

* Animal Kingdom *



* Level of Organisation

* Cellular level organisation - Porifera	* tissue level → platyhel- minthes → cnidaria → Ctenophora	* Organ level → Platyhel- minthes	* Organ system → Annelids, Arthropods, Mollusca, Echinodermata and chordates Aschelminthes to chordata
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→ Incomplete digestive system - has single opening to the outside

→ Cnidaria, Ctenophora, Platyhelminthes (of the body that serves as both mouth & Anus)

→ Complete digestive system - has two separate opening mouth and anus (Aschelminthes to chordata)

* Circulatory System *

* OPEN *

→ ^{Arthropods} Annelida, Mollusca, Echinodermata, Hemichordata

* CLOSED *

→ Vertebrates, Annelida

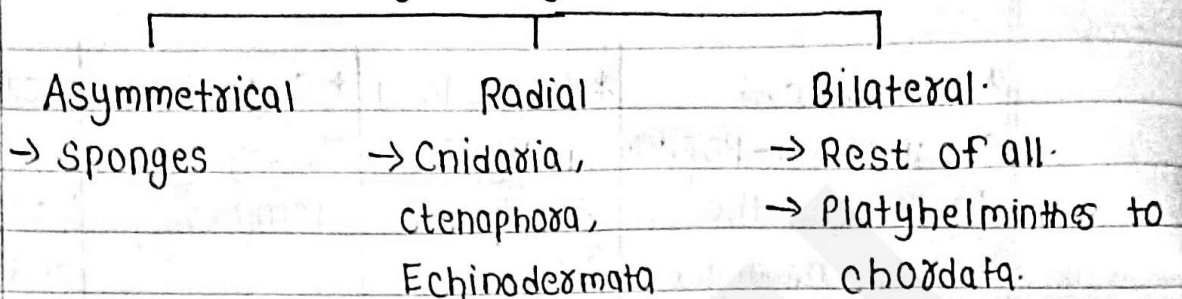
* Symmetry

1) Asymmetrical - Any plane passes through centre and does not divide animals into two equal halves (Porifera)

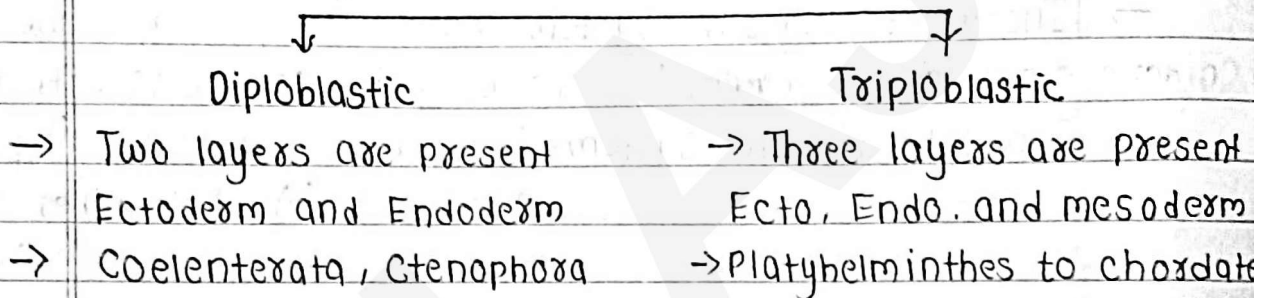
2) Radial Symmetry - Any plane passes through centre and divide animals into two equal halves (Cnidaria, Ctenophora, Adult Echinodermata)

3) Bilateral Symmetry - Only one plane divides into Right & left identical halves (Platyhelminthes to chordata)

* Symmetry *



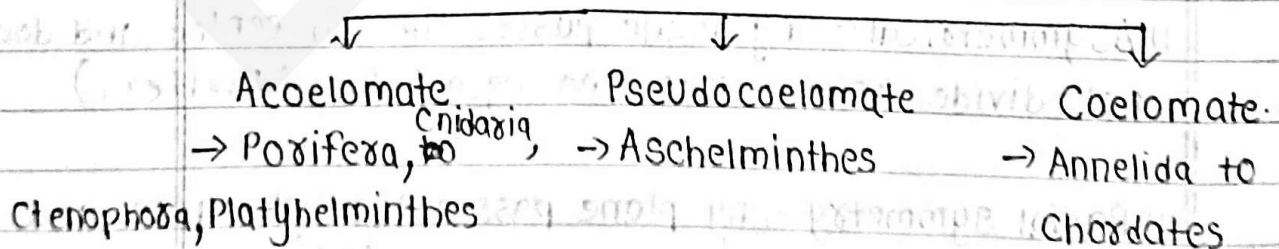
* Germinal Layers



* Coelom

- Body cavity is lined by Mesoderm called Coelom.
- If Coelom present called as Coelomate
- If Coelom Absent called as Acoelomate
- If Coelom present as patches called as Pseudocoelomate

Coelom



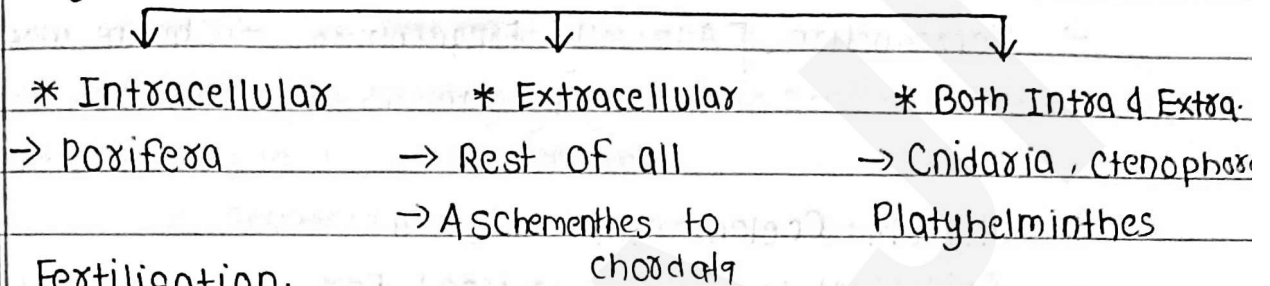
- * Segmentation → Present in Annelida, Arthropoda, Chordata
- * Notochord - is a mesodermally derived rod-like structure formed on dorsal side during embryonic development

→ Animals with notochord called chordates

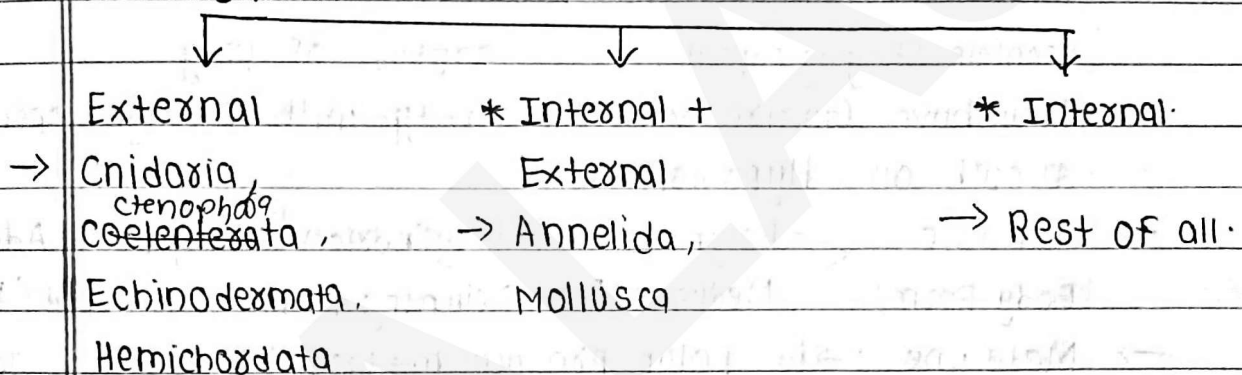
→ Animals without notochord called non-chordates

Ex - porifera to echinoderms.

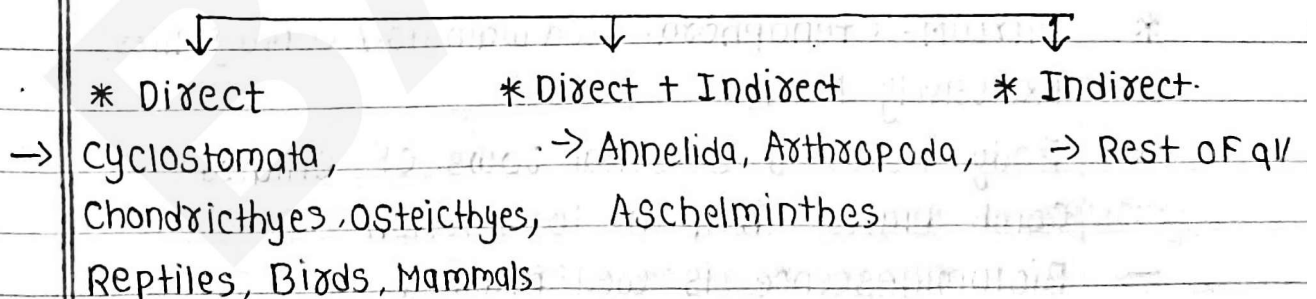
* Digestion.



* Fertilisation.



* Development



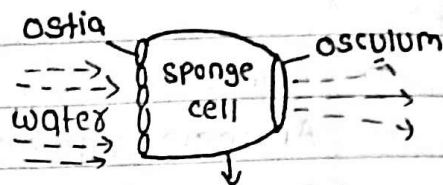
* Exclusively Marine - Ctenophora, Echinodermata, Hemichordata

* Cold Blooded - Fishes, Amphibians, Reptiles

* Warm Blooded - Birds, Mammals

* PHYLUM - Porifera (Sponges)

- Generally marine.
 - Body is supported by skeleton made up of spicules / Spongin fibre
 - Sexes are not separate [Hermaphrodite]
 - Reproduction - [Asexually - Fragmentation
Sexually by gametes]
- Food gathering
 → Respiratory exchange
 → Removal of waste
 → Choanocytes / Collar cells lines the Spongocoels and the canal



* PHYLUM - Coelenterata (Cnidaria)

- Cnidoblast / Cnidocytes → used for anchorage, defence and (contain stinging capsule) capture of prey.
- They have Gastro-vascular cavity with a single opening, mouth on Hypostome.
- 2 Basic Body Forms
 - Polyp → sessile & cylindrical [ex- Hydra & Adamsia]
 - Medusa → Free swimming & Umbrella shaped [Aurelia & Jelly Fish]
- Metagenesis → i.e. polyp produce medusa by Asexually and medusa produce polyp sexually (eg. Obelia)

* PHYLUM - Ctenophora (Sea walnuts / Comb jellies)

- Exclusively Marine
- Body bears 8 external rows of ciliated Comb plates, help in locomotion.
- Bioluminescence is well marked.
- Sexes are not separate
- Reproduction - only Sexual

* PHYLUM Platyhelminthes

- Dorsio-ventrally flattened body called Flatworms.
- Mostly endoparasites found in animals including human beings.

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- Specialised cells called flame cells helps in osmoregulation & Excretion
 - Sexes are not separate.
 - They Have High Regeneration Capacity like Planaria.

* Phylum Aschelminthes (Roundworms)

- Circular in cross section
- They may be free living, aquatic, & terrestrial or parasitic in plant & animals
- Well developed muscular Pharynx.
- Sexes are separate
- Often female are longer than male.

* Phylum Annelida.

- They may be aquatic (marine and freshwater) or terrestrial, free living and sometimes Parasitic
- Their body surface is marked out into Segments and metameres
- They possess longitudinal and circular muscle which help in locomotion.
- Nereis Posses lateral appendages, called Parapodia which help in ~~Swim~~ Swimming

* Phylum - Arthropoda. (Largest Phylum)

- over two-thirds of all named species are arthropods
- Body consists of Head, Thorax and abdomen.
- They have jointed appendages (arthro-joint, poda-appendages)
- Sensory organs like antennae, eyes, statocysts or balancing organs are present.

* Phylum - Mollusca. (2nd Largest Phylum)

- They are terrestrial or aquatic.
- Body is covered by a calcareous shell and is unsegmented with a distinct head, muscular foot and visceral hump
- Soft layer of skin forms Mantle over the visceral hump
- Space betⁿ Hump & Mantle is called Mantle cavity in which feathery like gills are present. They have Respiratory and excretory functions
- Anterior region has sensory Tentacles.
- Mouth contains file like rasping organ for feeding called RADULA

* Phylum Echinodermata. (Spiny bodied animals)

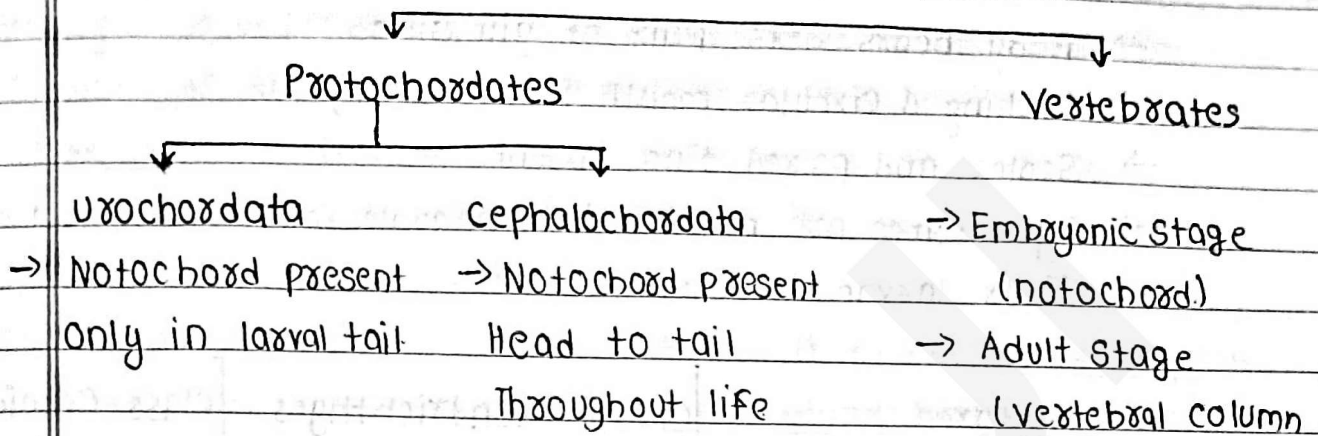
- All are marine
- Mouth - Lower side (ventral), Anus - upper side (Dorsal)
- They have water vascular system which help in locomotion, Food capturing, Respiration.
- Reproduction is sexual; sexes are separate.
- Excretory system is absent

* Phylum Hemichordata. (Worm-like marine animals)

- Earlier considered as subphylum under Chordata. Now separate phylum under non chordates.
- Body is composed of Proboscis, collar & trunk.
- Rudimentary structure in collar region called Stomochord (similar to notochord).

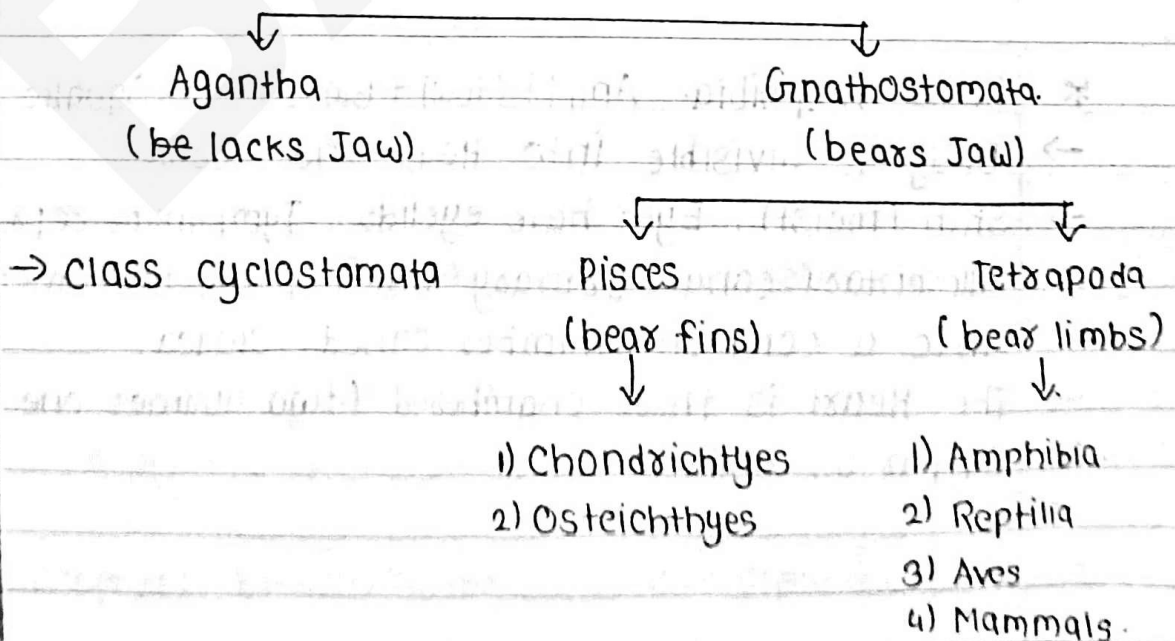
* Phylum Chordata.

CHORDATES (notochord present)



Features	CHORDATES	NON-CHORDATES.
Notochord	Present	Absent
Gill - Slits.	Present	Absent
Post anal Tail	Present	Absent
Heart	ventral	Dorsal
CNS.	Dorsal, Hollow, Single	Ventral, Solid, Double

* Vertebrata *



* Class - Cyclostomata.

- All are Ectoparasites on some fish.
- Body bears 6-15 pair of gill slits.
- Sucking & Circular mouth [Jaw absent]
- Scales and paired fins Absent
- Cyclostomes are marine but migrate for spawning to fresh water
- Their larvae to marine water.

* Features:

Class - Chondrichthyes.

Class - Osteichthyes.

Endoskeleton

Cartilagenous

Bony

Operculum

Absent

Present

Air - Bladder

Absent

Present

Oviparous / viviparous

Viviparous

Oviparous

Mouth

Ventral

Terminal

Scales

Placoid (modified teeth formed)

cycloid / Ctenoid

* chondrichthyes ← Electric organ (ex - Torpedo)

* Poisonous Sting (ex - Trygon)

* Class Amphibia. Amphi (dual) + Bios (life) → Aquatic + terrestrial

- Body is divisible into Head and Trunk.
- Skin (moist), Eyes have eyelids, Tympanum represents Ear
- Alimentary canal, urinary and Reproductive tracts open into a common chamber called cloaca.
- The Heart is three chambered (two auricles one ventricle)
- Oviparous animals

* Class Reptilia.

- Body is covered by dry & Cornified Skin, epidermal scales / scute
- External ear opening Absent, Tympanum represents Ear
- Heart is three chambered, but Four chambered in crocodiles
- Snakes and lizards shed their scales as skin cast

* Class Aves. Oviparous

- Feathers and Beak Present, most of them Fly except ostrich
- Forelimbs are modified into wings. Hind limbs have scales and are modified for walking, swimming or clamping tree branch
- Skin is dry without glands except oil gland at the base of tail.
- Endoskeleton is fully ossified (bony)
- Long bones are hollow with Air cavities (Pneumatic)
- Digestive tract of birds has additional chambers the Crop and Gizzard.

* Class Mammalia. (Mammary gland present)

- Skin with Hairs
- External ear / Pinnae Present
- Teeth present → mostly viviparous
- Heart is four chambered

* Examples.

- 1) Porifera - Sycon (Scypha), Spongilla (Fresh water), Euspongia ^{Bath sponge}
- 2) Coelenterata - Physalia (Portuguese man-of-war), Adamsia (sea anemone), Pennatula (Sea-pen), Gorgonia (sea-fan) & Meandrina (Brain coral)
- 3) Ctenophora - Pleurobrachia and Ctenoplana

- 4) Platyhelminthes - Taenia (Tapeworm), Fasciola (Liver fluke)
- 5) Aschelminthes - Ascaris (Roundworm), Wuchereria (Filaria worm), Ancylostoma (Hook worm)
- 6) Annelida - Nereis, Pheretima (Earthworm), Hirudinaria (Blood sucking)
- 7) Arthropoda - Economically important insects - Apis (Honey bee), Bombyx (Silkworm), Laccifer (Lac insect)
vectors - Anopheles, Culex and Aedes (Mosquitoes)
Gregarious pest - Locusta (Locust)
Living fossil - Limulus (King crab)
- 8) Mollusca - Pila (Apple snail), Pinctada (Pearl oyster), Sepia (cuttle fish), Loligo (Squid), Octopus (Devil fish), Aplysia (Sea slug), Dentalium (Tusk shell) and Chaetopleura (Chiton)
- 9) Echinodermata - Astarias (Star fish), Echinus (Sea urchin), Antedon (Sea lily), Cucumaria (Sea cucumber), Ophiura (Brittle star)
- 10) Hemichordata - Balanoglossus and Saccoglossus.
- 11) Urochordata - Ascidia, Salpa, Doliolum.
- 12) Cephalochordata - Branchiostoma (Amphioxus or Lancelet)
- 13) Cyclostomata - Petromyzon (Lamprey) & Myxine (Hagfish)
- 14) Chondrichthyes - Scoliodon (Dog fish), Pristis (Saw fish), Carcharodon (Great white shark), T ryggon (Sting ray)

- 15) Osteichthyes - Maxine - Exocoetus (Flying fish), Hippocampus (sea horse)
Freshwater - Labeo (Rohu), Catla (Katla), Clarias (Magur);
Aquarium - Betta (Fighting fish), Pterophyllum (Angel fish)
- 16) Amphibia - Bufo (Toad), Rana (Frog), Hyla (Tree frog), Salamandra (Salamander), Ichthyophis (Limbless Amphibia)
- 17) Reptilia - Chelone (Turtle), Testudo (Tortoise), Chameleon (Tree lizard), Calotes (Garden lizard), Crocodilus (Crocodile), Alligator, Hemidactylus (Wall lizard), Poisonous snakes - Naja (Cobra), Bungarus (Krait), Vipera (Viper)
- 18) Aves - Corvus (crow), Columba (Pigeon), Psittacula (Parrot), Struthio (Ostrich), Pavo (peacock), Aptenodytes (Penguin), Neophron (vulture)
- 19) Mammalia - Oviparous - Ornithorhynchus (platypus)
Viviparous - Macropus (kangaroo), Pteropus (Flying Fox), Camelus (camel), Macaca (Monkey), Rattus (Rat), Canis (Dog), Felis (cat), Elephas (Elephant), Equus (Horse), Delphinus (common dolphin), Balaenoptera (Blue whale), Panthera tigris (Tiger), Panthera Leo (Lion).