Phylum Mollusca

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General Characteristics

Habitats

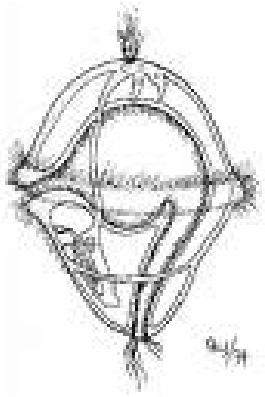
- Terrestrial or Aquatic (freshwater or marine).
- may be found in

deserts, forests, lakes, rivers, abysses of sea, coral reefs, underground

or

even as parasite - in the body of other animals.

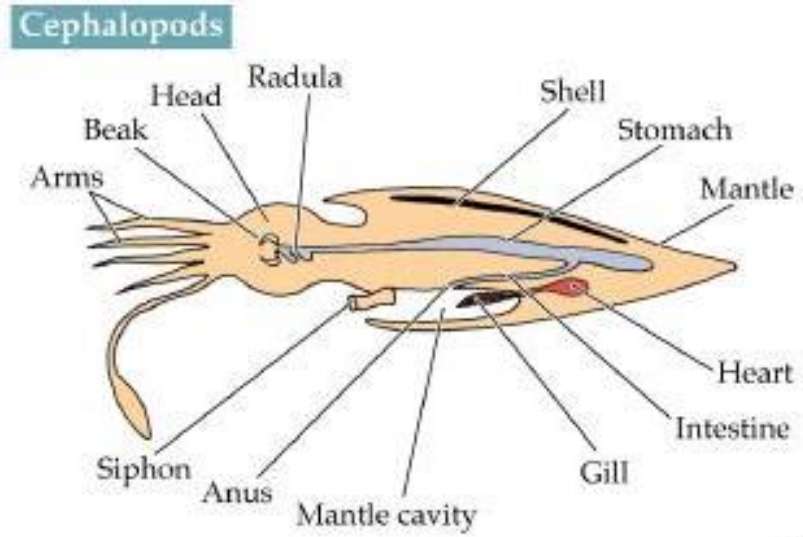
- may be found clinging to the rocks,
- crawling, swimming, burrowing or even digging.

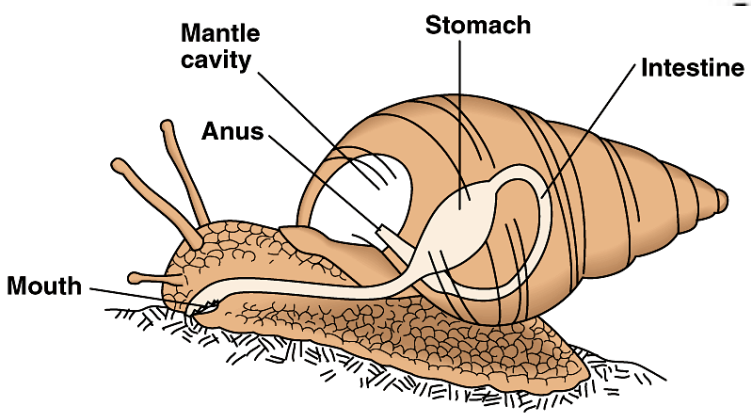


Body Plan

- Have a coelom (true body cavity), with a one way digestive system
- Are bilaterally symmetrical with 4 basic body parts:

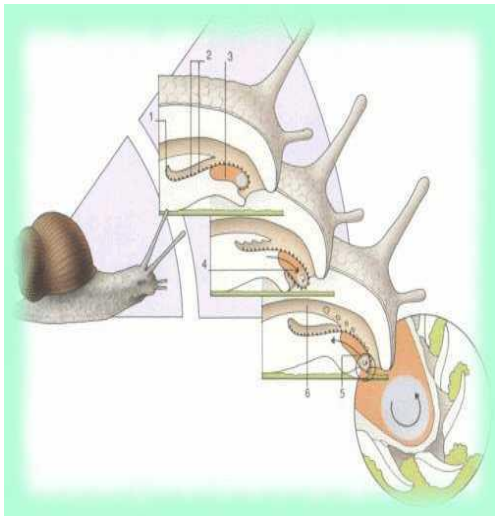
1. **Foot-** usually contains mouth and feeding parts
2. **Mantle-** tissue layer that covers most of the body
3. **Shell-** may be internal or external
4. **Visceral Mass-** contains the internal organs

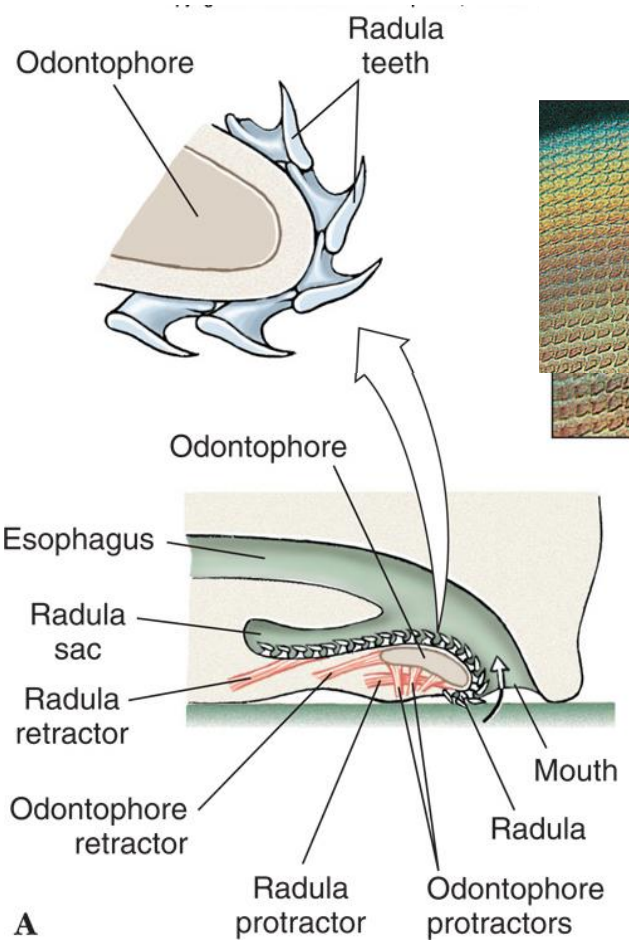


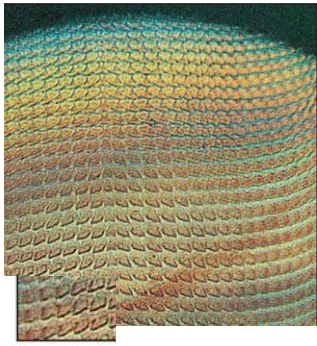


Feeding

Many contain a tongue shaped structure called a **radula** that has hundreds of teeth





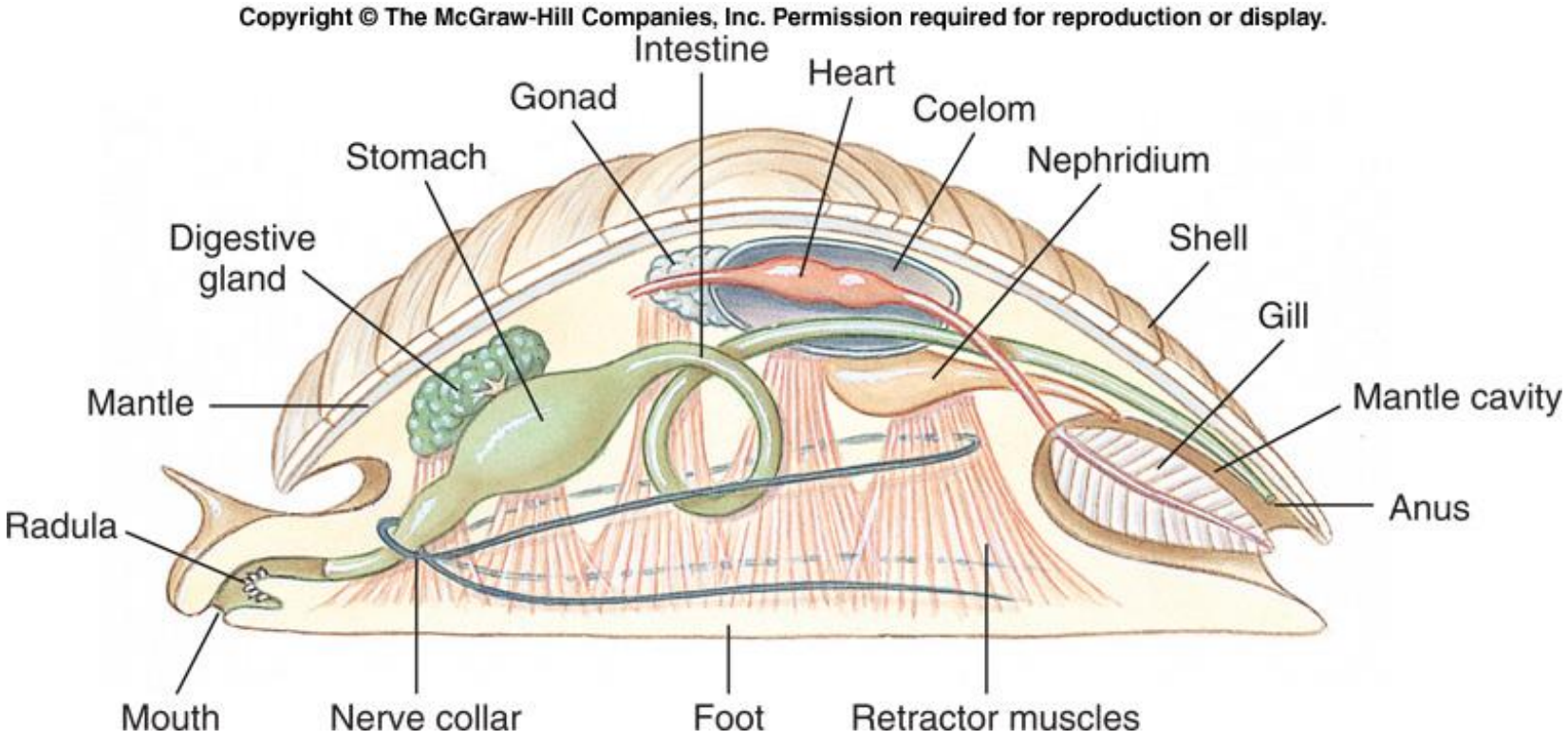


Some have jaws surrounding radula

Others use gills to filter-feed (eg- bivalves)

Respiration

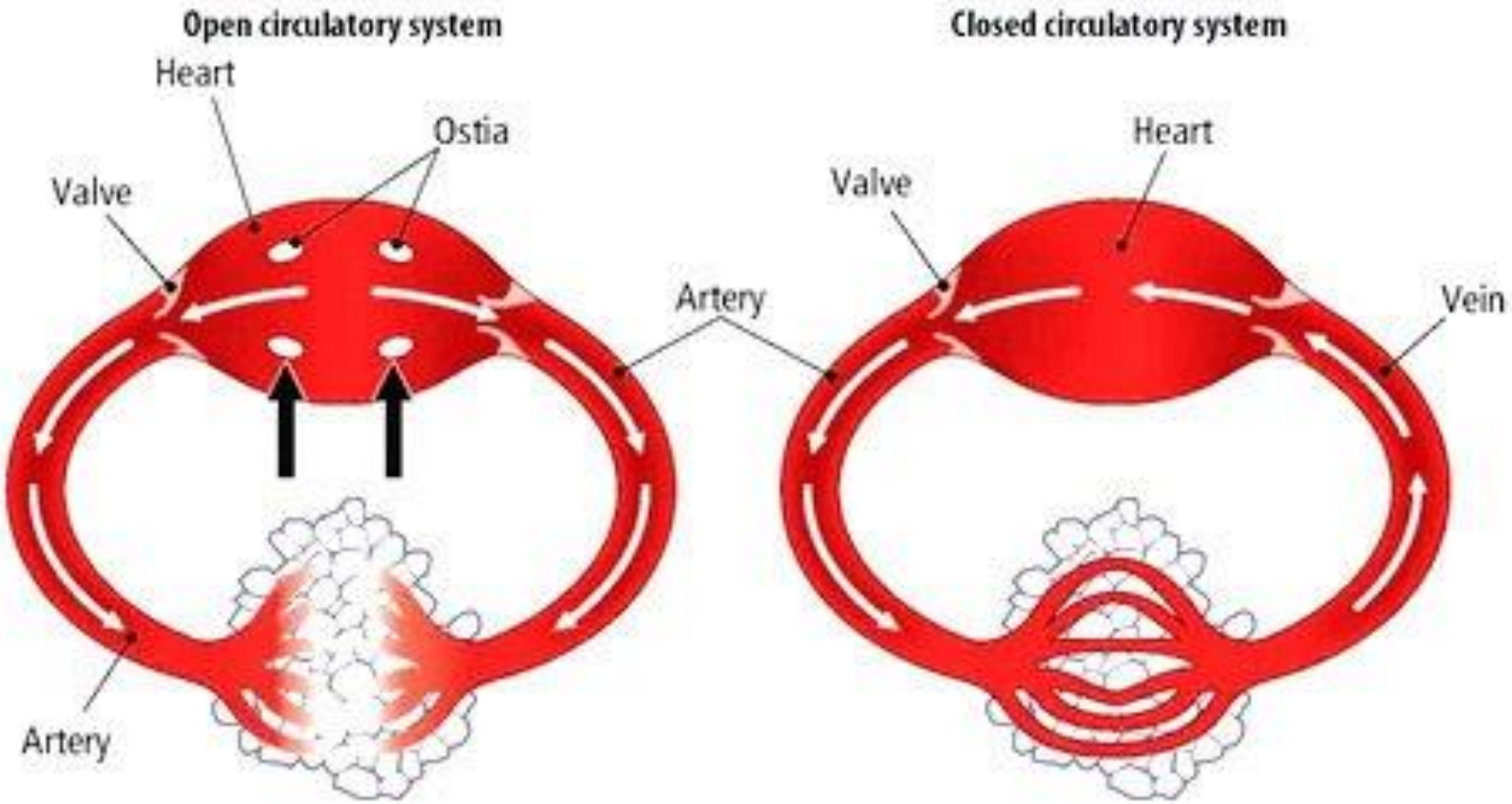
- Aquatic mollusks use **gills** (ctenidia)



- Terrestrial mollusks use **mantle cavity** (adapted to resemble a lung)
- Respiratory pigment is **hemocyanin**

Internal Transport

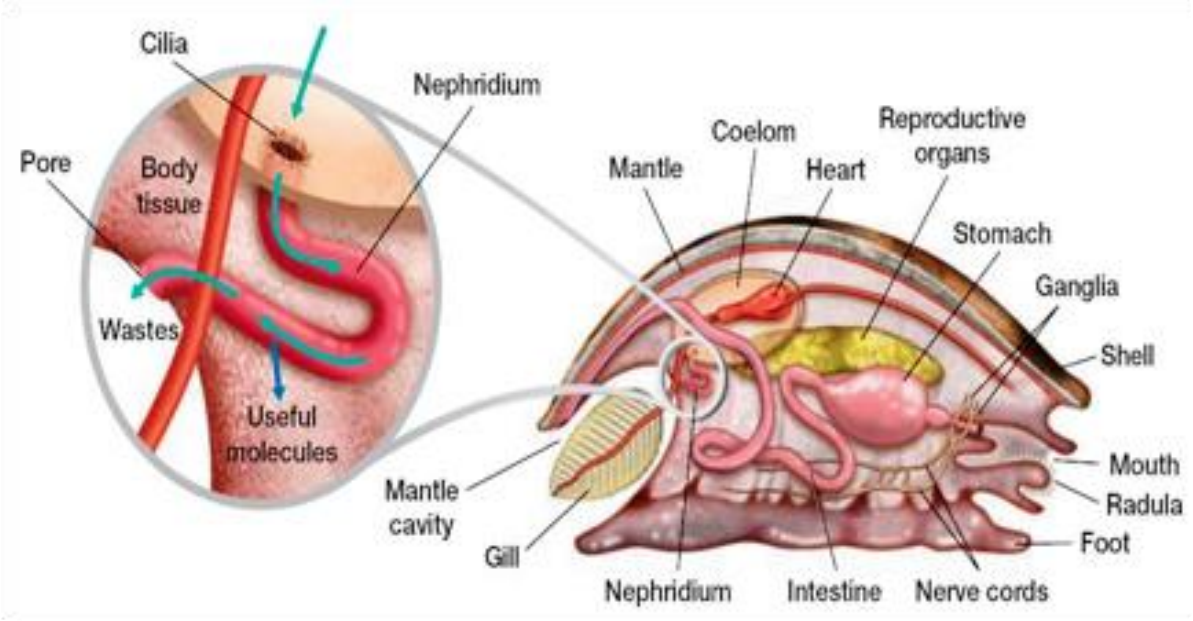
- Many have an open circulatory system



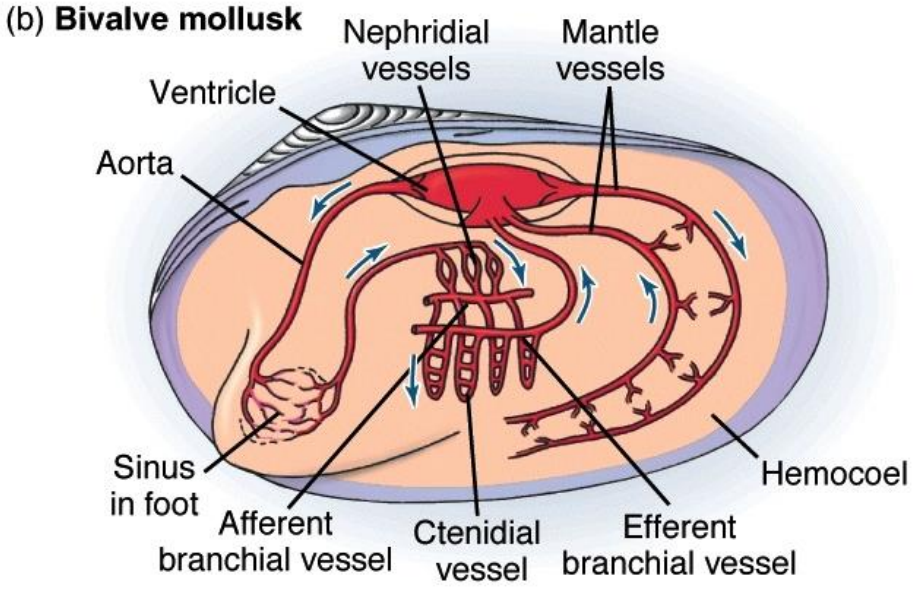
- Faster moving mollusks have a closed circulatory system

Elimination and Excretion

- Solid waste leaves through anus as feces



- Nitrogen waste is excreted by **nephridia**



Response

- Greatly varies within the phylum
  - Many have simple nervous systems (eg. clams)

paired ganglia

  - Some have highly developed nervous systems with **a well developed brain** (eg. octopuses)

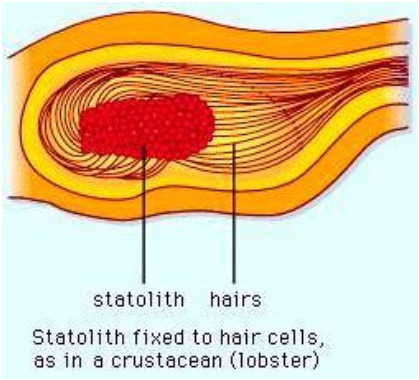
Octopuses have well developed eyes

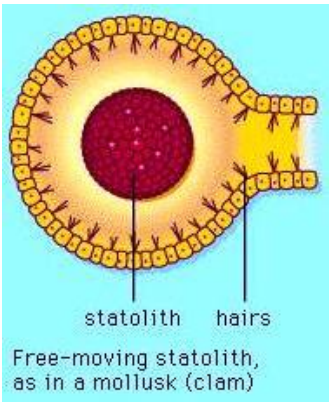
Eyes (photoreceptors)

Tentacles (tangoreceptors)

Statocysts (balancing organ)

Osphradium= chemosensory, attached to the roof of mantle cavity





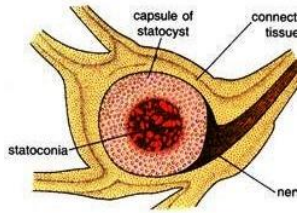
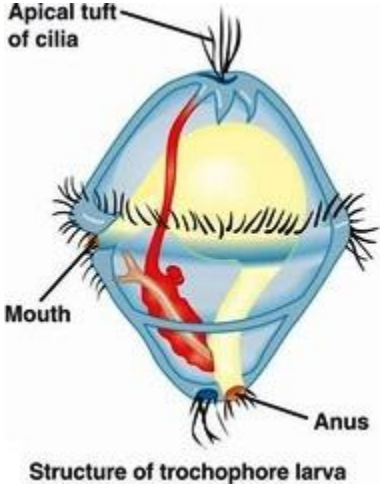


Fig. 60.26. *Pila globosa*. Statocyst.

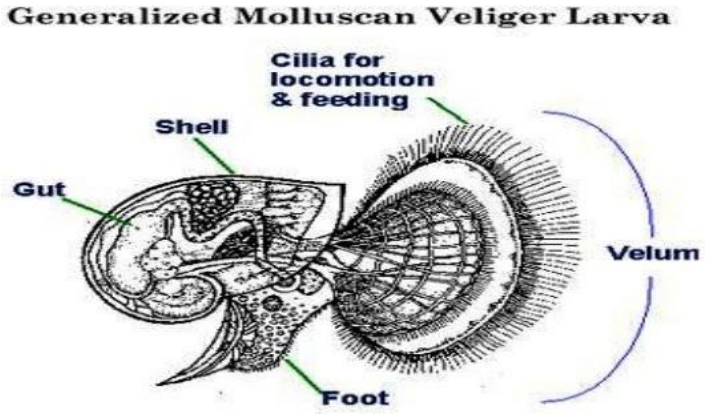
Reproduction

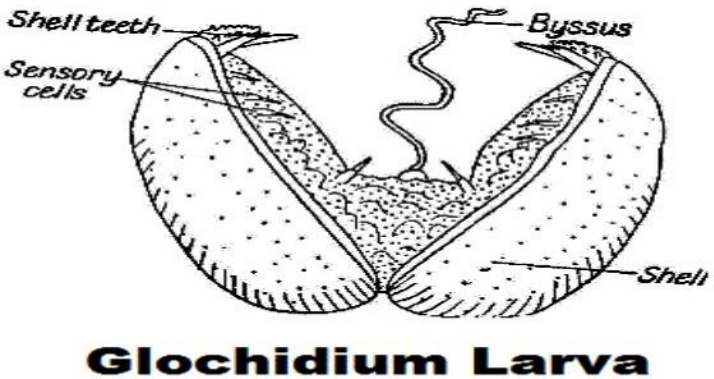
- Sexes are separate in most
- Fertilization is external in most
- **Development is generally indirect** having **larval stages** (Trocophore larva, veliger larva and glochidium larva)

but direct development is also found in some molluscs.



Structure of trochophore larva





Glochidium Larva

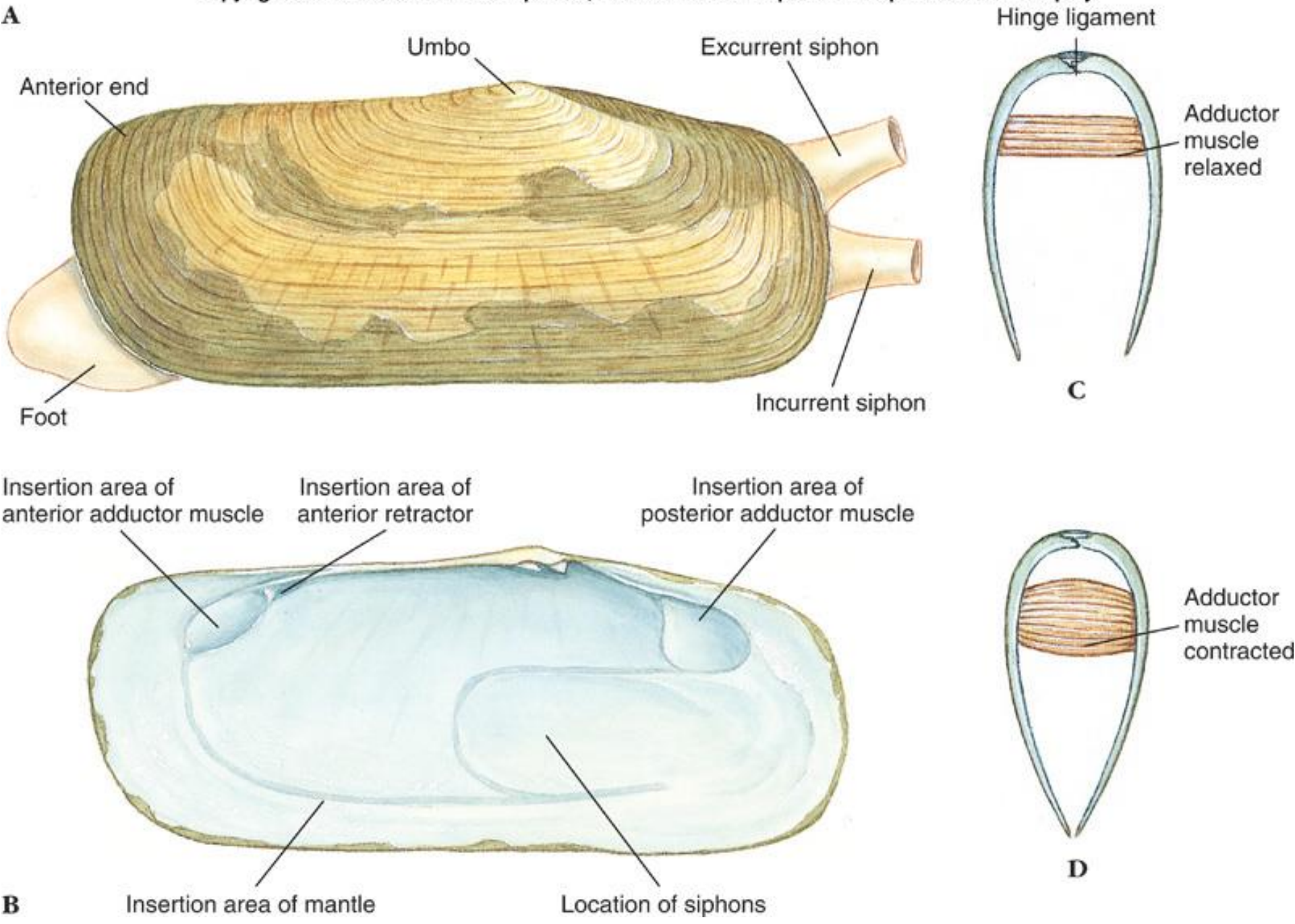
Classification

Class - Bivalvia (Pelecypoda)

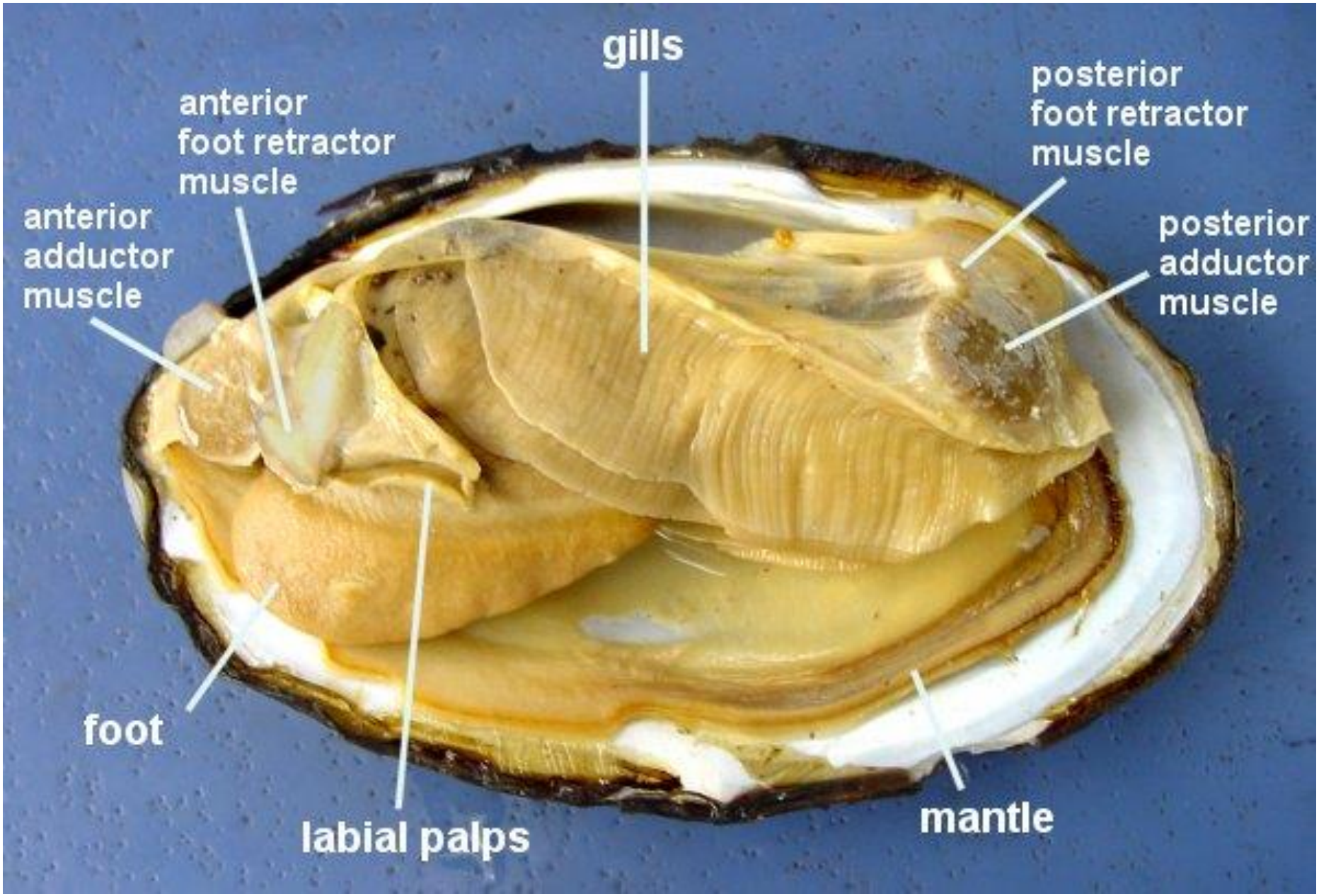
Clams, Mussels, Oysters, etc

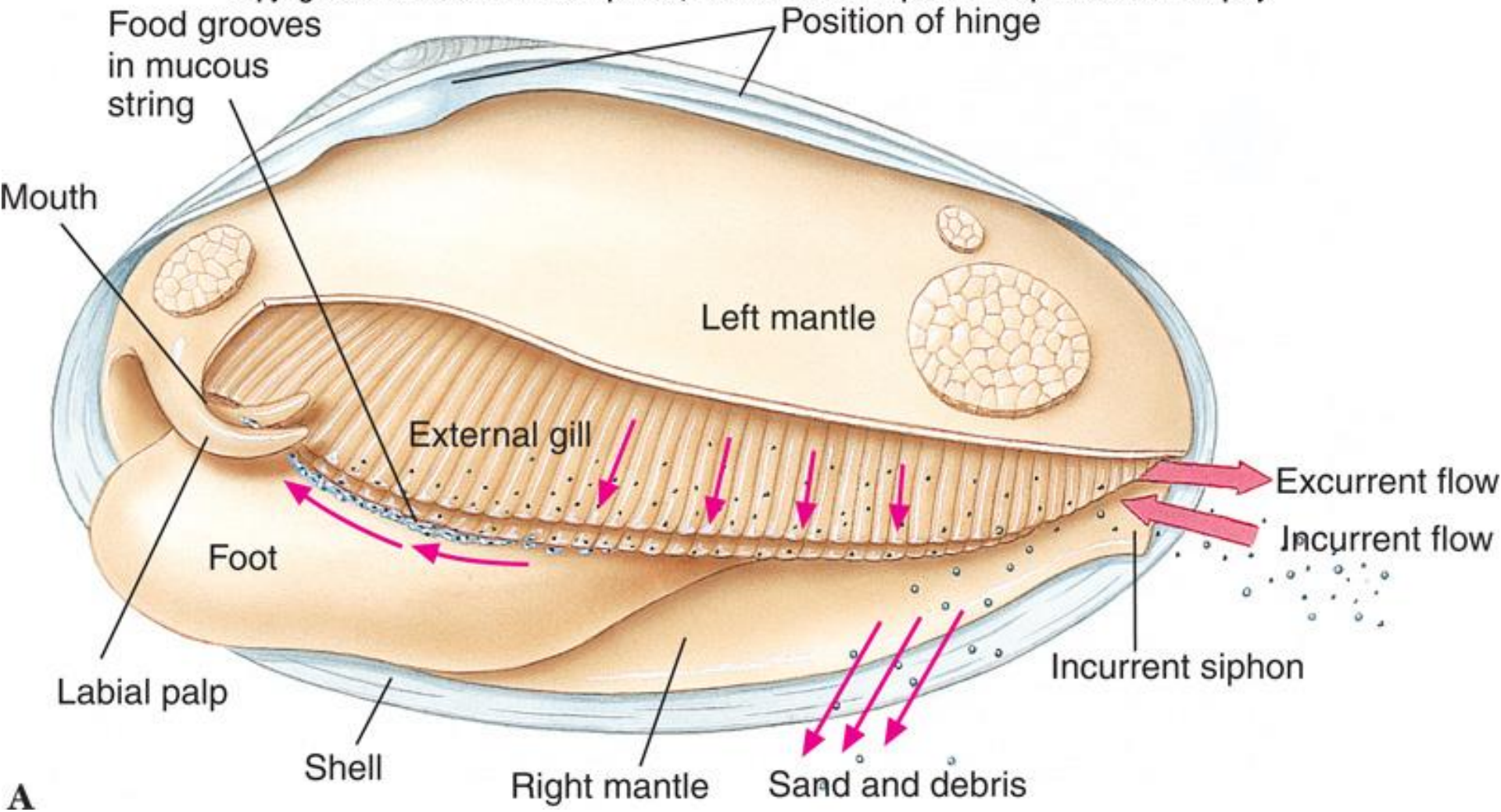
General Characteristics

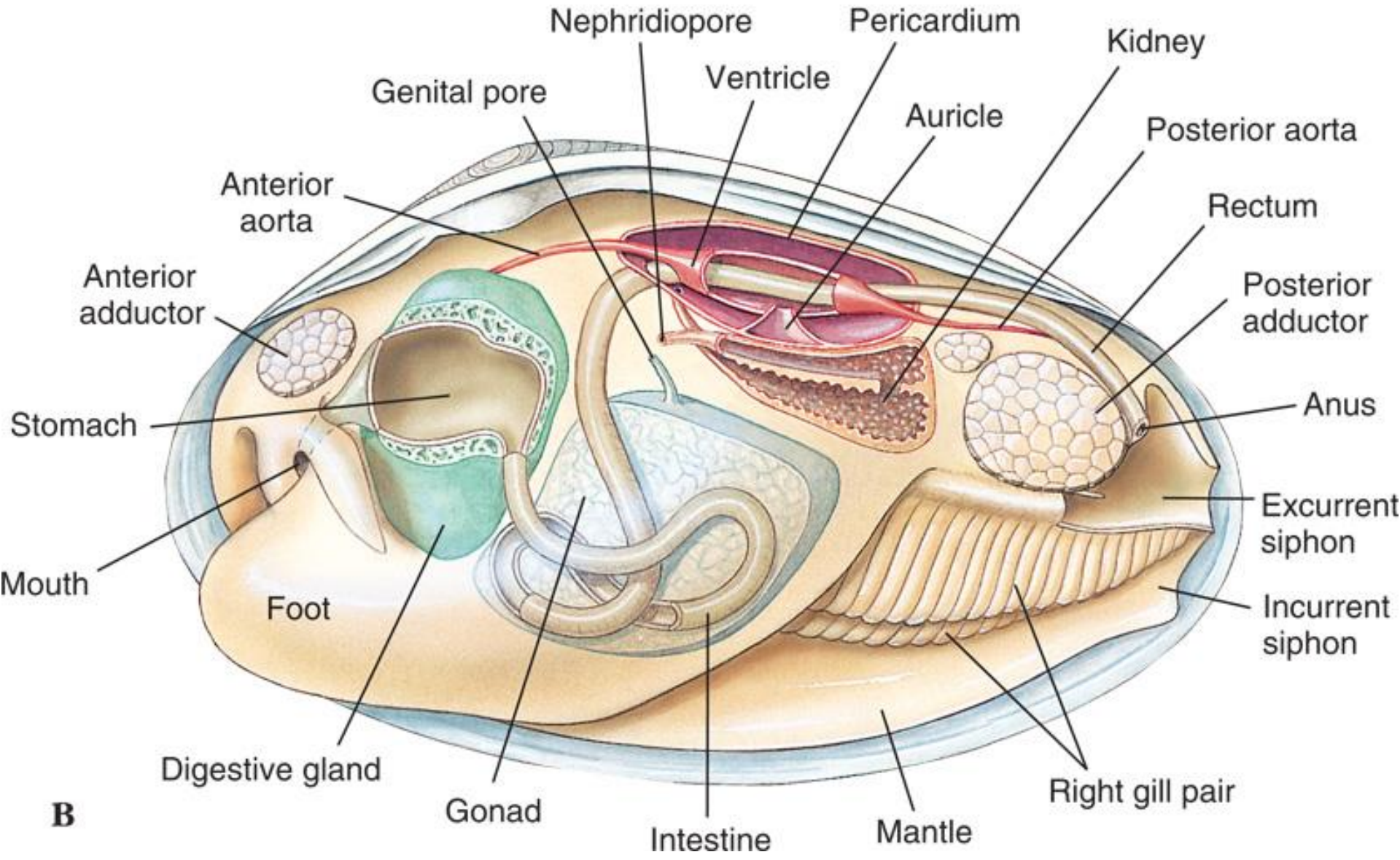
- Body enclosed in mantle
- shell has two lateral valves with dorsal hinge
- Umbo – oldest part of shell
- Head greatly reduced
- No radula
- No eyes, a few species with eyes on mantle margin
- foot usually wedge-shaped



Clam Dissection





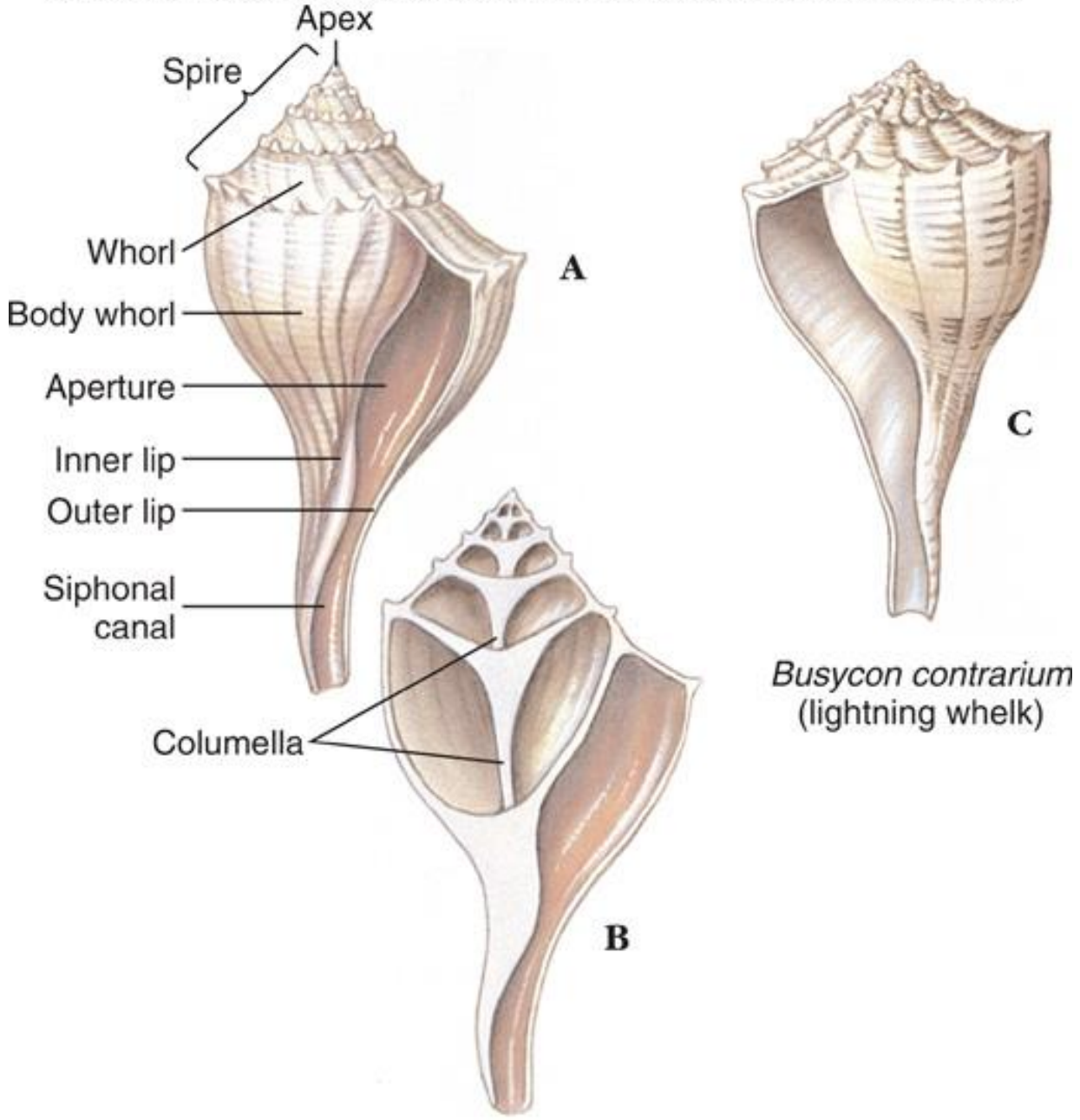


Class Gastropoda

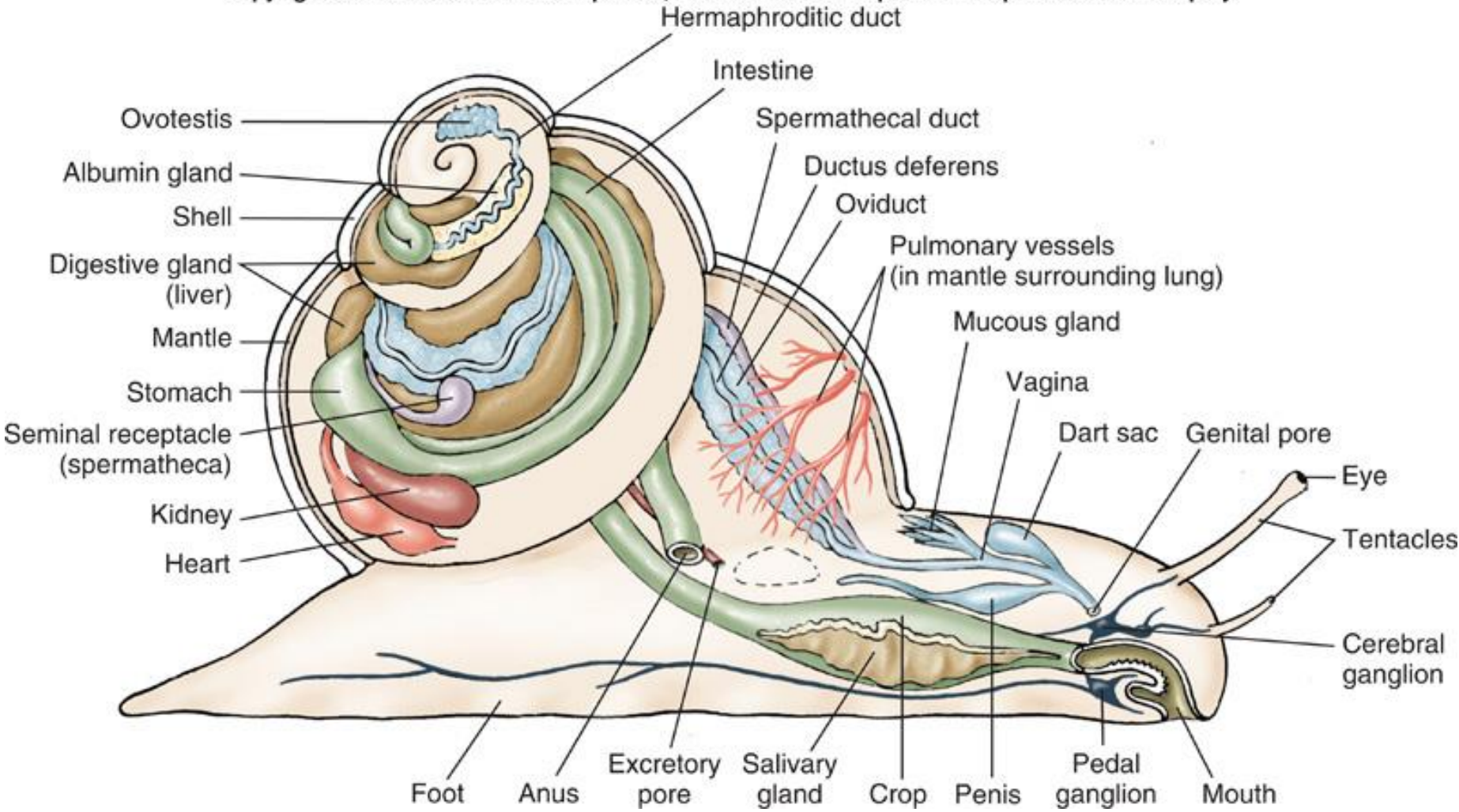
Snails

General Characteristics

- Body usually asymmetrical with a coiled shell (**torsion**)
- Some species lack shell and are not coiled
- Head well-developed
- **Radula** present
- Mantle modified into a lung or gill
- Foot large and flat



Helix – garden snail



Class Cephalopoda

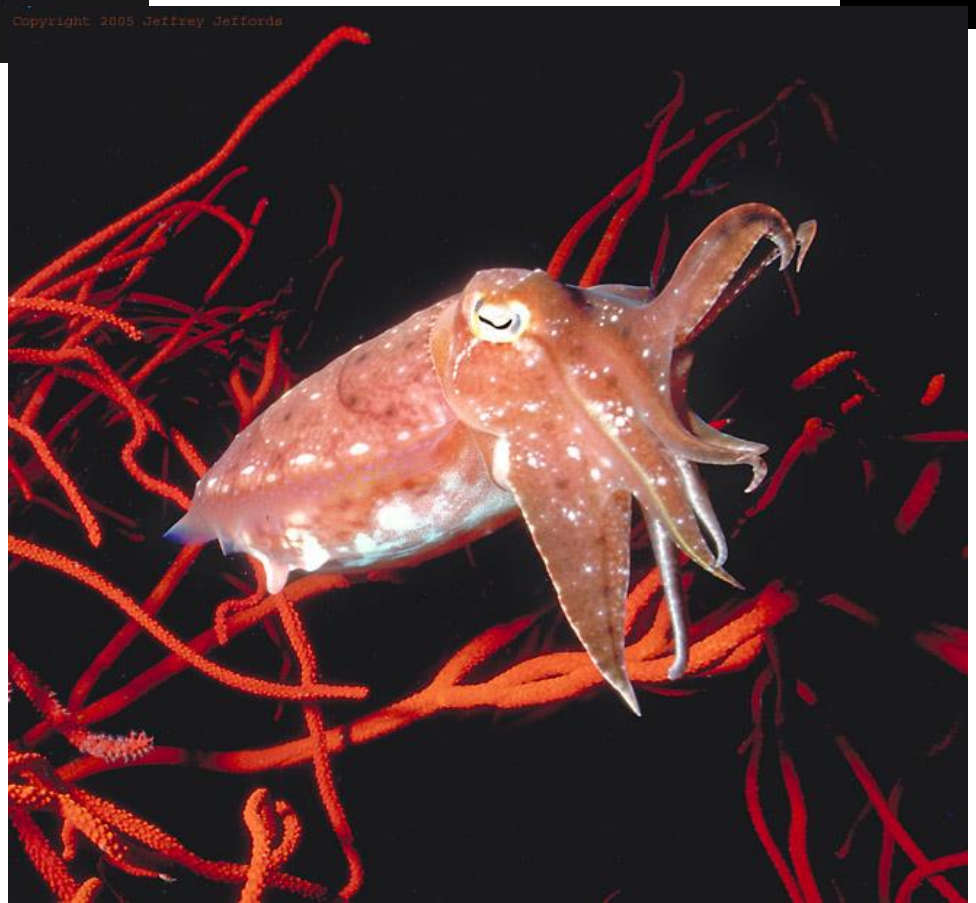
Squids, Cuttlefish, Chambered Nautilus and Octopuses

General Characteristics

- Shell often **reduced or absent**
- Head well developed with a **modified radula to form a beak**
- Foot modified into arms and/or tentacles
- Nervous system with centralized brain
- Complex, well-developed eyes

Squid

B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Chambered Nautilus

A

Class Polyplacophora

Chitons

General Characteristics

- Elongated, dorsoventrally flattened
- Reduced head
- Bilaterally symmetrical
- **Radula present**
- **Shell of eight dorsal plates**
- **Foot broad and flat**
- Multiple gills, along sides of body between foot and mantle edge

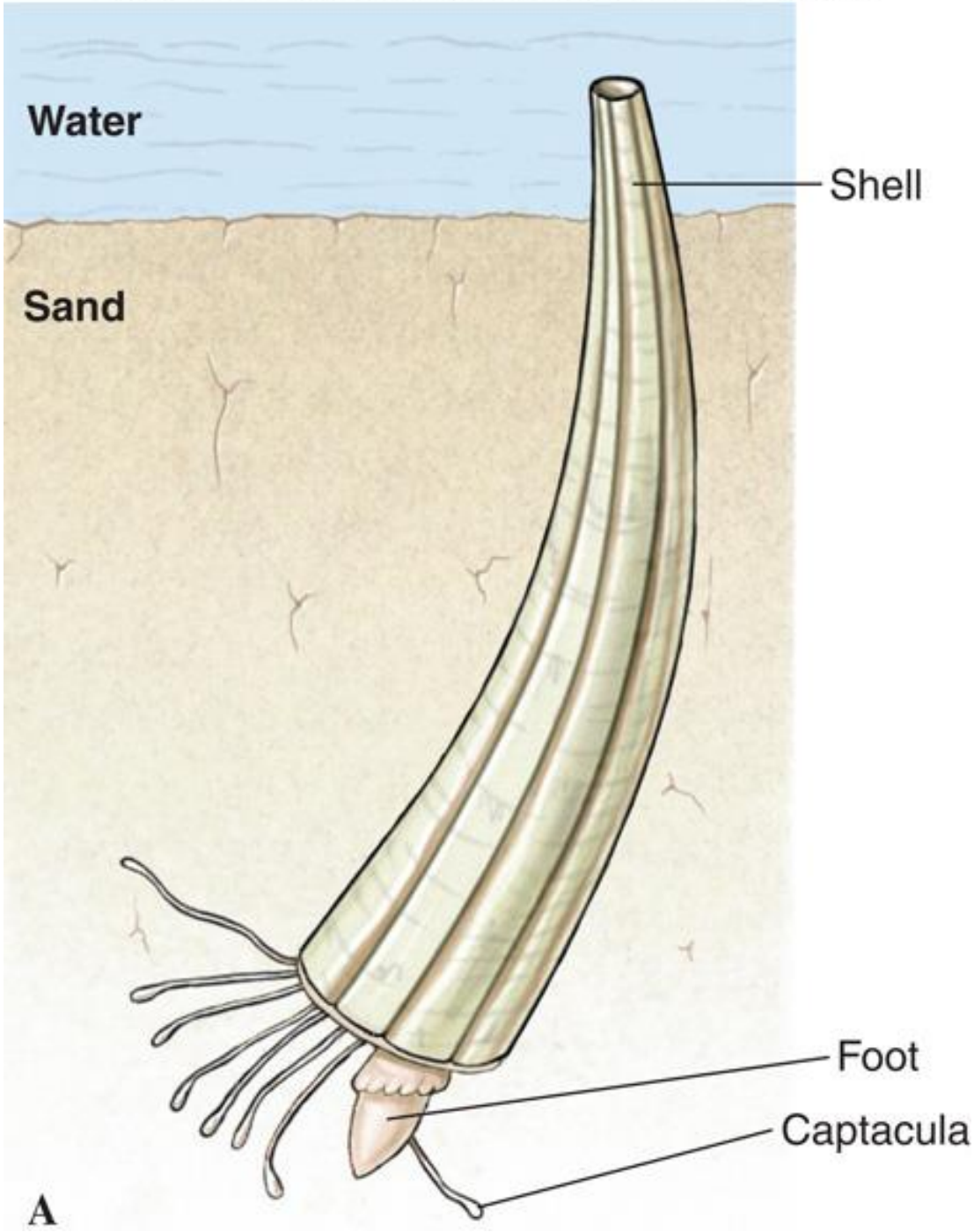
Chitons

Class Scaphopoda

Tusk Shells

General Characteristics

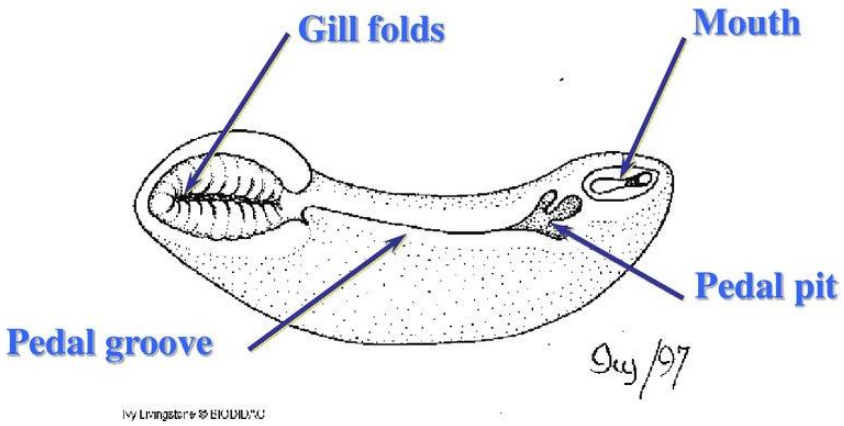
- Body enclosed in a one-piece tubular shell open at both ends
- Conical foot
- Mouth with radula and tentacles
- Head absent
- Mantle used for respiration



Tooth or Tusk Shells

Class Aplacophora

Neomenia, Chaetoderma

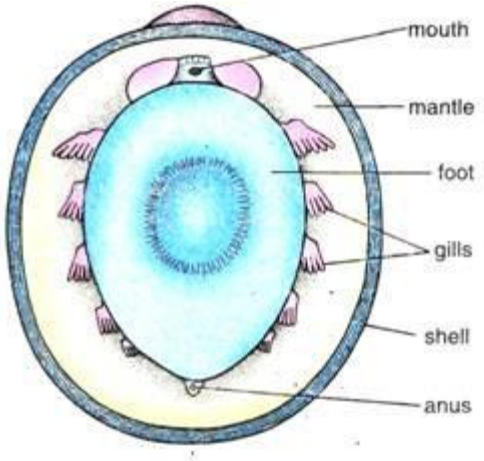


- worm like **primitive forms**

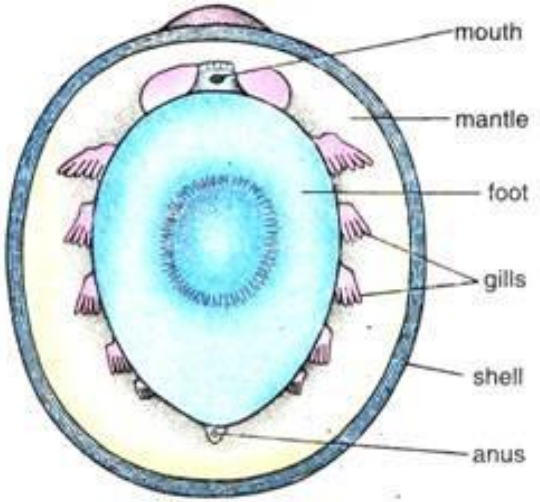
  - without shell and nephridia.
- with calcarious spicules in the cuticle.
- Foot **if present** is a fold that lies in pedal groove.
- Respiratory organs are one pair of gills.
- Ladder like nervous system.
- Podocytes occuring on the pericardial wall help in excretion in the absence of nephridia.
- Development is direct or indirect

Class Monoplacophora

Neopilina

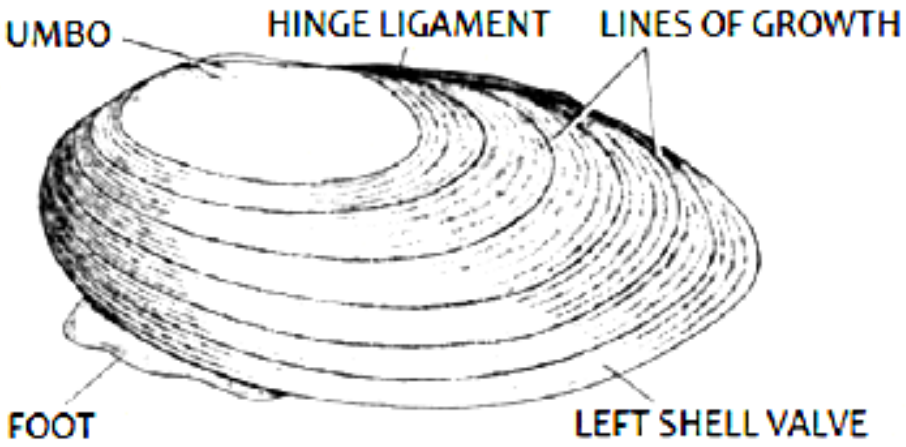


- primitive molluscs which was thought to be extinct until 1952
  - live forms were recovered by Galathea of the Pacific coast of Costa Rica



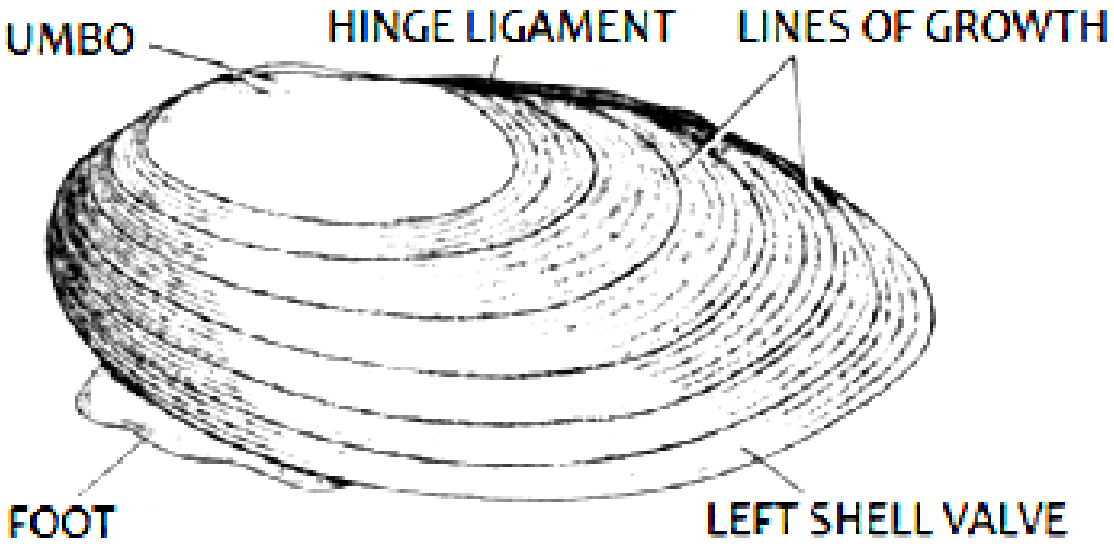
- Shell is Single and plate like
- Foot is broad and flat
- Excretion - 3 to 7 pairs of nephridia
- Respiration - 3 to 6 pairs of gills.
- Internal segmentation or serial repetition of internal organs in several system- striking feature.
- Heart is unique with - Two pairs of auricles which opens into two ventricles.

External Features of Unio or Lamellidens



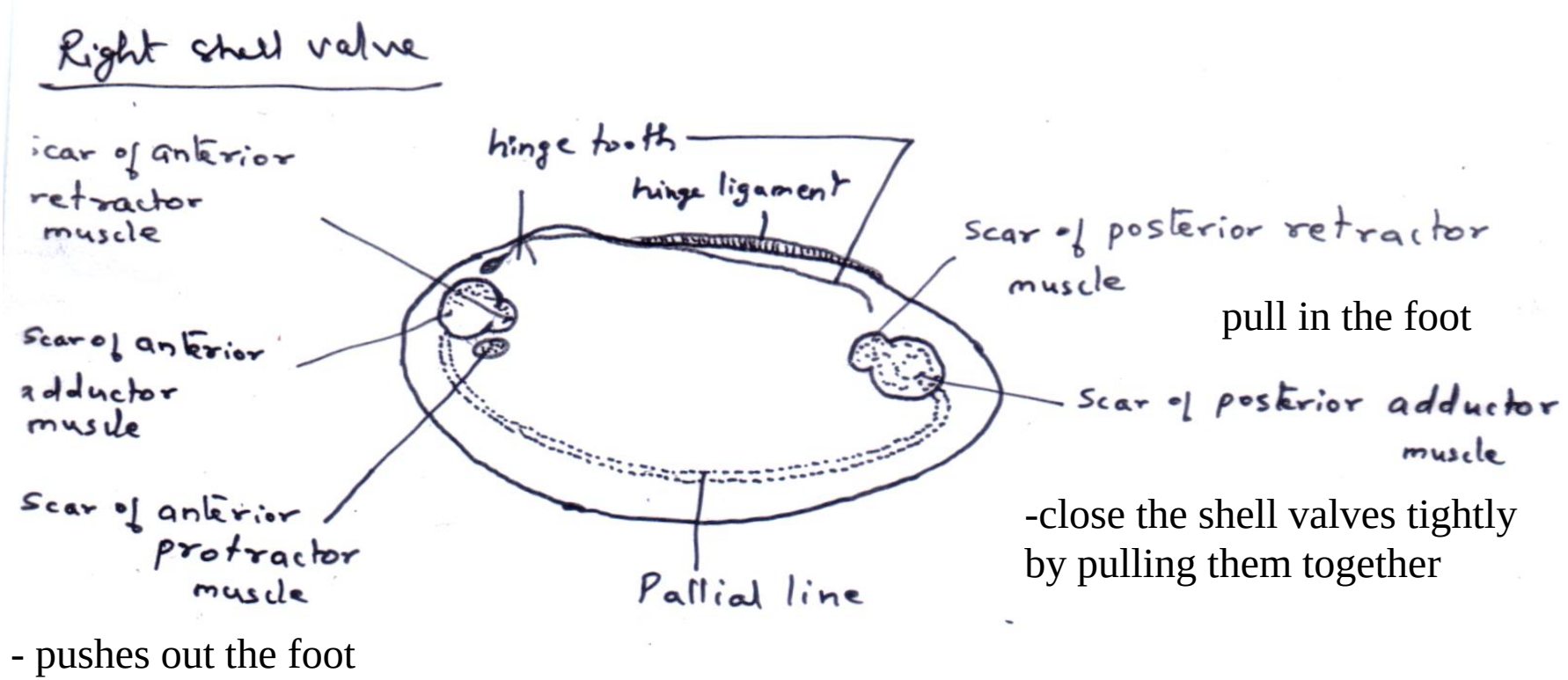
Shape and Size:

- bilaterally symmetrical and laterally flattened
- anterior side - roughly oval in outline
- posterior end - slightly narrower
- Outer surface - rough and mostly reddish brown
- Inner surface – smooth, white and lustrous
- size - varies from 5 to 10 cm in length



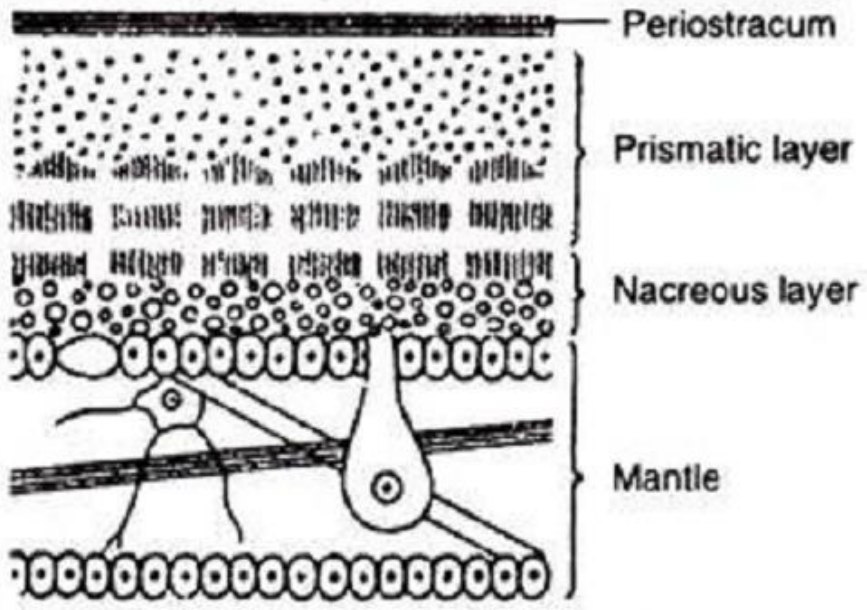
Shell

- hard calcareous shell- two symmetrical and equal halves called valves
- hinge ligament - made of un-calcified conchiolin (elastic)
- teeth and sockets – near hinge ligament
- Umbo - anterior end of the hinge ligament
- concentric lines of growth - below the umbo

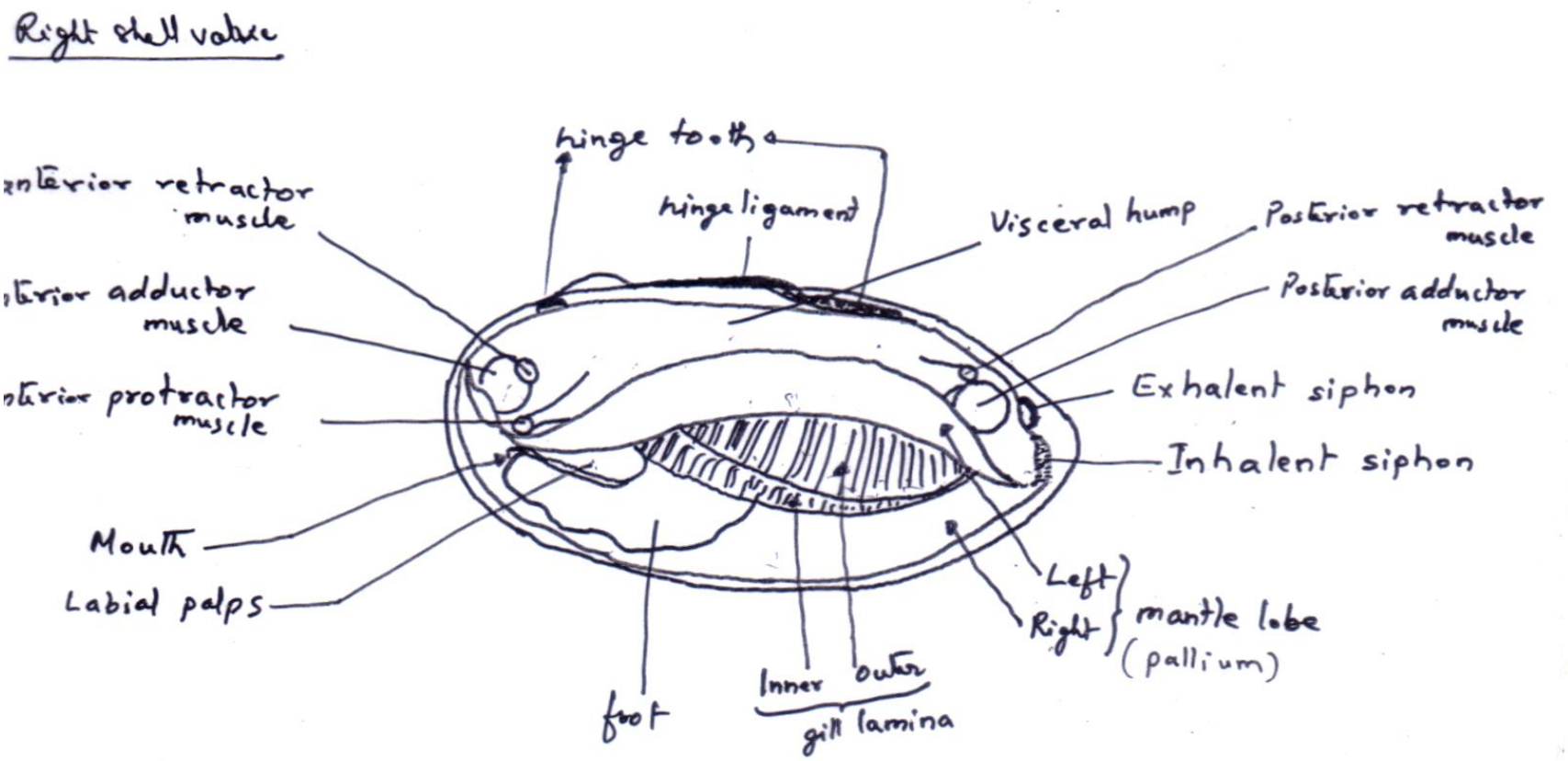


- inner surface - marks of insertion of muscles running transversely between two valves.
- The hinge ligament acts antagonistically to the adductor muscles

  - shell valves to open when the adductors relax



- Periostracum - conchiolin (related to chitin)
- Prismatic layer - alternate layers of conchiolin and prisms of calcium carbonate.
- Nacreous layer - alternate linings of conchiolin and calcium carbonate.
- mantle - two lateral halves (mantle lobes).
- two epithelial layers with an intermediate connective tissue layer.
- epithelium just beneath the shell - secretory cells
- inner epithelium - ciliated



- aboral side of the mantle lobes - two short tubes
  inhalant siphons – edge produced into delicate processes
  exhalant siphons – edge is smooth
- oral end - foot protrudes

External Features of Pila

differentiated into i) Shell of Pila and ii) Body of Pila.