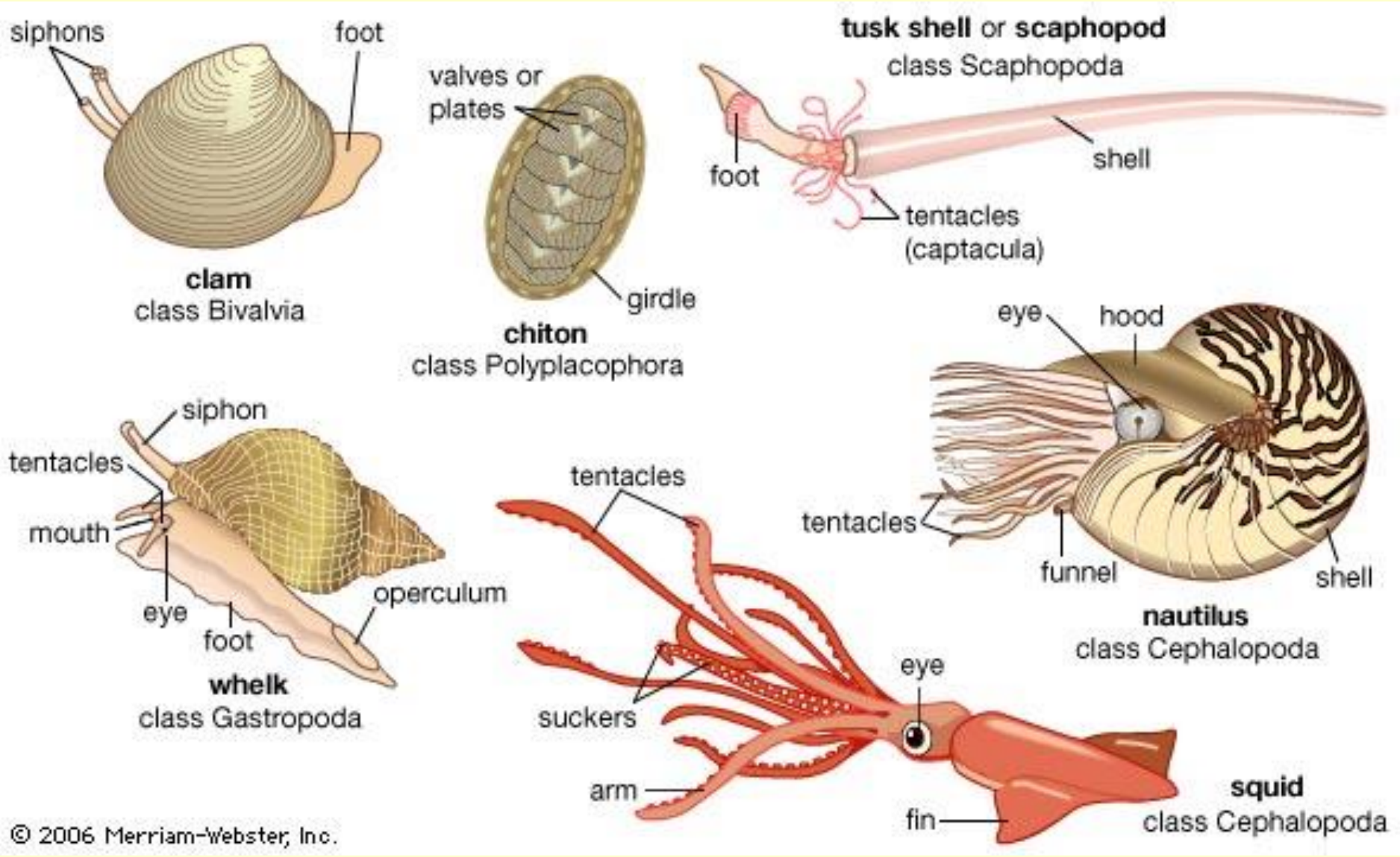
The Mollusks

Phylum Mollusca


siphons
foot
clam
class Bivalvia
valves or plates
girdle
chiton
class Polyplacophora
tusk shell or scaphopod
class Scaphopoda
foot
shell
tentacles (captacula)
eye
hood
tentacles
funnel
shell
nautilus
class Cephalopoda
siphon
tentacles
mouth
eye
foot
operculum
whelk
class Gastropoda
tentacles
suckers
arm
eye
fin
squid
class Cephalopoda
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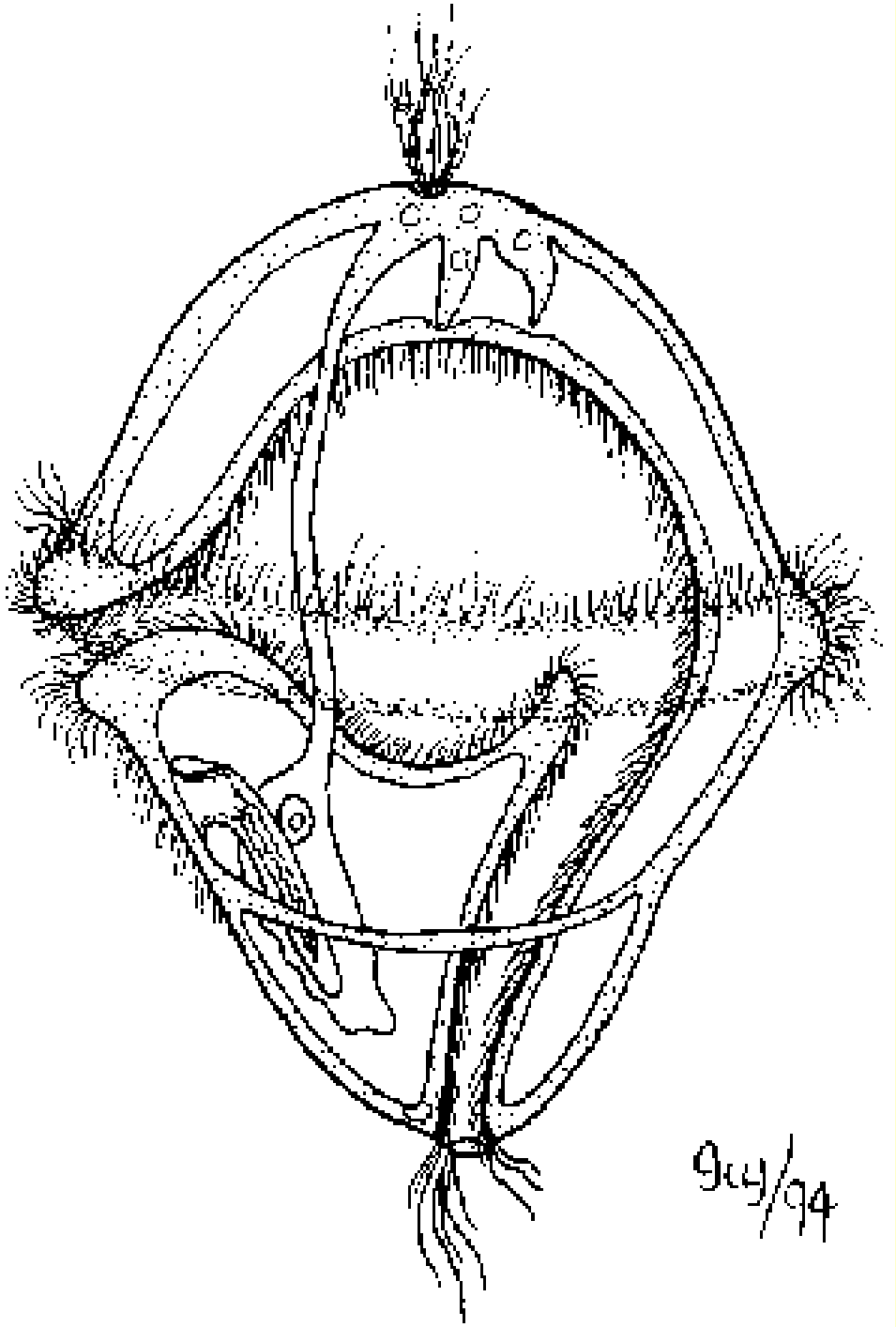
- Mollusks- Latin molluscus = soft
- Coelomates
- Exhibit cephalization

- Many mollusks have larval stage- trochophore
  - Hatch from egg case
  - Easily dispersed by ocean currents and tides

- Ciliated tissue (velum) may develop on larvae.
  - Larvae is then known as a veliger

- Velum is used to collect food and to swim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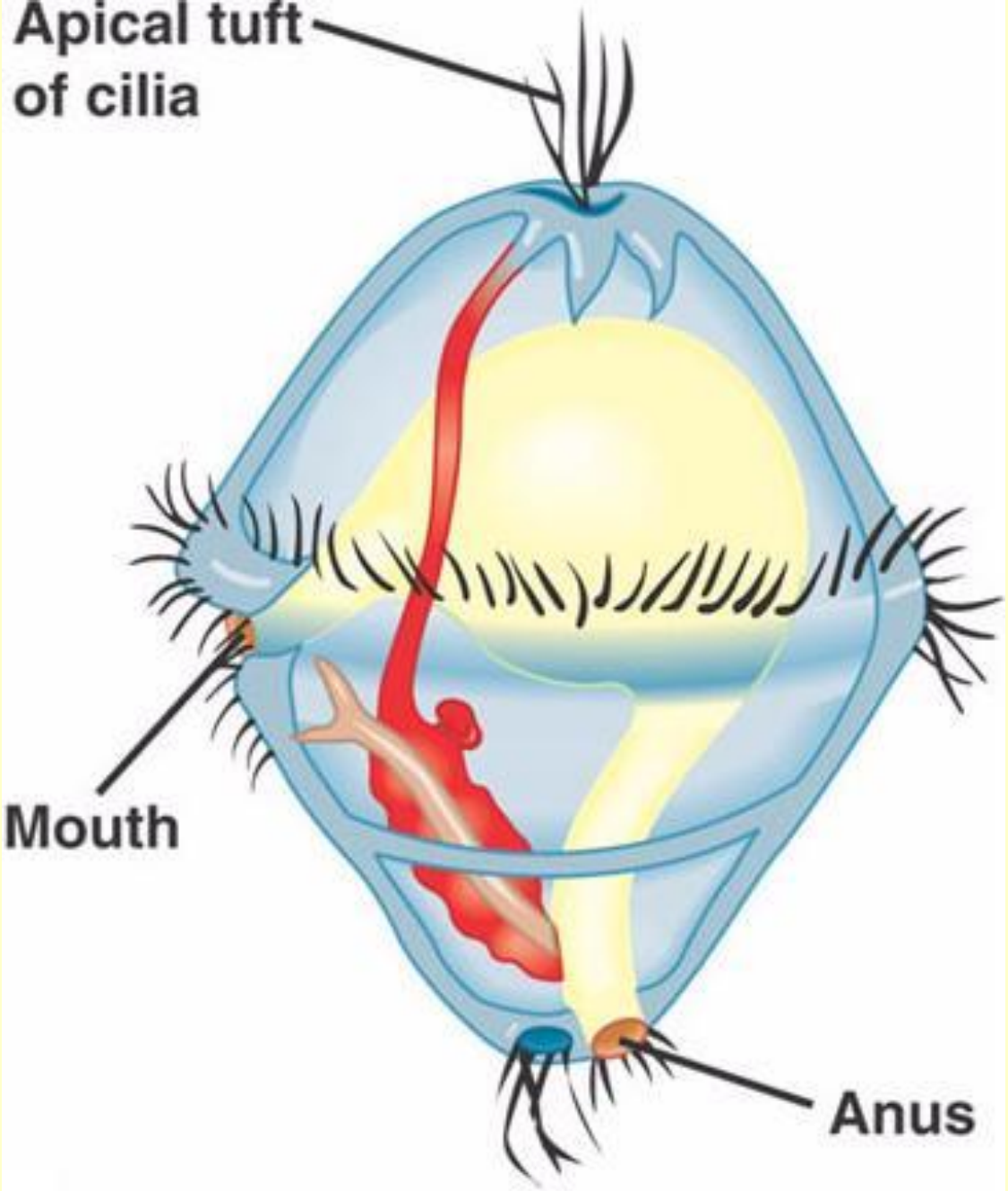
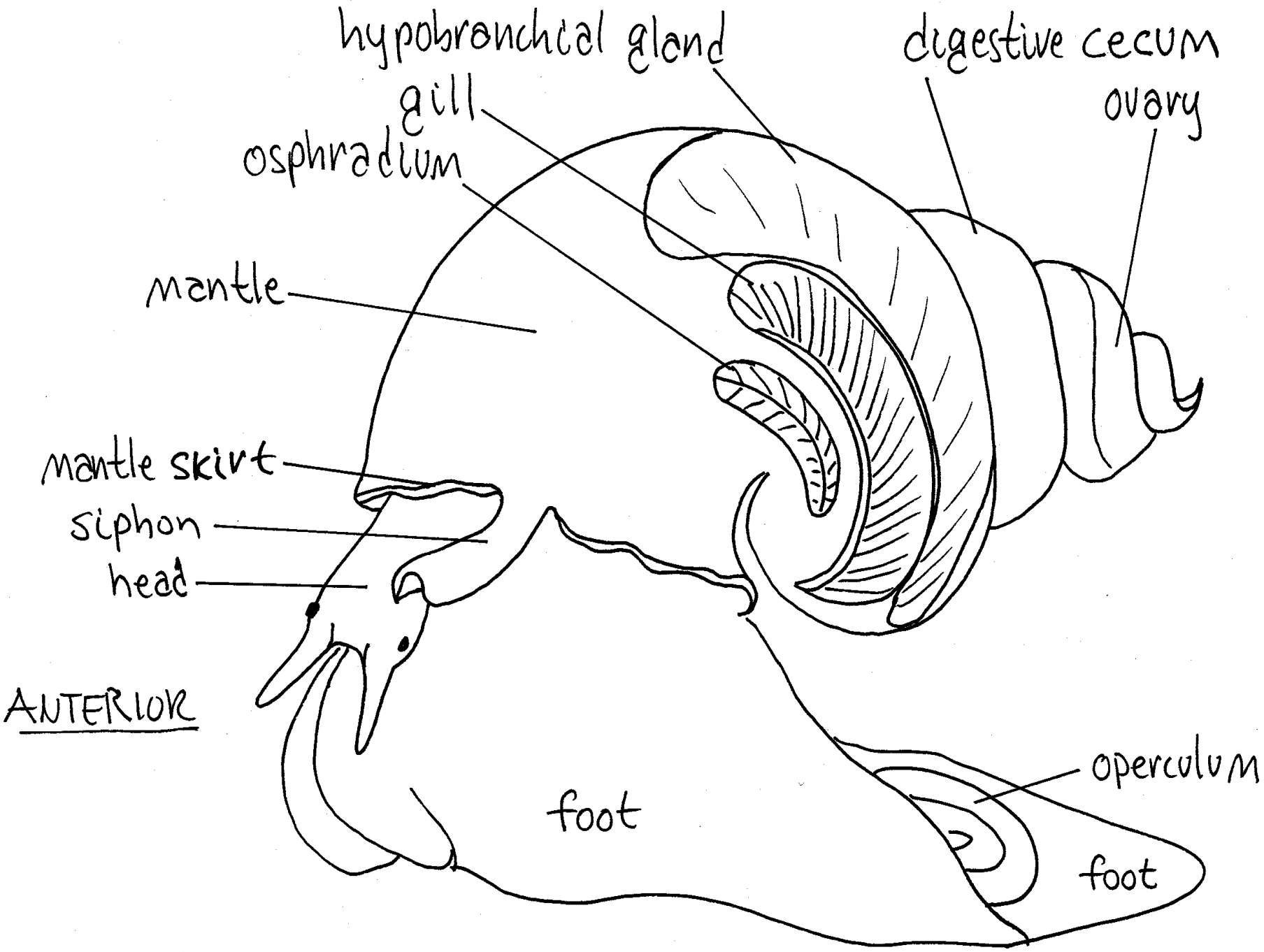
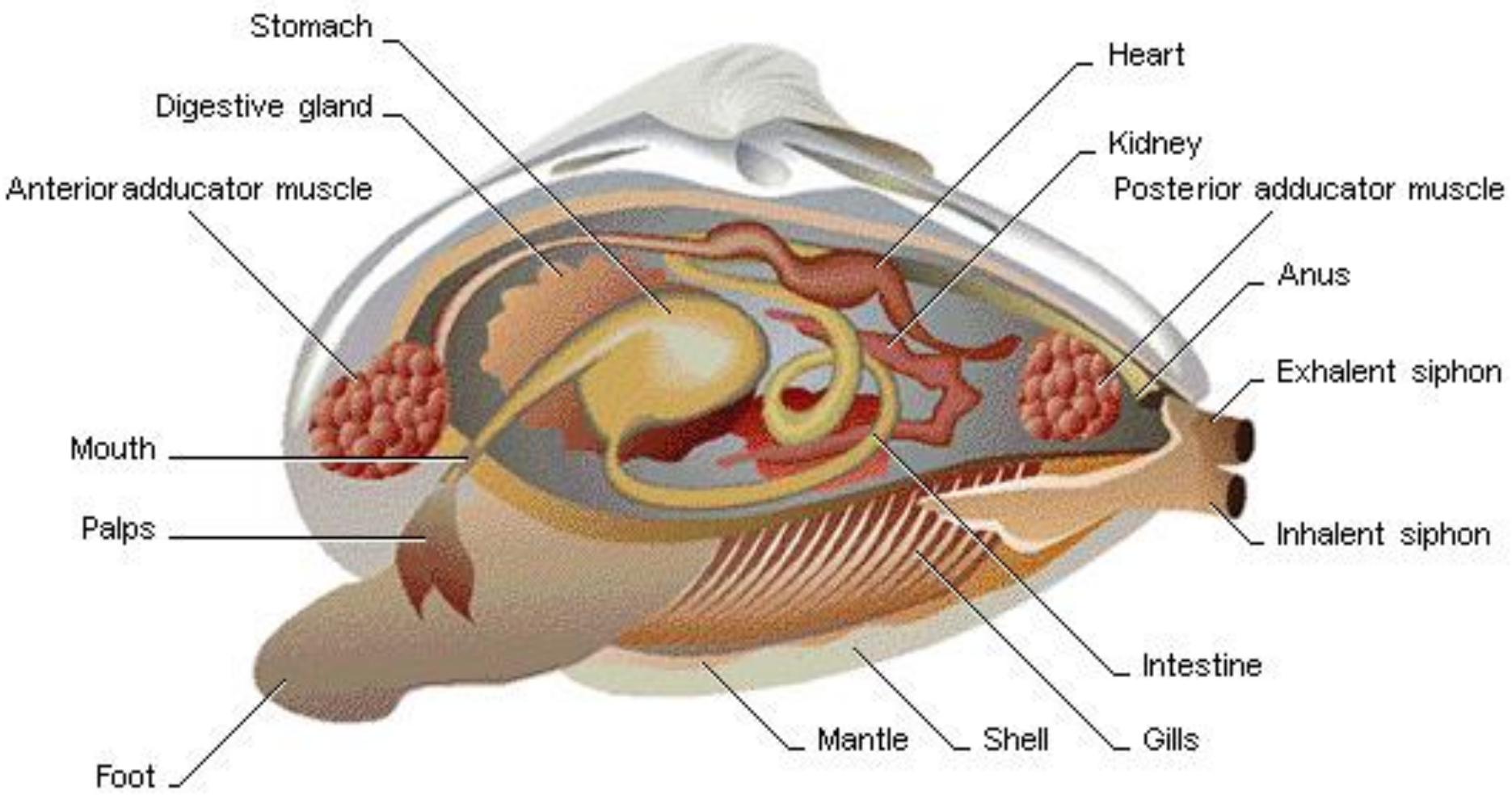


Structure of trochophore larva

Body Plan

- Generally divided into two main regions:
- Head-foot and Visceral Mass


hypobranchial gland
digestive cecum
gill
ovary
osphradium
mantle
mantle skirt
siphon
head
ANTERIOR
operculum
foot
foot


Stomach
Digestive gland
Anterior adducator muscle
Mouth
Palps
Foot
Heart
Kidney
Posterior adducator muscle
Anus
Exhalent siphon
Inhalent siphon
Intestine
Gills
Shell
Mantle

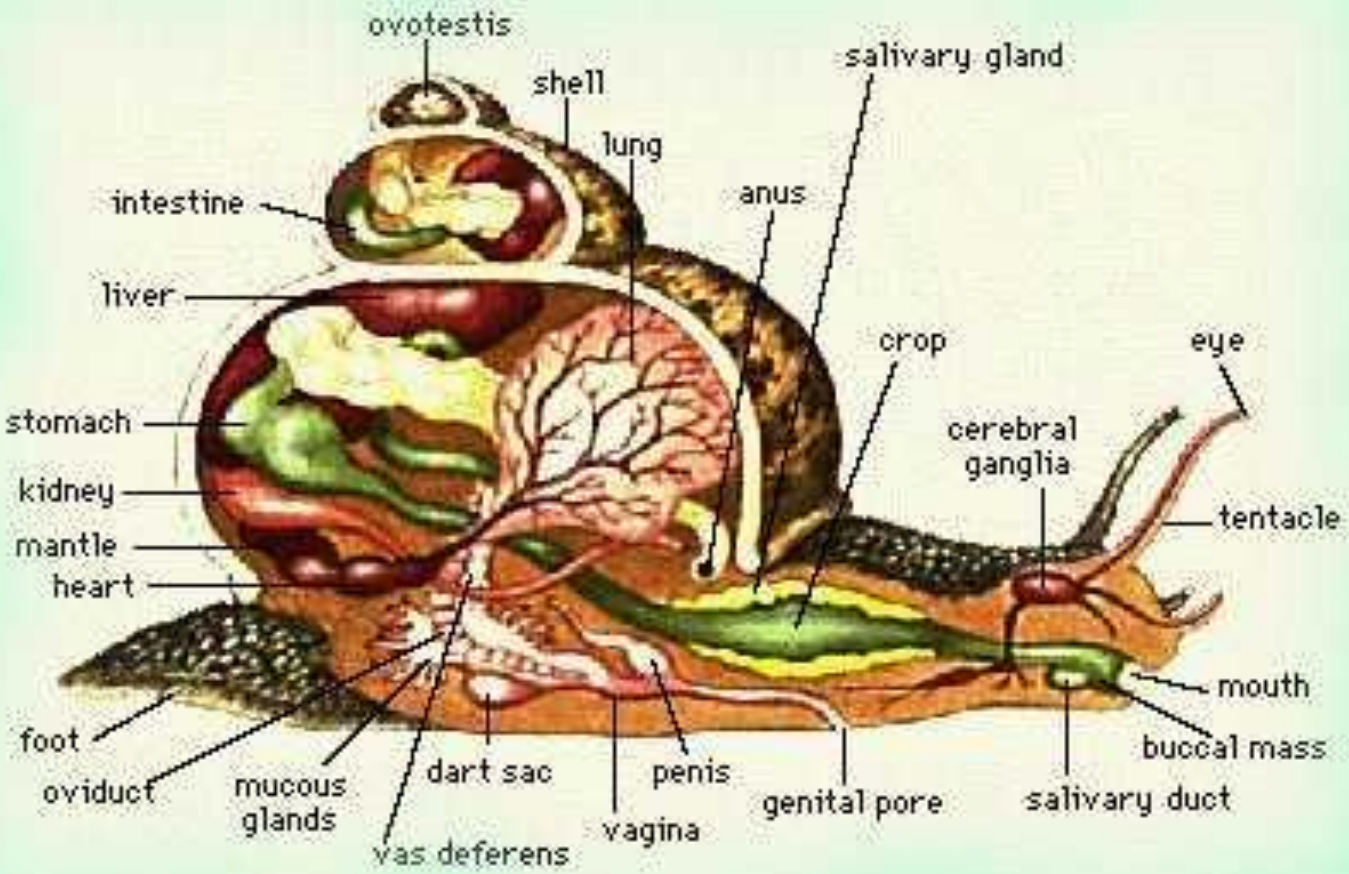
Head-Foot

- Head
  - –Contains mouth and sensory structures

- Foot- large muscular organ usually used for locomotion

Visceral Mass

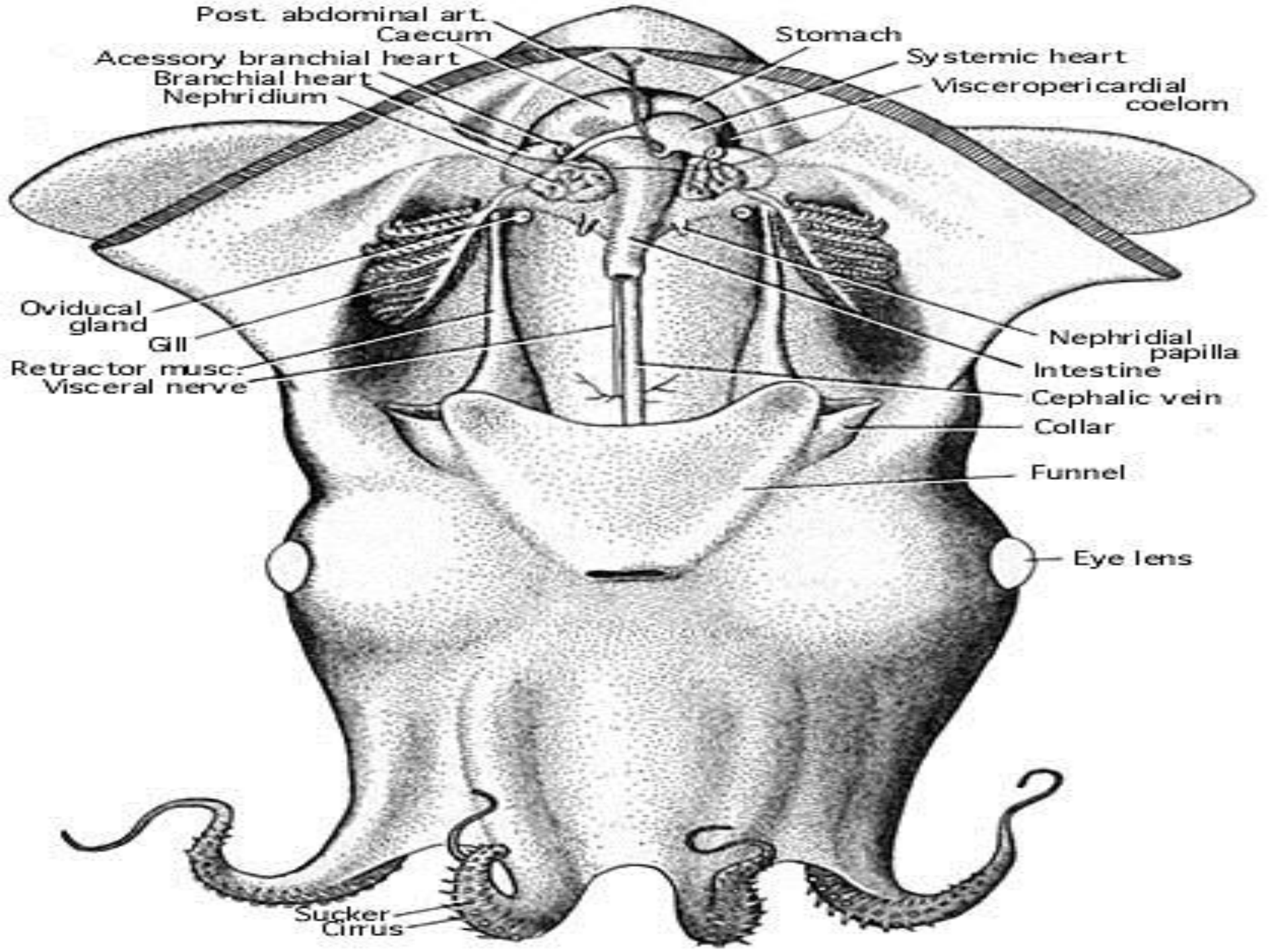
- Contains heart, and the organs of digestion, excretion, and reproduction


ovotestis
shell
lung
salivary gland
intestine
anus
liver
crop
eye
stomach
cerebral ganglia
kidney
tentacle
mantle
heart
mouth
buccal mass
foot
oviduct
mucous glands
dart sac
penis
genital pore
salivary duct
vas deferens
vagina

- Covering the visceral mass is a layer of epidermis- Mantle

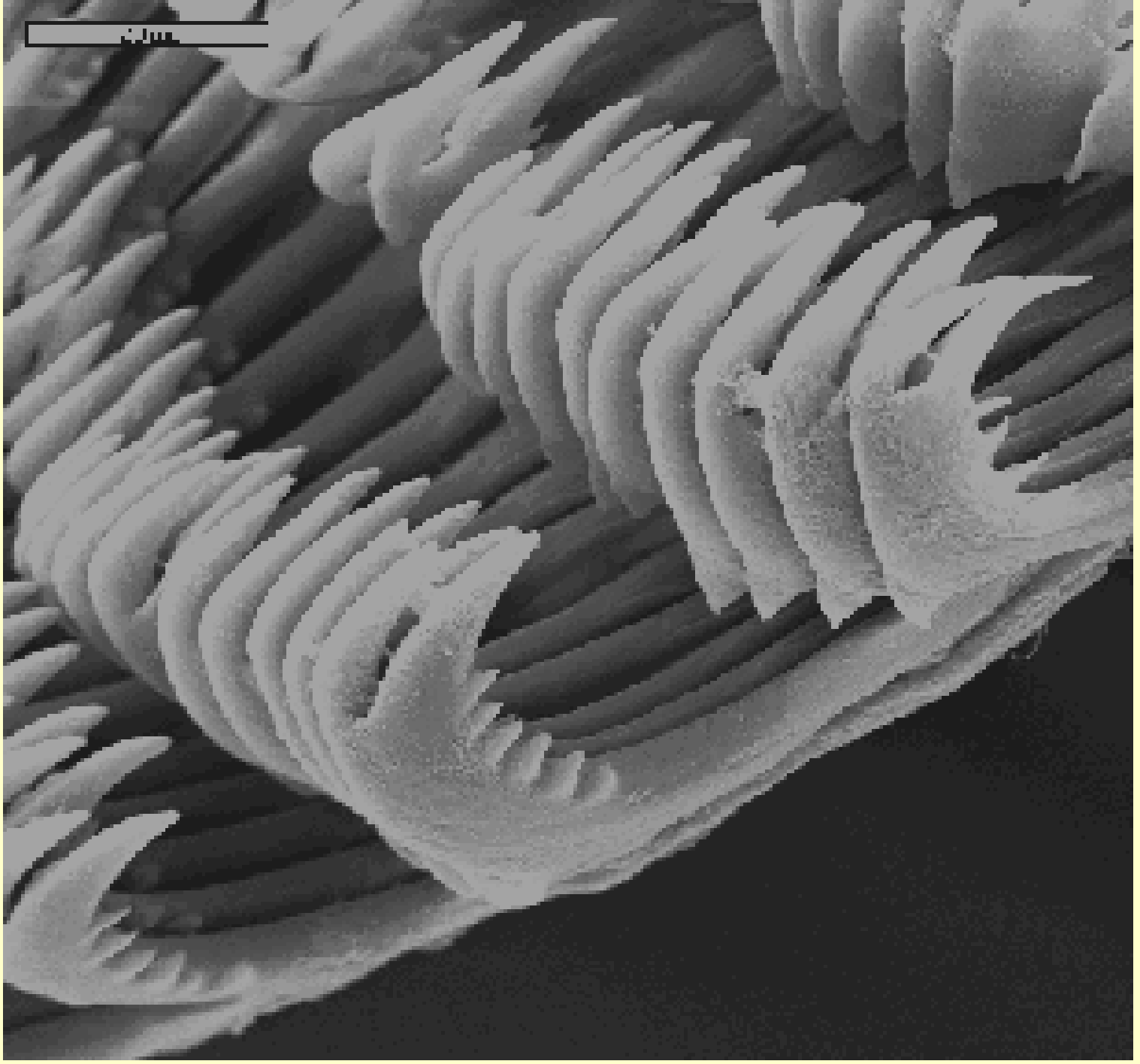
- In most mollusks, the mantle secretes one or more hard shells (calcium carbonate)

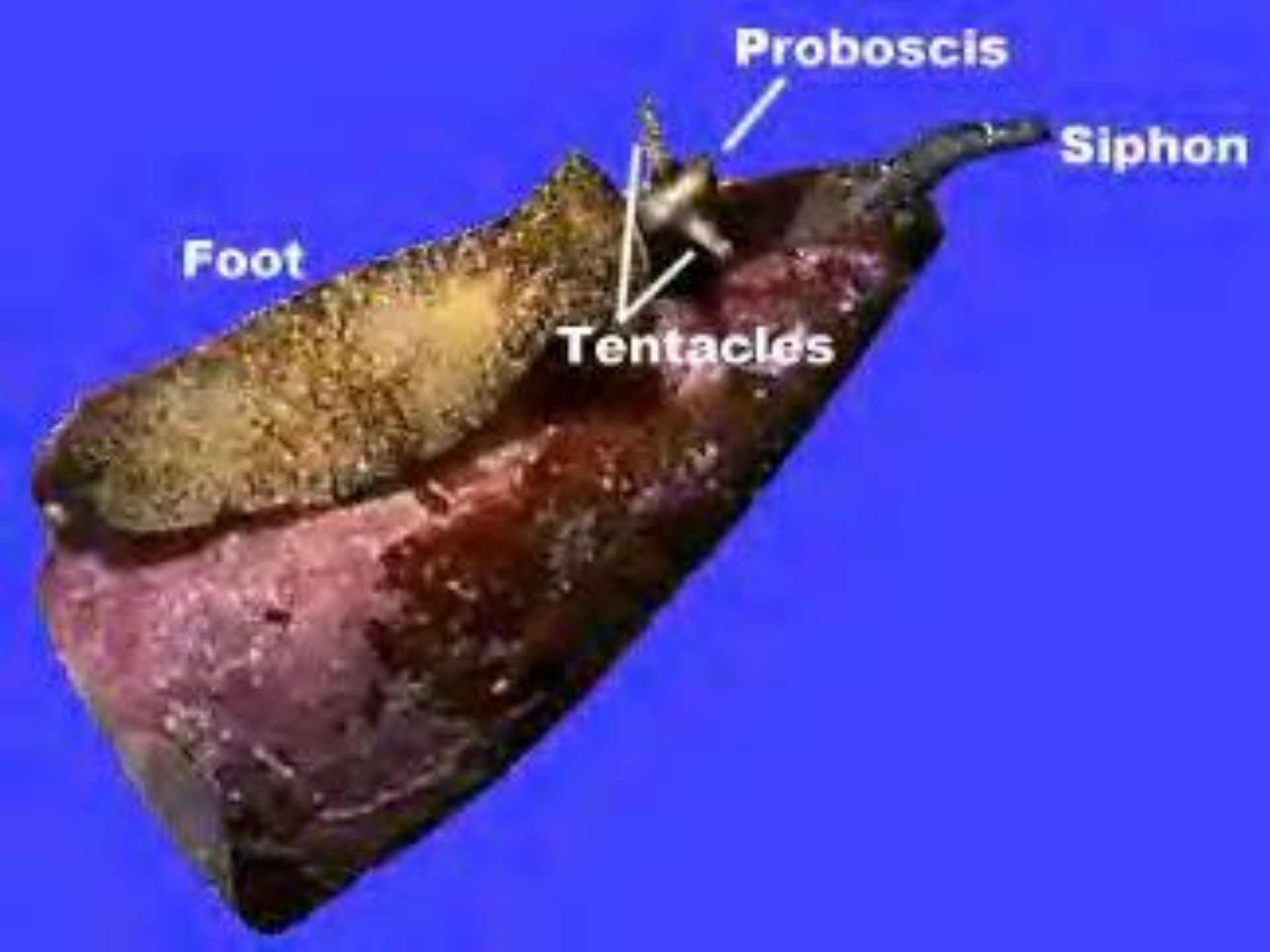
- Mantle Cavity- Space surrounding gill


Post. abdominal art.
Caecum
Acessory branchial heart
Branchial heart
Nephridium
Stomach
Systemic heart
Visceropericardial coelom
Ovidducal gland
Gill
Retractor musc.
Visceral nerve
Nephridial papilla
Intestine
Cephalic vein
Collar
Funnel
Eye lens
Sucker
Cirrus

- Ganglia- clusters of nerve cells
  - –Control muscles, and process info. related to light, touch, and chem. from the environment

- Radula- flexible, tongue-like strip of tissue covered tough, abrasive teeth that point backward.




Proboscis
Siphon
Foot
Tentacles

The Classes

- We will discuss four classes
  - Gastropods
  - Bivalves
  - Polyplacophora
  - Cephalopods

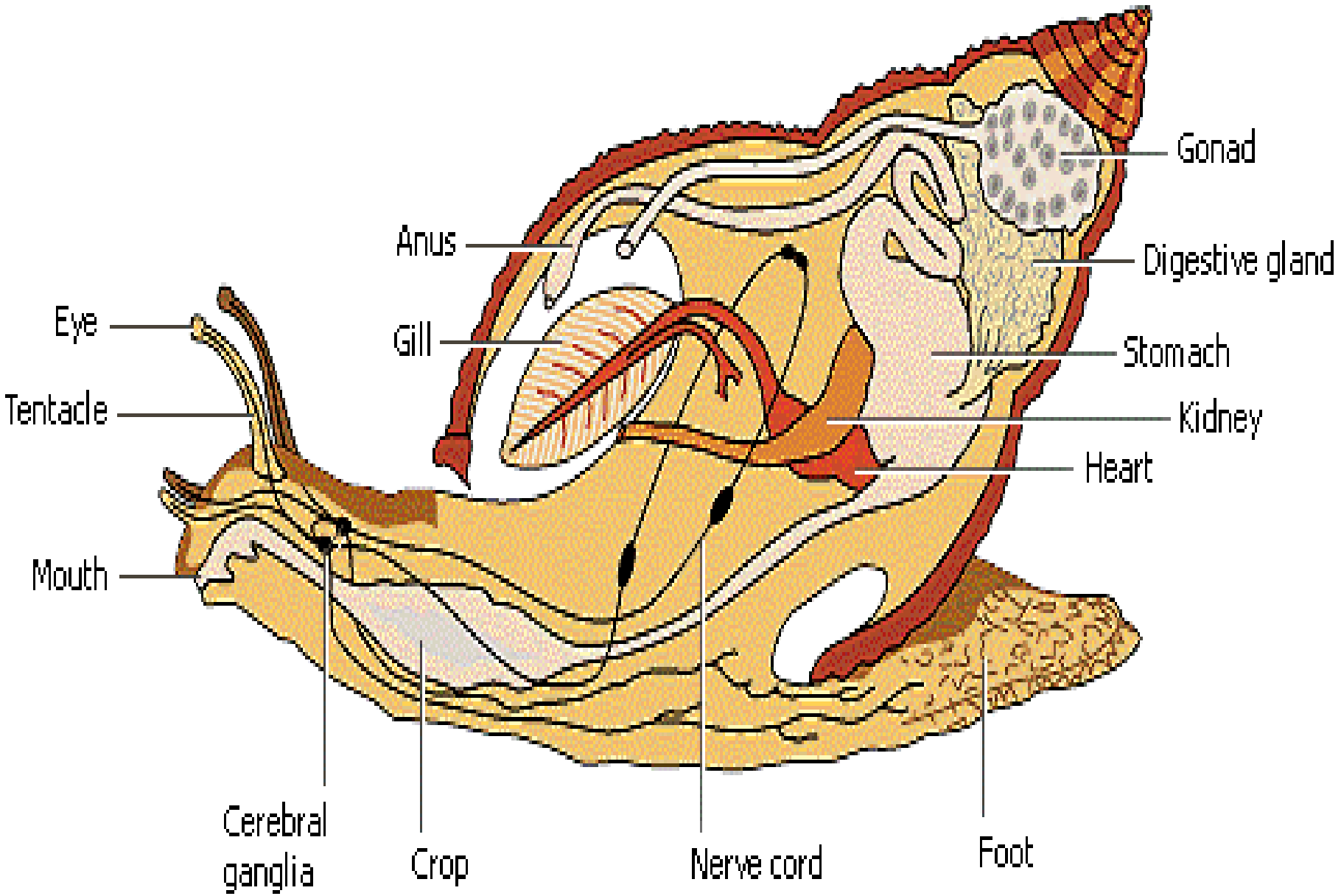
Class Gastropoda

- Largest and most diverse class of Mollusks

QuickTime™ and a
decompressor
are needed to see this picture.

- Marine snails, abalones, and conchs have a single shell
  - –Eyes are external
- Marine slugs and nudibranchs have no shells
  - –Eyes are beneath skin

- Ability to withdraw its head into mantle when threatened

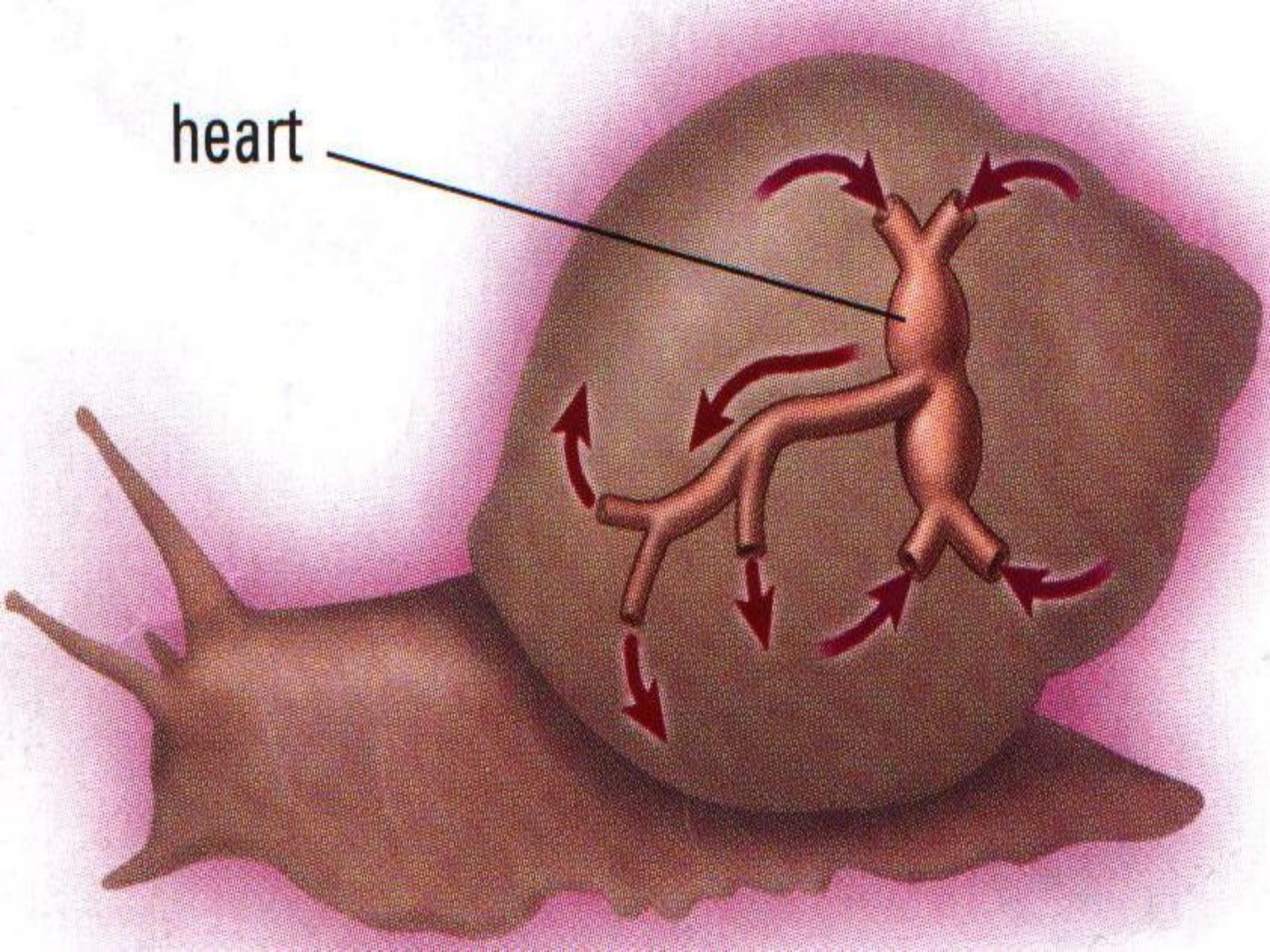

Gonad
Anus
Digestive gland
Eye
Gill
Stomach
Tentacle
Kidney
Heart
Mouth
Cerebral ganglia
Crop
Nerve cord
Foot

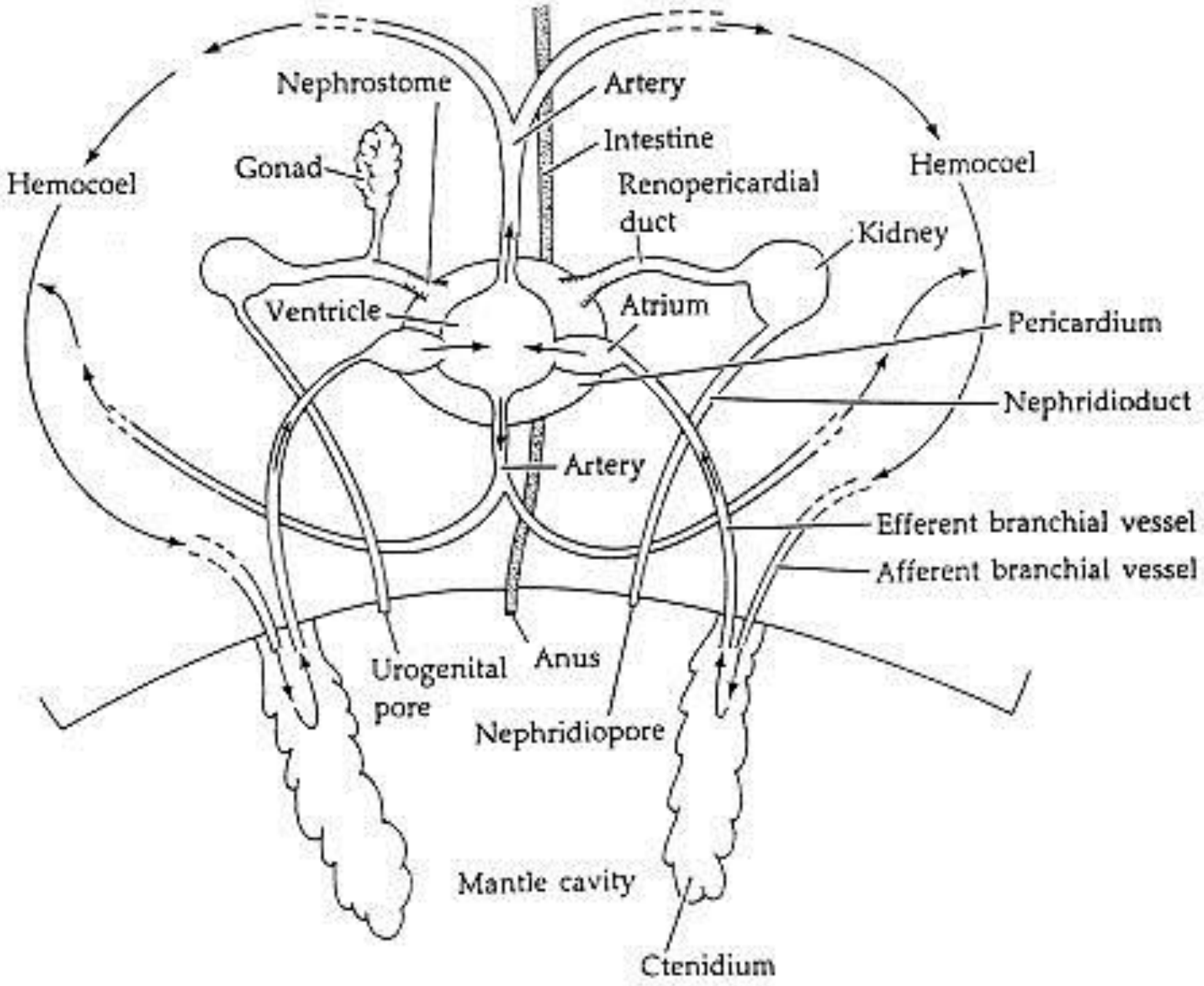

Abalone

- Open circulatory system
  - Circulatory fluid (hemolymph) is collected from gills, pumped through heart, released into spaces in tissues
  - Hemocyanin is a copper-containing protein that carries oxygen.

–The fluid-filled spaces compose the hemocoel, or blood cavity.

–From the hemocoel, hemolymph returns to the gill, then the heart


heart

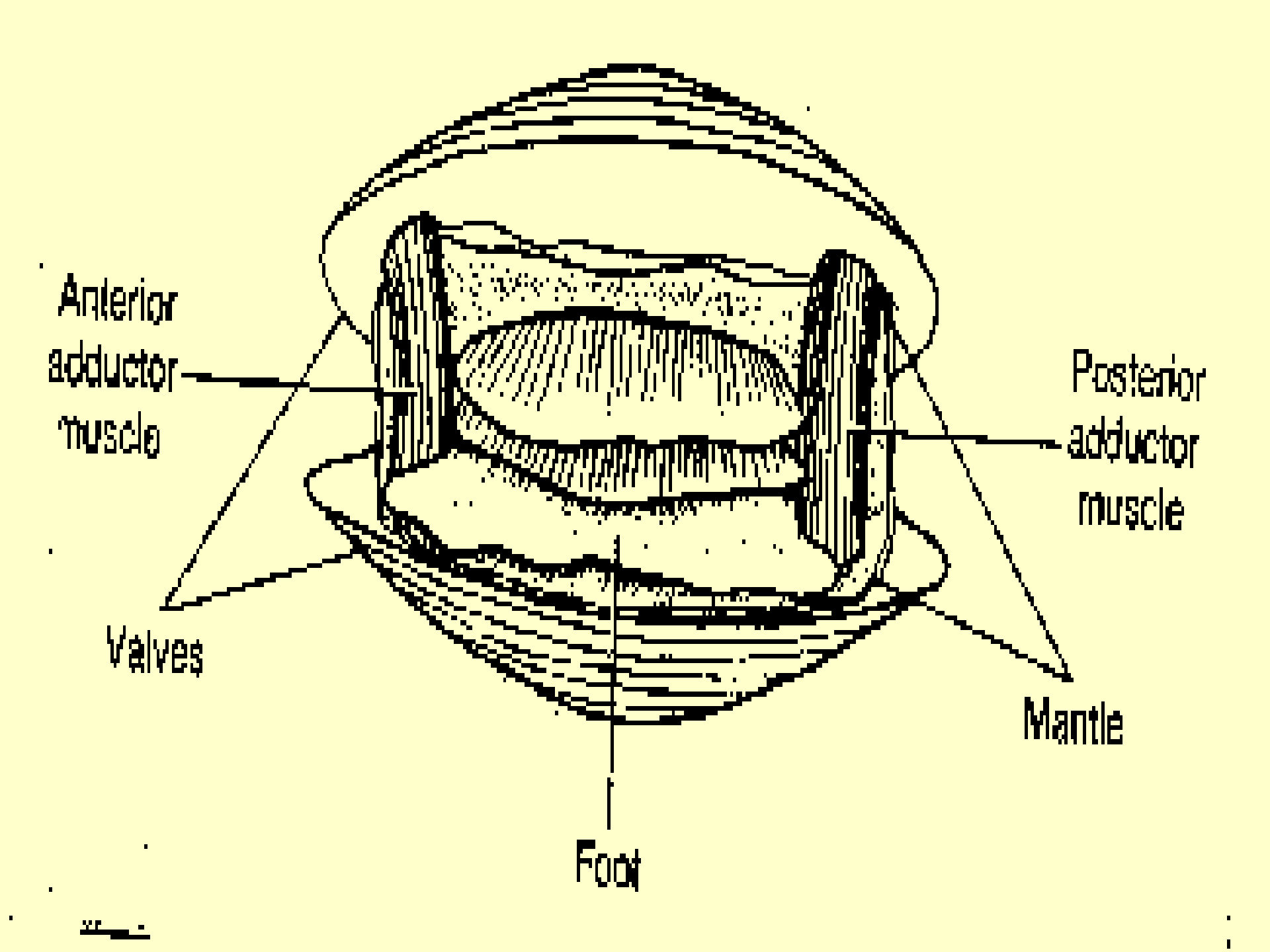

Nephrostome
Artery
Intestine
Hemocoel
Gonad
Hemocoel
Renopericardial duct
Kidney
Ventricle
Atrium
Pericardium
Nephridioduct
Artery
Efferent branchial vessel
Afferent branchial vessel
Urogenital pore
Anus
Nephridiopore
Mantle cavity
Ctenidium

Class Bivalvia

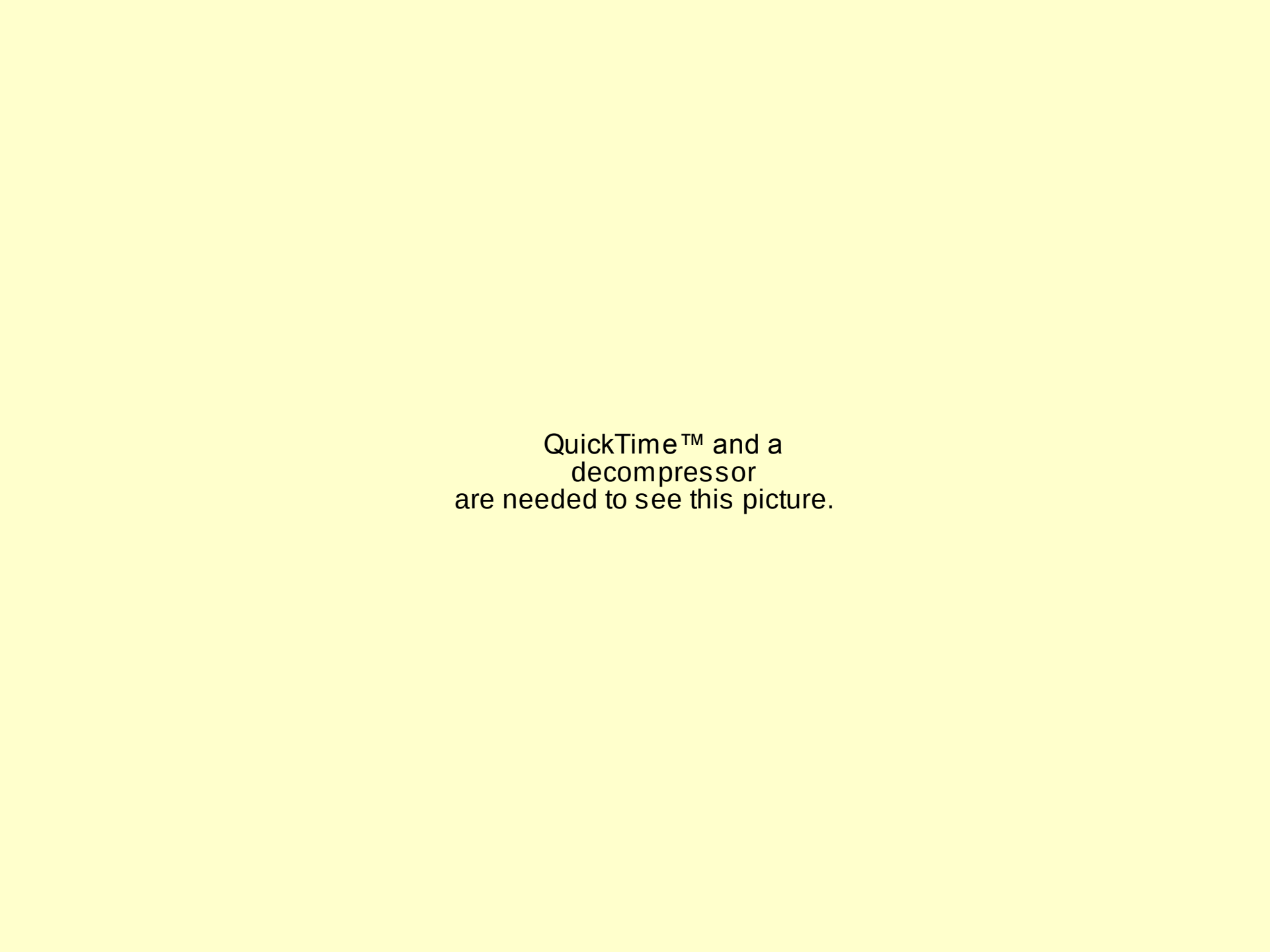
- Shells are divided into two halves, or valves, connected by a hinge
- Ex. clams, oysters, and scallops

QuickTime™ and a
decompressor
are needed to see this picture.

- Adductor muscles are used to close its shell


Anterior adductor muscle
Posterior adductor muscle
Valves
Mantle
Foot

- Constant contraction with little ATP usage is called a state of catch. This keeps the shell closed for long periods of time with minimal energy usage. It is initiated in the absence of Ca++
- Catch is released with the introduction of serotonin
- Ask about the starfish.

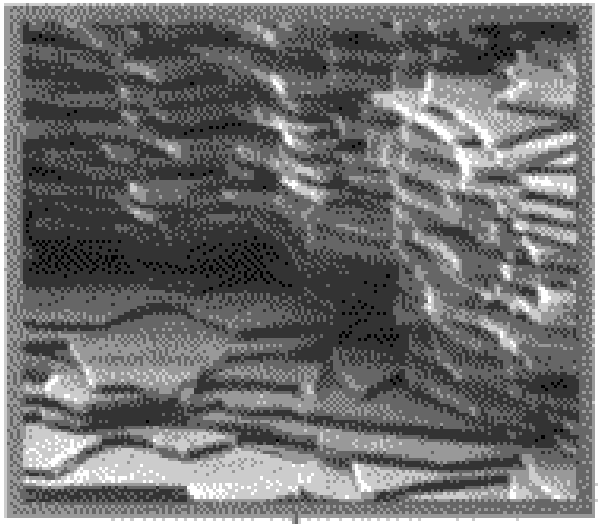

QuickTime™ and a
decompressor
are needed to see this picture.

- Each valve consists of three layers.
  - –Thin outer layer protects shell from acidic conditions
  - –The **periostracum** is the outermost layer. It is a thin layer of the protein conchiolin.

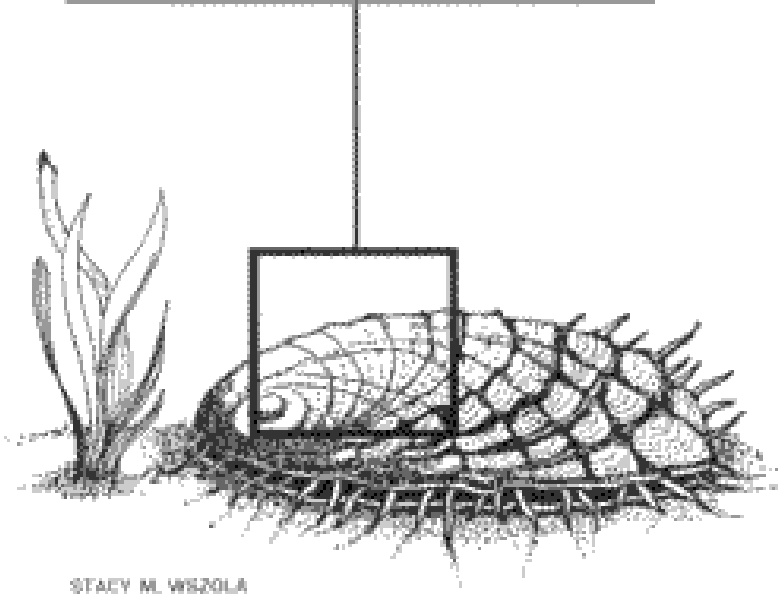
- Thick middle layer of calcium carbonate provides strength
- chalky white **prismatic layer** of calcium carbonate crystals deposited over an organic matrix

- Smooth, iridescent inner layer protects soft body
- In some molluscs the lamellar layer has a composition such that its appearance is smooth and lustrous. This type of shell is known as "mother of pearl" or nacre (pronounced NAKE ur).

The laminated layers of an abalone shell, as seen through a scanning electron microscope.



NAN YAO



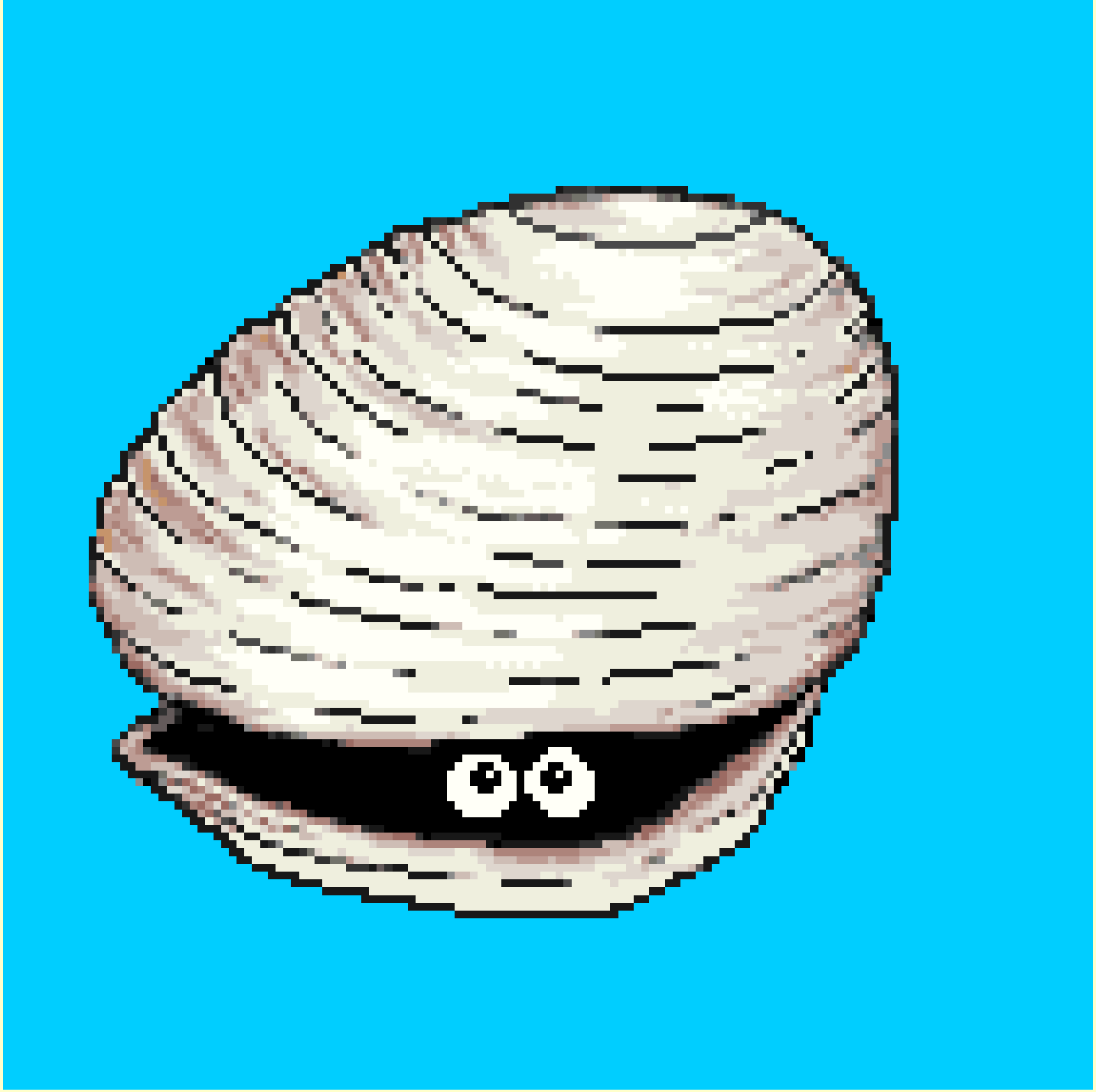
STACY M. WSZOLA

- Pearl formation occurs when an irritant is coated by mantle with the same material that lines the inner layer

- Most are sessile, filter-feeders
- Only mollusks without radula
- Some bivalves are epifaunal: that is, they attach themselves to surfaces in the water, by means of a byssus. Others are infaunal: they bury themselves in sand or other sediments. These forms typically have a strong digging foot.
  - The term **byssus** (sometimes **byssal thread**, or **byssus thread**) denotes strong threads secreted by mussels to attach to rocks and large, generally heavy objects in the intertidal zone. They range to 6 centimeters in length.

- Lack a distinct head
- Nervous system consists of three pair of ganglia
  - Near mouth, in the digestive sys., & in foot

- Some have rows of eyes along mantle



Class Polyplacophora

- Chitons
- Adapted for life in the intertidal zone
- 8 overlapping calcareous plates
- Scrape algae from rocks with radula