

Biology 14.2

Worms

Phylum Platyhelminthes

1. Flat worms—In three categories: Trematoda (parasitic flukes), Cestoda (parasitic tapeworms), and Turbellaria (free living Planaria).
2. Habitat: aquatic: marine and fresh. Some live in moist terrains.
3. Organization: triploblastic tissues (endoderm, ectoderm, and mesoderm), systems, no body cavity other than in some having a gastrovascular cavity.
4. Symmetry: bilateral
5. Integument: epidermis with a variety of colors
6. Skeleton: soft body invertebrate
7. Musculature: muscle like fibers
8. Movement: mobile
9. Nervous system/ senses: simple **cephalization**. Anterior nerve mass and 2 ventral nerve cords. Free living are more developed in sensory and motility than parasites. Chemoreceptors and light sensitive eye spots, also tactile cells.
10. Behavior/activity: interactive, taxes
11. Nutrition: heterotrophic
12. Digestion: extracellular/intracellular digestion. Gastrovascular cavity and pharynx extends through mouth to suck up food, sometimes into prey to suck out their insides. Tapeworm absorbs through body.
13. Respiration: skin for exchanging oxygen and carbon dioxide
14. Circulatory: none, simple diffusion
15. Immunity: Innate
16. Excretion: network of flame cells (like kidney cells) used to sweep nitrogenous waste out of the body.
17. Reproduction: asexual (fragmentation) and sexual (monoecious=hermaphroditic). Capable of self-fertilization. One fluke can produce over 500,000 embryos.
18. Life cycle: Some parasites have complex cycles passing through several hosts.
 - a. Sheep liver **fluke**: ‘liver rot’ disease in a variety of animals. 1) Egg deposited in water, 2) motile form hatches and is eaten by snail, 3) transforms through three stages ending in a motile larva form with oral sucker, 4) then another larval form that swims, 5) deposited in water and infects by ingestion or through skin, 6) In the vertebrate host, it matures to adult form, the fluke, which repeats cycle.
 - b. Human blood **fluke**: 1) Eggs released in blood and are eliminated from bladder or intestines, 2) Larvae hatch in fresh water, 3) intermediate snail host where new larval form emerges, 5) Larvae deposited in water infect humans through skin, 6) Adult form parasitizes capillaries and lays eggs.
 - c. Chinese liver **fluke**: Third most prevalent worm parasite in the world. : 1) Eggs in water are ingested and hatch in snail, 2) parasite reproduces asexually to multiply numbers, 3) swimming larvae bore out of snail into water, 4) Larvae attach and bore into fish host, 5) parasite forms a cyst and waits to be ingested by human, 6) Larvae release from cyst in intestines bore into blood stream, 7) Arriving at liver, the parasite lives on blood, matures and lays eggs.
 - d. Pork **tapeworm**: human intestines, cysts in pigs, humans
 - e. Fish **tapeworm**: similar to pork worm. Tapeworms have no mouth or digestive tract
 - f. Hydatid worm: Man is the intermediate for dogs. Forms big cysts in the liver.
19. Interesting facts
 1. Can grow 0.4 inches/hr and average about 55 feet. Can live in person for up to 25 years.

2. Estimated to live in 200 million humans around the world.

Phylum Nemertea

1. Ribbon worms or proboscis worms. From millimeters to 197 feet long.
2. Habitat: Mostly marine, others fresh water, and some terrestrial.
3. Organization: triploblastic tissues and systems. 1. Epidermis, dermis, muscle, mesenchyme. 2. Complete unidirectional digestive tube. Retractable proboscis in the rhynchocoel (not a body cavity).
4. Symmetry: bilateral
5. Integument: ciliated, glandular epidermis produces mucus.
6. Skeleton: soft body invertebrate
7. Musculature: three layers of muscles.
8. Movement: slow mobility
9. Nervous system/ senses: Anterior ganglia ring & 2 lateral cords. Central nervous system (CNS) from brain (four ganglia) to body. Chemo, photo, & tactile receptors, statocyst for balance.
10. Behavior/activity: interactive
11. Nutrition: heterotrophic.
12. Digestion: Projects proboscis to wrap, poison, and capture prey. Unidirectional digestive canal with foregut, stomach and intestine.
13. Respiration: diffusion through skin
14. Circulatory: Fluid freely moves back and forth from proboscis in rhynchocoel and peripheral vessels as body muscles contract.
15. Immunity: Innate
16. Excretion: protonephridia, with flame cells, excrete soluble nitrogenous and metabolic waste.
17. Reproduction: Asexual (fragmentation) and Dioecious (some are monoecious).
18. Life cycle: Egg, larvae or miniature form, to adult
19. Interesting facts:
 1. *Lineus longissimus* grow as long as 98 feet. One measured at 197 feet.
 2. Smallest ribbon worm looks like a thread of string about two inches long.
 3. More than 200,000 worms can regenerate from fragments of a six inch worm.

Phylum Nematoda

1. Round worms. Tiny, cylindrical worms. Greek *nema* means "thread". **Ascaris**
2. Habitat: ubiquitous and often harsh conditions, e.g., tundra and vinegar eel
3. Organization: triploblastic tissues and systems. Pseudocoelom. Tube within a tube: Epidermis secretes a thick cuticle, Complete digestive tube. Organs and fluid between the tubes. High internal pressure keeps them round.
4. Symmetry: bilateral
5. Integument: epidermis with cuticle, many can endure harsh conditions (Vinegar eel)
6. Skeleton: soft body invertebrate
7. Musculature: lateral muscle fibers contract in one direction
8. Movement: mobility involves thrashing, jerky movement
9. Nervous system/senses: anterior nerve ring with dorsal, ventral nerve and lateral cords
10. Behavior/activity: interactive, taxes
11. Nutrition: heterotrophic. Lives on host's digested food in intestine
12. Digestion: intracellular and extracellular. Unidirectional.
13. Respiration: diffusion through skin
14. Circulatory: none. Body fluid squeezed between outer and inner tubes
15. Immunity: Innate, "signaling cascades" of chemical reactions
16. Excretion: nephridia
17. Reproduction: Dioecious can produce up to 200,000 eggs a day. Parthenogenesis.
18. Life cycle: human ingestion of eggs, larvae burrow into blood, carried to lungs, penetrate into the throat, intestines and egg production
19. Examples:
 1. Hookworm: Southern America, larvae penetrate skin, travels through body and lungs to throat, intestines, lives on blood and tissue from intestines, can cause blood loss problems. Wear shoes!
 2. Trichina worm (Trichinosis): Pigs ingest cysts, burrow into intestines and produce larvae, larvae migrate to muscles and forms cysts. After eating cyst in flesh, cysts open in intestines and mature to adult worms. Worms invade muscle tissues, including the heart and diaphragm (the breathing muscle under the lungs). They can also infect the lungs and brain. Cook meat before eating it.
 3. Elephantitis: the result of clogged lymphatic vessels and increase in fluid.

Phylum Annelida

1. "little rings". Segmented worms. Entire body is made of similar segments (divided by membrane). Three classes: earthworms, leeches, marine worms.
2. Habitat: ubiquitous, most marine
3. Organization: triploblastic tissues and systems. Endoderm, ectoderm, and mesoderm. External and internal segmentation. Fluid-filled body cavity called coelom.
4. Symmetry: bilateral
5. Integument: epidermis, pliable cuticle, and tiny bristles (setae) on each segment
6. Skeleton: soft body invertebrate
7. Musculature: two layers of muscles: 1) circular and 2) longitudinal
8. Movement: mobility by wiggling and moving tiny bristles
9. Nervous system/ senses: anterior brain and double, ventral nerve cord. photoreceptors, chemoreceptors, tactile tentacles, and organs of equilibrium called statocysts
10. Behavior/activity: interactive, taxes
11. Nutrition: heterotrophic, vegetation, organic debris and refuse
12. Digestion: sucking pharynx takes in soil -> esophagus -> crop ->gizzard-> straight, unsegmented digestive tract
13. Respiration: rudimentary gills or skin for exchanging oxygen and carbon dioxide
14. Circulatory: closed circulatory system with hemoglobin. Transport nutrients to cells, and carry wastes away from cells.
15. Immunity: Innate
16. Excretion: Nephridia in each segment.
17. Reproduction: monoecious & asexual fragmentation, budding, or fission. The clitellum is barrel shaped swelling that forms a cocoon for eggs.
18. Life cycle: hatch from cocoon, then mature into adult
19. Examples
 - a. Leeches: feeds on blood of vertebrates
 - b. Clam worms: eats small animals and other worms
 - c. Feather worm: feathery tentacles stick out of sturdy tube
 - d. Earthworm has five aortic arches rather than hearts.