**Protists**

**Kingdom Protista**
- Called the “Junk Drawer”
- 3 Groups of Protists
  - Protozoans
  - Algae
  - Slime molds

**Protozoans**
- Animal-like
- Types:
  - Sarcodines
  - Ciliates
  - Flagellates
  - Sporozoans

**Sarcodines**
- The most common sarcodines are the amoebas.
- Move via “pseudopodia” or “false feet”
- Reproduce asexually through binary fission.

**Ciliates**
- The most common is the Paramecium.
- Move via cilia (tiny hair-like structures.)
- Reproduce sexually and asexually.
  - Sexually: Conjugation (joining at the oral groove.)
  - Asexually: binary fission.
- Have two nuclei
  - micronucleus: controls reproduction
  - macronucleus: controls cell activities

**Flagellates**
- Most common = Trypanosome (Causes African Sleeping Sickness,) Euglena
- Move via flagella (Long whip-like structure.)
- Reproduce asexually.
Sporozoans

- Most common is the Plasmodium (causes Malaria.)
- No means of locomotion: travel only with an infected host.
- Parasitic.

Algae

- Plant-like
- 22,000 kinds
- Photosynthetic protists--contain chlorophyll
- Can be unicellular or multicellular

The 6 Phyla of Algae

<table>
<thead>
<tr>
<th>Phyla Name</th>
<th>Unicellular or Multi-cellular</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorophyta</td>
<td>Both</td>
<td>Green Algae</td>
</tr>
<tr>
<td>Phaeophyta</td>
<td>Multi-cellular</td>
<td>Brown Algae</td>
</tr>
<tr>
<td>Rhodophyta</td>
<td>Multi-cellular</td>
<td>Red Algae</td>
</tr>
<tr>
<td>Chrysophyta</td>
<td>Unicellular</td>
<td>Golden Brown Algae, Diatoms</td>
</tr>
<tr>
<td>Pyrrophyta</td>
<td>Unicellular</td>
<td>Dinoflagellates</td>
</tr>
<tr>
<td>Euglenophyta</td>
<td>Unicellular</td>
<td>Euglena</td>
</tr>
</tbody>
</table>

Unicellular Algae

- Called “Plankton”
  - Photosynthetic Plankton are called “Phytoplankton”
- Float near the surface of fresh or salt water

Chlorophyta (The Green Algae)

- 7,000 Species
- Most live in Freshwater or on tree trunks
- All have large amounts of Chlorophyll
- Can be
  - unicellular – ie: Chlamydomonas, Chlorella
  - Colonial – ie: Volvox
  - multi-cellular – Spirogyra, Ulva (Sea Lettuce)

Phaeophyta (Brown Algae)

- Live in cold water near rocky coasts.
- Contain chlorophyll, but it is masked by a brown pigment called fucoxanthin.
- Examples: Seaweed and Kelp
- Kelp are the largest brown algae (100 m) and grow about 10 decimeters per day.
- Have air bladders to help it keep floating near the surface of the water.
- Used in fertilizer, and as a thickening agent in marshmallows and ice-cream.
**Rhodophyta (Red Algae)**
- 4,000 species—i.e. seaweed
- Live in warm, tropical ocean water as deep as 150 meters.
- Has chlorophyll, but it is masked by the pigment "phycobilins" causing a redish-orange color.
- Coated in a glue-like polysaccharide material that is used to make agar for lab use and carageenans used as thickening agents in pudding, toothpaste, cheese, marshmallows, etc.

**Chrysophyta: (Golden Brown Algae, Diatoms)**
- 10,000 species
- The most abundant phytoplankton
- Yellowish-brown to a Golden-brown in color from the golden-brown pigment that masks its chlorophyll

**Chrysophyta: (Golden Brown Algae, Diatoms)**
- Most are Diatoms:
  - Made up of silica so look glass-like
  - Used in toothpaste, detergent, and silver polish
  - Two kinds:
    - Centric—circular; found in oceans
    - Pennate—long/rectangular; found in lakes, freshwater

**Pyrrophyta (Dinoflagellates)**
- 2,000 species
- Sometimes called “Fire Algae.”
- Grow in ocean and freshwater ponds and lakes. (Most in saltwater.)
- Most are red in color or luminescent
- Have 2 flagella and spine-like projections
- Float near the Surface of water.

**Pyrrophyta (Dinoflagellates)**
- Examples:
  - Noctiluca: Glow pale green or blue
  - Gonyaulax: causes “Red Tide” when populations are in large quantities: Poisonous to vertebrates; kill some fish and are harmful to humans; shellfish are not harmed by it, but they collect the toxin and if eaten by humans, they get food poisoning.

**Euglenophyta (Euglenoids)**
- One celled
- Long flagellum
- Contain chloroplasts with chlorophyll
- Can synthesize its own food when in the presence of light or can absorb food when light is not present.
- No cell wall.
- Is both plant-like and animal-like.
Slime molds

- Fungus-like protists
- Grow in cool, shady, moist areas on decaying materials and bacteria.
- Have two life stages:
  - Reproductive - where they act like a fungus
  - Feeding - act like amoebas
- 3 Phyla
  - Myxomycota - terrestrial
  - Acrasiomycota - terrestrial
  - Oomycota - mostly aquatic, but can be terrestrial

Myxomycota

- In feeding stage it is “Pasmodial” - large cytoplasm mass with many nuclei and no cell walls or cell membranes separating them.
- Moves like amoebas digesting organic materials as it moves along.
- When food supply is gone, makes a stalk with reproductive structures that produce spores and are carried away by wind to start a new slime mold somewhere else.
- Usually yellow, but can be white, green, red, orange, brown, violet, or blue.

Acrasiomycota

- Unicellular
- One nucleus
- Feeding stage is amoeba-like
- Reproductive stage - become a pseudoplasmodium (each cell remains separate, but swarm together) and migrate to where there is light and produces reproductive structures.

Oomycota

- Include water molds, white rusts, downy mildews.
- Are branched and have many nuclei.
- Some are parasitic.
- Appear as fuzzy white growths on decaying material.