

Kingdom Protista

1. General

- a. Kingdom Protista consists of organisms that don't seem to fit anywhere else and so they are all placed in the same kingdom.
 - i. They are simple eukaryotes that are neither fungi, plants, nor animals.
 - ii. They are so diverse that some argue they should be split into additional kingdoms.
- b. Protists are some of the earliest living things on Earth. The first eukaryotic cells are thought to have been protists. They gave rise to fungi, plants, and animals.
- c. The oldest fossils of eukaryotic cells are 1.5 billion years old although the earliest eukaryotic cells may have arisen 2.1 billion years ago. The oldest fossils of prokaryotes are 3.6 billion years old.
- d. Most are small, single-celled organisms that are not necessarily related to one another.
- e. Protists are eukaryotes that lack the specialized features of fungi, plants, and animals, although they do have membrane-bound organelles.
- f. The three large taxonomic groups, based on how they obtain nutrition, show huge diversity:
 - i. **Plant-like** protists
 - (1) Mostly non-motile; photosynthetic
 - (2) Larger, multicellular algae are usually called seaweeds
 - (3) Although there are red, brown and green algae, only the green algae have chlorophyll and cellulose and store food in the form of starch. This suggests that they are the ancestors of all land plants.
 - (4) Massive blooms of a certain plant-like protist causes "red tides." The protists produce a toxin that becomes concentrated in filter-feeding shellfish and can be paralysis and death in humans who eat them.
 - (5) The red alga Porphyra is the one used to wrap sushi and a carbohydrate (carrageenan) from some algae is used to make ice cream, pudding and many other products.
 - ii. **Animal-like** protists
 - (1) Motile, heterotrophs
 - (2) Includes **sarcodines** (e.g., *Amoeba proteus*), **ciliates** (e.g., *Paramecium caudatum*), and **flagellates** (e.g., *Euglena* sp.).
 - (3) Several human diseases are caused by animal-like protists.
 - (a) Malaria, which kills 2 million per year, is caused by a protist that is transmitted by mosquitos.
 - (b) African sleeping sickness affects about 45,000 people per year. The protist that causes it damages nerve cells which causes people to become unconscious.
 - (c) Amebic dysentery is caused by an infection of an amoeba in the intestine which causes diarrhea and sometimes bloody diarrhea.

iii. **Fungus-like** protists

- (1) These heterotrophs obtain nutrition by extra-cellular digestion.
- (2) These grow in dark, shady habitats or on water and are called slime molds or water molds.
- (3) Most are colorful and can be found underneath rotting logs or leaves.
- (4) Slime molds produce sporangia and spores like higher fungi.

2. Respiration - protists are almost exclusively aerobic.

3. Nutrition

a. Protists display various feeding strategies:

- i. Some have chloroplasts and manufacture food like plants
- ii. Others ingest food like animals.
- iii. Others absorb food like fungi.

4. Reproduction - all are capable of asexual reproduction but some reproduce sexually as well.