Ministry of Higher Education and Scientific Research

Al -Mustaqbal University

Collage of medical and health techniques

Department of medical laboratories techniques

2ED LECTURE

Protista , Algae , Harmful Activity Of Algae

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2. Protista

Protists are simple eukaryotic organisms that are neither plants nor animals or fungi. Protists are unicellular in nature but can also be found as a colony of cells. Most protists live in water, damp terrestrial environments or even as parasites.

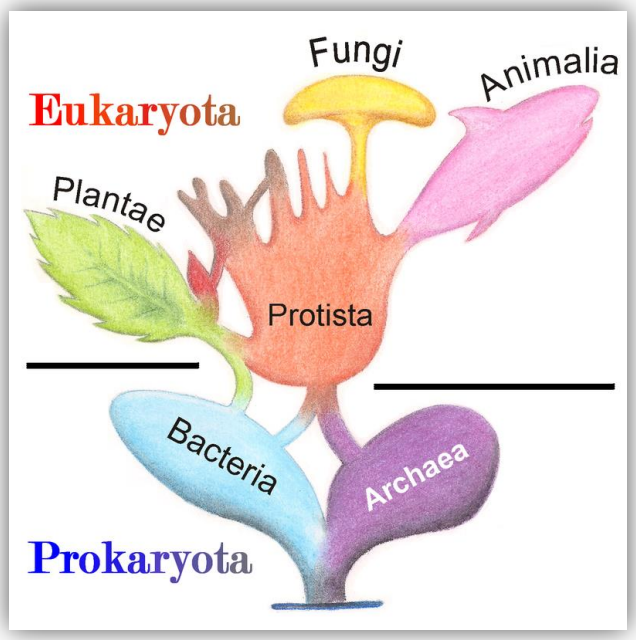
Kingdoms

- Fungi – cell wall with chitin , heterotrophic (1.5 BYA)
- Plantae – photosynthesis , vascular system (850 MYA)
- Animalia - multicellular , heterotrophic (550 MYA)
- Protists - (2 BYA)

Protists Not fungi , not animal , not plant ,

Some of them unicellular , some multicellular , some heterotrophic

Some can produce their own energy , some can move , some cannot …. ETC



Protists reside under the Eukarya Domain and are thus classified as eukaryotes. Eukaryotic organisms are distinguished from prokaryotes in that they have a nucleus that is surrounded by a membrane. In addition to a nucleus, protists have additional organelles in their cytoplasm. The endoplasmic reticulum and Golgi complexes are important for the synthesis of proteins and exocytosis of cellular molecules. Many protists also have lysosomes, which aid in the digestion of ingested organic material. Certain organelles may be found in some protist cells and not in others. Protists that have characteristics in common with animal cells also have mitochondria, which provide energy for the cell. Protists that are similar to plant cells have a cell wall and chloroplasts. Chloroplasts make photosynthesis possible in these cells.

Characteristics of Kingdom Protista

The primary feature of all protists is that they are eukaryotic organisms. This means that they have a membrane-enclosed nucleus.

Protists can be grouped according to similarities in many different categories including **nutrition acquisition, mobility, and reproduction.** Examples of protists include algae, *amoebas, euglena, plasmodium*, and slime molds.

Protists that are capable of **photosynthesis** include various types of algae, diatoms, dinoflagellates, and euglena. These organisms are often **unicellular but can form colonies**. They also contain chlorophyll, a pigment that absorbs light energy for photosynthesis. Photosynthetic protists are considered plant-like protists.

Other characteristic features of Kingdom Protista are as follows:

1. These are usually aquatic, present in the soil or in areas with moisture.
2. Most protist species are unicellular organisms, however, there are a few multicellular protists such as kelp. Some species of kelp grow so large that they exceed over 100 feet in height. (Giant Kelp).
3. Just like any other eukaryote, the cells of these species have a nucleus and membrane-bound organelles.
4. They may be autotrophic or heterotrophic in nature. An autotrophic organism can create its own food and survive. A heterotrophic organism, on the other hand, has to derive nutrition from other organisms such as plants or animals to survive.
5. **Symbiosis** is observed in the members of this class. For instance, kelp (seaweed) is a multicellular protist that provides otters, protection from predators amidst its thick kelp. In turn, the otters eat sea urchins that tend to feed on kelp.
6. **Parasitism** is also observed in protists. Species such as *Trypanosoma* protozoa can cause sleeping sickness in humans.
7. Protists exhibit locomotion through **cilia** and flagella. A few organisms belonging to the kingdom Protista have **pseudopodia** that help them to move.
8. Protista reproduces by asexual means. The sexual method of reproduction is extremely rare and occurs only during times of stress.

Classification of Protista

Kingdom Protista is classified into the following:

1. Protozoa

Protozoans are unicellular organisms. Historically, protozoans were called “animal” protists as they are heterotrophic and showed animal-like behaviors.

There are also parasitic protozoans which live in the cells of larger organisms. Most of the members do not have a predefined shape. For instance, an amoeba can change its shape indefinitely but a paramecium has a definite slipper-like shape. The most well-known examples of protozoans are amoeba, paramecium, and euglena. Unlike other members of this group, euglena is a free-living protozoan that has chlorophyll, which means it can make its own food.

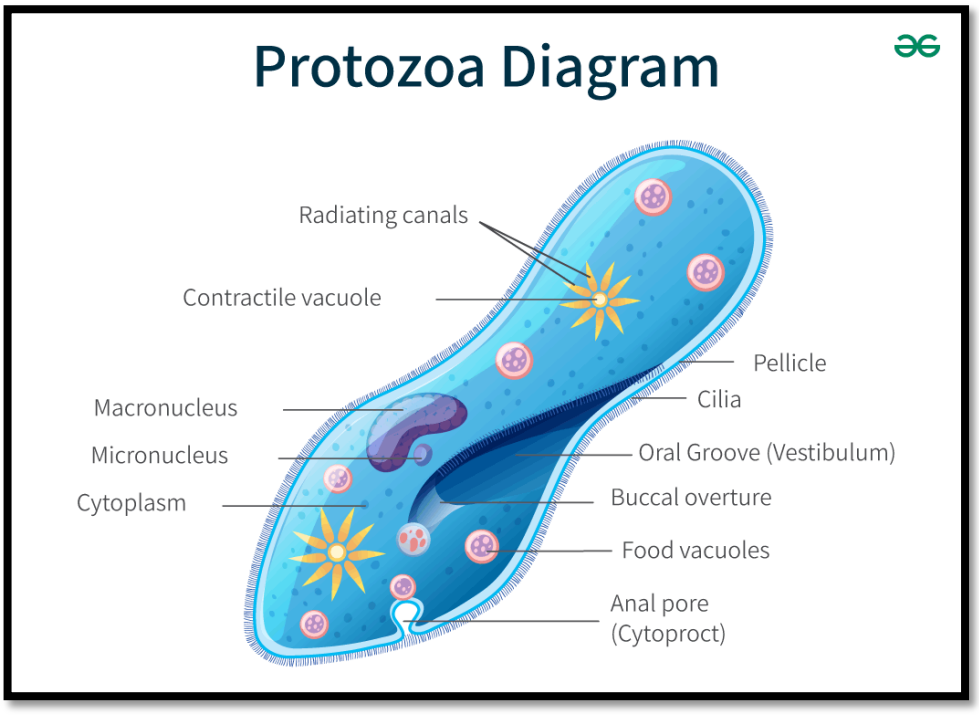
The protozoans can be divided into four major groups:

I. **Amoeboid protozoans –** Mostly found in water bodies, either fresh or saline. They have pseudopodia (false feet) which help to change their shape and to capture and engulf food. E.g. *Amoeba.*

II. **Flagellated protozoans –** As the name suggests, the members of this group have flagella. They can be free-living as well as parasitic. E.g. *Euglena.*

III. **Ciliated protozoans –** They have cilia all over their body which help in locomotion as well as nutrition. They are always aquatic. E.g. *Paramecium.*

IV. **Sporozoans –** These organisms are so-called because their life cycle has a spore-like stage. For example, the malarial parasite, *Plasmodium*.



2. Slime Moulds

Slime moulds are saprophytic organisms (they feed on dead and decaying matter). These are tiny organisms that have many nuclei.

Usually, Slime moulds are characterized by the presence of aggregates called *plasmodium* and are even visible to the naked eye.

3. Chrysophytes

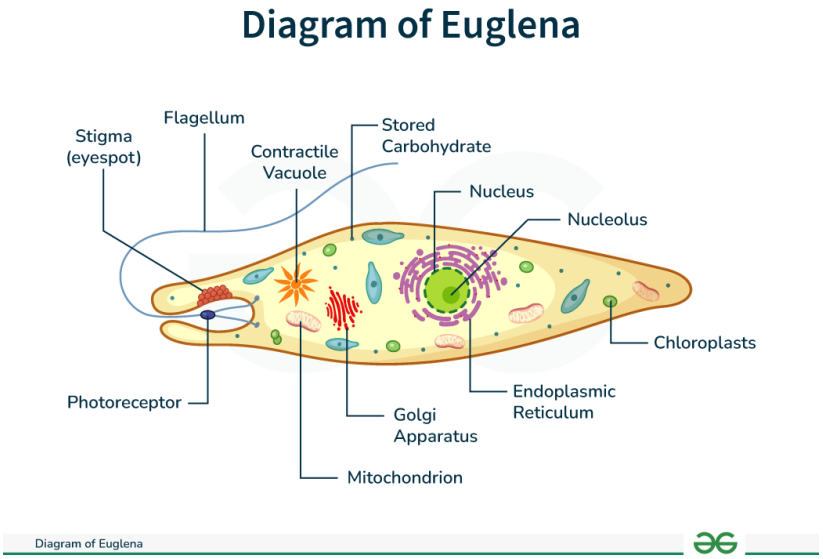
Example of chrysophytes include diatoms and golden algae. They are characterized by the presence of a hard siliceous cell wall. Diatomaceous earth is formed due to the accumulation of cell wall deposits. They are photosynthetic organisms.

4. Dinoflagellates

are photosynthetic and found in various different colors, according to the pigment present in them. They show bioluminescence and known to cause red tide.

5. Euglenoids

are the link between plants and animals. They lack a cell wall but perform photosynthesis. In the absence of sunlight, they act as a heterotroph and feed on small organisms. The outer body covering is a protein-rich layer known as a pellicle. E.g. *Euglena*, *Trachelomonas,* etc



Protista Reproduction

The most common method of reproduction displayed in protists is asexual reproduction **vegetative reproduction**. Sexual reproduction is possible, but typically only occurs during times of stress. Some protists reproduce asexually by binary fission or multiple fission. Others reproduce asexually by budding or through spore formation. In sexual reproduction, gametes are produced by meiosis and unite at fertilization to produce new individuals. Other protists, such as algae, exhibit a type of alternation of generations in which they alternate between haploid and diploid stages in their life cycles.

Protista Locomotion

While some protists are non-motile, others exhibit locomotion through different methods. Some protists have flagella or cilia, Other protists move by using temporary extensions of their cytoplasm known as pseudopodia , *Amoebas* are examples of protists that move using pseudopodia. allow the organism to move as well as to capture and engulf organic material through a type of endocytosis known as phagocytosis, or cell eating. Amoebas are amorphous and move by changing their shape. They reside in aquatic and moist environments, and some species are parasitic.

Economic Importance of Protists

Protists serve as the foundation of the food chain. Protists are symbionts – having a close relationship between two species in which, one is benefited. Some protists also produce oxygen and may be used to produce biofuel. Protists are the primary sources

of food for many animals. In some rare cases, Protists are harvested by humans for food and other industrial applications. Phytoplankton is one of the sole food sources for whales Seaweed is an alga, which is considered a plant-like protist. Zooplankton is fed on by various sea creatures including shrimp and larval crabs.

harmful algal bloom (HAB)

or excessive algae growth, sometimes called a red tide in marine environments, is an algal bloom that causes negative impacts to other organisms by production of natural algae-produced toxins, water DE oxygenation, mechanical damage to other organisms, or by other means.

- Blooms can last from a few days to many months. After the bloom dies, the microbes that decompose the dead algae use up more of the oxygen, generating a "dead zone" which can cause fish die-offs. When these zones cover a large area for an extended period of time, neither fish nor plants are able to survive. It is sometimes unclear what causes specific HABs as their occurrence in some locations appears to be entirely natural, while in others they appear to be a result of human activities.
- In certain locations there are links to particular drivers like nutrients, but HABs have also been occurring since before humans started to affect the environment. HABs are induced by eutrophication, which is an overabundance of nutrients in the water. The two most common nutrients are fixed nitrogen (nitrates, ammonia, and urea) and phosphate. The excess nutrients are emitted by agriculture, industrial pollution,

excessive fertilizer use in urban/suburban areas, and associated urban runoff. Higher water temperature and low circulation also contribute.

- HABs can cause significant harm to animals, the environment and economies. They have been increasing in size and frequency worldwide, a fact that many experts attribute to global climate change.
  - Sewage and livestock wastes, transports abundant nutrients to the seawater and stimulates bloom events. Natural causes, such as river floods or upwelling of nutrients from the sea floor, often following massive storms, provide nutrients and trigger bloom events as well.

Red tide

is a marine environmental event where protists, including algae and dinoflagellates, go through a tremendous growth period, called a bloom, or an algal bloom. In a 2- to 3-week period, it is possible for each algal cell to produce 1 million daughter cells. This growth may cause the water to change colors, causing what is commonly known as a Red Tide. Algal blooms may not result in color changes to the water; therefore, the technical term for this phenomenon is Algal Bloom. The protists may produce toxins or consume dissolved oxygen, and, therefore, cause damage or death to marine life.

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