

Chapter 16: Mollusca Latin: soft

90,000 living spp. 70,000 fossil spp.

marine fresh water terrestrial

chitons

tusk shells

snails

slugs

nudibranchs

sea butterflies

clams

mussels

oysters

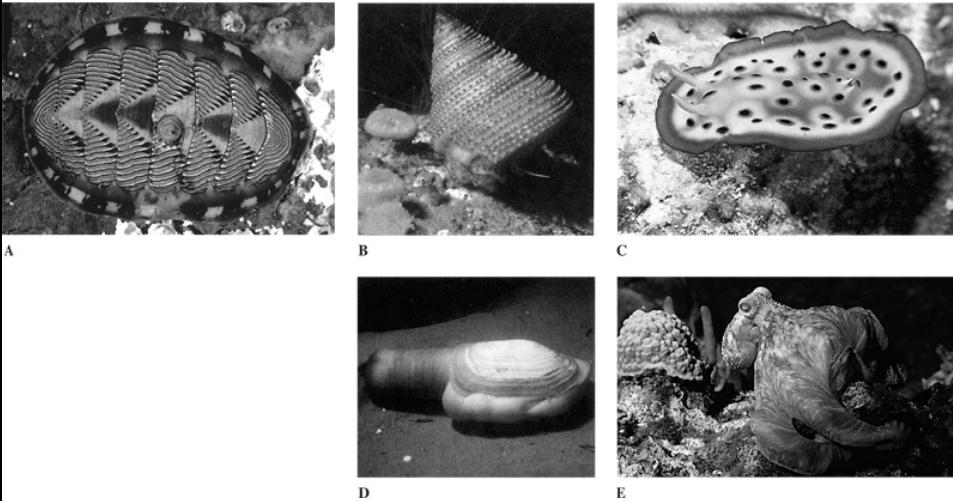
squids/cuttlefish

nautilus

octopuses

Figure 16.01

Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.



Most Diverse Phylum

80% are under 10 cm in size

some 90 kg; 20 m length

herbivorous

grazers

predaceous carnivores

filter feeders

parasites

Classes

I. Polyplacophora:

chitons, gumshoe chiton

II. Gastropoda:

snails, limpets, slugs, whelks, conchs,
periwinkles, sea hares, sea butterflies

III. Bivalvia:

clams, oysters, scallops & mussels

IV. Cephalopoda:

nautilus, squid, cuttlefish & octopus

Caudofoveata

Solenogasters

Monoplacophora

Scaphopoda

Molluscs Economically Important

- 1) food
- 2) snails/slugs garden pests
- 3) burrowing shipworms destroy wooden ships & wharves
- 4) industry: pearls & pearl buttons culture
- 5) some snails intermediate hosts for parasites

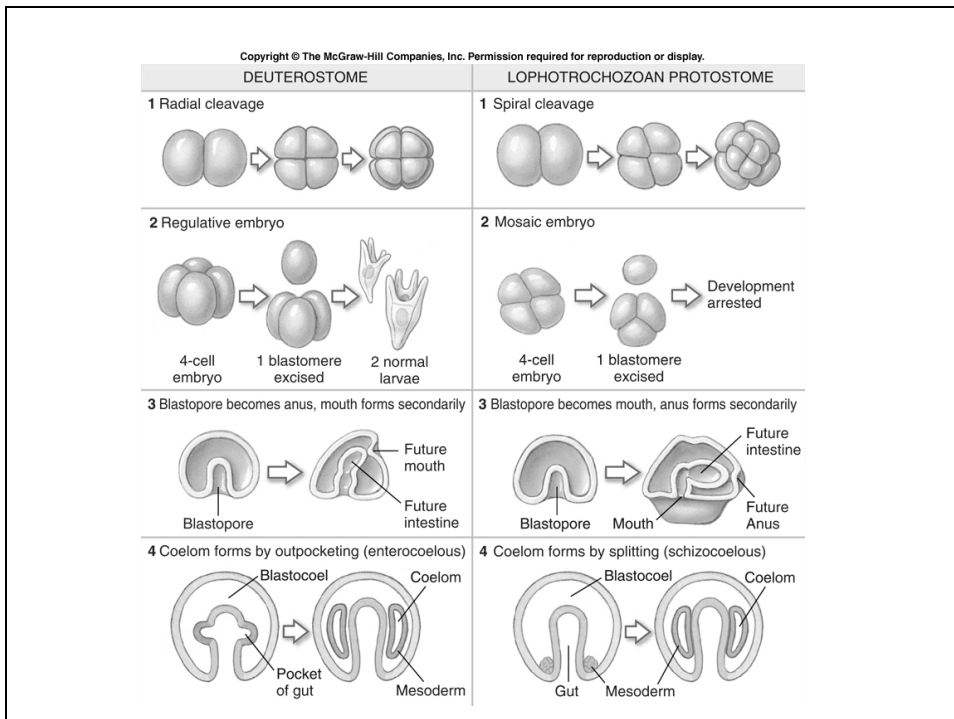
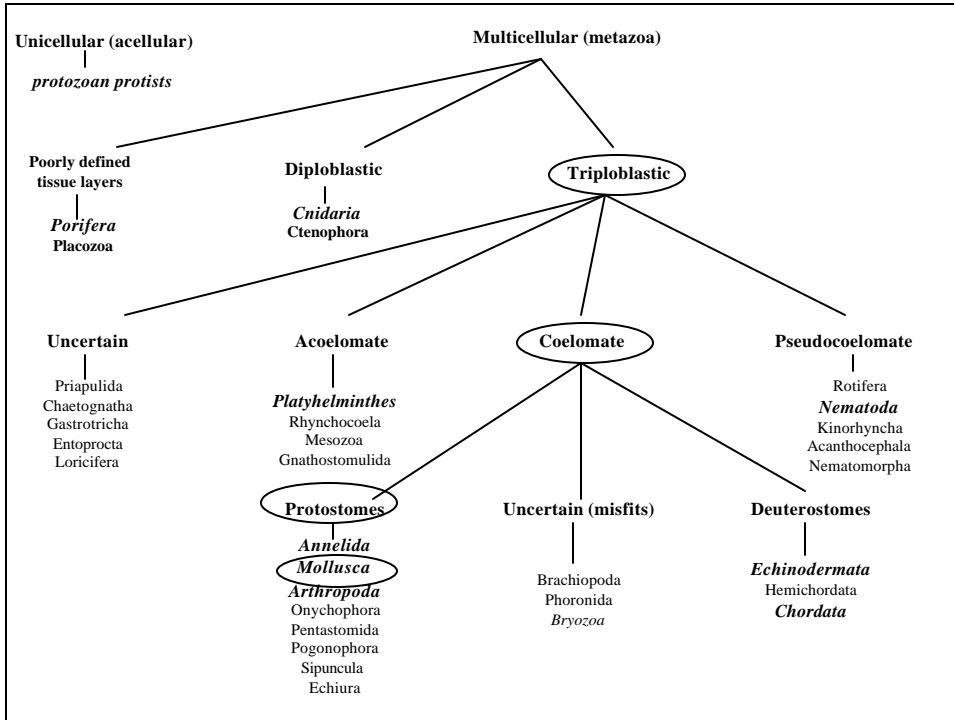
Review of General Characteristics

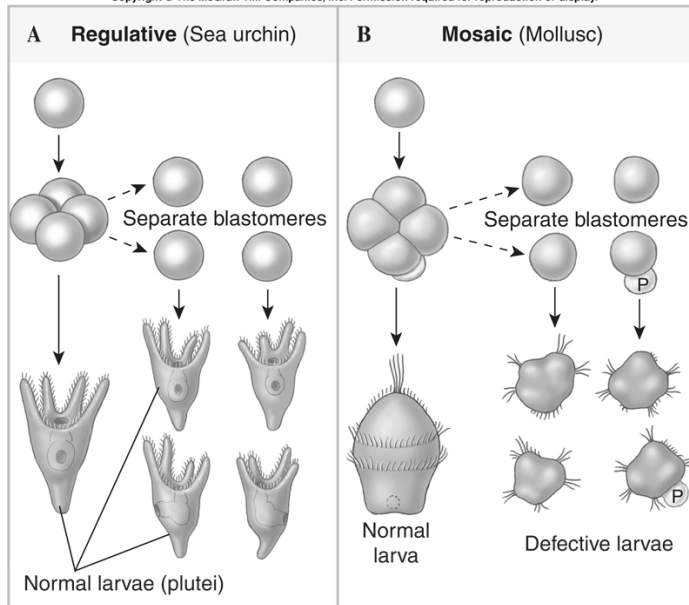
bilateral symmetry

triploblastic

coelom

protostome





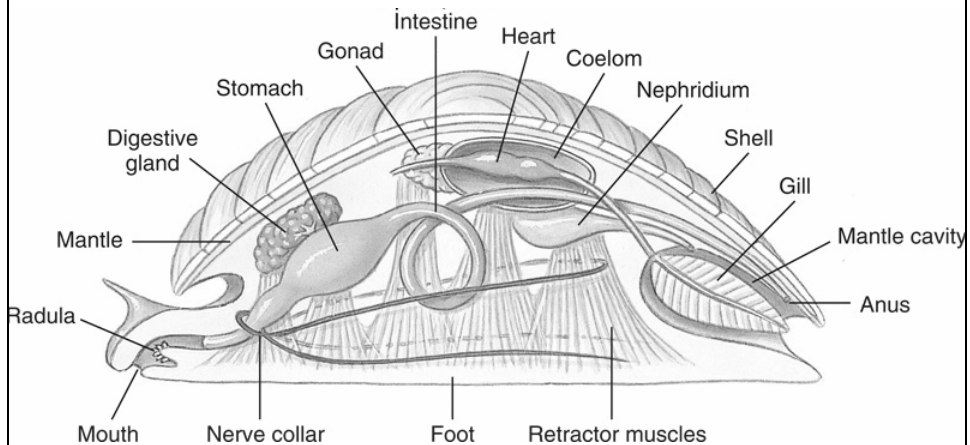
Molluscan Body Plan

1) head-foot

feeding, cephalic sensory & locomotor organs

2) visceral mass

digestive, circulatory, respiratory & reproductive organs



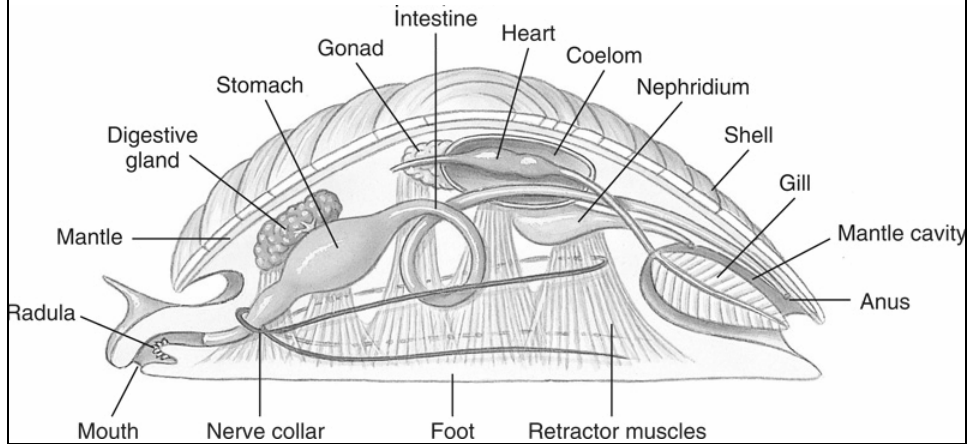
head-foot

well-developed head bearing the mouth & some sensory organs

photosensory receptors range from simple to complex eyes

tentacles may be present

posterior to the mouth → chief locomotor organ = foot



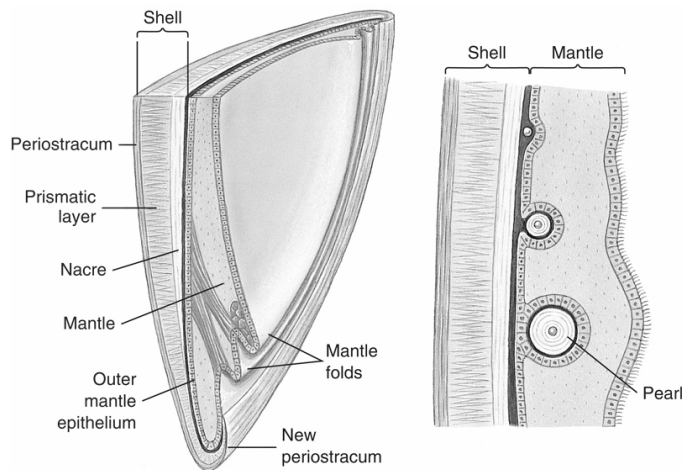
Molluscan Form & Function

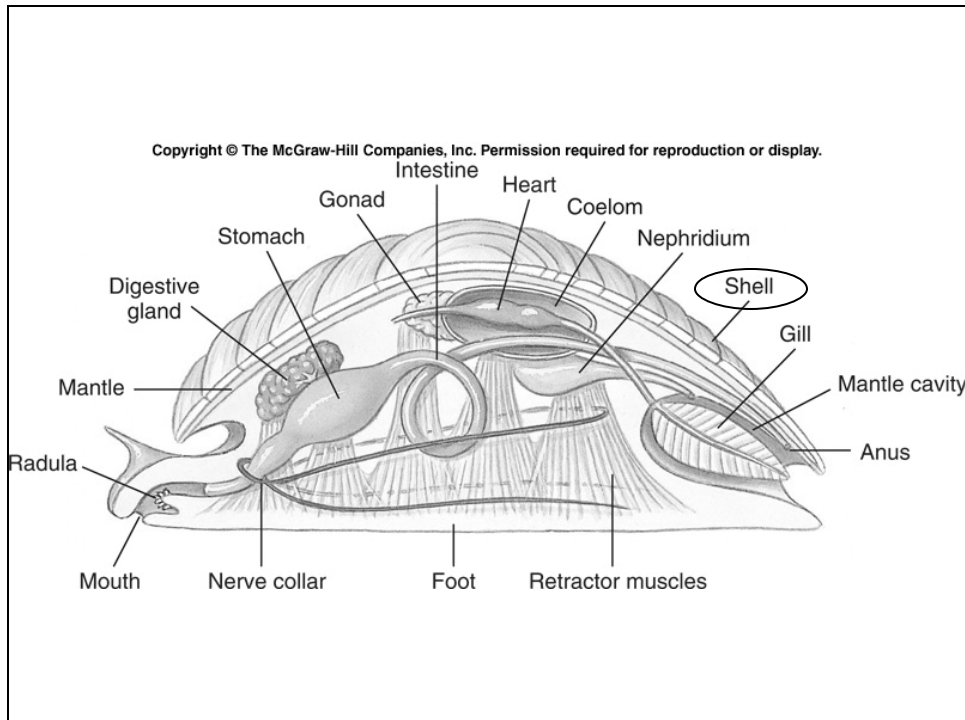
1) shell secreted by the mantle which lies underneath

a) **periostracum**: outer horny layer-composed of tanned protein conchiolin

b) **prismatic**: middle layer- closely packed prisms CaCO_3 (calcium carbonate)

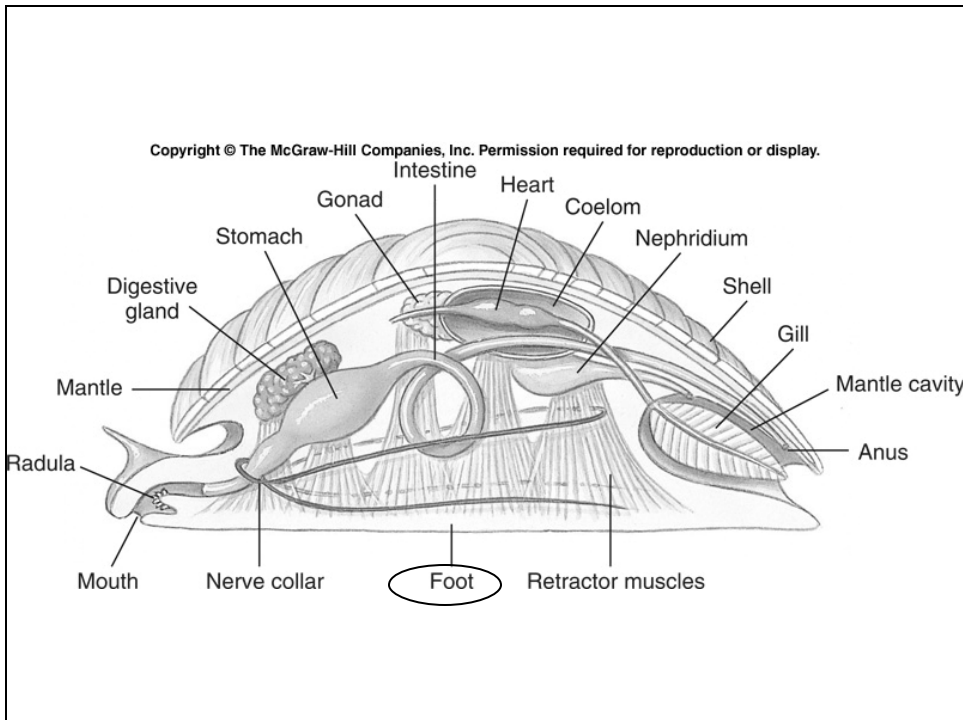
c) **nacreous**: layer next to mantle → nacre laid down in thin layers





2) Foot

- a) usually ventral
- b) attachment to the substratum or for locomotion
 - 1) mucus aid in adhesion or help glide on cilia
 - 2) snails/bivalves extend hydraulically by engorgement with blood
 - 3) burrowers extend into mud or sand, enlarge tip as an anchor & draw forward
 - 4) free-swimming → wing or fin-like
- c) modifications
 - 1) attachment disc of limpets
 - 2) hatchet foot of clams
 - 3) siphon jet of squids



3) mantle & mantle cavity

two folds of skin form protective **mantle** or pallium

secretes a protective shell over visceral mass

space between mantle & body wall = **mantle cavity**

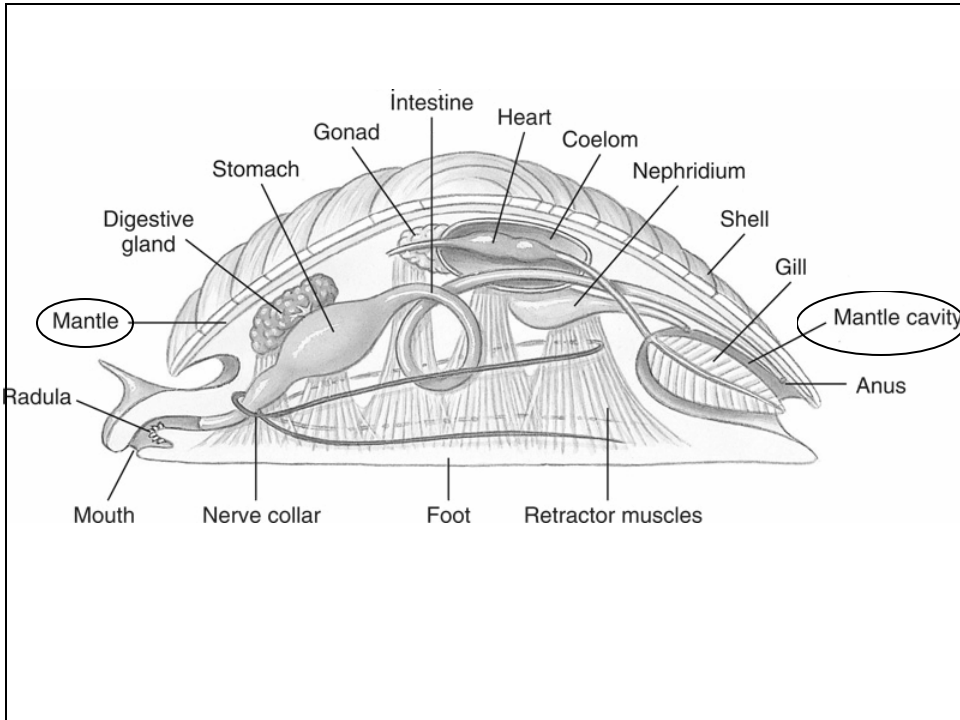
mantle cavity houses gills (ctenidia) or a lung

exposed surface of mantle serves for gaseous exchange

continuous flow of water: oxygen & food & flushes out wastes

digestive, excretory & reproductive systems empty mantle cavity

cephalopods: head and mantle cavity to create jet propulsion



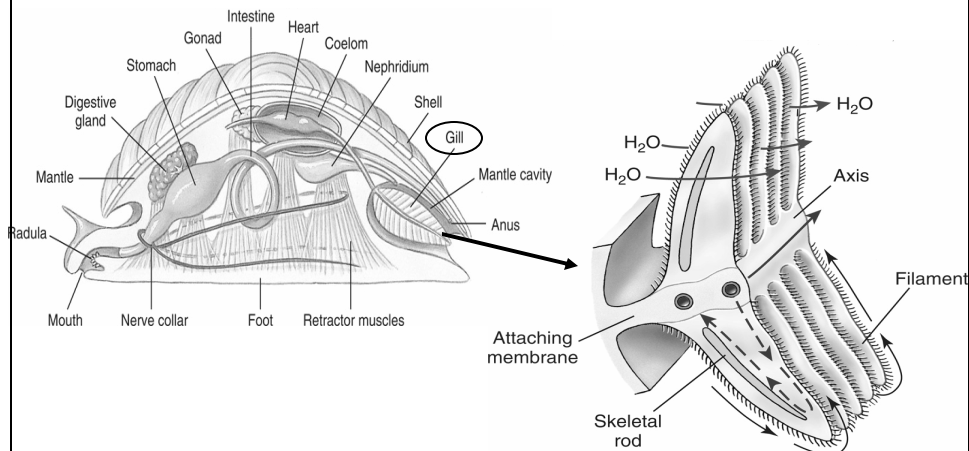
4) gills

leaf-like filaments

cilia propel water across the surface

countercurrent blood movement absorbs O_2 efficiently

two ctenidia on opposite sides form incurrent & excurrent chamber



5) radula

all except bivalves & some solenogasters

protruding, rasping, tongue-like organ

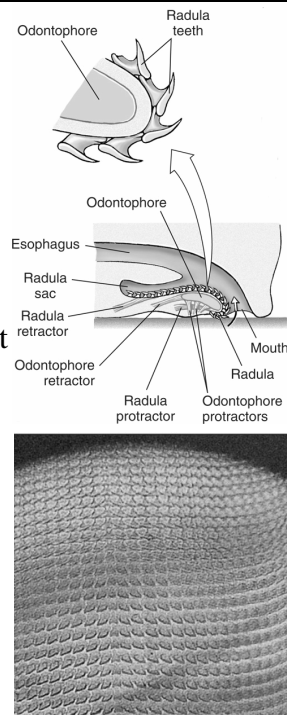
ribbon-like membrane has rows of tiny teeth
up to 250,000—pointed backward

rasps off fine food particles from surfaces

conveyor belt to move particles to digestive tract

new rows of teeth replace those that wear away
pattern & number of teeth used in classification

some specialized for boring through
hard material or harpoon prey



Internal Structure and Function

open circulatory system

pumping heart

blood vessels

blood sinuses

closed circulatory system

heart

blood vessels

capillaries

most cephalopods

pair of kidneys or metanephridia

kidney ducts also discharge sperm & eggs

nervous system: pairs of ganglia but simpler than in annelids

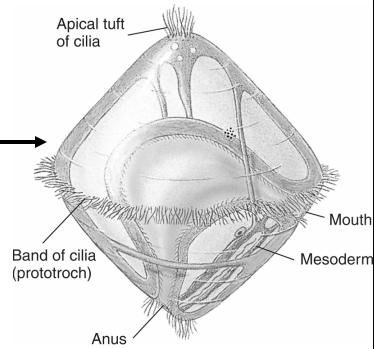
growth hormones in air-breathing snails

sense organs vary & may be highly specialized

Reproduction & Life History

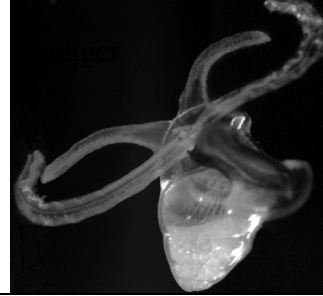
dioecious but some are **hermaphroditic**

egg hatches & produces free-swimming larva =
trochophore larva →



chitons: trochophore direct metamorphosis into small juvenile

gastropods & bivalves: intermediate
larval stage → **veliger** (derived state)



trochophore larva: considered to unite molluscs with
annelids, marine turbellarians, nemerteans, phoronids