins) and **Tetrapoda** (bears limbs).

A. Class Cyclostomata (Circular mouthed fishes) -

- They are ectoparasites on some fishes. Having sucking and circular mouth without jaws.
- Body devoid of scales, gill slits for respiration, cranium and vertebral column is cartilaginous.
- Circulation is closed type. They are marine but migrate to fresh water for spawning and die after few days. Larva return to seas after metamorphosis.
- Exmple – Petromyzon (Lamprey), Maxine (Hag fish).

B. Class Chondrichithyes (The cartilaginous Fish)

- They are marine, streamlined body, bears cartilaginous endoskeleton, cold blooded, tough skin with minute placoid scales.
- Gill slits are separate with operculum, powerful jaw and predator.
- Air bladder is absent, to avoid sinking swims constantly. Heart is two chambered, cold blooded (Poikilothermus).
- Sexes separate, in males pelvic fins bears claspers. Internal fertilization, many are viviparous.
- **Electric organ** is present in Torpedo and **Poison sting** in Trygon
- Example - Scollodon (Dog fish), Carcharodron (great white shark).

C. Class Ostechthyes (The body fish)

- Marine and fresh water both with bony endoskeleton. Stremilned body with four pair of gills covered operculum.
- Skin is covered with scales, air bladder is present, and heart is two chambered, cold blooded.
- Sexes are separate, fertilization is external, oviparous and development direct.
  Example : Marine - Hippocampus (Sea horse), Exocoetus (Flying fish).
  Fresh water - Labeo (Rohu), Catia, Clarias (Magur).

D. Class Tetrapoda :

Subdivided as: Amphibia, Reptilia, Aves, and Mammals.

Amphibian	Reptilian	Aves	Mammals
Lives in aquatic as well as terrestrial habitat.	Mostly terrestrial animals.	Presence of feathers for flying.	Mostly terrestrial, a few can fly and live in water.
Two pairs of limbs	Limbs two pair if present.	Forelimb is modified into wings.	Two pair of limps.
Moist skin without scales.	Dry and cornified skin having scale or scute.	Skin is dry without glands. Long bones are hollow with air cavities.	Mammary gland is present to produce milk. Skin possesses hairs.
Respiration by gills, lungs or skin.	Respiration by lungs	Respiration by lungs	Respiration by lungs
Heart three chambered, cold blooded	Heart three chambered, Crocodile 4 – Chambered	Heart is four chambered, warm blooded.	Heart is four chambered.
Oviparous	Oviparous	Oviparous	Viviparous or Oviparous.
Ran (frog), Salamander	Chamelion, Crocodilus, Naja	Columba, Pavo, Ostrich	Paltypus(oviparous), Camel, Dog, blue Whale.