Ministry of Higher Education and Scientific Research

Al -Mustaqbal University

Collage of medical and health techniques

Department of medical laboratories techniques

3ED LECTURE

Sarcodina , Amoeba , Trypanosome Giardia

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3.1Sarcodina

Introduction to Sarcodina

In the 20th century, protozoans were classified based on their modes of nutrition and locomotion. They were divided into various taxonomic groups - Mastigophora(based on locomotion with flagella), Sarcodina (based on locomotion with pseudopodia), Ciliophora(based on locomotion with cilia), and Sporozoa (parasites that do not have specific locomotory structures).

But these divisions were not accurate from the evolutionary perspective and thus this classification is considered outdated, protozoans are divided into 4 subphylums and superclass Sarcodina is included under the subphylum Sarcomastigophora.

The members of the superclass Sarcodina are known as sarcodines. It compromises *Amoeba* and other related organisms. The key feature of the organisms of this class is the presence of pseudopodium, it has a role in trapping food for the ingestion process performed by the organisms. Pseudopod can be defined as the temporary extension of the protoplasm. They can be singular as a single blunt lobopodium with simple anatomy or they can be found in the bundle as reticulopodia which protrudes from a foraminifera shell.

Features of the Sarcodines

Sarcodines anatomy is very simple as it only consists of a single cell, with abundant protoplasm. All the metabolic processes occur in the protoplasm. *Amoeba* is the key organism that is used to study the physiological and biochemical features of the superclass Sarcodina. Amoeba is also used for the phylogenetic study of the superclass. Phylogenetic history and relation are generally hypothesized using the genetic and proteomic data of the organism. Some of the general characteristics and features of sarcodines are as follows.

1. Most of the organisms of this class are free-living carnivores.
2. They engulf food by pinocytosis.
3. Some of the strains of protozoans are parasitic. For example, amoebic dysentery is caused by the sarcodine family protozoa ***Entamoeba histolytica.***
4. Most of them are free living.
5. Most of them are sessile, that is they are attached to some kind of surface and cannot perform voluntary locomotion. Locomotion is rather achieved by external forces, such as water current, laminar flow, etc.
6. Sarcodines are further classified into three main classes that are - Rhizopodea, Piroplasmea, and Actinopodea.
7. The class differentiation among sarcodines is based on the type and feature of pseudopodia.

Classification of Sarcodina

It is based on classification by B.M Honigberg. Sarcodina is classified under the phylum protozoa. Protozoa are further classified into subphylum Sarcomastigophora, Sporozoa, Cnidospora and, Ciliophora. The subphylum Sarcomastigophora is further classified into three superclasses, Sarcodina, Mastigophora and, Opalinata. The class Sarcodina is then further classified into subclasses of Rhizopoda, Piroplasmea, and Actinopoda.

Amoeba

is a term that describes a simple eukaryotic organism that moves in a characteristic crawling fashion.

Classification

Amoebas are eukaryotes. Their single cells, like those of other eukaryotes, possess certain characteristic features: Their cellular contents are enclosed within a cell membrane, and their DNA is packaged into a central cellular compartment called the nucleus,

Most of these organelles are common to all eukaryotic cells, but there are a few exceptions. For example, the parasitic amoebas *Entamoeba histolytica*, which cause amoebic dysentery in humans, do not have the golgi apparatus, Researchers found that *E. histolytica* instead contain golgi-like compartments or vesicles small fluid-filled pouches.

There are also amoebas that don't have mitochondria, the organelle responsible for generating cellular energy, because they live in environments lacking in oxygen, or "anoxic conditions,

Locomotion

Structurally, amoebas closely resemble the cells of higher organisms. "They are like our cells, and in fact, when they are moving they look very much like our white blood cells.

Like our white blood cells, amoebas move using pseudopodia, These short-lived, outward projections of the cytoplasm the semifluid material inside the cell membrane help amoebas to grip a surface and propel themselves forward. As the pseudopodium moves out along a surface in one direction.

The contraction pushes the cytoplasm forward to fill the expanding pseudopod, but the contraction also pulls up adhesions at the back end of the cell .

Amoebas can also use their pseudopodia to feed. The process of ingesting solid material is called phagocytosis, and the process of engulfing drops of liquid is known as pinocytosis, also known as cell drinking,

Medical important of *Amoeba*

Amoebas are known to cause a range of human diseases. Amebiasis, or amoebic dysentery, is an infection caused by *E. histolytica*, a human intestinal parasite, *E. histolytica* can invade the colon wall and cause colitis, where the inner lining of the colon becomes inflamed, and the parasite can cause severe diarrhea and dysentery.

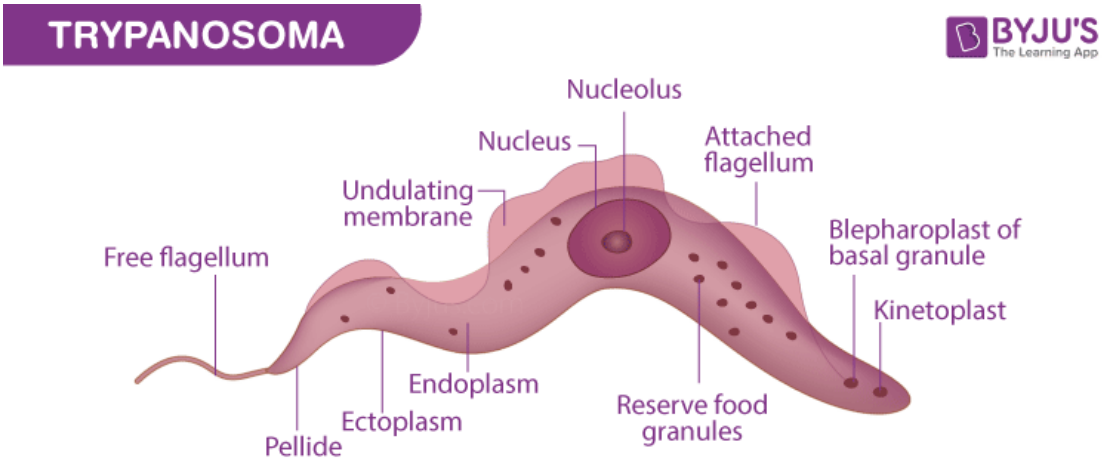
Though *E. histolytica* infections can occur anywhere in the world, it is most common in tropical regions that have substandard sanitation systems and crowded conditions.

3.2. Zoomastigina

A sub phylum of parasitic or free-living heterotrophic protozoa that possess one or more (flagella) for locomotion.

Organisms within this group have a spherical, elongated body with a single central nucleus. They are single-celled, heterotrophic eukaryotes and may form symbiotic relationships with other organisms, including Trichomonas. Some species are parasitic, causing diseases such as the African Sleeping Sickness, caused by the zooflagellate *Trypanosoma brucei*. and leishmaniasis, caused by and leis*hmania braziliensis.* Zooflagellates have one or more flagella but do not have or cell walls.

Trypanosome

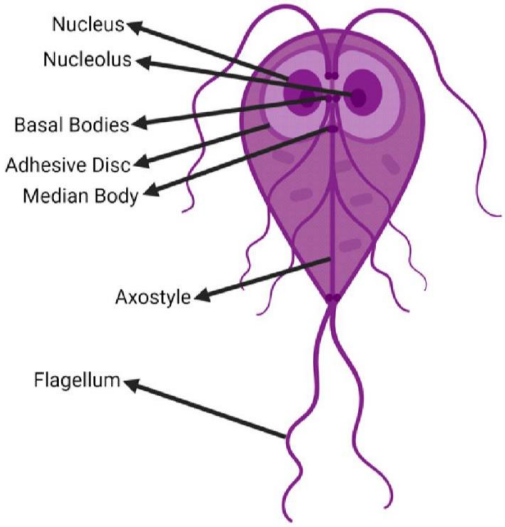


Trypanosomes are unicellular parasitic protozoa belonging to the Trypanosoma genus . Different species of trypanosomes infect a variety of different vertebrates, including humans. Most of them are transmitted by different insects and cause such diseases as Human African Trypanosomiasis (HAT) also known

as sleeping sickness, and American trypanosomiasis or Chagas disease.

Chagas disease caused by *Trypanosoma cruzi* is a devastating human disease in Latin and South America with more than 10 million infected people. It is transmitted to man by infected faeces of a blood-sucking bug through skin breaks during blood meal or through mucous membranes, occasionally causing outbreaks with contaminated food. Transmission through blood transfusion, pregnancy and delivery are also possible, and less frequently, through organ transplantation or laboratory accidents.

Giardia



Giardia is a parasite. Illness caused by *Giardia* is called giardiasis.

Giardia lives in the gut of infected people and animals and comes out of the body in stool. *Giardia* can survive for weeks to months outside the body (for example, in soil).

In the United States, more people get sick from *Giardia* than from any other parasite that lives in the gut. Every year, more than 1 million people get sick from *Giardia.*

Giardia is found in every region of the United States and around the world.

Testing methods

To see if *Giardia* is making you sick, a healthcare provider will ask you for one or more stool samples. They will send your samples to a laboratory to check if you have *Giardia* germs in your stool. If the laboratory finds *Giardia* in your stool, it means you have a *Giardia* infection.

You may be asked to submit several stool samples collected over several days to see if you have a *Giardia* infection. The laboratory may need several samples because it can be difficult to detect *Giardia* in stool. Even if you have a *Giardia* infection, there may not be enough *Giardia* germs in every stool sample for the laboratory to find them. Additionally, people with *Giardia* infections do not pass *Giardia* germs every time they stool.

Symptoms

Symptoms usually begin by having diarrhea 2 to 5 times per day and feeling more and more tired.

Short-term symptoms include:

- Diarrhea
- Gas
- Smelly, greasy stool that can float
- Stomach cramps or pain
- Upset stomach or nausea
- Dehydration (loss of fluids)

Symptoms usually begin 1 to 2 weeks after becoming infected with *Giardia* and last for 2 to 6 weeks. Occasionally, people have long-term symptoms that can last for years.

Giardia lifecycle

Giardia can be in water or food, or on hands, surfaces, or objects. You can get sick when you swallow *Giardia* germs.

Once the *Giardia* germs are in your small intestine (part of your gut), they shed their shell and split in two. These *Giardia* germs start absorbing nutrients from you.

Giardia germs can continue to multiply in your small intestine.

The germs then move to your colon (lower gut) and regain their shell.

Giardia leaves your body through stool. The *Giardia* in your stool can spread to other people and make them sick.

You can get sick from *Giardia* by

- Having close contact with someone who is sick from *Giardia*, especially in childcare settings

- Swallowing water contaminated with *Giardia,* such as lake, pool, or unsafe drinking water
- Swallowing food contaminated with *Giardia*
- Having contact with stool during sex with someone who is sick, or was recently sick, from *Giardia*
- Getting *Giardia* in your mouth that you picked up from contaminated surfaces, such as bathroom handles or toys
- Touching animals that have a *Giardia* infection or animal environments that are contaminated with stool

Prevention steps and strategies

Wash your hands with soap and water at **key times** when you are more likely to get or spread germs.

Key times include:

- Before preparing food or eating

- After using the toilet
- After changing diapers
- After touching an animal or their environment
- After touching soil

Giardia germs can be in soil, so wash your hands after activities like gardening, landscaping, or field work. Wash your hands even if you were wearing gloves.

At pools, lakes, and other swim areas

- Stay out of the water if you are sick with diarrhea.
- Shower before you get in the water.
- Do not swallow the water.
- Take kids on bathroom breaks and check diapers every hour.
- Change diapers away from the water to keep germs out of the water.

Around animals

- Avoid touching animal feces, especially the feces of young animals.
- Do not touch your face or mouth after being near animals.
- Wash your hands after touching animals or the areas where they live.