

## Protozoa

- The name “protozoa” has a dynamic history, at one time including only the “animal-like” unicellular forms of life. Today, these heterotrophic protozoa are lumped together with the autotrophic algae and other simple forms of life into the Kingdom Protista.
- Many have complex cellular division that resembles binary fission in bacteria, on a larger scale.
- Some phyla in the Kingdom Protista are autotrophic cells, containing chloroplasts, which can produce sugars from sunlight.

## Types of Protozoa

### 1) Phylum: Euglenida

- ❖ The **Euglenida** are a phylum of protozoa recognized by the **pellicle** that gives them shape and the flagella, which they use for locomotion.
- ❖ The pellicle is a shell of sorts that exists beneath the cell membrane. It is composed of strips of proteins, which interlock for support.
- ❖ Some organisms in the Euglenida are photosynthetic, and contain chloroplasts. Others obtain food from dissolved nutrients in the environment, while still others are parasitic.

### 2) Phylum: Kinetoplastida

- Closely related to the Euglenida, the **Kinetoplastida** are also protected by a **pellicle**, although it is made exclusively of microtubules.
- Organisms in the Kinetoplastida share the unique characteristic of having a single, much enlarged and elongated, mitochondrion.
- Typically, cells have many small mitochondria, as opposed to one large one.

- The Kinetoplastida includes many parasitic organisms that cause disease in humans , like *leishmaniosis* that is the most notable, affecting over a million people a year. However, advances in medical treatments saves most of those infected, and only around 1000 people die annually from these protozoa.

### 3) **Phylum: Ciliophora**

- Instead of flagella for locomotion, organisms in the phylum **Ciliophora** use much smaller structures called **cilia**.
- The cilia of these organisms cover their entire cell, and work together to propel the cell forward.
- Organisms in the Ciliophora include a wide variety of body plans, including free-swimming organisms and sessile organisms that use their cilia to filter food from the water.
- Most ciliates exist on the bottom of marine environments, known as the benthic zone. However, these protozoa have also specialized as parasites in the digestive tracts of larger organisms.

### 4) **Phylum: Apicomplexa**

- The **Apicomplexa** include mostly parasitic organisms that exist solely within their host organisms.
- Inside the cells, the parasites are much more resistant and have better access to nutrients.
- Many of these parasites can also change the proteins exposed on the surface of their cells. This helps them “hide” from the immune system cells, which recognize foreign cells on the surface of invading pathogens and this makes it very difficult to treat medically.

### 5) **Phylum: Dinoflagellata**

- The **dinoflagellates** use flagella to locomotion and are also covered by a pellicle.

- Unlike the two previous groups with pellicles, the dinoflagellates use a series of vesicles beneath the cell membrane to create a rigid form.
- Some dinoflagellates even fill their vesicles with polysaccharides, like cellulose, to create a form of armor that protects their cells.

#### 6) **Phylum: Stramenopila**

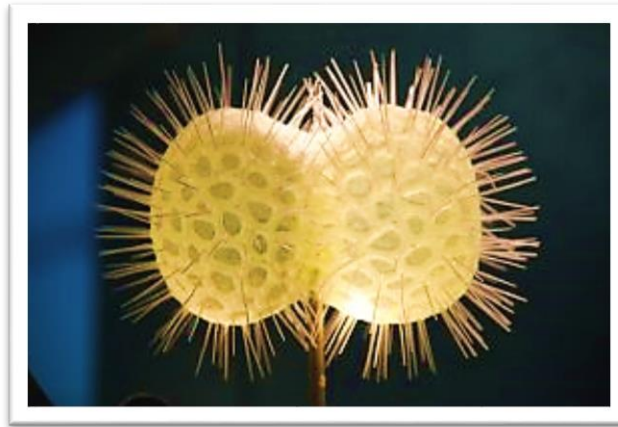
- The **Stramenopila** includes a wide variety of organisms, from the shelled diatoms to brown and golden algae.
- Protozoa in this phylum have shells, scales, or tests that support the cell. These protective covering vary widely across the phylum.
- The diatoms tend to make ornate and complex tests of silicate, which is also used to make glass. Others form their shells from calcium carbonate or protein.

#### 7) **Phylum: Rhizopoda**

- The phylum **Rhizopoda** contains the amoebas. The small, unicellular protozoa are some of the only protozoa that do not have any sort of hard covering.
- The amoebas move by extending their cytoplasm into the environment. These extensions are called *pseudopodia*.

#### 8) **Phylum: Actinopoda**

- The organisms in **Actinopoda** have characteristic axopodia, which are sharp spines that extend from the cell and are covered in cytoplasm.
- They are used in locomotion and feeding.
- The axopodia also produce beautiful shapes, as seen in the organism below



*Radiolarian*

9) **Phylum: Granuloreticulosa**

- The **Granuloreticulosa** includes a variety of organism that have immense industrial value. The tests produced by these protozoa aggregate in huge numbers on the bottom of marine environments.
- Over time they fossilize together and become substances like chalk, limestone, and marble. Even the pyramids of Egypt were built from stones that originated from the shells of these protozoans.

10) **Phylum: Diplomonodida**

- The **Diplomonodida** are a phylum of organisms that have many flagella for locomotion. The average number is around 8.
- The most well-known of these protozoa is the genus *Giardia*, which can be consumed in unclean water and cause flu-like symptoms and diarrhea in humans.

11) **Phylum: Parabasilida**

- These organisms contain many flagella, up to thousands on a single cell.
- Many parabasilids exist as symbiotic protozoa in the digestive tracts of insects, particularly those that eat wood.
- These protozoa are able to secrete an enzyme that can break down cellulose.