

Ectyzoans

- 1) Phylum nematode
 - a) One of the most abundant animal
 - i) "if all the matter in the universe except nematodes were swept away, our world would still be recognizable, and if we could then investigate it, we should find its mountains, hills, lakes, rivers, oceans, represented by a thin film of nematodes..."
 - ii) They exist in every kind of ecological niche
 - iii) Only 12,000 species have been named but estimates put the true number around 500,000.
 - b) Size:
 - i) Most are microscopic (an square meter of topsoil may contain more nematodes than there are people on earth)
 - ii) Some however can grow to over a meter long
 - c) They contain a **cuticle** on their outer surface that protects and help maintain hydrostatic pressure.
 - d) One of the main defining characteristics of nematodes is there musculature only runs in one direction in the body, which causes the movement to be restricted to a "wiggly" motion. (think of a fish thrashing back and forth)
 - e) A species of nematode (*C. elegans*) has actually been one of the most important experimental species in biology. The original lineage of all cells have been mapped from fertilization to adult, nervous systems have been completely mapped, and all 19,820 genes have been sequenced. All this has been the fundamental understanding about the nervous system, development, and genetics leading to many modern medical advances.
 - f) Feeding:
 - i) Many nematodes are free living, and used a very muscular pharynx to suck food into its mouth.
 - ii) The intestinal tract is very simple and with just a small intestines leading to an anus.
 - iii) Parasitic nematodes will have a method for cutting into its host in order to steal its nutrients. A common method is with the use of cutting plates and use of anti-coagulants.
 - g) Circulatory/ respiration
 - i) Both respiratory and circulatory systems are absent in nematodes
 - ii) Many adult parasitic nematodes have and Anaerobic (lacking oxygen) energy metabolism.
 - h) Reproduction
 - i) Most all have a male and female form
 - ii) Fertilization is internal and females can postpone zygote development and retain the zygote in the uterus until its ready to deposit the eggs
 - iii) The hydrostatic pressure is so high in nematodes that the male hook is used to hold open the female and inject her uterus directly with sperm. Because of this nematode sperm has no flagellum
 - i) Examples:
 - i) **Ascaris**
 - (1) Observed in lab

- (2) One of the most common worm parasites in humans (about 1 billion people infected worldwide)
- (3) Occurs in warm humid regions of earth
- (4) Becoming more uncommon in humans in the US due to medical advancements
- (5) However, ascaris species found in other vertebrates are still prevalent. One species that infects dogs and cats remains dormant in them until pregnancy where the juvenile to infect the embryo. These puppies are born with worms that shed eggs through feces. These species can survive in humans but they can't complete their life cycle which can cause a serious health risks in children called visceral larva migrans. SO DISPOSE OF YOUR PET FECES PROPERLY!!
- (6) When a human eat contaminated vegetables or children put soiled hands or toys in their mouths they ingest the larvae. The larvae burrow out of the intestines and travel to the lungs where they can cause serious pneumonia. The juvenile will then travel up the trachea and back into the intestines where they mature and reproduce. This can cause abdominal pains, allergic reactions, or complete blockage of intestines.

ii) Hook worms

- (1) Hook worms develop in the soil, when human flesh comes in contact with the worms they burrow through the skin and into the blood and they travel to the lungs and eventually the intestines in a similar method as described above.
- (2) They use cutting plates to open the intestines and suck the blood for nutrients. An infected person may experience anemia, however an infected child may retard mental and physical growth.

iii) Trichinella

- (1) Can cause a lethal disease called trichinosis
- (2) Found in most vertebrates but most prevalent in swine.
- (3) When infected undercooked meat is eaten the larvae are released into the intestines where they burrow into the blood and travel to any tissue (including the heart, brain, lungs, kidneys, muscles, etc...)
- (4) Meat must be cooked thoroughly to kill the worm, freezing won't do it!

iv) Pinworms

- (1) Cause relatively little disease, which is probably why they are the most common worm infection in the US. 30% of children and 16% of adults.
- (2) They live in the large intestine where they come out of the anus at night and lay their eggs (then go back in). This causes you to itch which is how the eggs then spread.
- (3) Complications can happen in women when the infection spreads to the vagina causing vaginitis (swelling of the uterus/vagina)

v) Filarial worms

- (1) These worms are transmitted via insect hosts like mosquitos and black flies.
- (2) One species carried by mosquitos infect the lymphatic system which can cause elephantiasis.
- (3) Other species are carried by black flies in tropical regions which can infect the retina causing river blindness

- (4) Most common infection is in dogs (heartworms) carried by mosquitos
- (5) Filarial worm diseases are considered “neglected tropical diseases” because there almost completely eliminated from developed countries.

2) Phylum: Tardigrada

- a) Water bears!!
- b) Probably the most adorable microscopic species ever!
- c) They have 8 legs with claws that grasp their environment
- d) Some are free living in freshwater and salt water environments, however most live in a terrestrial environment around mosses and lichens.
- e) Their nervous system is surprising complex similar to annelids.
- f) They feed mostly on plant material and smaller organisms like nematodes.
- g) The most interesting thing about them is they can survive just about anything
 - i) Tardigrades tend to require water to function, however when water is limiting they can drop their body water content from 85% to 3%, stop moving, and enter into a **cryptobiotic** state. They essentially are dead at this point their bodily functions are almost zero, but they can stay in this state for years until water returns where they rebound quickly and resume normal processes.
 - ii) We also find these guys in extreme environments like thermal vents, incredible salty systems, and they have been shown to be able to survive the vacuum of space!
- h) They can reproduce by parthenogenesis or sexual reproduction.

3) Other phylum in Ecdysozoans

- a) There are 5 other phylum in Ecdysozoans
- b) Most are small groups who have only been studied briefly