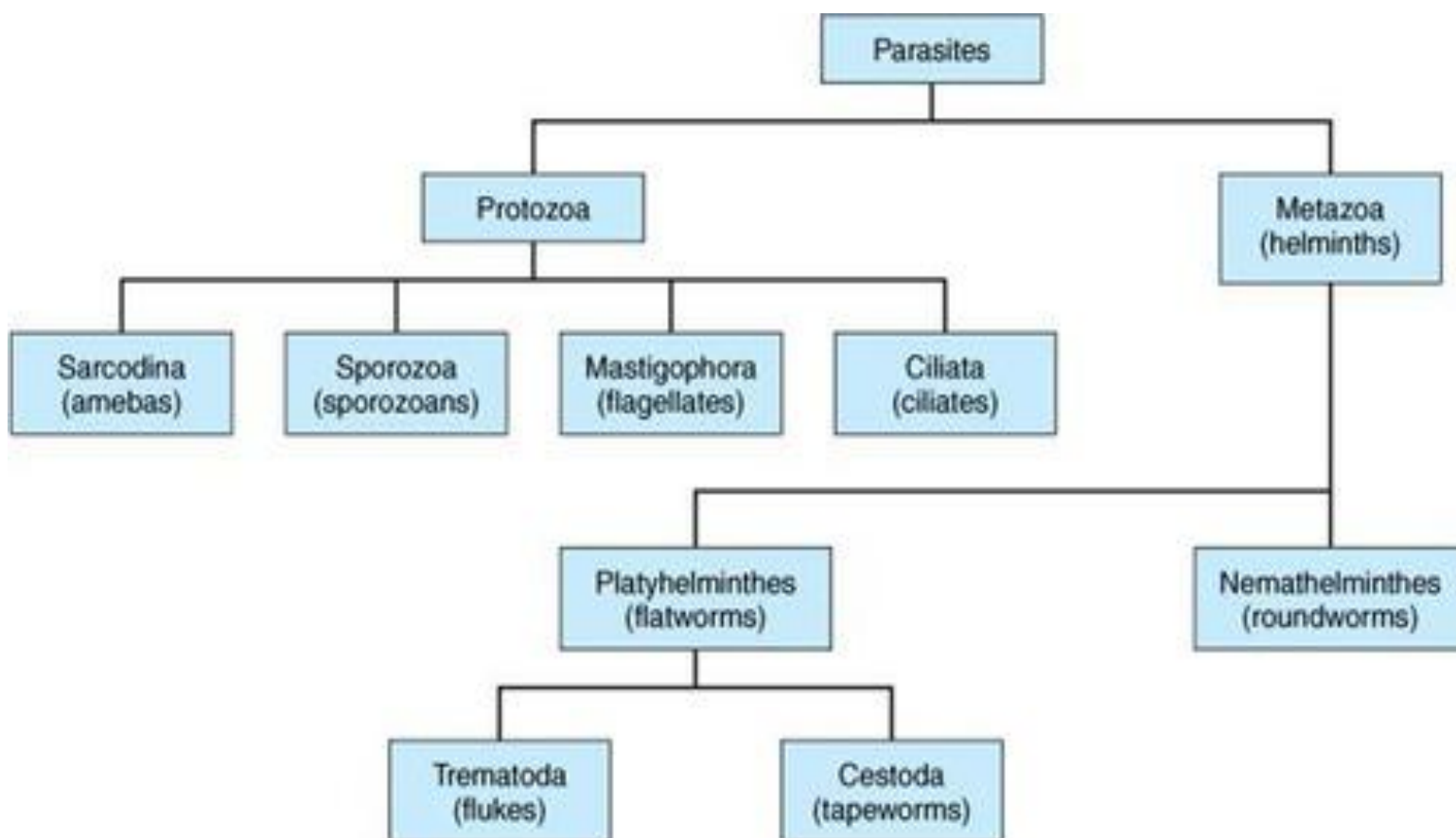


Introduction:

- Parasitology is the branch of biology that studies **parasites** and the relationships between parasites and their **hosts**. (a host is an organism that provides resources or shelter for a parasite).
- A parasite is an organism that lives on or inside a host organism and gets its nutrients from the host, usually harming the host in the process.*
- Common **human parasites** include **protozoa** (single-celled parasites like Plasmodium, Giardia, Entamoeba), **helminths** (worms like tapeworms, roundworms, fluke worms), and **ectoparasites** (lice, scabies mites, bed bugs).
- Parasites have **complex life cycles** with different forms that may involve multiple host species. Transmission occurs through vectors, contaminated food/water, or direct contact.
- Parasitic diseases** cause enormous global health and economic burdens. Diseases like malaria, toxoplasmosis, and schistosomiasis infect millions annually.
- Diagnosis** involves identifying parasite forms in clinical samples like blood, stool, or tissue biopsies through *microscopy*, *immunodiagnosics*, or *DNA tests*.
- Treatment** involves antiprotozoal, anthelmintic or insecticide medications targeting the relevant parasite. Vaccines exist for some but not all parasitic diseases.





Intestinal and tissue protozoa a group of single-celled organisms that can live in the human intestine and sometimes cause disease. These organisms are called protozoa, and they belong to the kingdom Protista. Protozoa are diverse and complex, and they have different shapes, sizes, and modes of movement. Some protozoa have hair-like structures called cilia, some have whip-like structures called flagella, and some have pseudopodia, which are extensions of their cytoplasm that can change shape and direction.

Among the protozoa, there is a subgroup called amoeba, which are characterized by having pseudopodia. Amoeba can be found in various habitats, such as soil, water, and animals. Some amoeba can infect humans and cause intestinal or tissue diseases, while others are harmless and do not cause any symptoms.

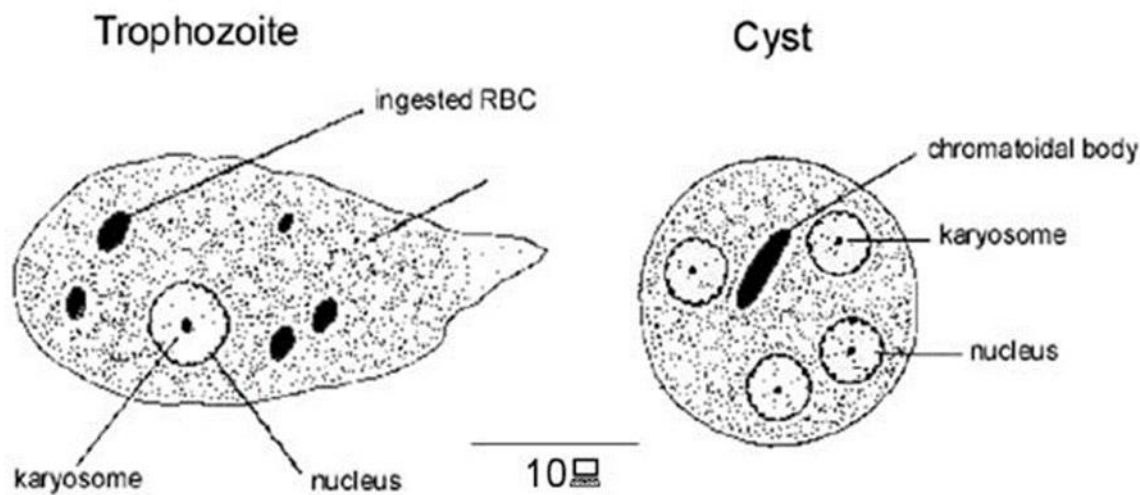
There are other species of *Entamoeba* that are morphologically similar to *Entamoeba histolytica*, but are not considered pathogenic. These include *Entamoeba dispar*, *Entamoeba moshkovskii*, *Entamoeba hartmanni*, *Entamoeba coli*, and *Entamoeba polecki*. These species are usually harmless and do not cause any disease in humans. However, they can be confused with *Entamoeba histolytica* under the microscope, and therefore molecular methods are needed to distinguish them.

Besides *Entamoeba*, there are other genera of amoeba that can cause intestinal or tissue infections in humans. These include *Acanthamoeba*, *Balamuthia*, *Naegleria*, and *Sappinia*. These amoeba are usually found in soil and water, and can infect humans through contact with the eyes, nose, mouth, or skin. They can cause diseases such as keratitis, encephalitis, granulomatous amebic encephalitis, and amebic meningoencephalitis.

Entamoeba histolytica

Introduction

Entamoeba histolytica is an intestinal protozoan parasite that can infect humans and cause a disease known as amebiasis. It is an important cause of parasitic diarrhea globally. In this lecture, we will discuss the life cycle, pathogenesis, clinical manifestations, diagnosis and treatment of *E. histolytica* infection in detail.



Life-cycle

E. histolytica has two forms - the infective cyst form and the disease-causing trophozoite form.

- Cysts are ingested through the fecal-oral route by consuming contaminated food or water.
- In the small intestine, each cyst breaks open releasing 8 motile trophozoites.
- Trophozoites multiply and divide via binary fission in the colon and intestine. Some differentiate back into cysts which are passed in stool.



- When another suitable host is infected by ingesting these cysts from contaminated sources, the cycle continues.

Pathogenesis

In the intestine, trophozoites feed on intestinal epithelial cells and bacteria. They use proteolytic enzymes and phagocytosis to invade and damage tissues.

- In most infections, trophozoites remain confined to the intestinal lumen causing an asymptomatic infection.
- However, in some cases trophozoites penetrate the intestinal mucosa causing an acute, invasive infection known as amebic colitis.
- Trophozoites can spread via the bloodstream to the liver, lungs and brain where they cause abscesses. This is known as extraintestinal amebiasis.

Clinical Manifestations

- Asymptomatic infection - Most infected individuals do not develop symptoms.
- Amebic colitis - Abdominal pain, tenderness, bloody diarrhea.
- Amebic liver abscess - Right upper quadrant pain, fever. May cause sepsis if ruptured.
- Extrapulmonary or brain abscesses - Rare but life-threatening if occur.

Diagnosis

- Stool examination - Visualize trophozoites or cysts on microscopy. Culturing on non-nutrient agar enhances the detection rate.
- Serological tests - Detect anti-*E. histolytica* antibodies by ELISA, IHA. Help diagnose extraintestinal infection.

- Imaging - Ultrasound or CT helps confirm liver abscess.

Treatment

- Metronidazole or Tinidazole are drugs of choice for intestinal and tissue amebiasis.
- Surgery may be needed for large, complicated liver abscesses.
- Treatment of asymptomatic cyst carriers is not usually needed.

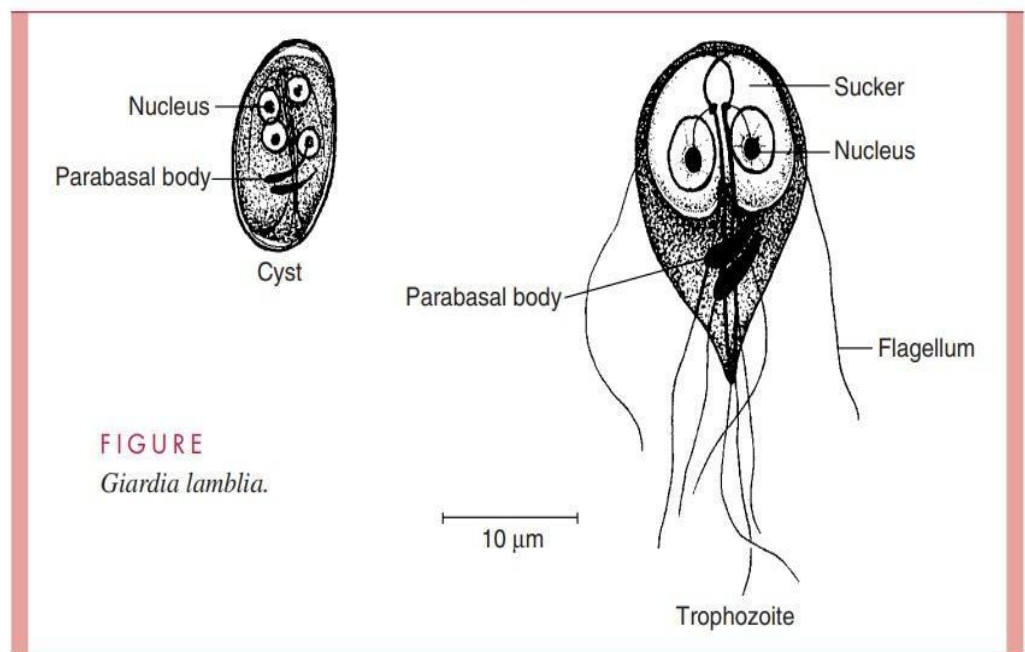
Prevention focuses on improving sanitation, water treatment, and health education to interrupt fecal-oral transmission of the infective cysts. Vaccine development is ongoing but none is available currently.

Giardia

Introduction

Giardia lamblia, also known as *Giardia intestinalis* or *Giardia duodenalis*, is a flagellated protozoan parasite that infects the small intestine causing giardiasis. It is one of the most common intestinal parasites worldwide and a major cause of

travelers' diarrhea.



Life Cycle

- Trophozoites colonize and multiply in the small intestine.
- Some differentiate into infective cyst forms which are passed in feces.
- Cysts are ingested orally through contaminated food, water, or person-to-person spread.
- In the small intestine, each cyst released 4 flagellated trophozoites.

Pathogenesis

- Trophozoites adhere to the epithelium of the duodenum and jejunum using ventral suckers and disks.
- They feed on intestinal contents but do not invade tissues.
- Their presence causes inflammation and villous atrophy leading to malabsorption and diarrhea.

Clinical Manifestation

- Asymptomatic infection is common, especially in developing countries.
- Symptomatic giardiasis causes acute or chronic diarrhea, abdominal cramps, bloating, nausea and weight loss.
- Symptoms range from mild to severe depending on infective dose and immune status.
- If untreated, may persist for months.

Diagnosis

- Stool microscopy to detect characteristic banana-shaped cysts or pear-shaped trophozoites.



- Antigen detection tests like **ELISA** are available for diagnosis.
- duodenal biopsy shows trophozoites attached to epithelium.

Treatment

- Metronidazole or Tinidazole are drugs of choice for symptomatic giardiasis.
- Asymptomatic cases may not need treatment.
- Good hand hygiene prevents fecal-oral spread through contaminated food/water.