Protists

Kingdom Protista

- Called the "Junk Drawer"
- 3 Subkingdoms of Protists
  - Protozoans
  - Algae
  - Slime molds

Protozoans

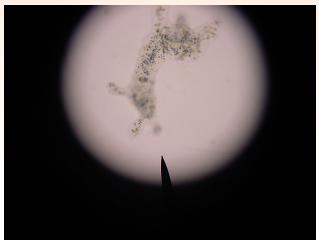
- Animal-like
- Superphyla:
  - Sarcodines (Sarcodina)
  - Ciliates (Ciliophora)
  - Flagellates (Mastigophora)
  - Sporozoans (Apicomplexa)

Protozoa

- superphylum: Sarcodina
  - phylum: Rhizopoda
    - (for example, *Amoeba*, *Difflugia*, *Entamoeba*)
  - phylum: Foraminifera (= Granuloreticulosa) ----- the foraminiferans
  - phylum: Actinopoda
    - Heliozoans- freshwater and the Radiolarians-marine
- superphylum: Ciliata
  - phylum: Ciliophora
    - (for example, *Paramecium*, *Stentor*, *Vorticella*)
- superphylum: Mastigophora (= Flagellates)
  - phylum: Zoömastigophora
    - (for example, *Trypanosoma* (different species of which are responsible for "African sleeping sickness" and "Chagas' disease"))
- superphylum: Apicomplexa
  - phylum: Sporozoa
    - (for example, *Plasmodium*, the organism responsible for malaria, different species for different kinds of malaria)

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

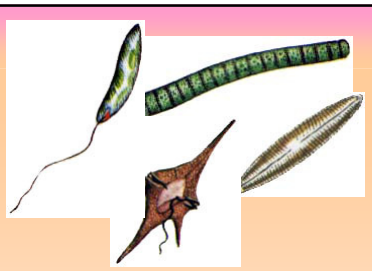
Flagellates:

- 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 chloropyll
- Can be unicellular or multicellular

The 6 Phyla of Algae

Phyla Name	Unicellular or Multi-cellular	Common Name
Chlorophyta	Both	Green Algae
Phaeophyta	Multi-cellular	Brown Algae
Rhodophyta	Multi-cellular	Red Algae
Chrysophyta	Unicellular	Golden Brown Algae, Diatoms
Pyrrophyta	Unicellular	Dinoflagellates
Euglenophyta	Unicellular	Euglena

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-- ie: 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 fungi
  - 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.