

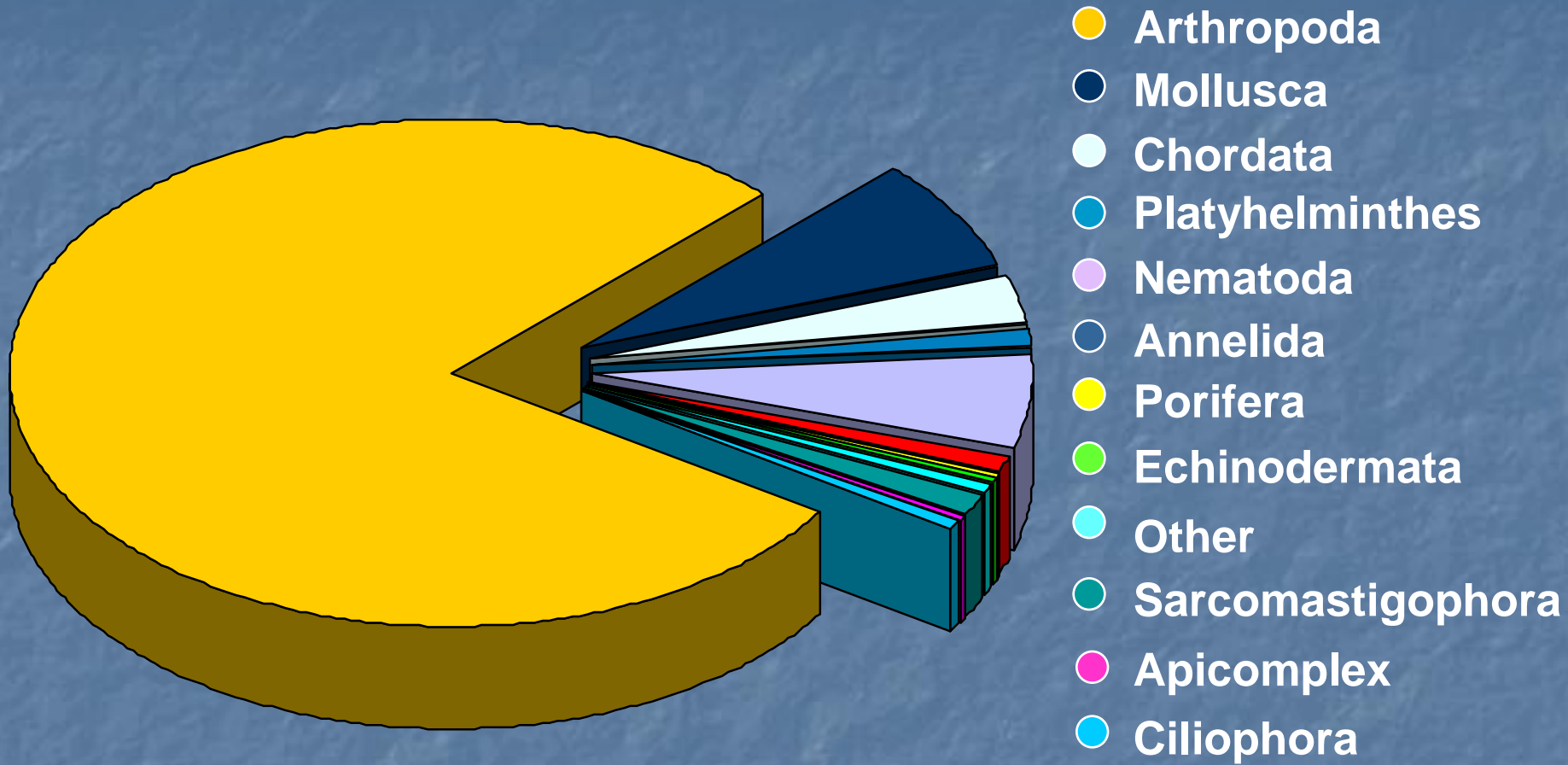


PHYLUM MOLLUSCA

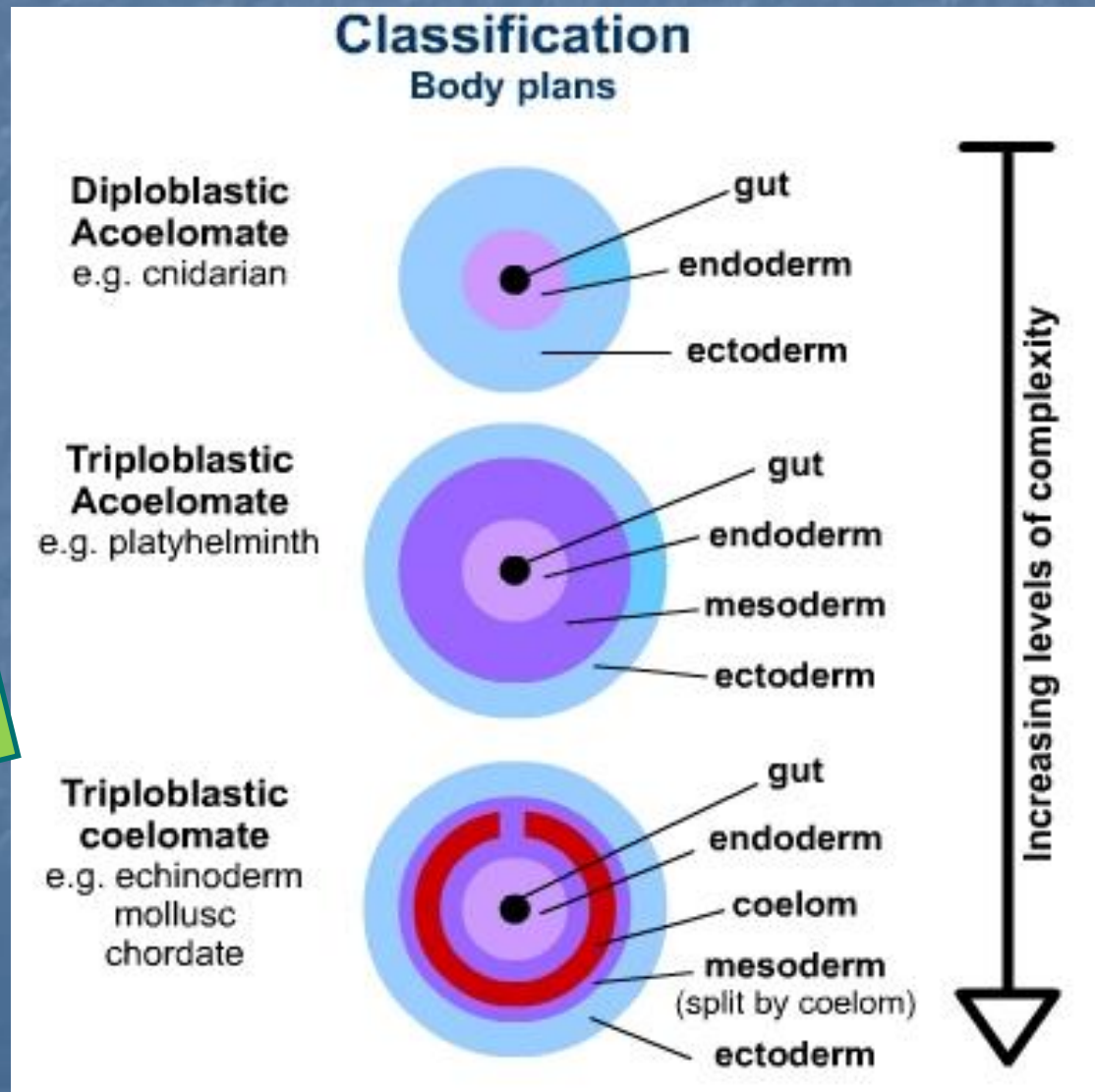
are second only to arthropods in numbers of living animal species



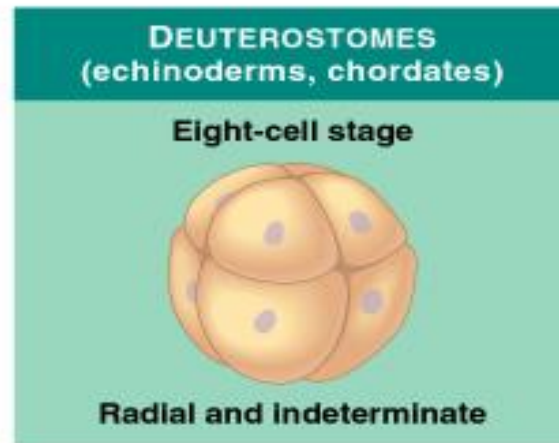
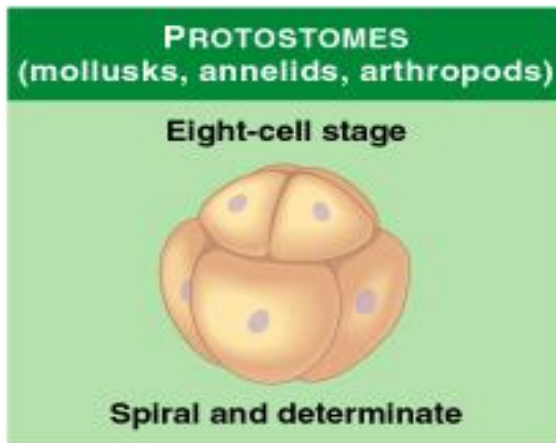
Numbers of species



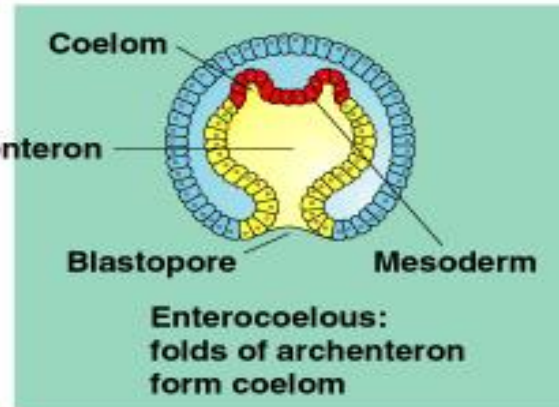
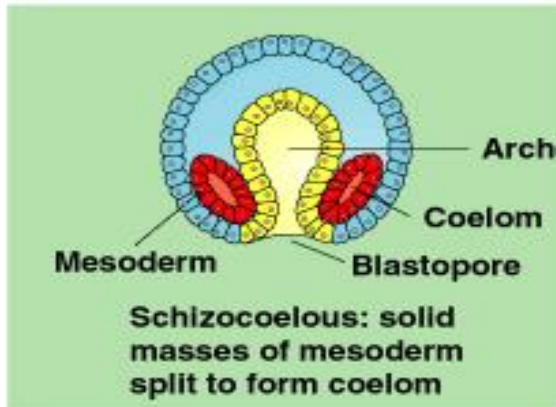
Coelomates-body cavity lined with mesodermal tissue



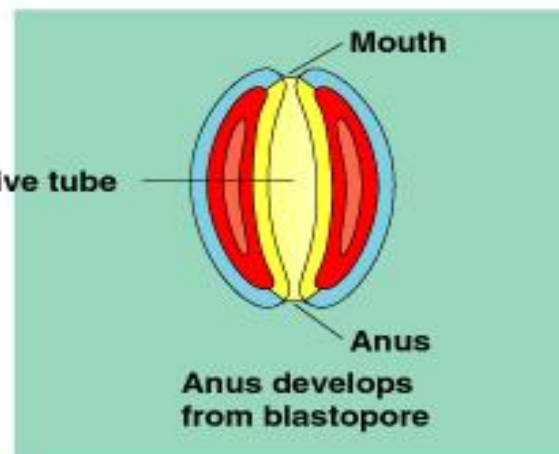
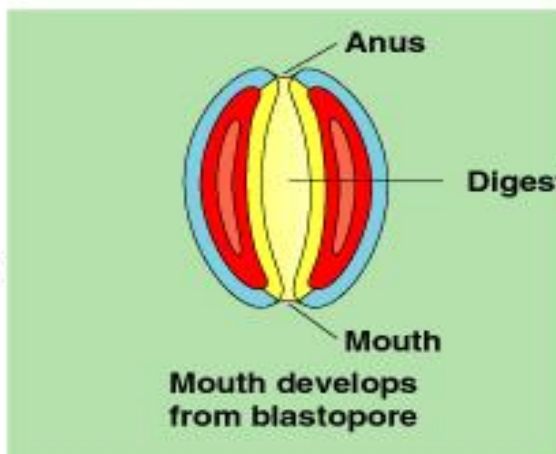
(a)
CLEAVAGE



(b)
COELOM
FORMATION



(c)
FATE OF
BLASTOPORE



Characteristics

- 1. They contain over 90,000 living species and 70,000 fossil species.**
- 2. They have a soft body**
- 3. They include chitons, tusk shells, snails, slugs, nudibranchs, sea butterflies, clams, mussels, oysters, squids, octopuses and nautilus.**
- 4. Some may weigh up to 900 kg and grow to nearly 20 m long, but 80% are under 10 cm in size.**
- 5. Molluscs include herbivorous grazers, predaceous carnivores, filter feeders and parasites.**
- 6. Most are marine, but some are terrestrial or freshwater aquatic.**

Economic Importance

1. Many kinds of molluscs are used as food.
2. Culturing of pearls and pearl buttons is an important industry.
3. Burrowing shipworms destroy wooden ships and wharves . ارضفة .
4. Snails and slugs are garden pests افات ; some snails are intermediate hosts for parasites.

Economic Importance of Cephalopods

- **Research on nervous system**
- **Bait** طعام- علف
- **Food – calamari**
- **Minerals for pets** معادن للحيوانات الأليفة – cuttlebone

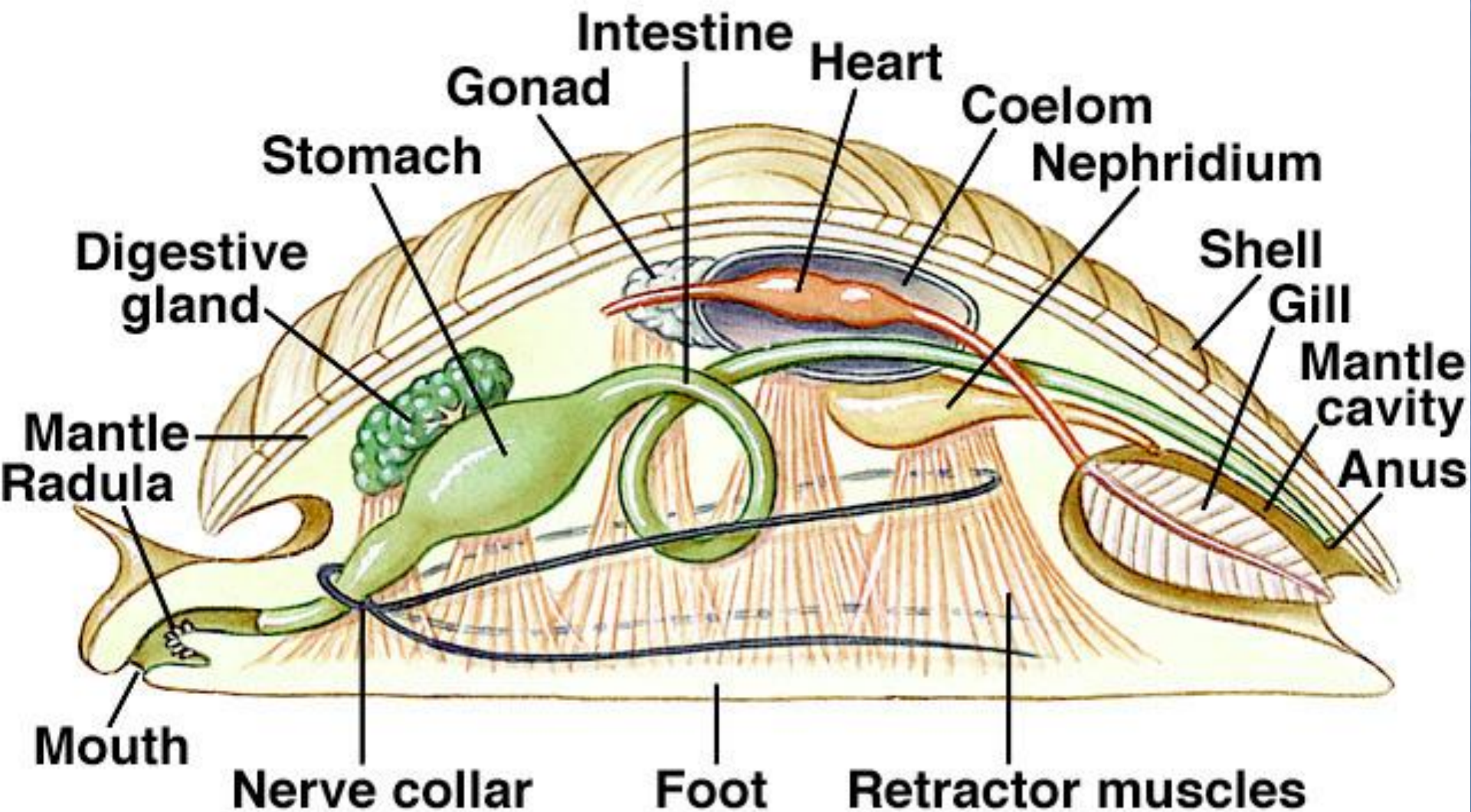
Mollusc Body Plan: Head-Foot and Visceral Mass Portions

- 1. The head-foot portion contains the feeding, cephalic sensory and locomotor organs.**
- 2. The visceral mass portion contains digestive, circulatory, respiratory, and reproductive organs.**

Head-Foot

- 1. Most molluscs have a well-developed head bearing the mouth and some sensory organs.**
- 2. Photosensory receptors range from simple to complex eyes.**
- 3. Tentacles may be present.**
- 4. Posterior to the mouth is the chief locomotor organ, the foot.**

Generalized mollusca body

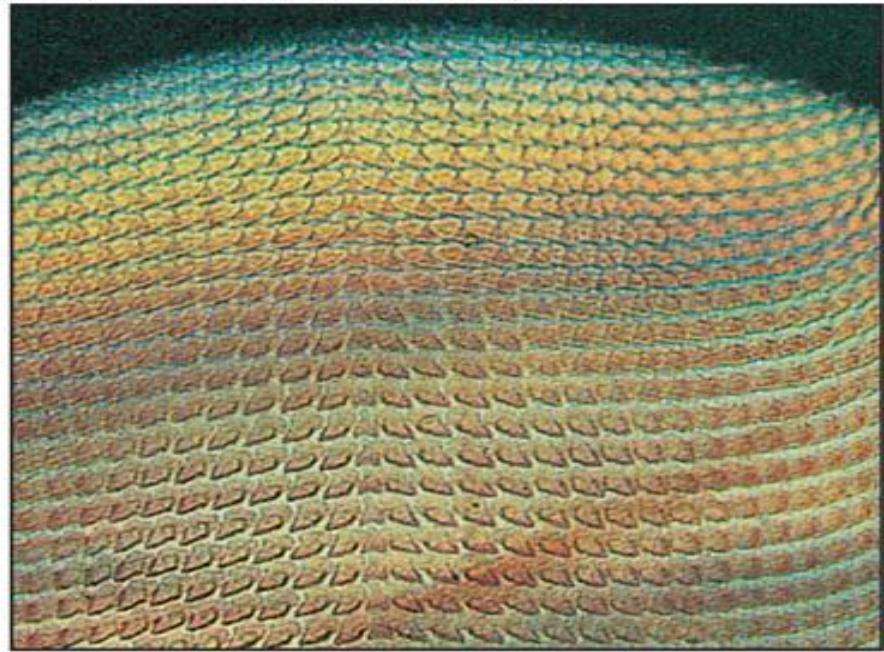
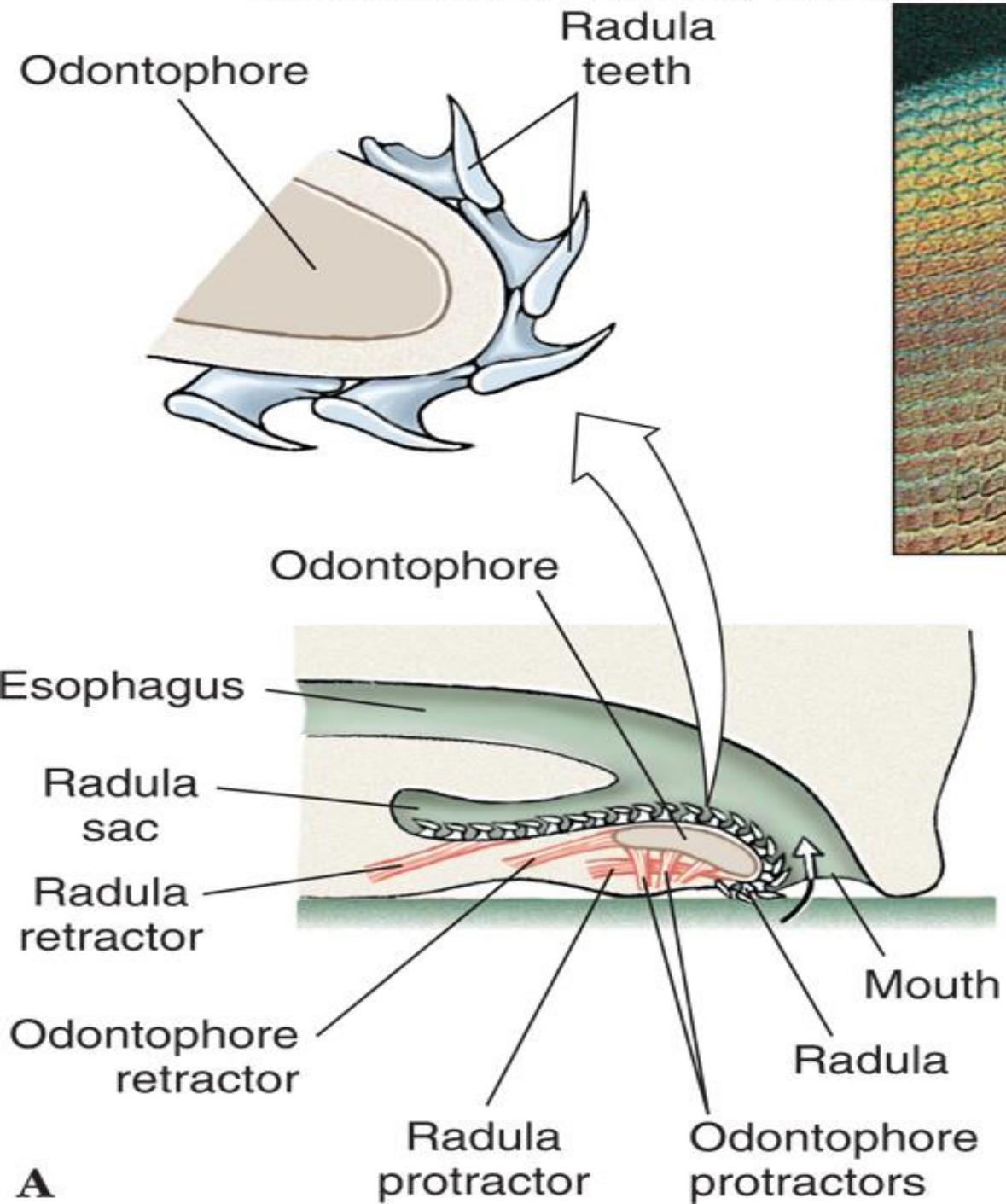


Unique mollusc structures - متميز متفرد

structures:

Radula

1. The radula is unique to molluscs; it is found in all except bivalves .
2. The radula is a protruding, rasping, tongue-like organ.
3. The ribbon-like membrane has rows of tiny teeth—up to 250,000—pointed backward.
4. The radula rasps **تبرد** off fine particles of food material from surfaces.



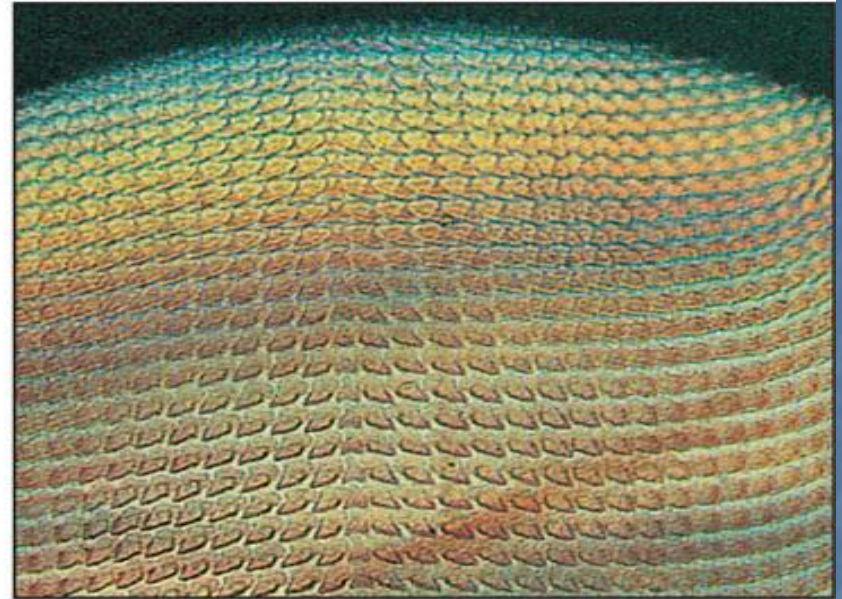
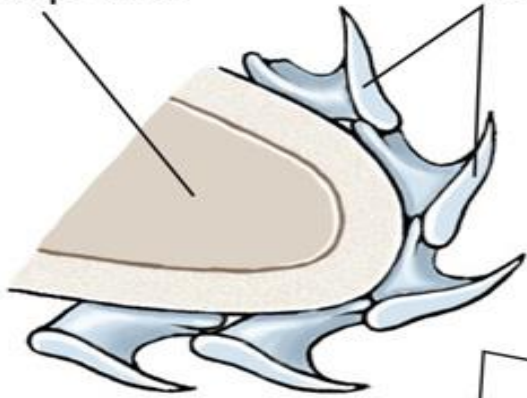
B

A

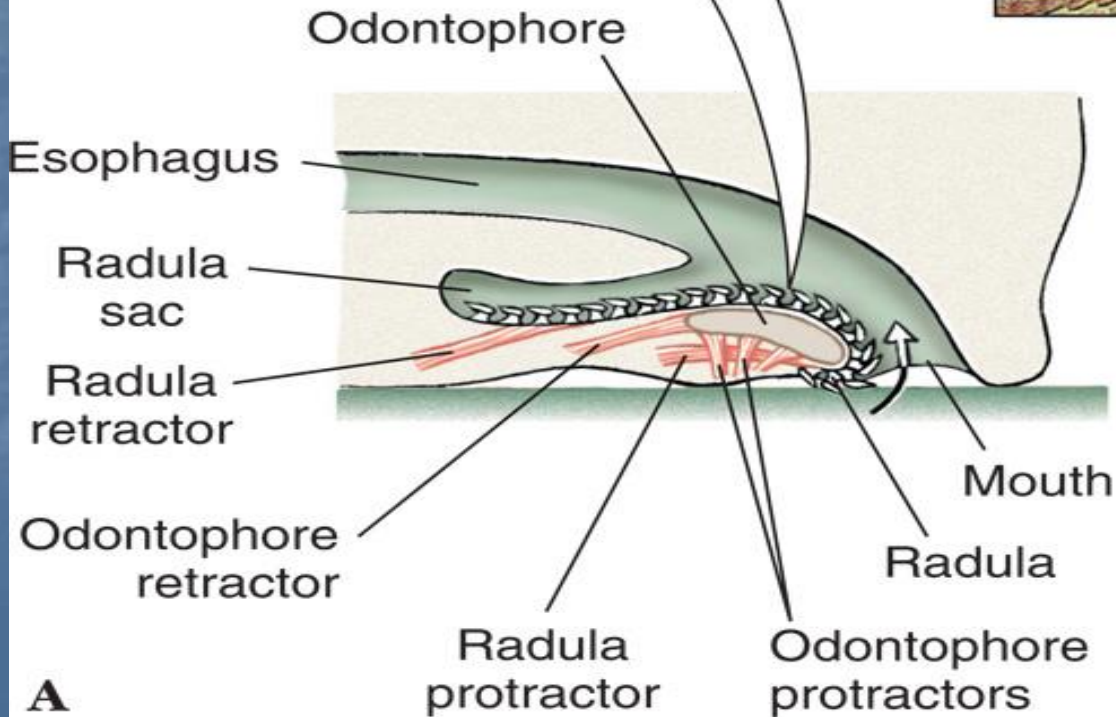
Feeding

- Modified radula pertaining to food **متعلقة**
source **بـالغذاء**
- Herbivores, carnivores, detritovors, parasitism
- Uses
 - Scrap **كشط او حك**
 - Drill **حفر**
 - Dart **دوران**
 - Secrete poison **افراز السم**
 - Grasp **امسك**

Odontophore
Radula
teeth



B



A

5. The radula serves as a conveyor belt حزام توصيل to move particles to the digestive tract.
6. New rows of teeth replace those that fallen
7. The pattern and number of teeth are used in classification of molluscs.
8. Some are specialized to bore حفر-ثقب through hard material .

Foot

1. The foot is usually ventral.
2. It can function for attachment to the substratum or for locomotion.
3. Modifications include the attachment disc of limpets, the hatchet foot of clams and the siphon jet of squids.
4. Secreted mucus can aid in adhesion or help some molluscs glide on cilia. تتزلق على اهداب

5 . Burrowers extend the foot into mud or sand, enlarge the tip as an anchor, and draw forward.

6. Free-swimming forms have modified the foot into wing or fin-like swimming agents.

Mantle and Mantle Cavity

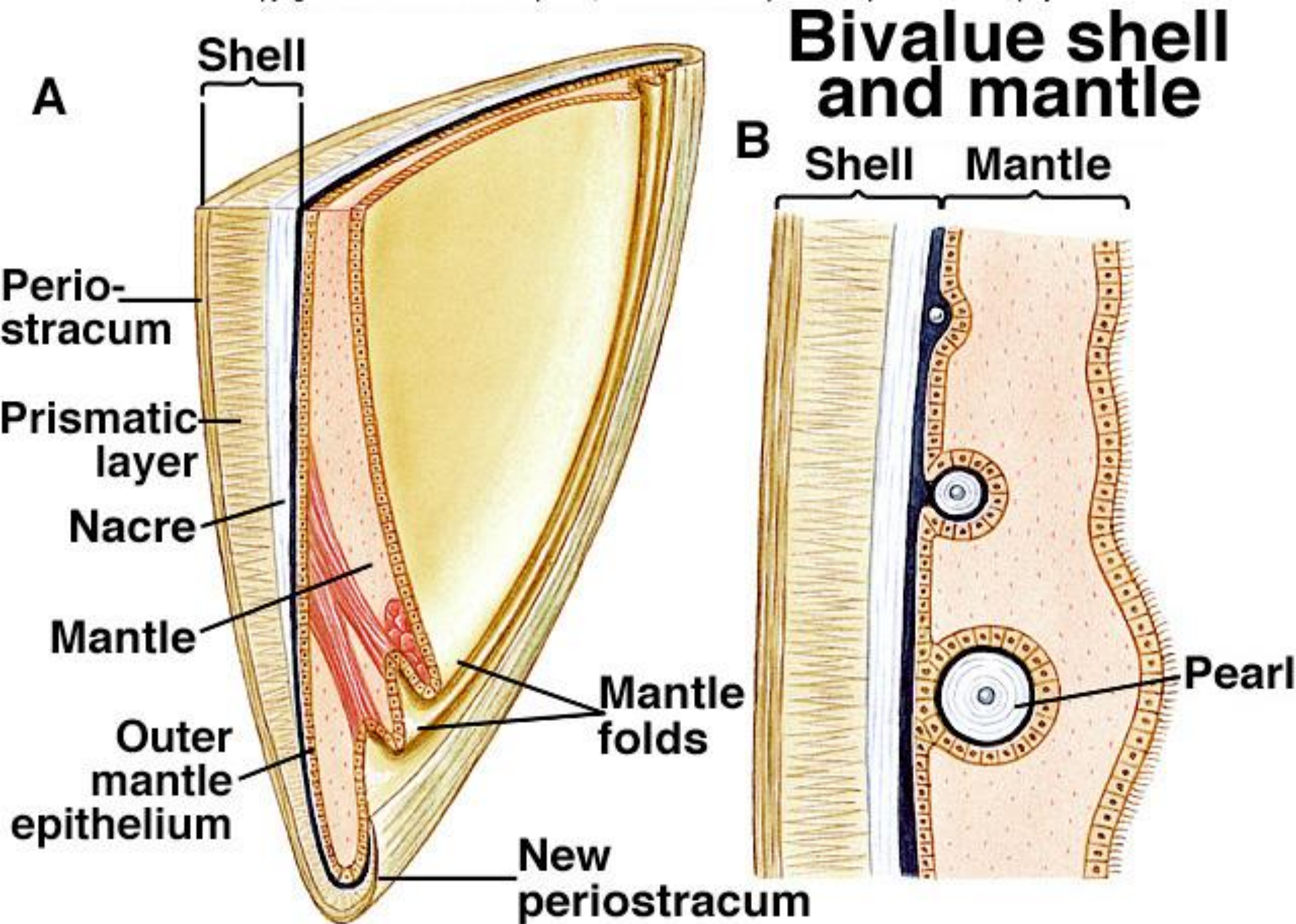
- 1) A mantle is a sheath of skin on each side of the body; it secretes the shell when present.
- 2) The mantle cavity houses the gills or lungs that develop from the mantle.
- 3) The exposed surface of the mantle also serves for gaseous exchange.
- 4) In aquatic molluscs, a continuous flow of water brings in oxygen and food, and throw away the wastes.

5- Products of digestive, excretory and reproductive systems empty into the mantle cavity.

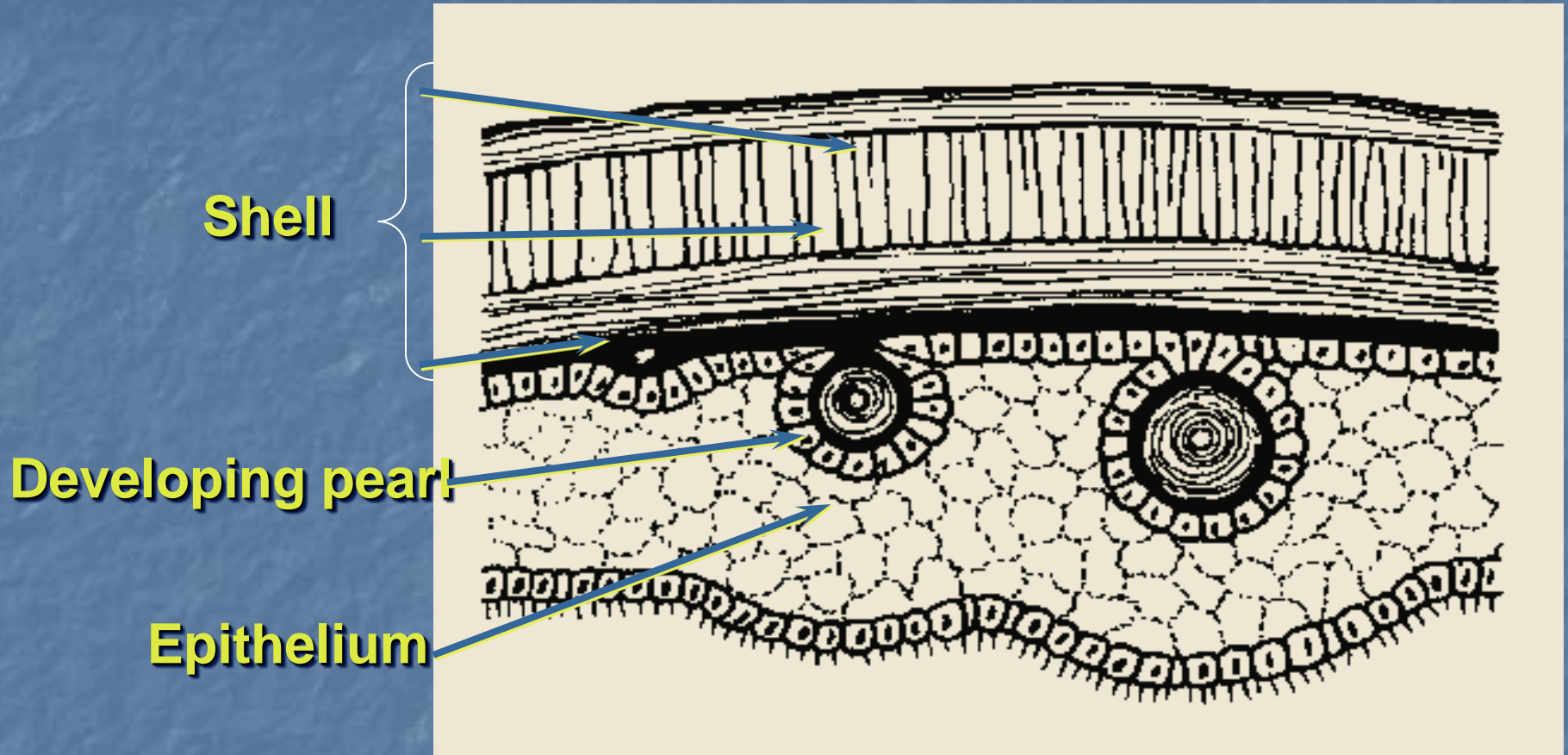
**6) Cephalopods use the head and mantle cavity to create jet propulsion
الدفع النفاث.**

Shell

- 1) When present, the shell is secreted by the mantle and lined by it.
- 2) The periostracum قشرة الصدفة is the outer horny layer, composed of conchiolin, a tanned protein.
- 3) The middle prismatic layer طبقة منشورية has closely packed prisms of calcium carbonate معبأة بطبقة منشورية من كربونات الكالسيوم.
- 4) The inner nacreous layer طبقة لؤلؤية is next to the mantle; the nacre is laid down in thin layers.
- 5) The thick periostracum of freshwater molluscs protects against acid from decay in streams.



Pearl formation



Irritant lodged between shell and mantle

Layers of nacre secreted around foreign material

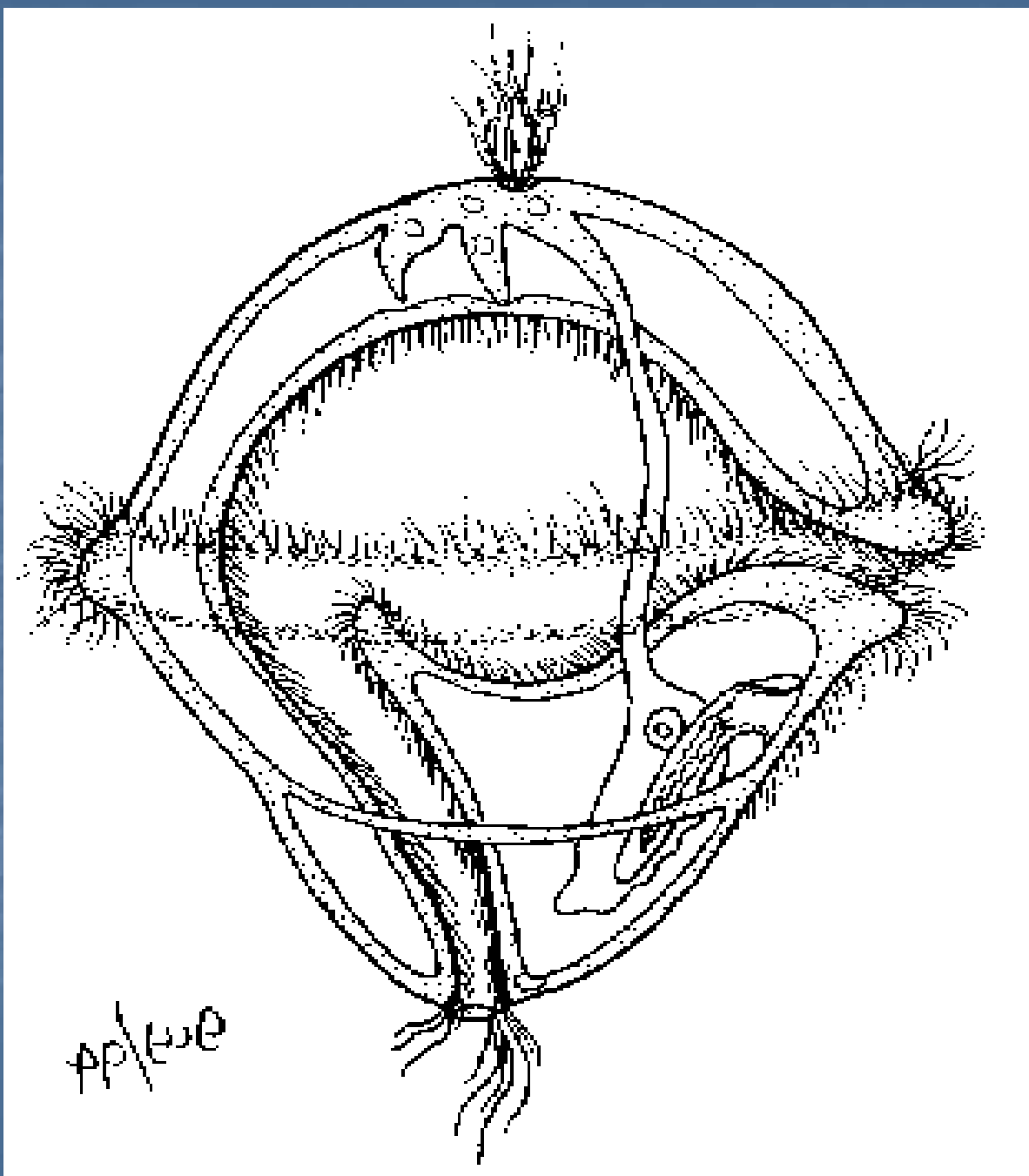
Internal Structure and Function

- 1) **The open circulatory system includes a pumping heart, blood vessels and blood sinuses.**
- 2) **Most cephalopods have a closed system with a heart, vessels and capillaries.**
- 3) **Most molluscs have a pair of kidneys or metanephridia.**

- 5) The nervous system has pairs of ganglia but is generally simpler than in annelids.**
- 6) In air-breathing snails, the nervous system produces growth hormones.**
- 7) Sense organs vary and may be highly specialized.**

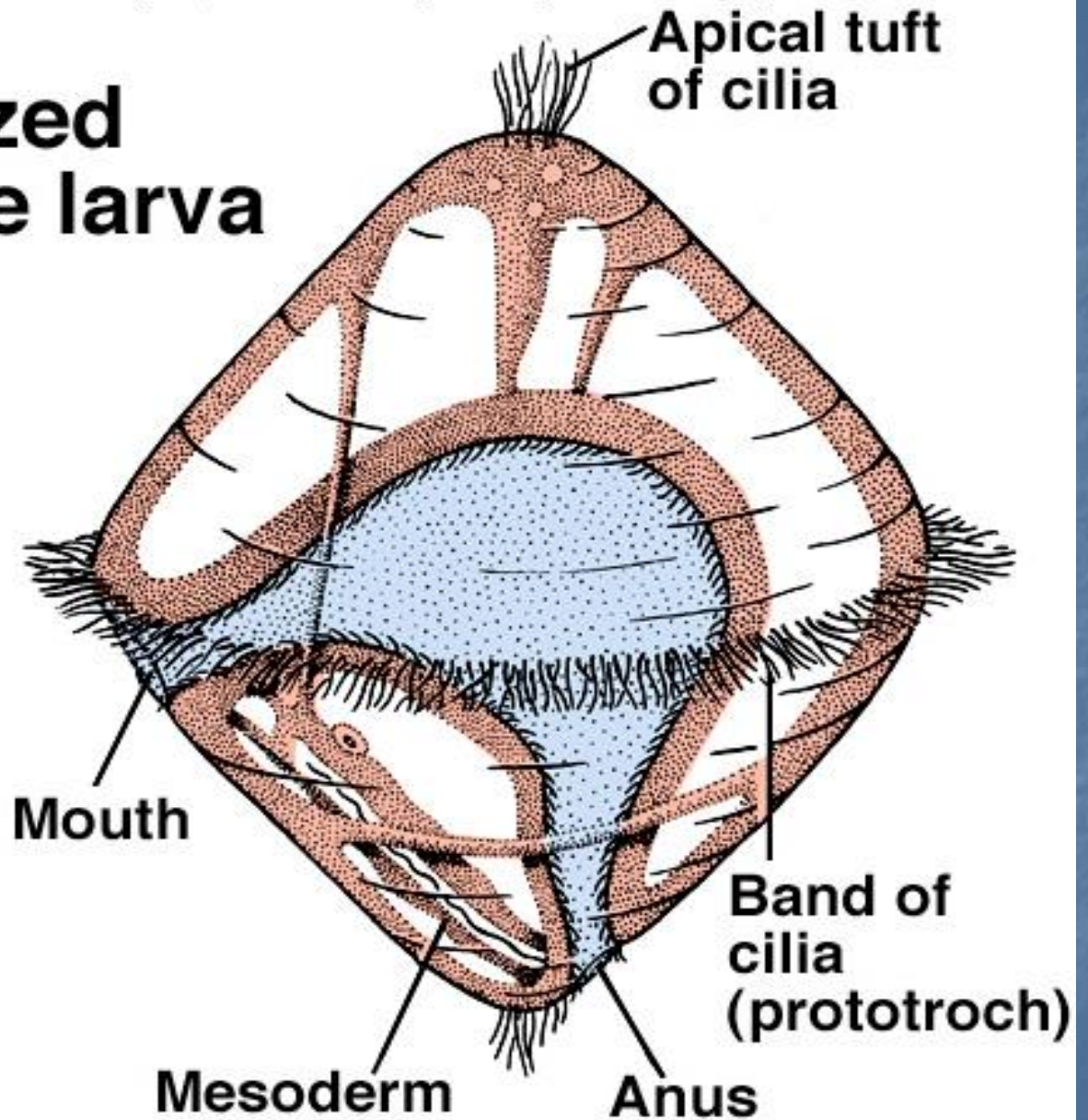
Reproduction and Life History

- 1. Most are dioecious but some are hermaphroditic.**
- 2. The egg hatches and produces a free-swimming larva called a trochophore larva.**
- 3. This larva undergoes direct metamorphosis into a small juvenile in chitons.**
- 4. In many gastropods and bivalves, an intermediate larval stage—the veliger—is a derived state.**
- 5. The trochophore larvae are considered by some to unite molluscs with annelids.**



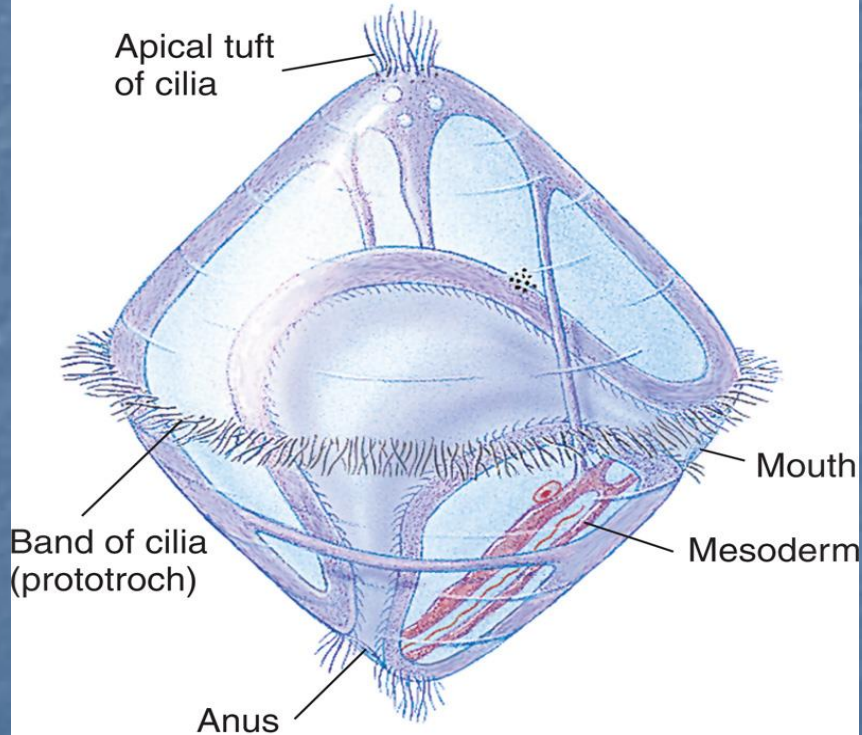
AP/LSB

Generalized trochophore larva



Figures 16.6 & 16.7

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