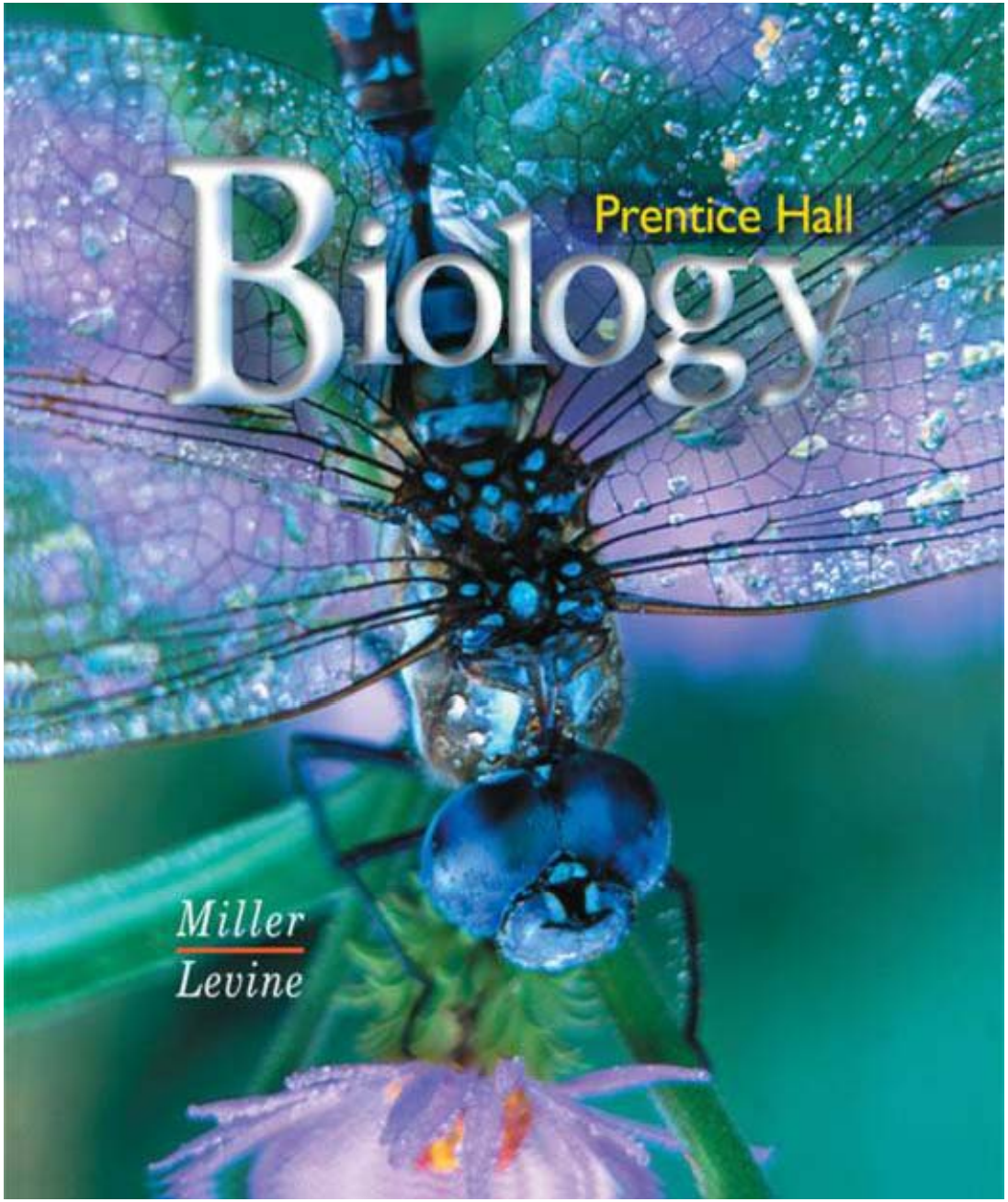


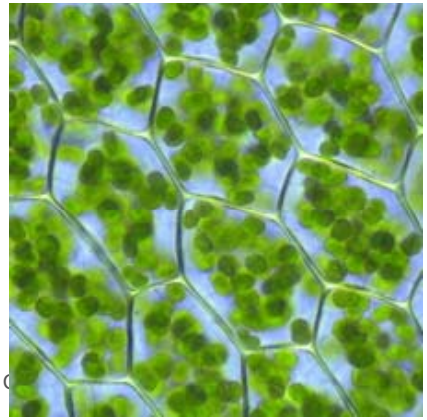
20-3 Plantlike Protists: Unicellular Algae

General characteristics of Plantlike Protists

- Commonly called **algae**
- Found in ponds and lakes
- Lack true roots, true leaves and stems (differ from true plants)
- **Most** are autotrophic and carry out photosynthesis; some are heterotrophic
- Unicellular, eukaryotic and usually motile
- In **chloroplasts**, contain the green photosynthetic pigment, chlorophyll and may contain accessory pigments

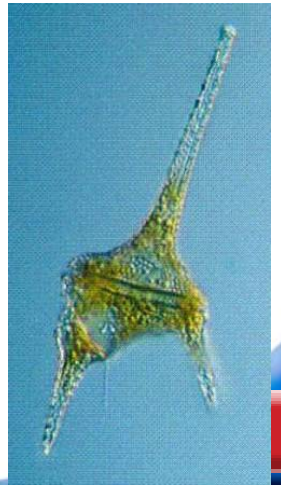
Chlorophyll and Accessory Pigments

- Chlorophyll and accessory pigments allow algae to harvest and use the energy from sunlight.
- Algae found in deep water have had to adapt to capturing different wavelengths of light than algae found at the surface of water.
- Accessory pigments increase the range of light used for photosynthesis. Chlorophyll **a, b** and **c** collectively allows for the capturing of all the wavelengths of light.
- Accessory pigments can give algae a color other than green.



The four phyla of unicellular algae are:

- **euglenophytes**
- **chrysophytes**
- **diatoms**
- **dinoflagellates**



Euglenophytes

- Euglenophytes are plantlike protists that have **two flagella**
- The two flagella emerge from a **gullet**
- no cell wall but rather a **pellicle** which is tough and enables euglena to crawl through mud when there is not enough water to swim.

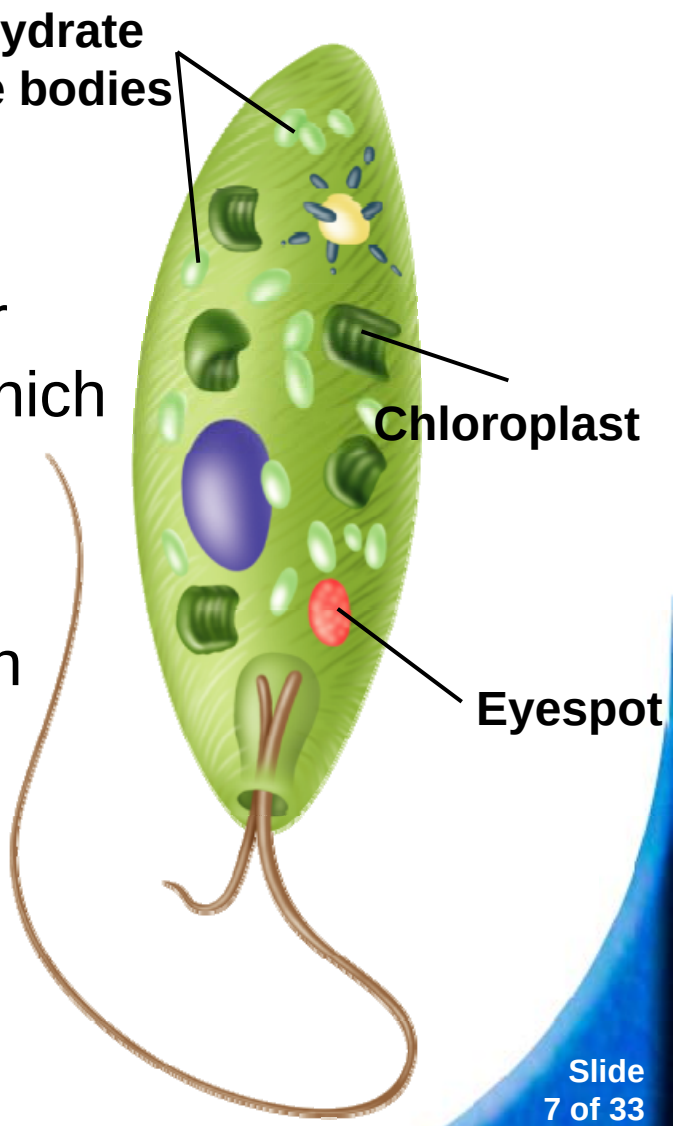
Nutrition

- Photosynthesis: in **chloroplasts**

- Near the gullet end of the cell is a cluster of reddish pigment called the **eyespot**, which helps the organism find sunlight to power photosynthesis

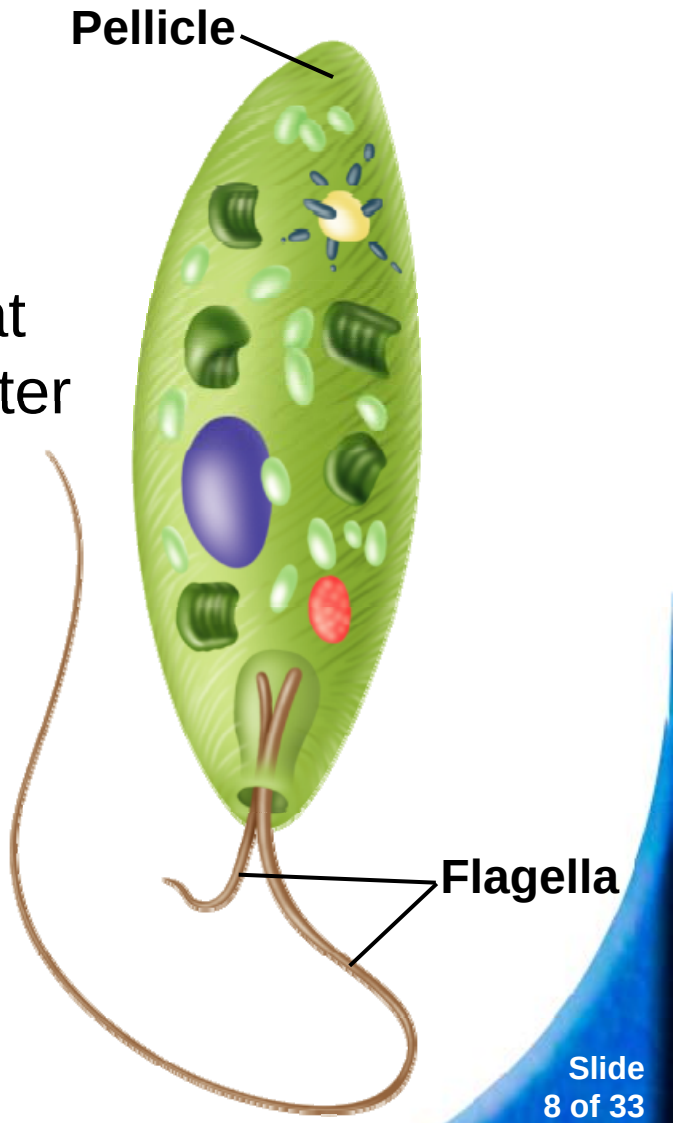
- If sunlight is unavailable, they can switch to being saprophytic (feed on decaying material).

- Euglenas store **carbohydrates** in small **storage bodies**



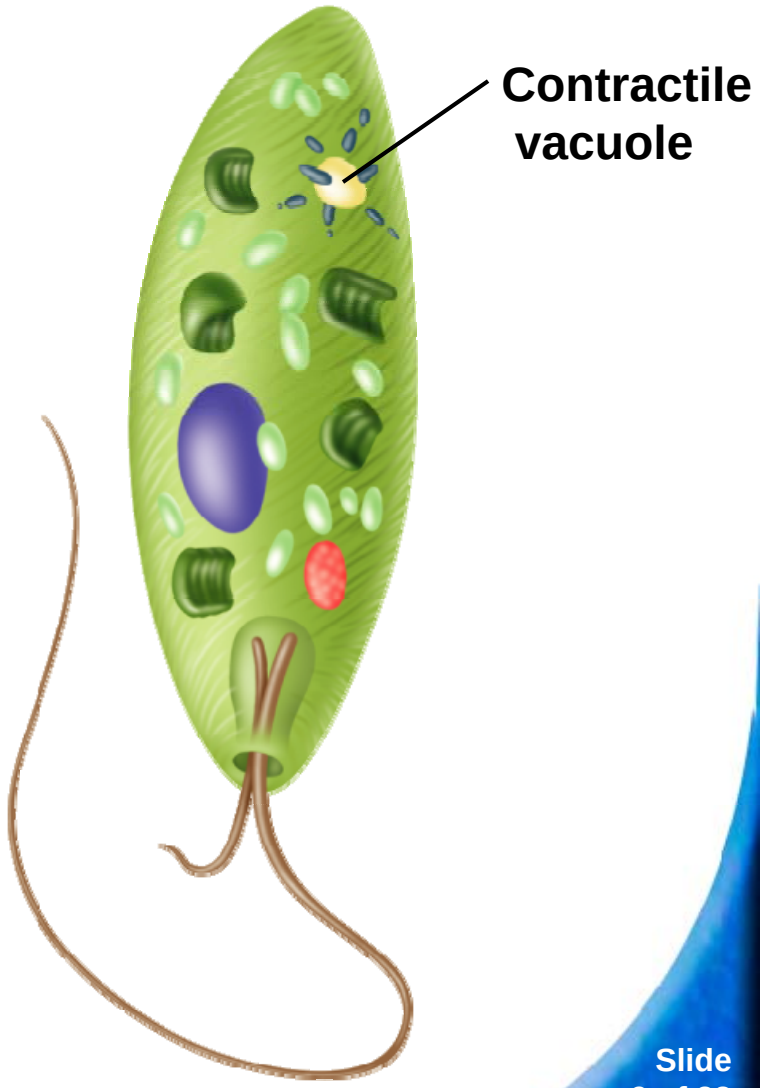
Movement

- Euglena are excellent swimmers
- The longer flagella spins in a pattern that pulls the organism rapidly through the water
- The **pellicle** is tough and flexible, letting euglena crawl through mud when there is not enough water for them to swim.



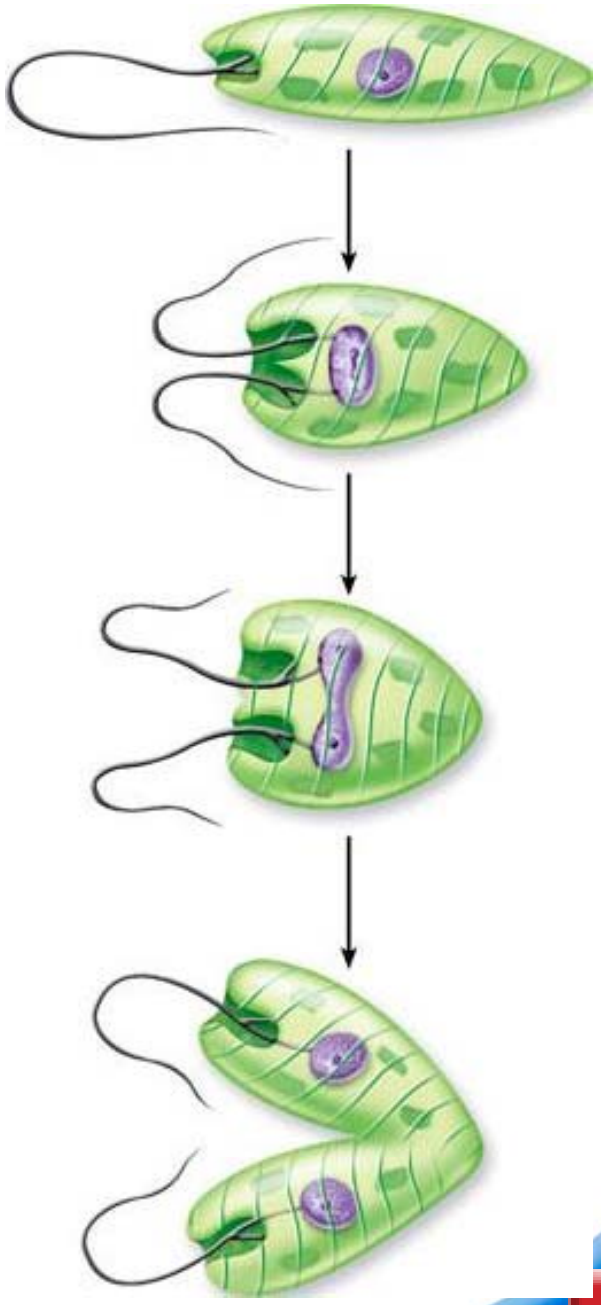
Water excretion

- Like paramecia, euglenas expel excess water through a **contractile vacuole**



Reproduction

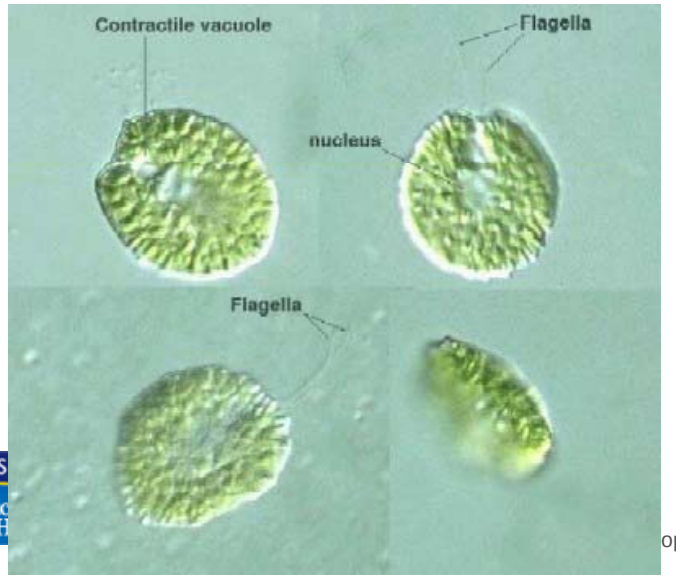
- Asexually by **binary fission**



Chrysophytes

- Members of the phylum Chrysophyta are a diverse group of plantlike protists that have **gold-colored chloroplasts**.

- Most are solitary, but some form threadlike colonies



Reproduction

- Asexually
- Sexually

Nutrition

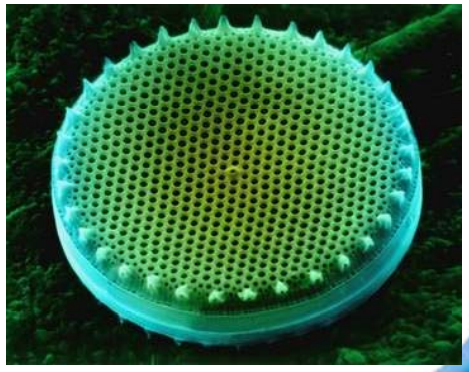
- Store food in the form of oil rather than as starch

Diatoms (Bacillariophyta)

- Diatoms produce thin, delicate cell walls rich in **silicon** (Si)—the main component of glass.

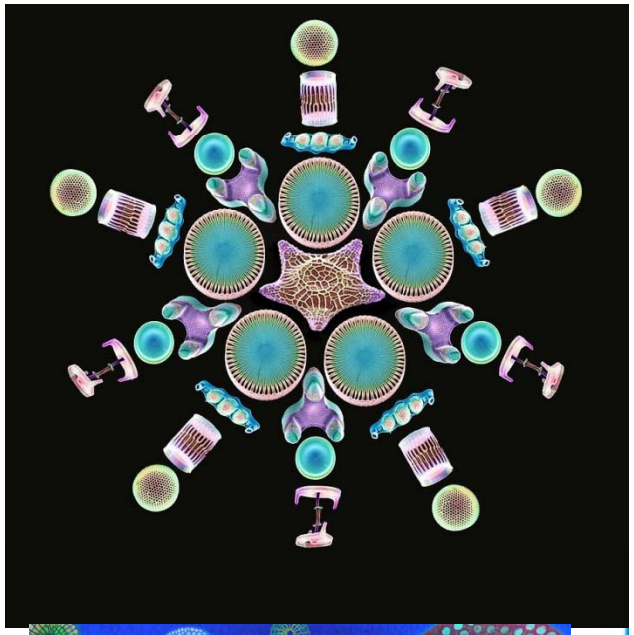
- The walls are **shaped like the two sides of a petri dish** or flat pillbox, with one side fitted snugly into the other.

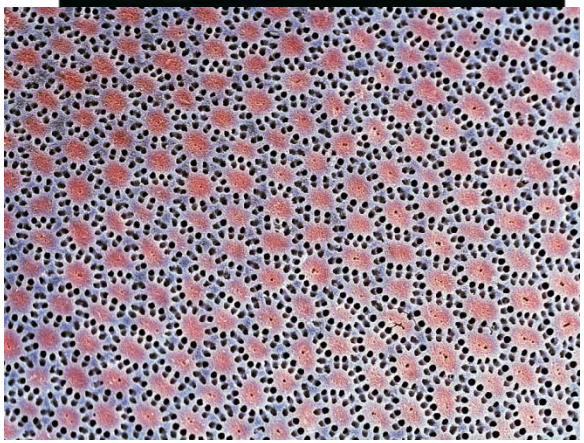
- Among the most abundant and beautiful organisms on Earth.

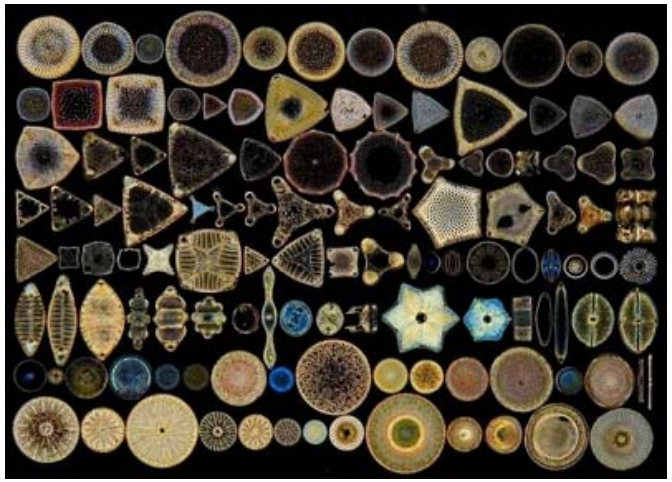


20-3 Plantlike Protists: ➡ Diatoms
Unicellular Algae

Artistic scientists love diatoms...



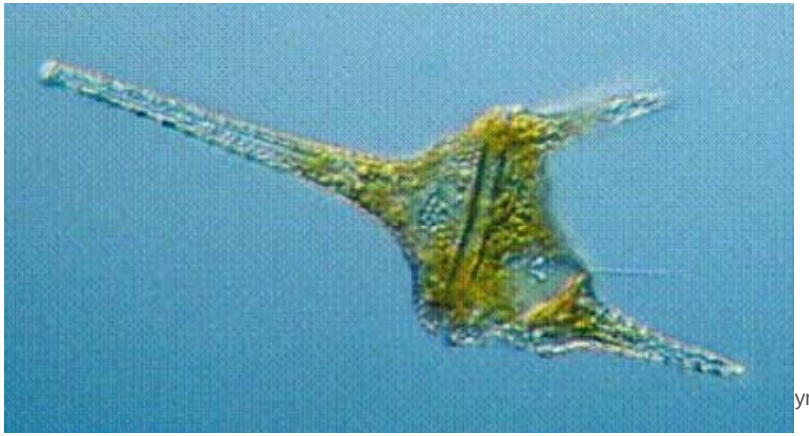


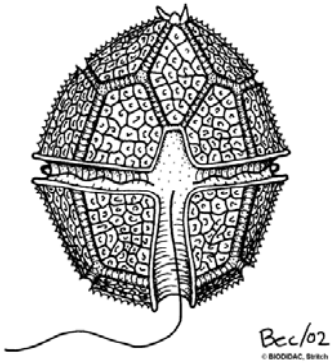


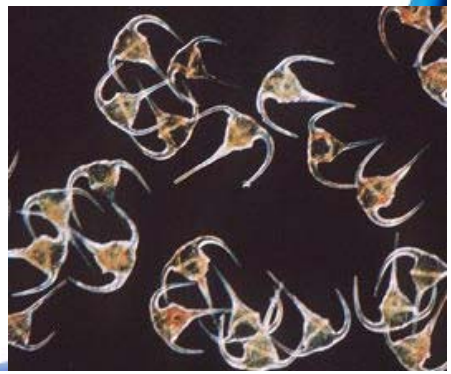
Dinoflagellates (Pyrrophyta)

• Dinoflagellates have two flagella that fit in grooves between **two thick plates of cellulose** that protect the cell.

• Many species are **luminescent** and when agitated by sudden movement in water, give off light.
(pyrrophyta for “fire plants”)

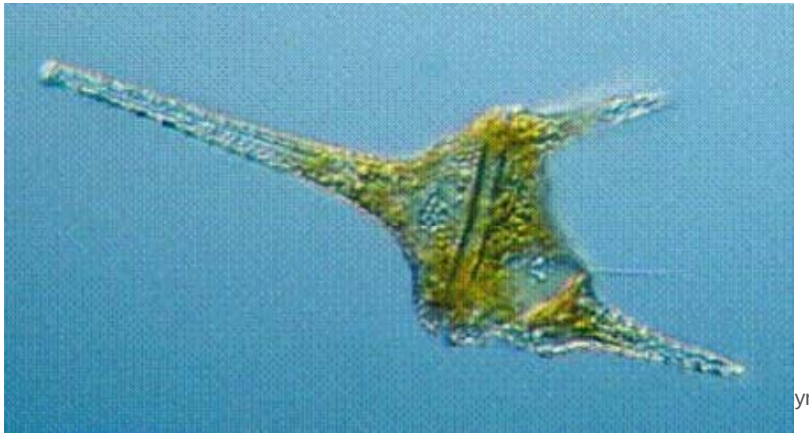


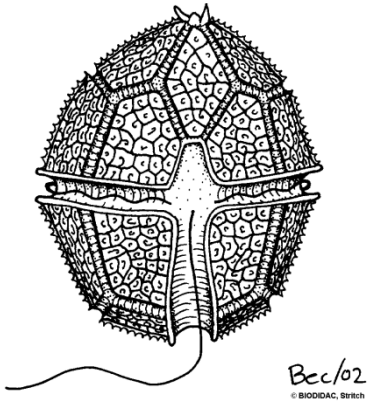


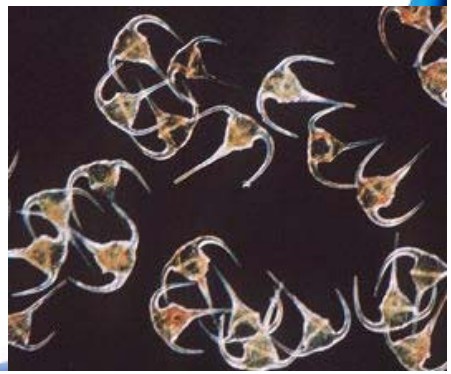


Nutrition

• About half of the dinoflagellates are photosynthetic; the other half live as heterotrophs.

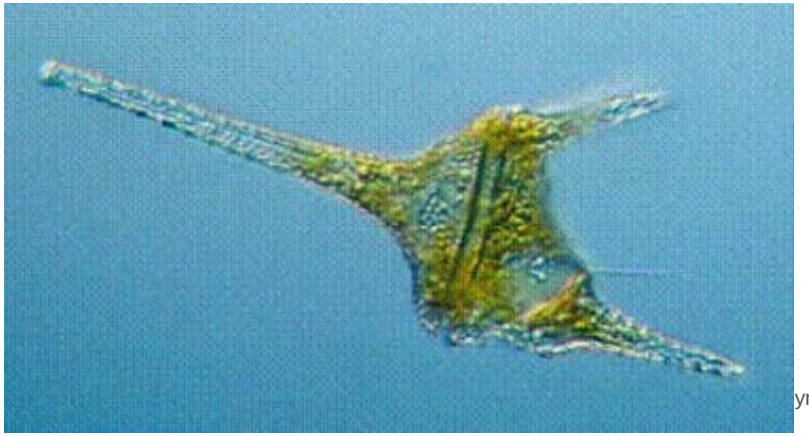


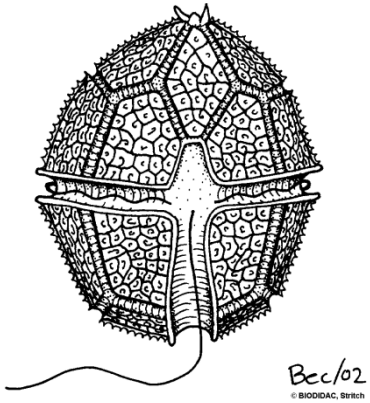


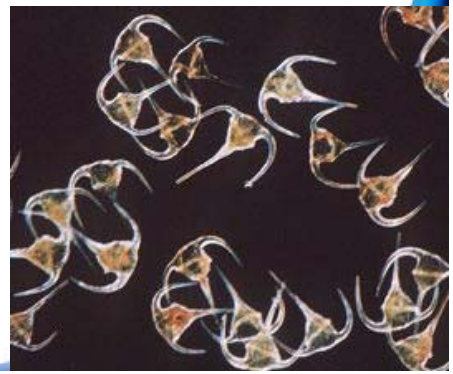


Reproduction

- Most reproduce asexually by **binary fission**

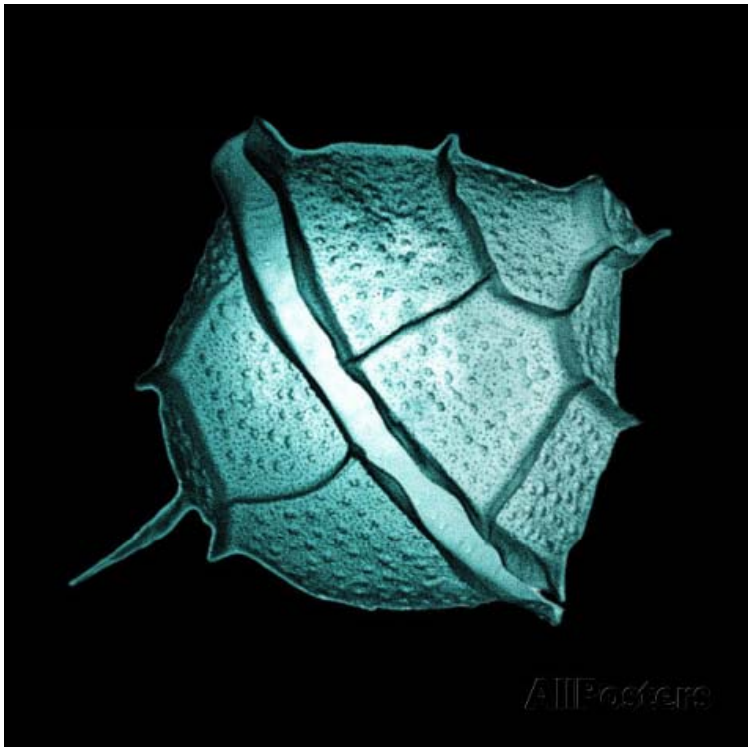






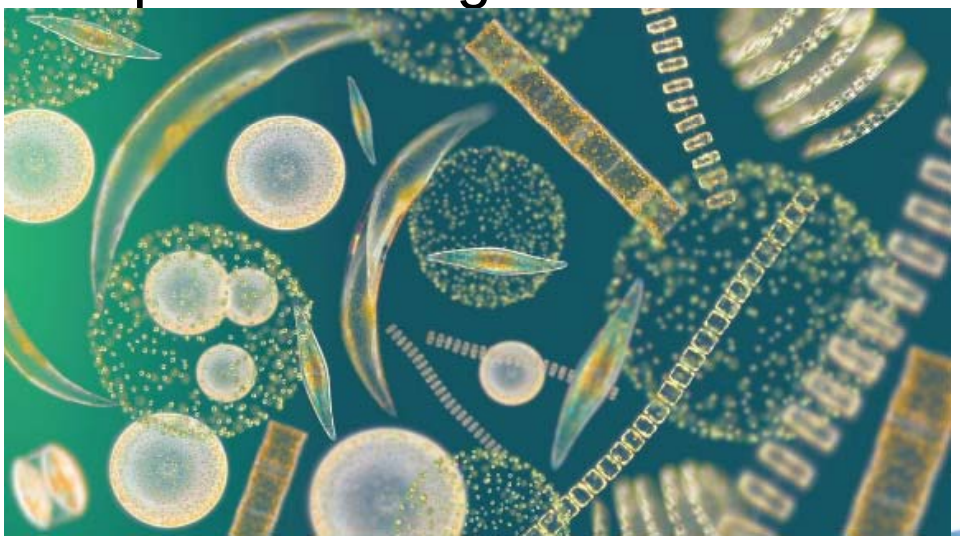
Video of dinoflagellate luminescence in waves (2min):

https://www.youtube.com/watch?v=Fvob6L8q3I8



Ecology of Unicellular Algae

- **Phytoplankton** constitute the population of small, photosynthetic organisms found near the surface of the ocean.
- **Unicellular algae** are common in both fresh and salt water. They make up a considerable part of the **phytoplankton**.
- Phytoplankton carry out half of Earth's photosynthesis. In addition, they provide nourishment for many organisms.
- However, a few species of algae can cause serious problems.



Algal blooms

- Many protists grow rapidly in regions where sewage is discharged.

- The protists play a vital role in recycling sewage and other waste materials.

- However, when the amount of waste is excessive, populations of euglenophytes and other algae may grow into enormous masses known as **algal blooms.**

Algal blooms can be dangerous for ecosystems

• Algal blooms deplete the water of nutrients, and the cells die in great numbers. The decomposition of these dead algae can rob water of its oxygen, choking its resident fish and invertebrate life.

• Some release **toxins**, such as *Gonyaulax* and *Karenia.* They cause **"red tides".** Filter-feeding shellfish such as clams can trap them for food and become filled with the toxin. Eating shellfish from water infected can cause serious illness, paralysis, and even death in humans and fish.