



## Why Classification is Needed?

- We have animals with **different forms and features** around us!

↳ 1.7-1.8 million species : ↗ >12 million - animal ↑  
(Total) ↗ ~0.5 million - plants

- Features of Animals:
  - Eukaryotes
  - all multicellular
  - Heterotrophic
  - cell wall  $\ominus$  nt
  - Holozoic mode of nutrition
    - ↳ First : ingest
    - Then : digest



## Basis of Classification

- Despite of differences in structure and form of different animals, there are fundamental features common to various individuals in relation to:
  - ✓. the arrangement of cells,
  - ✓. body symmetry,
  - ✓. nature of coelom,
  - ✓. patterns of digestive,
  - ✓. circulatory or reproductive system



# Animal Kingdom (Classification)

Kingdom Animalia is called **METAZOA** which can be divided into **2 sub-kingdoms**

**PARAZOA**

↓  
Phylum

1. Poikilofexa / Sponges (most primitive animals)  
(Pore-breaker)

1-10: Non-chondates  
11: Notochord + nt

Simple to  
Complex

**EUMETAZOA**

↓  
Phylums

2. Coelenterata/cnidaria
3. Ctenophora
4. Platyhelminths
5. Aschelminths
6. Annelida
7. Anthropoda
8. Mollusca
9. Echinodermata
10. Hemichondriata
11. Chordata



## Level of Organisation

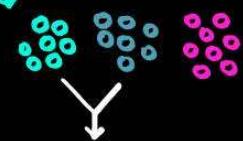
### Cellular Level

Here, loose cells makes body of an organism

- Division of labour occurs b/w cells

e.g., Paramecium

### Tissue Level



group of cells specialised to form tissue to perform a specific function

e.g., Coelenterata & ctenophora

### Organ Level

e.g., Platyhelminthes  
(Flatworms)

### Organ System Level

e.g., Aschelminthes & higher animals

# Body Plan

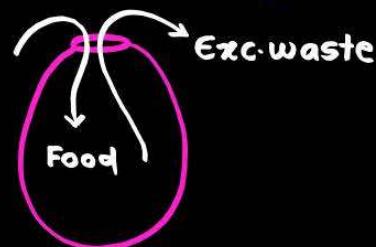


## Cellular Aggregated

- Body is formed by loose cells

e.g., Porifera

## Blind Sac



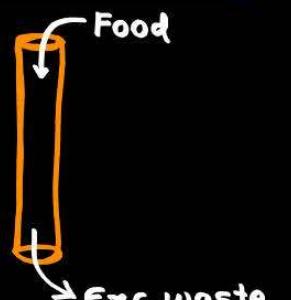
Incompl.  
dig. tube

- single opening that behaves as both mouth & anus

e.g., coelenterata, ctenophora &  
platyhelminth

## Tube in Tube

Complete dig.  
system



- 2 separate openings
- Aschelminthes & higher animals

# Circulatory System



## Open Circulation

- Blood flows in open spaces (sinuses)
- Cells/tissues get bathed in blood
- Capillaries don't
- Anthropods, Non-cephalopod mollusc, Urochordates

## Closed Circulation

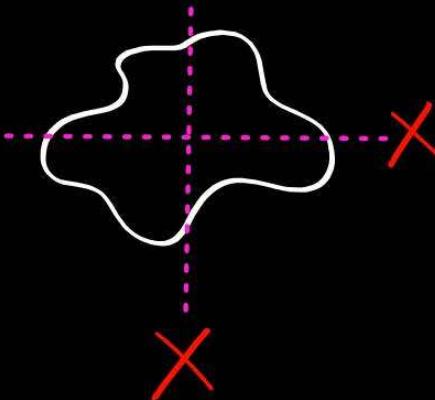
- Blood flows in blood vessels like arteries, veins & capillaries
- Tissues/cells do not get bathed directly in blood
- Annelids, chordates, cephalopod mollusc



# Symmetry

Asymmetric

Most protists



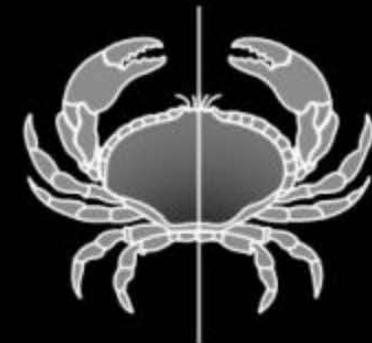
Bilateral Symmetry

- organism can be divided into 2 equal halves only by one plane
- REST

Radial Symmetry

Animals can be divided into 2 equal halves at more than one plane

Coelenterata, ctenophora,  
ADULT ECHINODERMS



(a) Radial symmetry

(b) Bilateral symmetry



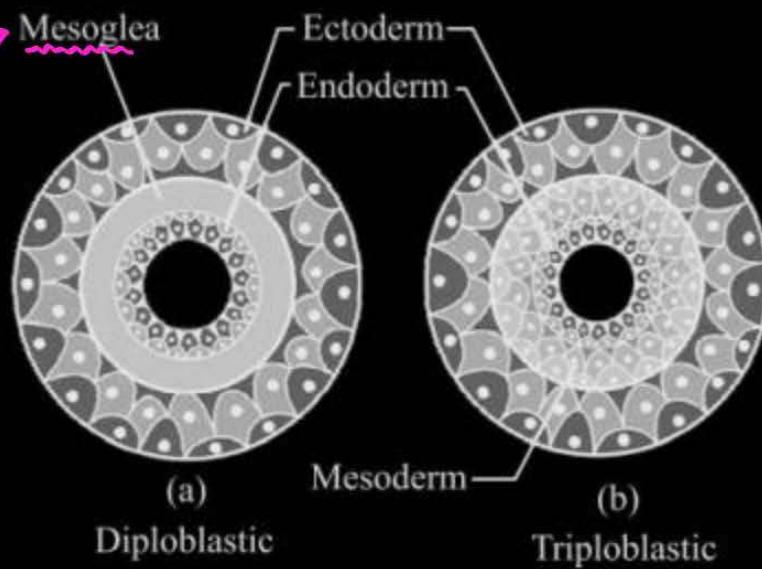
## Germ Layers

### Diploblastic

2 germ layers are seen

- Ectoderm : outer
- Endoderm : inner
- An un-differentiated layer called MESOGLEA is also seen b/w ecto & endoderm

e.g., *Ranifera*, *coelenterata* &  
*Ctenophora*



### Triploblastic

3 germ layers are seen

- Ectoderm : outer
- Mesoderm : middle
- Endoderm : inner
- REST

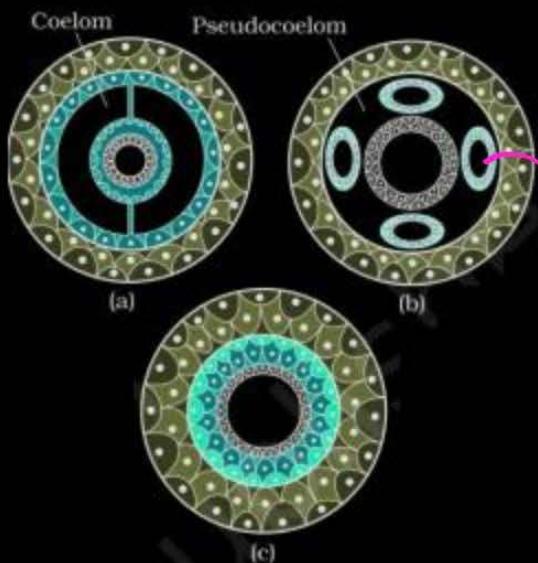


## Coelom

### Acoelomate

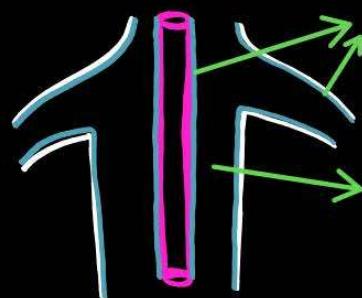
coelom  $\ominus$ nt

↳ *Romifera, coelenterata,  
ctenophora, platyhelminthes*



### Coelomate

True coelom  $\oplus$ nt  
e.g., REST



Coelom (cavity b/w body wall & alimentary canal  
where all our organs are  $\oplus$ nt)

- covered with mesoderm on both sides  
(lined)

### Pseudocoelomate

False coelom  $\ominus$ nt  
↓

not lined by mesoderm  
on both sides

e.g., Aschelminth

# Segmentation



## Segmented

- 1. Annelida
- 2. Arthropoda
- 3. Chordates

## Non-Segmented

REST



Fig: Clitellum



## Notochord



- Mesodermally derived rod like structure ~~that~~ on dorsal side of the body of Chondates
- ~~that~~ in all non-chondates



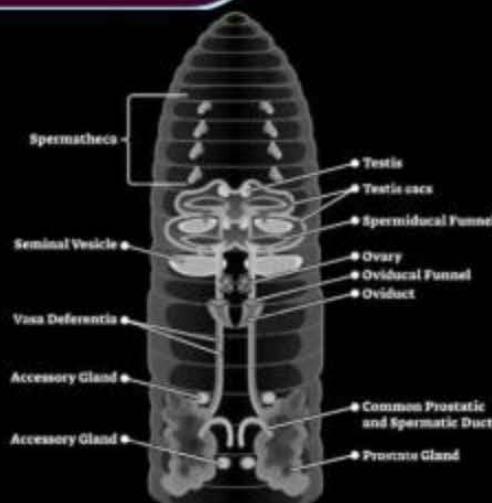
## Extra Points (for Non-Chordates) NCERT

- Digestive System Completed for First time in: *Aschelminthes*
- Circulatory System seen First time in: *Annelida*
- Respiratory System seen First time in: *Axthropoda*



## Extra Points (for Non-Chordates) NCERT

- DIGESTION TRICK: IB3
  - Both: Intra + Extra
    - Coelent, ctenop., platyhel.
  - Pomifera
    - Intracellular
- REST: Extracellular
- Fertilisation TRICK:
  - External: CC Hema's Echo
    - Coelent, ctenop., Hemichord, Echinodermata
  - Ext-fert
- BAM: Both in Annelida and Mollusca
- Rest: Internal
- Development: Both in A3
  - Aschelminthes
  - Annelida
  - Anthropoda
- In all rest non-chordates: Indirect
  - Larva Ent
- Sexes: Separate in Aschelminths
- Both in Annelids
- Rest: Separate in higher animals

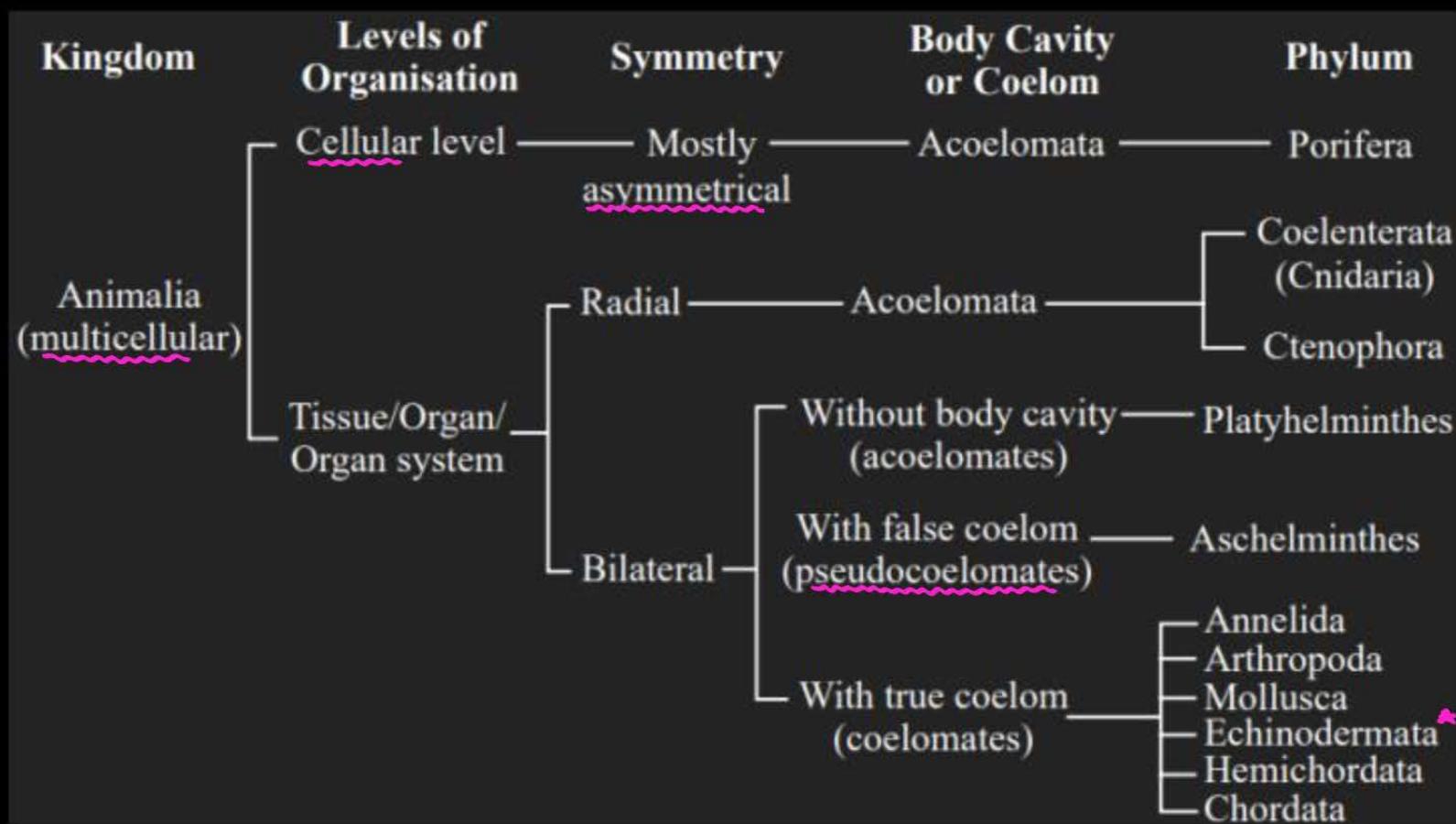


Male

Female



## Overall Classification



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	Bilateral	Absent	Absent	Incomplete	Absent	Absent	Flat body, suckers. ✓
Aschelminthes	Organ system	Bilateral	Pseudo coelomate	Absent	Complete	Absent	Absent	Often wormshaped, 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 <i>(adult)</i>	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. ✓

## Validate



### Porifera Features:

1. Level of Organisation: Cellular
2. Symmetry: MOSTLY Asymmetrical
3. Germ Layers: Absent
4. Body Plan: Cell Aggregated
5. Coelom: Acoelomate
6. Metamerism: Absent ✗
7. Notochord: Absent ✗
8. Digestion: Intracellular (IB3)
9. Circulatory System: Absent ✗
10. Respiratory System: Absent ✗
11. Fertilisation: Internal (CC Hema's Echo and BAM)
12. Development: Indirect (larva present) (Both in A3; Rest: Indirect)
13. Sexes: Not separate (Hermaphrodite): Sexual and Asexual

### Echinodermata Features:

1. Level of Organisation: Organ System
2. Symmetry: Bilateral in Larva and Radial in Adults
3. Germ Layers: Triploblastic
4. Body Plan: Tube in Tube
5. Coelom: Coelomate
6. Metamerism: Absent ✗
7. Notochord: Absent ✗
8. Digestion: Extracellular (IB3)
9. Circulatory System: Present ✓
10. Excretory System: Absent
11. Fertilisation: External (CC Hema's Echo and BAM)
12. Development: Indirect (Both in A3; Rest: Indirect)
13. Sexes: Dioecious  
(separate)

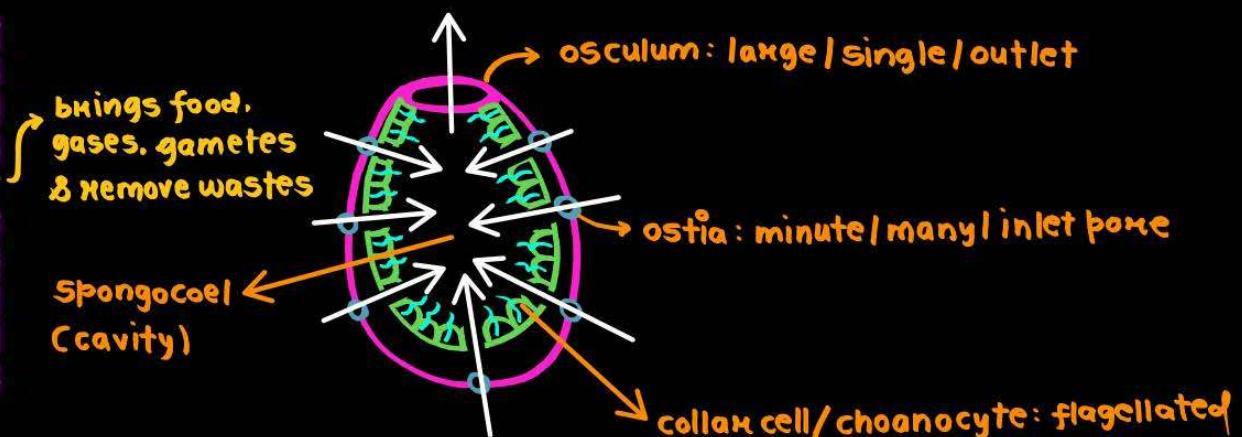


# **Porifera**

#### 4.2.1 Phylum - Porifera → pore bearing animals

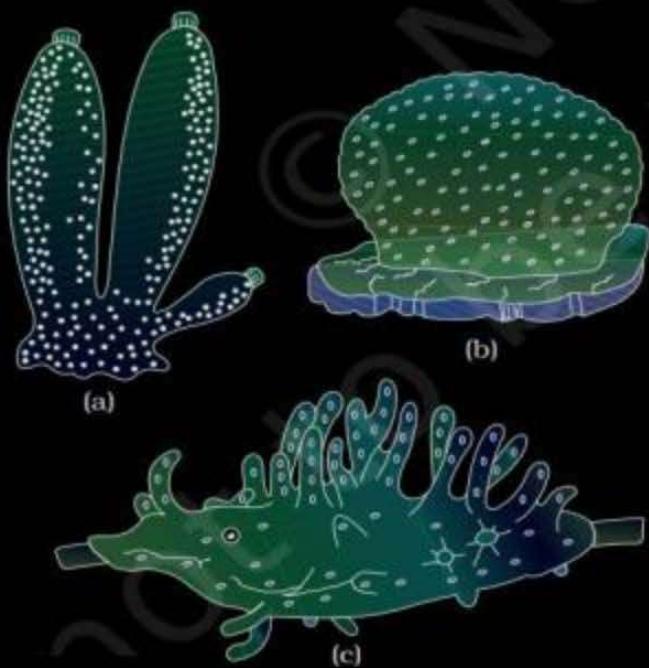
Members of this phylum are commonly known as sponges. They are generally marine and mostly asymmetrical animals (Figure 4.5). These are primitive multicellular animals and have cellular level of organisation. Sponges have a water transport or canal system. Water enters through minute pores (ostia) in the body wall into a central cavity, spongocoel, from where it goes out through the osculum. This pathway of water transport is helpful in food gathering, respiratory exchange and removal of waste. Choanocytes or collar cells line the spongocoel and the canals. Digestion is intracellular. The body is supported by a skeleton made up of spicules or spongin fibres. Sexes are not separate (hermaphrodite), i.e., eggs and sperms are produced by the same individual. Sponges reproduce asexually by fragmentation and sexually by formation of gametes. Fertilisation is internal and development is indirect having a larval stage which is morphologically distinct from the adult.

→ mostly marine & some in fresh H<sub>2</sub>O → Spongillidae





## Porifera



Examples of Porifera : (a) *Sycon*  
(b) *Euspongia* (c) *Spongilla*

Sycon (Scypha)

Euspongia (True Bath Sponge)

Spongilla (Fresh Water Sponge)

- Skeletal can be made up of spicules → **Calcareous**  
**Spongin fibers**
- Reproduce asexually by fragmentation  
Internal budding (gemmae)
- Larva is distinct from adult



## Coelenterata (Cnidaria)

### 4.2.2 Phylum - Coelenterata (Cnidaria)

They are aquatic, mostly marine, sessile or free-swimming, radially symmetrical animals (Figure 4.6). The name **cnidaria** is derived from the **cnidoblasts** or **cnidocytes** (which contain the **stinging capsules** or **nematocysts**) present on the **tentacles** and the body. Cnidoblasts are used for **anchorage, defense and for the capture of prey** (Figure 4.7). Cnidarians exhibit tissue level of organisation and are diploblastic. They have a central gastro-vascular cavity with a single opening, **mouth on hypostome**. Digestion is extracellular and intracellular. Some of the cnidarians, e.g., **corals** have a skeleton composed of **calcium carbonate**. Cnidarians exhibit two basic body forms called **polyp** and **medusa** (Figure 4.6). The former is a **sessile and cylindrical form like Hydra, Adamsia, etc.** whereas, the latter is **umbrella-shaped and free-swimming like Aurelia or jelly fish**. Those cnidarians which exist in both forms exhibit **alternation of generation (Metagenesis)**, i.e., polyps produce medusae asexually and medusae form the polyps sexually (e.g., *Obelia*).

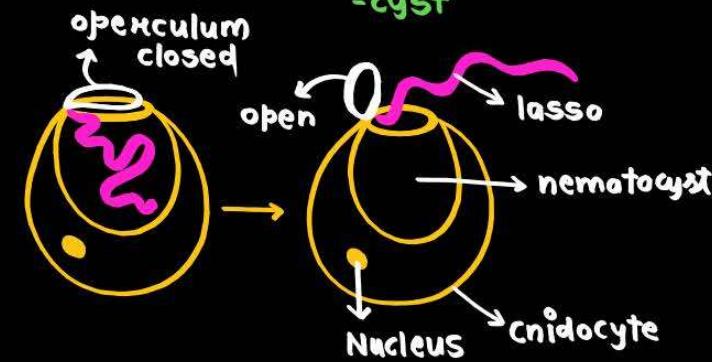
→ cavity called coelenterone

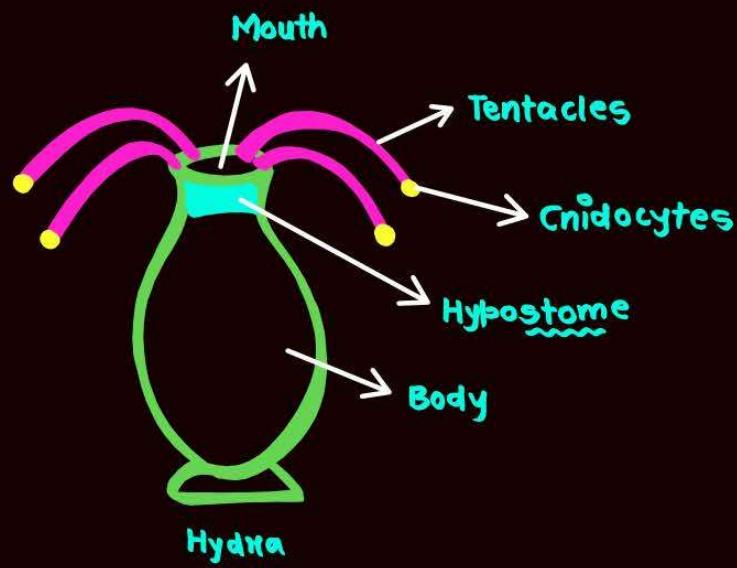
Cnidoblast or cnidocytes found

(cell)



Contains a stinging capsule or nemato-cyst





### 2 Body forms of coelenterates

Poly<sup>p</sup>  
(asexually)

- sessile
- cylindrical
- *Hydra, Adamsia*

Medusa  
(reproduce sexually)

- Free-swimming
- Umbrella shaped
- *Aurelia*

e.g., of metagenesis: *obelia* & *Physalia*  
(Alternation of generation)

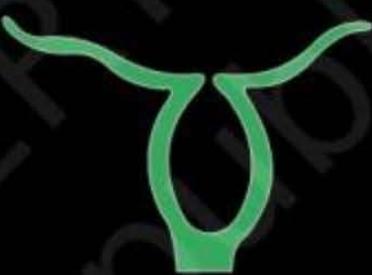


## Coelenterata (Cnidaria)

- Examples:



(a)



(b)

**Figure 4.6** Examples of Coelenterata indicating outline of their body form :  
(a) *Aurelia* (Medusa) (b) *Adamsia* (Polyp)

Hydra (Fresh Water) ✓
Adamsia (Sea Anemone) ✓
Aurelia (Jelly fish) ✓
Obelia (show metagenesis) ✓
Physalia (Portuguese Man of War) ✓
Pennatula (Sea Pen)
Gorgonia (Sea Fan) ✓
Meandrina (Brain Coral)

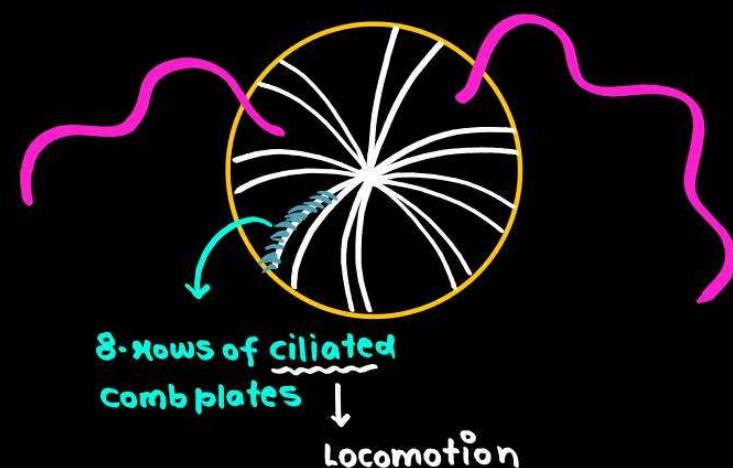


## Ctenophora



### 4.2.3 Phylum - Ctenophora

Ctenophores, commonly known as **sea walnuts** or **comb jellies** are exclusively marine, radially symmetrical, diploblastic organisms with tissue level of organisation. The body bears **eight external rows of ciliated comb plates**, which help in **locomotion** (Figure 4.8). Digestion is both extracellular and intracellular. **Bioluminescence** (the property of a living organism to emit light) is well-marked in ctenophores. Sexes are not separate. Reproduction takes place **only by sexual means**. Fertilisation is external with indirect development.





## Ctenophora

- Examples:

Ctenoplana  
Pleurobrachia



Example of  
Ctenophora  
(*Pleurobrachia*)

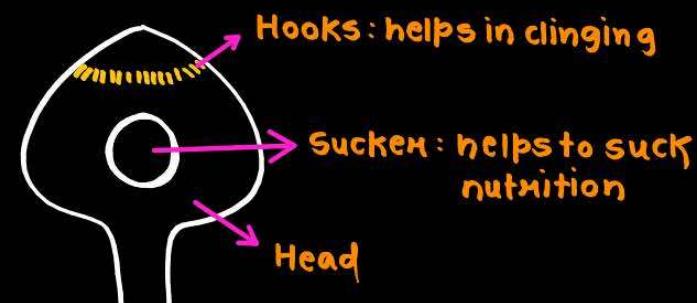


## Platyhelminthes

→ Platelike: dorso-ventrally flat

### 4.2.4 Phylum - Platyhelminthes

They have **dorso-ventrally flattened body**, hence are called **flatworms** (Figure 4.9). These are **mostly endoparasites** found in animals including human beings. Flatworms are bilaterally symmetrical, triploblastic and acoelomate animals with organ level of organisation. **Hooks and suckers** are present in the parasitic forms. **Some** of them **absorb nutrients** from the host directly through their **body surface**. Specialised cells called **flame cells** help in **osmoregulation** and **excretion**. Sexes are not separate. Fertilisation is internal and development is through **many larval stages**. Some members like *Planaria* possess high **regeneration capacity**.





# Platyhelminthes

Taenia (Tapeworm)

Fasciola (Liver fluke)



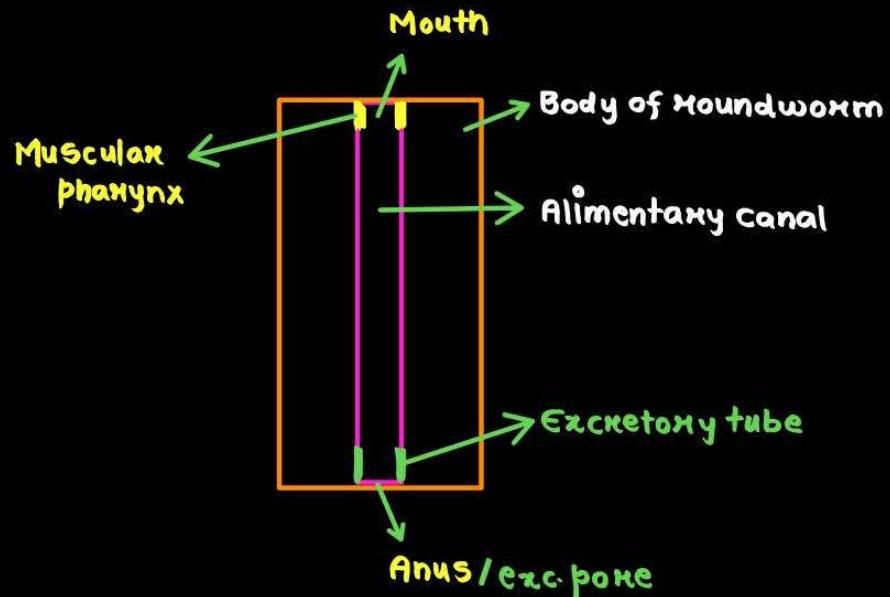


## Aschelminths

### 4.2.5 Phylum - Aschelminthes

The body of the aschelminthes is circular in cross-section, hence, the name roundworms (Figure 4.10). They may be freeliving, aquatic and terrestrial or parasitic in plants and animals.

Roundworms have organ-system level of body organisation. They are bilaterally symmetrical, triploblastic and pseudocoelomate animals. Alimentary canal is complete with a well-developed muscular pharynx. An excretory tube removes body wastes from the body cavity through the excretory pore. Sexes are separate (**dioecious**), i.e., males and females are distinct. Often females are longer than males. Fertilisation is internal and development may be direct (the young ones resemble the adult) or indirect.





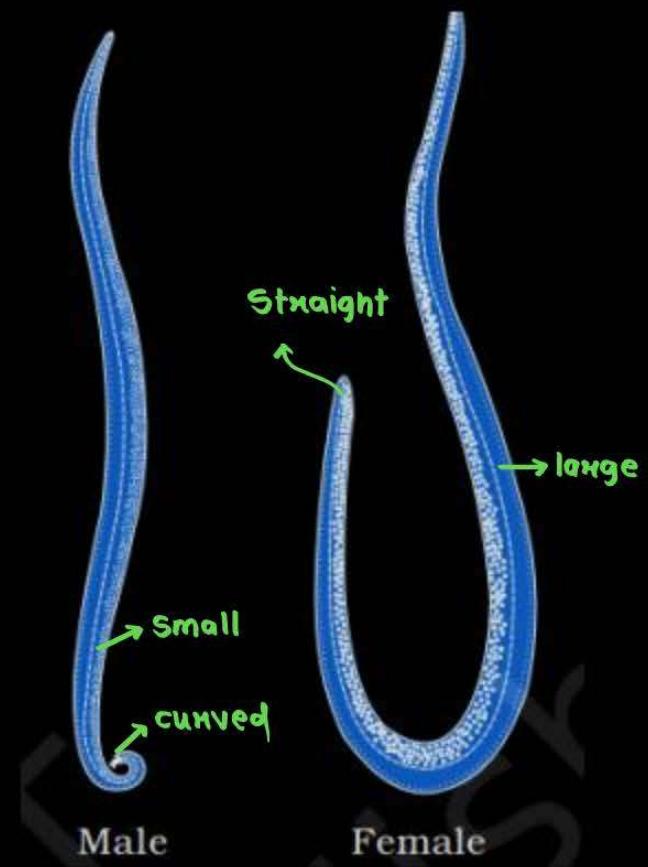
# Aschelminths

- Examples:

Wuchereria (Filarial worm)

Ancylostoma (Hookworm)

Ascaris (Common roundworm)





# Annelida

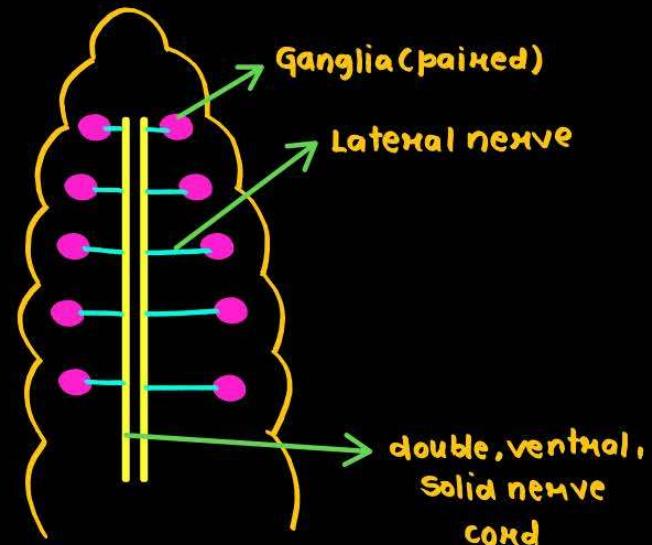


## 4.2.6 Phylum - Annelida

They may be aquatic (marine and fresh water) or terrestrial; free-living, and sometimes parasitic. *Leech\**  
They exhibit organ-system level of body organisation and bilateral symmetry. They are triploblastic, metamerically segmented and coelomate animals. Their body surface is distinctly marked out into segments or metameres and, hence, the phylum name Annelida (Latin, *annulus*: little ring) (Figure 4.11). They possess longitudinal and circular muscles which help in locomotion. Aquatic annelids like *Nereis* possess lateral appendages, parapodia, which help in swimming. A closed circulatory system is present. *Nephridia* (sing. nephridium) help in osmoregulation and excretion. Neural system consists of paired ganglia (sing. ganglion) connected by lateral nerves to a double ventral nerve cord. *Nereis*, an aquatic form, is dioecious, but earthworms and leeches are monoecious. Reproduction is sexual.



unisexual





## Annelida



- Examples:

Nereis
Pheretima (Earthworm)
Hirudinaria (Blood Sucking Leech)

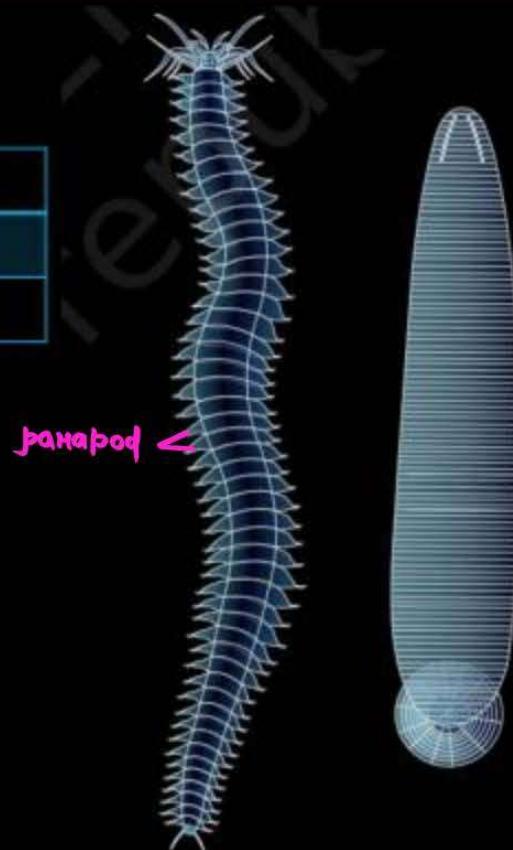


Figure 4.11 Examples of Annelida : (a) *Nereis*  
(b) *Hirudinaria*



## Arthropoda



### 4.2.7 Phylum – Arthropoda

This is the **largest phylum** of Animalia which includes insects. Over two-thirds of all named **species** on earth are arthropods (Figure 4.12).

They have organ-system level of organisation. They are bilaterally symmetrical, triploblastic, segmented and coelomate animals. The body of arthropods is **covered by chitinous exoskeleton**. The body consists of **head, thorax and abdomen**. They have **jointed appendages** (arthros-joint, poda-appendages). **Respiratory organs** are **gills, book gills, book lungs or tracheal system**. Circulatory system is of open type. **Sensory organs** like **antennae, eyes (compound and simple), statocysts** or balancing organs are present. Excretion takes place through **malpighian tubules**. They are mostly dioecious. Fertilisation is usually internal. They are **mostly oviparous**. Development may be direct or indirect.



## Arthropoda

- Examples:

**Economically important insects**

*Apis (Honey bee)* ✓

*Bombyx (Silkworm)* ✓

*Laccifer (lac insect)* ✓

**Vectors (Toxi)**

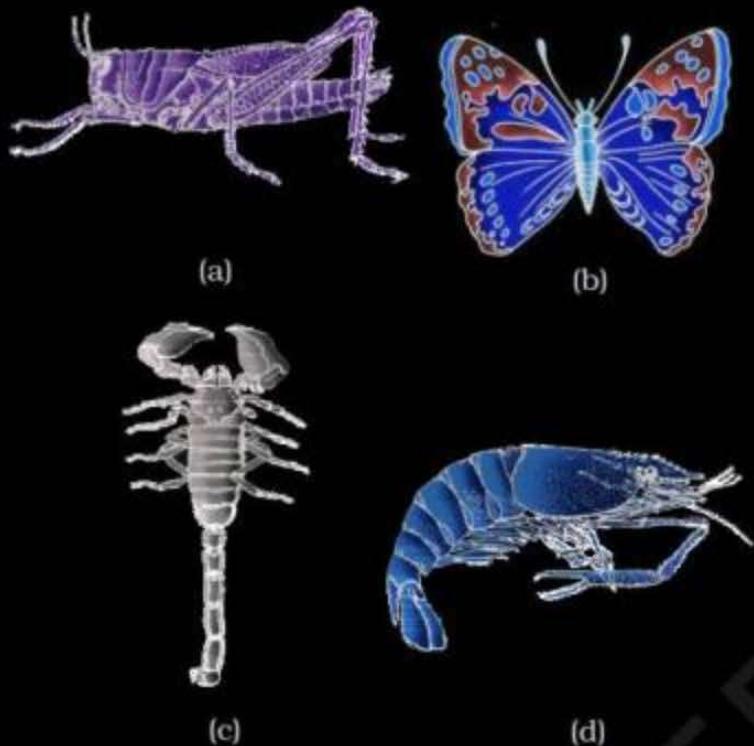
*Anopheles: Malaria*

*Culex: Dengue, Chikungunya*

*Aedes: Elephantiasis*

**Gregarious Pest: Locust** ✓

**Living Fossil: Limulus (King Crab)**



**Figure 4.12** Examples of Arthropoda:  
(a) Locust (b) Butterfly  
(c) Scorpion (d) Prawn



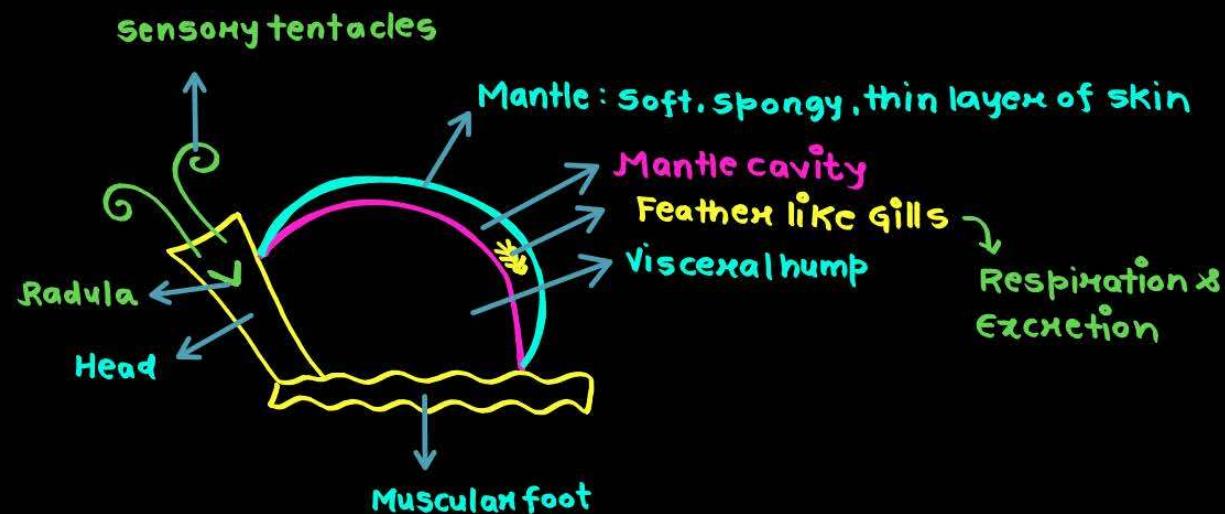
## Mollusca



### 4.2.8 Phylum - Mollusca

This is the **second largest** animal phylum (Figure 4.13). Molluscs are terrestrial or aquatic (marine or fresh water) having an organ-system level of organisation. They are bilaterally symmetrical, triploblastic and coelomate animals. Body is covered by a **calcareous shell** and is **unsegmented** with a distinct **head**, **muscular foot** and **visceral hump**. A soft and spongy layer of skin forms a **mantle** over the **visceral hump**. The space between the hump and the mantle is called the **mantle cavity** in which **feather like gills** are present. They have **respiratory** and **excretory** functions. The anterior head region has **sensory tentacles**. The mouth contains a file-like rasping organ for feeding, called **radula**.

They are usually dioecious and oviparous with indirect development.





## Mollusca

- Examples: PILA PINK APPLE LO, DAANT SE CHABAO, in OCTOBER

PILA: Pila (Apple Snail)

PINK: Pinctada (Pearl Oyster)

APPLE: Aplysia (Sea-hare)

LO: Loligo (Squid)

DAANT: Dentalium (Tusk shell)

SE: Sepia (Cuttlefish)

CHABAO: Chaetopleura (Chiton)

OCTOBER: Octopus (Devil fish)



Figure 4.13 Examples of Mollusca:  
(a) *Pila* (b) *Octopus*



## Echinodermata

### 4.2.9 Phylum - Echinodermata

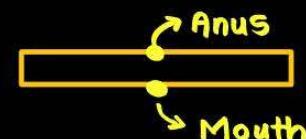
These animals have an endoskeleton of calcareous ossicles and, hence, the name Echinodermata (Spiny bodied, Figure 4.14). All are marine with organ-system level of organisation.

The adult echinoderms are radially symmetrical but larvae are bilaterally symmetrical. They are triploblastic and coelomate animals. Digestive system is complete with mouth on the lower (ventral) side and anus on the upper (dorsal) side. The most distinctive feature of echinoderms is the presence of water vascular system which helps in locomotion, capture and transport of food and respiration.

An excretory system is absent. Sexes are separate. Reproduction is sexual. Fertilisation is usually external. Development is indirect with free-swimming larva.

Echino : spiny  
derm : skin (clayex)

- Endoskeletal: calcareous ossicles



- capture of food ; transport of food
- Respiration ; excretion
- locomotion



## Echinodermata

- Examples:
- Asterias: Star Fish
- Echinus: Sea urchin
- Antedon: Sea lily
- Cucumaria: Sea cucumber
- Ophiura: Brittle Star

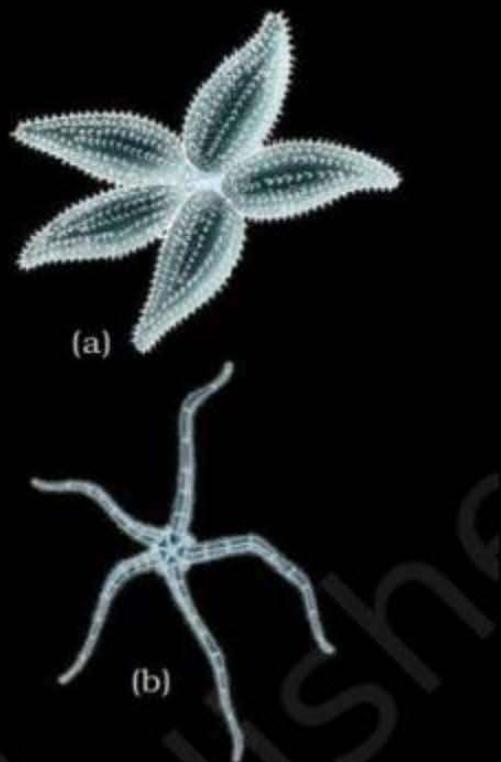


Figure 4.14 Examples of Echinodermata :  
(a) *Asterias*  
(b) *Ophiura*



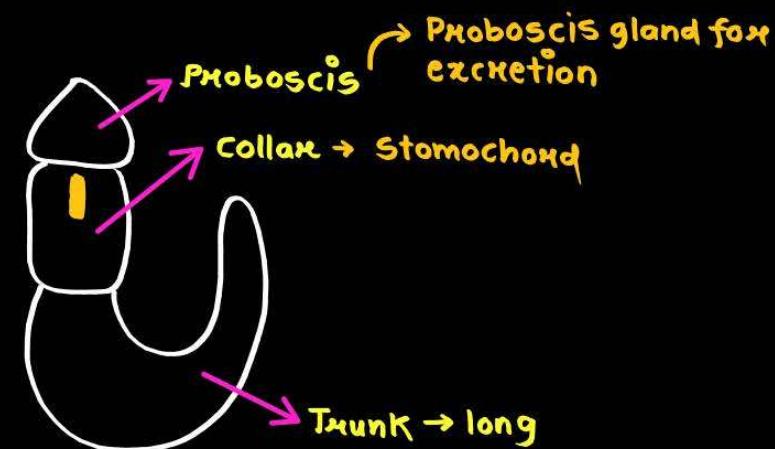
## Hemi-Chordata



### 4.2.10 Phylum - Hemichordata

Hemichordata was earlier considered as a sub-phylum under phylum Chordata. But now it is placed as a separate phylum under non-chordata. Hemichordates have a rudimentary structure in the collar region called stomochord, a structure similar to notochord.

This phylum consists of a small group of worm-like marine animals with organ-system level of organisation. They are bilaterally symmetrical, triploblastic and coelomate animals. The body is cylindrical and is composed of an anterior proboscis, a collar and a long trunk (Figure 4.15). Circulatory system is of open type. Respiration takes place through gills. Excretory organ is proboscis gland. Sexes are separate. Fertilisation is external. Development is indirect.





## Hemi-Chordata

- Examples: Balanoglossus and Saccoglossus

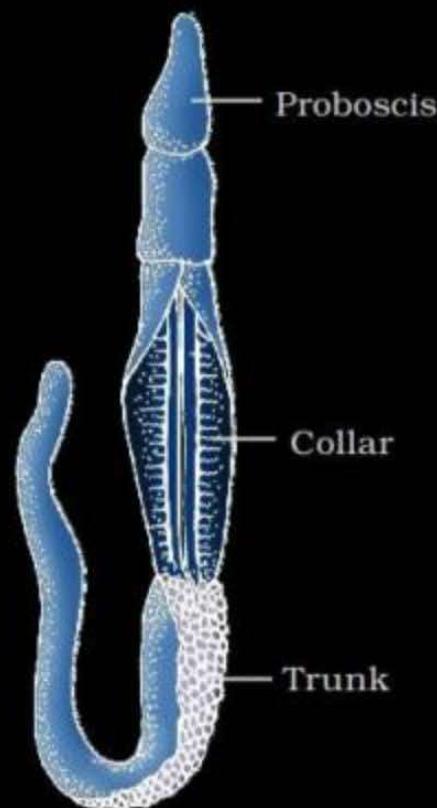


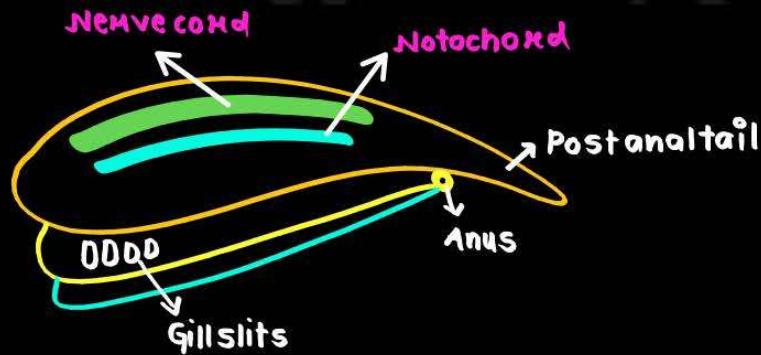
Figure 4.15 *Balanoglossus*



## Difference Between Chordates and Non-Chordates

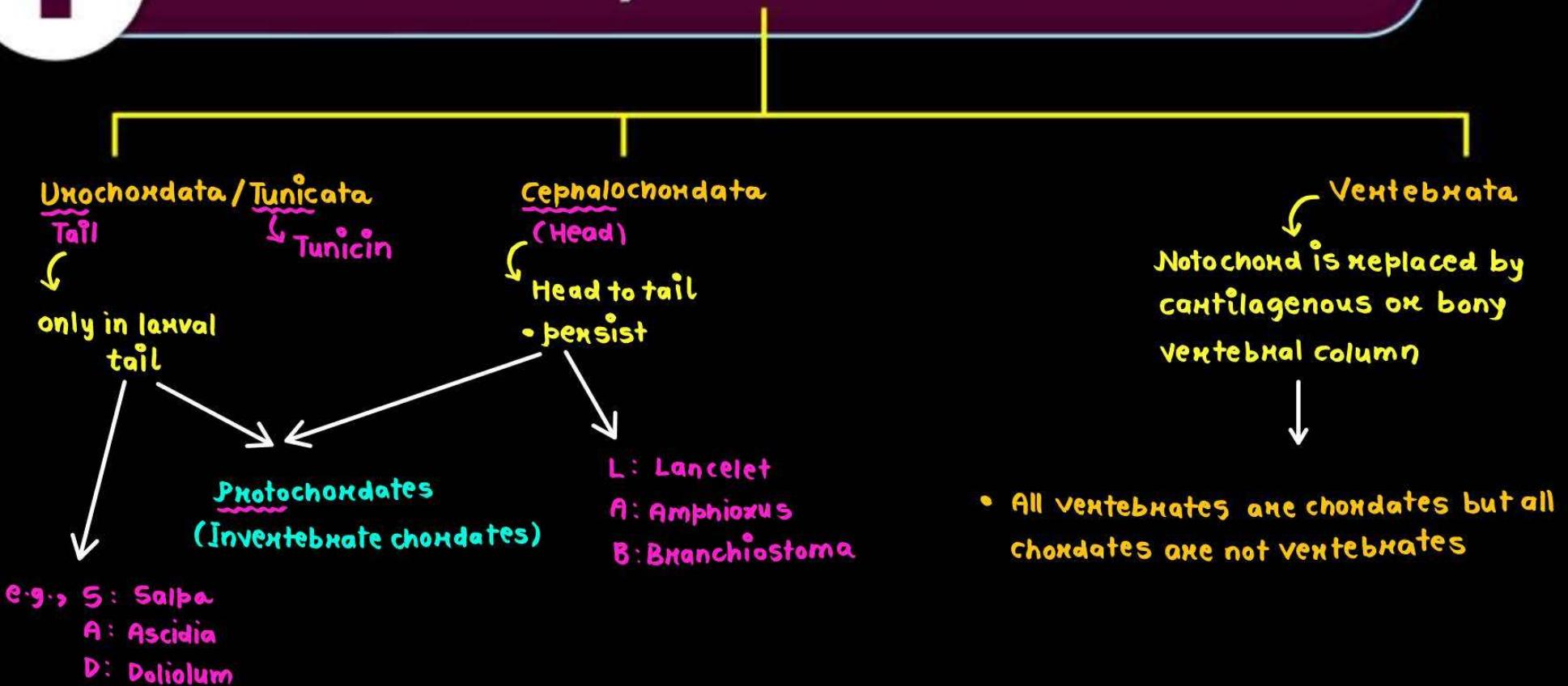
TABLE 4.1 Comparison of Chordates and Non-chordates

S.No.	Chordates	Non-chordates
1.	Notochord present.	Notochord absent.
2.	Central nervous system is dorsal, hollow and single.	Central nervous system is ventral, solid and double.
3.	Pharynx perforated by gill slits.	Gill slits are absent.
4.	Heart is ventral.	Heart is dorsal (if present).
5.	A post-anal part (tail) is present.	Post-anal tail is absent.





# Phylum Chordata



# Vertebrata



Agnatha  
↓ jaws  
absent

① Class: cyclostomata  
circular mouth

Gnathostomata  
jaws  
↓ mouth

Pisces

② osteichthyes  
(Bony fishes)  
③ chondrichthyes  
(Cart-fishes)

④ Amphibia  
⑤ Reptile  
⑥ Aves  
⑦ Mammals

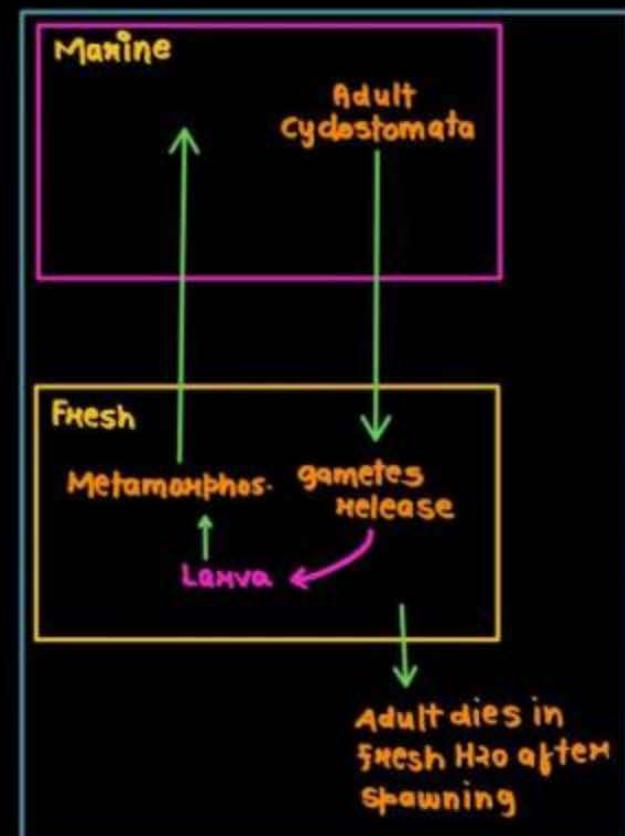
Tetrapoda



## Class Cyclo-stomata



- Meaning: Cyclo: circular; stomata: mouth
- Nature: Ectoparasites on fishes as it has suctorial mouth  
    ↳ helps in sucking
- Body: Elongated
- Gill slits: 6-15 pair: respiration
- Scales and Paired fins: Ent\*
- Cranium and Vertebral column: cartilagenous\*
- Circulation: \*Closed circulation
- Spawning: Marine water  $\xrightarrow[\text{Anadromous migration}]{\text{for spawning}}$  Fresh water में





## Class Cyclostomata

- Examples:

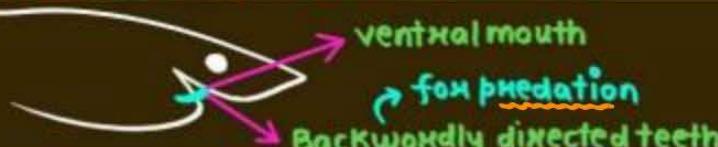
1. Petromyzon: Lamprey
2. Myxine: Hagfish



**Figure 4.18** A jawless vertebrate - *Petromyzon*



## Chondrichthyes and Osteichthyes

Characters	Cartilaginous Fishes	Bony Fishes
Habitat	• Mostly marine	• Both: Fresh + marine
Body	• Endoskeletal: cartilage ; streamlined	Endoskeletal: bones ; streamlined
Location of mouth	 ventral mouth → for predation Backwardly directed teeth	 usually terminal mouth
Notochord	persistent	• not persistent
Operculum	4-5 pairs gills ; operculum/gill covers $\ominus$ nt	4 pairs of gills ; operculum $\oplus$ nt*
Scales	Skin is tough and contains minute placoid scales • Teeth is also formed by modification of placoid sc.	Skin is covered with cycloid and ctenoid scales
Nature	Jaws: Powerful, thus predaceous*	-
Bladder	• swim bladder $\ominus$ nt; swim constantly	• swim bladder $\oplus$ nt*
Heart	• 2 chambers (II+IV) ; cold blooded or poikilothermal - enmal	• 2 chambers ; cold blooded/poikilothermal

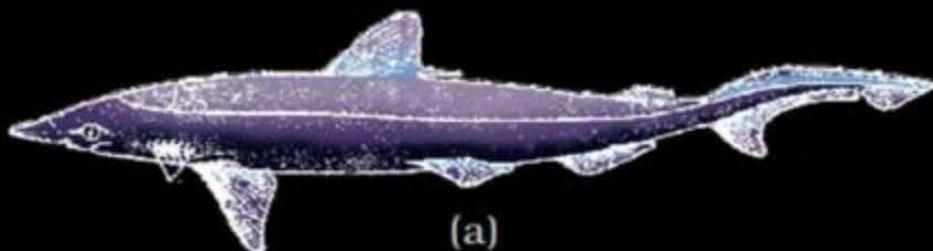


## Chondrichthyes and Osteichthyes

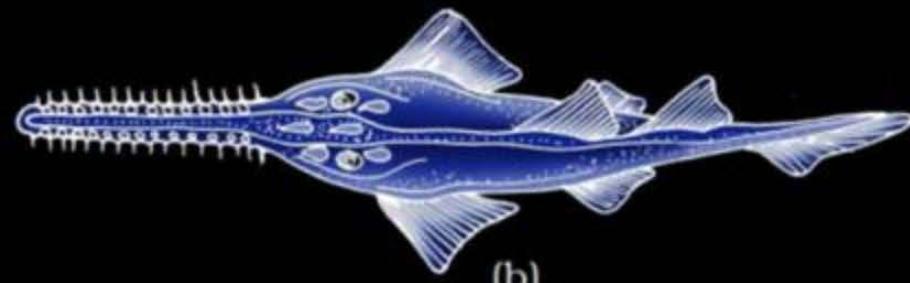
Characters	Cartilaginous Fishes	Bony Fishes
Speciality	* <u>Torpedo</u> : <u>Electric organ</u> Trygon/ <u>Sting ray</u> : <u>poisonous sting</u>	-
Sexes	<u>Separate</u> : ♂: its <u>pelvic fins</u> bears <u>CLASPER</u>	* <u>No clasper</u>
Fertilisation	(Dog) : <u>Internal</u> *	* <u>External</u> *
Ovi/viviparity	<u>viviparous</u> * ; <u>indirect development</u>	* <u>oviparous</u> ; <u>direct development</u>
Examples	Scoliodon (Dog fish) Pristis: <u>Saw fish</u> Carcharodon: <u>The Great White Shark</u> Trygon: <u>Sting Ray</u>  • 3-4-dogs - देख ↓ ↓ Txi chak Txi	Marine: <u>Exocoetus</u> ( <u>Flying fish</u> ) <u>Hippocampus</u> ( <u>sea Horse</u> ) Freshwater: <u>Catla</u> ( <u>Katla</u> ) ; <u>Labeo</u> ( <u>Rohu</u> ) <u>Clarias</u> ( <u>Magur</u> ) Aquarium: <u>Betta</u> ( <u>Fighting fish</u> ) <u>Pterophyllum</u> ( <u>Angel fish</u> )



## Chondrichthyes and Osteichthyes



(a)



(b)

**Figure 4.19** Example of Cartilaginous fishes :  
(a) *Scoliodon* (b) *Pristis*



(a)



(b)

**Figure 4.20** Examples of Bony fishes :  
(a) *Hippocampus* (b) *Catla*



## Class Amphibia

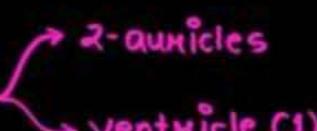


- Meaning: Amphibia  
    ↳ dual; both: live in both land & water
- Limbs: Usually: 4 limbs; Exception: Ichthyophis: limbless amphibian
- Body divisions: Head & Trunk (Tail: may or maynot be ent)
- Skin: moist; glandular (scales ent)  
    ↳ Salamander → Frog
- Eyelids: ent
- Ear: represented by Tympanum
- Cloaca: common opening of alimentary can, urinary system & reproductive system



## Class Amphibia



- Respiration by: skin, pulmonary (lungs), buccopharynx, gills
- Heart: 3-chambered  2-auricles  
ventricle (1)
- Regulation: cold blooded or poikilothermal: they can't regulate their body temperature  
∴ their temp fluctuates with environmental changes
- Sexes: separate
- Fertilisation: External
- Do they lay eggs: Yes\* ∴ oviparous
- Development: Indirect (tadpole larva) ✓



## Class Amphibia



- Examples:
- Bufo: Toad ✓
- Rana: Frog ✓
- Hyla: Tree frog ✓
- Salamandra: Salamander ✓
- Ichthyophis: Limbless amphibian \*



Figure 4.21 Examples of Amphibia :  
(a) *Salamandra*  
(b) *Rana*



## Class Reptilia



- Meaning: Creeping & crawling animals
- Habitat: Mostly Terrrestrial
- Body covered with: dry & cornified skin; epidermal scales & scutes  
(hard)
  - tough, protective layer like
    - on shell of turtle
    - on crocodile
- Ear: Represented by Tympanum
- Limbs: If  $\oplus$  ; then they are  $\ominus$
- Heart: 3 chambered → 2 Atrium + 1 ventricle  
except crocodile  
→ 4 chambers
- Regulation: cold blooded or poikilothermal



## Class Reptilia



- Skin cast: many snakes & lizards can shed their scale as skin cast  
    ↳ New layer appears in some days
- Sexes: Separate
- Fertilisation: Internal
- Do they lay eggs: Yes; oviparous
- Development: Direct\*



## Class Reptilia



- Examples:

- Chelone: Turtle ✓
- Testudo: Tortoise ✓
- Chameleon: Tree Lizard ✓
- Calotes: Garden Lizard ✓
- Crocodilus: Crocodile ✓
- Alligator: Alligator ✓
- Hemidactylus: Wall Lizard ✓
- Poisonous snakes: Naja (Cobra), Bungarus (Krait), Vipera (Viper)



Figure 4.22 Reptiles: (a) Chameleon (b) Crocodilus (c) Chelone (d) Naja



## Class Aves (Birds)

- Special Feature: Once of feathers that helps them fly
  - Flightless bird: ostrich, emu, kiwi, penguin
- Beak: ~~ent~~\*
- Forelimbs and hindlimbs
  - ↳ turned into wings\*
  - ↳ they modified themselves for running, clasping (ठाली एकड़ना)
  - Scales ~~ent~~
- Skin: ~~dry~~ & oil glands are ~~ent~~
  - ↳ only one oil gland found on base of tail
- Endo-skeletal: fully ossified ; long bones are pneumatic in nature
  - (bones ~~ent~~)
  - ↳ hollow
  - ↳ .. weight reduces
- Additional chambers in digestive tract: Crop & gizzard to digest food faster so that energy is made early



## Class Aves (Birds)



- Regulation: ~~Warm blooded~~ ✓ / Homeothermic ∵ can maintain constant body temperature
- Respiration: through lungs; ↗ additional compartments are found in lungs to supplement respiration  
↗ air sacs to make energy faster
- Sexes: separate \*
- Fertilisation: Internal \*
- Do they lay eggs: Yes; oviparous \*
- Development: direct \*



## Class Aves (Birds)

- Examples:

- Corvus: Crow ✓
- Columba: Pigeon \*
- Psittacula: Parrot
- Struthio: Ostrich ✓
- Pavo: Peacock ✓
- Aptenodytes: Penguin (bird)
- Neophron: Vulture \*

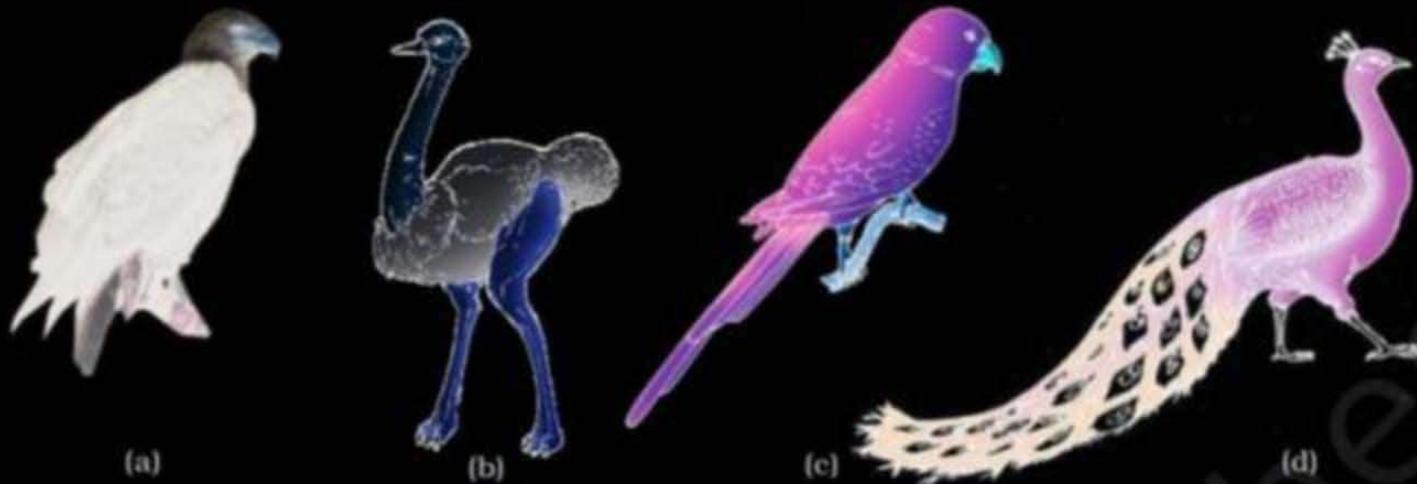


Figure 4.23 Some birds : (a) *Neophron* (b) *Struthio* (c) *Psittacula* (d) *Pavo*



## Class Mammalia



### 4.2.11.7 Class – Mammalia

They are found in a variety of habitats – polar ice caps, deserts, mountains, forests, grasslands and dark caves. Some of them have adapted to fly or live in water. The most unique mammalian characteristic is the presence of milk producing glands (**mammary glands**) by which the young ones are nourished. They have two pairs of limbs, adapted for walking, running, climbing, burrowing, swimming or flying (Figure 4.24). The skin of mammals is unique in possessing hair. External ears or pinnae are present. Different types of teeth are present in the jaw. Heart is four-chambered. They are homoiothermous. Respiration is by lungs. Sexes are separate and fertilisation is internal. They are viviparous with few exceptions and development is direct.



## Class Mammalia



- Examples:
- Oviparous: \*Ornithorhynchus (Platypus)
- Viviparous
- Macropus: kangaroo
- Pteropus: Flying fox
- Camelus: Camel → Bat
- Macaca: Monkey
- Rattus: Rat
- Canis: Dog
- Felis: Cat
- Elephas: Elephant
- Equus: Horse
- Delphinus: Dolphin
- Balaenoptera: Blue Whale
- Panthera tigris: Tiger
- Panthera leo: Lion

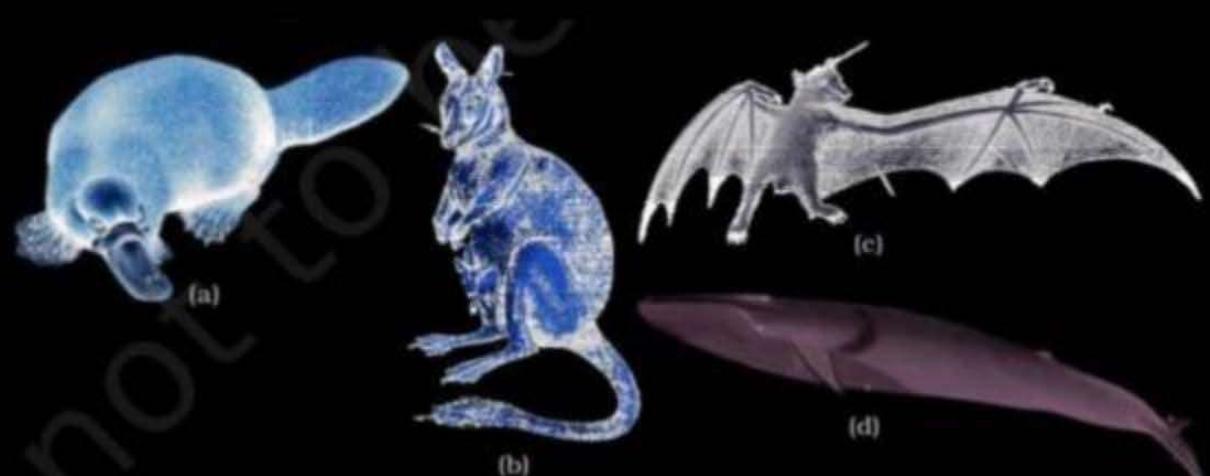


Figure 4.24 Some mammals : (a) *Ornithorhynchus* (b) *Macropus* (c) *Pteropus* (d) *Balaenoptera*

**QUESTION (NEET PYQ EXAM 2024)**

Match List I with List II :

**List I**

- A. *Pterophyllum*
- B. *Myxine*
- C. *Pristis*
- D. *Exocoetus*

**List II**

- I. Hag fish
- II. Saw fish
- III. Angel fish
- IV. Flying fish

Choose the correct answer from the options given below :

- ( A-II, B-I, C-III, D-IV  
( A-IV, B-I, C-II, D-III

- ( A-III, B-I, C-II, D-IV  
( A-III, B-II, C-I, D-IV

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**FOR NOTES & DPP CHECK DESCRIPTION**

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## QUESTION (NEET PYQ EXAM 2024)

Consider the following statements :

- A. Annelids are true coelomates ✓
- B. Poriferans are pseudocoelomates ✗
- C. Aschelminthes are acoelomates ✗
- D. Platyhelminthes are pseudocoelomates ✗

Choose the correct answer from the options given below :

- (1) B only
- (2) A only
- (3) C only
- (4) D only

---

**FOR NOTES & DPP CHECK DESCRIPTION**

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## QUESTION (NEET PYQ EXAM 2024)

The following are the statements about non-chordates:

- A. Pharynx is perforated by gill slits. ✗
- B. Notochord is absent. ✓
- C. Central nervous system is dorsal. ✗
- D. Heart is dorsal if present. ✓
- E. Post anal tail is absent. ✓

Choose the most appropriate answer from the options given below:

- (1) A & C only
- (2) A, B & D only
- (3) B, D & E only
- (4) B, C & D only

---

**FOR NOTES & DPP CHECK DESCRIPTION**

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## QUESTION (NEET PYQ EXAM 2024)

Open Circulatory system is present in:

- (1) *Palaemon*, ~~Nereis~~, *Balanoglossus*
- (2) ~~Hirudinaria~~, *Bombyx*, *Salpa*
- (3) *Anopheles*, *Limax*, *Limulus*
- (4) ~~Pheretima~~, *Musca*, *Pila*

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**FOR NOTES & DPP CHECK DESCRIPTION**

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## QUESTION (NEET PYQ EXAM 2024)

Which of the following pairs is an incorrect match?

- (1) Annelids and arthropods-Bilateral symmetry ✓
- (2) Sponges-Acoelomates ✓
- (3) Coelenterates and Ctenophores-Radial symmetry ✓
- (4) Platyhelminthes-Diploblastic organisation X

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**FOR NOTES & DPP CHECK DESCRIPTION**

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## QUESTION (NEET PYQ EXAM 2024)

Given below are two statements: One is labelled as **Assertion A** and the other is labelled as **Reason R**.

**Assertion A:** Members of subphylum vertebrates possess notochord during the embryonic period. The notochord is replaced by a cartilaginous or bony vertebral column in the adult.

**Reason R:** Thus all chordates are vertebrates not all vertebrates are chordates.

In the light of the above statements choose the correct answer from the option given below.

- (1) **A** is true but **R** is false.
- (2) **A** is false but **R** is true
- (3) Both **A** and **R** are true and **R** is the correct explanation of **A**.
- (4) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.

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**FOR NOTES & DPP CHECK DESCRIPTION**

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## QUESTION (NEET PYQ EXAM 2023)

Select the **correct** statements. (Manipur 2023)

- (A) Platyhelminthes are triploblastic, pseudocoelomate and bilaterally symmetrical organisms.
- (B) Ctenophores reproduce only sexually and fertilization is external.
- (C) In tapeworm, fertilization is internal but sexes are not separate.
- (D) Ctenophores are exclusively marine, diploblastic and bioluminescent organisms.
- (E) In sponges, fertilization is external and development is direct.

Choose the **correct** answer from the options given below:

- (1) (A), (C) and (D) only (2) (B), (C) and (D) only
- (3) (A) and (E) only (4) (B) and (D) only

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## FOR NOTES & DPP CHECK DESCRIPTION

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## QUESTION (NEET PYQ EXAM 2023)

Match **list-I** with **list-II**.

(Manipur 2023)

List-I		List-II	
A.	<i>Taenia</i>	P.	Nephridia
B.	<i>Paramoecium</i>	Q.	Contractile vacuole
C.	<i>Periplaneta</i>	R.	Flame cells
D.	<i>Pheretima</i>	S.	Uricose gland

Choose the **correct** answer from the options give below.

- (1) A-(Q); B-(P); C-(S); D-(R)
- (2) A-(P); B-(Q); C-(R); D-(S)
- (3) A-(P); B-(Q); C-(S); D-(R)
- (4) A-(R); B-(Q); C-(S); D-(P)

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**FOR NOTES & DPP CHECK DESCRIPTION**

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**QUESTION (NEET PYQ EXAM 2023)**

Select the **correct** statements with reference to chordates.

(2023)

- A. Presence of a mid-dorsal, solid and double nerve cord.
- B. Presence of closed circulatory system.
- C. Presence of paired pharyngeal gills.
- D. Presence of dorsal heart.
- E. Triploblastic pseudocoelomate animals.

Choose the **correct** answer from the options given below:

- (1) C, D and E only
- (2) A, C and D only
- (3) B and C only
- (4) B, D and E only

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**FOR NOTES & DPP CHECK DESCRIPTION**

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## QUESTION (NEET PYQ EXAM 2022)

The unique mammalian characteristics are; (2023)

- (1) pinna, monocondylic skull and mammary glands
- (2) hairs, tympanic membrane and mammary glands
- (3) hairs, pinna and mammary glands ✓
- (4) hairs, pinna and indirect development ✗

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**FOR NOTES & DPP CHECK DESCRIPTION**

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## QUESTION (NEET PYQ EXAM 2022)

Radial symmetry is **not** found in adults of phylum; (2023)

- (1) Echinodermata
- (2) Ctenophora
- (3) Hemichordata
- (4) Coelenterata

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**FOR NOTES & DPP CHECK DESCRIPTION**

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### QUESTION (NEET PYQ EXAM 2022)

In which of the following animals, digestive tract has additional chambers like crop and gizzard? (2022)

- (1) *Pavo, Psittacula, Corvus*
- (2) *Corvus, Columba, Chameleon*
- (3) *Bufo, Balaenoptera, Bangarus*
- (4) ~~*Catla, Columba, Crocodilus*~~

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**FOR NOTES & DPP CHECK DESCRIPTION**

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**QUESTION (NEET PYQ EXAM 2021)**

Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**. (2022)

**Assertion (A):** All vertebrates are chordates but all chordates are not vertebrates. ✓

**Reason (R):** Notochord is replaced by vertebral column in the adult vertebrates. ✓

In the light of the above statements, choose the **correct** answer from the options given below.

- (1) Assertion (A) is not correct but Reason (R) is correct.
- (2) Both Assertion (A) and Reason (R) are correct and Reason (R) is the correct explanation of Assertion (A). ✓
- (3) Both Assertion (A) and Reason (R) are correct but Reason (R) is not the correct explanation of Assertion (A).
- (4) Assertion (A) is correct but (R) is not correct.

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**FOR NOTES & DPP CHECK DESCRIPTION**

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**QUESTION (NEET PYQ EXAM 2021)**Match **list-I** with **list-II**.

(2021)

List-I		List-II	
A.	Metamerism	P.	Coelenterata
B.	Canal system	Q.	Ctenophora
C.	Comb plates	R.	Annelida
D.	Cnidoblasts	S.	Porifera

Choose the **correct** answer from the options given below.

- (1) A-(R); B-(S); C-(Q); D-(P)  
(2) A-(Q); B-(S); C-(R); D-(P)  
(3) A-(S); B-(P); C-(Q); D-(R)  
(4) A-(S); B-(R); C-(P); D-(Q)

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**FOR NOTES & DPP CHECK DESCRIPTION**

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## QUESTION (NEET PYQ EXAM 2020)

Which one of the following organisms bears hollow and pneumatic long bones? (2021)

- (1) *Hemidactylus*
- (2) *Macropus*
- (3) *Ornithorhynchus*
- (4) *Neophron*

---

**FOR NOTES & DPP CHECK DESCRIPTION**

---

**QUESTION (NEET PYQ EXAM 2020)**

Match the list-I with list-II.

(2021)

List-I		List-II	
A.	<i>Physalia</i>	P.	Pearl oyster
B.	<i>Limulus</i>	Q.	Portuguese man of war
C.	<i>Ancylostoma</i>	R.	Living fossil
D.	<i>Pinctada</i>	S.	Hookworm

- ( A-(S); B-(P); C-(R); D-(Q))  
( A-(Q); B-(R); C-(S); D-(P))  
( A-(P); B-(S); C-(R); D-(Q))  
( A-(Q); B-(R); C-(P); D-(S))

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**FOR NOTES & DPP CHECK DESCRIPTION**

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## QUESTION (NEET PYQ EXAM 2020)

Read the following statements. (2021)

- A. Metagenesis is observed in helminthes. ✗
- B. Echinoderms are triploblastic and coelomate animals. ✓
- C. Round worms have organ-system level of body organization. ✓
- D. Comb plates present in ctenophores help in digestion. ✗
- E. Water vascular system is characteristic of echinoderms. ✓

Choose the **correct** answer from the options given below.

- (1) A, B and C are correct (2) A, D and E are correct
- (3) B, C and E are correct (4) C, D and E are correct

---

**FOR NOTES & DPP CHECK DESCRIPTION**

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## QUESTION (NEET PYQ EXAM 2020)

Which of the following statements are **true** for the phylum-Chordata? (2020)

- (1) In urochordata, notochord extends from head to tail and it is present throughout their life
- (2) In vertebrata, notochord is present during the embryonic period only \*
- (3) Central nervous system is dorsal and hollow ✓
- (4) Chordata is divided into 3 subphyla: Hemichordata, tunicata and cephalochordata

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**FOR NOTES & DPP CHECK DESCRIPTION**

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## QUESTION (NEET PYQ EXAM 2020)

Bilaterally symmetrical and **acelomate** animals are exemplified by:

(2020)

- (1) Platyhelminthes
- (2) Aschelminthes
- (3) Annelida
- (4) Ctenophora

---

**FOR NOTES & DPP CHECK DESCRIPTION**

---

**QUESTION (NEET PYQ EXAM 2020)**

Match the **List-I** and **List-II** and select the correct option.  
(2020)

List-I		List-II	
A.	6-15 pairs of gill slits	P.	<i>Trygon</i>
B.	Heterocercal caudal fin	Q.	Cyclostomes
C.	Air bladder	R.	Chondrichthyes
D.	Poison sting	S.	Osteichthyes

- (X) A-(R); B-(S); C-(P); D-(Q)  
(X) A-(S); B-(Q); C-(R); D-(P)  
(X) A-(P); B-(S); C-(R); D-(Q)  
**(✓)** A-(Q); B-(R); C-(S); D-(P)

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**FOR NOTES & DPP CHECK DESCRIPTION**

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**QUESTION (NEET PYQ EXAM 2020)**

Match the **List-I** and **List-II** and select the **correct** option.  
**(2020)**

List-I		List-II	
A.	Gregarious, polyphagous pest	P.	<i>Asterias</i>
B.	Adult with radial symmetry and larva with bilateral symmetry	Q.	Scorpion
C.	Book lungs	R.	<i>Ctenoplana</i>
D.	Bioluminescence	S.	Locust

- (1) A-(S); B-(P); C-(Q); D-(R)  
(2) A-(R); B-(Q); C-(P); D-(S)  
(3) A-(Q); B-(P); C-(R); D-(S)  
(4) A-(P); B-(R); C-(Q); D-(S)

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**FOR NOTES & DPP CHECK DESCRIPTION**

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**QUESTION (NEET PYQ EXAM 2020)**

Match the **list-I** and **list-II** and select the **correct** option.

(2020 Covid)

List-I		List-II	
A.	<i>Aptenodytes</i>	P.	Flying fox
B.	<i>Pteropus</i>	Q.	Angel fish
C.	<i>Pterophyllum</i>	R.	Lamprey
D.	<i>Petromyzon</i>	S.	Penguin

- () A-(R); B-(S); C-(P); D-(Q)  
() A-(S); B-(P); C-(Q); D-(R)  
() A-(Q); B-(P); C-(S); D-(R)  
() A-(R); B-(S); C-(Q); D-(P)

---

**FOR NOTES & DPP CHECK DESCRIPTION**

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**QUESTION (NEET PYQ EXAM 2020)**

Match the following group of organisms with their respective distinctive characteristics and select the **correct** option.

(2020 Covid)

Organisms		Characteristics	
A.	Platyhelminthes	P.	Cylindrical body with no segmentation
B.	Echinoderms	Q.	Warm blooded animals with direct development
C.	Hemichordates	R.	Bilateral symmetry with incomplete digestive system
D.	Aves	S.	Radial symmetry with indirect development

- (1) A-(Q); B-(R); C-(S); D-(P)  
(2) A-(S); B-(P); C-(Q); D-(R)  
(3) A-(P); B-(Q); C-(R); D-(S)  
 (4) A-(R); B-(S); C-(P); D-(Q)

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**FOR NOTES & DPP CHECK DESCRIPTION**

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## QUESTION (NEET PYQ EXAM 2020)

Which of the following options does correctly represent the characteristic features of phylum Annelida?

(2020 Covid)

- (1) Triploblastic, segmented body and bilaterally symmetrical ✓
- (2) Triploblastic, flattened body and acelomate condition
- (3) Diploblastic, mostly marine and radially symmetrical
- (4) Triploblastic, unsegmented body and bilaterally symmetrical ✗

---

**FOR NOTES & DPP CHECK DESCRIPTION**

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## QUESTION (NEET PYQ EXAM 2020)

All vertebrates are chordates but all chordates are **not** vertebrates, why? (2020 Covid)

- (1) Ventral hollow nerve cord remains throughout life in some chordates **X**
- (2) All chordates possess vertebral column **X**
- (3) All chordates possess notochord throughout their life **X**
- (4) Notochord is replaced by vertebral column in adult of some chordates **✓**

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**FOR NOTES & DPP CHECK DESCRIPTION**

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