

Chapter 20 Protists**Summary****20–1 The Kingdom Protista**

The kingdom Protista is a diverse group. Protists are eukaryotes that are not members of the kingdoms Plantae, Animalia, or Fungi. Most protists are unicellular. The first eukaryotic organisms on Earth were protists.

One way to classify protists is according to the way they obtain nutrition. There are animallike protists, plantlike protists, and funguslike protists.

20–2 Animallike Protists: Protozoans

Animallike protists—also called protozoans—are heterotrophs. The four phyla of animallike protists are classified according to the way they move.

Animallike protists that swim using flagella are classified in the phylum Zoomastigina. They are called zooflagellates. Members of the phylum Sarcodina move by means of temporary projections of cytoplasm known as pseudopods. Sarcodines use pseudopods for feeding and movement. Sarcodines called amoebas have thick pseudopods. The phylum Ciliophora is named for cilia, which are short hairlike projections similar to flagella. Ciliates use cilia for feeding and movement. Some of the best-known ciliates belong to the genus *Paramecium*. Members of the phylum Sporozoa are parasites and do not move on their own. Sporozoans reproduce by means of sporozoites.

Some animallike protists cause serious diseases. The sporozoan *Plasmodium* causes malaria. The zooflagellate *Trypanosoma* causes African sleeping sickness. Some animallike protists are beneficial to organisms. *Trichonympha* lives within the digestive system of termites and helps termites digest wood.

20–3 Plantlike Protists: Unicellular Algae

Plantlike protists are commonly called algae. Plantlike protists include four phyla that contain unicellular organisms. One of the key traits used to classify algae is the photosynthetic pigments they contain. Chlorophyll includes three forms. Each form absorbs a different wavelength of light. Many algae also have compounds called accessory pigments that absorb light at different wavelengths than chlorophyll.

Euglenophytes—members of the phylum Euglenophyta—are plantlike protists that have two flagella but no cell wall. Euglenophytes have chloroplasts, but in most other ways they are like the protozoans called zooflagellates.

Chrysophytes—members of the phylum Chrysophyta—are a diverse group of plantlike protists that have gold-colored chloroplasts. Diatoms—members of the phylum Bacillariophyta—produce thin, delicate cell walls rich in silicon. Silicon (Si) is the main component of glass. These walls are shaped like the two sides of a petri dish or a flat pillbox.

Dinoflagellates—members of the phylum Pyrrophyta—generally have two flagella. About half of the dinoflagellates are photosynthetic. The other half live as heterotrophs.

Plantlike protists play a major ecological role on Earth by being a considerable part of the phytoplankton. Phytoplankton are made up by the population of small photosynthetic organisms found near the surface of the ocean. Many protists grow rapidly in regions where sewage is dumped into water. When the amount of waste is excessive, algae grow into enormous masses called algal blooms.

20–4 Plantlike Protists: Red, Brown, and Green Algae

Three phyla of plantlike protists contain mostly multicellular organisms. The most important differences among these phyla are their photosynthetic pigments. Red algae—members of phylum Rhodophyta—are able to live at great depths due to their efficiency in harvesting light energy. Red algae contain chlorophyll *a* and reddish accessory pigments called phycobilins.

Brown algae—members of the phylum Phaeophyta—contain chlorophyll *a* and *c* as well as a brown accessory pigment called fucoxanthin. The largest alga is giant kelp, a brown alga that grows to be more than 60 meters in length.

Green algae—members of the phylum Chlorophyta—share many characteristics with plants. They share the same photosynthetic pigments, chlorophyll *a* and *b*. Both plants and green algae have cellulose in their cell walls. Also, green algae are like plants in that they store food in the form of starch. These shared characteristics lead scientists to hypothesize that the ancestors of modern land plants looked like green algae. Green algae include the unicellular *Chlamydomonas*. Several species of green algae live in multicellular colonies. *Ulva*, called “sea lettuce,” is a true multicellular green algae.

The life cycles of many algae include both a diploid and a haploid generation. The process of switching back and forth between haploid stages and diploid stages in a life cycle is called alternation of generations.

Algae produce much of Earth’s oxygen through photosynthesis. Algae are a major food source in the oceans. People also use algae for food. Industry uses algae in making plastics and other products.

20–5 Funguslike Protists

Funguslike protists are like fungi in that they are heterotrophs that absorb food from dead or decaying organic matter. Unlike most true fungi, though, funguslike protists have centrioles. They also lack the chitin cell walls of true fungi.

Slime molds are funguslike protists that play key roles in recycling organic material. At one stage of their life cycle, slime molds look just like amoebas. At other stages, they form moldlike clumps that produce spores, almost like fungi. In cellular slime molds, individual cells remain distinct during every phase of the life cycle. They spend most of their lives as free-living cells. In acellular slime molds, cells fuse to form large cells with many nuclei. These structures are known as plasmodia. Fruiting bodies, or sporangia, spring up from a plasmodium.

Water molds, or oomycetes, are members of the phylum Oomycota. Oomycetes thrive on dead or decaying organic matter in water. Some oomycetes are plant parasites on land.

Slime molds and water molds are important recyclers of organic material. Some funguslike protists can cause diseases in plants. An oomycete caused a disease in the Irish potato crop in 1845 and 1846, leading to mass starvation.