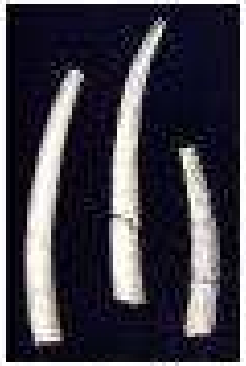
Phylum Mollusca

The Molluscs

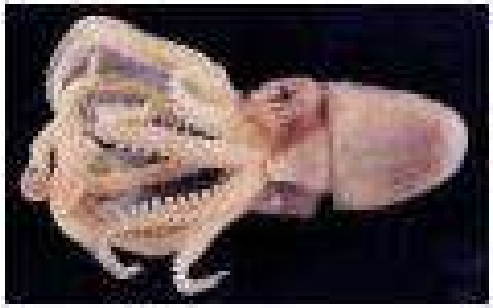
What is a mollusc?

- Examples?



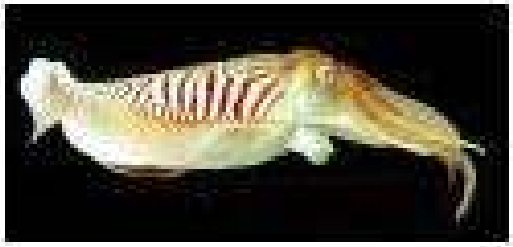
Dentalium

Chiton



Octopus

Unio



Sepia

Limnaea

Pearl Oyster

Land Snail

Mollusc Classes

- Class Gastropoda
- Class Bivalvia
- Class Cephalopoda

Class Gastropoda

- Limpets

Class Gastropoda

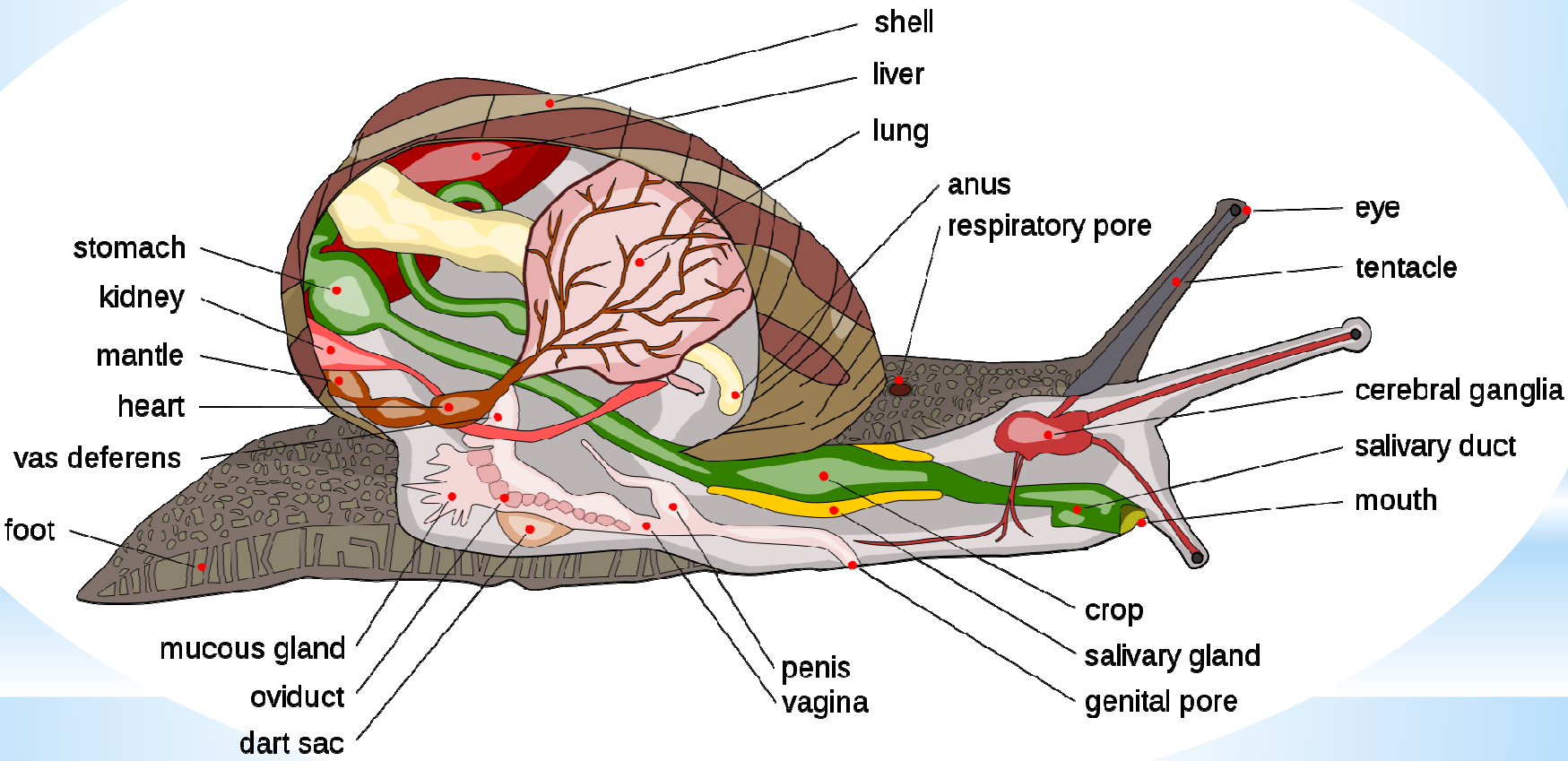
- Slugs

Class Gastropoda

- Snails

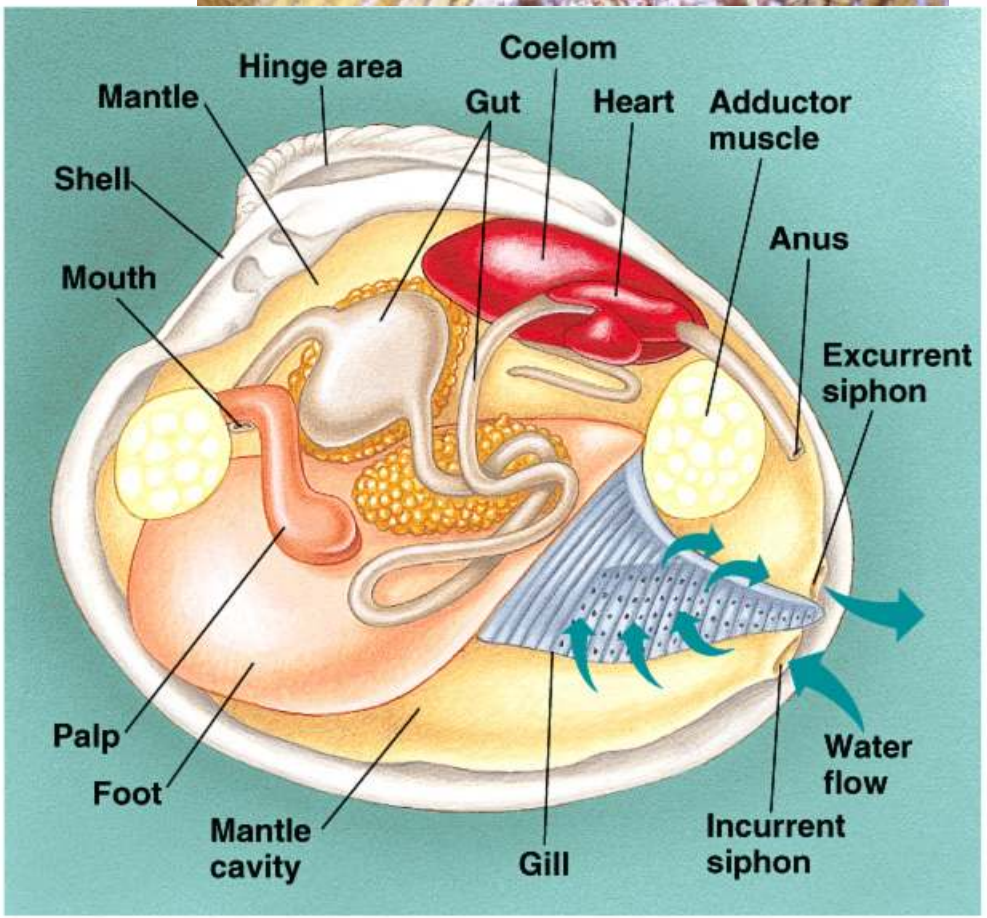
Class Gastropoda

- Snails



Class Bivalvia

- Clams



Class Bivalvia

- Mussels

Class Bivalvia

* Oysters

Class Bivalvia

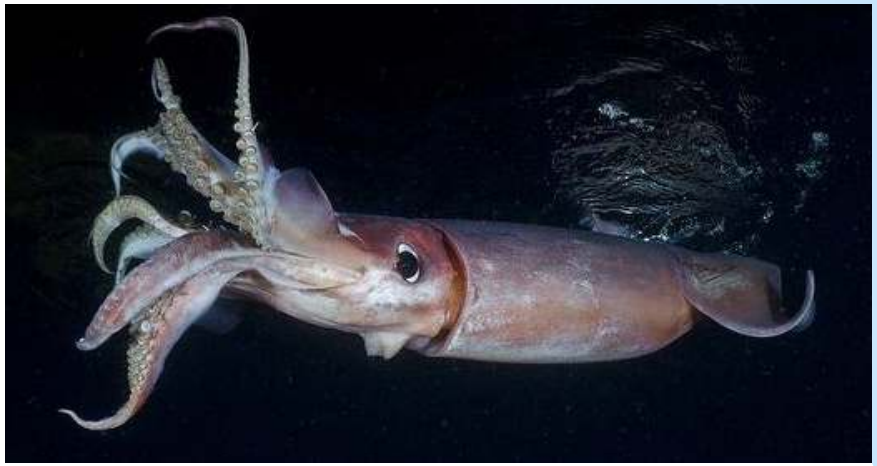
* Scallops

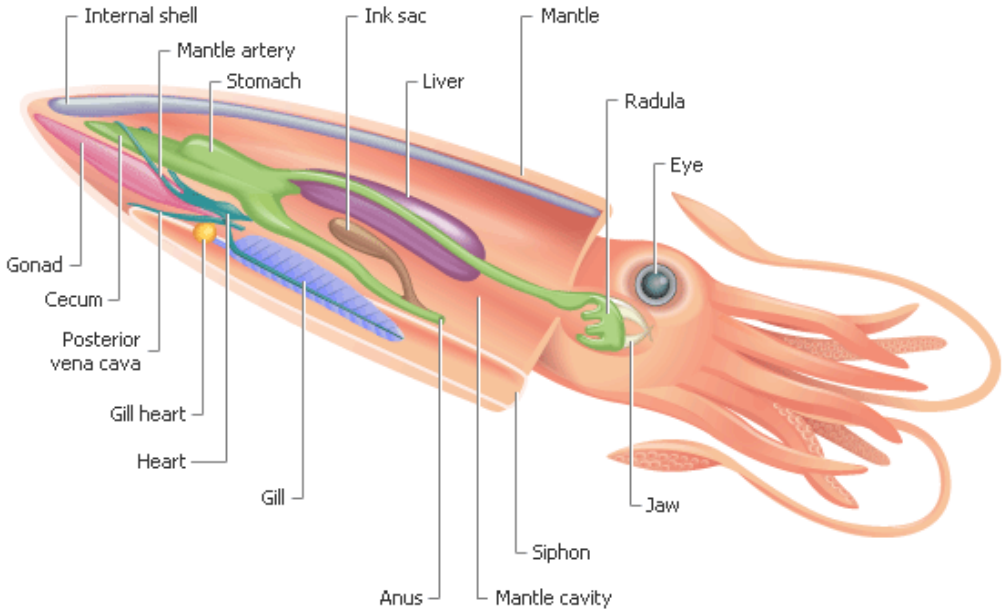
Class Cephalopoda

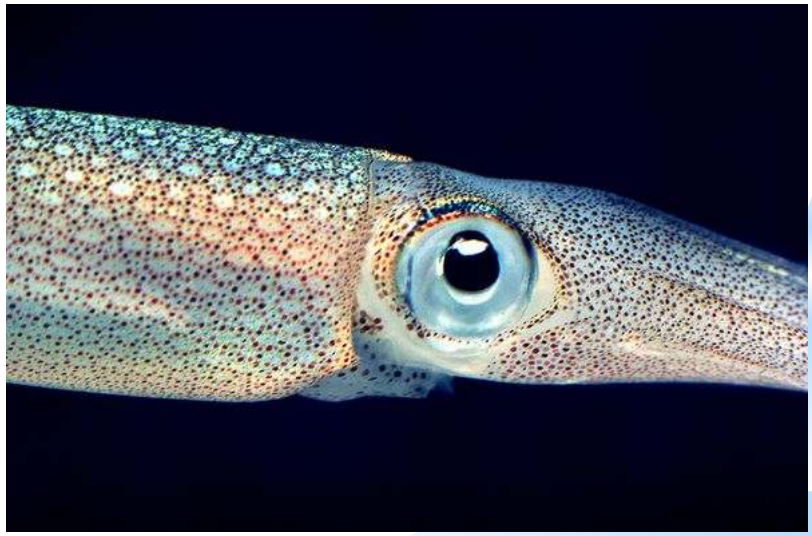
- Octopus

Class Cephalopoda

- Squid







Class Cephalopoda

- Nautilus

Class Cephalopoda

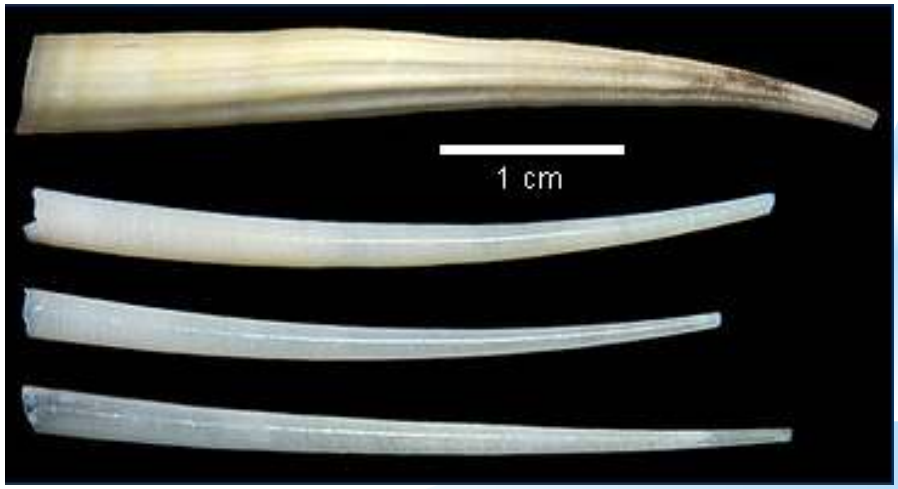
- Cuttlefish

Other Mollusc Classes

- Caudofoveata
- Aplacophora
- Polyplacophera

Other Mollusc Classes

- Monoplacophera
- Scaphopoda



* What are the characteristics of each class?

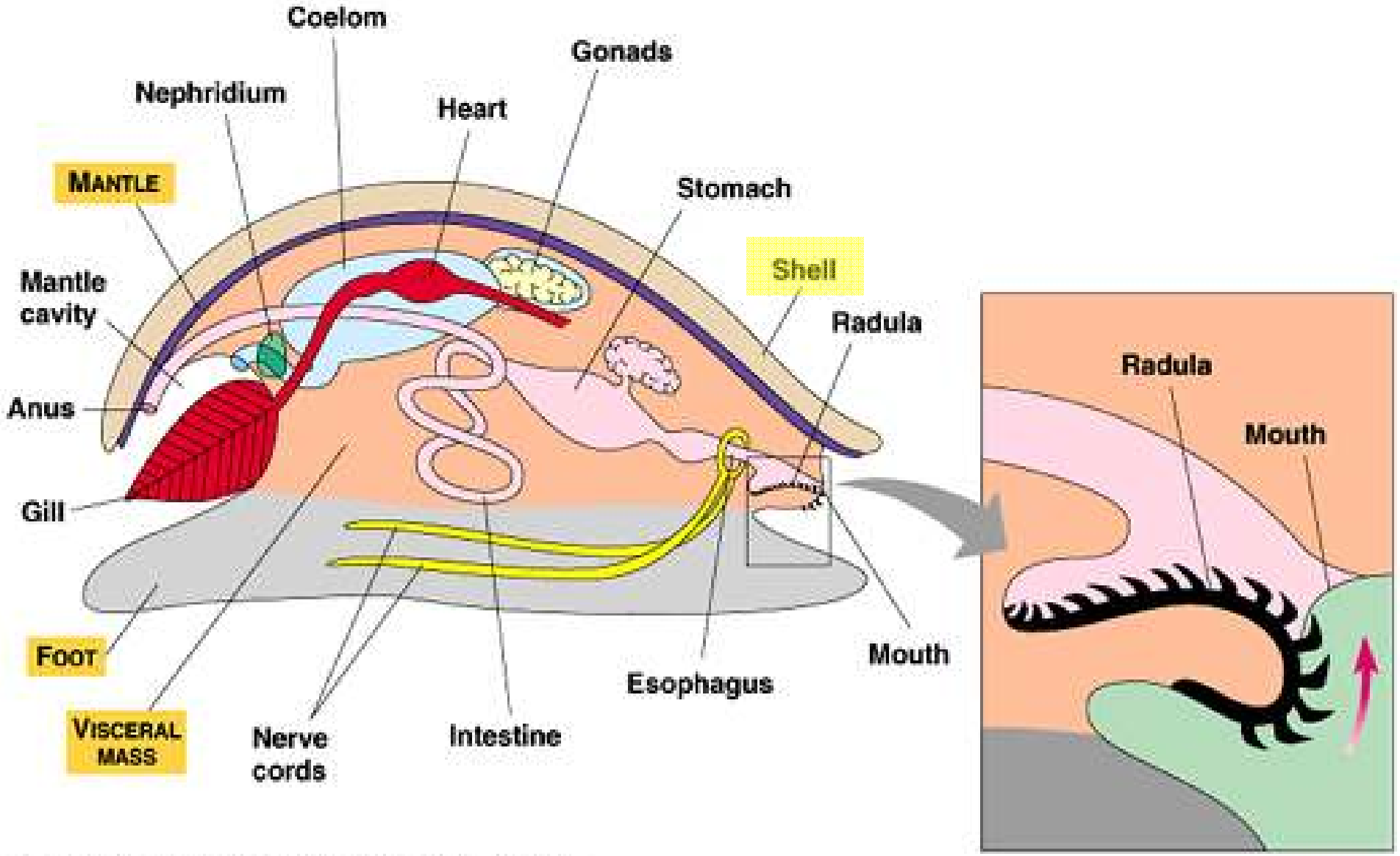
* What are the characteristics of all molluscs?

* Doc Cam pg. 702

*General characteristics of phylum Mollusca

1. Bilateral symmetry with cephalization
2. Four basic parts found in most molluscs
   a. Muscular foot
   b. Mantle
   c. Shell- internal or external
   d. Visceral mass
3. Coelom
4. Organ systems – Circulatory, Respiratory, Digestive, Excretory, Nervous
5. Many produce a free-swimming larvae, trochophore

*Generalized Body Form



Body Structure

Coelom

Foot

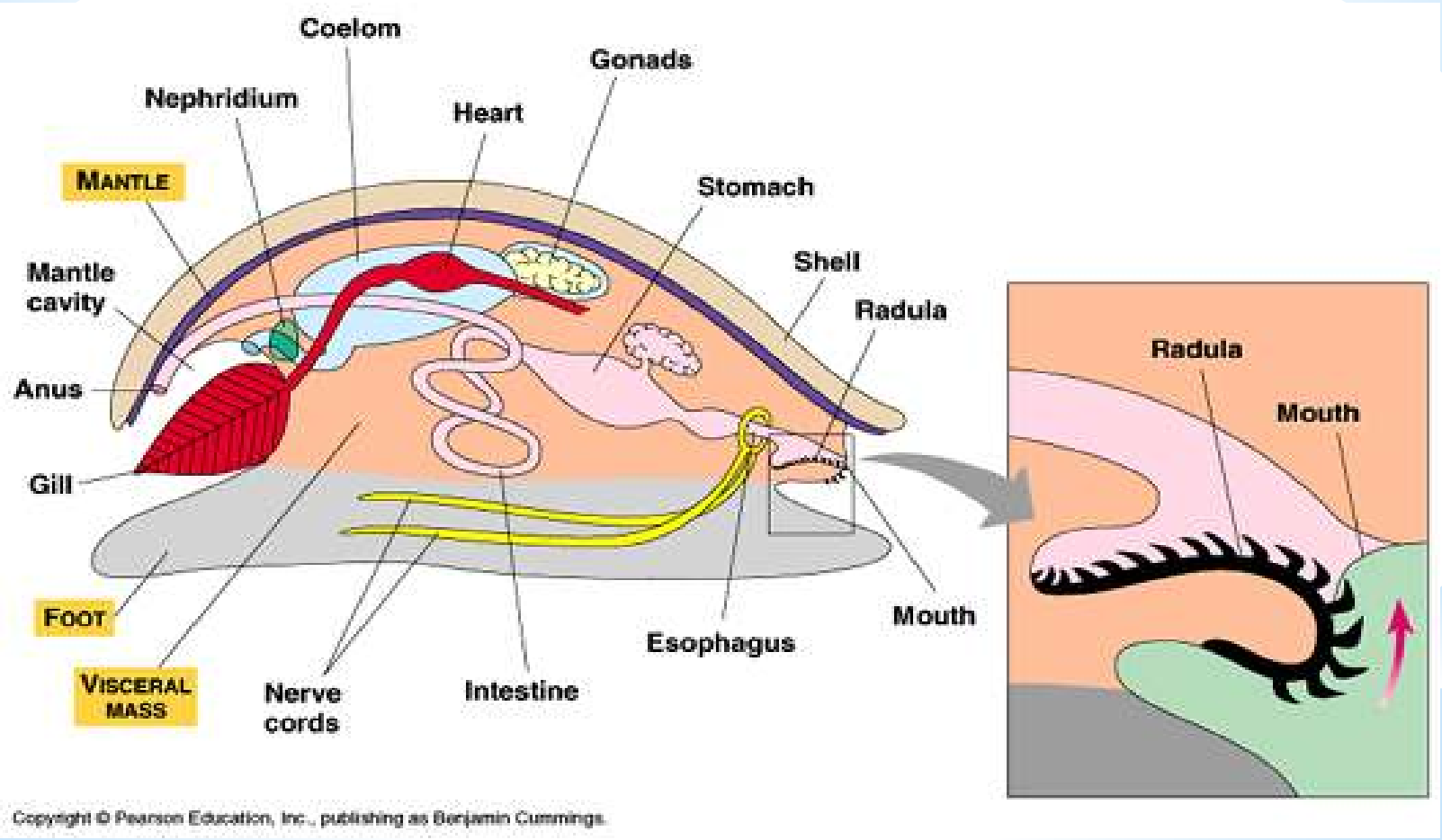
Mantle

Shell

Visceral Mass

*Coelom

*Reduced to small cavity around the heart



*Foot

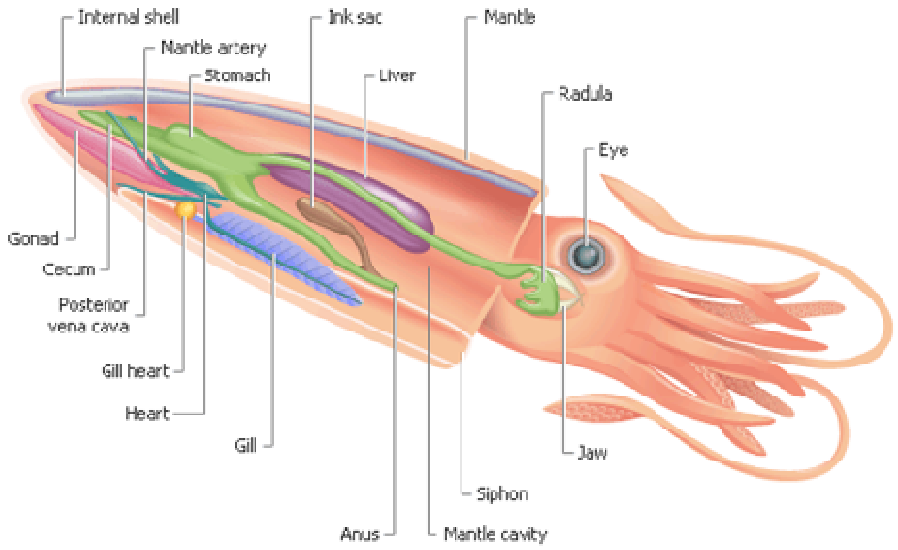
*Muscular and adapted for different uses

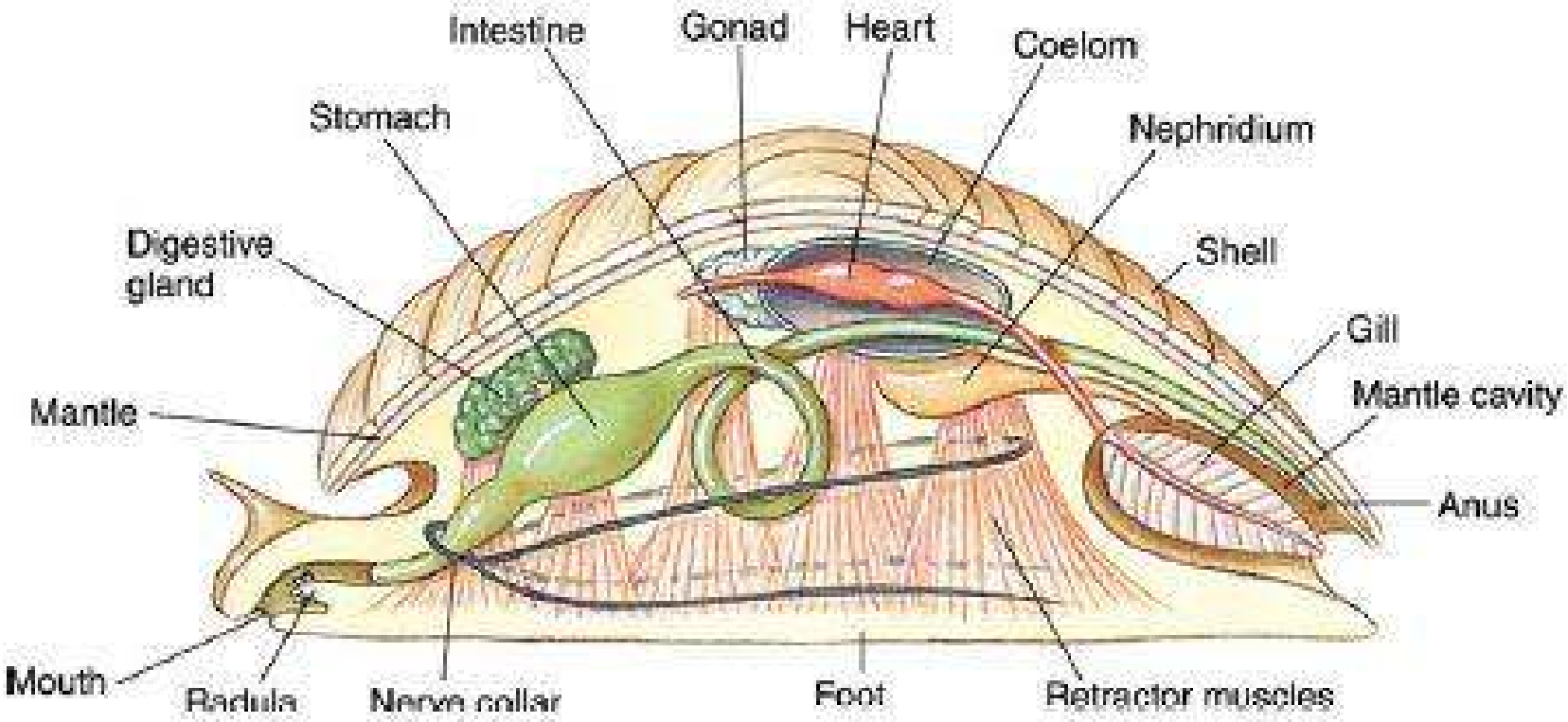
- *Limpets- attachment disc
- *Bivalves- hatchet foot for burrowing - video
- *Cephalopods-tentacles/arms


ARKive
www.arkive.org
© Espen Rekdal / SeaPics.com

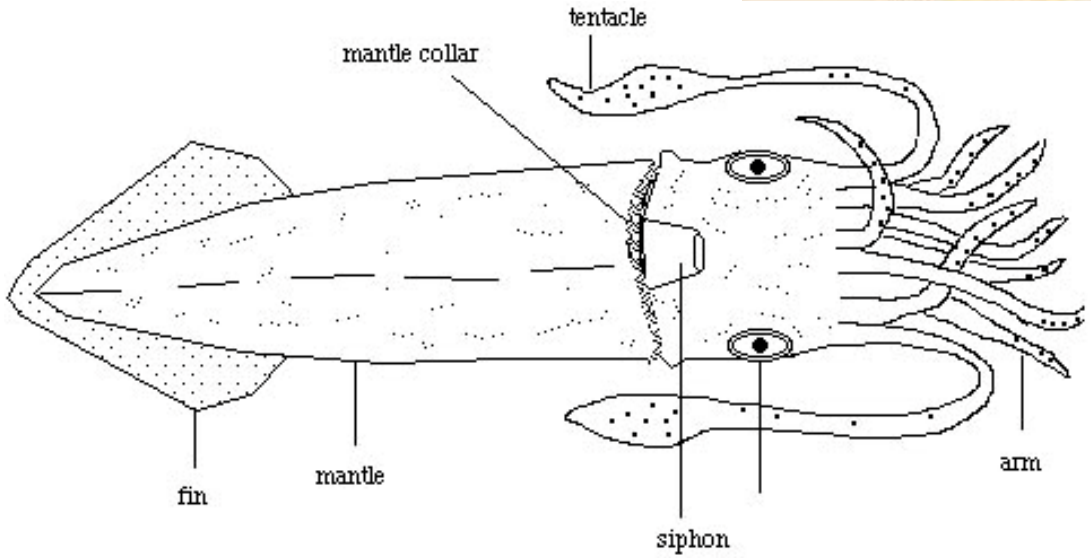
Mantle

- Mantle- layer of tissue that covers and protects the inner body
  - Secretes shell in some species
  - Creates mantle cavity



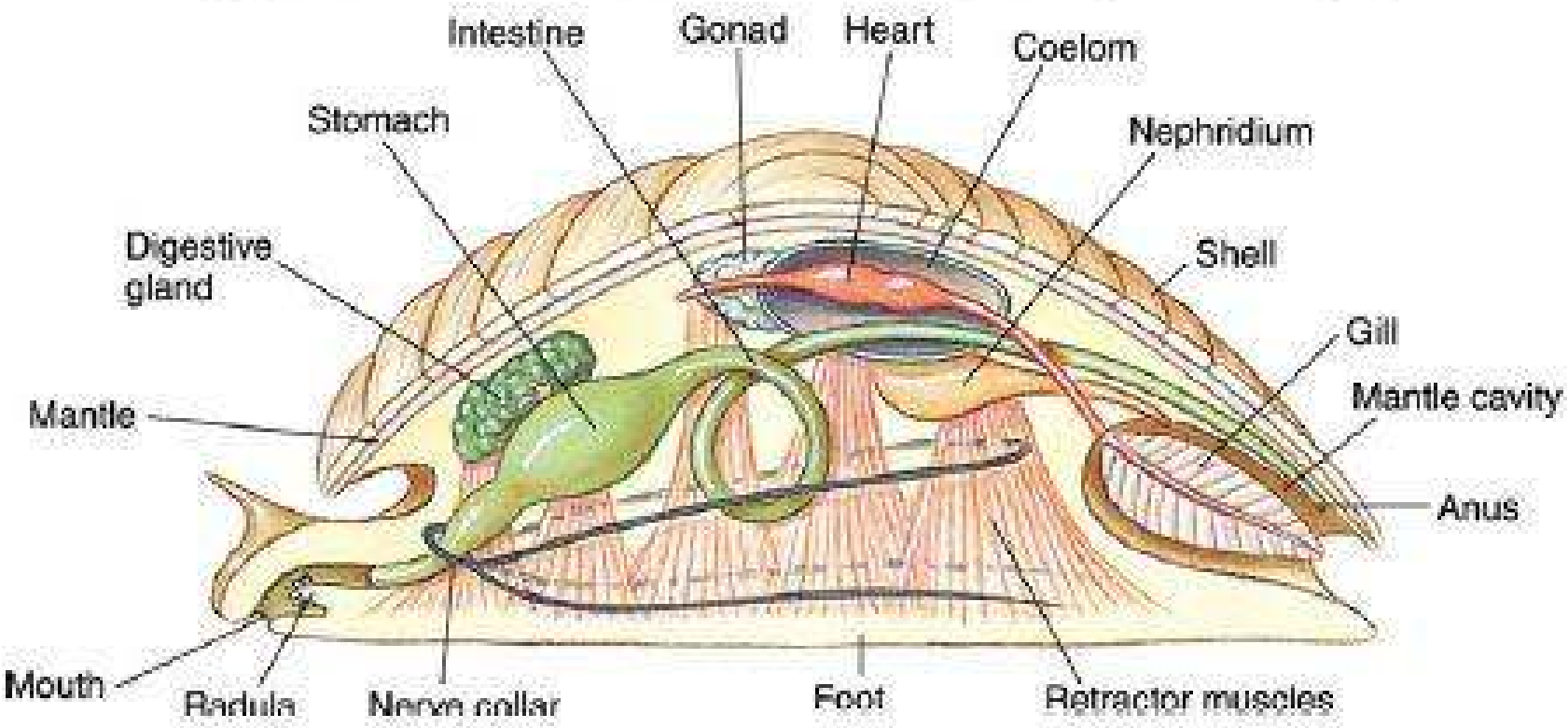

Intestine
Gonad
Heart
Coelom
Stomach
Nephridium
Digestive gland
Shell
Gill
Mantle
Mantle cavity
Anus
Mouth
Radula
Nerve collar
Foot
Retractor muscles

* Adapted for swimming in some species
* Video



Mantle Cavity

- Mantle cavity- houses respiratory organs (lungs, gills)
  - Excretory, digestive and reproductive products released here
  - Protection – head draws in
  - Cephalopods pull water in for jet propulsion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Stomach
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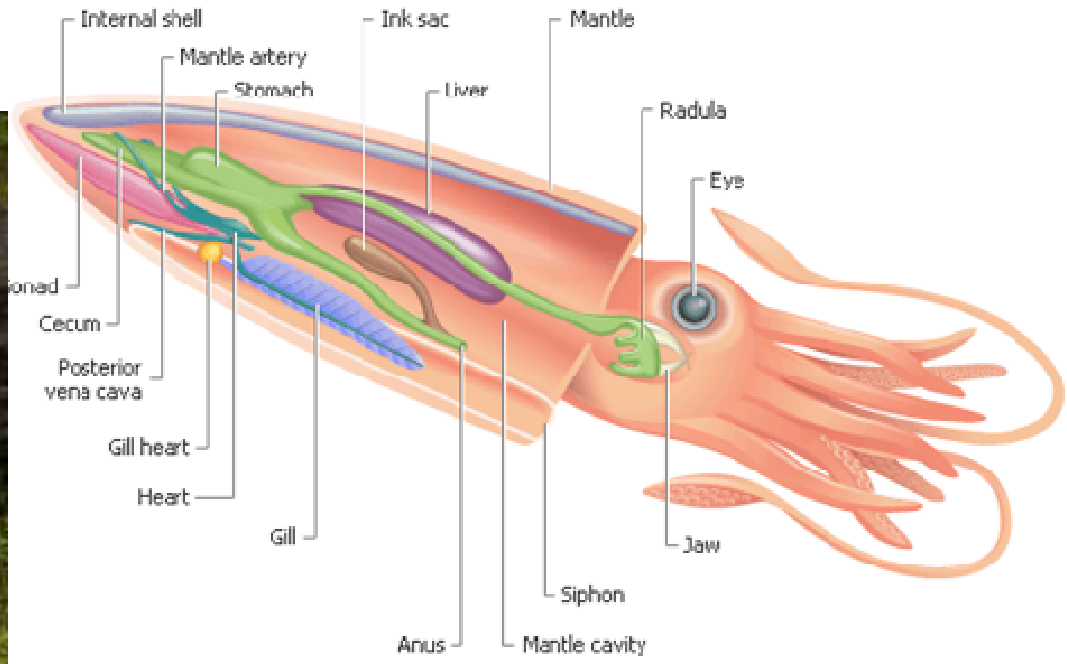
Digestive gland
Shell
Gill
Mantle
Mantle cavity
Anus
Mouth
Radula
Nerve collar
Foot
Retractor muscles

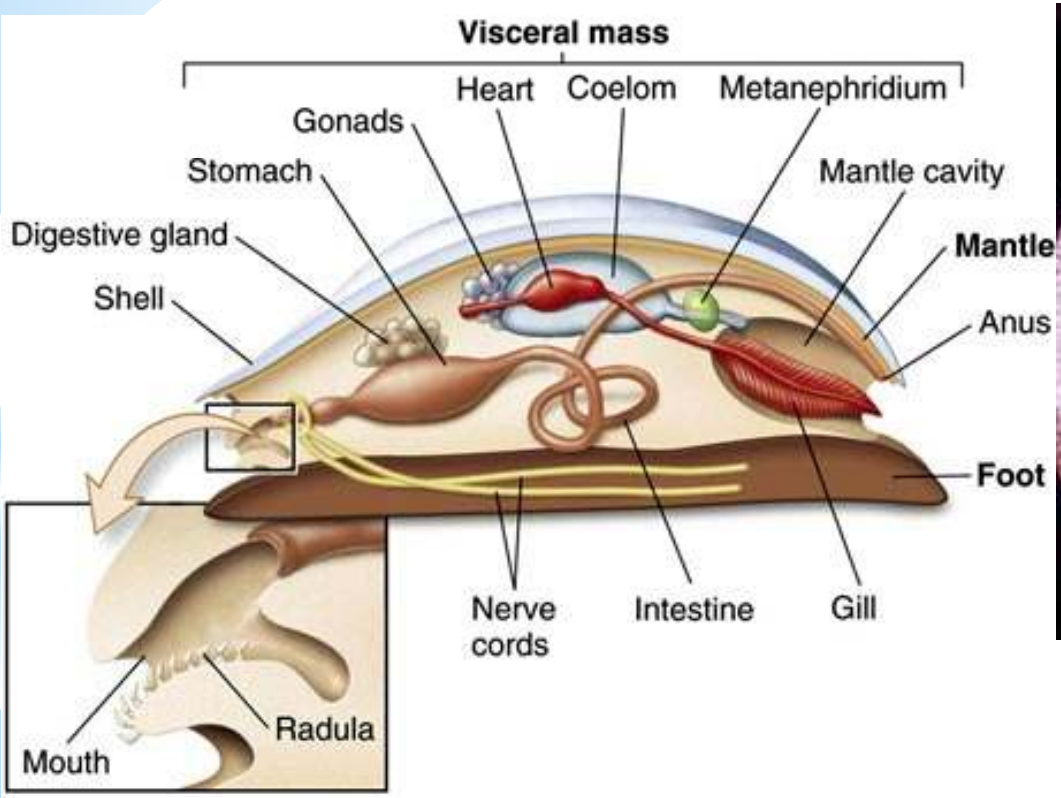
Shell and Visceral Mass

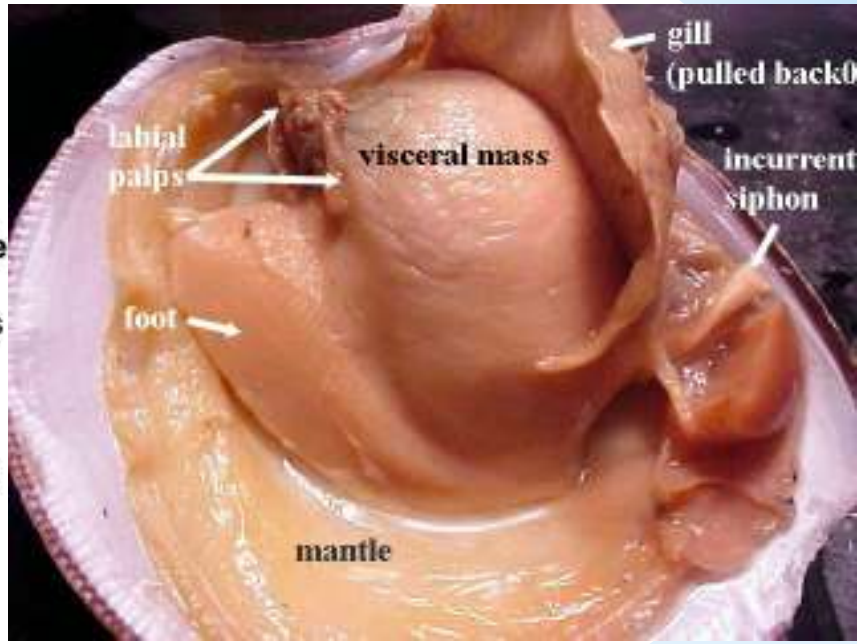
- Made by glands
  - Calcium carbonate
- Reduced or lost in some species



*Shell and Visceral Mass

*Visceral mass - all the internal organs

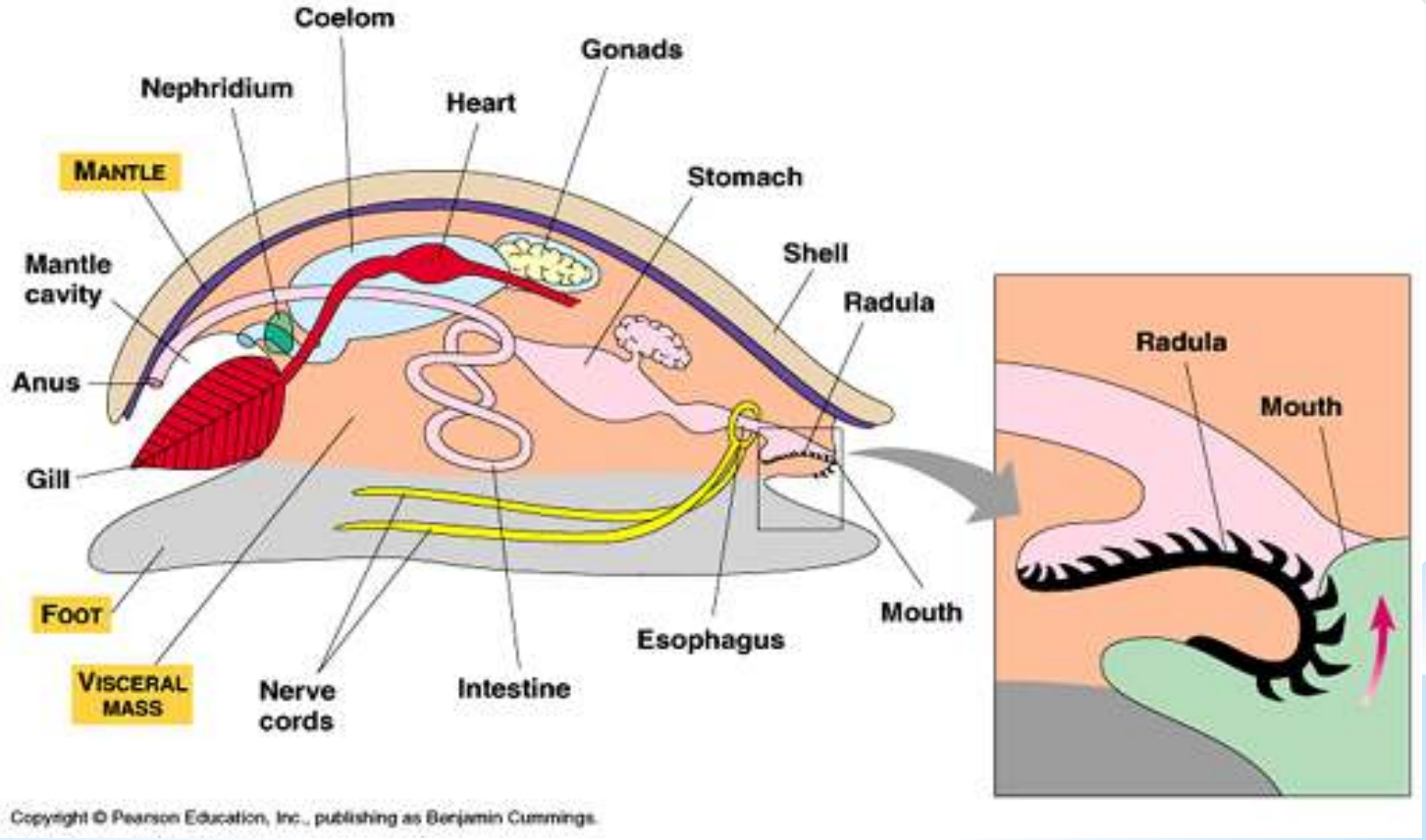


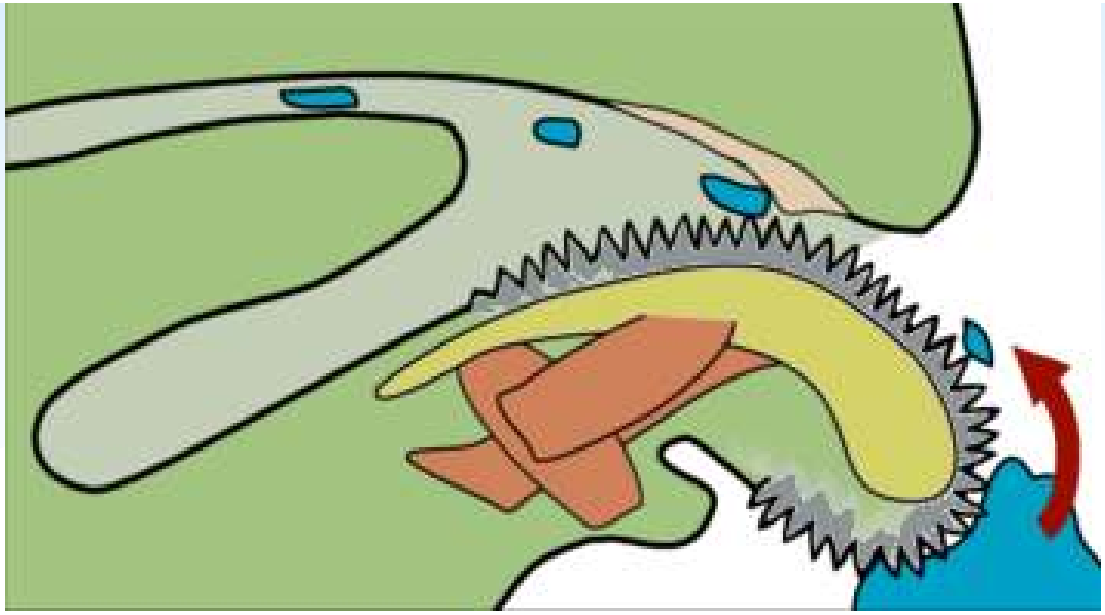


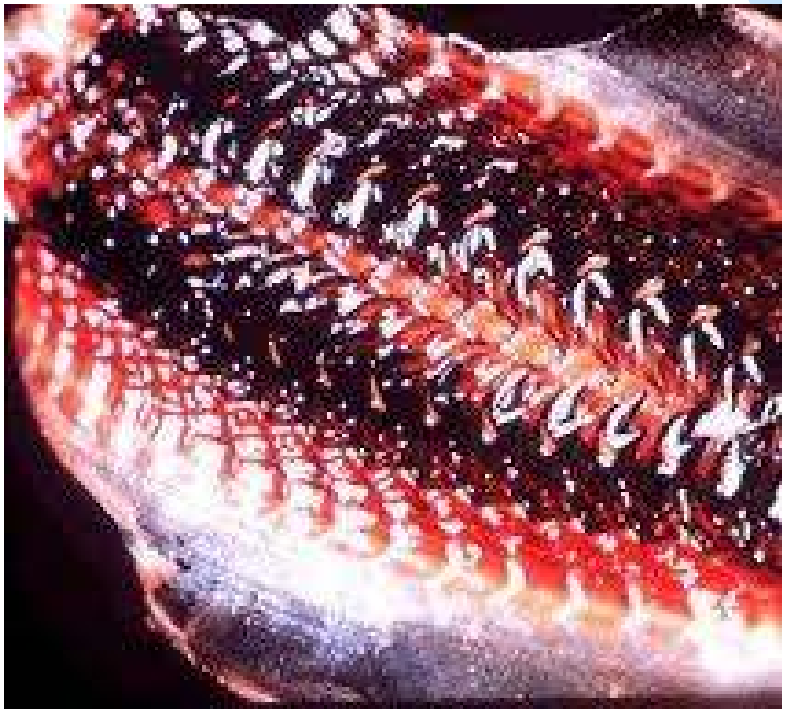
*Feeding and Digestion

*Mouth has radula- rasping tongue-like organ with teeth

*For scraping food



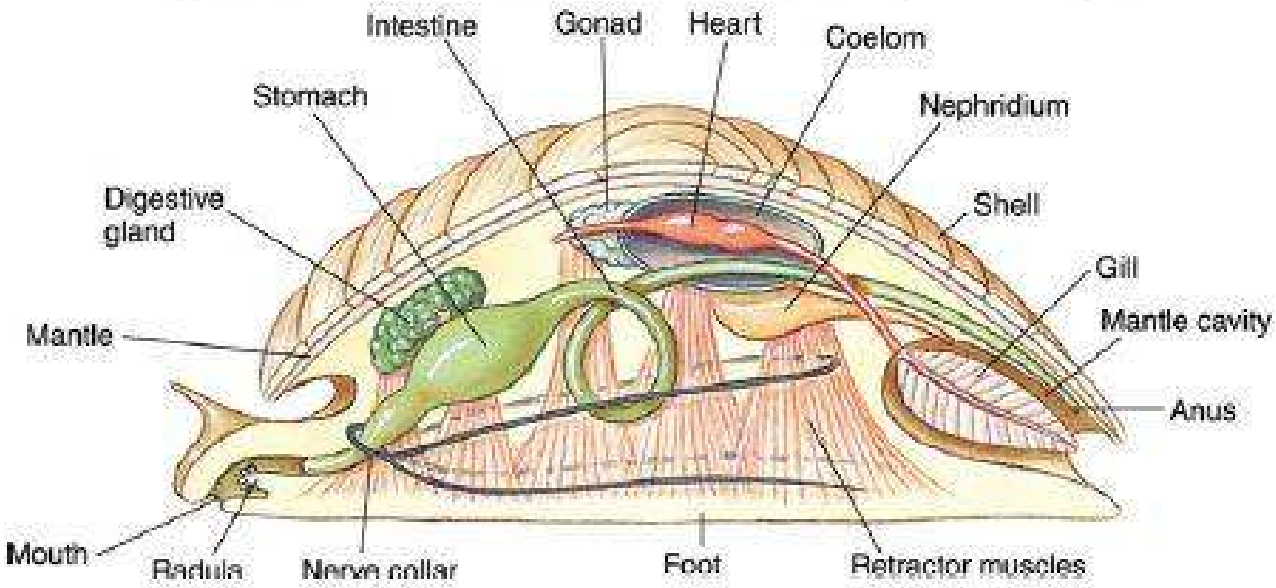


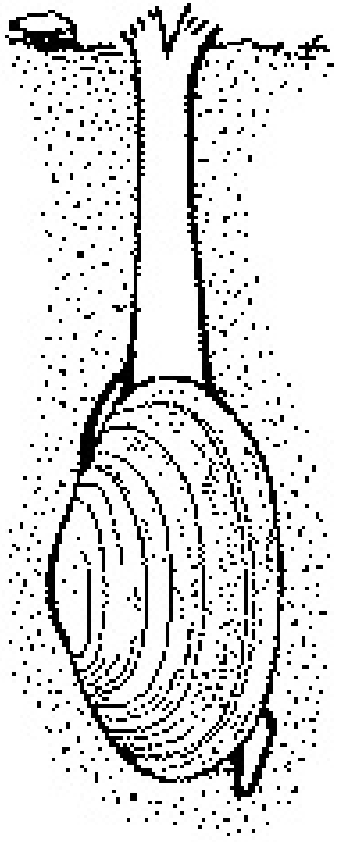


*Feeding

*Herbivores, carnivores, filter feeders video 2

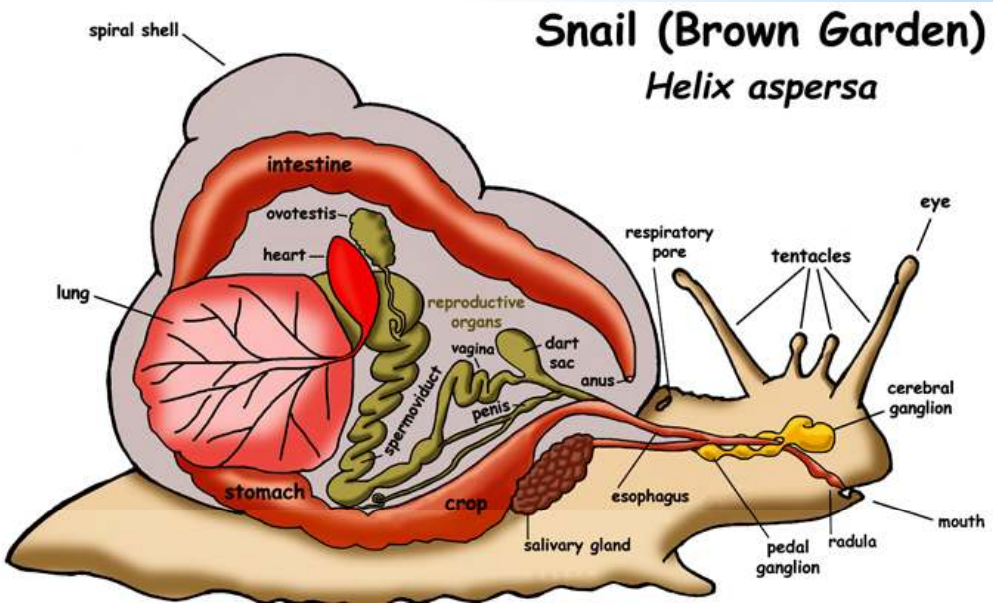
*Complete digestive tract with stomach and intestine

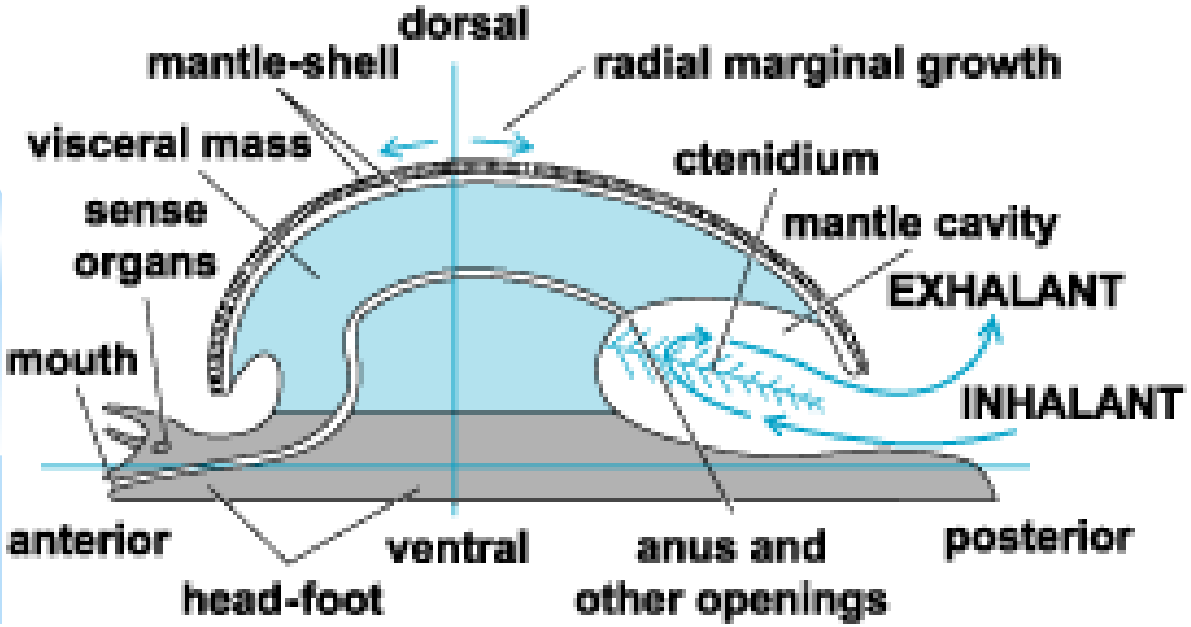




*Respiration

*Gases diffuse from the gills or lungs into the blood then into the mantle cavity

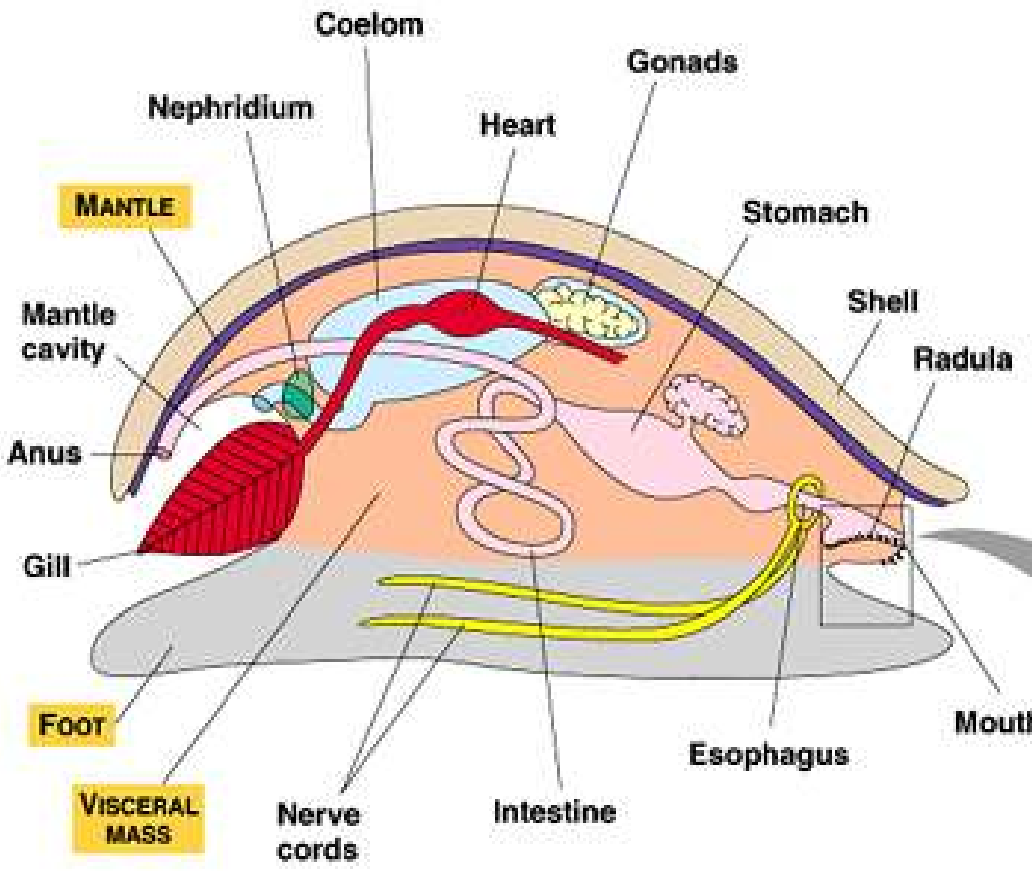




*Circulation

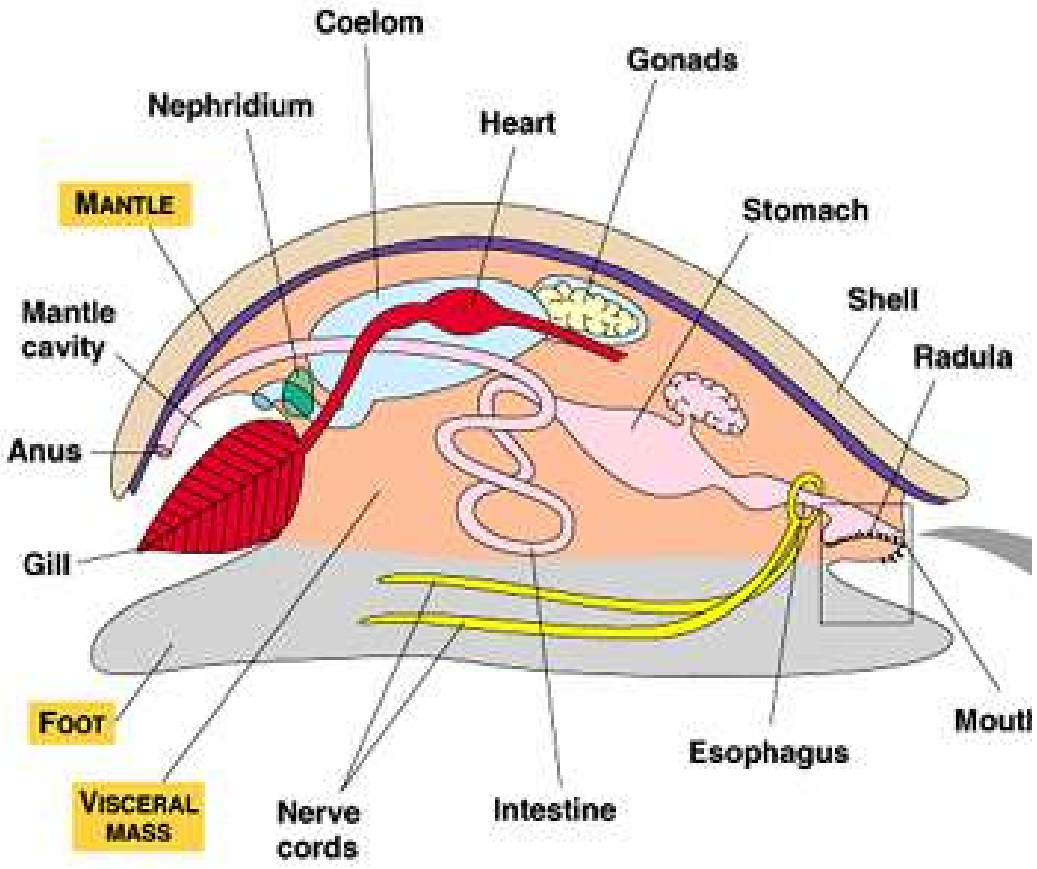
*Most have an open system-blood leaves the vessels and directly contacts the tissues

*Muscular heart



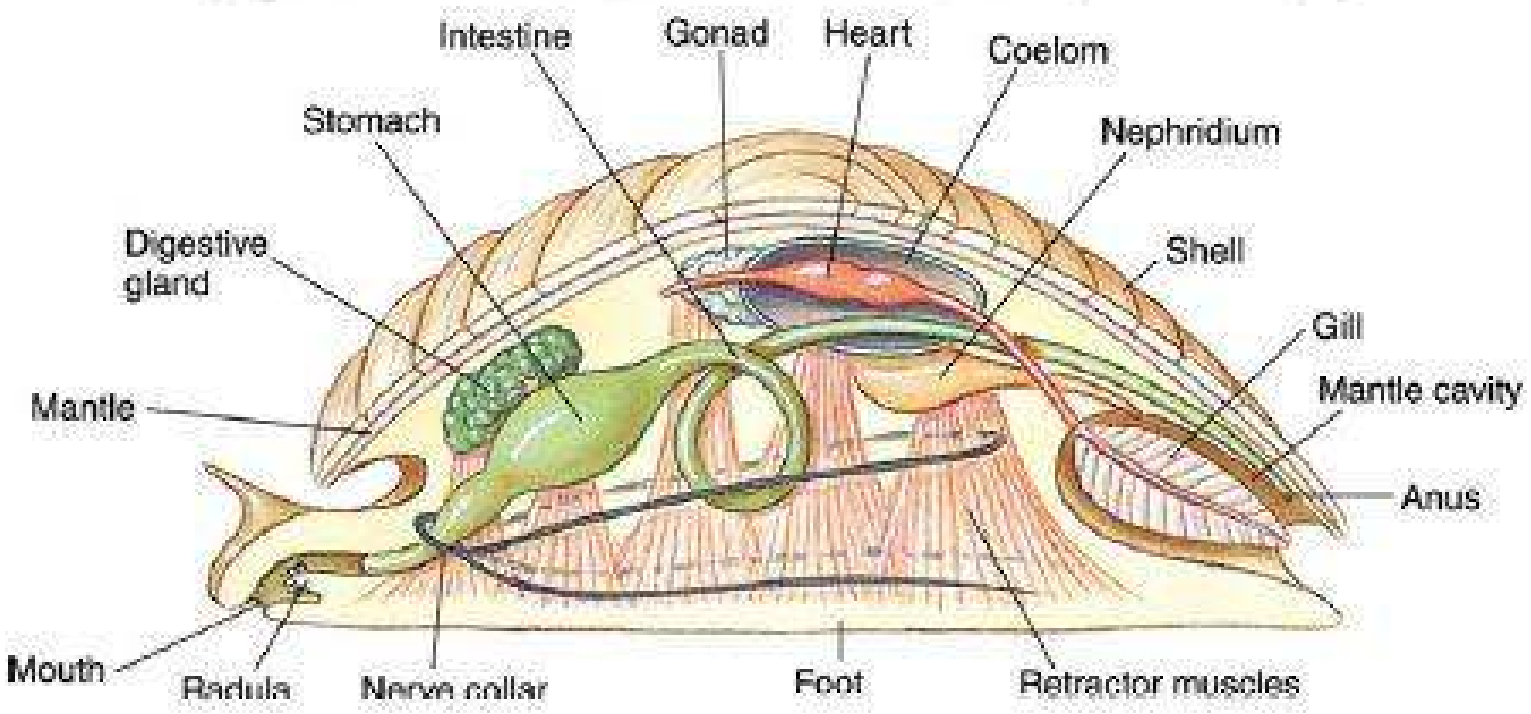
*Circulation

*What are the advantages of open vs closed?



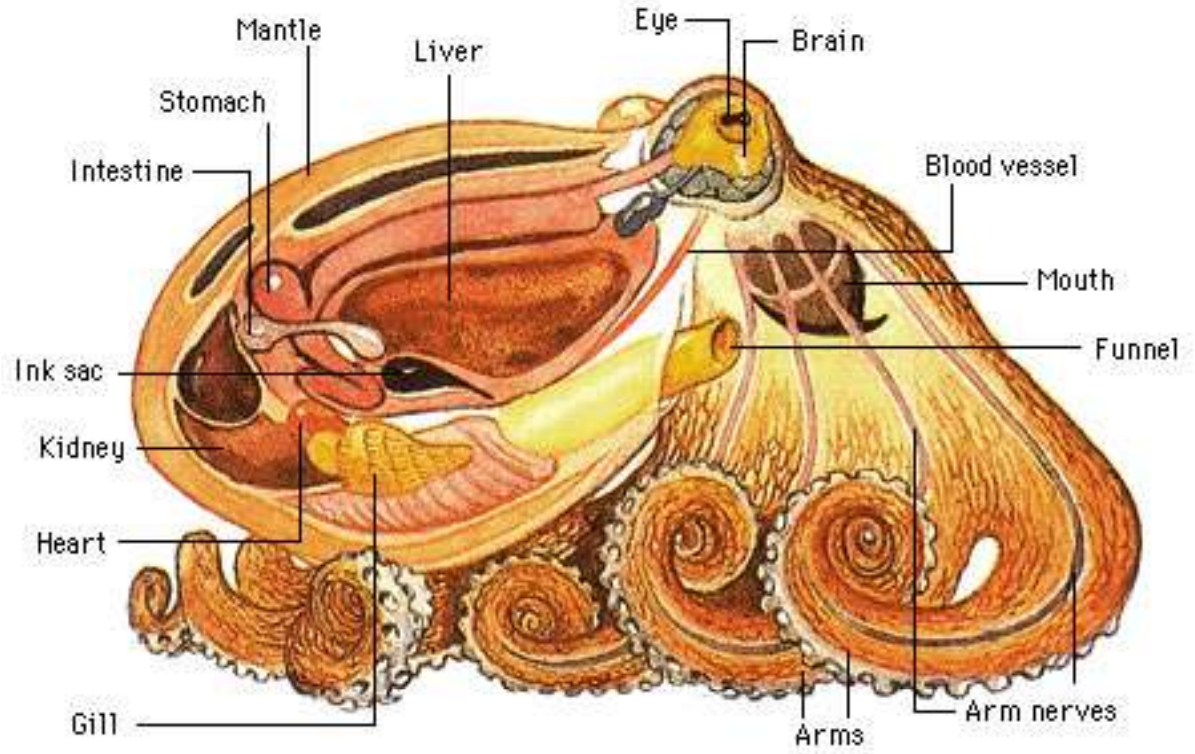
Excretion

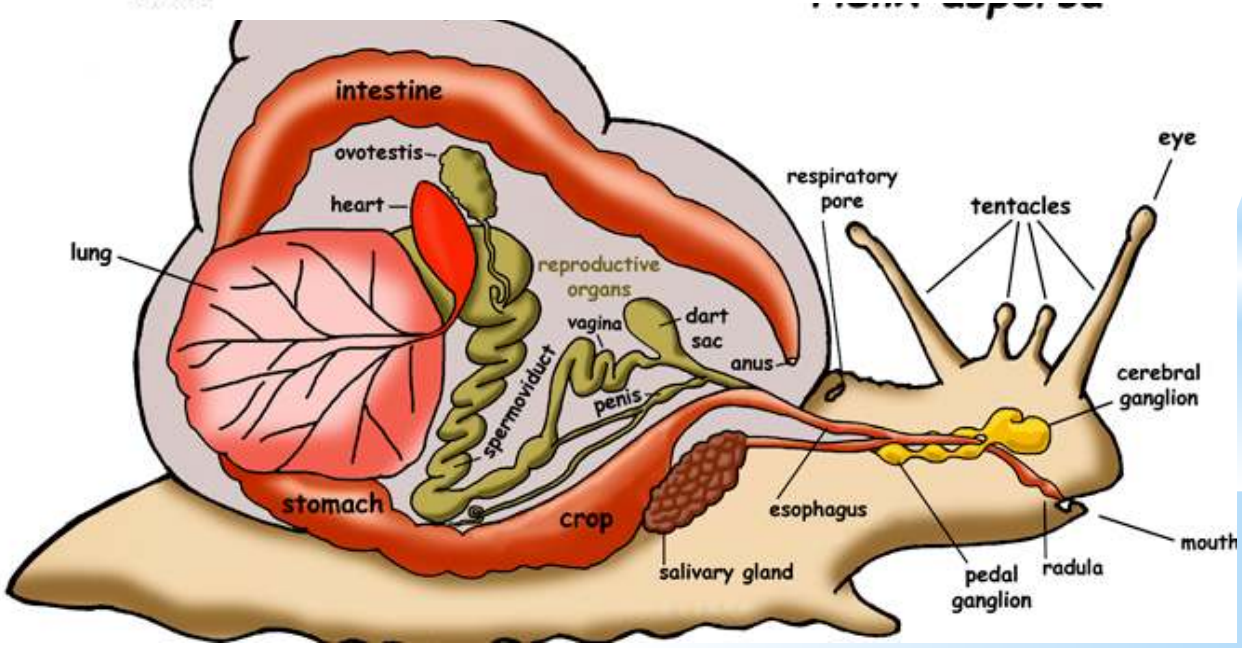
- Waste travels in the blood to the coelom
- Kidneys (nephridium) remove waste from the coelom



Response and Senses

- Bivalves- simple nervous system
  - Ganglia, nerve cords, eyespots, chemical receptors
- Cephalopods – complex nervous system with advanced senses
  - Eyesight, intelligence, memory, touch


Mantle
Liver
Eye
Brain
Stomach
Intestine
Blood vessel
Mouth
Funnel
Ink sac
Kidney
Heart
Gill
Arms
Arm nerves

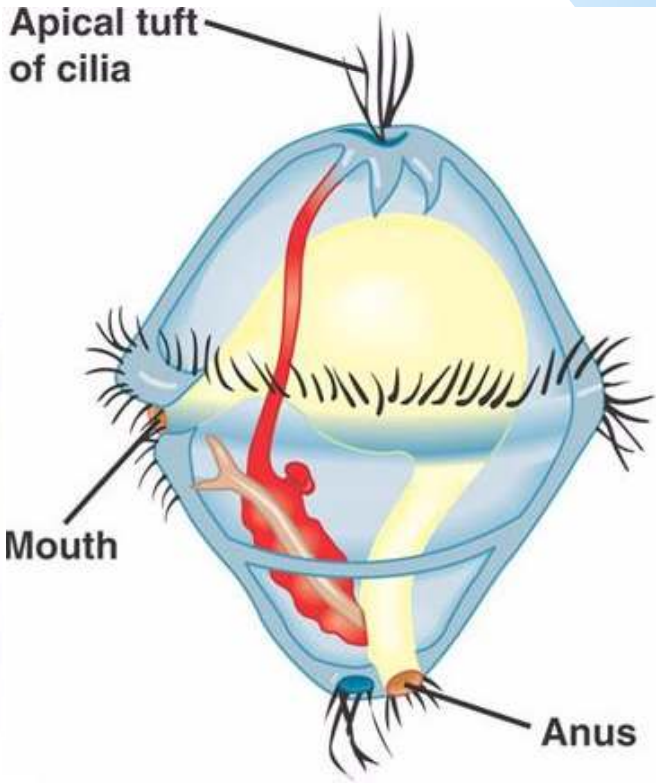

intestine
ovotestis
heart
lung
reproductive organs
vagina
dart sac
anus
spermoviduct
penis
stomach
crop
salivary gland
esophagus
respiratory pore
tentacles
eye
cerebral ganglion
pedal ganglion
radula
mouth

Movement

- Snails and slugs – secrete slime and use foot - video
- Cephalopods- siphon used for jet propulsion -video

*Reproduction

* Mostly dioecious with sexual reproduction – internal
* Bivalves- external fertilization
  * Free swimming larvae- trochophore



Reproduction

- Many monoecious snails
  - Eggs hatch and become larvae

* Sea Angels
  http://video.nationalgeographic.com/video/animals/invertebrates-animals/other-invertebrates/sea_angels/

* Cephalopod Videos

* Giant Clam
* The

* Bivalve Videos

Gastropod videos

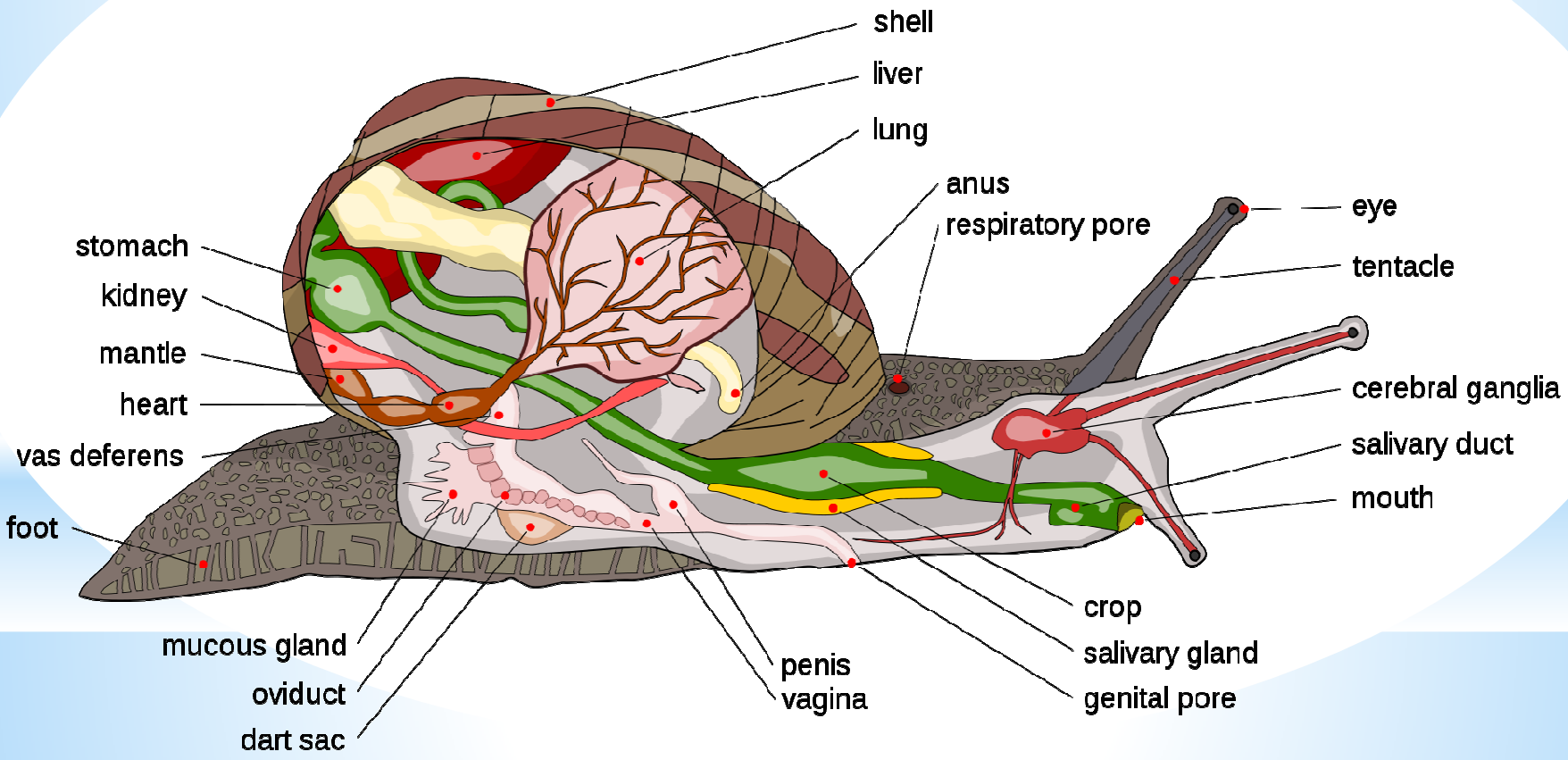
* Zombie Snails
* Nudibranch – stinging defense
* Cone Snail – fish hunting
* Cone Snail – Venom proboscis
* Shape of life
* BBC Garden Snail Invasion
* Sea Angels
* Nudibranch – Diversity
* Horse Conch

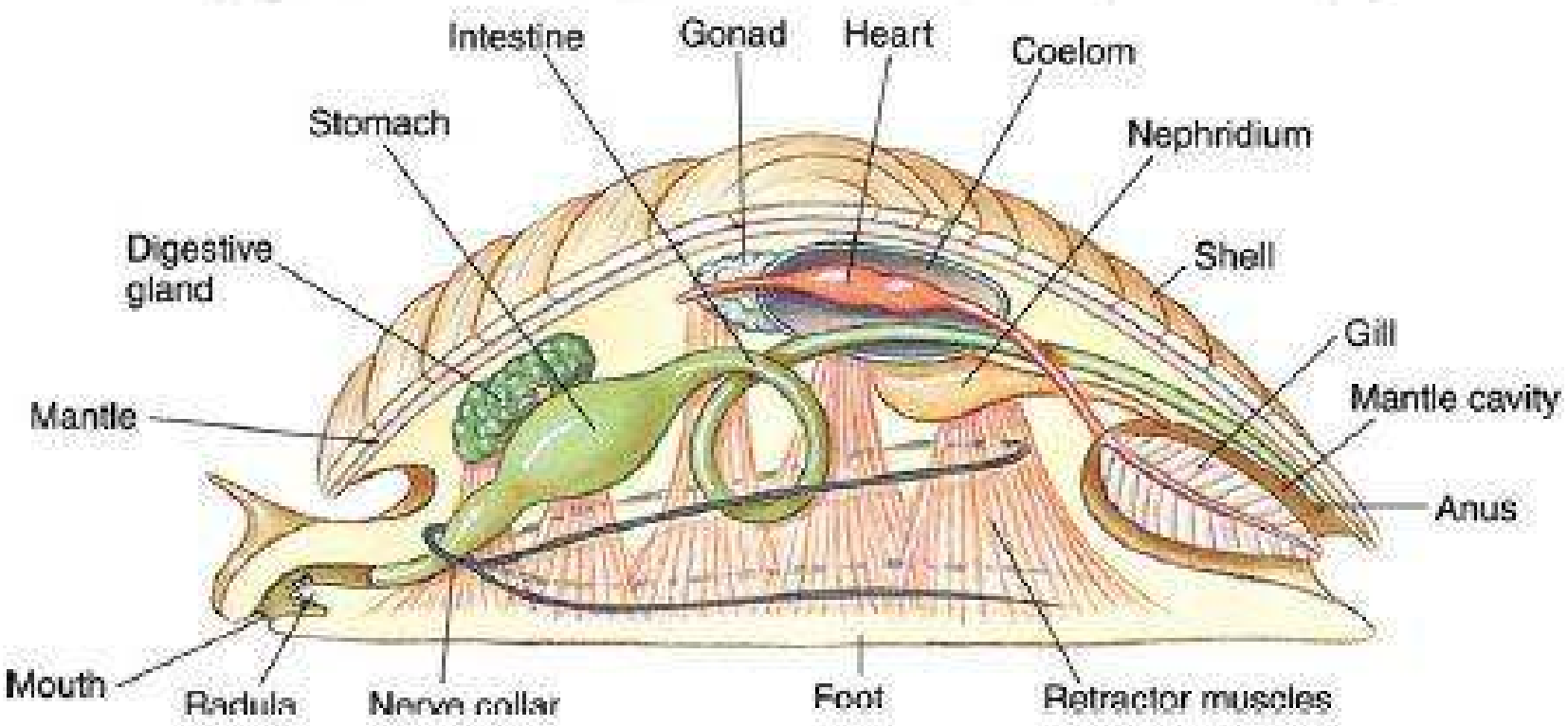
*Cool stuff about gastropods

- *40,000 living species. 15,000 fossil species
- *Mostly herbivores but some carnivores
  - *They eat other mollusks by drilling and splitting their shells open
    - *Clams, oysters
- *Poisonous cone snails
  - *Produce venom

Class Gastropoda

- Torsion: body organs are rotated
- Foot on ventral side




Intestine
Gonad
Heart
Coelom
Stomach
Nephridium
Digestive gland
Shell
Gill
Mantle
Mantle cavity
Anus
Mouth
Radula
Nerve collar
Foot
Retractor muscles

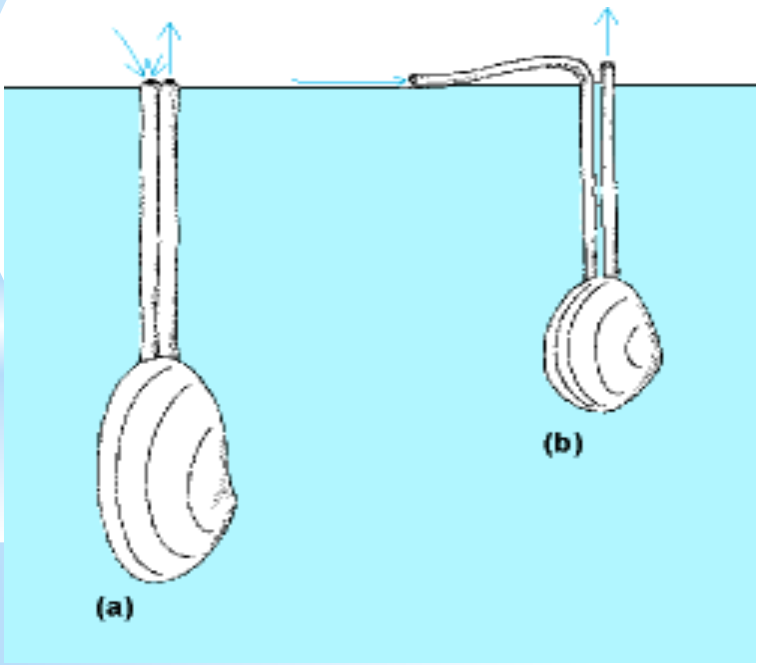
*Cool stuff about bivalves

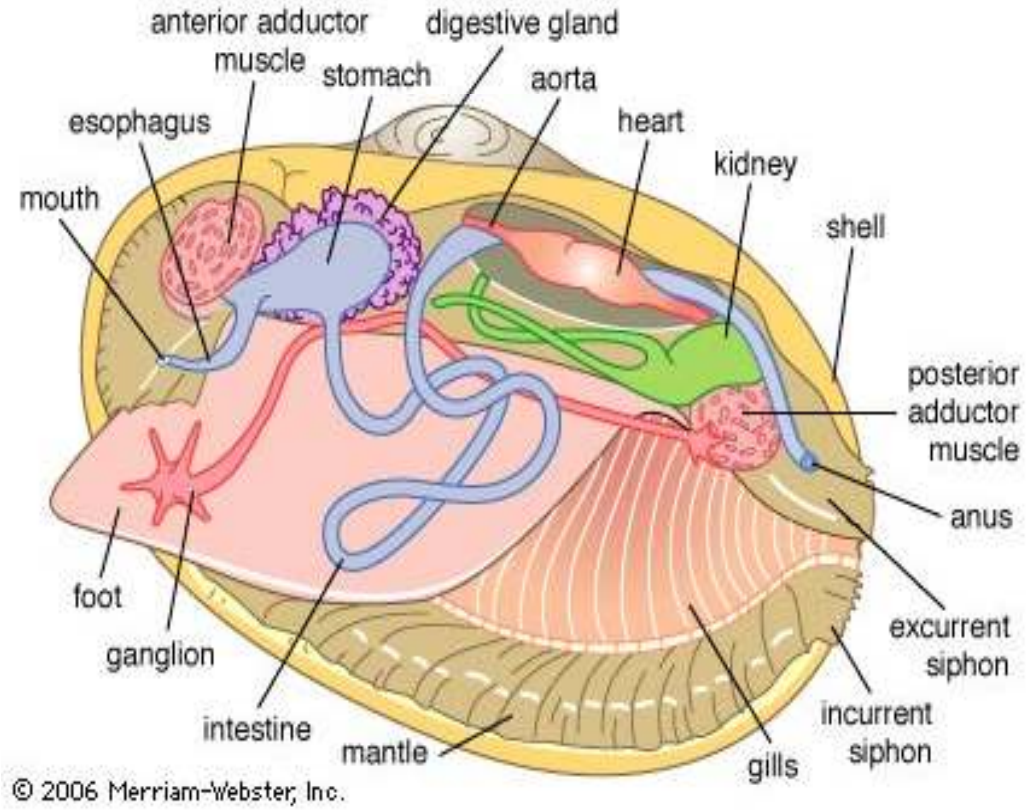
*30,000 living species

*Filter feeders- no head or radula, use siphon to get food

*Sand between mantle and shell results in a pearl - oyster

*Often burrow and extend siphon to the surface





*Class bivalvia

*No brain just ganglia

*2 shells held together by muscles and hinge ligament- Primary defense against sea stars

*Some are sedentary: oysters, mussels

*Escape by digging or “clapping”

*Cool stuff about bivalves

*Sensory cells on the mantle – eyes in scallops

*Cool stuff about bivalves

* Oysters- 50 million eggs per year
  * Zebra Mussel
* Most freshwater bivalves brood their young till larvae stage
  * Some larvae live as parasites on fish

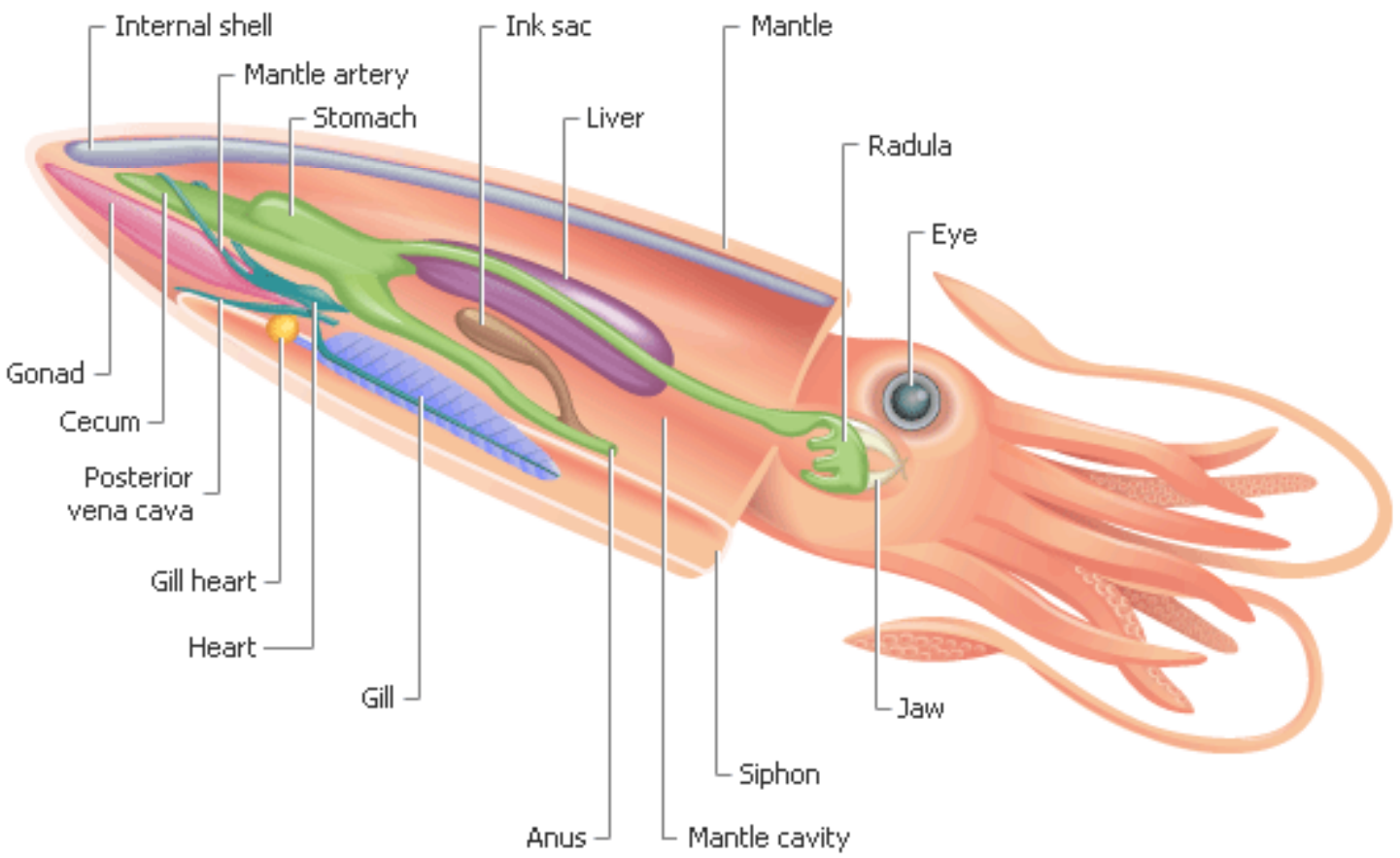
Cool stuff about cephalopods

- Head attached directly to foot

*Cool stuff about cephalopods

*Shells lost or reduced to small structure

*Pen or cuttlebone

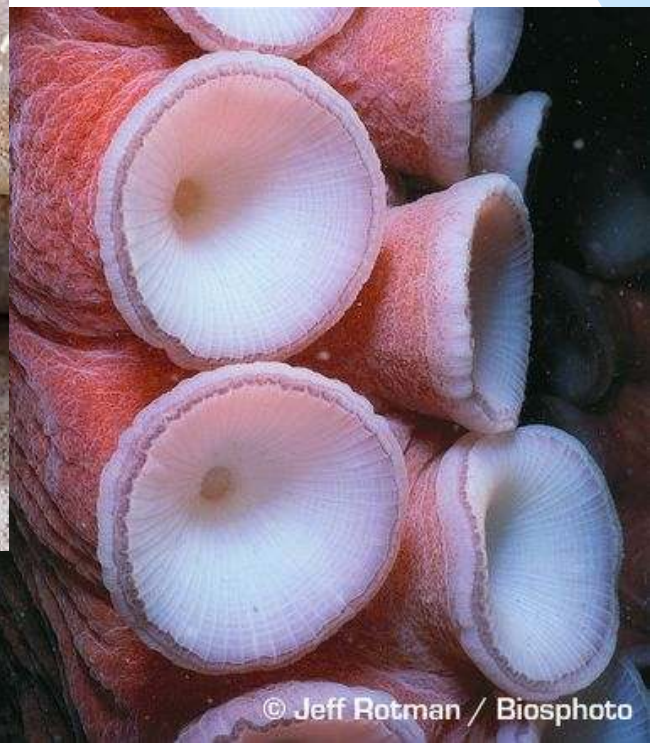


*Cool stuff about cephalopods

*Nautilus with chambers

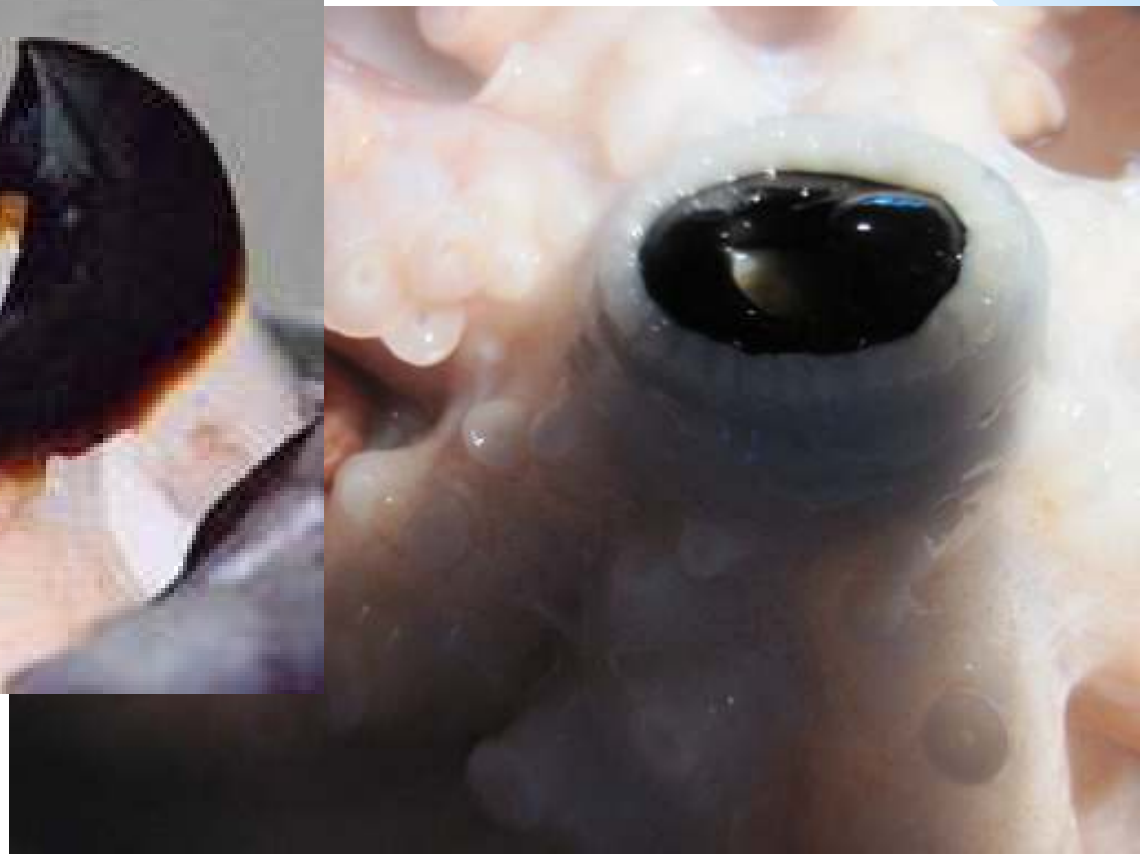
*Cool stuff about cephalopods

*Squid have hooks in their suckers



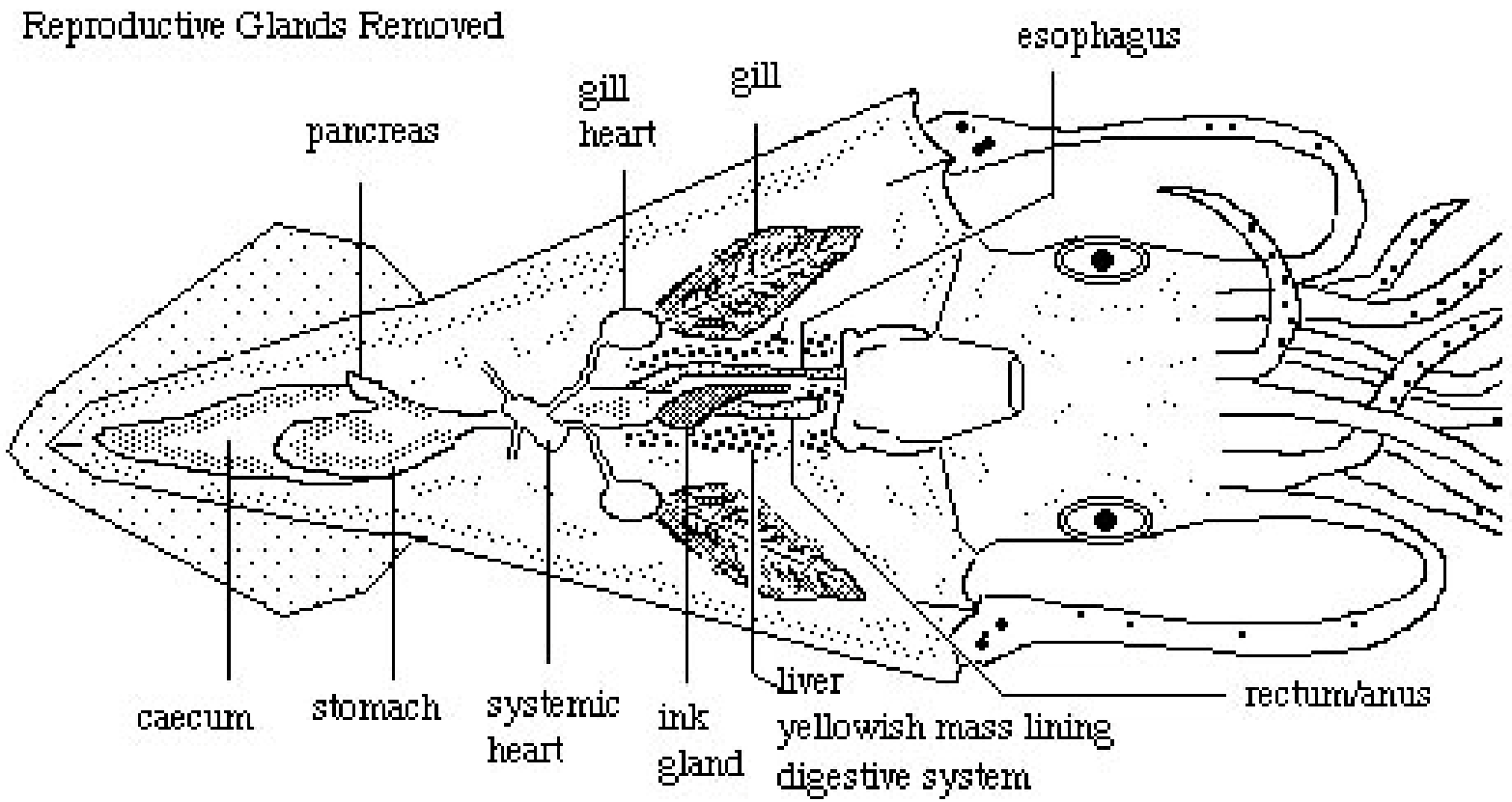
*Cool stuff about cephalopods

* Octopus with poisonous salivary glands
* Jaws and radula – beak



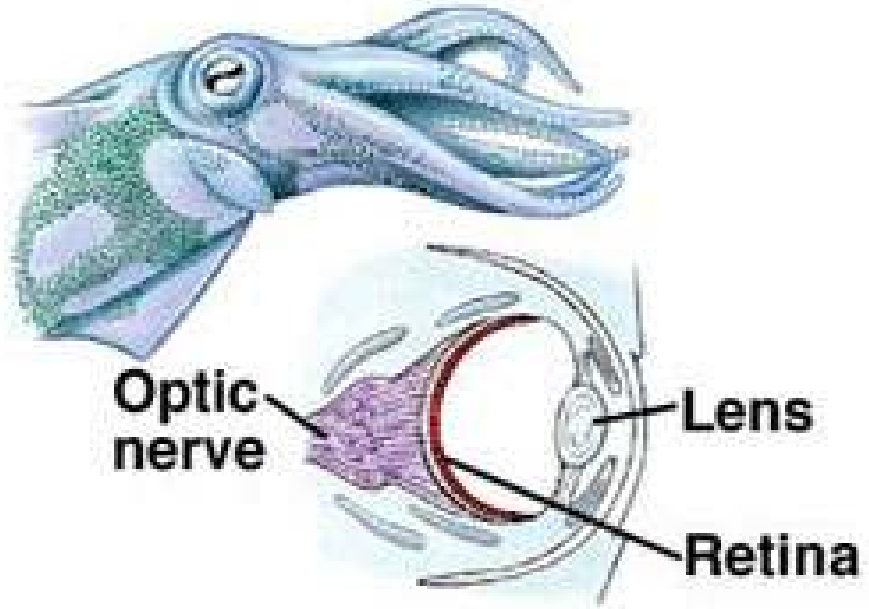
*Cool stuff about cephalopods

- *Closed circulatory system- multiple hearts
  - *Why is that better?

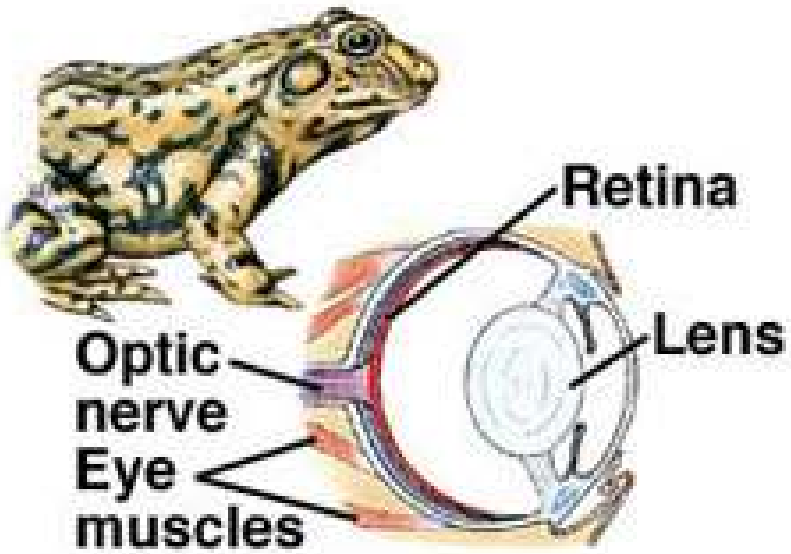


*Cool stuff about cephalopods

- Eyes like ours
  - See images, shapes and some colors
  - No blind spot



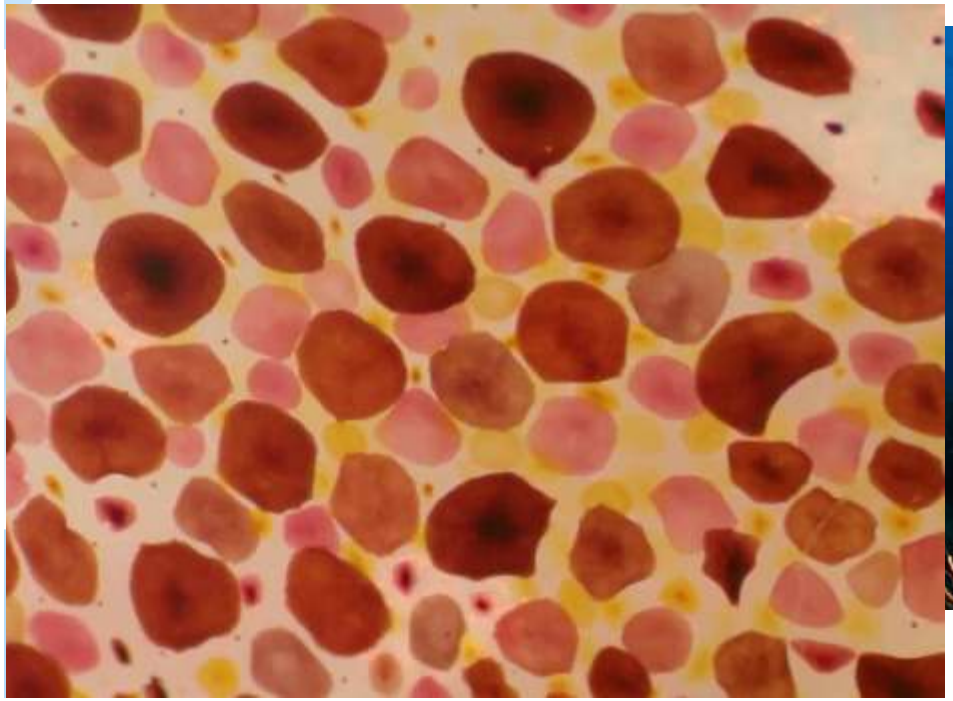
Mollusk



Vertebrate

*Cool stuff about cephalopods

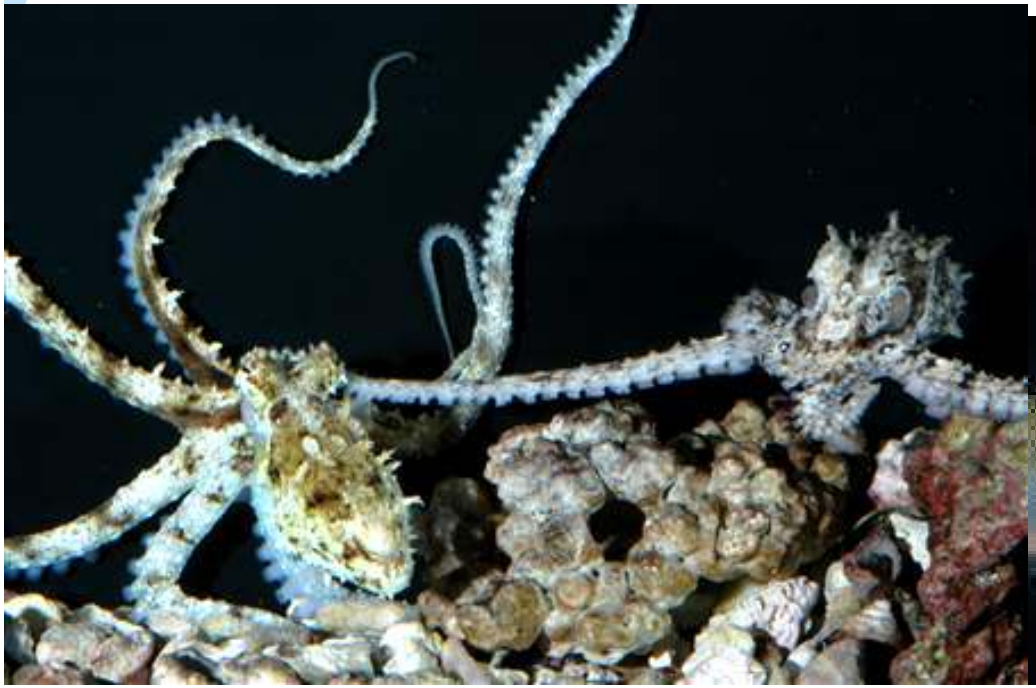
- *Chromatophores- pigment cells with muscles attached
- *Ink gland – for defense



*Cool stuff about cephalopods

*Males make spermatophores- sperm packets

*Males transfer packets to inside of female mantle during copulation



* General Mollusc – national geographic
* Swimming scallops – BBC nature