

Lec 2 Phylum :Protozoa

General attributes:

1. Unicellular (clonal) and microscope animals.
2. Most are motile by flagella, cilia or pseudopodia.
3. Most protozoal species are aerobic, but some an aerobic species have been found in the human intestine and animal rumen.
4. They occur in all habitats including marine, freshwater and terrestrial including soil.
5. The food enters to the cell (body of animal) by mouth of cell or by body wall but the digestive happens in food vacuole in cytoplasm.
6. Osmoregulation in freshwater protozoans is accomplished by contractile vacuoles that pump a hypoosmotic urine from the cytoplasm back into the environment.
7. Most protozoa reproduce by asexual methods (Binary fission, Budding) Or sexual reproduction (Syngamy, Conjugation).
8. Some species are parasites on plants, human and animals.

Classification of Protozoa:

Phylum: Protozoa

1. Class: Flagellata

Order 1: Cryptomonadina..... *Chilomonas*.

Order 2: Phytomonadina.....*Volvox*.

Order 3: Euglenoidina*Euglena*.

Order 4: Diplomonadina..... *Giardia*.

Order5: Opalinina..... *Opalina*.

2. Class: Sarcondina

Order: Amoebina *Amoeba*

3. Class: Sporozoa

Order 1: Gregarinida.....*Gregarina*.

Order 2: Coccidia.....*Plasmodium*

4-Class: Ciliata

Order: Holotricha.....*Paramecium*.

Nutrition:

Heterotrophic, micro organisms and most species obtain large food particles by phagocytosis. The food particle is ingested into a food vacuole, lysosomal enzymes then digest the nutrients in the particle throughout the cell. Some species have specialized structures called cytostomes through which particles pass in phagocytosis.

Locomotor Organelles:

Flagella - Cilia- Pseudopodia.

Cilia

1. Are short hair like appendages extending from the surface of living cell.
2. Rotational like a motor very fast moving.
3. Many (handed) per cell.
4. Eukaryotic cells.

Flagella

1. Are long, thread like appendages on the surface of a living cells.
2. Wave – like undulating, slow movement compared to cilia.
3. Few (less than 10) per cell.
4. Eukaryotic and Prokaryotic cells.

Pseudopodia: divided into:

1. Lobopoda..... *Amoeba*
2. Filopodia..... *Euglypha*
3. Rhizopoda (Reticulopodia).....*Elphidium*.
4. Axopodia*Actinospherium*.

Nucleus

contain from:

1. Nuclear membrane
2. Chromatin.
3. Plastine.
4. Nuclear juice.

The nucleus in protozoa divided into two kind of :

1. Compact nuclei: contain a large amount of chromatin and small amount of Nuclear juice.
2. Vesicular nuclei: contain a little amount of chromatin and large amount of Nuclear juice, have nucleolus - like ball shape called **endosome**

There are two types of nucleolus:

- Plasmosome: Empty from chromatin.
- Karyosome: contain chromatin.

Cytoplasm:

organized complex of inorganic and organic substances external to the nuclear membrane of a cell and including the cytosol and membrane-bound organelles (such as mitochondria or chloroplasts)

Divided into:

- Ectoplasm and Endoplasm

Ectoplasm	Endoplasm
• near the cell membrane.	• near the nuclei membrane.
• Is a gel containing the basal bodies of cilia.	• Sol more fluid than ectoplasm and contain organelles such as nuclei, mitochondria, vacuoles and vesicles of various types.

Protoplasm

The colorless material comprising the living part of a cell, that constitutes of :

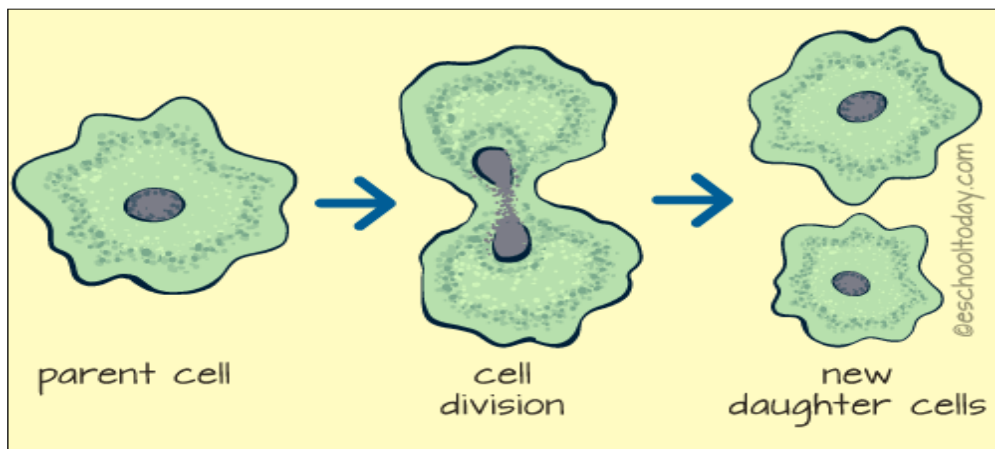
- Nucleus
- Cytoplasm
- Organelles

Reproduction in Protozoa:

A sexual reproduction

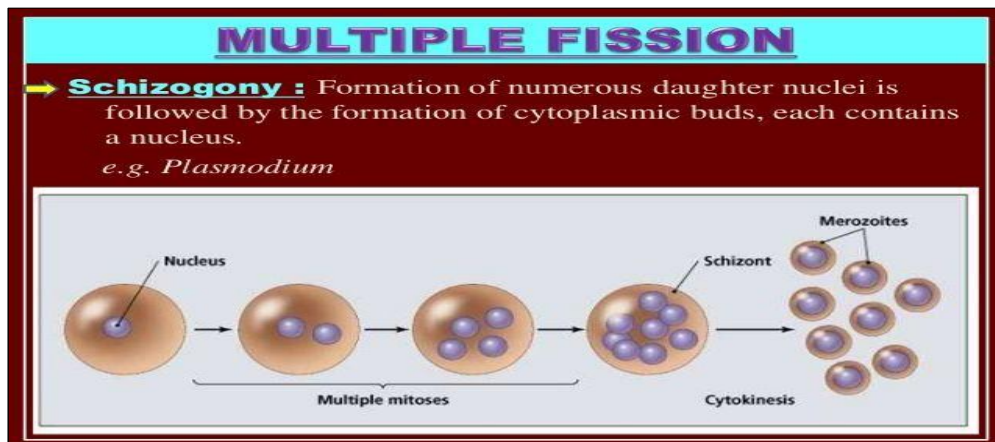
1. Binary fission:

cell divided into two cells. DNA of the nucleus of a mature cell divided first and then the cell divided into two daughter cells of almost the same. *Amoeba*.



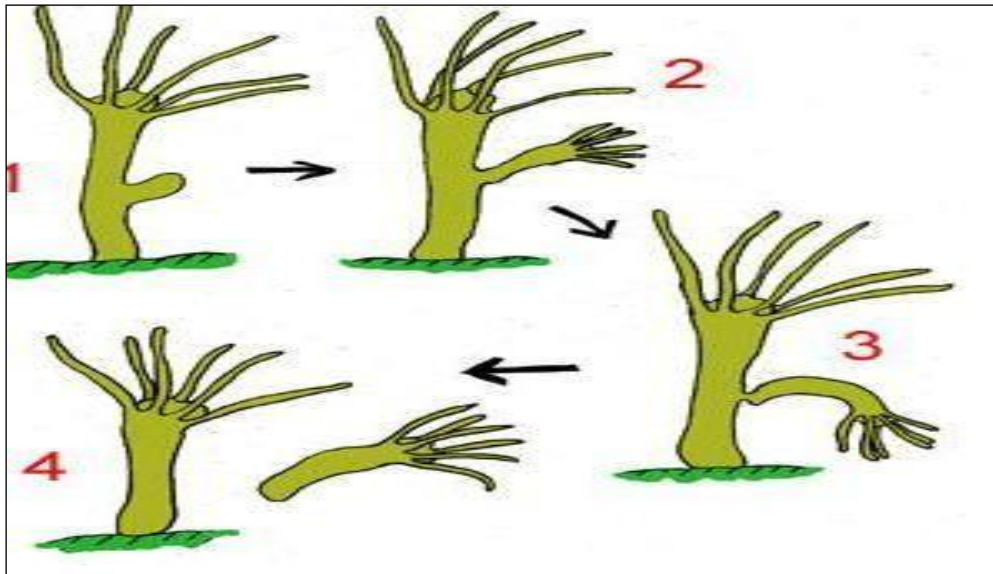
2. Multiple fission (Sporulation):

one of the cells enlarges and forms the sporangium. The nucleus divided many times and then the daughter nuclei are surrounded with protoplasm bits to form daughter cells called spores are covered with a thick wall called the cyst, on maturation the sporangium bursts and releases the spores.



3. Budding:

in which a new individual develops from some generative anatomical point of the parent organism, in some species buds may be produced from almost any point of the body but in many cases budding is restricted to specialized areas.



4. Plasmotomy:

Division of a multinucleate cell into multinucleate daughter cells. Cytoplasm divided into two or more masses.

Sexual reproduction:

1. Syngamy:

Is the complete and permanent fusion of the two sex cells gametes to form zygote which gives rise to adult and distinguished into following types:

Hologamy : The form of sexual reproduction in which the gametes are of the same size and structure as the somatic cells

Paedogamy : mutual fertilization of gametes ultimately derived from the same parent cell or gametangium

Isogamy: the fusion of two gametes of similar form, as in certain algae

Anisogamy: Sexual reproduction involving two types of gametes that differ in size

Macrogamy: syngamy between fully developed vegetative cells

Microgamety: syngamy between gametes much smaller than the vegetative cells

2. Conjugation:

Sexual process in which two lower organisms of the same species, such as protozoans exchange nuclear material during a temporary union completely transfer one or organism's contents to the other organism or fuse together to form one organism, the forms may or may not resemble each other in size, shape or mortality, they differ in some physiological or genetic characteristic

- **Plasmogamy:**

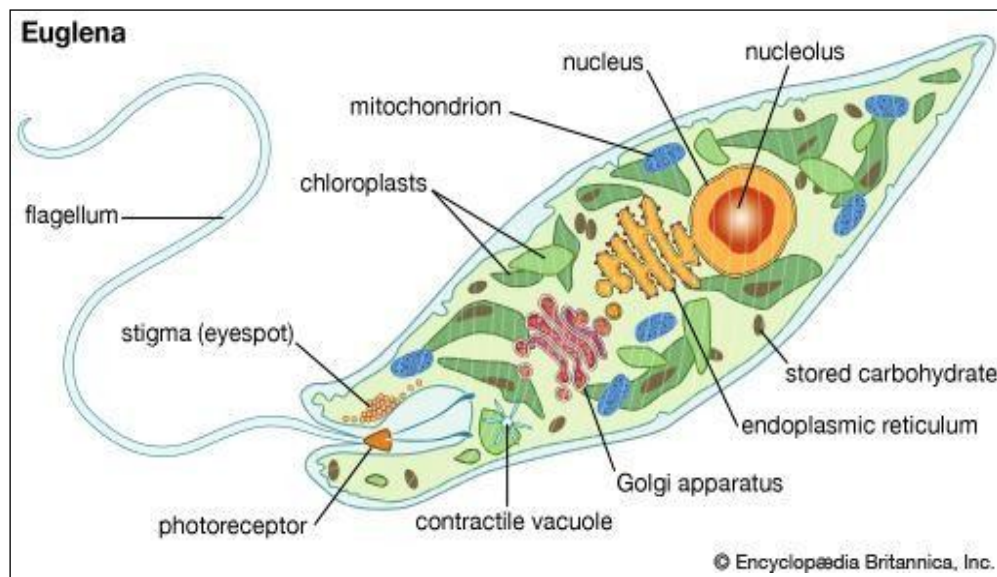
Fusion of two or more cells without fusion of nuclei. The purpose to kill the big size prey like *Paramecium* (that method not kind of reproduction).

Euglena

1. Bi-flagellated, unicell, spindle shape.
2. Most species have photosynthesizing, chloroplast within the body of cell, chloroplasts contain pyrenoid used in the synthesis of paramylon, a form of starch energy storage.
3. Have two flagella rooted in basal bodies located in small reservoir at the front of the cell, one of flagellum is very short while the other is long easily visible with light microscopy.
4. Posses red eye spot (stigma) an organelle composed of carotenoid pigment granules, the red spot itself is not through to be photosynthetic so that

paraflagellar body it filters the sun light located at base of flagellum.

5. Like a cell wall instead it has pellicle, made of protein layer supported by structure of microtubules arranged in strips spiriting around the cell, pellicle give exception flexibility and contractility, there is no cellulose.
6. Euglenoids are found in many freshwater habitat and are most abundant in those.
7. Small and conspicuous contractile vacuole is located to one side of the reservoir into which it discharges, its function is osmoregulatory.
8. Binary fission the type of asexual reproduction that start by divide the cell
(*Euglena*) longitudinally beginning at the front end of the cell with the duplication of flagella processes, stigma cleavage from the anterior and (V) shaped moves toward the posterior until the two halves are anterior separated, sexual conjugation are rare.



Amoeba

1. They so tiny so need microscope to see them.
2. Living in water, including lakes, Ponds, Streams, Rivers. Some can live in the bodies of animals.
3. Move by pseudopoda and they help *Amoeba* to eat.
4. 4- Reproduce by binary fission, it means that one *Amoeba* can split in half and make two identical new *Amoeba*.
5. Cytoplasm divided into two parts (Endoplasm & Ectoplasm) both enclosed within flexible plasma membrane.
6. Cell contain single granular nucleus containing DNA.
7. Contractile vacuole is used to maintain osmotic equilibrium by excreting excess water from the cell.
8. *Amoeba* obtains its food by phagocytosis and particles of organic matter, Or by Pincocytosis taking in dissolved nutrients through vesicles formed within the cell membrane.

