Plant and Animal Kingdom

The Hierarchy of Classification - Groups

Ernst Haeckel (1894) | Robert Whittaker (1969) | Carl Woese (1997)

Father of Taxonomy

. 1735: Carl Linnaeus
Gave 2 Kingdom Classification
- Animal
- Plant

Taxonomy: it is the science of classifying and naming the living organisms

KINGDOM

1. Monera
2. Protista
3. Fungi
4. Plantae
5. Animalia

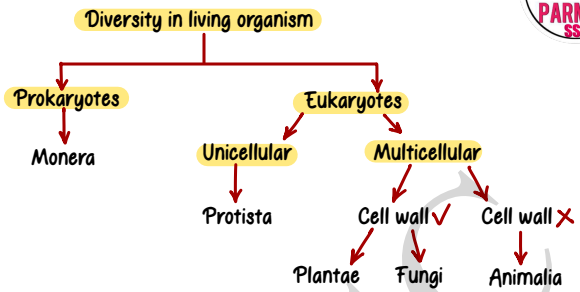
5 kingdoms

These two Kingdoms are very important

- 5 kingdoms classification by Robert Whittaker in 1969
- Ernst Haeckel in 1866 coined the term "Ecology"
  - 3 Kingdom Classification (1864)
- Father of Indian ecology: Ramdeo Mishra
- Carl Woese (1997): 3 domains

TRICK to learn the order

Kingdom	Kabaddi
Phylum (Animals)/ Division (Plants)	Play
Class	Class
Order	Our
Family	Of
Genus	Girls
Species	Some



Classification is based on following:

- Prokaryote v/s Eukaryote cell structure
- Unicellular/Multicellular organization
- Modes of nutrition
- Further classification is done into sub groups

KINGDOM MONERA

- Microscopic, Prokaryotic
- Prokaryotic
  eg: Archaebacteria, Eubacteria, Cynobacteria (Blue-green algae)
- Can be autotrophic/heterotrophic
- Well defined nucleus and membrane bound organelles is absent
- Cell wall maybe present/absent

KINGDOM PROTISTA

Characteristics

- Unicellular eukaryotic organisms
- Locomotion through appendages
- Cell wall is absent except Euglena

Mode of Nutrition

- Autotrophic/Heterotrophic
  eg: Unicellular algae(diatoms) protozoa

Classification of kingdom Protista

PHYLUM PROTOZOA

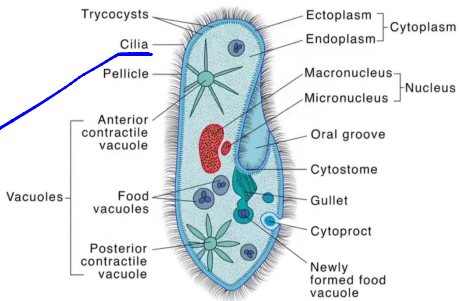
- Unicellular, mostly aquatic, solitary or colonial
- free living/parasitic/symbiotic
  eg: Euglena, Amoeba, Paramecium, Plasmodium

Kingdom Monera Classification

Archaebacteria
- Mostly autotrophs
- Few photosynthesis

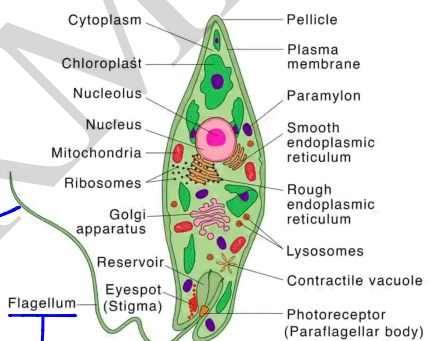
- Eubacteria
  - Cell wall is present
  - Plasma membrane is present
  - Cytoplasm present
  - Ribosomes present

Paramecium



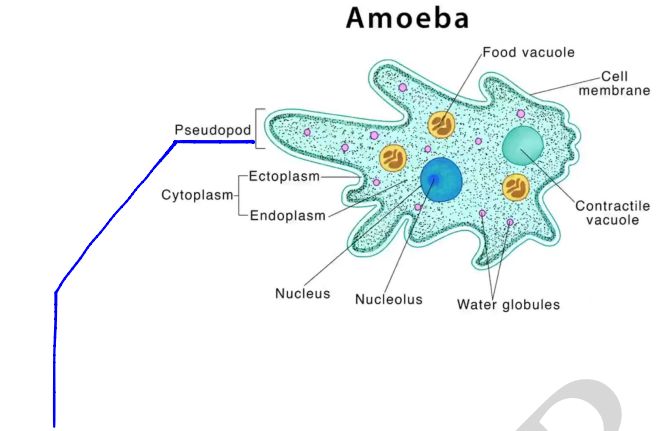
- Helps in movement/locomotion
- Also, helps to move food to its oral cavity

Euglena



Euglena has a tail-like structure

Helps in cell movement



KINGDOM FUNGI

Fungus on Bread

Mushroom

Characteristics

- Multicellular except yeast
- Cell wall is present and is made of complex sugar chitin

- Some are in symbiotic relationship — benefit from each other
  eg: Lichen – Blue green algae + fungi
  - changes colour due to global warming
  - gives food to fungus
  - gives water + shelter + minerals to algae

- India's first lichen park: Uttarakhand

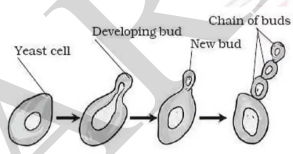
- Used in medicine: Penicillin
- Used in bakery: Yeast

Alexander Fleming discovered Penicillin

Mode of nutrition

- Heterotrophic
- Saprophytic: Decaying organic material as food
- Parasitic: Dependent on protoplasm of a host organism for food

Types of fungi :-



Saccharomyces (Yeast)

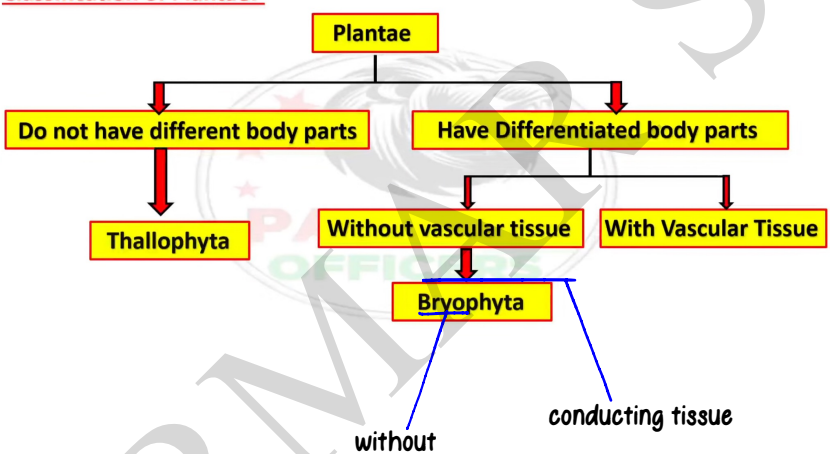

Penicillium (Mold)


Agaricus (Mushroom)

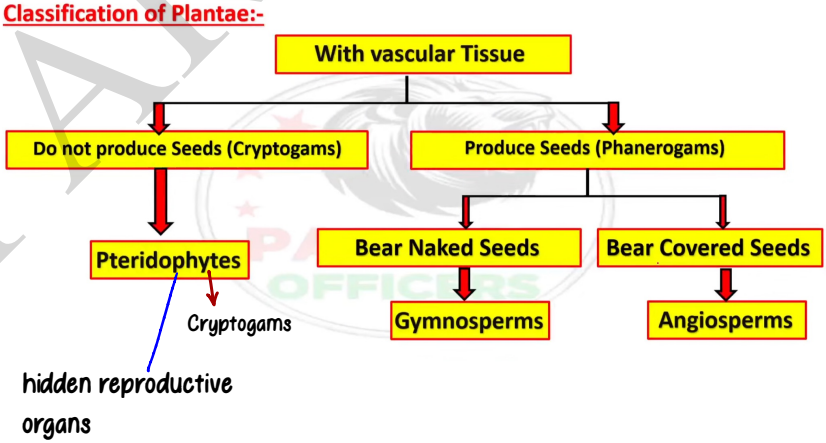
KINGDOM PLANTAE

- Multicellular
- Eukaryotes
- Cell Wall present — Cellulose
- Autotrophic in nature
- Sedentary

Classification of Plantae:-



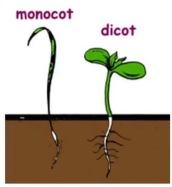
Classification of Plantae:-

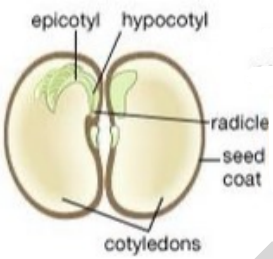


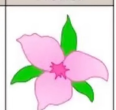
Classification of Plantae:-

Angiosperms

- **Monocots (One Cotyledon)**
- **Dicots (two Cotylodeons)**





	Seed	Root	Vascular	Leaf	Flower
Monocot					
	One cotyledon	Fibrous roots	Scattered	Parallel veins	Multiples of 3
Dicot					
	Two cotyledon	Tap roots	Ringed	Net-like veins	4 or 5

single cotyledon

Two cotyledons

PHYLUMS OF KINGDOM PLANTAE

Characteristics of Thallophyta

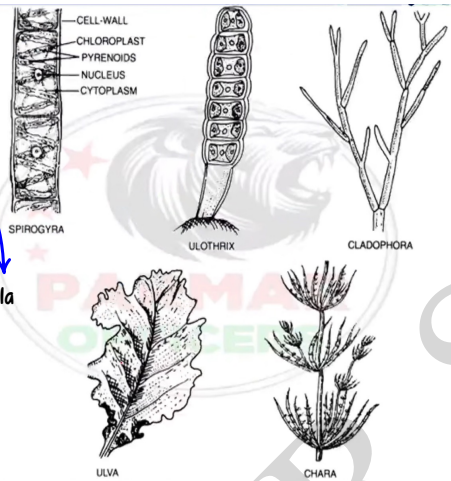
- Plants do not have **well-differentiated body parts**
- Plants are called as algae
- Mostly aquatic

  eg: Spirogyra, Ulothrix, Ulva, and Chara
- Presence or absence of vascular tissues
- Ability to bear seeds
- Ability to produce flower

no distinguished root or stem or body

Thallophyta - Algae

- **Phycology:** Study of algae
- **Green algae:** Chlorophyceae
- **Red algae:** Rhodophyceae
- **Brown algae:** Phaeophyceae
  - Sargassum grass, Lamanaria (Kelps)
- **Blue green algae:** Cyanobacteria



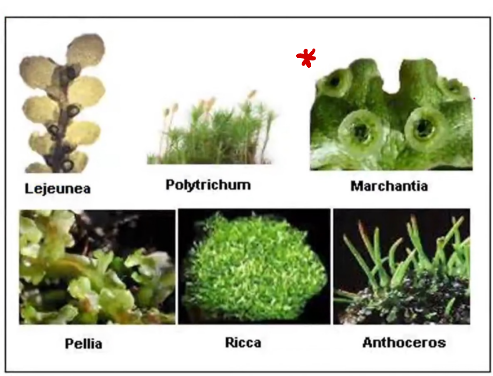
- **Antheridium:** the male sex organ of algae, Moses, ferns, fungi, and other non-flowering plants

Characteristics of Bryophyta

- They are known as "Amphibians of Plant Kingdom"
- Well differentiated body: Stem and leaves
- Root like structures present: Rhizoids
- Autotrophic, non-motile
- No specialised tissues for water and food conduction
- Found in damp and moist areas

  eg: Riccia, Moss (Funaria), Marchantia

Bryophyta:-



Found in cracks of rocks, moist and shady places

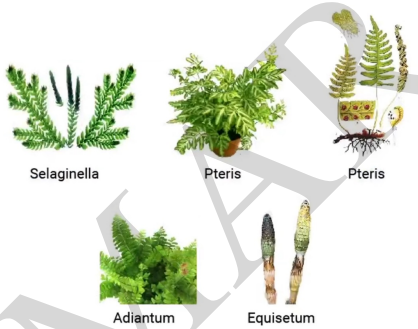
Characteristics of Pteridophyta

zameen par

- First terrestrial plants
- Well-differentiated into roots, stem, and leaves
- Well-developed reproductive organs are hidden
- Specialised tissue for food and water conduction: Vascular tissues are present

  eg: Marsilea and fern, Horsetails

Pteridophyta



Difference Between Cryptogams and Phanerogams

Cryptogams	Phanerogams
→ Seeds, flowers, fruits are absent	→ Seeds, flowers, fruits are present.
→ Reproductive organs are hidden.	→ Reproductive organs are exposed.
→ Less evolved plants.	→ Highly evolved plants.
→ Mostly thallophytes, bryophytes and pteridophytes.	→ Gymnosperm and Angiosperm.

Characteristics of Gymnosperms

- Gymno: Without cover
- Sperma: Seeds without fruit
- Usually perennials, evergreen and mostly woody plants
- True roots, stem, and leaves are present
- Xylem vessel absent

eg: Pinnes and Deodar, Cycas

Pinus

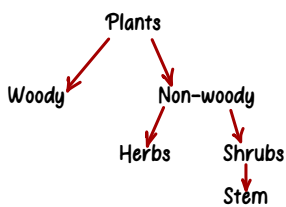
coniferous forest: in temperate regions

Pines

Deodar

Characteristics of Angiosperms

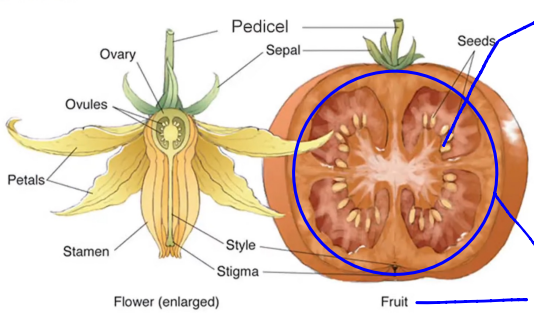
Types
- Monocots
- Dicots



- Angio: Covered
- Sperma: Seed
- They are flowering plants and produce seeds enclosed within fruit
- They are highly evolved
- Ovary gets modified into fruit
- Seeds have embryo inside it and these seeds develop inside ovary
- Embryos have structure: Cotyledons — seed leaves

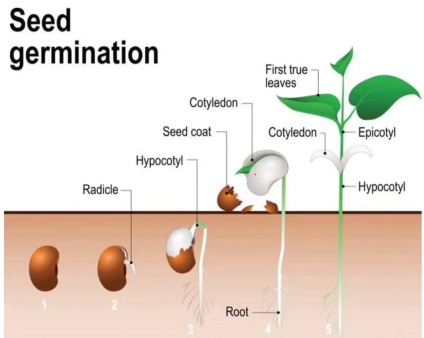
Flower to fruit:-

Cotyledons → Emerge → Green → During seed germination



seeds that were earlier ovules

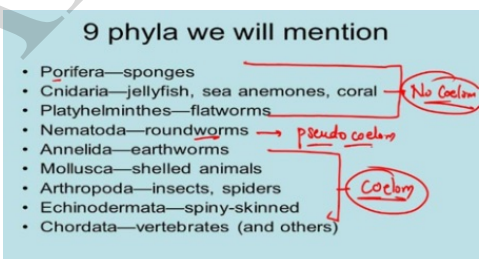
that was earlier ovary



KINGDOM ANIMALIA

- Eukaryotic
- Multicellular
- Heterotrophic
- Cell wall absent
- Most of them are mobile

- Classified into phyla on the basis of extent and type of body design differentiation found

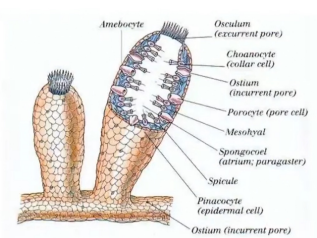


Characteristics of Porifera

- They have holes called pores i.e. body is perforated that is why called sponges
- Have water canal system (pores se paani)
- Asymmetrical body
- Cellular level organization
- Two layer germ layers: Diploblastic
- Exclusively aquatic

Ectoderm: cells outside the body

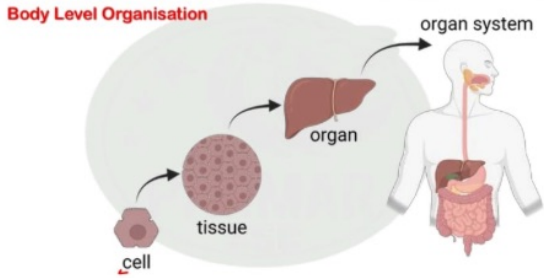
Endoderm: cells inside the body

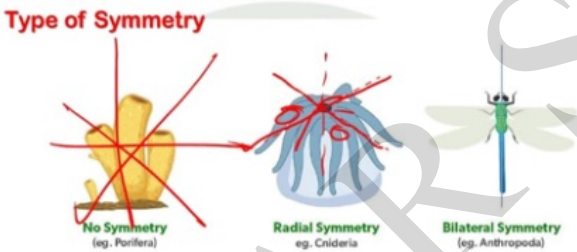


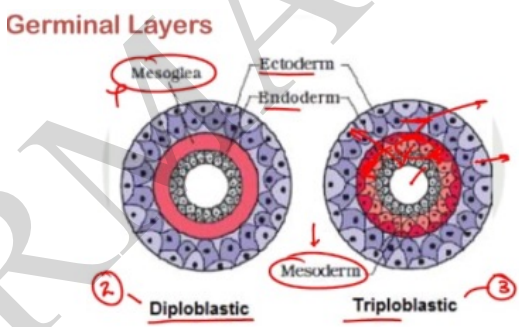
Scyon

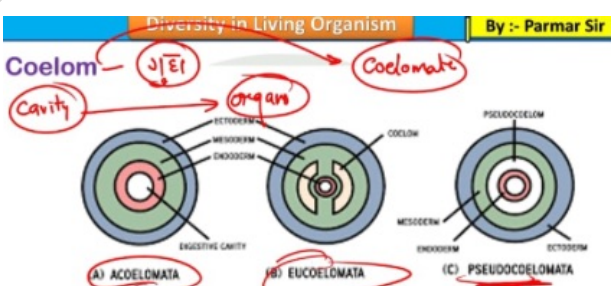
Endoskeleton is present

- Other examples: Euplectella, Spongilla


Body Level Organisation
organ system
organ
tissue
cell


Type of Symmetry
No Symmetry
(eg. Porifera)
Radial Symmetry
eg. Cnideria
Bilateral Symmetry
(eg. Anthropoda)


Germinal Layers
Mesoglea
Ectoderm
Endoderm
Mesoderm
2
Diploblastic
Triploblastic
3

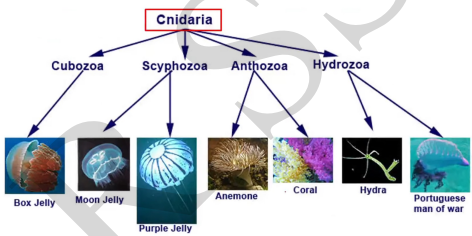

Diversity in Living Organism
By :- Parmar Sir
Coelom
Cavity
Coelomate
organ
ECTODERM
MESODERM
ENDODERM
COELOM
PSEUDOCOELOM
DIGESTIVE CAVITY
(A) ACOELOMATA
(B) EUCOELOMATA
(C) PSEUDOCOELOMATA

Characteristics of Coelenterata/Cnidaria

- Aquatic animals
- Tissue level organisation
- Hard skeleton developed outside called Exoskeleton made of calcium carbonate
- Body made of two layers: Diploblastic
  - Ectoderm: makes up cells outside of body
  - Endoderm: makes inner lining of the body
- Anus is absent
- Radial symmetry (divided in equal parts from anywhere)
- Central gastrovascular cavity is present

eg: Coral and hydra

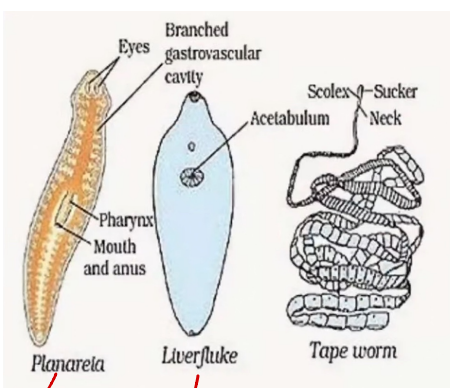
- Mouth is present surrounded by tentacles
- Mostly marine somewhere, freshwater animals (eg: Hydra)



Characteristics of Platyhelminthes

- They have dorsoventrally flattened body like a ribbon
- Bilateral symmetry
- Organ level organisation
- Triploblastic animals: three germ layers
- True internal cavity/coelom absent: Acoelomate

Body cavity



- They can be parasitic or free living

Free living — Parasite

- Coelom have organs accommodated
- Either free, living or parasitic and terrestrial
- Suckers and hooks are usually present
- Hermaphrodite (Male+Female part present) animals
- Anus is absent

Characteristics of Nematodes/Aschelmithes

- Body is cylindrical
- Bilateral symmetry
- Triploblastic organisation
- Organ system organization
- No real organs present
  Pseudocoelom present — false cavity
- Alimentary is complete: mouth and anus (Different entry and exit point)
  eg: Elephantiasis (filarial worms)
  Worms in intestines (roundworms/pinworms)
- Sexes are separate

- Animals show sexual dimorphism

Phylum Nematoda

Hermaphrodite: having both male and female part

Unisexual: either male or female part

- Locomotory organs paired, lateral appendages parapodia (Nereis)
- Alimentary canal is tube like extend from mouth to anus
- They are usually found in freshwater, marine water, land

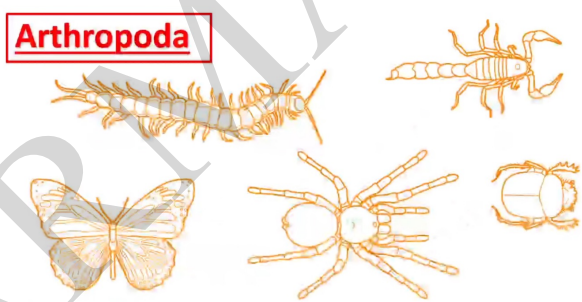
Characteristics of Annelida

- Bilaterally symmetrical
- Triploblastic
- Cylindrical/dorsoventrally flattened
- Brown colour skin is present
- True coelomate animal
- True organ packaged in coelom
- Organ system organization
- Body segmetation is present
- Reproduction: Sexually

Phylum Annelida

Characteristics of Arthropoda

- Largest phylum in animal kingdom
- They have jointed legs
- Bilateral symmetry
- Segmented body into head, thorax/cahals thorax, abdomen
- Open circulatory system (blood openly flows; not through a blood vessel)
- Coelom is present and is blood filled
- Triploblastic
- Respiration through gills, trachea
- Excreation through Malpighian Tubules
- Exoskeleton is made of chitin
- Unisexual

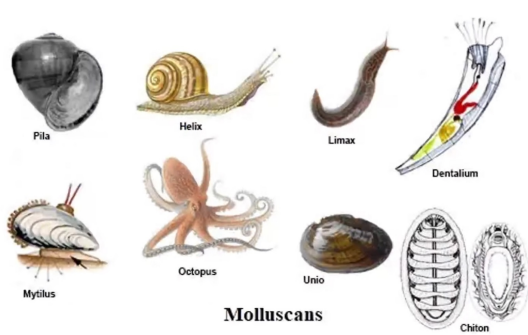


Devil fish: common name of octopus

Characteristics of Mollusca

2nd largest phylum

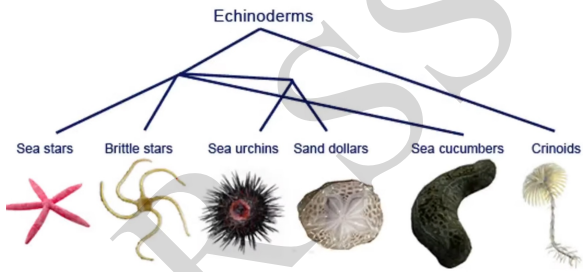
- Body is soft
- Exoskeleton is hard (snails)
- Little segmentation
- Open circulatory system



Blue colour blood: Haemocyanin
Alimentary canal is complete
Kidney like organs for excretion is present
Respiration through gills
Unisexual

Characteristics of Echinodermata

- Spiny skinned organism
- Star shaped, spherical, elongated
- Radial symmetry
- Triploblastic
- Coelomic cavity is present
- No segmentation
- Organ system organization



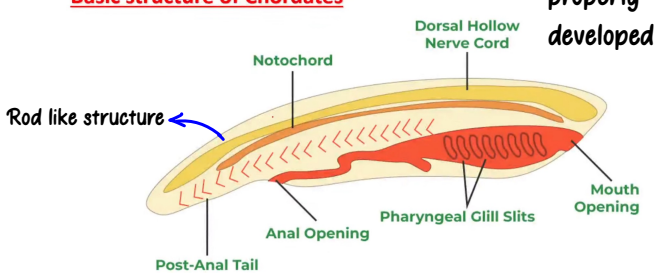
Characteristics of Chordata

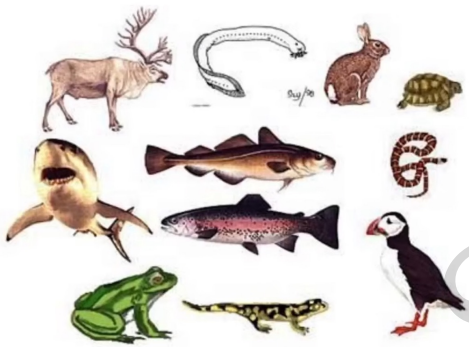
- They have notochord: rod like structure
- Paired gills slits in pharynx
- Bilateral
- Triploblastic
- Organ system level organisation
- Closed blood vascular system
- Heart is ventral

Types:
a) Protochordata — Notochord not developed properly
b) Vertebrata — Notochord properly developed

- Hemichordata → Invertebrates

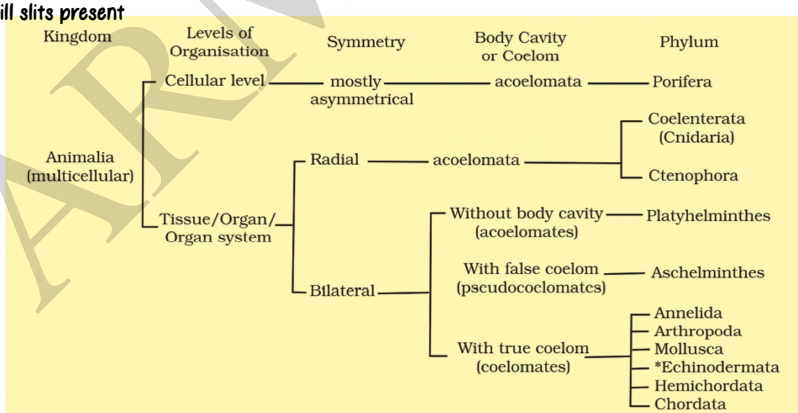
Basic structure of Chordates





Characteristics of Protochordata

- Do not have proper notochord present during all stages of life
- Bilaterally symmetrical
- Triploblastic
- Coelomate animals
- Nerve cord is present
- Pharyngeal gill slits present
- Post anal tail present



*Echinodermata exhibits radial or bilateral symmetry depending on the stage.

Figure 4.4 Broad classification of Kingdom Animalia based on common fundamental features

Phylum	Level of Organisation	Symmetry	Coelom	Segmentation	Digestive System	Circulatory System	Respiratory System	Distinctive Features
Porifera	Cellular	Various	Absent	Absent	Absent	Absent	Absent	Body with pores and canals in walls.
Coelenterata (Cnidaria)	Tissue	Radial	Absent	Absent	Incomplete	Absent	Absent	Cnidoblasts present.
Ctenophora	Tissue	Radial	Absent	Absent	Incomplete	Absent	Absent	Comb plates for locomotion.
Platyhelminthes	Organ & Organ-system	Bilateral	Absent	Absent	Incomplete	Absent	Absent	Flat body, suckers.
Aschelminthes	Organ-system	Bilateral	Pseudo coelomate	Absent	Complete	Absent	Absent	Often worm-shaped, elongated.
Annelida	Organ-system	Bilateral	Coelomate	Present	Complete	Present	Absent	Body segmentation like rings.
Arthropoda	Organ-system	Bilateral	Coelomate	Present	Complete	Present	Present	Exoskeleton of cuticle, jointed appendages.
Mollusca	Organ-system	Bilateral	Coelomate	Absent	Complete	Present	Present	External skeleton of shell usually present.
Echinodermata	Organ-system	Radial	Coelomate	Absent	Complete	Present	Present	Water vascular system, radial symmetry.
Hemichordata	Organ-system	Bilateral	Coelomate	Absent	Complete	Present	Present	Worm-like with proboscis, collar and trunk.
Chordata	Organ-system	Bilateral	Coelomate	Present	Complete	Present	Present	Notochord, dorsal hollow nerve cord, gill slits with limbs or fins.

Characteristics of Vertebrates

Characteristics of Cyclostomata

- They are jawless vertebrates
  eg: Petromyzon/Myxine, hog fishes, lamprey

Characteristics of Pieces

- They are fishes
  eg: Dog fish, Shark, tuna
- Chambered heart: 2

Arthropoda

Crayfish

- Silverfish

Mammals

- Whale
- Dolphins

Characteristics of Amphibians

- They have mucous glands in skin for respiration
- They have 3 chambered heart → or through gills

eg: Frogs, toads, salamander

Characteristics of Reptiles

- They have 3 chambered heart
- Exception: Crocodile 4 chambered heart
- Cold blooded animals

eg: snake, turtle, lizard, crocodile

Characteristics of Aves

- They are warm blooded animals
- They have 4 chambered heart
- They lay eggs

Characteristics of Mammalian

- They are warm blooded organism
- They have 4 chambered heart
- They have mammary glands
- Exception: Mammals but lay eggs eg: Platypus and echidnas