VIVEKANANDA COLLEGE

THAKURPUKUR
KOLKATA-700063
NAAC ACCREDITED 'A' GRADE

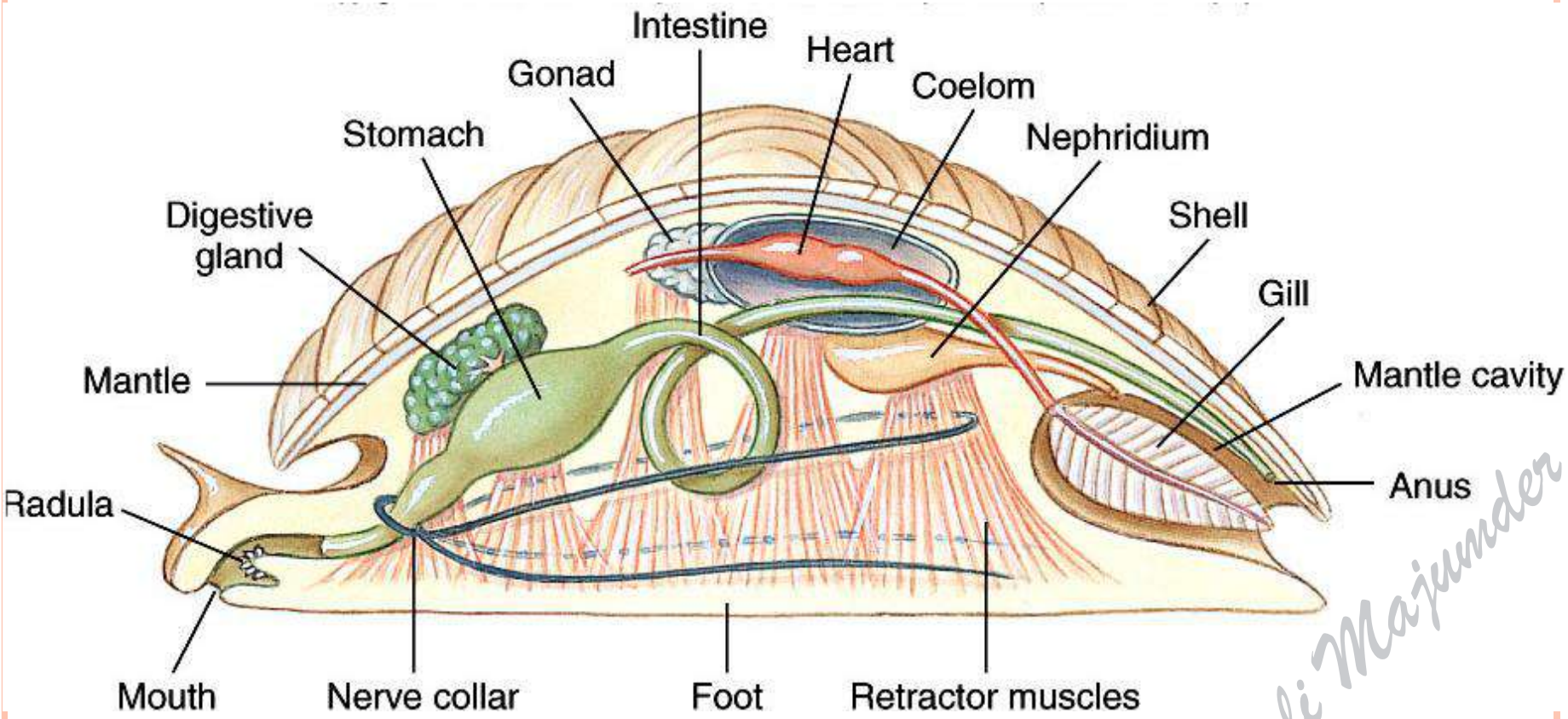
Topic: MOLLUSCA
Course Title: NON-CHORDATES II – COELOMATES
Paper: CC3 (ZOOA-CC2-3-TH)
Unit: 2
Semester: 2ND
Name of the Teacher: Dr. Shaoli Majumder
Name of the Department: Zoology

Welcome you to the world of

- Mollis= soft (by Aristotle)
- Second largest animal phylum
- Largest marine phylum
- Some gastropods and bivalves inhabit freshwater; few gastropods (slugs & snails) are terrestrial.
- Highly diverse- size, anotomical structure, behaviour, habitat

Characters

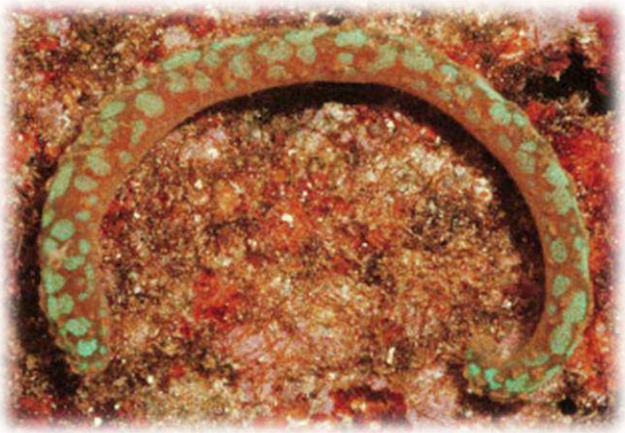
- Soft unsegmented body
- Covered with protective mantle that may or may not form a hard, calcium carbonate shell
- Have a muscular foot for movement which is modified into tentacles for squid & octopus
- Have a scraping, mouth-like structure called radula



- **Classes:**
  - Aplacophora
  - Monoplacophora
  - Polyplacophora
  - Scaphopoda
  - Gastropoda
  - Bivalvia
  - Cephalopoda

[Ruppert &Barnes, 1994)

Aplacophora



Characters

- worm-like animals
- no shell, although small calcified spicules are embedded in the skin
- Foot rudimentary

Monoplacophora

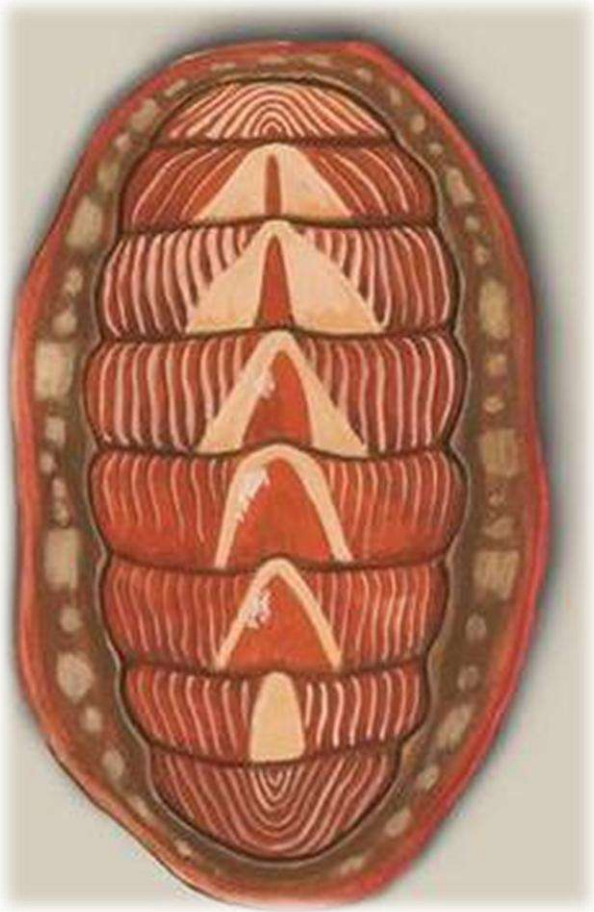
thought to be extinct until 1952 when ten living specimens were dredged off the coasts of Costa Rica and Peru by the Galathea Expedition.

***Neopilina* is the only living genus**

Characters

- **single, cap-shaped shell**
- **External gill more than one pair arranged serially**

Polyplacophora



(poly=multiple; placo= shell; phora= organism)

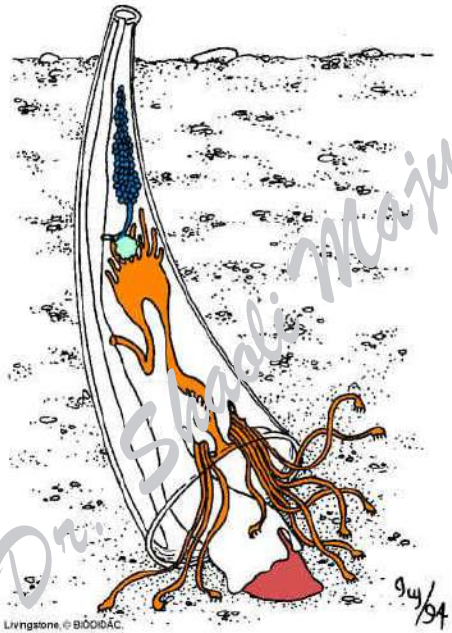
Characters

- Elliptical body with dorsal surface bearing eight overlapping plates (valves)
- Strong foot for adhesion; surrounded by a structure called girdle
- Most live in rocky intertidal zone
- Uses radula to eat algae

Scaphopoda

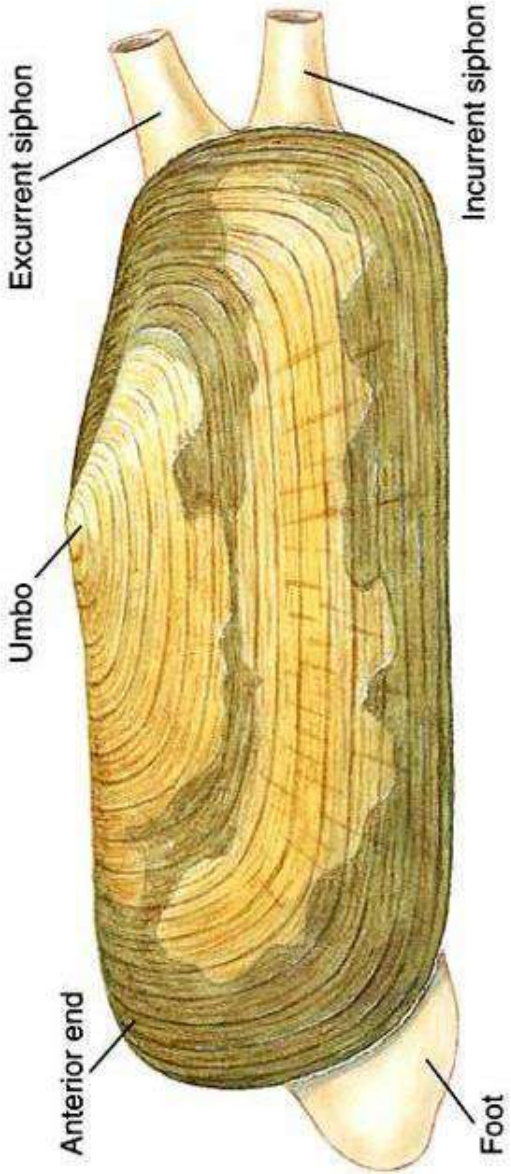
Characters

- Tubular shell with 2 open ends
- Heads burrow in sediments
- No gills: mantle acts as gills
- Found in subtidal zone to 6000 m deep.



Bivalvia

Characters



- Shell of two lateral valves
  - Umbo-oldest part of shell
  - Growth occurs in concentric rings around it
  - Strong abductor muscles keep it closed
- Mantle of flattened right and left lobes; Posterior margin commonly form siphons
- No head
- No radula
- Labial palps beside mouth
- Most are sessile filter feeders
- Foot used to burrow; scallops use jet propulsion to move

Gastropoda

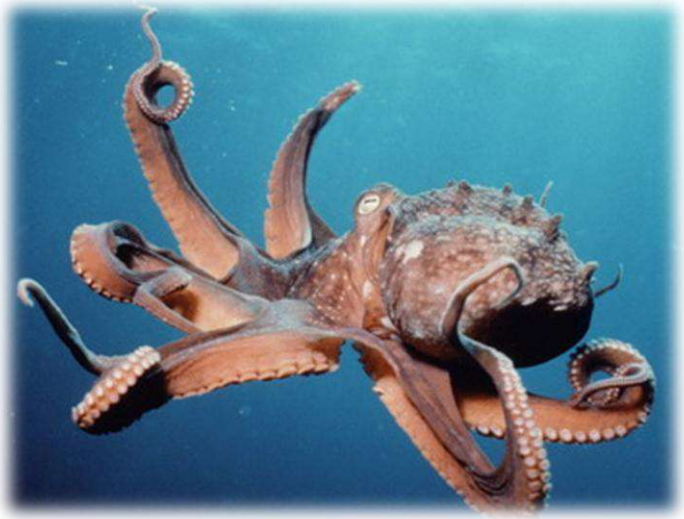
largest of the mollusk classes;

70,000 named species.

Characters

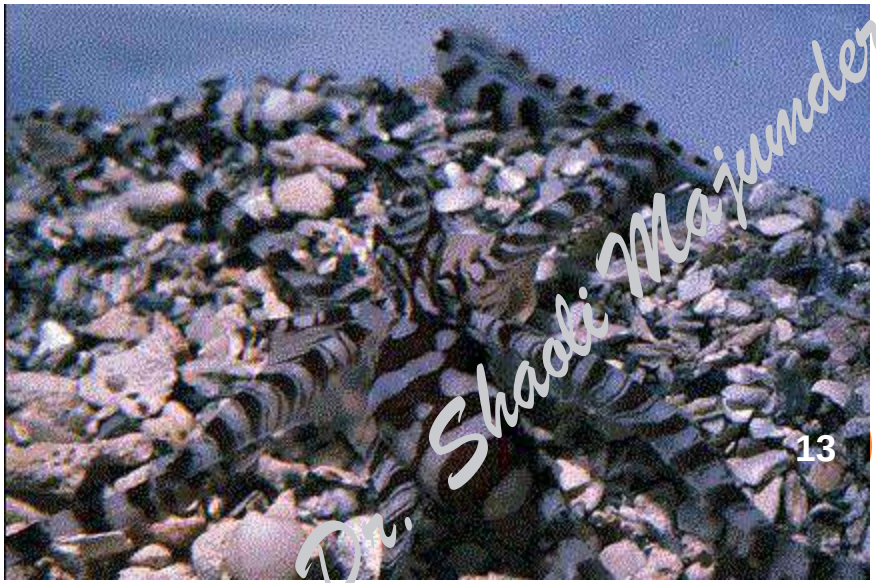
- Most diverse class
- Some have shells, some don't
- Shell univalves, usually spiral
- distinct head; 2-4 tentacles with eyes or sensory cells
- Operculum-trap door to shell
- Visceral mass typically turned 180° counterclockwise = torsion
- scraping radula

Cephalopoda



Characters

- Large head with conspicuous eyes
- Ventral foot modified into tentacles with suckers
- Males have a special arm to deliver a sperm packet to the female
- Most intelligent of all invertebrates, complex nervous system
- Chromotophores: colored pigments that allow them to change color or flash light
- Ink gland



Respiration in *Pila*

Ctenidium

Aquatic molluscs respire through ctenidia. These are the comb-like outgrowths of the mantle and are located within the mantle cavity.

Structure: Each ctenidium consists of a long flattened axis hangs from the anterior wall of the mantle cavity. The ctenidium contains afferent and efferent blood vessels, muscles and nerves. A row of flattened, triangular gill filaments or lamellae are attached to each side of ctenidial axis. The surface of ctenidium is generally covered with cilia.

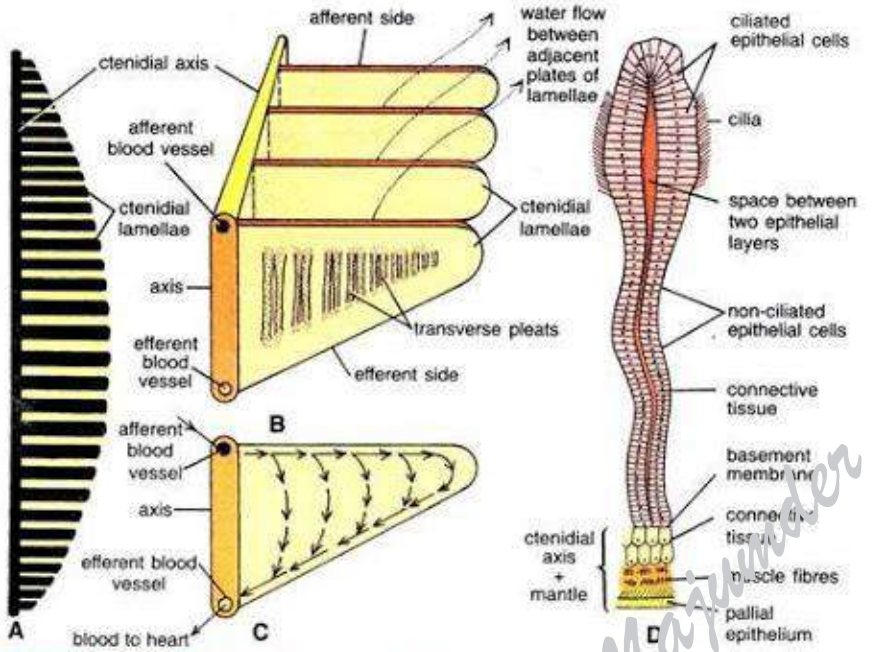


Fig. 60.14. *Pila globosa*, Respiratory organs. A—A monopectinate ctenidium; B—Stereogram to show water current through gill-lamellae; C—A single lamella to show flow of blood within it; D—A lamella in T.S.

Pulmonary sac

In some amphibious prosobranchs (*Pila*) and most Pulmonata, the pallial cavity is incompletely partitioned by a fleshy fold, the epitaenia, into a right branchial chamber and a left pulmonary chamber. The highly vascularized roof of the pulmonary chamber forms a pulmonary sac, the aerial respiratory structure, with a small aperture opening in the pulmonary chambers.

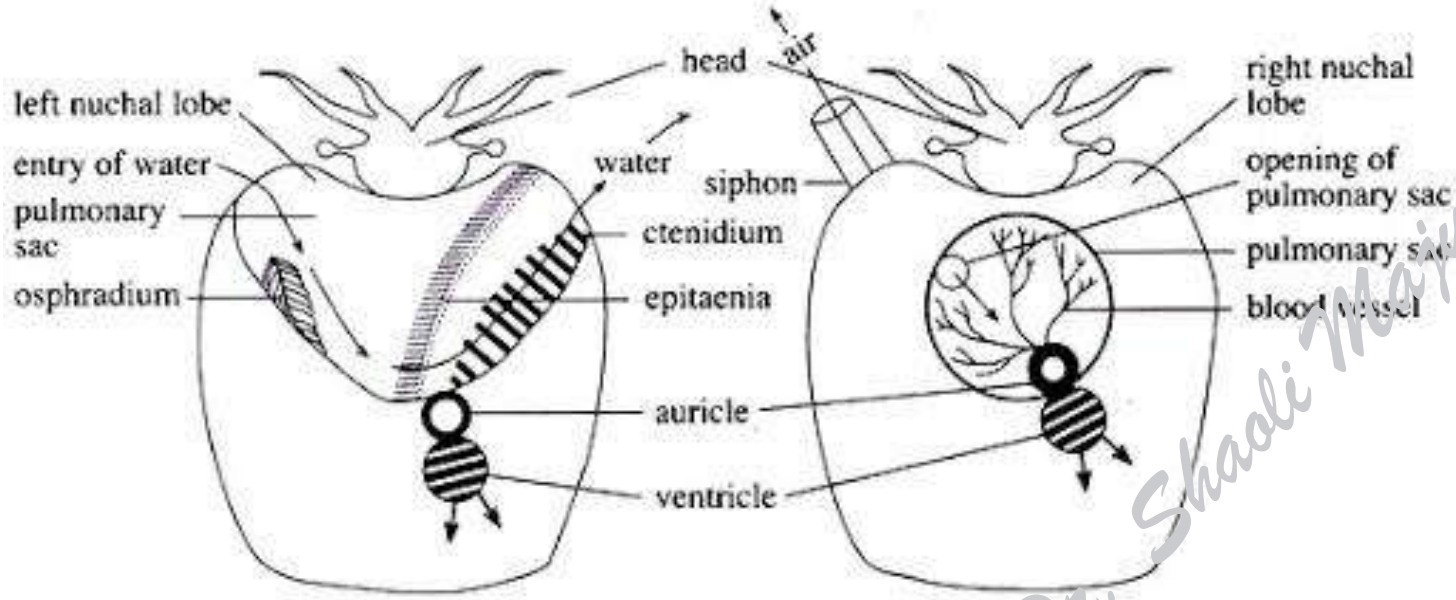


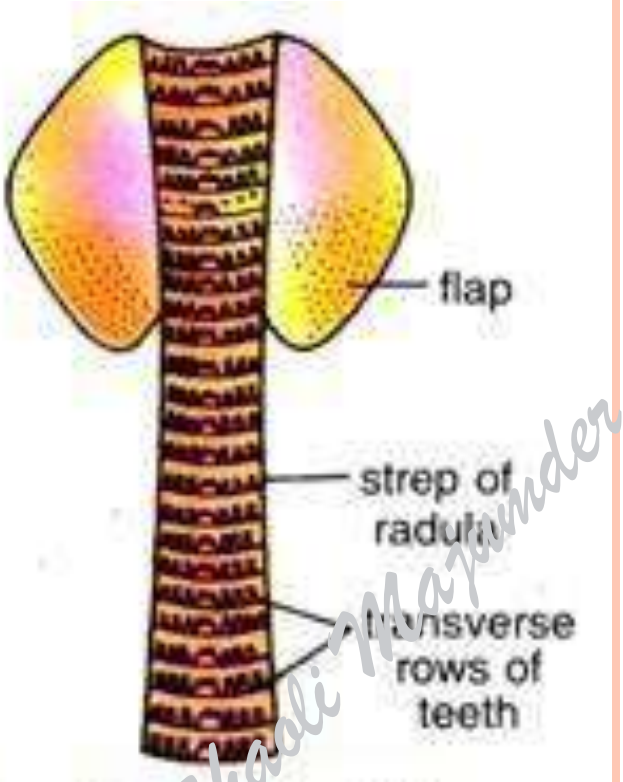
Fig. 2.64 : Respiration in *Pila*, (a) aquatic (b) aerial.

Feeding in *Pila*

Radula

Horny, ribbonlike structure (part of the odontophore) found in the mouths of all molluscs except the bivalves. It is supported by a cartilage-like mass (the odontophore) and is covered with transverse rows of minute chitinous teeth.

The radula, is used in drilling holes in prey or in rasping food particles from a surface.

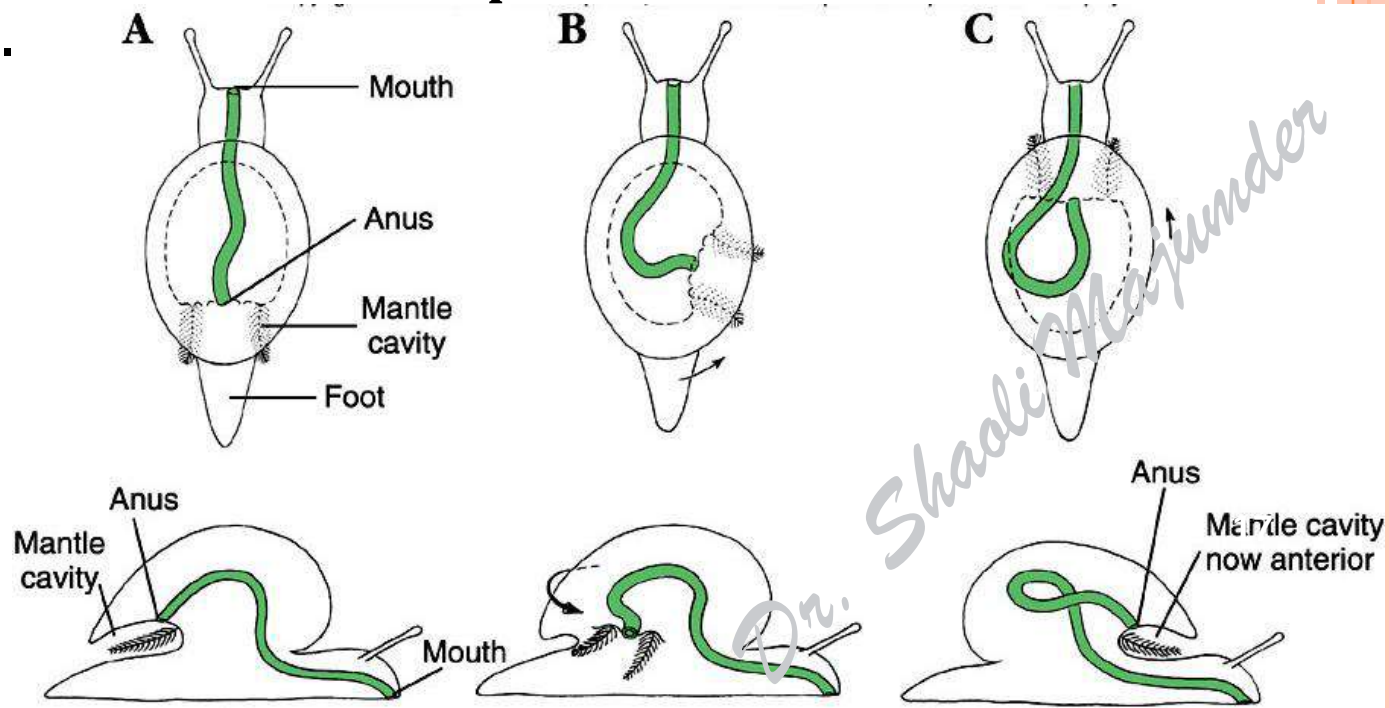


Torsion

Torsion is the rotation of visceral organs in anticlockwise direction through an angle of 180° on the rest of the body during larval development. The phenomenon takes place in the free-swimming (veliger) larva of gastropods and converts the symmetrical larva into an asym-metrical adult.

This position twists the gills, anus, openings of excretory and reproductive systems behind head; twists the digestive tract and nerve cord into a U shape and incipient organs are switched left to right.

Many gastropods remain torted. Opisthobranchs further become detorted (untwist).



Views on the Significance of Torsion in Gastropods:

The significance of such torsion in gastropods is not clear. Several contrasting views are extant on this issue.

Garstang (1928) advocated that torsion is an adaptive feature and useful to the larvae (veliger larva) for protection of soft parts against enemies since delicate head and velum can be withdrawn in manthe cavity at the time of danger, but of little direct use to the adult.

C.M. Yonge's theory (1947) explains the cilia of the gills draw the respiratory current from behind the mantle which is in opposite direction of the current produced by the locomotion of the animal and the weak current of the sea itself, thus producing disadvantage in respiration and locomotion.

Morton (1958) emphasized that the anteriorly placed mantle cavity housing the head with sense organs, respiratory structures, etc. in adult add positive advantage to test the water and also to come in intimate contact for gaseous exchange with the oncoming water respectively.

THANKS