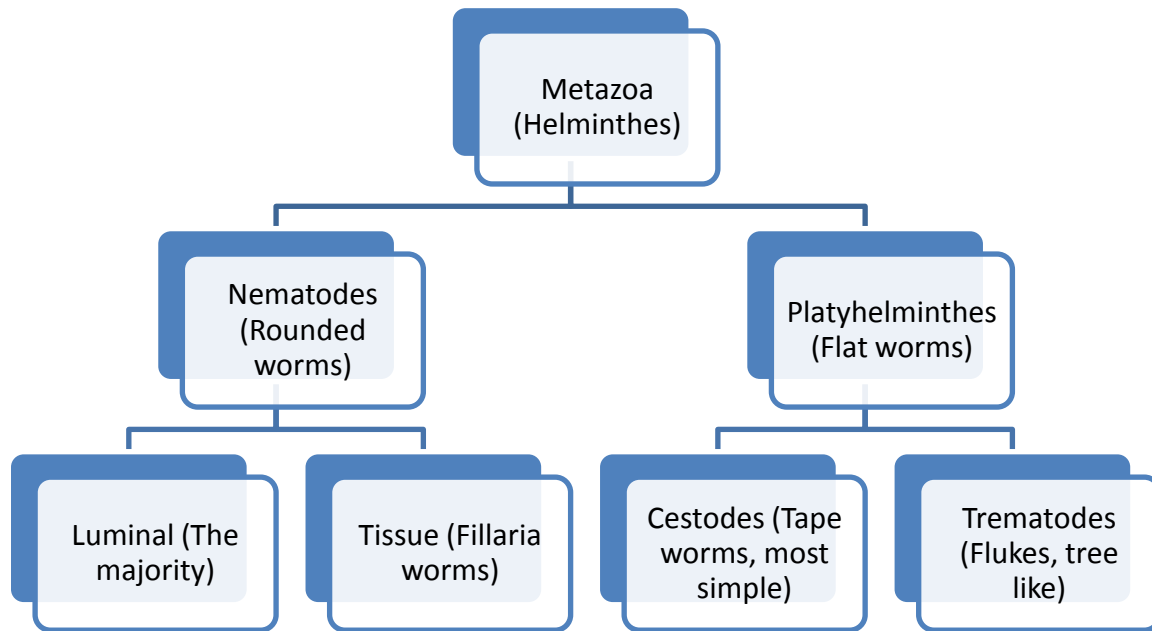


Metazoa (Helminthes) (Parasite Worms)



Cestodes are the most primitive, Nematodes are the most complex. Worms' life span varies from 8 weeks to 16 years.

Nematodes

Rounded in shape, vary in size between 2 mm and 1m, so they can't be intracellular. They are either luminal or tissue parasites such as *Fillaria* worms, transmission of disease differs between these two categories. Nematodes have different female and male worms, this differentiates them from Platyhelminthes, which are Hermaphrodites, i.e. possess both male and female reproductive organs in the same organism.

Luminal Nematodes:

Fertilized eggs do not hatch in the body, and are instead produced in the feces. The eggs can be infective immediately, or might need to mature for some time before they gain infectivity. In some cases, the eggs hatch into larvae in the soil, this is termed the **free living stage**. **Larvae** infect by gaining access through the **skin**, not the GI tract. **Eggs** infect through the **GI tract** by hatching in the intestine to produce larvae which matures and grows into worms.

Sanitation and hygiene play a great role in prevention of disease in these cases. Washing hands is crucial. In case of suspected infection, the feces should be checked for eggs. Eggs of different parasites have distinctive morphologies, and diagnosis can be made based on that.

Sometimes the transformation of larvae into the worm is known as **Mortem**, a Mortem is a transitional state of growth till the final adult state.

In some cases, like *Ascaris*, after the eggs hatch in the intestine, they don't continue maturation in the GI tract, but instead they penetrate into the circulation, move to the lungs where they continue their maturation. Then, they move to the alveoli, up to the trachea with the mucus and sputum where you swallow them again to the lumen of the small intestine where they are finally mature. *Ascaris* need high tension of oxygen in the lungs.

Tissue Nematodes (Filarial worms)

They live in tissues, either in **lymphatic** or **subcutaneous** tissue.

Their eggs hatch **fast** and so they produce larvae called **micro filaria** inside these tissues. Micro filaria enter the circulation, **but cannot mature till they are carried by an intermediate host**, a vector. Micro filaria look like a tube filled with nuclei, and can be sheathed or unsheathed. (those features can be used in **diagnosis, the disposition of the nuclei** and the **existence of a sheath**)

To make a diagnosis we have to take a biopsy of the suspected tissue, this biopsy is best taken at **certain times**. For instance in **Loa Loa disease** which is transmitted by the **Mango fly** which is usually more active in the afternoon, we should take the biopsy in the **afternoon**.

Structure of the Nematodes:

They have a GI tract **with an anal opening**. A rudimentary nervous system. Male and female reproductive organs in separate organisms (remember Nematodes are not hermaphrodites) and a primitive excretory system.

Covered most exteriorly by a cuticle which protects the worm from the harshness of the GI. Deep to the cuticle is a muscle layer which allows their movement. Deep to that the worms are filled with fluid which carries out the function of blood, for transport of nutrients/wastes along the worm (through diffusion).

They have certain structures to anchor them to the GI. Some of them have a **very sharp anterior** end which pins into the intestine. Others have hooks; **teeth-like structures**, which bite into the villi for anchorage. Others are **very muscular** like the *Ascaris*, they continually push themselves up to counteract the action of peristalsis. **Perazine**, a paralyzing drug for the worms, can help get rid of them in such cases.

They are anaerobic, feed on intestinal juice, and might sometimes feed on blood [in case of the "biting" worms which cling to the villi through hooks]

Symptoms include gradual development of iron deficiency anemia due to the blood loss which occurs because of penetration, and sucking of the blood by hook worms. Do note though that the blood is never visible in the feces, because it is spilled in very low concentrations and is **occult** (occult = you can't see it).