

Kingdom Plantae

Section 12.1 Overview of Plants



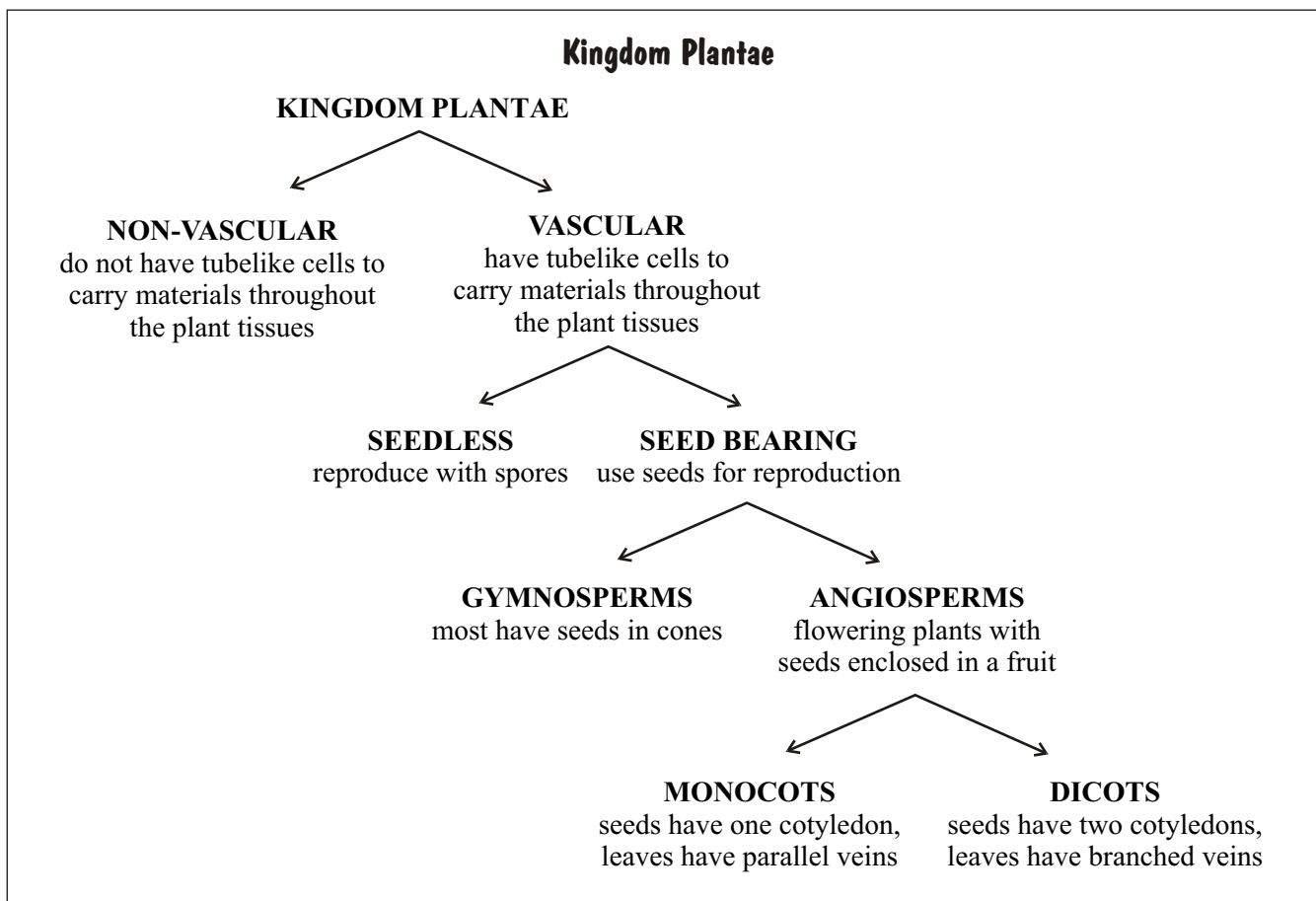
How are plants different from the other organisms we've studied so far? Plants are classified into the Kingdom Plantae if they have all of the characteristics listed in the chart below.

Characteristics of All Plants

- They are made of more than one cell.
- The cells are eukaryotic cells.
- They are autotrophs, meaning they can produce their own food through photosynthesis.

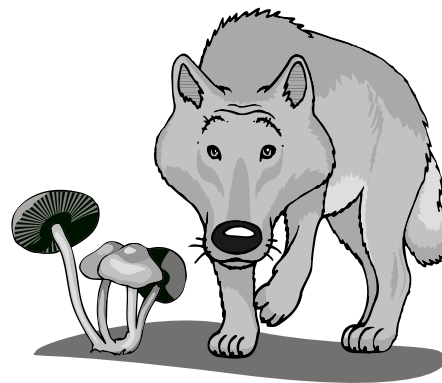
Plant cells also have cell walls that are made of cellulose. Scientists know that over 250,000 species of plants exist on the earth today.

Plants are classified using the same tools as other organisms, but the largest group after kingdom is called a **division** (instead of phylum). There are twelve divisions of plants recognized by **botanists**, the scientists who study plants. To make it easier to study some of the major divisions of plants, the Kingdom Plantae is usually split into two groups: vascular plants and non-vascular plants. The vascular plants are divided again into groups according to the way they reproduce: seedless plants and seeded plants. Then the plants with seeds are divided into gymnosperms and angiosperms. Finally, the angiosperms are divided into the monocots and the dicots.



The Flow of Energy and Matter

Section 15.1 The Flow of Energy in Ecosystems



An **ecosystem** is made up of a community of organisms (plants, animals, etc.) and their interactions with their environment. All organisms must have energy to live, but where does that energy come from? Think about how much energy you have used today by the time you read this sentence. Where did you get that energy, and where did it go when you used it? What about the oxygen you breathed? Where did it come from, and what happened to it after it went to your lungs? Energy and all sorts of matter flow constantly through the ecosystem to provide you and all of the living organisms in your ecosystem with the things that are needed to sustain life on the earth.

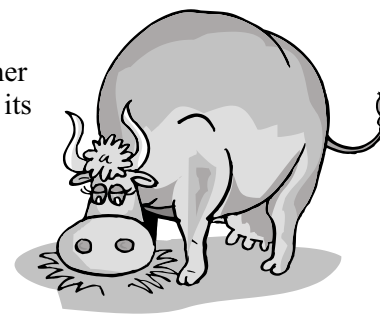
Producers/Autotrophs



Where does all of this energy originate? The ultimate energy source for life on earth is the sun. Less than 1% of the energy that reaches earth from the sun is used by living organisms, but that small percentage fuels life. **Producers** are organisms that can use energy directly from the sun to produce simple sugars that other organisms can use as food. Plants are probably the most familiar producers on earth. Producers are also called **autotrophs** because they make their own food and do not need to “eat” other organisms to survive. Autotrophs capture energy from the sun, and they use the sun’s energy to make organic compounds out of inorganic materials. This conversion usually happens in a process that is familiar to you — photosynthesis. (A few autotrophic organisms use a process called chemosynthesis to produce organic compounds since they live where there is no sunlight.) As you learned in Section 7.3, the energy from the sunlight is stored in the bonds of simple sugars.

Consumers/Heterotrophs

Consumers are organisms that get their energy by eating either producers or other consumers. Consumers are also called **heterotrophs** because they must depend on other organisms for their food. Think about a cow, which eats grass. The cow doesn’t make its own energy; it gets energy from the grass it eats. A cow is a consumer. The grass contains energy in its bonds of simple sugars. Through the process of cellular respiration (reviewed in Section 7.2), the cow breaks down the simple sugars to obtain energy to live. Since cows consume producers, they are called **primary consumers**. A wolf may then eat the cow, and the cow becomes the source of energy for the wolf. The wolf is also a consumer, but when it eats a primary consumer like a cow, it is called a **secondary consumer**.



Decomposers and Detritivores

Decomposers are also consumers and heterotrophs, but instead of eating other living organisms, decomposers break down dead organisms into matter called **detritus**. The detritus is then eaten by organisms called **detritivores**, which convert the organic material into inorganic material. For example, when the wolf dies, bacteria and fungi are decomposers that break down the dead tissues. Detritivores are usually small invertebrates like earthworms and nematodes, which further break down material and return elements to the soil to be used again by producers. Decomposers and detritivores use the energy from the dead material to live. Decomposers and detritivores make use of the lowest energy level. Note that they do not recycle energy, but they do recycle matter, and producers benefit the most from their efforts.

From sunlight to producers, from producers to consumers, from consumers to other consumers, and from consumers to decomposers, energy flows through an ecosystem.