

Biology 14.3

Mollusks/echinoderms

Phylum Mollusca

1. Very diverse, mostly small & harmless. 50,000 to 200,000 species including clams, oysters, snails, slugs, scallops, squids, octopi, and nautili.
Mollus means 'soft body.' Bivalves, gastropods, and cephalopods.
2. Habitat: mostly aquatic
3. Organization: triploblastic, systems, Coelom.
 - a) Shell: 1. Multilayered, 2. Protection, 3. Support
 - b) Mantle: 1. Sheaths the vital organs, 2. Secretes the shell, 3. Respiration
 - c) Visceral hump: **coelom** containing the heart, digestive and excretory organs
 - d) Foot: variety of shapes
 - e) Radula: scraping organ
4. Symmetry: bilateral at some point in development. Some are asymmetrical.
5. Integument: mantle epidermis is dorsal body wall which secretes shell.
6. Skeleton: soft body invertebrate
7. Musculature: muscular foot or feet for movement and more.
8. Movement: mobile, single foot and eight foot, including gliding or jet propulsion
9. Nervous system/ senses: ganglia ring and paired nerve cords, sense organs
10. Behavior/activity: interactive
11. Nutrition: heterotrophic
12. Digestion: unidirectional, ciliated alimentary canal, intracellular or extracellular, rasp-like tongue called radula.
13. Respiration: gills and siphons, or skin, or lungs
14. Circulatory: open circulatory system, meaning the blood does not circulate entirely within vessels but is collected from the gills, pumped through the heart, and released directly into spaces in the tissues from which it returns to the gills and then to the dorsal heart. Closed in cephalopods & have three hearts.
15. Immunity: anatomical and chemical protective barriers. phagocytosis, nodule formation, encapsulation, pearl formation, atrophy, necrosis and tissue liquefaction
16. Excretion: nephridia pair
17. Reproduction: Dioecious & some monoecious, some parthenogenesis.
18. Life cycle: egg to larva to adult
19. Three of seven classes
 1. Bivalva: hatchet footed: clams, oysters, mussels
 - a. -bivalved: two shelled. enlarges with growth
 - b. -grain of sand in interior. mantle secretes pearly layer
 - c. -foot drags the shell deeper into the sand
 - d. -filter feeders: strain organic material from the water
 - e. incurrent and excurrent siphons to circulate water through shell
 - f. -gills for gas exchange
 - g. -open circulatory system
 - h. -life cycle involves larvae
 - i. scallop: swims by clapping its valves
 - j. shipworm: borrows into wood
 - k. The largest living bivalve mollusk is the giant clam (*Tridacna gigas*) weighing as much as 550 lb and measuring 4.5 feet across. Average lifespan is 100 years, and are symbiotic with dinoflagellates for food.

2. Gastropods
 - a. -snails, slugs
 - b. -"stomach footed": gastro/pod
 - c. -univalve
 - d. -mantle cavity for respiration
 - e. -tentacles
 - f. slugs have no shell
 - g. largest snail is in Australia, the giant whelk (*Syrinx aruanus*) shell length of 2.3'.
3. Cephalopods
 - a. squid and octopi have closed circulatory system.
 - b. head-footed; head divided into several arms
 - c. jet propulsion
 - d. mammal-like eyes
 - e. Largest octopus was 30 feet diameter and over 600 pounds. Average is 16 ft at 110 lbs and live 4 years.
 - f. Octopus skin changes color and texture for camouflage. Ink made of melanin.
 - g. Largest squid is the colossal squid measuring 15 feet long and weighing 495 lbs.. Eyes are largest in the animal kingdom at 12-16 inches diameter

Phylum Echinodermata

1. "Hedgehog skin", 7,000 species including prickly sea urchin, star fish, sand dollar
2. Habitat: Marine
3. Organization: triploblastic, systems, Coelom. Central disc with five rays (arms). A mesh of hard plates (ossicles) beneath ectoderm. 'Catch connective tissue' allows nerve control transition from flexibility to rigidity. Water vascular system, tube feet. No head
4. Symmetry: bilateral larvae, adult five point radial
5. Integument: spiny ectoderm, pigmented cells.
6. Skeleton: invertebrate with endoskeleton of ossicles.
7. Musculature: used to create vacuum in tube feet pads.
8. Movement: mobile by means of water-vascular system and tube feet
9. Nervous system/ senses: circum-oesophageal ring from mouth to arms, photoreceptors on each arm.
10. Behavior/activity: interactive and predatory, slow moving
11. Nutrition: heterotrophic, shell fish
12. Digestion: unidirectional, protrudes stomach for external digestion in shell
13. Respiration: simple diffusion from the body cavity and skin gills
14. Circulatory: Open, heartless, bloodless vascular system for gas exchange, feeding & movement.
15. Immunity: Innate and a complement system
16. Excretion: simple diffusion from the body cavity and skin gills. Amoebocytes.
17. Reproduction: Dioecious and asexual (regeneration)
18. Life cycle: eggs, larva, adult
19. Classes
 - a) *Holothuroidea*--Sea Cucumbers
 - b) *Crinoidea*--Feather Stars
 - c) *Echinoidea*--Sea Urchins
 - d) *Ophiuroidea*--Brittle Stars
 - e) *Asteroidea*--Starfish or Sea Stars
20. Largest starfish is the sunflower star measuring 40" diameter, up to 11 lbs and many arms.