Phylum Platyhelminthes
Phylum Nematoda
Phylum Mollusca

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Phylum Platyhelminthes
Common Characteristics:

- Triploblastic
- Bilateral Symmetry
- Protostome
- No true stomach structure
- No mouth
- Acoelomate
- Body is flattened
- Can produce asexually or sexually
- No respiratory system
Three Classes:

Class Cestoda - Tapeworm
Class Turbellaria - Planarians
Class Trematoda - Flukes
All three classes: Cestoda, Turbellaria and Trematoda have bilateral symmetry and the coelom development is Protostome.
Reproduction:

- **Tapeworms** reproduce asexually and sexually. Through mitosis, they can reproduce through fragmentation.
- **Planarians** are hermaphroditic. They can reproduce asexually and sexually just like the tapeworms.
- **Flukes** reproduce sexually and asexually. Flukes require an intermediate host as part of their life cycle which is a snail. They reproduce in the host and ciliated larvae leave the snail and look for a human that they could burrow into. The larvae then go through the blood of the human host and find their way to the intestinal linings where they reproduce and lay eggs. The eggs are excreted from the host and so the cycle begins again.
Levels of Organization:

Tapeworms is covered with cuticle, with a soft ribbon like body which is flattened. They lack a respiratory system and a circulatory system but they do contain a nervous system. They are characterized by three germ layers which are ectoderm, mesoderm, and endoderm.

Planarians have one opening. They lack a respiratory system but they have an excretory system which is mainly used for water regulation. The excretory system contains flame cells. Flame cells moves excess water into tubes that open to the outside. They are characterized by three germ layers which are ectoderm, mesoderm and endoderm. It has a gastrovascular cavity which digestion occurs.

Flukes contain the same body form and digestive cavity as Planarians, the entire interior is occupied by the reproductive system. They have three germ layers which are ectoderm, mesoderm and endoderm. Flukes have a leaf-shape and an outer cover called the tegument.
Cephalization:

Tapeworms have a small head which is also known as Scolex. Planarians have a triangle shaped head region with ganglia. Flukes have ganglia in the head region.
Feeding:

Tapeworms absorb the digested food and nutrients from the host’s intestines through their cuticle.

Planarians are non parasitic worms and it mainly feeds on crustaceans, larvae and small worms. The Turbellaria extends a long and tubular pharynx that is located underneath and at the center of the Planarian’s underside.

Flukes digests the host’s blood, mucus, tissues and intestinal debris through the oral sucker that surrounds the anterior of the mouth, or ventral sucker.
Respiration:

Tapeworms have no respiratory system but when oxygen is available, the general body lining works as the respiratory surface.

Planarians have no respiratory system, the oxygen and carbon dioxide diffuse through the cells of the planarians.

Flukes have no respiratory system and also rely on diffusion.
Internal Transport:

**Tapeworms** does not contain a circulatory system thus they depend on diffusion.

Just like tapeworms, **Planarians** depend on simple diffusion.

**Flukes** don't have a circulatory system, so they depend on diffusion.
Excretion:

**Tapeworms** use the same route when disposing waste and when they “feed” by absorbing their nutrients through their cuticle.

**Planarians** uses the pharynx to dispose of waste.

**Flukes** rid their waste products through a well developed excretory system. The system, which is protonephridial, consists of flame cells which are conjoined to tubules that open into ducts that end in the bladder. This part of the excretory system is involved with osmoregulation. Waste is also excreted through the tegument.
Response and Motility:

In all three, the motility is using muscles to twist and cilia to glide. Some flatworms have light-sensing eyes called ocelli that allow them to either move away or towards the light such as the Turbellaria.
Introduction to the Nematoda
The Roundworms

- Approximately 12,000 species of Nematoda have been named.
- The word "nematode" comes from a Greek word nema that means "thread".
- They live in the sea, in fresh water, and in soil, from polar regions to the tropics, and from mountaintops to the depths of the sea.
- Good topsoil may contain billions of nematodes per acre.
Nematodes also **parasitize every type of animal and many plants.**

- Effects of nematode infestation on crops, domestic animals, and humans make this phylum one of the most important of all parasitic animal groups.

  - The hookworm, pinworm and trichinella are part of this group. They are more advanced than flatworms but less advanced than earthworm.
Roundworms

Phylum Nematoda

The hookworm, pinworm and trichinella are part of this group. They are more advanced than flatworms but less advanced than earthworm.

Soil Nematodes - Free-living species (decomposers)

Free-living nematodes are very important and beneficial in the decomposition of organic material and the recycling of nutrients in soil. Nematode bacterivores and fungivores do not feed directly on soil organic matter, but on the bacteria and fungi which decompose organic matter.
Soil-inhabiting nematodes can also be classified according to their feeding habits.

**Herbivores.** These are the plant parasites, which are relatively well known.

**Bacterivores.** Many kinds of free-living nematodes feed only on bacteria, which are always extremely abundant in soil.

**Fungivores.** This group of nematodes feeds on fungi and uses a stylet to puncture fungal hyphae.

**Predators.** These nematodes feed on other soil nematodes and on other animals of comparable size.

**Omnivores.** A few kinds of nematodes may feed on more than one type of food material, and therefore are considered omnivores.
ANATOMY

-A Nematode is a long hollow tube within which is another tube, the alimentary canal and the reproductive organs.
- Nematodes are round in cross section, this is because they maintain their body fluids under great pressure.
- To contain this high pressure nematodes have an extremely tough, yet elastic and flexible cuticle.
- Beneath the cuticle is a hypodermis and a layer of longitudinal muscle. - Nematode has bilateral symmetry.

-Food digested in the gut is not distributed by any specialized vascular system
-Neither is there a respiratory system for the uptake or distribution of oxygen. - Nutrients and waste are distributed in the body cavity, whose contents are regulated by an **excretory duct** along each side of the body

Nematodes move by contraction of the longitudinal muscles. Because their internal pressure is high, this causes the body to flex rather than flatten.
- A mouth opening leads into a muscular pharynx (throat) where food is pulled in and crushed.

- There is no stomach, with the pharynx connecting directly to a muscleless intestine that forms the main length of the gut.

- This produces further enzymes, and also absorbs nutrients through its single cell thick lining.

- The last portion of the intestine is lined by cuticle, forming a rectum, which expels waste through the anus just below and in front of the tip of the tail.
Nervous system

- Four peripheral nerves run the length of the body on the dorsal, ventral, and lateral surfaces.
- The ventral nerve is the largest.
- The dorsal nerve is responsible for motor control, while the lateral nerves are sensory, and the ventral combines both functions.

- The bodies of nematodes are covered in numerous sensory bristles that provide a sense of touch.
Reproduction

-Most nematode species are dioecious, with separate male and female individuals.

-The testes each open into a relatively wide sperm duct and then into a glandular and muscular ejaculatory duct associated with the cloaca.

-In females, the ovaries each open into an oviduct and then a glandular uterus.

-Reproduction is usually sexual.
-Males are usually smaller than females (often much smaller) and often have a characteristically bent tail for holding the female.
## SUMMARY OF PHYLM NEMATODA

<table>
<thead>
<tr>
<th>Muscular-Skeletal</th>
<th>A roundworm has no skeleton.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response and Motility</td>
<td>Nematodes move by contraction of the longitudinal muscles. The bodies are covered in numerous sensory bristles and papillae that together provide a sense of touch.</td>
</tr>
<tr>
<td>Digestion</td>
<td>A roundworm has a definite digestive system that runs the length of their bodies. It has a mouth, pharynx, intestine and anus. Many are parasites and live off other animals and plants.</td>
</tr>
<tr>
<td>Nervous</td>
<td>A roundworm has two nerve cords that transmit impulses in the roundworm.</td>
</tr>
<tr>
<td>Circulation, Internal Transport</td>
<td>A roundworm has no heart or formal blood vessels. Absence of circulator/system is compensated by - the presence of pseudocoelomic fluid which transports nutrients though out the body.</td>
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<tr>
<td>Respiration</td>
<td>A roundworm has no formal respiratory system.</td>
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<tr>
<td><strong>Reproduction</strong></td>
<td>A roundworm reproduces sexually. The female has an ovary, holds eggs in an oviduct and then passes them to the uterus, where they are fertilized. The male has sperm cells are made in the testis and stored in the vas deferens. When it is time to reproduce, the sperm cells pass through the spicule. Over 200,000 eggs can be deposited at once in the soil once they are fertilized.</td>
</tr>
<tr>
<td><strong>Excretion</strong></td>
<td>A roundworm has an anus at its rear end and a series of excretory tubes that end in an excretory pore.</td>
</tr>
<tr>
<td><strong>Symmetry</strong></td>
<td>A roundworm has bilateral symmetry.</td>
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<tr>
<td><strong>Appearance</strong></td>
<td>A roundworm is thin, round, smooth and can be up to four feet in length.</td>
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<tr>
<td><strong>Feeding</strong></td>
<td>The head of a nematode has a mouth opening into a muscular pharynx (throat) where food is pulled in and crushed</td>
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Phylum Mollusca
Characteristics of Mollusks

Mollusks are soft-bodied animals that contain an interior or exterior shell
- Invertebrates (no backbone)
- Bilateral symmetry
- Protostomes
- Live in bodies of water like ocean and lakes, also live on land
- May be herbivores, carnivores, omnivores, filter feeders, parasites and/or detritivores
- Reproduction: Sexual and most sexes are separate
10 or 9 classes of mollusks but 3 are extinct

- **Class Gastropoda**: Snail and Slugs
- **Class Bivalvia**: Clams, Oysters, Scallops and Mussels
- **Class Cephalopods**: Octopus, Squid, and Cuttlefish
Class Gastropoda

Feeding:
Snails and slugs feed through their mouth using radula and a supporting rod. **Radula** are tongue-like flexible skin that have hundreds of tiny teeth. **A Supporting Rod** are located inside a radula and are made of cartilage.
Class Gastropoda

**Reproduction:** Many snails reproduce by releasing sperm and eggs into the water and after being fertilized they are free-swimming larva. This occurs when they are separate sexes. Hermaphrodite (same sex) snails get together and fertilized each other's eggs at the same time.
Respiration:
Aquatic snails and slugs use gills located in their mantle cavity to breathe.

Land snails and slugs have many blood vessels acting like lungs located in a mantle cavity. They breathe through an opening called pneumostome.
Class Gastropoda

Internal Transport: Snails have an open circulatory system. They have blood circulating through body tissues in open spaces called sinuses.
**Response:** Gastropods have a small cerebral ganglia as their brain. *Ganglia* are a mass of nerve cells.

Gastropods have a sense of smell, two eyes and *statocysts* (fluid-filled sac, used for helping indicate position when moving).

Gastropods can't hear.

**Motility:** Gastropods move by gliding by contracting muscles, they also produce slime to help make gliding easier.
**Class Bivalvia**

**Feeding:** Bivalves don't have radula and are filter feeders. They mostly eat plankton and use their gills to separate their water and food. The plankton gets stuck in a layer of sticky mucus and cilia on the gills move it into their mouths.

**Respiration:** Bivalves breathe using gills located in their mantle cavity.
Reproduction: Fertilization can be internal or external, and most are **dioecious** (separate sex). They release eggs and sperm into the open water and find each other. Some bivalves can switch their sexes.
**Class Bivalvia**

**Response:** Bivalves have a simple nervous system, ganglia near their mouth, sense organs used for touch, statocysts, and eyes.

**Motility:** Some bivalves move with their "foot", a muscle that can be project through their shells. They can use this to dig themselves into the sand and pull themselves.

**Internal Transport:** Bivalves pump blood with its heart and has an open circulatory system. They also have sinuses like snails.
Class Cephalopoda

**Feeding:** Cephalopods are carnivores and have a radula and a beak-like mouth. They can use their radula to break into the shell of its prey and then use it to tear up and swallow its prey's soft tissue. They can also produce poison to hurt its prey and some poisons can kill humans.

**Respiration:** Cephalopods have feathery gills they use to breathe. Using water, the oxygen is picked up by its blood.
**Class Cephalopoda**

**Internal Transport:** Cephalopods have a closed circulatory system because they are fast-moving and an open circulatory system isn't efficient. Their blood moves through blood vessels.

**Motility:** Cephalopods swim with jet propulsion and they move very fast. They take water into their cavity, and release a jet of water from contacting its muscles.
Class Cephalopoda

Reproduction: Cephalopods have internal fertilization. Cephalopods can put their tentacle into a female cephalopod or detached their tentacle and give it to the female, and give off sperm. The female lays eggs and guards them from any danger.
Class Cephalopoda

**Response:** Cephalopods and octopuses have a highly developed brain and nervous system. They can remember things for a long period of time and are intelligent. They have sense organs to distinguish shapes by using their eyesight and texture by using their touch. They can camouflage and shoot ink to confuse their enemy to retreat.
Excretion

Class Gastropoda, Class Bivalvia, and Class Cephalopoda dispose of their wastes the same way. They dispose their waste via anus and produce waste in the form of ammonia. Since ammonia is poisonous they use tube-like organs called nephridia. Nephridia cleans their blood from ammonia and releases it.
Basic body parts of Mollusks

**Foot:** May be used for movement, food capture or attachment

**Visceral mass:** carries the digestive organ, excretory organ and reproductive organ

**Shell:** Protection and can help keep them from drying out

**Mantle Cavity:** Contains the gills and flesh
Cephalization: Cephalopods and gastropods have heads while bivalves don't. Ganglia acts like its brain.

Coelom development: All Mollusks are protostomes
All have bilateral symmetry