



INVERTEBRATES

PROTOZOA (1)

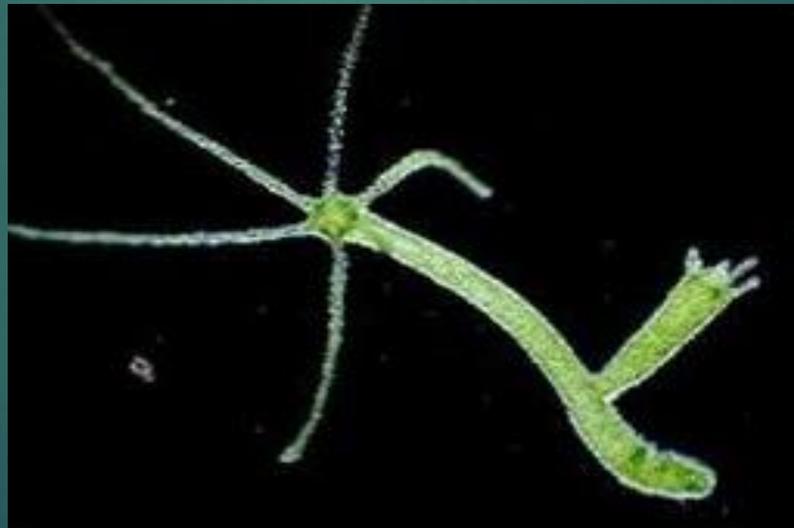
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Animal Kingdom is classified into three subkingdoms:

- 1- **Subkingdom Protozoa**: This subkingdom includes a single phylum, Protozoa, the members of which are referred to as unicellular animals (or cellular) since the body of each is formed of a single protoplasmic mass that performs all life activities (e.g. *Amoeba*).
- 2- **Subkingdom Parazoa**: This includes a single phylum, Porifera, the members of which are simple multicellular animals commonly known as sponges. The body of the animal is formed of many cells which are not much differentiated and do not form proper tissues (e.g. *Leucosolenia*).



3- Subkingdom Metazoa: This includes the rest of the animal phyla. The body in these animals is composed of many cells which are well differentiated into distinct types and form definite tissues. The different phyla of the Metazoa show gradations from simple structural organization to complicated organ systems in the body (e.g. *Hydra*).



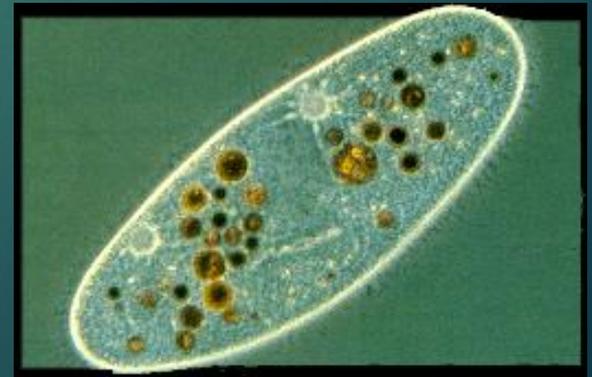
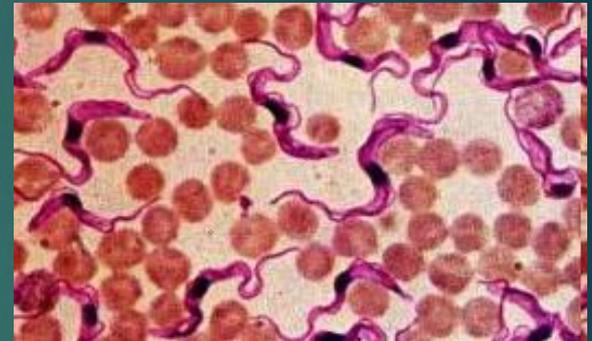
Subkingdom: Protozoa

Phylum: Protozoa

Protozoa has a cellular structure that carries out all the functions of life. Most of them can only be seen under a microscope. They do breathe, move, and reproduce like multicelled animals. They live in water or at least where it is damp.

Some protozoans are harmful to man as they can cause serious diseases (e.g. *Trypanosoma*).

Others are helpful because they eat harmful bacteria and are food for fish and other animals (e.g. *Paramecium*).



General characters of protozoa

- 1- **Size:** The great majority are very small in size and can only be seen by the aid of the light microscope. Some of them are only 2 or 3 μm in length, but the majority are larger, reaching 250 μm in length. There are few species, however, which reach 16 mm in length and thus can be seen by the naked eye.

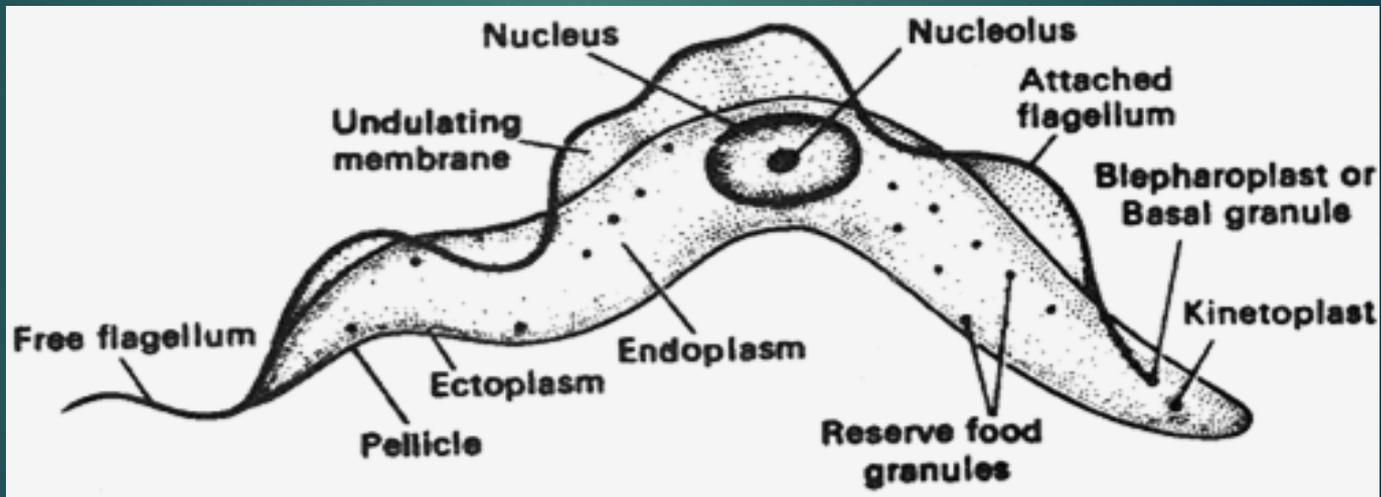


Amoeba
~ 10 - 20 μm



Paramecium
~ 120- 300 μm

2- Structure: In the majority of cases, there is only one nucleus in the cytoplasm with the distinct nucleolus often referred to as the endosomes. The cytoplasm is usually differentiated into outer clear ectoplasm and inner granular endoplasm. The cell is covered by a delicate plasma membrane or by a firm living pellicle (e.g. *Trypanosoma*).

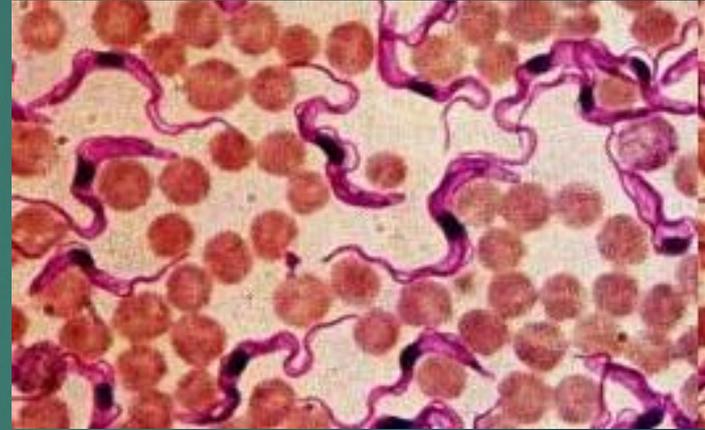


Trypanosoma

3- Habitat: Many species live as solitary individuals, while a few live in colonies. Many species are free living (*Paramecium*), and others are parasitic (*Trypanosoma*).

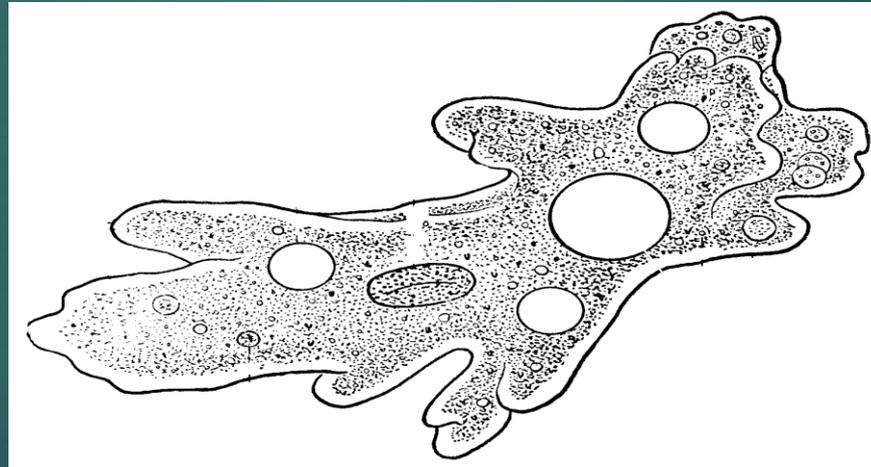


Paramecium



Trypanosoma

4- Water balance (osmoregulation): Most Protozoa which live in fresh water are provided by water balancing structure called contractile vacuoles, which remove excess water from cytoplasm, also may share in excretion.



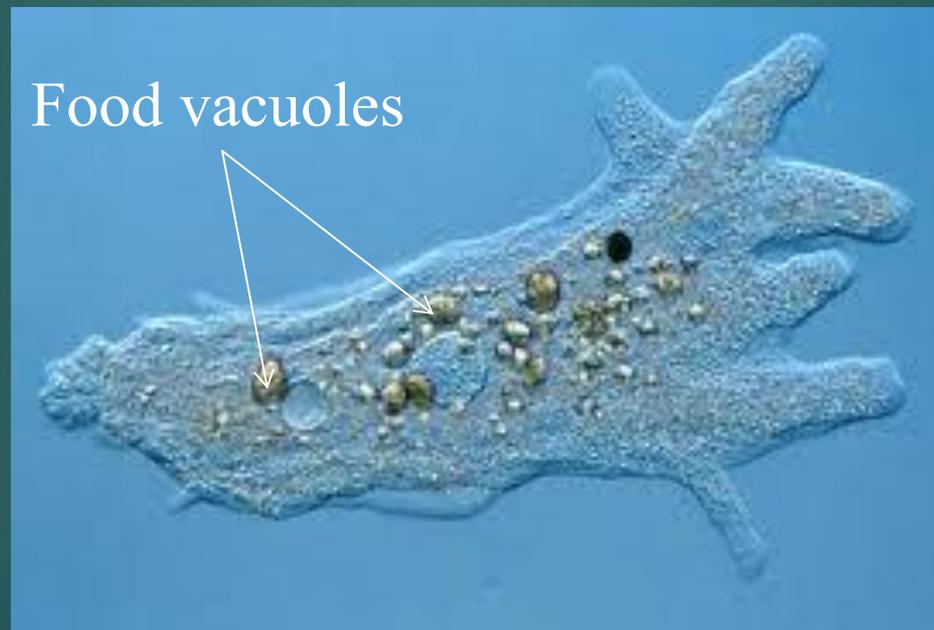
Amoeba

5- Nutrition: It may be

- a. Holophytic: In this type, the organism synthesizes its own complex organic food material from carbon dioxide and water in the presence of sunlight, as plants generally do (e.g. *Euglena*).
- b. Holozoic : Is the most common type of nutrition in this phylum. In this type, the animal feeds actively on other organisms (bacteria, algae, smaller protozoa, etc.) or on decaying organic matter.
- c. Saprozoic: Feeding by absorbing the solution of decayed organic and inorganic substances found in the surrounding medium by diffusion through the protozoan body surface.

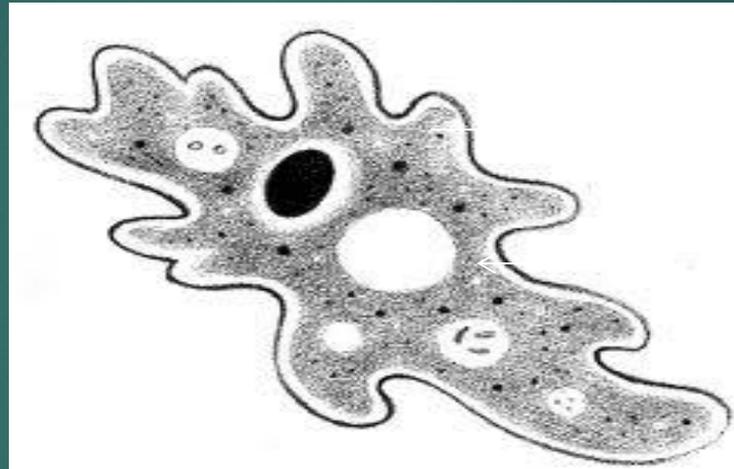
Pinocytosis: The electron microscope has recently shown that most of the protozoa ingest droplets of the surrounding medium in tiny vacuoles at the surface, a process known as pinocytosis.

6- **Digestion**: It takes place intercellularly inside the food vacuoles, the digested food is absorbed, and the undigested remains are ejected outside.



Amoeba

7. **Respiration:** It takes place by diffusion of oxygen and gives off carbon dioxide through the body surface. Most protozoans breathe by aerobic respiration and others breathe by anaerobic respiration



Amoeba

8. **Excretion:** It takes place by diffusion of metabolic wastes through the body surface. There are no specialized excretory organelles for excretion.

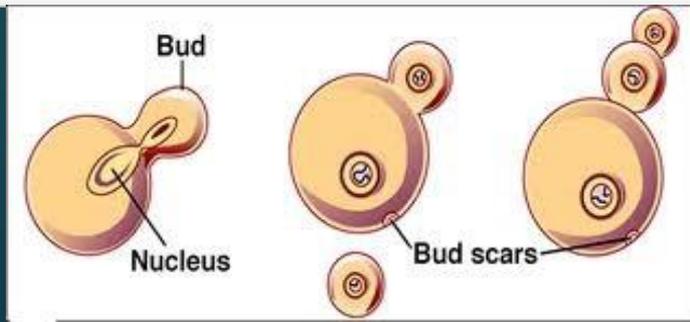
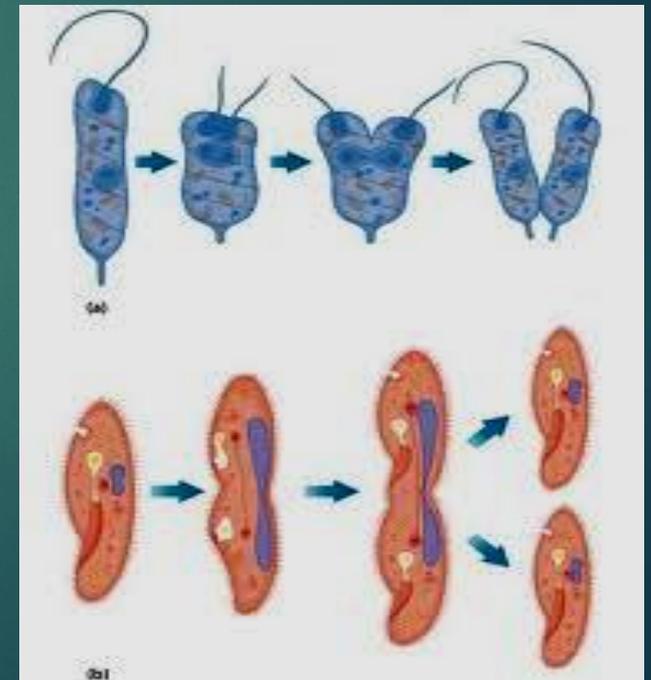
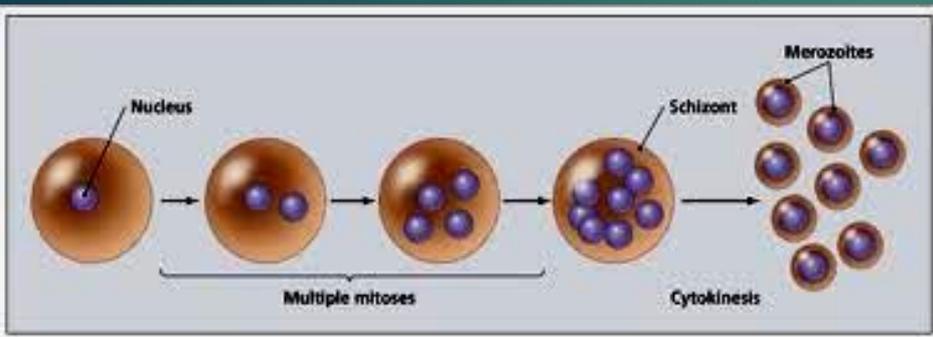
9. Reproduction: It is of two main types,

a. Asexual reproduction:

Binary fission: The animal is divided into equal daughter cells.

Multiple fission: The protozoan divides into a number of daughter individuals.

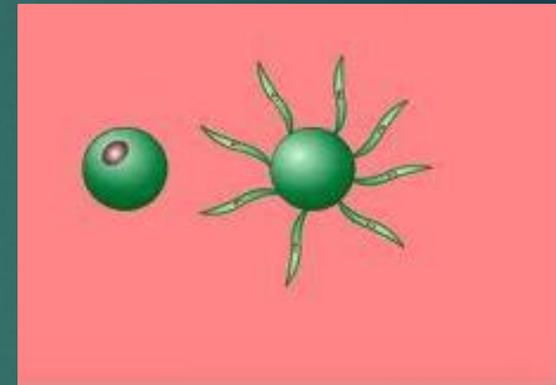
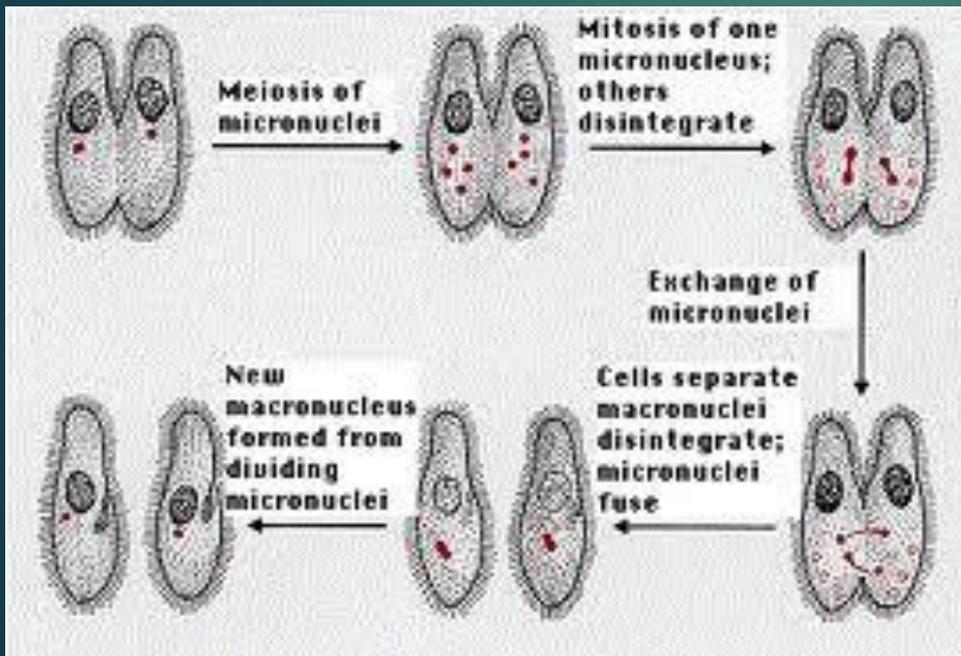
Budding: One or more smaller daughter individuals are produced from the parent organism.



b. Sexual reproduction:

Fusion: Gametes fuse together, they may be identical (isogametes) or different (anisogametes).

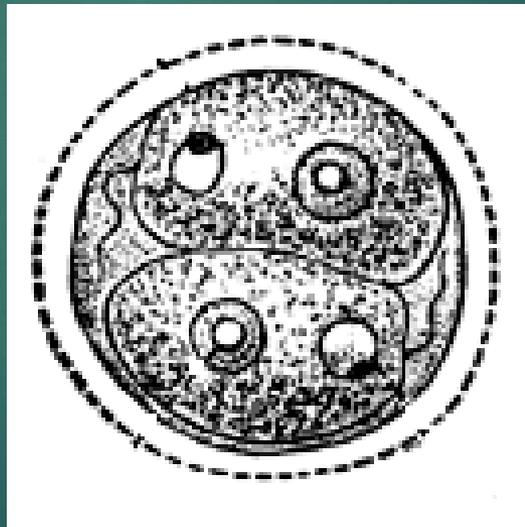
Conjugation: In ciliates exchange of nuclei takes place between two organisms.



Anisogametes

Life cycle of *Plasmodium*

10- Encystment: Many protozoan animals secrete a protective cyst which resists unfavourable conditions and for dispersal (e.g. Encystment in *Euglena*).



11- Locomotion

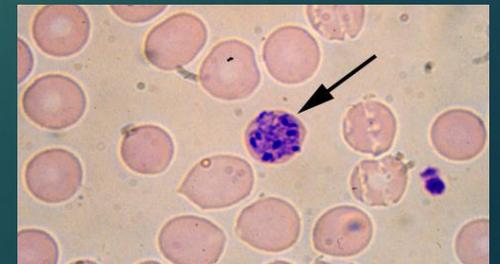
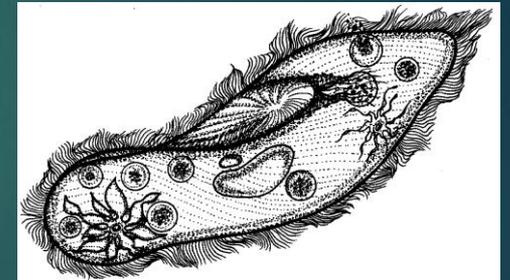
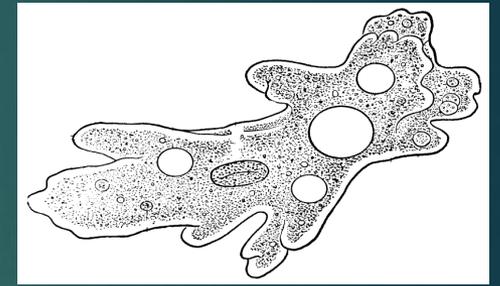
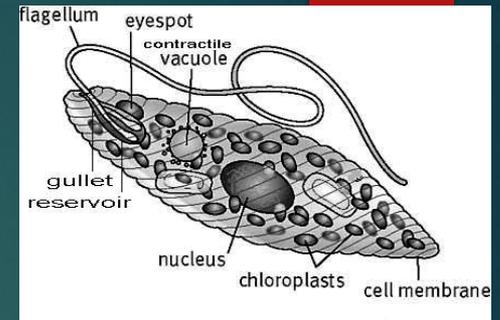
The locomotors organs vary as the following:

a. Flagella: As in Mastigophora (Flagellates, e.g. *Euglena*).

b. Pseudopodia: As in Sarcodina (Amoeboids, e.g. *Amoeba*).

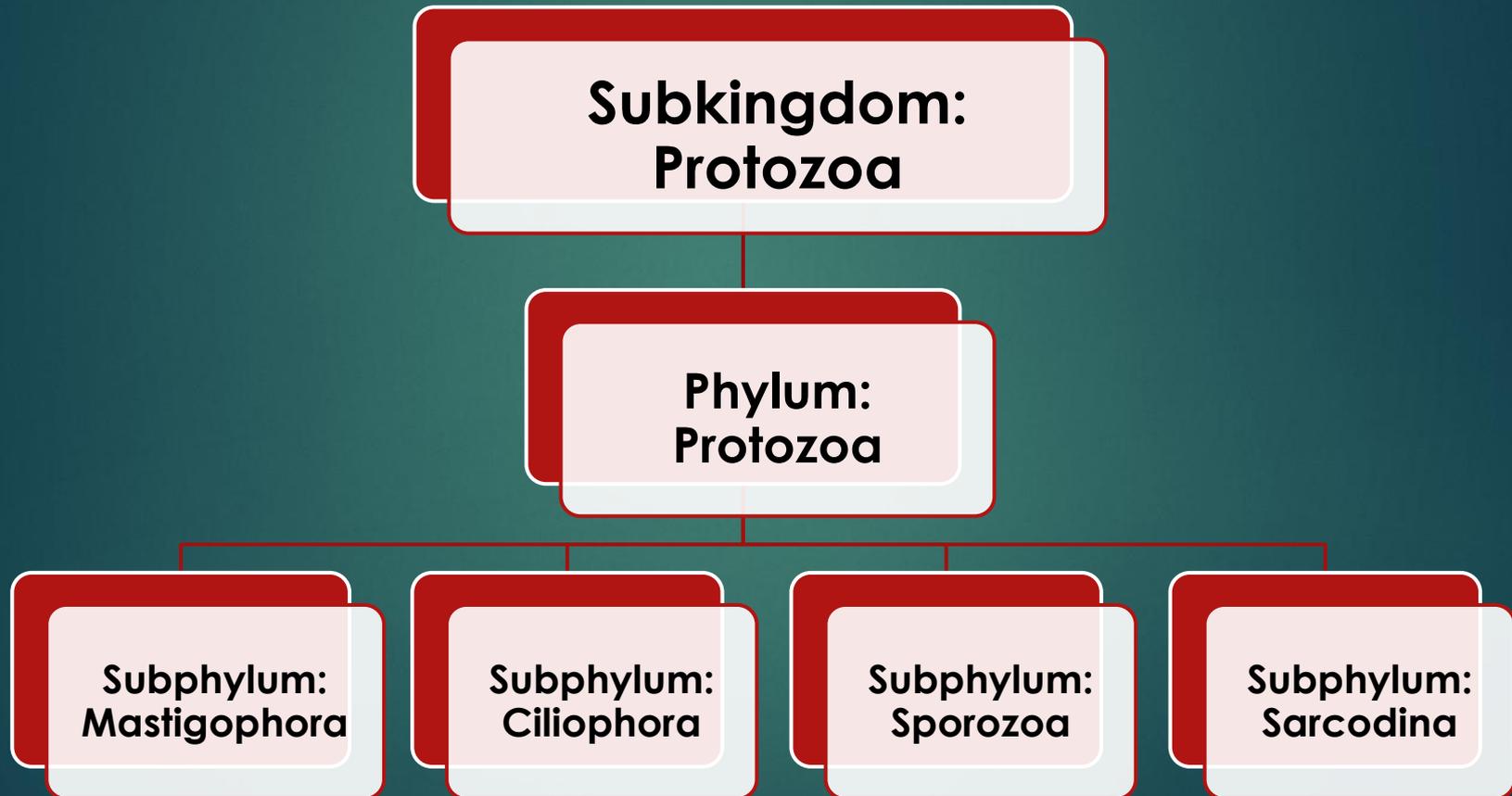
c. Cilia: As in Ciliophora (Ciliates, e.g. *Paramecium*).

d. Sporozoans As in Sporozoa don't have locomotory organs and move by gliding.



Classification

Subkingdom Protozoa are classified into one phylum and four subphyla as follow:





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