

# Medical Protozoology

- Study of protozoa of medical importance
- **Protozoa:** [Proto=first & zoa=animals]
- Unicellular (single-celled) eukaryotic organisms that can perform all functions of life

## General Characteristics of Protozoa

- Microscopic organisms (microorganisms) ,,, Widely distributed
- Wide variety of morphology (from amorphous organisms to well defined cells)
- Modes of motility (Pseudopodia, flagella, cilia) or immotile
- Living conditions: Free-living, Commensals, Mutualistic, Parasitic
- Different life cycles (from few stages to complicated life cycles)
- Nutrition (Feed by phagocytosis, pinocytosis or cytostome & Excrete by diffusion or rarely by contractile vacuoles)
- Respiration (Aerobic and/or Anaerobic)
- Reproduction (Asexual and/or Sexual)

# General Morphology of Protozoa

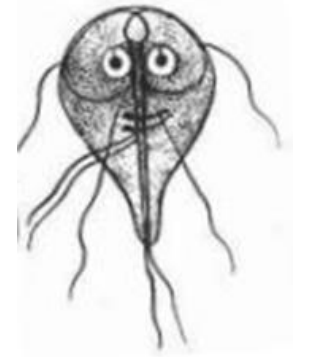
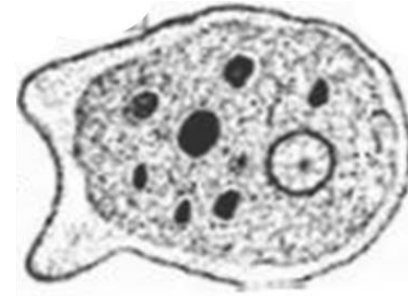
Protozoa are mass of **protoplasm** differentiated into outer ectoplasm & inner endoplasm

- **Ectoplasm functions:** Protection, locomotion, respiration, ingestion of food & excretion
- **Endoplasm functions:** Enclosing nucleus + Concerned with metabolism & Contains:
  - Food vacuoles: Contain food during digestion
  - Volutin granules: Store food as carbs (glycogen vacuole) or protein (chromatoid body)
  - Excretory vacuoles: Collect waste products & discharge them to exterior
- Nucleus: Has nuclear membrane & Regulate cell activities & reproduction

# General Biology of Protozoa

## ■ Locomotion:

- Pseudopodia: Amoebae
- Cilia: Ciliates
- Flagella: Flagellates
- Gliding movement: Sporozoa



## ■ Nutrition:

- Liquid food: absorbed through body surface (e.g. Sporozoa)
- Solid food: ingested by pseudopodia (amoebae) or through cytostome (flagellates & ciliates)

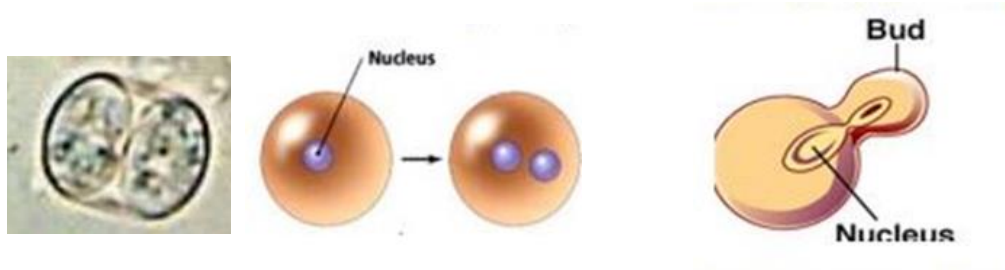
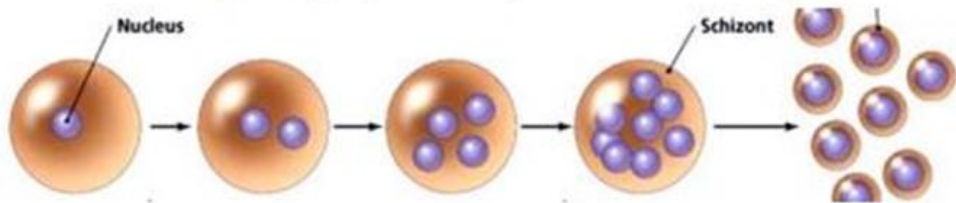
## ■ Excretion:

- Diffusion: through body surface
- Accumulation into contractile vacuoles: which rupture on surface or is connected to an excretory pore (cytopyge)
- Precipitation of excretory materials: in endoplasm (e.g. malarial pigment)

- Secretion: of digestive enzymes, toxins, antigenic substances & cyst wall

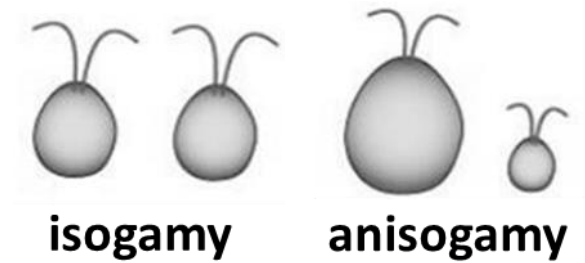
## Asexual Reproduction:

- Budding (gemmation)
- Binary fission
- Schizogony (multiple fission)
- Endodyogeny (e.g. *Toxoplasma* sp.)



## Sexual Reproduction:

- Syngamy (fusion of gametes):
- Conjugation (temporary pairing with exchange of nuclear material)



# Classification of Parasitic Protozoa (Taxonomic)

Kingdom: Animalia

Subkingdom: Protozoa

Phylum: Sarcomastigophora

Subphylum: Sarcodina (Amoeba)

Subphylum: Mastigophora (flagellates)

Phylum: Ciliophora (Ciliates)

Phylum: Apicomplexa (Sporozoa)

Phylum: Microspora

## Amoeba:

- *Entamoeba*
- *Naegleria*
- *Acanthamoeba*

## Flagellates:

- *Giardia*
- *Trichomonas*
- *Leishmania*
- *Trypanosoma*

## Ciliates:

- *Balantidium*

## Apicomplexa:

- *Cryptosporidium*
- *Cyclospora*
- *Toxoplasma*
- *Isospora*
- *Plasmodium*

## Microspora:

- *Microsporidia*

**EX of parasitic protozoa  
affecting humans:**

# Classification of Parasitic Protozoa (Habitat)

## Intestinal Protozoa

### Commensals:

- *Entamoeba coli*
- *Entamoeba dispar*
- *Entamoeba hartmani*
- *Iodamoeba bütschlii*
- *Endolimax nana*
- *Chilomastix mesnili*
- *Trichomonas hominis*
- *Blastocystis hominis*

### Pathogenic:

- *Entamoeba histolytica*
- *Dientamoeba fragilis*
- *Giardia lamblia*
- *Balantidium coli*
- *Cryptosporidium parvum*
- *Cyclospora cayetanensis*
- *Isospora belli*

# General Life Cycle

## Typical Fecal-Oral Life Cycle

