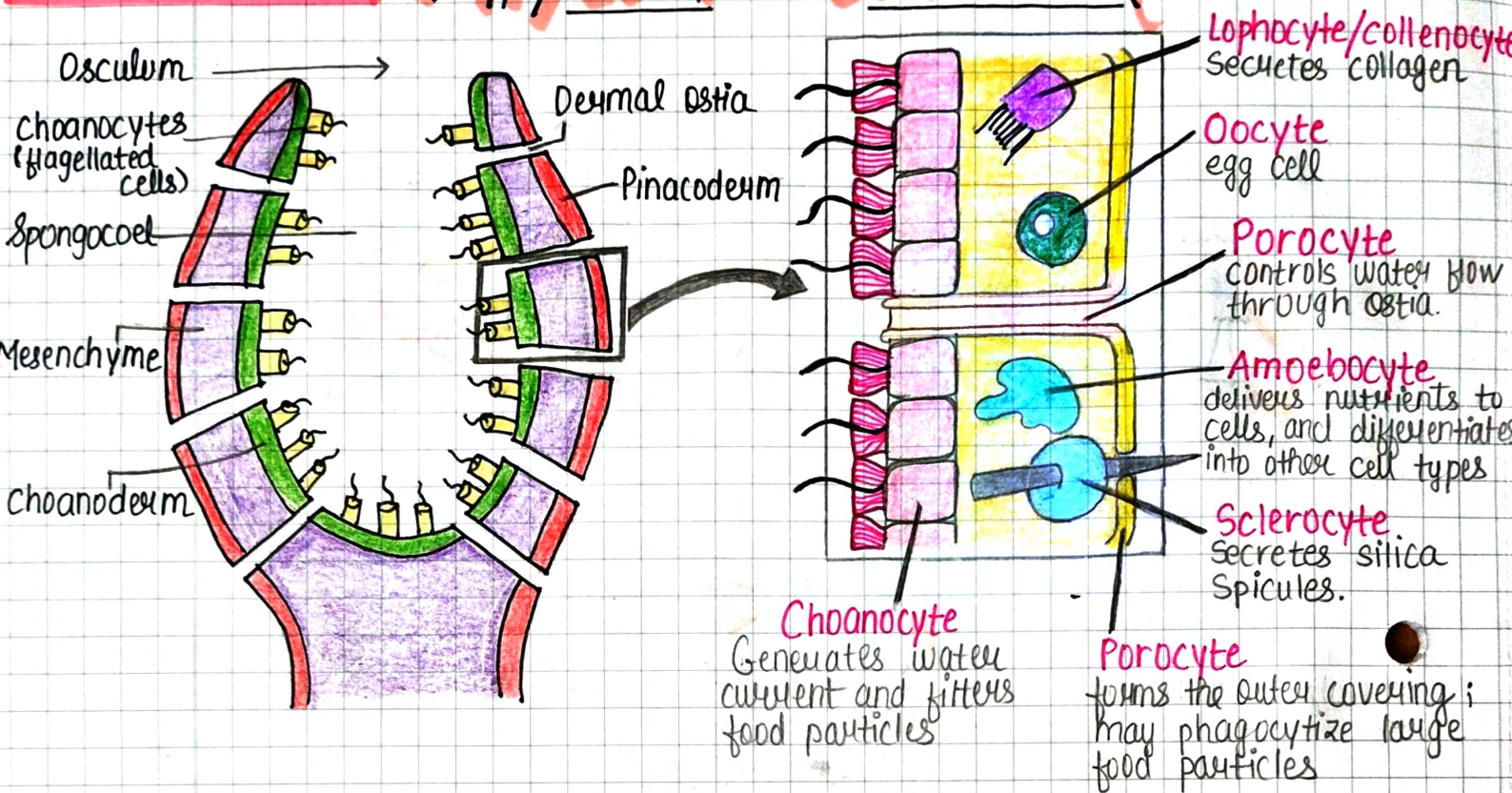


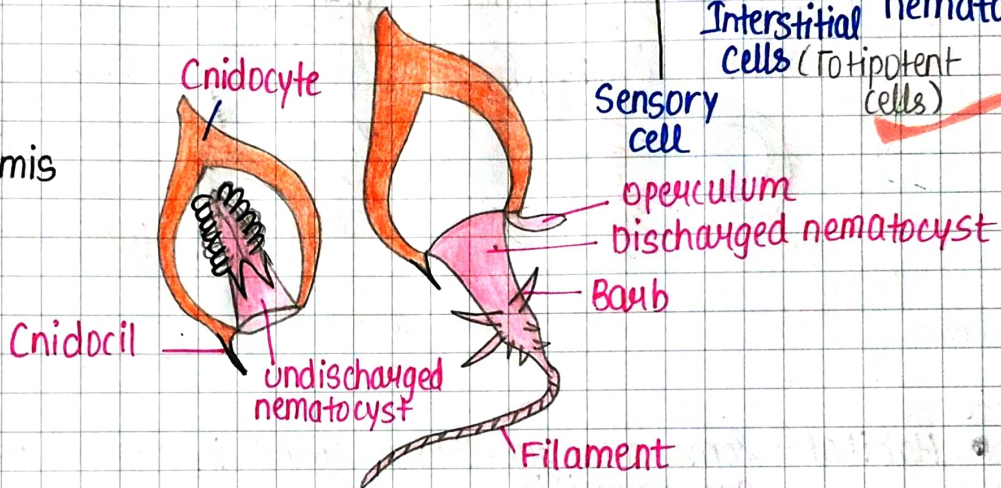
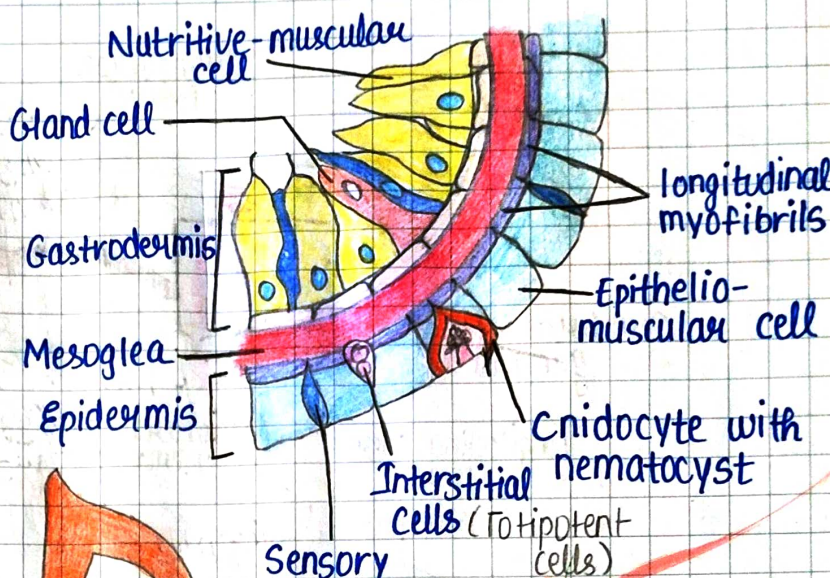
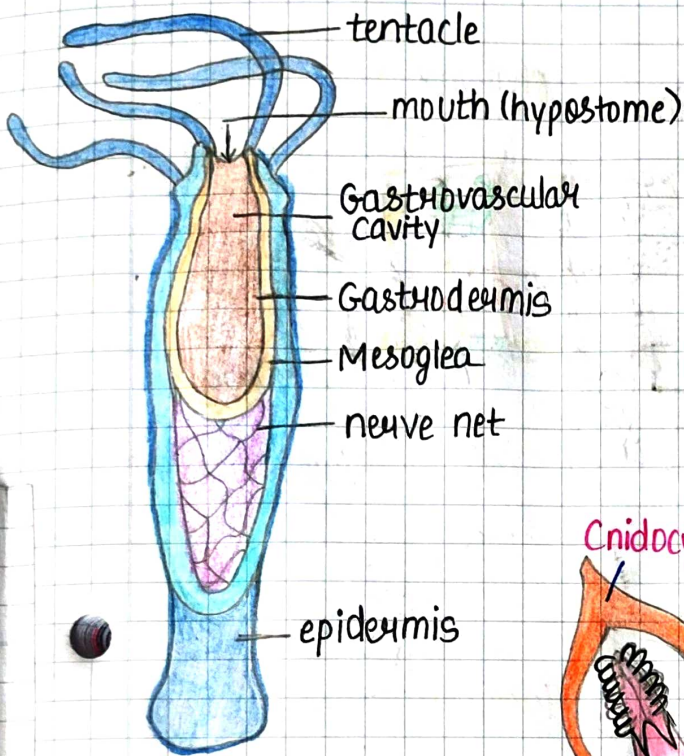
# PHYLUM - PORIFERA



- **Habitat** - Mostly marine, but a few live in fresh water.
- **Organisation** - Cellular grade of organisation.
- **Size & shape** - Irregularly shaped, often giving out finger-like branches. Remain stationary, attached to substratum.
- **Symmetry** - Asymmetrical
- **Coelom** - Acoelomates
- **specific classification** - Body with large number of incurrent pores called **ostia**, leading into a **spongocoel** through a system of **canals**. Spongocoel opens out by a large excurrent pore called **oscula**. Canals are lined by flagellated cells called **choanocytes/collary cells**. This system is known as **canal system**. They are known as **Filter Feeders**.
- **Digestion** is intracellular and holozoic.
- **Sensory/nerve cells** are absent in sponges.
- **Respiration and Excretion** occur by simple diffusion.
- **Endoskeleton** - made up of **spicules**, composed of calcareous or siliceous or spongin fibres.
- **Reproduction** - Asexual by external or internal buds  
Sexual by forming gametes. (**hermaphrodites**).  
- Fertilization is external.  
- Indirect development is found.  
The larvae are like balls of cells which have cilia and flagella for movement. It is called **parenchyma**.  
They are **Photostomes**.

Examples :- Sycon (Scypha), Spongilla (fresh water), Euspongia (Bath sponge), Venus flower basket

# PHYLUM - COELENTRATA (CNIDARIA)



- **Habitat** - Generally marine, but a few species are fresh water.
- **Organisation** - Tissue level of organisation.
- **Body Plan** - Blind sac body plan.
- **Symmetry** - Radially symmetrical.
- **Coelom** - Acoelomate and diploblastic.
- **Specific classification** - Body has a mouth at oral end, which leads into a spacious cavity called **gastrovascular cavity** or **coelenteron**. **Tentacles** are present for locomotion and food capturing. The presence of special cells called **cnidoblasts/nematocysts** or **stinging cells** is used for offence and defense. It anchorages on its prey by using these cells. This is the phylum that shows **Polymorphism**.
- **Digestion** is both intracellular and extracellular.
- **Nervous system** - The presence of a network of nerves spread all over the body. **Statocyst** is a balance sensory receptor.
- **Respiration** and **Excretion** occurs by simple diffusion.
- **Endoskeleton** - some Cnidarians, e.g., **Corals** have a skeleton composed of calcium carbonate.
- **size and shape** - Two body forms - **Polyp** and **Medusa**.  
Polyp is sessile and in cylindrical form.  
Medusa is umbrella shaped and free swimming.
- **Reproduction** - Asexual by budding and sexual by gametes.
  - Fertilization is
  - Indirect development is found.
  - Larva stage - **Planula**
  - Cnidarians are **Protostomes**.

# METAGENESIS

is referred to the phenomenon of **alternation of generation** shown by cnidarians which exhibit both forms - Polyps and Medusae.

- Phylum Coelenterata is divided into 3 classes:-

① HYDROZOA - Their life history includes both polypoid and medusoid forms.

Examples:- Hydra, Obelia, Millepora (coral), Physalia (Portuguese Man-of-war) and Porpita.

② SCYPHOZOA - Their life history lacks polypoid phase and has only medusoid phase.

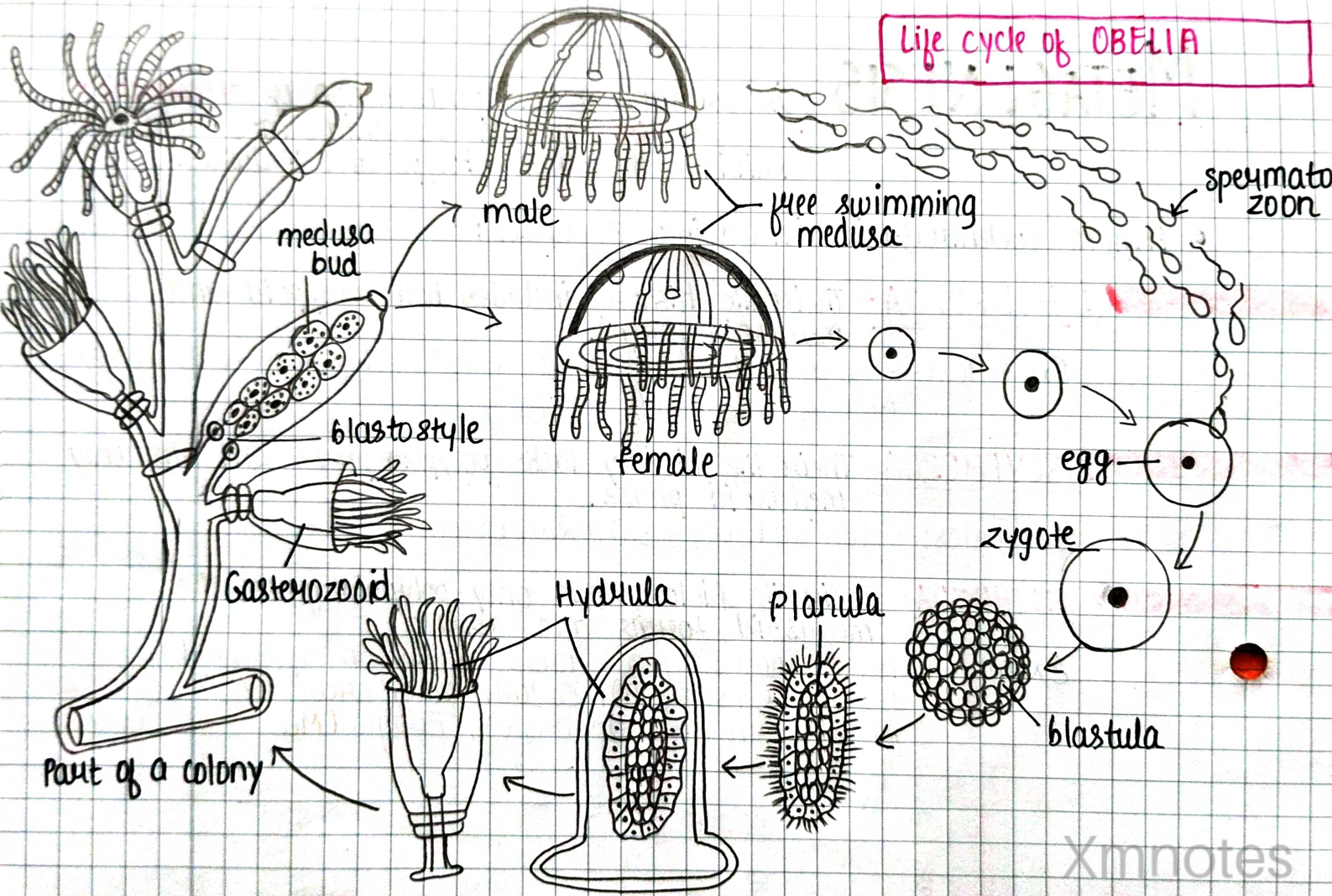
Examples:- Aurelia (Jelly fish), Rhizostoma.

③ ANTHOZOA - Their life history has only polypoid form, the medusoid forms are absent.

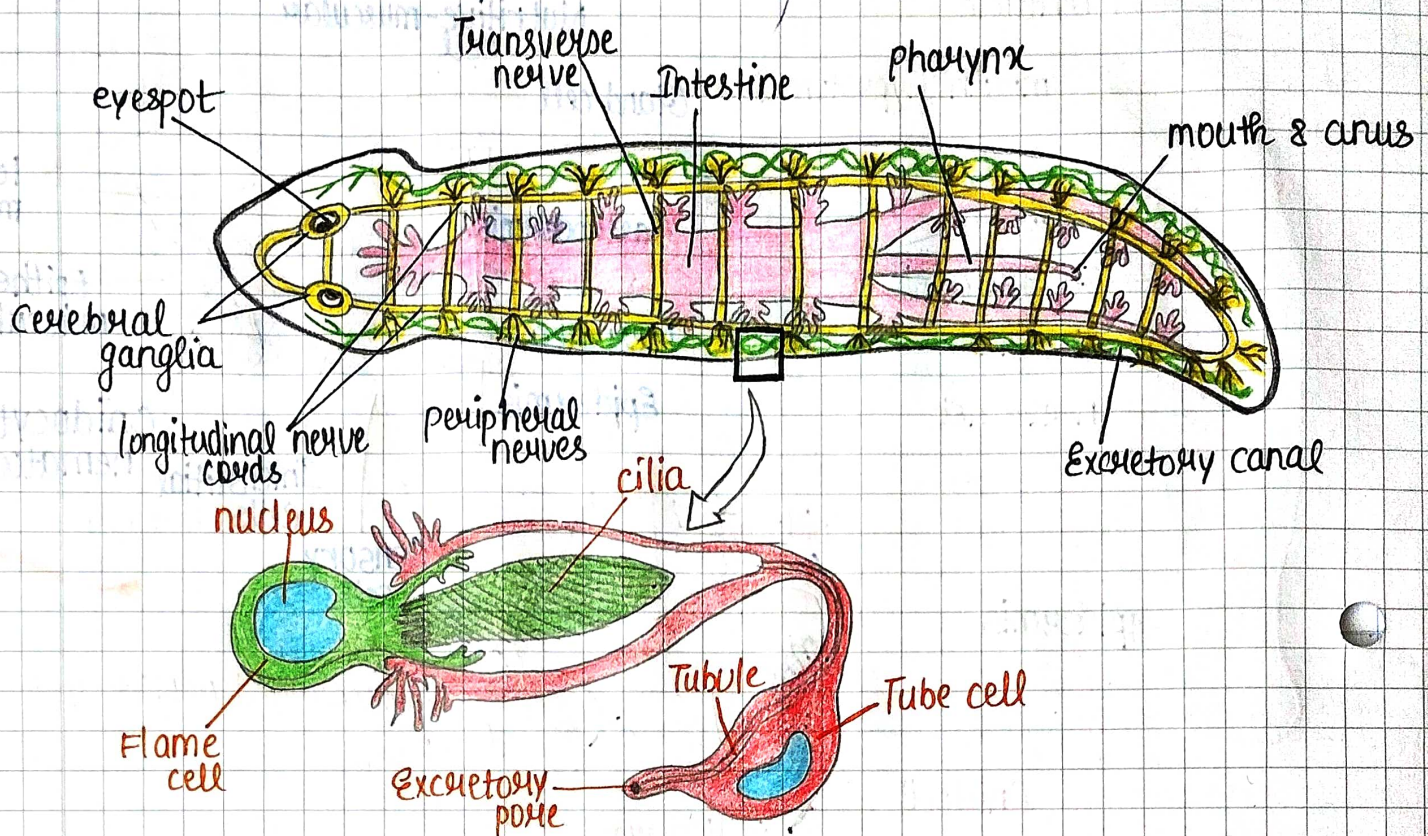
Examples - Pennatula (sea pen), Tubipora (organ pipe coral), Gorgonia (sea fan), Corallium or (red coral), Metridium (sea anemone), Fungia (Mushroom coral)

Xmnotes

Life cycle of OBELIA



# PHYLUM PLATYHELMINTHES

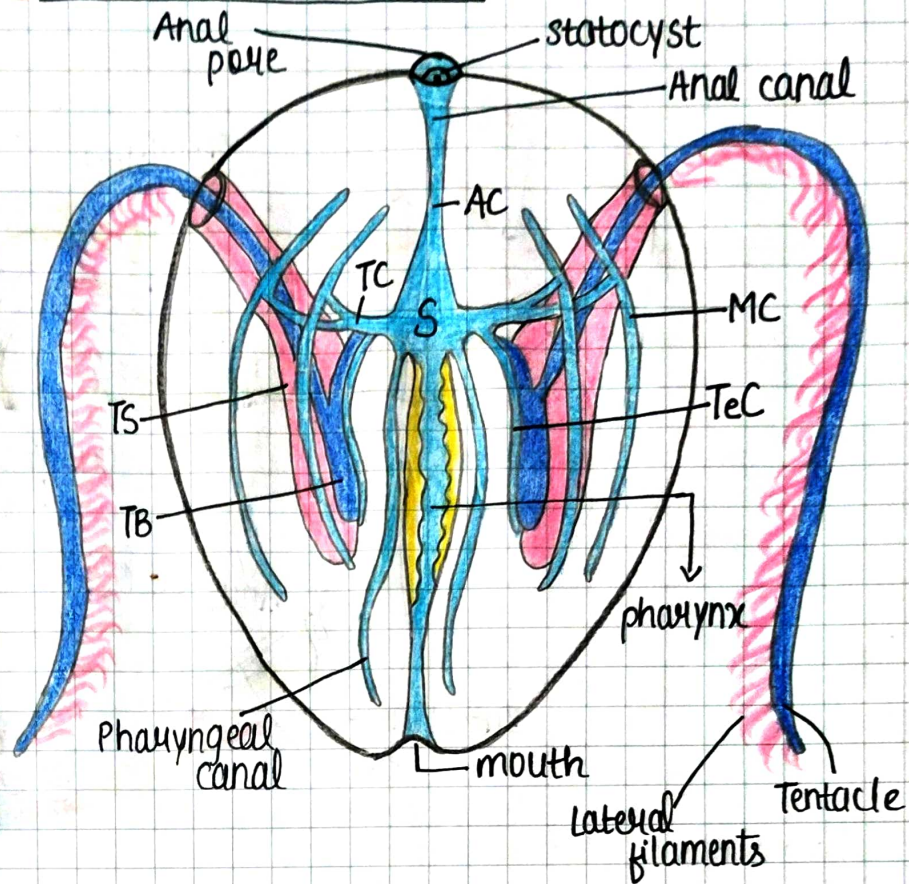


- **Habitat** - Some are free-living found in water or damp soil. Others are parasitic.
- **Organisation** - Organ level of organisation.
- **Size and shape** - They are flat, soft, unsegmented worms. Body is dorsoventrally flat and leaf-like or ribbon-like.
- **Symmetry** - Bilaterally symmetrical.
- **Coelom** - Acoelomate and triploblastic.
- **Body Plan** - Blind sac body plan.
- **Specific classification** - Hooks and suckers are present in parasitic forms. Pseudo-segmentation is found in parasites.
  - ① **Monogenetic Parasites** - completes life cycle in one host.
  - ② **Digenetic Parasites** - completes life cycle in two hosts.
- Body is covered with **cuticle** in parasitic forms.
- **Digestive system** is incomplete and anus is absent.
- **Respiration** occurs by general body surface through diffusion.
- **Excretory system** consists of single or paired protonephridia called **flame cells or solenocytes**.
- **Nervous system** is primitive ladder-like consisting of a pair of **cerebral ganglia** and a pair of longitudinal nerves connected by many transverse nerves.
- **Reproduction** - sexual reproduction by fission. They are hermaphrodites (**monoecious**)
  - Cross and self fertilization found
  - Internal fertilization
  - Development is indirect

Examples :- Fasciola Hepatica (liver flukes), Dugesia (Planaria), Schistosoma (Blood flukes), Taenia solium (Tape worm)

# PHYLUM - CTENOPHORA

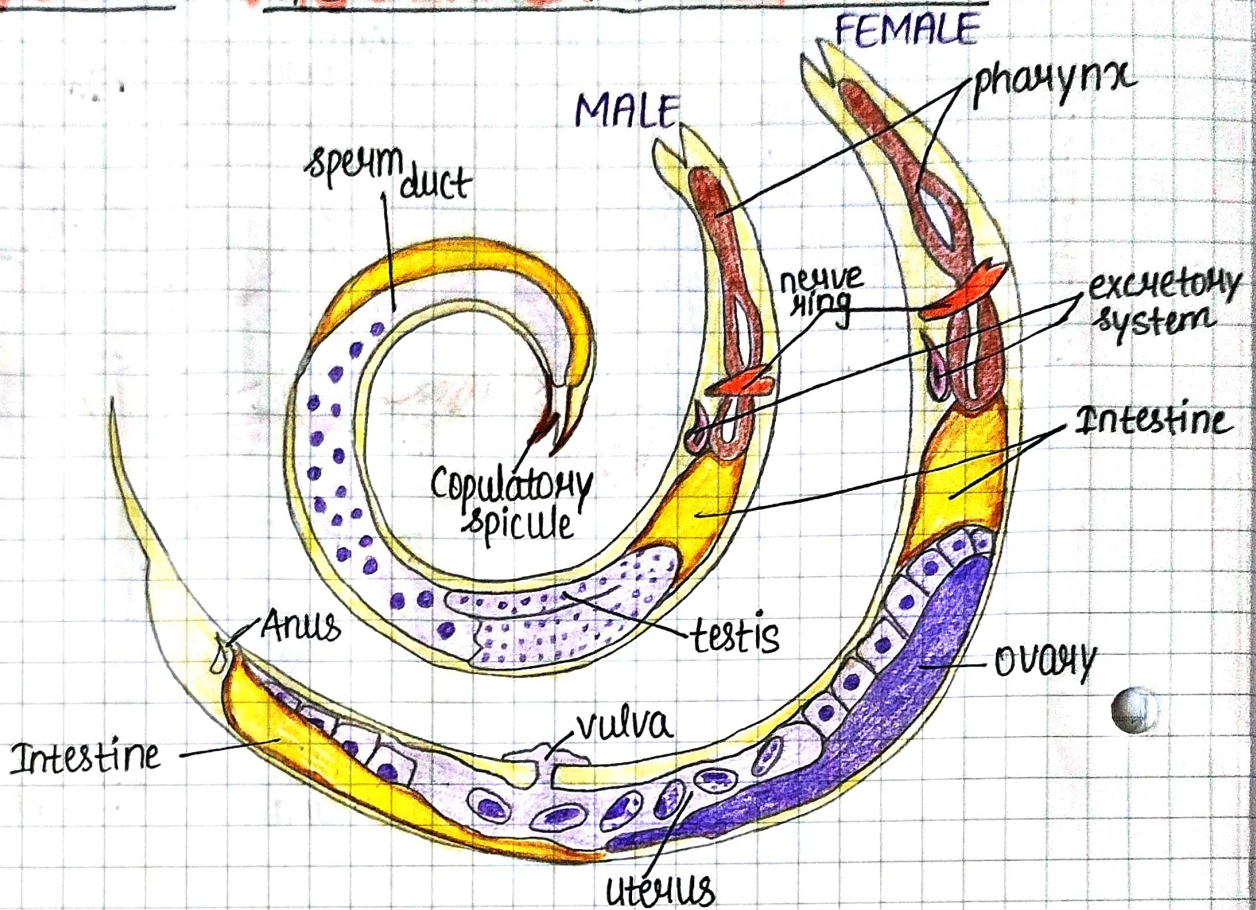
- AC = Aboral canal
- S = stomach
- TB = tentacle base
- TC = transverse canal
- TeC = tentacular canal
- TS = tentacle sheath
- MC = meridional canal



- **Habitat** - They are free-swimming, marine, solitary, pelagic animals.
- **Size and shape** - Body is transparent, gelatinous, pear-shaped, cylindrical, flat or ribbon-shaped.
- **Organisation** - Tissue level of organisation.
- **Symmetry** - Bifacial symmetry.
- **Coelom** - Acoelomate and diploblastic.
- **Body plan** -
- **Specific classification** - They are commonly known as **comb jellies / sea walnuts**. They have a pair of long, solid metridactile tentacles. They have special adhesive and sensory cells i.e., **colloblasts or lasso cells** present in tentacles for food capturing. **Bioluminescence** is well marked in ctenophores.
- **Digestive system** contains the mouth, stomodaeum, complex gastrovascular canals and 2 aboral anal pores.
- **Locomotion** - They have external surface with comb-like 8 ciliary plates for locomotion.
- **Nervous system** - is diffused type and the aboral end bears a sensory organ called **statocyst**.
- **Reproduction** - They are **monoecious**.
  - Reproduction only by sexual methods.
  - Fertilization is external.
  - Development is indirect.
  - larvae - **Cydidipid**
  - Regeneration and **paedogenesis** is common in them.

Examples :- Pleurobrachia, Ctenoplana, Beroe, Mnemiopsis leidyi, Bolinopsis, Ocyropsis, Bathocyroe fasteni, Euplokamis

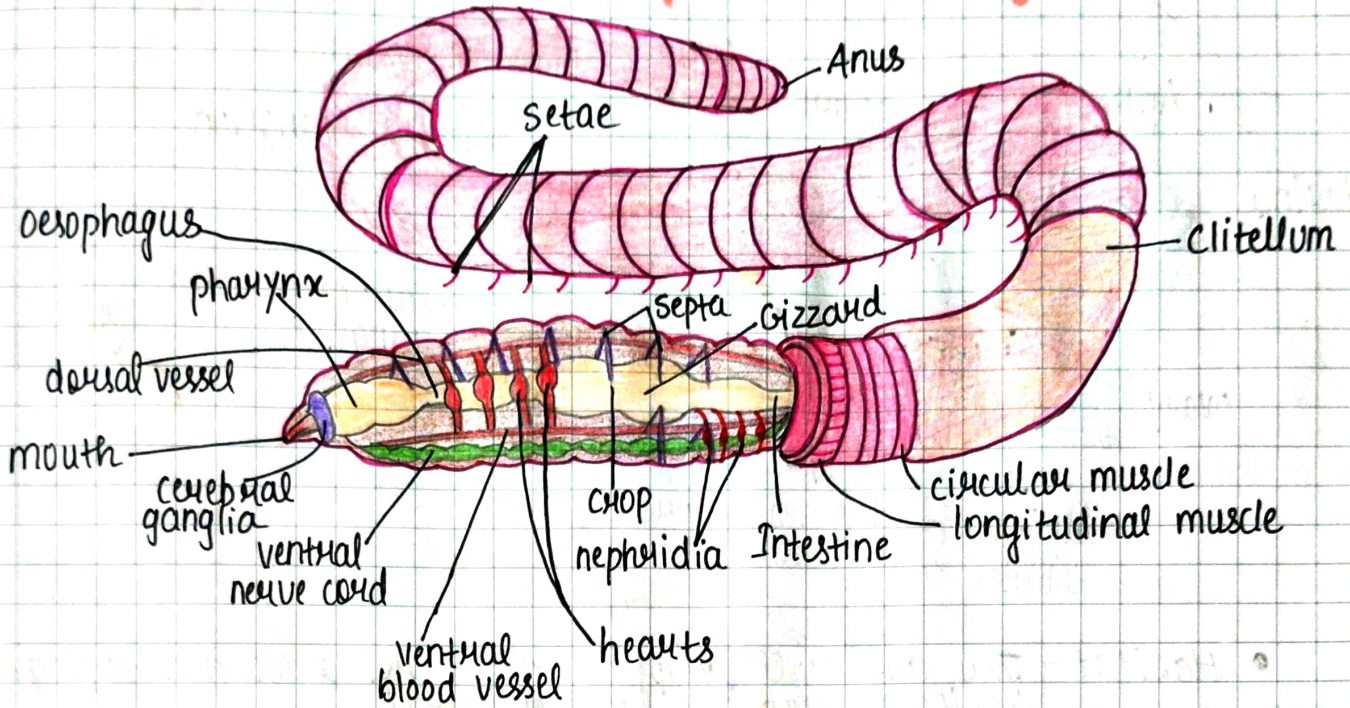
# PHYLUM - ASCHELMINTHES



- **Habitat** - terrestrial as well as aquatic (freshwater or marine) (free-living or parasitic)
- **Size and shape** - Possess long, smooth, cylindrical & unsegmented body. Also called nematodes (round worms)
- **Organization** - Organ system level of organization
- **Symmetry** - Bilateral symmetry
- **Coelom** - Pseudocoelomates and triploblastic
- **Body-plan** -
- **Specific classification** - Round worms have an exterior **cuticle**, a **syncytial epidermis** and a muscle layer on body wall.
- **Digestive system** is complete. They have a well developed muscular pharynx.
- **Excretory system** - consists of excretory tube and excretory pore.
- **Respiration** occurs through surface of the body
- **Nervous system** includes a nerve ring and a nerve cord running throughout the body.
- **Circulatory system** is underdeveloped.
- **Reproduction** - sexual dimorphism is found. **Pineal spicules** are present in males for copulation.
  - sexual methods for fertilization (cross/self)
  - Internal fertilization found
  - Development is direct or indirect

Examples - *Ascaris lumbricoides* (round worm), *Ancylostoma* (hook worm), *Wuchereria Bancrofti* (filarial worm), *Enterobius vermicularis* (pin worm), *Trichuris trichiura* (whipworm)

# PHYLUM - ANNELIDA

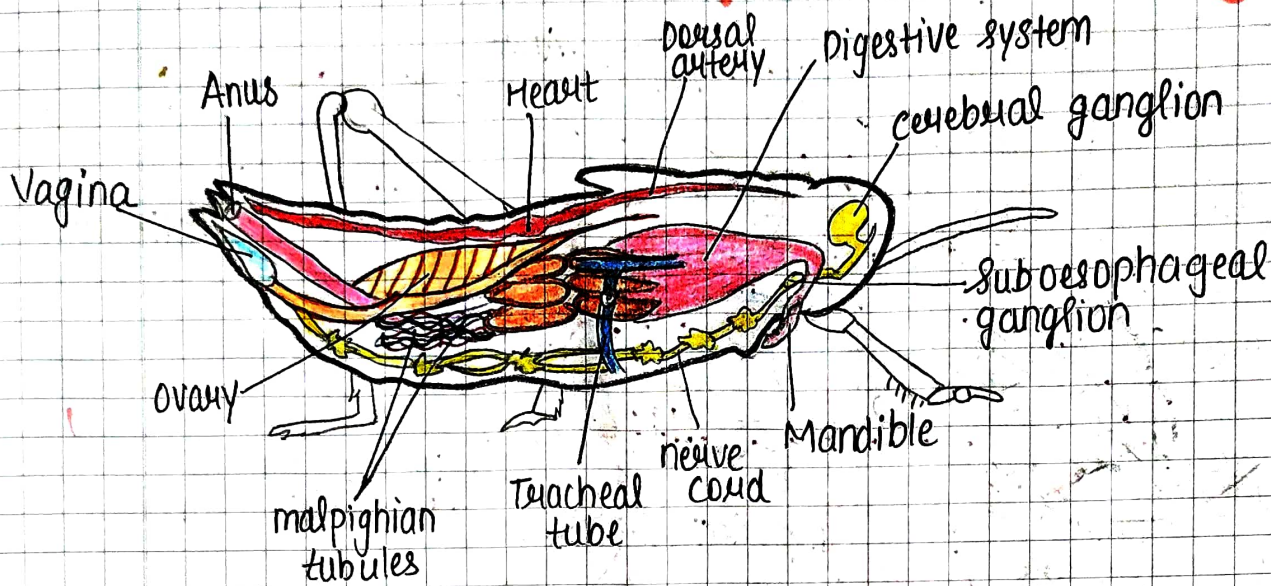


- **Habitat** - terrestrial or aquatic (freshwater or marine)
- **Size and shape** - Body is long, cylindrical and metamerically segmented.
- **Organization** - organ system level of organization
- **Symmetry** - Bilateral symmetry
- **Coelom** - Eucoelomate and triploblastic (**Schizocoelomates**)
- **Body Plan** - Tube within tube body plan
- **Special classification** - Body is externally and internally divided into segments with serial repetition of organs in them. These segments are called **metameres**. The body wall consists of thin non-cellular cuticles and is usually moist.
- **Locomotion** - They move by **longitudinal** and **circular** muscles and also with the help of unjointed appendages called **setae** or **parapodia**.
- **Digestive system** - They have complete digestive system
- **Respiration** is either through skin or gills.
- **Circulatory system** - They possess a closed circulatory system.
- **Nervous system** - consists of a nerve ring and a **double ventral nerve cord** with **segmental ganglia**.
- **Excretory system** - consists of characteristic **nephridia**.
- **Reproduction** - **Monocious or Dioecious**
  - Sexual reproduction
  - Development is mostly direct except Nereis.
  - Internal fertilization found

Examples - Earthworm, Nereis (sand worm), sea mouse, cattle leech, Bobbit worm, Clitellata, polychaete, Urechis uncinatus



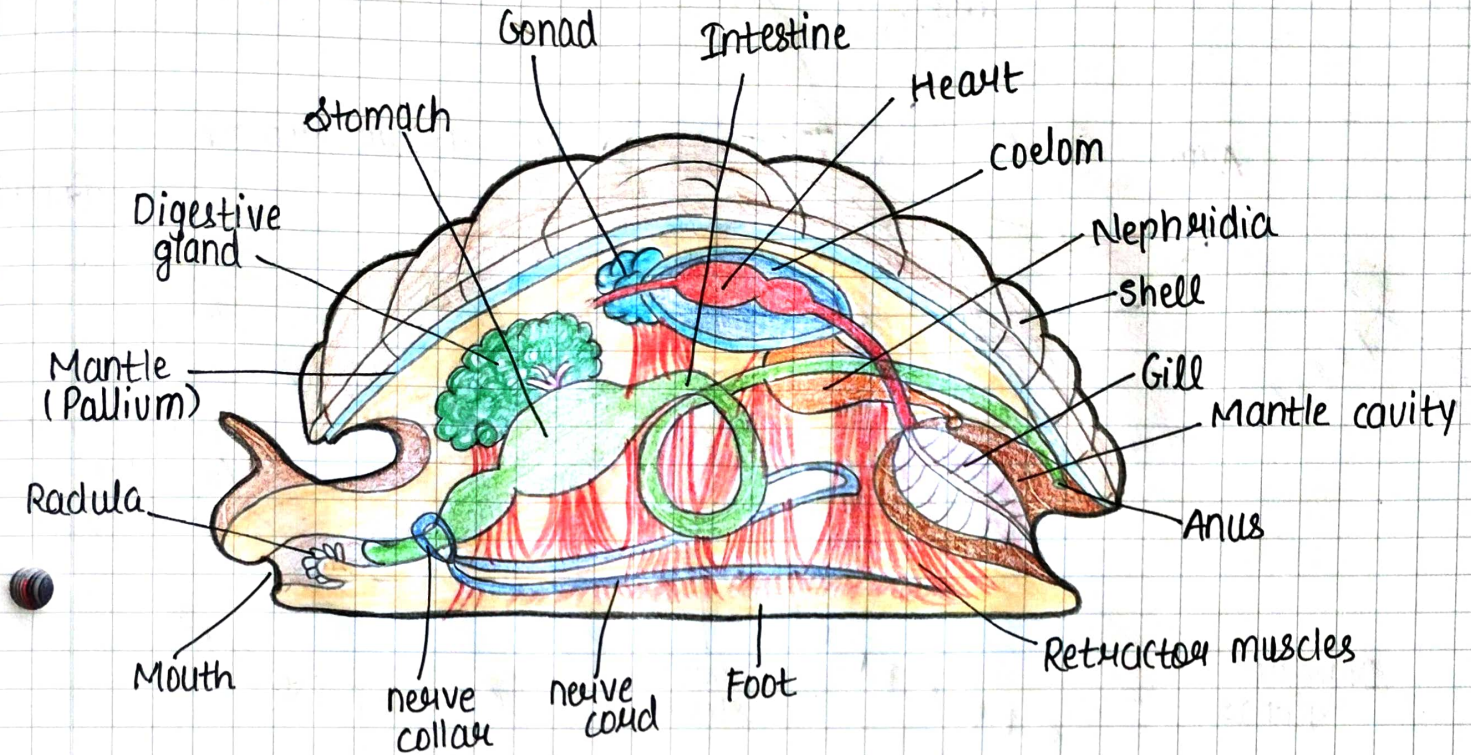
# PHYLUM ARTHROPODA



- **Habitat** - They are well adapted to (air flying or non-flying) habitats such as land or water.
- **Size & shape** - Their body is divided into head, thorax and abdomen.
- **Organization** - Organ system level of organization.
- **Symmetry** - Bilateral symmetry.
- **Coelom** - Eucoelomate and triploblastic.
- **Body Plan** - Tube within tube body plan.
- **Specific classification** - Two-thirds of all species identified to date on Earth are members of this phylum. (largest phylum). They possess compound eyes.
- **Digestive system** is complete and alimentary canal is divided into foregut, midgut and hindgut.
- **Respiratory system** - Respiratory organs are gills / book gills in aquatic forms and book lungs or tracheae in terrestrial forms.
- **Circulatory system** is open type.
- **Nervous system** consists of a nerve ring and double-ganglionated ventral nerve cord.
- **Excretory system** consists of green glands or malpighian tubules.
- **Locomotion** - They have characteristic jointed appendages.
- **Exoskeleton** - They have a hard chitinous exoskeleton. The exoskeleton is periodically shed by a process called moulting or ecdysis.
- This was the first phylum to develop endocrine glands.
- **Reproduction** - They are unisexual.
  - Fertilization is internal.
  - Development is direct or indirect.They show metamorphosis.

Examples :- (Anopheles, Culex, Aedes), Bombyx mori (silkworm), Lacifer (lac insect), Apis (Honey bee), Locusta

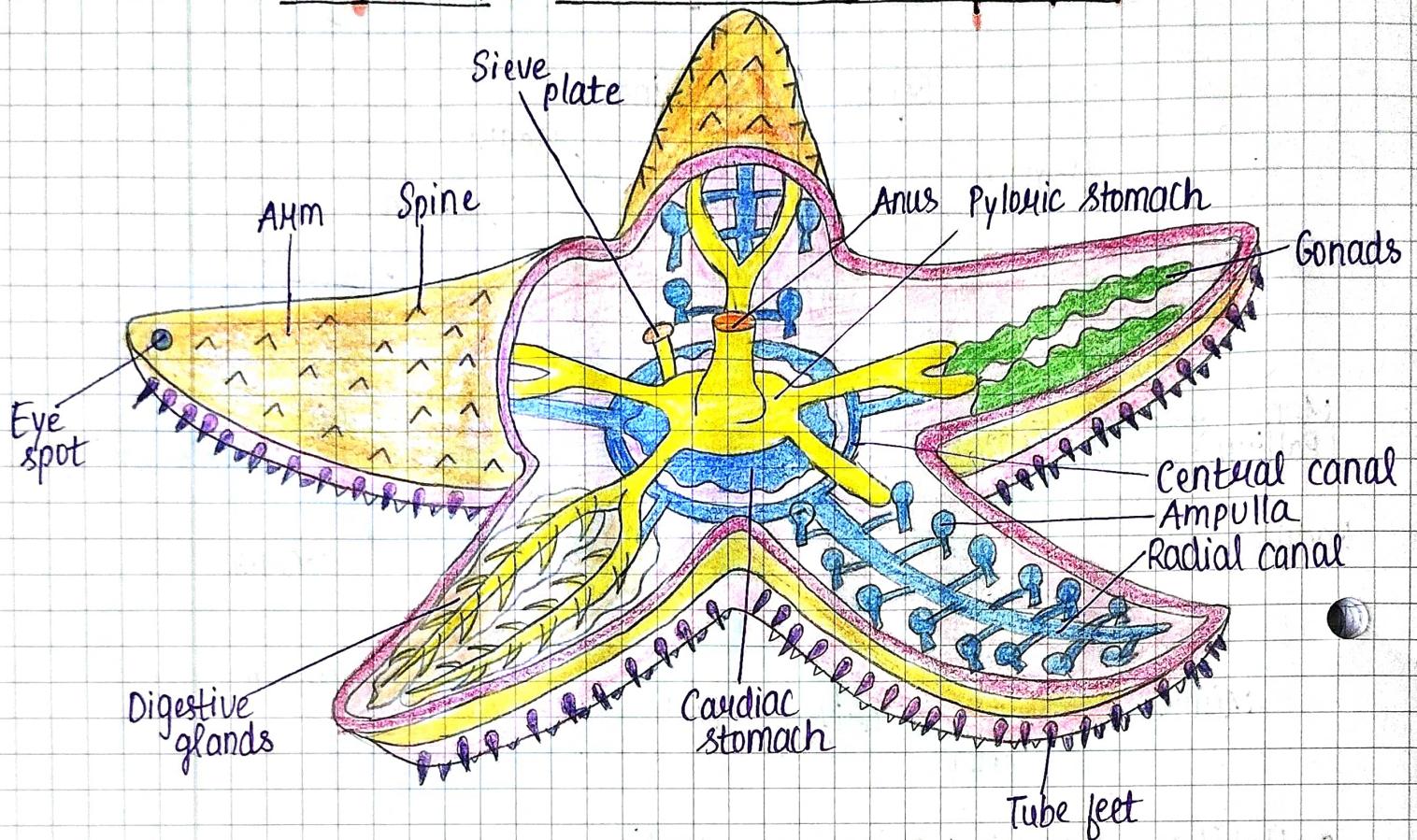
# PHYLUM - MOLLUSCA



- **Habitat** - terrestrial as well as aquatic
- **Size and shape** - The body is divided into three divisions - **head, muscular foot and visceral hump.**
- **Organization** - organ system level of organization
- **Symmetry** - Bilaterally symmetrical (some are asymmetrical)
- **Coelom** - Eucoelomate and triploblastic
- **Digestive system** - Digestive tract is complete. The **radula**, a **rasping organ** with a file like transverse row of chitinous teeth is found in mouth. Anus opens in mantle cavity.
- **Respiratory system** - **Gills / ctenidia** in the mantle cavity are used for breathing in aquatic forms. **Lungs / air sacs** are used to breathe in terrestrial animals.
- **Circulatory system** - It has an open heart with a pulsatile dorsal heart and few arteries that open into sinuses. **Haemocyanin**, a copper-containing blue respiratory pigment, is found in blood plasma.
- **Excretory system** - **Metanephridia (Bojanus)** are present which functions as kidneys.
- **Nervous system** - made up of few pairs of ganglia that are connected by nerve connections and commissures. sense organs include **eyes, tentacles, statocysts for balance and osphradia.**
- **Exoskeleton** - They have a hard outer calcareous shell, which is secreted by **mantle**. It may be external or internal.
- **Reproduction** - They are unisexual
  - Fertilisation may be external or internal.
  - Development may be direct or indirect with a larva named **glochidium** or **veliger.**

Examples - Neopilina (connecting link Annelida - Mollusca), Chiton, Dentalium, Pila (apple snail), Cypraea, limax, Helix, Aplysia, Limnaea, Turbinella, Unio, Ostrea, Mytilus, Terebratulina

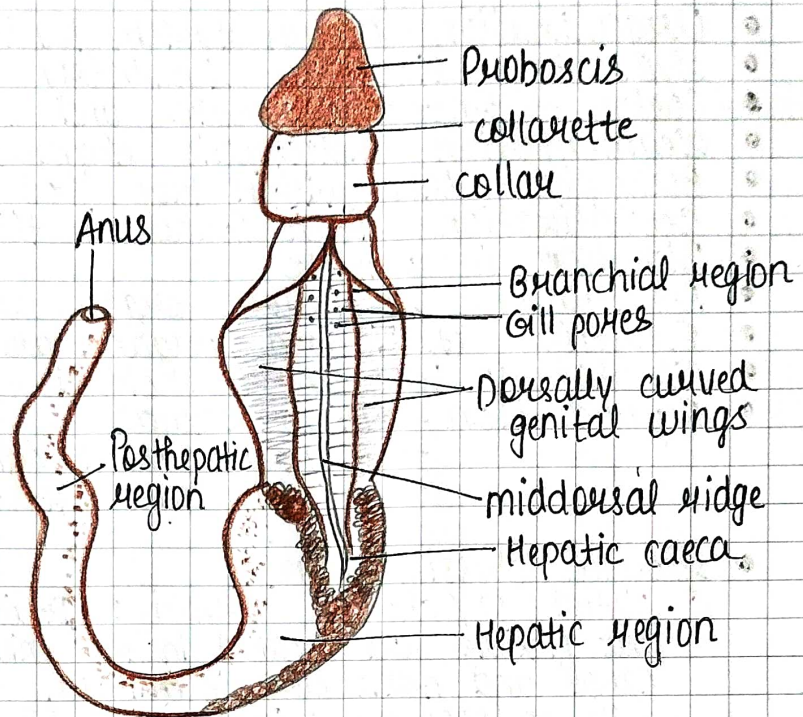
# PHYLUM - ECHINODERMATA



- **Habitat** - They are exclusively marine.
- **size & shape** - Various shapes such as star-like, cylindrical, melon-like, disc-like or flower-like.
- **Organization** - Organ system level of organization.
- **Symmetry** - Radially symmetrical. Larvae - Bilaterally symmetrical
- **Coelom** - Enterocoelomates and triploblastic
- **Body plan** - Tube within tube plan
- **Digestion** - Digestive tract is usually complete. Incomplete in brittle stars.
- **Respiration** - occurs by gills called dermal branchiae or papulae in starfish, by genital bursae in brittle stars, by peristomial gills in sea-urchins, cloacal trees - sea-cucumbers, and by tube feet in all.
- **Circulatory system** - open-type circulation. It is called haemal system. No heart or pumping vessel. No blood pigment.
- **Excretory system** - No excretory organs. Nitrogenous waste is Ammonia. (Ammoniotelism) Diffuses out via gills, bursae, respiratory trees and tube feet.
- **Nervous system** - includes a nerve ring and radial nerve cords.
- **Locomotion** - Peculiar tube feet (podia) are present. It protrudes out through special areas called ambulacra.
- **Reproduction** - They are unisexual.
  - Fertilization is external
  - Development is indirect. Larvae - ① bipinnaria - starfish ② ophiopluteus - brittle stars ③ echinopluteus - sea urchins ④ auricularia - sea-cucumbers ④ chinoidea - feather stars.

Examples:- Asterias, Ophiothrix, Echinus, Cucumaria, Antedon (feather star)

# PHYLUM - HEMI CHORDATA



- **Habitat** -
- **size and shape** - Body is soft and unsegmented. Body has three distinct regions - **proboscis, collar and trunk**.
- **Organization** - organ system level of organization
- **Symmetry** - Bilateral symmetry
- **Coelom** - Eucoelomates and triploblastic
- **Body Plan** - Tube within tube
- **Digestive tract** - is complete. Proboscis contains a hollow outgrowth from gut called the **buccal diverticulum** or **stomochord** and regarded as notochord in past.
- **Respiration** occurs through gill slits or body surface.
- **Circulatory system** - includes a dorsal heart, two main longitudinal vessels which are connected by lateral vessels and sinuses. Blood is colourless without corpuscles.
- **Nervous system** - diffused type. Consists an **epidermal plexus** of nerve cells and fibres.
- **Excretory system** comprises of proboscis gland, or **glomerulus**, situated in proboscis.
- **Reproduction** - Unisexual or bisexual
  - Fertilization is internal or external.
  - Development includes a free swimming **tomaria larva**.
- **Special classification** - Body cavity is **enterocoelus**, divided into **Protocoel, Mesocoel and Metacoel**. They are mostly ciliary feeders. A notochord like structure is found in their buccal cavity, which is a rudimentary structure called **Buccal Diverticulum** or **stomochord**.

Examples :- Balanoglossus, Cephalodiscus, Rhabdopleura, Saccoglossus

# PHYLUM - CHORDATA

- Organization - Organ system level
- Symmetry - bilateral symmetry
- Coelom - Enterocoelomates and triploblastic.
- Segmentation - metameric segmentation
- Body plan - tube within tube body plan
- Cephalization - It is found in this phylum
- Digestion is complete
- Respiration - specialised organs are present
- Excretion - specialised organs are present
- Circulatory system is closed type. Ventral heart is present
- Reproduction - It is sexual
  - They are mostly unisexual
  - Gonads are present with gonoducts.

## • Special classification -

① **Notochord / Chorda dorsalis** :- It is a solid, unjointed, stiff but flexible rod located in the middorsal line between alimentary canal and nerve cord in embryo. Composed of large fluid-filled cells enclosed by fairly stiff fibrous sheaths.

② **Dorsal Hollow Nerve cord** :- A nerve cord develops in a chordate embryo from a plate of ectoderm that rolls into a tube located above the notochord. This produces a single, dorsal, hollow, fluid-filled, non-ganglionated nerve cord unique to chordates.

③ **Pharyngeal gill slits** :- These are the paired openings leading from the lateral sides of the pharynx to the exterior. They help in suspension feeding in invertebrate chordates and in respiration in aquatic chordates (vertebrates).

④ **Muscular tail / Anal tail** :- It is the part of the body behind the cloacal or anal opening. It contains skeletal elements, muscles, blood vessels and nerves but no viscera. It provides much of propulsive force in aquatic species.

## • Chordates show advancement over nonchordates in having -

- ① living endoskeleton which grows with the body
- ② more efficient respiratory organs (gills and lungs) with enormous surface area for rapid exchange of gases
- ③ more efficient circulation of blood maintained by well developed heart having special cardiac muscle tissue
- ④ tubular CNS which provides more space for the nerve cells,
- ⑤ far better sense organs
- ⑥ Well developed endocrine glands for efficient chemical co-ordination.