

Diversity of Life 1

- 10.1 [Classifying Life](#)
- 10.2 [Evolutionary Trees](#)
- 10.3 [Three Domains of Life](#)
- 10.4 [Bacteria](#)
- 10.5 [Archaea](#)
- 10.6 [Protists](#)
- 10.7 [Plants](#)



Summary of Terms

- **Archaea** One of the three domains of life, consisting of many different kinds of prokaryotic organisms that are more closely related to eukaryotes than bacteria; some archaea are adapted to extreme environments.
- **Autotrophs** Living organisms that convert inorganic molecules into food and organic molecules.
- **Bacteria** One of the three domains of life, consisting of an extremely diverse array of prokaryotic organisms.
- **Eukarya** One of the three domains of life, consisting of eukaryotic organisms whose cells have a nucleus: animals, fungi, plants, and protists.
- **Evolutionary tree** A diagram that shows the relationships among a set of organisms.
- **Flower** The reproductive structure of flowering plants.
- **Fruit** In flowering plants, a structure surrounding the seeds that typically helps to spread the seeds.
- **Heterotrophs** Living organisms that obtain energy and organic molecules from other living organisms or other organic materials.
- **Plants** A group of autotrophic, multicellular, terrestrial eukaryotes that make food through photosynthesis.
- **Pollen** In seed plants, immature male gametophytes wrapped in protective coatings; it ultimately produces sperm in flowering plants.
- **Protists** A miscellaneous group of eukaryotic organisms that includes all the eukaryotes that are not plants, animals, or fungi.
- **Seed** In seed plants, a structure consisting of a plant embryo, a food supply, and a tough outer coating.



Detailed Chapter Summary

Under Linnaean classification, living species are divided into separate groups based on their characteristics and overall “similarity.” The levels of classification are: domain, kingdom, phylum, class, order, family, genus, species. A species’ scientific name consists of its genus name and species name.

However, biologists now aim to classify species based on their evolutionary relationships -- that is, how closely related they are to one another. These relationships are not always easy to work out, but they are not subjective the way “similarity” is. Relationships among species are shown with a diagram called an evolutionary tree.

The three domains of life are Bacteria, Archaea, and Eukarya. Archaea and Eukarya are more closely related to each other than either is to Bacteria. Bacteria and Archaea consist of prokaryotes, whereas Eukarya consists of eukaryotes.

Bacteria represent one of the oldest lineages on Earth. Bacteria are extremely diverse. Some bacteria are photosynthetic autotrophs, some are chemoautotrophs, and some are heterotrophs. Most bacteria are single-celled, but some gather in multicellular clusters. Some bacteria are able to move using flagella. Bacteria reproduce asexually by dividing, and many form hardy spores when conditions are poor. Bacteria play an essential role in decomposition, the breaking down of organic matter. They also help cycle important nutrients such as nitrogen. A large number of bacteria live within our bodies, performing essential functions. Others are used in the production of food. Some bacteria cause important human diseases.

Archaea are a domain of single-celled prokaryotic organisms. Some archaean species are extremophiles that live in unusual, extreme environments such as very salty ponds or hot hydrothermal vents.

Protists are a diverse group that includes all the eukaryotes that are not plants, animals, or fungi. The group Protists includes a variety of species that have been lumped together while scientists continue to work out their evolutionary relationships. It is no surprise, then, that the group includes many different kinds of species. Autotrophic protists include single-celled marine species such as diatoms and (some) dinoflagellates, as well as multicellular seaweeds such as kelp, red algae, and green algae. Heterotrophic protists include single-celled amoebas, ciliates, and flagellates. Slime molds are unusual among living things in that they may move from single-celled to multicellular during their life cycle.

Plants are terrestrial, multicellular, autotrophic eukaryotes. They obtain energy and organic molecules through photosynthesis. Plant adaptations for living on land include roots, shoots, and leaves. Leaves typically have a large surface area for catching sunlight and stomata for obtaining carbon dioxide. Some plants also have a vascular system for transporting materials. The xylem transports water and soil nutrients up from the roots and is made of dead cells. The phloem transports sugars down from the leaves and is made of living cells. Plant reproduction occurs through an “alternation of generations” that differs in its details among the main groups of plants. During the alternation of generations, plants alternate between a haploid gametophyte and a diploid sporophyte.

The major groups of plants are mosses, ferns, and seed plants. Mosses are small plants with no vascular systems. In mosses, the gametophyte is much larger than the sporophyte and dominates the life cycle. Moss sperm swim directly through the environment to reach the eggs. Because of this feature and the absence of a vascular system, mosses are restricted to moist environments.



Ferns have a vascular system, but their sperm also swim through the environment to fertilize the eggs. The fern sporophyte is much larger than the gametophyte.

The seed plant life cycle is also dominated by the sporophyte. Seed plants have two key features, pollen and seeds, that have enabled them to live in a wider range of habitats, including drier ones. Pollen grains are male gametophytes that can be carried to female structures during reproduction, making swimming sperm (and moist habitats) less necessary. Seeds are embryonic sporophytes encased in a tough outer coating along with a food supply.

The two main groups of seed plants are conifers and flowering plants. Conifers have reproductive structures called cones, and they are pollinated by wind. Flowering plants are the largest and most diverse group of plants. Their reproductive structures are flowers, which include male parts such as the stamen and anther, and female parts such as the carpel, ovary, and stigma. Insects and other animals are involved in the pollination of many flowering plants. Flowering plants surround their seeds with a structure called a fruit, which functions in spreading seeds.

