4 ANIMAL KINGDOM

Prepared By:- PRASANNA. N.M
BIOLOGY LECTURER
(SKCH PU COLLEGE)

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Contents:-

4.1. BASIC CLASSIFICATIONS:-

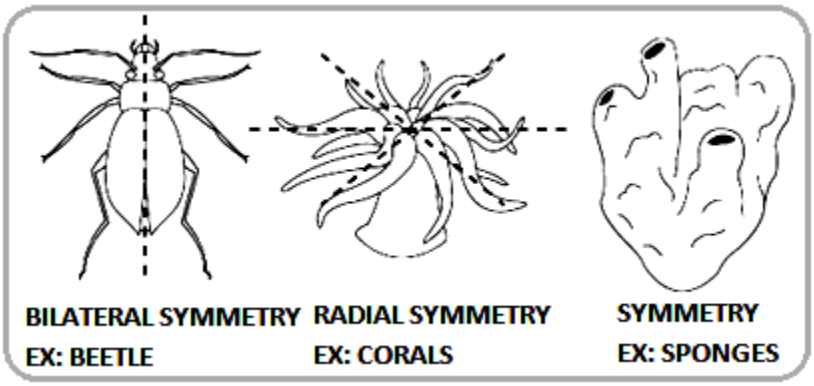
Animal kingdom includes eukaryotic and multicellular organisms. It is classified into several phyla according to some basic features such as:

I. LEVEL OF ORGANIZATION: Animals show three different levels of organization.

- **CELLULAR LEVEL**: The body consists of many cells which may be similar or show minor division of labour. **E.g., Sponges**.
- **TISSUE LEVEL**: Cells performing the same function are organized into tissues. **E.g., Coelenterates**.
- **ORGAN SYSTEM LEVEL**: Tissues are grouped together to form organs and organs are grouped together to form organ systems. **E.g., higher invertebrates and all vertebrates**.

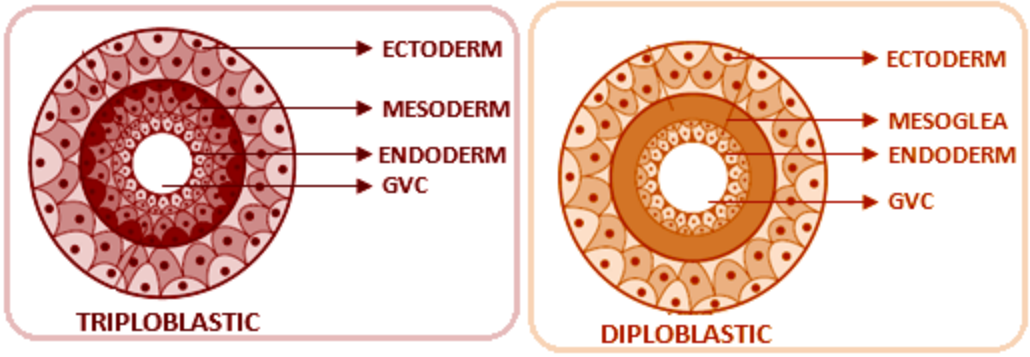
II. BODY SYMMETRY:-

- Body symmetry is the similarity of parts in different regions and directions of the body.
- **ASYMMETRY:** Body cannot be divided into equal halves by an plane , **Eg., most sponges**.
- **RADIAL SYMMETRY:** The body of the individual can be divided into equal halves by any plane passing through the centre from top to bottom , **E.g., Cnidarians (Hydra, jelly fish, etc).**
- **BILATERAL SYMMETRY:** A single, median longitudinal or saggital plane can divide the body into two halves, **E.g., many invertebrates (Annelidans, Arthropodans) and all vertebrates.**



III. EMBRYONIC ORGANIZATION:-

- **DIPLOBLASTIC ANIMALS:** Animals in which the cells are arranged in two embryonic layers, an external ectoderm and an internal endoderm, are called **diploblastic animals**,
  E.g., Coelenterates. An undifferentiated layer, **mesoglea**, is present in between the ectoderm and the endoderm.
- **TRIPLOBLASTIC ANIMALS**: The embryos of all other animals (from phylum Platyhelminthes to phylum Chordata) have three germinal layers – the ectoderm, mesoderm and endoderm. These animals are called triploblastic animals



IV. BODY CAVITY (COELOM):-

A body cavity means any internal space, or a series of spaces present inside body. On the basis of body cavity, animals can be of three types:

- **COELOMATES:-**Body cavity is lined by mesoderm i.e., true coelum,
  E.g., Annelids, Molluscs, Aethropods, Echinoderms, Hemichorades and Chordates.
- **PSEUDOCOLEOMATES:-**The body cavity is not lined by mesoderm, instead, the mesoderm is present as scattered pouches in between the ectoderm and endoderm
  Eg., Aschelminthes.
- **ACOELOMATES:-**the animals which do not have coelom are called acoelomates.
  E.g., Platyhelminthes.

V. SEGMENTATION:-

Segmentation is division or differentiation of the body into distinct portions called segments. It is of two types:

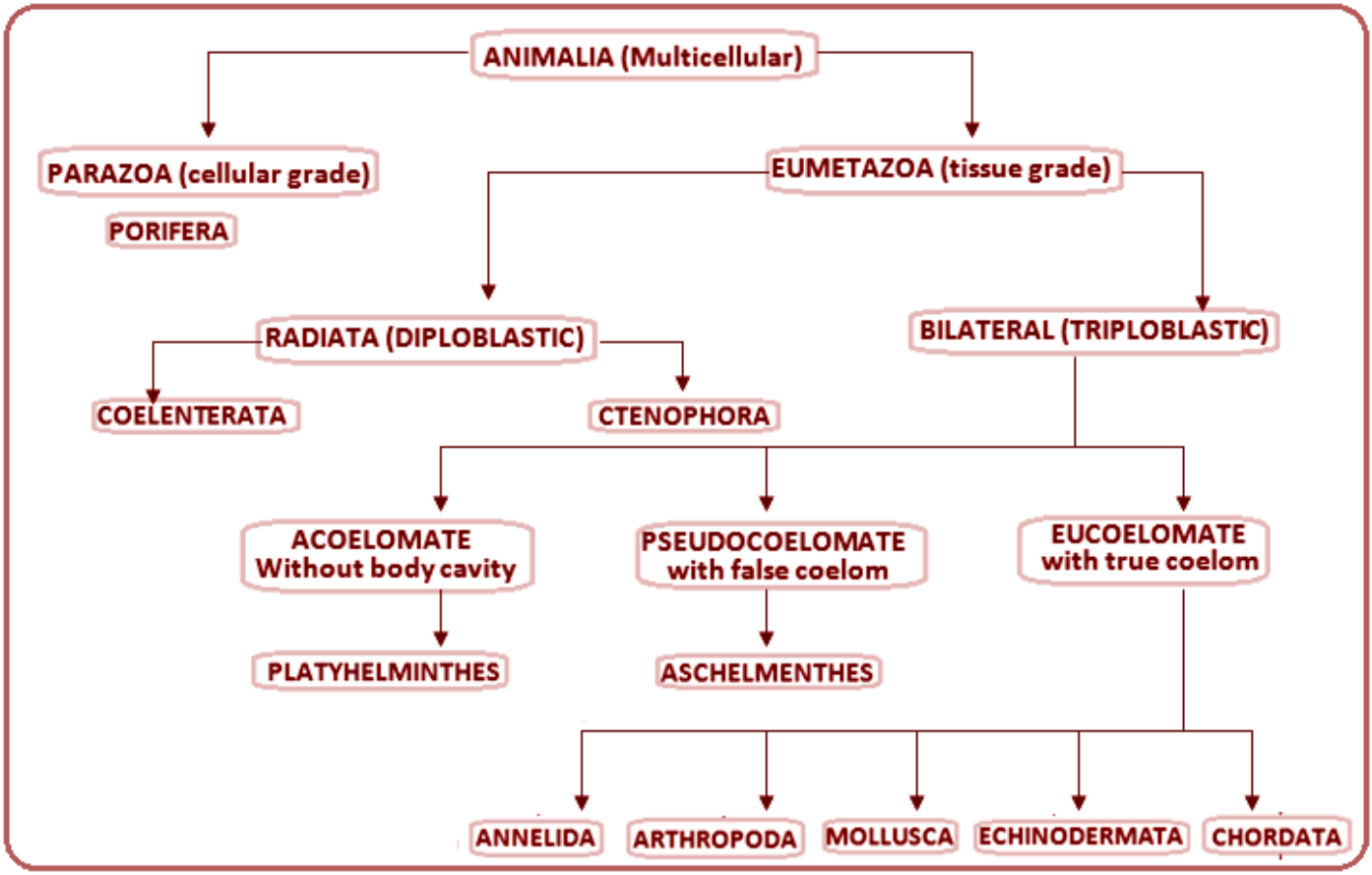
- **METAMERIC SEGMENTATION (TRUE SEGMENTATION):** The body is divided into a number of sections where external divisions correspond to internal divisions.
  E.g., Annelida, Arthropoda and Chordata.

- **PSEUDOMETAMERISM (FALSE SEGMENTATION):** The body is segmented only externally, there is no internal division.
  E.g., tapeworms.

VI. NOTOCHORD:-

- **CHORDATES:** Notochord is a mesodermally derived rod like structure formed on the dorsal side during embryonic development in some animals. Animals with notochord are called **chordates**
  E.g., humans,,
- **NON CORDATES:** animals which do not form this structure are called **non cordates**,
  E.g., Porifera to Echinodermata.

4.2. CLASSIFICATION OF ANIMALS:-

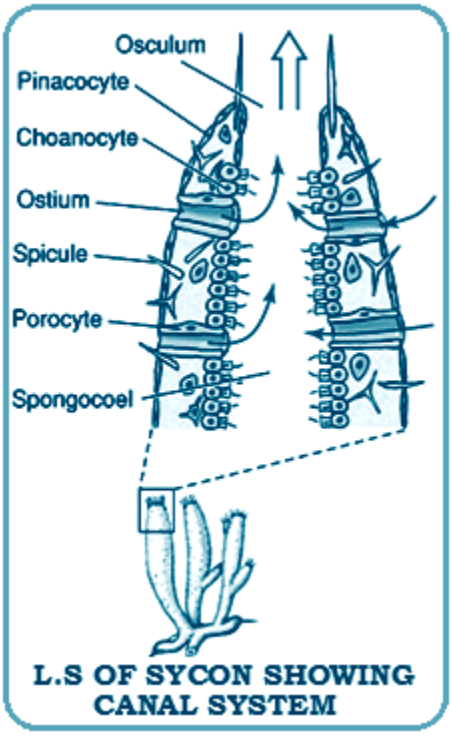


1. PHYLUM- PORIFERA(General characters):-

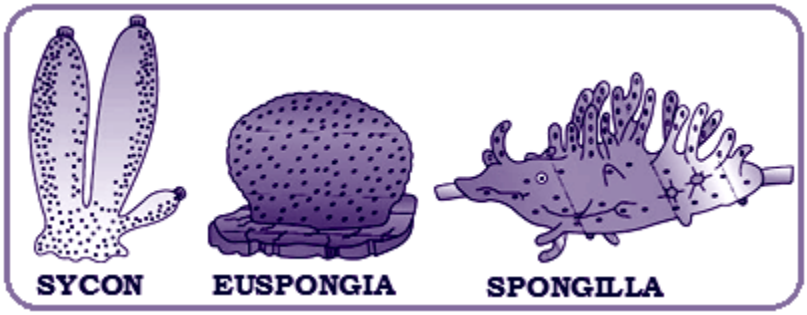
- All aquatic ,mostly marine, few freshwater ,solitary or colonial, sessile. Body form vase like cylindrical, tubular, cushion-shaped, branched etc.
- Porifera contains primitive multicellular animals, called **sponges** referred to as '**pore bearers'**, as their body walls contain tiny pores (**ostia**).
- Sponges have **cellular level of organization.**
- 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. **Chanocytes or collar cells** line the spongocoel and the canals.

- Digestion is intracellular.
- Skeleton if present may be of calcareous or siliceous **spicules** or **spongin fibers**, or of both.
- Sexes are not separate (hermaphrodite). Sponges reproduce asexually by **fragmentation** and sexually by **formation of gametes**. **Fertilsation is internal** and **development is indirect** having a larval stage which is morphologically distinct from the adult.
- **Examples: Sycon, Spongilla (fresh water sponge) and Euspongia (bath sponge).**

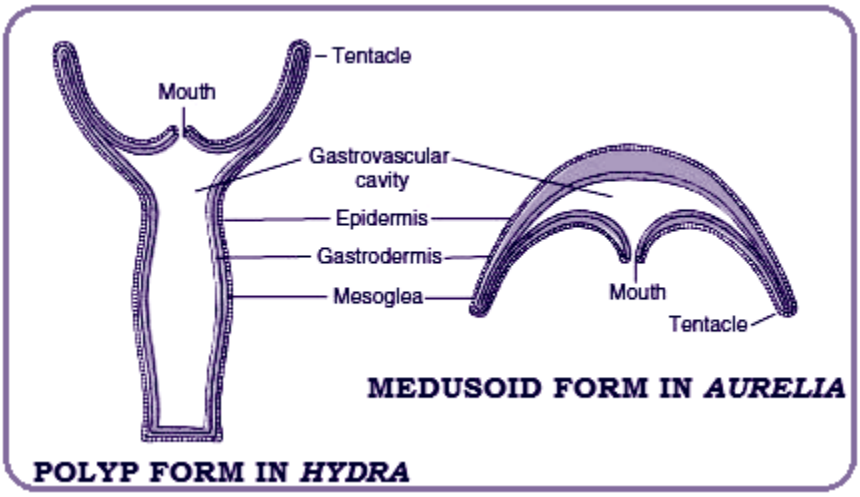


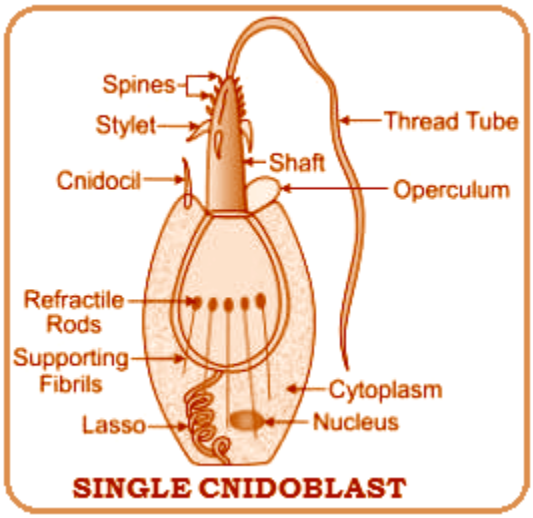
L.S OF SYCON SHOWING CANAL SYSTEM



2. PHYLUM -COELENTERATA (CINDARIA)(general characters):-

- They are aquatic, mostly marine, sessile or free swimming, radically symmetrical animals, exhibit **tissue level of organization** and are **diplobastic.**
- Body and tentacles have peculiar stinging cells called as **cnidoblasts (nematoblasts).** A nematoblasts has nematocysts (stinging organs). These are used for adhesion, food capture, offence and defense.
- A central **gastro vascular cavity** or **coelentron** with a single opening mouth. Thus, there is present incomplete digestive tract. Both intra and extra cellular digestion present.
- Two body forms occur,
  - **Attached polyps (sessile and cylindrical) Eg:**- ***Hydra Adamsia***
  - **Free swimming medusa (Free living and umbrella shaped)**. ***Eg:-Aurelia(Jelly fish)***
  - These cnidarians which exist in both the forms exhibit **metagenesis**, i.e., **polyps**(sessile and cylindrical) produce **medusa**(Free living and umbrella shaped) asexually and medusa form the polyps sexually) ***E.g., Obelia***

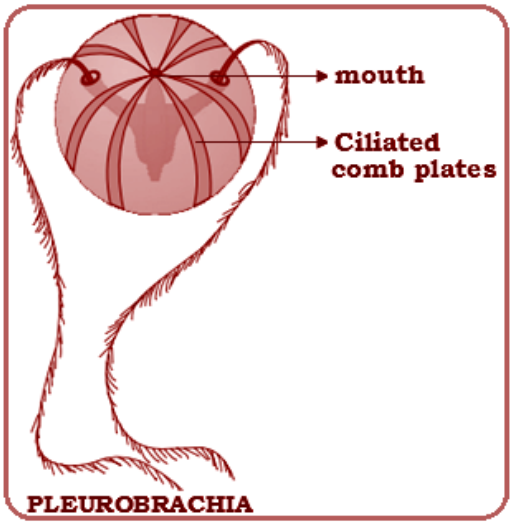




- **Examples :** ***Physalia*** (protuguese man of war), ***Adamsia*** (sea anemone), ***Pennatula*** (sea pen), ***Gorgonia*** (sea fan) and ***Meandrina*** (brain coral).

3. PHYLUM- CTENOPHORA(General characters):-

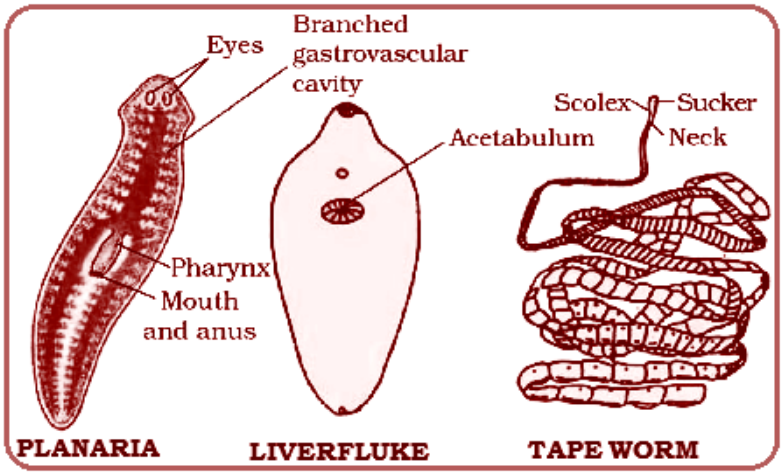
- Ctenophora (Gk, Ktens – comb, Phors – bearing) is a small phylum of **exclusively marine**, radially symmetrical diplobalstic animals with tissue level of organization. They are commonly known as **sea walnuts** or **comb jellies**.
- The body bears **eight external rows of ciliated comb plates**, which help in locomotion.
- Reproduce only sexually, monoecious **(hermaphrodite)**.
- **Power of regeneration is well marked**.
- **Bioluminescence is well marked.**
- **Examples**: ***Pleurobrachia*** and ***Ctenoplana.***



4. PHYLUM- PLATYHELMINTHES(General characters):-

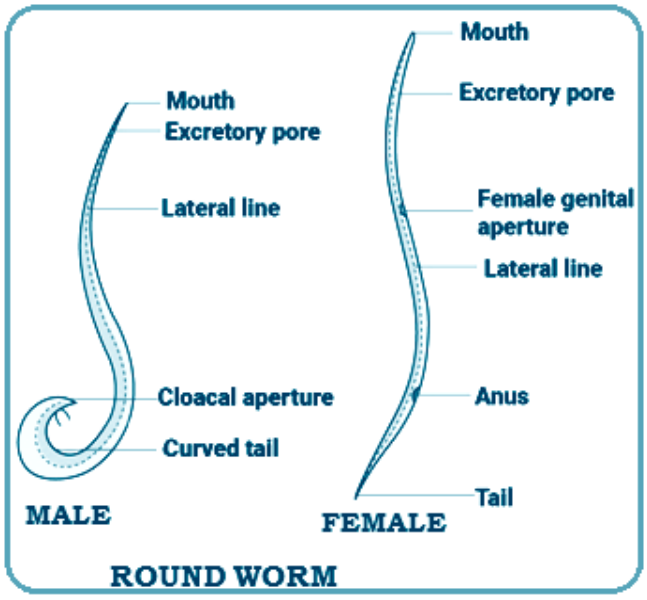
- Most of them are endoparasitic, dorsoventrally flattened body commonly known as **flatworms**.
- These are **triplobastic, bilaterally symmetrical, acoelomate** animals with well defined ventral surface bearing **mouth** and **gonopore.**
- Platyhelminthes possess **organ level of organization**, in which tissues are grouped together to form organs.
- Body **unsegmented** (expect in class Cestoda).
- Digestive tract, if present, is incomplete without anus.
- Adhesive structures like **hooks, spines** and **suckers** and **adhesive secretions** are common in parasitic forms.
- **Excretory system** includes **flame cells.** Absent in some primitive forms.
- **Nervous system** is ladder like. It consists of the brain and two main longitudinal nerve cords.

- Mostly **monoecious** with complex reproductive system. **Fertilization internal**, may be cross or self. **Development direct or indirect** (common in endoparasites) .Planaria exhibit power full regeneration.
- **Examples: *Taenia* (tapeworm), *Fasciola* (liver fluke)**



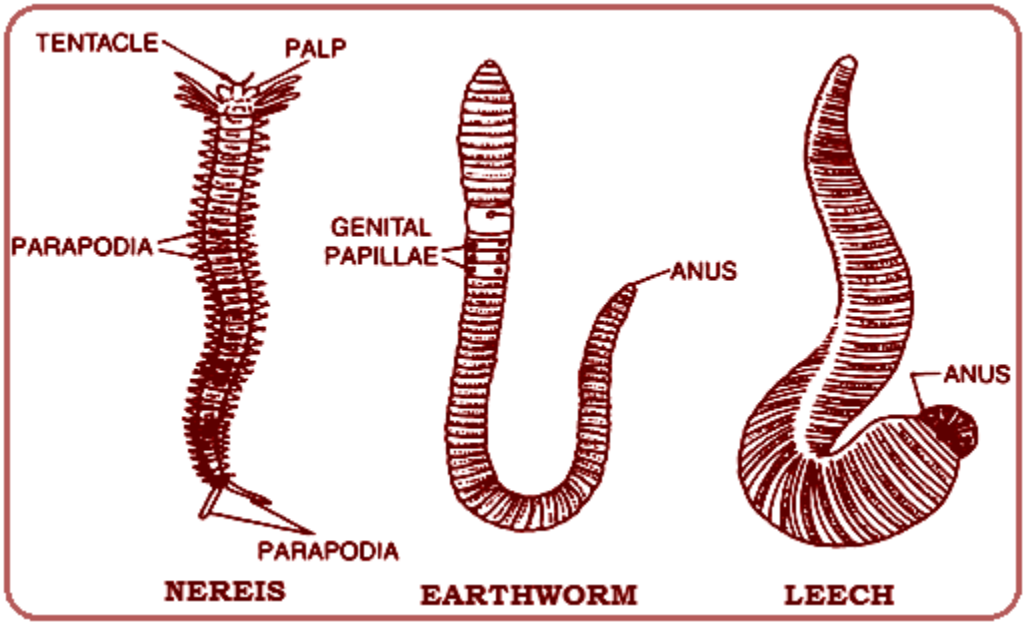
5. PHYLUM -ASCHELMINTES(NEMATODES) (General characters):-

- Aschelminthes (round worms) may be free living, aquatic, terrestrial or parasitic. Body slender, vermiform, unsegmented, flat or cyclindrical, **bilaterally symmetrical** and **triploblastic** with **organ system level** of body organization.
- **They are Pseudocoelomates**.
- **Digestive tract is complete** with mouth, specialized muscular pharynx, straight non muscular intestine and posterior anus. **Circulatory, respiratory** and **skeletal systems** are absent.
- The **excretory system** consists of **gland cells**, or of canals or of both. In Ascaris 'H' shaped excretory system of canals and complicated "**giant cell**" called "**renette cell**" is present.
- Mostly dioecious (sexes are separate). Males usually smaller than females (sexual dimorphism).
- **Examples: *Ascaris* (round worm), *Wuchereria* (filarial worm), *Ancylostoma* (hook worm).**



6. PHYLUIM -ANNELIDA(General characters):-

- Annelids may be aquatic, terrestrial, free living or parasitic. Body elongated, bilaterally symmetrical, **triploblastic**, showing **metamerism** and organ system level of organization.
- Locomotory organs are segmentally repeated chitinous bristles, called **setae or chaetae**, embedded in skin. May be borne by lateral fleshy appendages or **parapodia (Nereis).**
- **True coelom**, mostly well developed expect in leeches.
- **Digestive system straight and complete**. Digestion entirely extracellular.
- **Blood vascular system closed**. Respiratory pigment either **haemoglobin or erythrocruorin** dissolved in blood plasma. **Respiration by moist skin or gills.**
- **Excretory system** consists of coiled tubes, called **nephridia,** which help in osmoregulation and excretion.
- **Nervous system** consists of a nerve ring and ventral nerve cord with **ganglia.**
- Both unisexual (e.g., Nereis) and bisexual (e.g., earthworms and leeches) forms are found. **Reproduction is sexual**, cleavage spiral and determinate.
- Larva, when present, is a **trochophore. Regeneration common.**
- **Examples: *Nereis, Pheretima* (earth worm) and *Hirudinaria* (leech).**

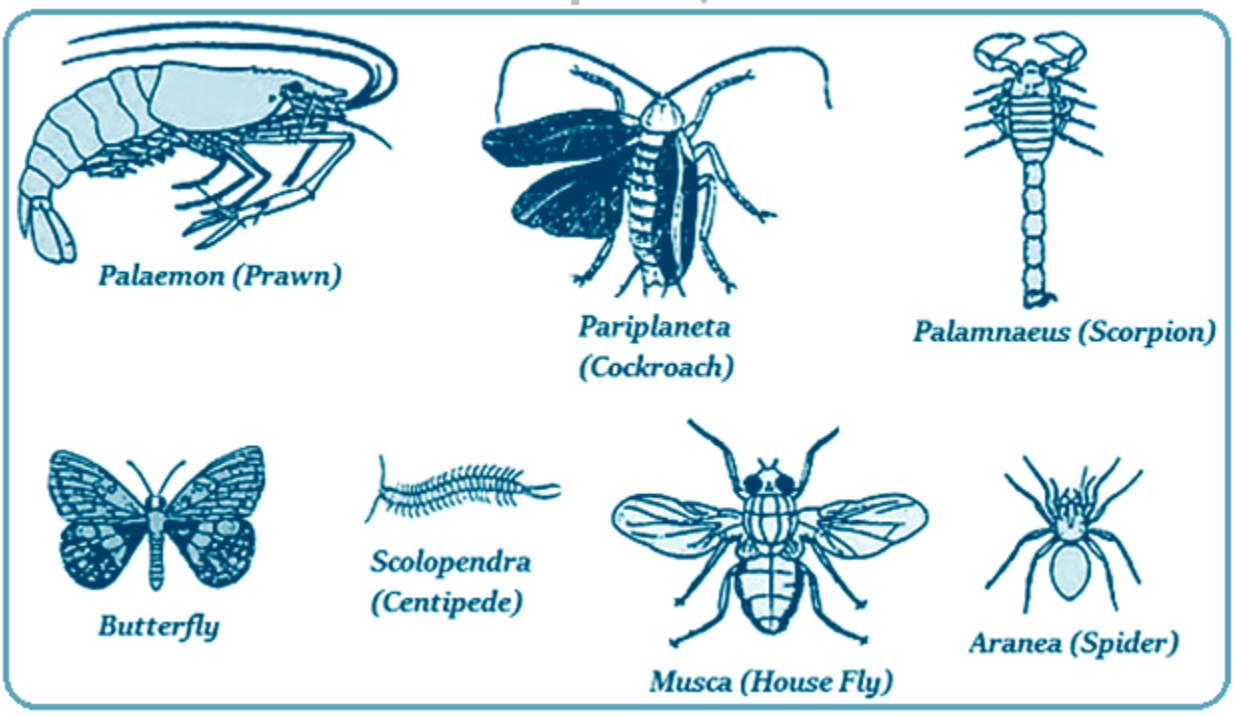


7. PHYLUM- ARTHROPODA(General characters):-

- The **largest phylum** of the animal kingdom.
- **Organ system level** of body organization. Body bilaterally symmetrical, triploblastic and metamerically segmented. Appendages jointed. **Body divisible into head, thorax and abdomen**. Head and thorax often fused to form a **cephalothorax.**
- **Exoskeleton** of dead **chitinous cuticle** that is shed in intervals, called **ecdysis or moulting**, for growth and development.
- True coelom reduced and largely replaced by a **blood filled haemocoel**. Muscles mostly striated, usually capable of rapid contraction.

- **Digestive tract complete** with mouth and anus. **Mouth parts** adapted for various modes of feeding.
- **Circulatory system open** with dorsal often many chambered heart, arteries and blood sinsus of haemocoel.
- Excretory organs are **green glands** or **Malpighian tubules**.
- **Nervous system** with a dorsal brain connected with a nerve ring to a double **ventral nerve cord.**
- Sexes usually separate (**dioecious**). Reproductive organs and ducts generally paired. Fertilization usually internal. Mostly oviparous. Development direct or indirect with one or many larval stages.
- **Examples:**
  - **Economically important insects** – *Apis* (honey bee), *bombyx* (silk worm), *Laccifer* (lac insect)
  - **Vectors** – *Anopheles, Culex* and *Aede*s (mosquitoes).
  - **Gregarious pest** – *Locusta* (locust).
  - **Living fossil** – *Limulus* (king crab).

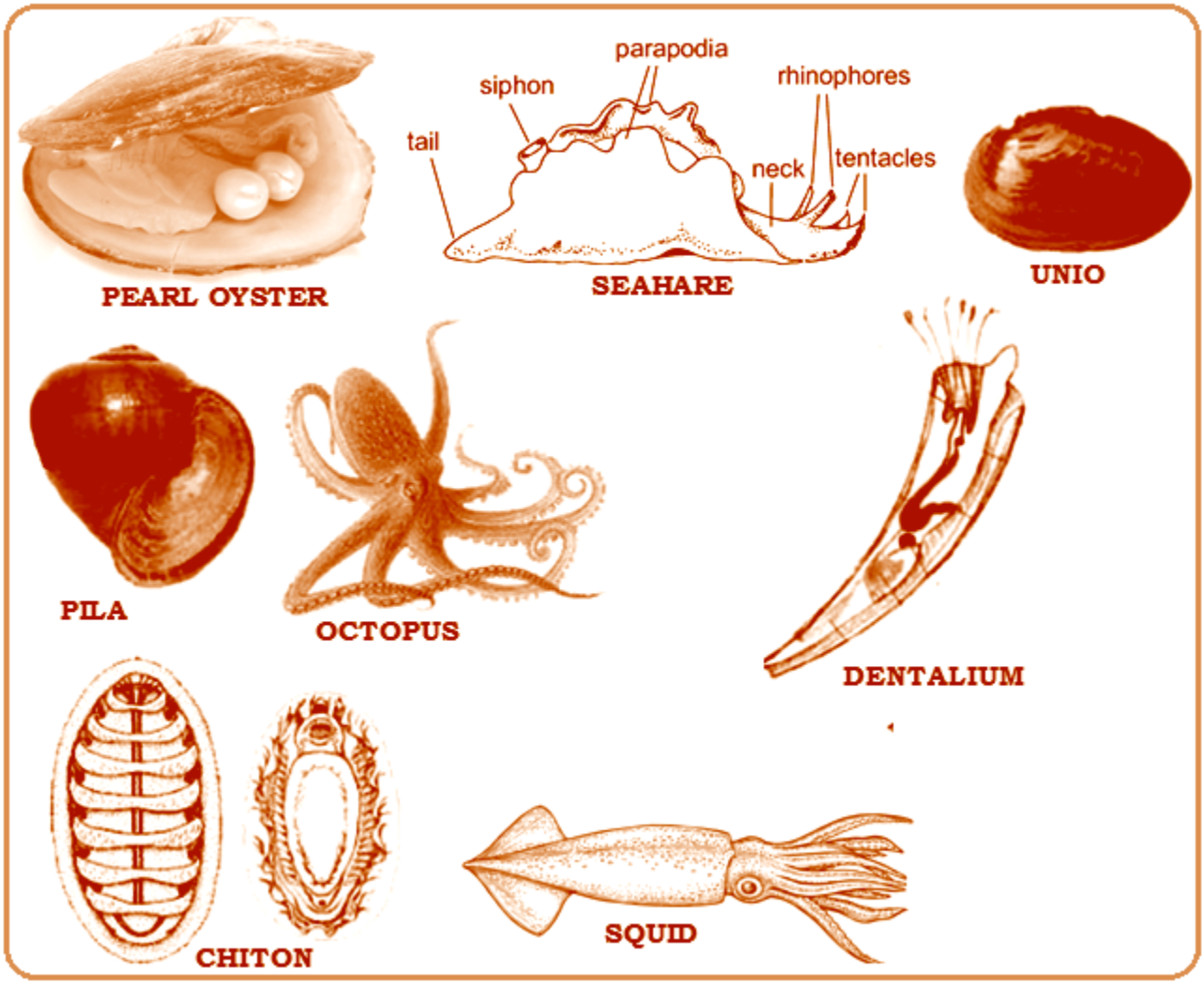
NOTE: Peripatus or the walking worm is an important example of the class Onychophora which has characters of both phylum Annelida and phylum Arthropoda. Hence it is a **connecting link** between the two phyla. **Neopilina**, a living fossil, serves as a **connecting link** between Annelida and Mollusca.



8. PHYLUM -MOLLUSCA(General characters):-

- It includes the **second largest phylum** after Arthopoda.
- **Unsegmented** with a distinct **head, muscular foot** and **visceral hump**. Triploblastic, coelomate with organ system level of body organization.
- Body is **bilaterally symmetrical**.

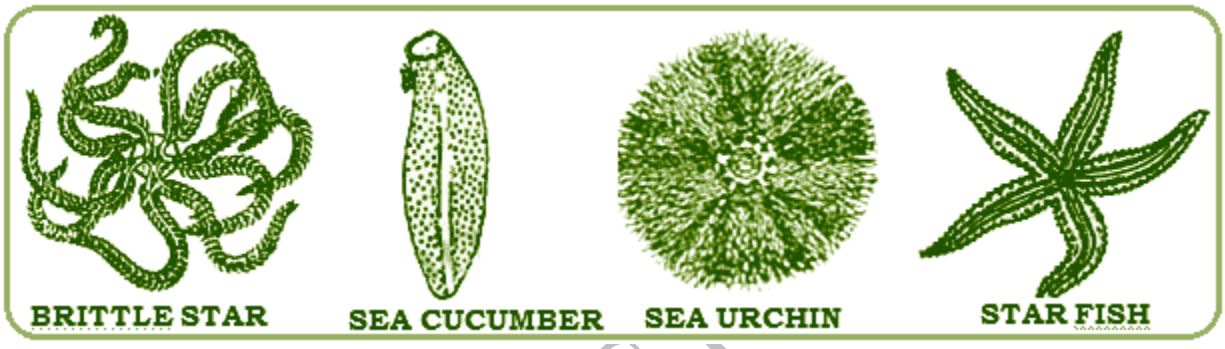
- Mouth contains a file like **rasping organ for feeding called radula.**
- A thin fleshy fold or outgrowth of dorsal body wall more or less covers the body. This fold is called **mantle or pallium**. The mantle usually secretes the shell made up of **calcium carbonate**.
- Blood is usually blue in colour due to the presence of **haemocyanin** which is a **copper** containing, blue respiratory pigment.
- Excretory organs are one or two pairs of **sac like kidneys**. **Gills** are also excretory in function.
- They are usually **dioecious** and **oviparous.**
- When the development is indirect, it includes a characteristic larva, **trochophore** or **Glochidium.**
- **Examples: *Pila* (apple snail), *Pinctada* (pearl oyster), *Sepia* (cuttle fish), *Loligo* (squid), *Octopus* (devil fish), *Aplysia* (sea hare), *Dentalium* (tusk shell) and *Chaetopleura* (chiton).**



9. PHYLUM -ECHINODERMATA(General characters):-

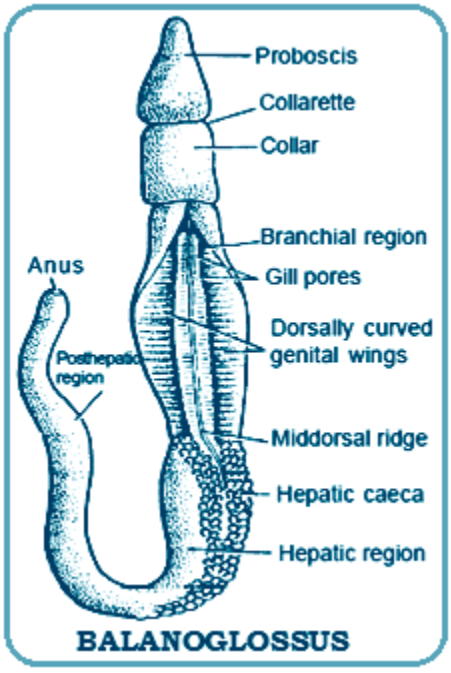
- Echinodermata literally means "**spiny or prickly skinned**" and refers to the conspicuous spines possessed by skin.
- Echinoderms are marine, triploblastic and coelomate animals with organ system level of organization.

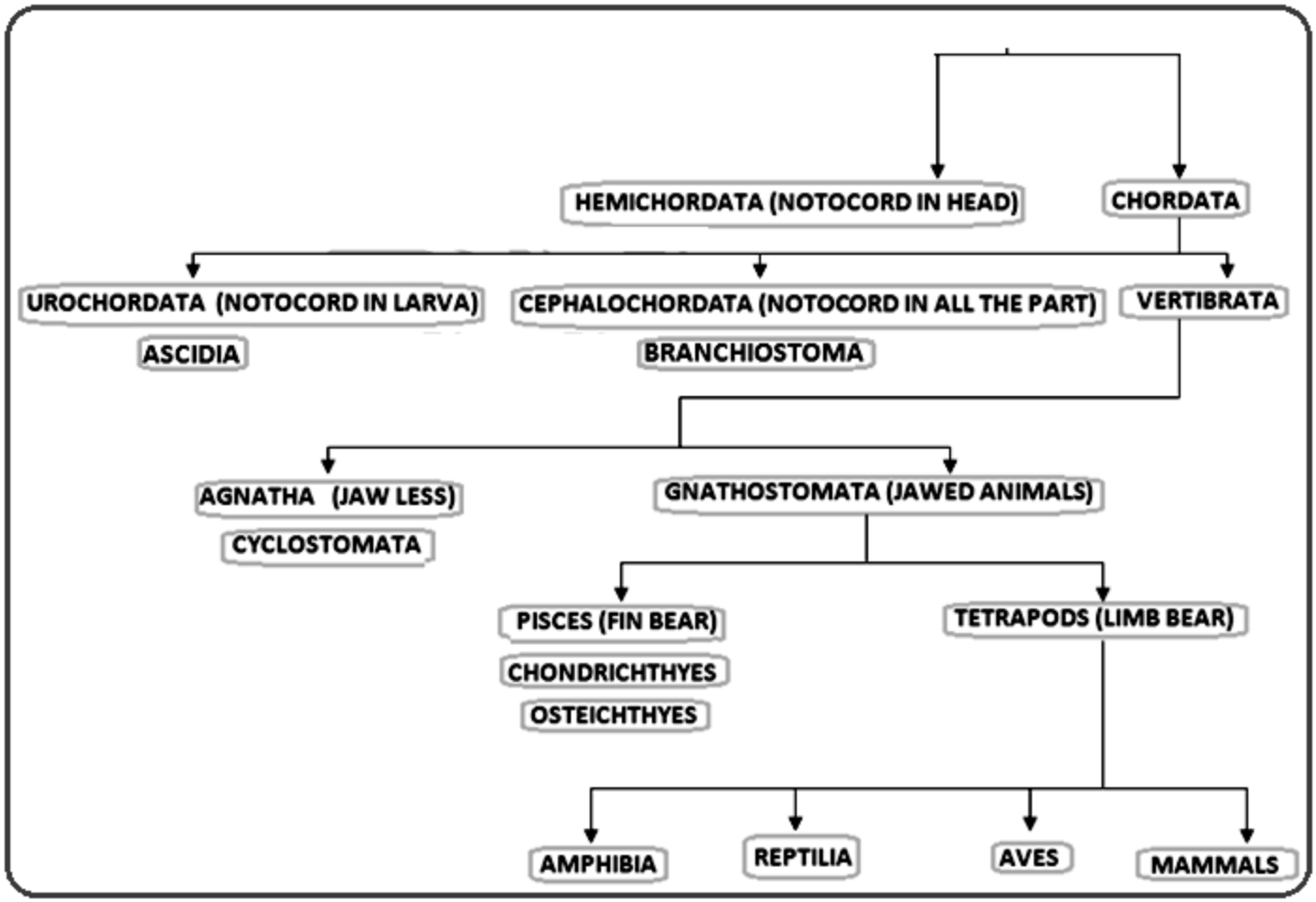
- Symmetry **bilateral in larvae** and pentamerous **radial symmetry in adults**. Body **unsegmented** with globular, star- like, spherical, discoidal or elongnated shape. **Endoskeleton** of dermal **calcareous ossicles** with spines, covered by the epidermis.
- Presence of **Ambulacral system (water vascular system)** A perforated plate called **madreporite** is present in this system. The pores of the madreporite allow water into the system. Tube feet of this system help in locomotion, capture of food and respiration.
- Usually **dioecious, fertlilzation external; development indirect (bipinnaria larva)** through free swimming larval forms. Phenomena of **autotomy** and **regeneration** are present.
- **Examples: *Asterias* (star fish), *Echinus* (sea urchin), *Antedon* (sea lily), *Cucumaria* (sea cucumber), *Ophiura* (brittle star).**



10. PHYLUM- HEMICHORDATA(General characters):-

- Hemichordate was earlier considered as a sub phylum under phylum Chordata. But now it is placed as a separate phylum under Non – chordate.
- This phylum consists of a small group of worm like marine animals with **organ system level of organization.**
- 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.**
- They mostly live in burrows and are exclusively marine.
- Circulatory system is **open type**.
- **Respiration** through **pharynx bearing gill slits**.
- Excretory organ situated in proboscis.
- Sexes usually separate. **Fertilization external** in sea water.
- **Development direct or indirect** with a free swimming **tornaria larva**.
- **Examples: *Balanoglossus* (ancorn/ tongue worm) and *Saccoglossus*.**





DIFFERENCES BETWEEN CHORDATA AND NON CHORDATA:-

NON CHORDATE	CHORDATE
1. Notochord is absent.	Notochord is present.
2. Cranium and vertebral column are absent.	Cranium and vertebral column are present.
3. Ventral nerve cord is present.	Dorsal nerve cord is present.
4. Gills do not opens in to pharynx.	Gills open in to pharynx.
5. Heart is dorsal.	Heart is ventral.
6. Both open and closed type of circulation.	Only closed type of circulation.
7. They may be Protostomes or Deuterostomes.	They are only Deuterostomes.
8. Heart is tubular.	Heart is chambered.
9. Post anal tail projection is absent.	Post anal tail projection is present.

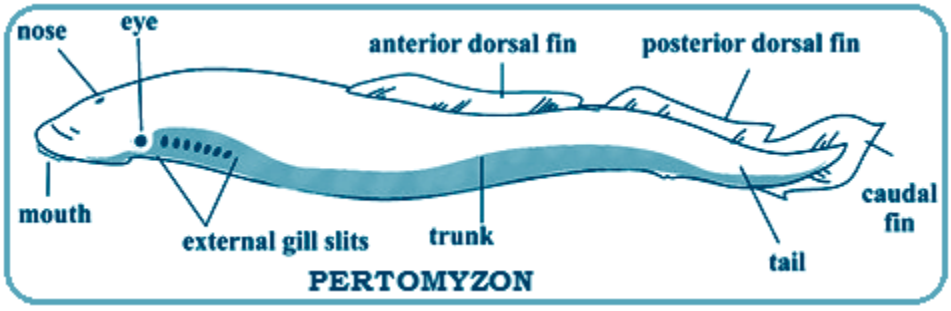
11. PHYLUM- CHORDATA(General characters):-

- Chordatas are fundamentally characterized by the presence of a **notochord**, a dorsal hallow **nerve cord** and **paired pharyngeal gills slits**.
- These are **bilaterally symmetrical, triploblastic, coelomates** with **organ system level of organization**. They possess a **post anal tail** and a **closed circulatory system**.
- Phylum Chordatanis divided into three subphyla : Urochordata or Tunicata, Cephalochordata and vertebrata.
- Subphyla Urochordata or Cephalochordata are often referred to as **protochordates** and are exclusively marine. In Urochordata, notochord is present only in larval tail, while in Cephalochordata, it extends from head to tail region and is prersistant throughout their life.

- **Examples :**
  - **Urochordata – Ascidia, Salpa, Doliolum**;
  - **Cephalochordata – Branchiostoma (amphioxus or lancelet)**
- The members of subphylum Verebrata possess **notochord during the embryonic period, replaced later by a cartilaginous or bony vertebral column** in the adult. Thus, all vertebrates are chordates but all chordates are not vertebrates.

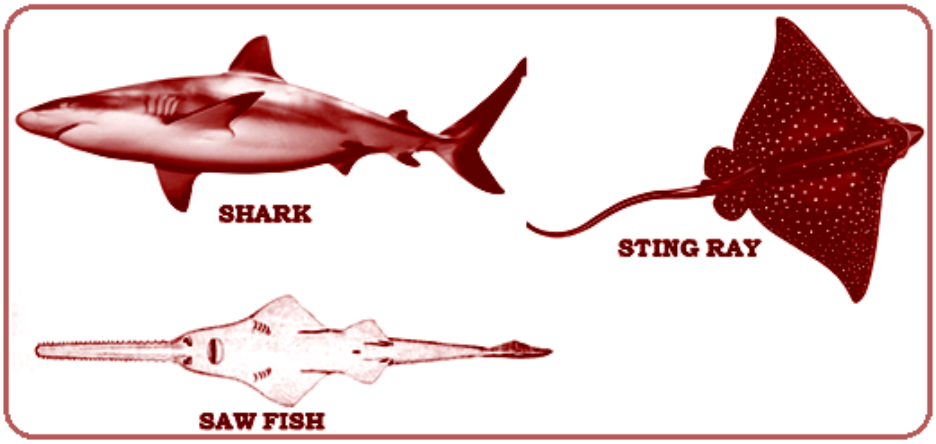
A. CLASS CYCLOSTOMATA:-

- The cyclostomes or round mouthed fishes are aquatic vertebrates. Mouth is circular and jawless. It has **suctorial tongue** which possesses horny teeth. Body is eel like, tail is compressed. **Endoskeleton** is cartilaginous. Notochord persists throughout life.
- They have an elongated body bearing **6 – 15 pairs** of gill slits for respiration.
- **Closed circulation**.
- They are ectoparasites on some fishes.
- Fertilization is external. Life history may include a larva named as ammocoetes.
- **Examples : Petromyzon (lamprey), Myxine (hagfish)**



B. CLASS CHONDRICHTHYES – The Cartilaginous Fishes:-

- All chondrichthyes fishes are **marine**. Body **laterally compressed or dorsoventrally flattened**.
- They have two dorsal fins. Median and paried fins are supported by horny fin rays. **Pelvic fins bear claspers in male.**
- **They have heterocercal tail fins.**
- **Endoskeleton is cartilaginous** and **dermal placiod scales** are present.
- They have **5 – 7 pairs of lamelliform gills**. Gills are not covered by opercula (exception Chimaera). **Swim bladder is absent.**
- **Heart is 2 chambered**. Sinus venosus and conus arteriosus are present. Renal portal system is well developed. Kidneys are mesonephric, ureotelic. Internal ears present, have 3 semicircular ducts, lateral line sense organs are well developed.
- Some of them have **electric organs** (e.g., Torpedo). They are cold blooded (**poikilothermous**) animals, i.e., they lack the capacity to regulate their body temperature.
- They are oviparous or ovoviviparous.
- Development is direct.
- **Examples: *Scoliodon* (dog fish), *Pristis* (saw fish), Carcharodon (great white shark), *Trygon* (sting ray).**



C. CLASS- OSTEICHTHYES – The Bony Fishes:-

- Osteichthyes includes all members of lung fishes, the ray finned and lobe finned fishes. They occur in all sorts of water fresh, brackish, salt, warm and cold.
- Body is often **spindle shaped**. Scales of 3 types **ganoid, cycloid or ctenoid**.
- **Endoskeleton is chiefly of bone** (exception – Sturgeon).
- Four pairs of gills covered by an operculum.
- Mouth is mostly terminal, jaws usually with teeth. **Heart 2 chambered**. Kidney is **mesonephric**. 10 pairs of cranial nerves are present.
- They have internal ears, which help the fish to keep its balance. **Lateral line system** well developed.
- Gonads paired. **Fertilization is generally external**. Mostly oviparous and development is mostly direct.
- Bony fishes have a sac like outgrowth, the swim bladder (or air bladder), arising from the dorsal wall of the oesophagus, which is air filled organ, used to maintain balance and to swim up and down. In some fishes, such as Heteropneustes, it helps in respiration.
- **Examples: Marine – *Exocoetus* (flying fish), *Hippocampus* (sea horse), *Fresh water – Labeo* (rohu), *Catla* (katla), *Clarias* (magur), *Aquarium – Betta* (fighting fish), *Pterophyllum* (angel fish).**

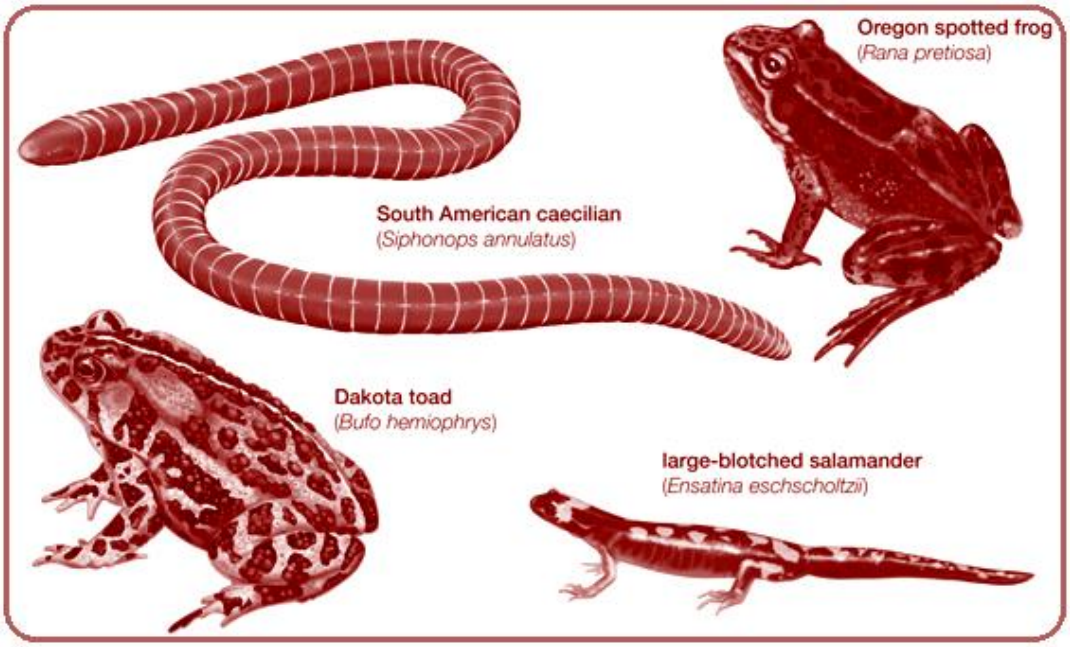
DIFFERENCES BETWEEN OSTEICHTHYES AND CHONDRIHTHYES:

OSTEICHTHYES	CHONDICHTHYES
1. Endoskeleton is boney.	Endoskeleton is cartilage.
2. Members are both marine and fresh water.	They are exclusively marine forms.
3. Body is laterally compressed.	Body is dorsoventrally flattened.
4. Mouth and nostrils are terminal.	Mouth and nostrils are ventral.
5. Cycloid scales are present.	Placoid scales are present.
6. Operculum is present.	Operculum is absent.
7. In males anus is present.	In males cloaca is present.
8. Homocercal caudal fins are present.	Heterocercal caudal fin is present.
9. External fertilization.	Internal fertilization.

D.CLASS –AMPHIBIA:-

- The amphibians were the **first cold blooded vertebrates to invade land**, but they have not fully adapted to terrestrial life.

- Exoskeleton absent. Endoskeleton mostly bony. Skull with 2 occipital condlyes **(Dicondylic).**
- Amphibian skin is usually without scales.
- Alimentary, urinary and reproductive tracts open into cloaca.
- Respiration by lungs, skin, buccopharyngeal cavity and gills**. Larvae with external gills which may persist in some aquatic adults. Poikilotherms.**
- **Heart 3 chambered** (2 auricles + 1 ventricle).
- Renal and hepatic portal systems well developed. Kidneys **mesonephric**.
- Excretion **ureotelic**. Brain poorly developed.
- Cranial nerves **10 pairs**. Eyes have eyelids. **Tympanum** represents ear.
- Sexes separate. Male without copulatory organ. Fertilization mostly external. Mostly oviparous. **Development indirect**. Larva is a **tadpole** which metamorphoses into adult.



- **Examples: *Bufo* (toad), *Rana* (frog), *Hyla* (tree frog), *Salamandra* (salamander), *Ichthyophis* (limbless amphibia).**

E. CLASS- REPTILIA:-

- Reptiles are the creeping and burrowing cold blooded vertebrates.
- Skin is dry, rough and without glands, bearing epidermal **scales or scutes**.
- **Alimentary canal** terminates into a cloacal aperture.
- Respiration always takes place through lungs.
- **Heart usually 3 chambered, 4 chambered in crocodiles.**
- Kidneys **metanephric**. Crocodiles are ammonotelic. Turtles and alligators are ureotelic. Lizards and snakes are uricotelic.
- Lateral line system absent.
- Snakes possess **Jacobon's organs**, which are present in the roof of buccal cavity, used for smelling.

- **Skull monocondylic**, **12 pairs of cranial nerves.**
- **Sexes separate. Direct Development. Internal fertilization. No metamorphosis**.
- **Examples: *Chelone* (turtle), *Testudo* (tortoise), *Chameleon* (tree lizard), *Calotes* (garden lizard), *Crocodilus* (crocodile), *Alligator* (alligator), *Hemidactylus* (wall lizard). Poisonous snakes – *Naja* (cobra), *Bangarus* (krait), *Vipera* (viper).**

F. CLASS AVES:-

- It includes birds which are **unique in having a coat of feathers** and in resting on the hindlimbs alone. T.H.Huxley described birds as "**glorified reptiles**" because of their resemblance with and origin from the reptiles.
- The body is boat shaped and streamlined. Forelimbs modified into flight wings. Legs bear horny epidermal scales. Skin is dry except for the presence of an oil or preen gland (or uropygial gland) at the base of short tail or uropygium. Sweat glands are absent. Oil gland is absent in ostrich and parrot.
- Upper and lower jaws modified into break, which lacks teeth.
- The **endoskeleton is bony**, but delicate and light. Skull is **monocondylic.** Long bones are pneumatic, i.e., contain air cavities to reduce weight. **Bone marrow is absent**.
- A system of thin walled air sacs lying among the viscera is associated with the lungs. Most of the birds have **9 major air sacs**. Voice box lies at the junction of the trachea and bronchi. It is called **syrinx** (characteristic feature). **The larynx does not act as a sound box**
- The heart is relatively large and fast beating for quick supply of adequate amount of blood during flight. Heart is 4 chambered, having two auricles and two ventricles.
- Kidneys are **metanephric.**
- Renal portal system reduced.
- Excretion **uricotelic**. **Urinary bladder absent** (except Rhea Americana).
- 12 pairs of cranial nerves.
- **Development is direct**. The birds are **homoeotherms,** and spend a lot of energy to keep warm.
- **Examples: *Corvus* (crow), *Columba* (pigeon), *Psittacula* (parrot), *Struthio* (ostrich), *Pavo* (peacock), *Aptenodytes* (penguin), *Neophron* (vulture).**

G. CLASS MAMMALIA:-

- Mammals are warm blooded, **hairy and have mammary or milk producing glands**. They are the only animals which nourish their young ones with milk.
- The **skin is grandular** and mostly covered by a horny **epidermal exoskeleton of hair**, which conserve body heat.
- The skin glands are multicellular, and include **sweat glands, oil glands, wax glands and milk glands.**
- **Endoskeleton is bony**. Except a few mammals have seven cervical vertebrae.

- The mouth is relatively small and has movable lips. Buccal cavity has true **salivary glands**. Teeth occur in both the jaws. **Heterodont, diphyodont, thecodont**.
- **Respiration occurs only by lungs**. The **heart is 4 chambered**, having two auricles and two ventricles. They possess a **muscular diaphragm** dividing trunk into thorax and abdomen.
- **Skull dicondylic**. Renal portal system absent.
- The brain has large cerebrum and cerebellum. Optic lobes are divided into four libes called **corpora quadrigemina**. **Corpus callosum** connects the two cerebral hemispheres internally. 12 pairs of cranial nerves.
- **Fertilization is internal**. Except egg laying monotremes, mammals are mostly **viviparous. Development is direct**.
- There are present four embryonic membranes; chorion, amnion, allantois and yolk sac.
- Except in egg laying mammals, a well developed placenta is present which is a medium of association between mother and foetus.
- **Examples: Oviparous – *Ornithorhynchus* (duck billed 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).**

Assignment

I. ONE MARK QUESTUIONS:

1. What are radially symmetrical animals?
2. What are bilaterally symmetrical animals?
3. What are Choanocytes?
4. Name the body cavity of sponges.
5. Name the exoskeleton of sponges.
6. What are cnidoblast?
7. Name the fresh water sponge.
8. Name the fresh water coelenterata
9. Give one example for Ctenophora.
10. Name the excretory cells in flat worms.
11. Name the excretory organs in Arthropoda.
12. Name the excretory organs in Annelida. (FEBRUARY-2015-BN)
13. Give one example for hemichordate.
14. Give one example for cyclostomata.
15. Name the limbless amphibians.
16. What are Homeotherms?
17. What are pokilothermic animals?
18. Name the egg laying mammal. .(FEBRUARY-2013-BS)
19. Which group animal posses pneumatic bones? (FEBRUARY-2013-BS)

II. TWO MARKS QUESTIONS:

20. What are coelomate? Give one example.
21. What is Acoelomate? Give one example.
22. What is Pseudocoelomate? Give one example. .(FEBRUARY-2016-BN)
23. Write any two differences between polyp and medusoids.
24. What are diploblastic animals? Give one example . .(FEBRUARY-2014-BS)
25. Describe four important features of aves. . (FEBRUARY-2014-BS)
26. Mention the functions of following organs Malpighian tubules and Combplates. (FEBRUARY-2016-BS)
27. Differentiate bilateral and radial symmetry. . (FEBRUARY-2015-BN)
28. Enumerate four salient features of Pteridophytes. (FEBRUARY-2016-BS)
29. Write the scientific names of the following. apple snail, Cuttle fish, Squid, Devil fish, Tusk shell.
30. Write four salient features of phylum chordata.
31. Give two examples for chondrichthes.
32. Give two examples for Osteichthyes.
33. Write the excretory organs in arthropoda and Mammalia. .(FEBRUARY-2014-BS)

III. THREE MARKS QUESTIONS:

34. Write out line classification of kingdom Animalia.
35. Write any three characters of coelenterate.
36. Enumerates any three characters of platyhelminthes.
37. Write any three differences between aschelmenthes and platyhelminthes.
38. Mention three locomotary structures in annelida..
39. Write any three differences between Chordata and non Chordata.
40. Name the three sub phylum of Chordata with one example each.
41. Write the outline classifications of vertebrata.
42. Write the characters of class reptilia.
43. Write areal mode life in birds.
44. Assign the following animals to their respective phylum-Combjellies, Pila, Planaria, Ascaris, Star fish, Sycon .(FEBRUARY-2014-BS)

IV. FIVE MARKS QUESTIONS:

45. Explain any five characters of Porifera. (FEBRUARY-2013-BS)
46. Write any characters of phylum Annelida. (FEBRUARY-2015-BN)
47. Enumerate the general characters of phylum Arthropoda.
48. Write any five differences between chondrichthes and Oseichthyes. .(FEBRUARY-2014-BN)
49. Write any characters of class Amphibia with two examples. .(FEBRUARY-2016-BS)
50. Write the characters of class Mammalia. . (FEBRUARY-2014-BS)