Program
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# PROTOZOA

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# SUB CPMK

- Mahasiswa mampu menjelaskan struktur sel protozoa;
- Mampu mengklasifikasikan protozoa berdasarkan kategori tententu;
- Mampu menerangkan reproduksi protozoa;
- Mampu menerangkan peranan protozoa bagi kehidupan manusia

# Materi Online

- Parasites: Protozoa (classification, structure, life cycle) - YouTube

# Karakteristik

- Protozoa (Egypt) ; protos = first; zoon = animal
- Protozoa are microscopic, unicellular organisms that lack photosynthetic capability, usually are motile at least at some stage in their life cycle, and generally reproduce by asexual fission.
- Size : 10 – 200 µm

- A majority of protozoa are free-living and found in marine, freshwater, or terrestrial environments. They are essential as decomposers in many ecosystems.
- Some species, however, are parasitic, living on or in other host organisms
- All protozoa require large amounts of moisture, no matter what their habitat.

In marine environments, protozoa make up part of the zooplankton, where they feed on the algae of the phytoplankton and are an important part of the aquatic food chain

On land, protozoa are abundant in soil as well as in or on plants and animals

- The hosts for protozoan parasites range from simple organisms, such as algae, to complex vertebrates, including humans.
- Specialized protozoan habitats include the guts of termites, roaches, and ruminants such as cattle.

# Cell Structure : Structure of Protozoa

***Cell Wall***

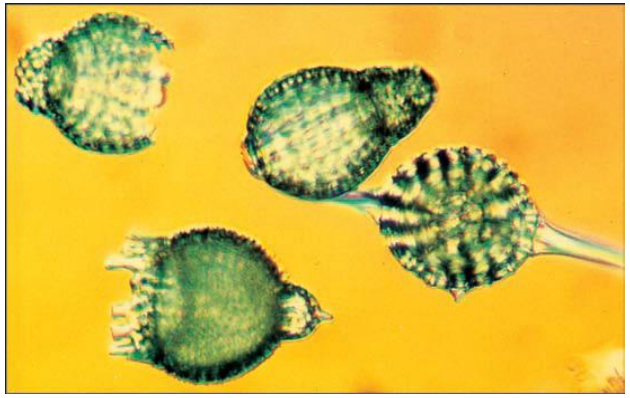
***Eukaryotic Cell Structures***

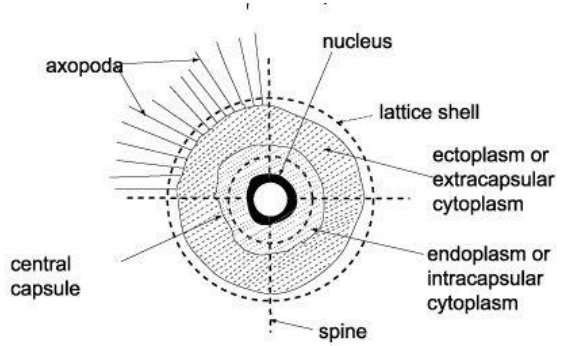
***Feeding on Protozoa***

***Encystment***

***Locomotion***

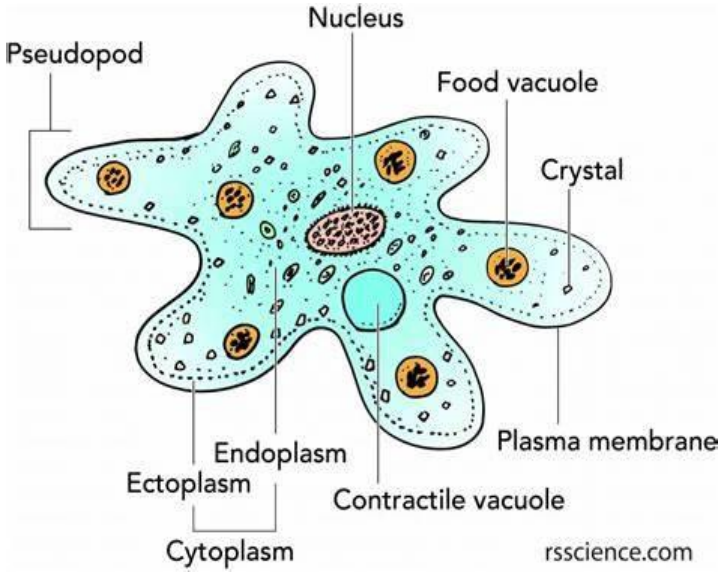
- The protozoan cell is devoid of cell wall. The outermost boundary is made up of a cell unit membrane called plasmalemma. This not only protects the cell from external factors and controls exchange of substances, but it also acts as the site of perception of mechanical or chemical stimuli as well as establishment of contact with other cells.
- Some protozoa produce an exoskeleton in the form of shells which are made up of siliceous, calcareous or proteinaceous material.
- **Foraminifera** have distinct hard shells composed of silicon or calcium compounds

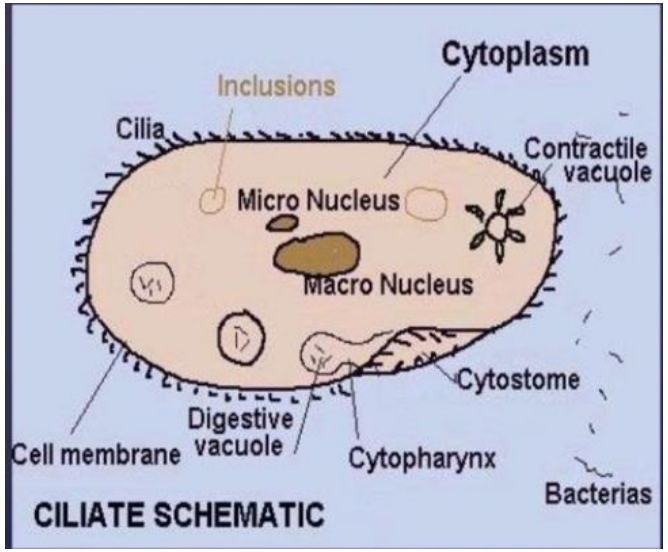




# Nucleus

- The nucleus or nucleus is the most important part needed to maintain life and for reproduction and to regulate metabolism.
- The nucleus is made up of the nuclear membrane (nuclear membrane) which includes the fine nuclear fibers (reticulum) containing Fluids and karyosomes
- Macronuleus in ciliate ( cytoplasmic function)
- Micronucleus (dormant but active at sexual reproduction)



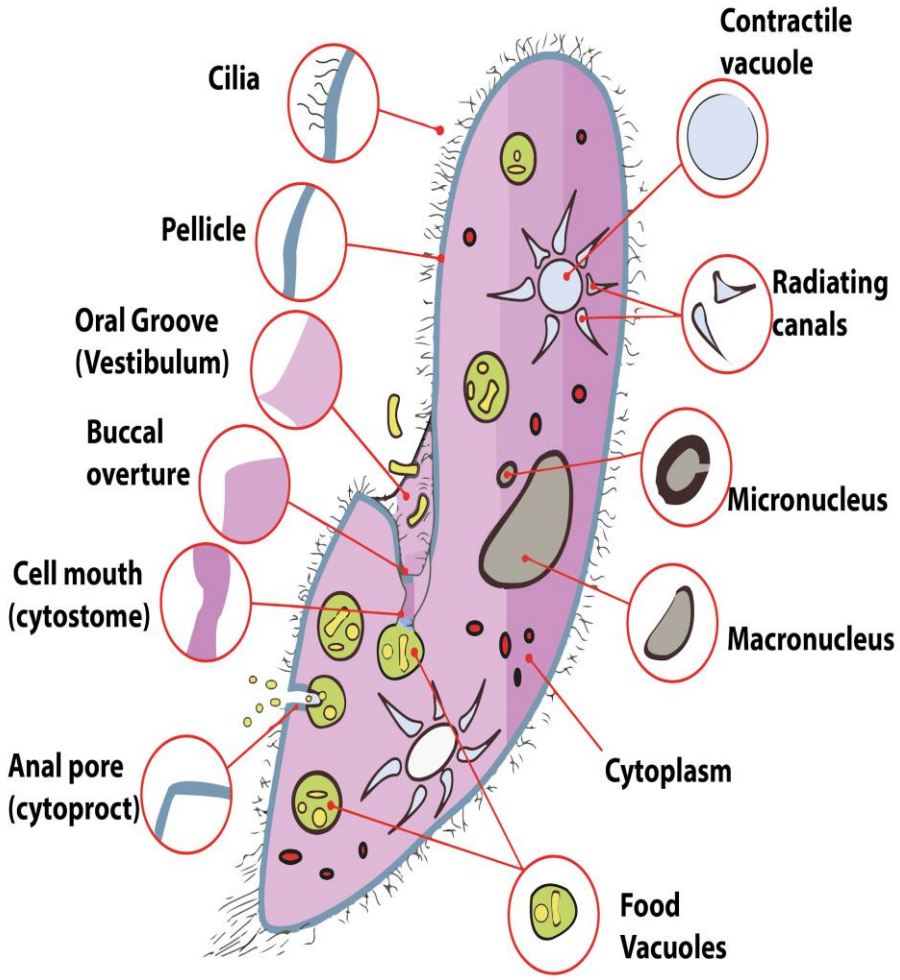



# Cytoplasma

- In most protozoa the cytoplasm is differentiated into ectoplasm (the outer, transparent layer) and endoplasm (the inner layer containing organelles); the structure of the cytoplasm is most easily seen in species with projecting pseudopodia, such as the amoeba

# Membran Plasma

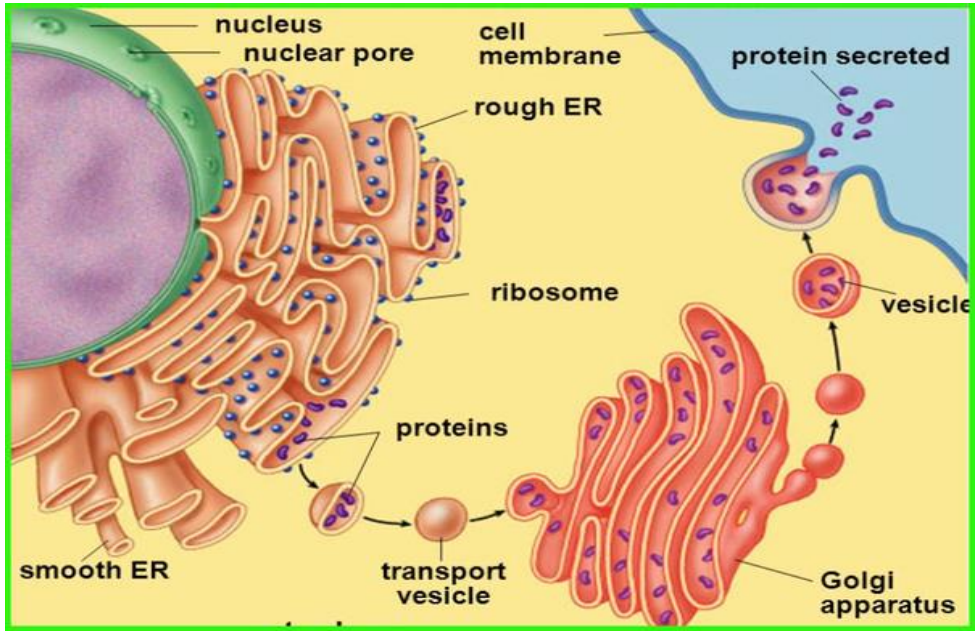
- The plasma membrane enclosing the cytoplasm also covers the projecting locomotory structures such as pseudopodia, cilia, and flagella.
- The outer surface layer of some protozoa, termed a **pellicle**, is sufficiently rigid to maintain a distinctive shape, as in the trypanosomes and *Giardia*. However, these organisms can readily twist and bend when moving through their environment



# ENDOPLASMIC RETICULUM (ER)

Rough ER (Ribosom bounded), Smooth ER

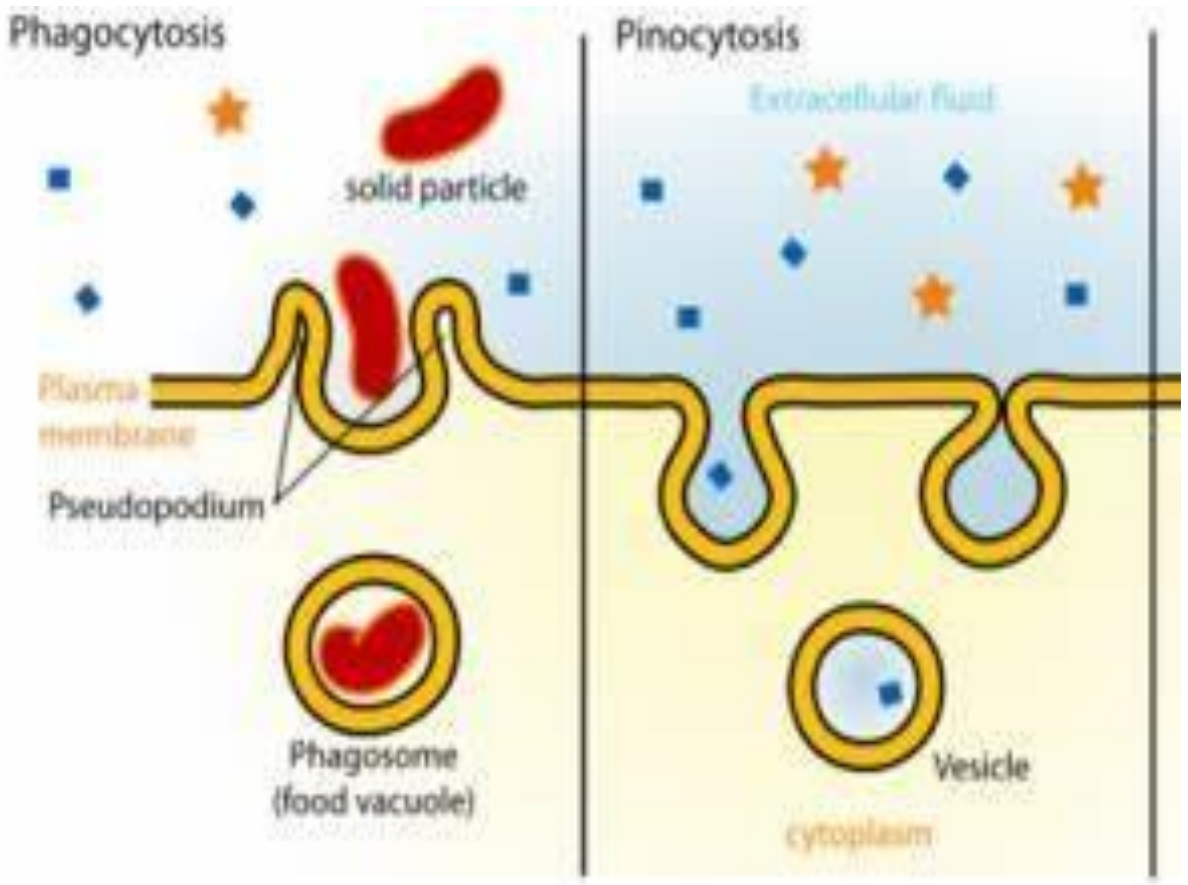
- Membranous sacs or cisterns
- Synthesize lipid and store lipid & proteins
- Transport molecules to other parts of cells



# Feeding on Protozoa

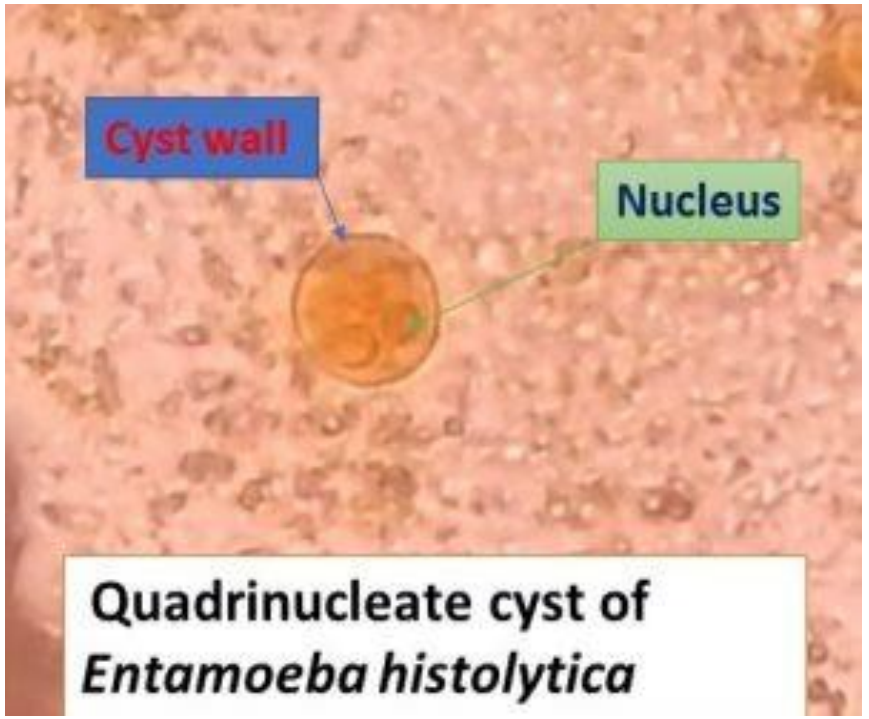
- Since protozoa live in an aquatic environment, water, oxygen, and other small molecules readily diffuse through the cell membrane.
- Some protozoa have a **cytosome** or cell “mouth” for ingesting fluids or solid particles. **Contractile vacuoles** for osmoregulation occur in some, such as *Naegleria* and *Balantidium*.
- protozoa use either pinocytosis or phagocytosis to obtain food and water

# Feeding Type

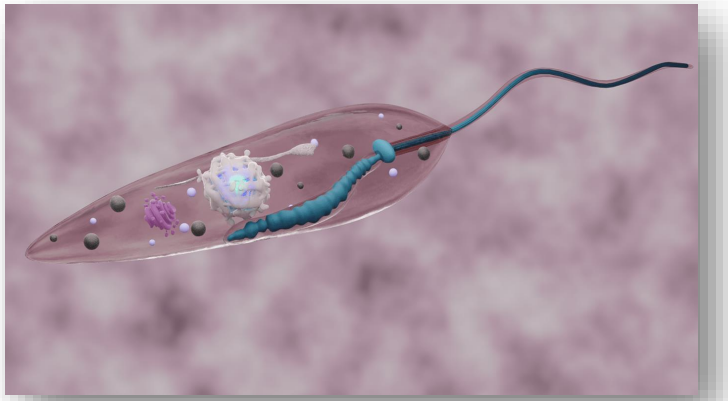


# Encystment

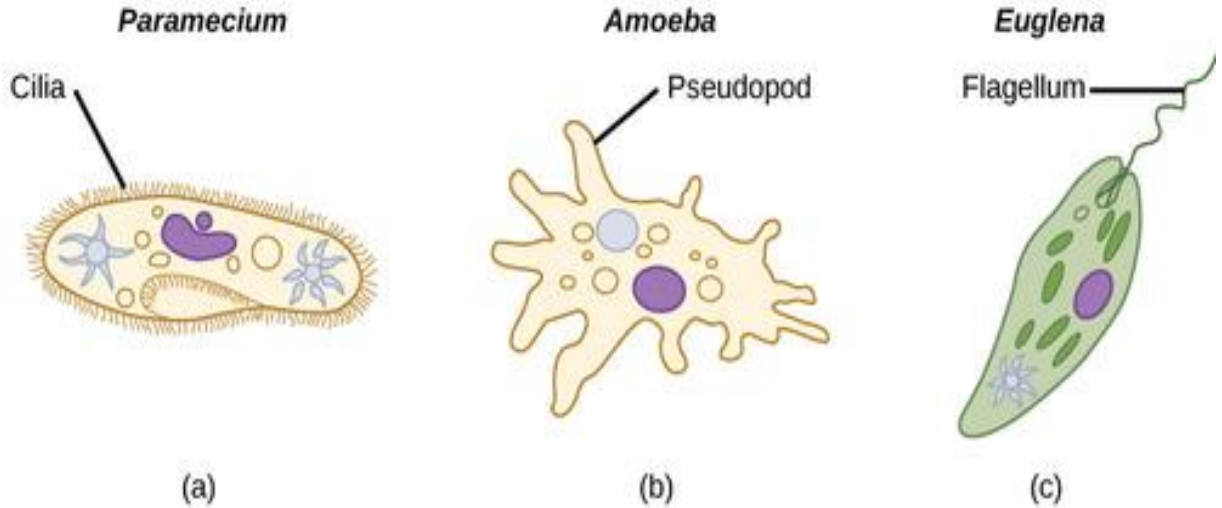
- Under certain adverse conditons some protozoa produce a protective capsule called a *Cyst*.
- A Cyst permits the organism to survive when food, moisture, or oxygwn are lacking, when temperatures are not suitable or when toxic chemical are present
- The Cyst form in members of phylum Apicomplexa is calles an *oocyst*. It is a reproductive structure in which new cells are produced asexually



# Locomotion



- Protozoa merupakan sel tunggal, yang dapat bergerak secara khas menggunakan **pseudopodia** (kaki palsu), **flagela** (bulu cambuk) dan **silia (bulu getar)**, namun **ada yang tidak dapat bergerak aktif**




Locomotion in Protozoa: 4 Types | Protozoa (notesonzoology.com)

# REPRODUKSI PROTOZOA

- Protozoa dapat berkembang biak secara **seksual** dan **aseksual**
- Secara aseksual protozoa dapat mengadakan pembelahan diri menjadi 2 anak sel (biner), tetapi pada Flagelata pembelahan terjadi secara longitudinal dan pada Ciliata secara transversal
- Beberapa jenis protozoa membelah diri menjadi banyak sel (schizogony)
- Perkembangbiakan secara seksual dapat melalui cara konjugasi, autogami, dan sitogami

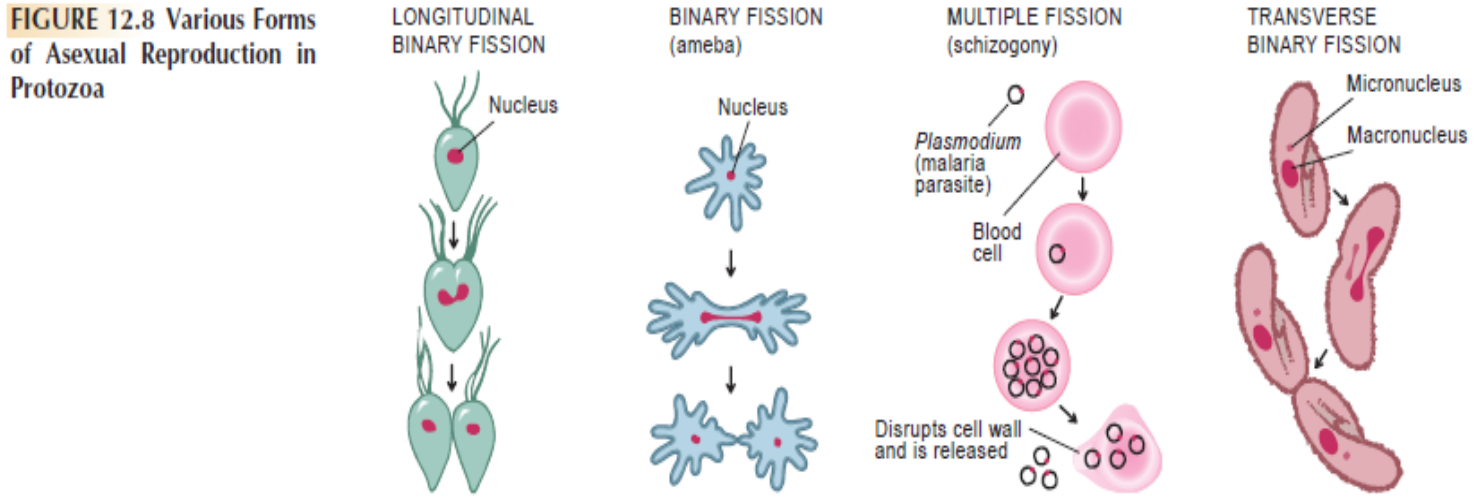



FIGURE 12.8 Various Forms of Asexual Reproduction in Protozoa

# KLASIFIKASI PROTOZOA

- Klasifikasi Protozoa didasarkan pada alat gerak yang dimiliki dan mekanismenya yang dibagi ke dalam 4 kelas yaitu:
  - Sarcodina (bergerak dg amoeboid),
  - Mastigophora (bergerak dg Flagella),
  - Ciliophora (bergerak dg silia) dan
  - Sporozoa (tidak dapat bergerak)

# Lanjutan,,,

**TABLE 12.2** Protozoa of Medical Importance

| Traditional Classification | 18s rRNA Classification | Genus of Disease-Causing Protozoa | Disease Caused by Protozoa | Mode of Motility | Mode of Asexual Reproduction |
|---|---|---|---|---|---|
| **Phylum: Sarcomastigophora** | | | | | |
| Subphylum: | | | | | |
| Mastigophora | Kinetoplastid | *Trypanosoma* | African sleeping sickness | Flagella | Longitudinal fission |
| | Diplomonad | *Giardia* | Giardiasis | | |
| | Parabasalian | *Trichomonas* | Trichomoniasis | | |
| | Kinetoplastic | *Leishmania* | Leishmaniasis | | |
| Sarcodina | Entamoebids | *Entamoeba* | Amebiasis (diarrhea) | Pseudopodia | Binary fission |
| **Phylum: Ciliophora** | Ciliates | *Balantidium* | Dysentery | Cilia | Transverse fission |
| **Phylum: Apicomplexa** | Apicomplexans | *Plasmodium* | Malaria | Flagella | Multiple fission |
| | | *Toxoplasma* | Toxoplasmosis | | |
| | | *Cryptosporidium* | Cryptosporidiosis | | |
| **Phylum: Microspora** | Microsporans | *Microsporidium* | Diarrhea | Polar filament | ? |

1. The phylum **Sarcomastigophora** includes two :

- The subphylum *Mastigophora*: includes the flagellated protozoa. These flagella are used for locomotion and foodgathering as well as sensory receptors.
- The subphylum *Sarcodina* move by means of pseudopodia. The Sarcodina change shape as they move.

2. The phylum **Ciliophora,** or the **ciliates,** includes organisms that have cilia. The cilia are similar in construction to the flagella and usually completely cover the surface of an organism

3. Organisms in the phylum **Apicomplexa**, also referred to as **sporozoa**, cause some of the most serious protozoan diseases of humans.

4. The phylum **Microspora** includes the intracellular protozoa that infect immunocompromised humans. They are most often found in marine habitats and are parasiticon fish and other sea life

# PENUTUP

# SEKIAN
# DAN
# TERIMAKASIH