### **The Domains of Life**

Let’s explore the **domain**, the least specific category of classification.

All of life can be divided into three domains, based on the type of cell of the organism:

1. **Bacteria**: [cells](http://www.ck12.org/biology/Cells) do not contain a nucleus.
2. **Archaea**: [cells](http://www.ck12.org/biology/Cells) do not contain a nucleus; they have a different **cell wall** from bacteria.
3. **Eukarya**: cells do contain a nucleus.

#### Archaea and Bacteria

The [Archaea](http://www.ck12.org/life-science/Archaea-in-Life-Science) and Bacteria domains (**Figure** [below](http://www.ck12.org/life-science/Domains-of-Life-in-Life-Science/lesson/Domains-of-Life-MS-LS/?referrer=featured_content#x-ck12-TVMtTFMtMDEtMTItTGlmZQ..)) are both entirely composed of small, single-celled organisms and seem very similar, but they also have significant differences. Both are composed of **prokaryotic cells**, which are cells without a nucleus. In addition, both domains are composed of species that reproduce asexually (**asexual reproduction**) by dividing in two. Both domains also have species with cells surrounded by a **cell wall**, however, the cell walls are made of different materials. Bacterial cell walls contain the polysaccharide **peptidoglycan**. Lastly, [Archaea](http://www.ck12.org/life-science/Archaea-in-Life-Science) often live in extreme environments including hot [springs](http://www.ck12.org/physics/Springs), geysers, and salt flats. Bacteria do not live in these environments.

#### Eukarya

All of the cells in the domain Eukarya keep their genetic material, or **DNA**, inside the **nucleus**. The domain Eukarya is made up of four kingdoms:

1. Plantae: Plants, such as trees and grasses, survive by capturing [energy](http://www.ck12.org/physics/Energy) from the [sun](http://www.ck12.org/earth-science/Sun), a process called **photosynthesis**.
2. Fungi: [Fungi](http://www.ck12.org/life-science/Fungi-in-Life-Science), such as mushrooms and [molds](http://www.ck12.org/biology/Molds), survive by "eating" other organisms or the remains of other organisms. These organisms absorb their nutrients from other organisms.
3. Animalia: Animals also survive by eating other organisms or the remains of other organisms. Animals range from tiny ants to the largest whales, and include [arthropods](http://www.ck12.org/life-science/Arthropods-in-Life-Science), [fish](http://www.ck12.org/life-science/Fish-in-Life-Science), [amphibians](http://www.ck12.org/life-science/Amphibians-in-Life-Science), [reptiles](http://www.ck12.org/life-science/Reptiles-in-Life-Science), and mammals.
4. Protista: Protists are not all descended from a single common ancestor in the way that plants, animals, and [fungi](http://www.ck12.org/life-science/Fungi-in-Life-Science) are. Protists are all the eukaryotic organisms that do not fit into one of the other three kingdoms. They include many kinds of microscopic one-celled (unicellular) organisms, such as [algae](http://www.ck12.org/biology/Algae) and plankton, but also giant seaweeds that can grow to be 200 feet long.

**Kingdoms of the Domain Eukarya**

**Kingdom Protista**

Protists are a group of all the eukaryotes that are not [fungi](http://www.ck12.org/biology/Fungi), animals, or plants. As a result, it is a very diverse group of organisms. The eukaryotes that make up this kingdom, Kingdom **Protista**, do not have much in common besides a relatively simple organization. Protists can look very different from each other. Some are tiny and unicellular, like an **amoeba**, and some are large and multicellular, like **seaweed**. However, multicellular protists do not have highly specialized tissues or organs. This simple cellular-level organization distinguishes protists from other eukaryotes, such as [fungi](http://www.ck12.org/biology/Fungi), animals, and plants. There are thought to be between 60,000 and 200,000 protist species, and many have yet to be identified. Protists live in almost any environment that contains liquid [water](http://www.ck12.org/biology/Water-Advanced). Many protists, such as the **algae**, are photosynthetic and are vital primary [producers](http://www.ck12.org/biology/Producers) in [ecosystems](http://www.ck12.org/biology/Ecosystems). Other protists are responsible for a range of serious human diseases, such as **malaria** and sleeping sickness

**Kingdom Fungi**

Most fungi are multicellular, but some exist as single [cells](http://www.ck12.org/biology/Cells). Single-celled fungi are known as **yeasts.** Fungi spend most of their life cycle in the haploid state. They form diploid [cells](http://www.ck12.org/biology/Cells) only during [sexual reproduction](http://www.ck12.org/biology/Sexual-Reproduction). Like the cells of protists and plants, the cells of fungi have cell walls. But fungi are unique in having cell walls made of **chitin** instead of cellulose. **Chitin** is a tough carbohydrate that also makes up the exoskeleton (outer skeleton) of [insects](http://www.ck12.org/biology/Insects) and related organisms.

**Habitats of Fungi**

Fungi are found all around the world, and grow in a wide range of habitats, including deserts. Most grow in terrestrial environments, but several species live only in aquatic habitats. Most fungi live in soil or dead matter, and in symbiotic relationships with plants, animals, or other fungi. Fungi, along with bacteria that are found in soil, are the primary decomposers of organic matter in terrestrial [ecosystems](http://www.ck12.org/biology/Ecosystems). The decomposition of dead organisms returns nutrient to the soil, and the environment.

#### Kingdom Plantae

#### What are Plants?

Plants are multicellular eukaryotic organisms with **cell walls** made of **cellulose**. Plant cells also have **chloroplasts**. In addition, plants have specialized reproductive organs. These are structures that produce reproductive cells. Male reproductive organs produce sperm, and female reproductive organs produce eggs. Male and female reproductive organs may be on the same or different plants.

#### How Do Plants Obtain Food?

Almost all plants make food by **photosynthesis**. Only about 1 percent of the estimated 300,000 species of plants have lost the ability to photosynthesize. These other species are consumers, many of them predators. How do plants prey on other organisms? The [Venus](http://www.ck12.org/earth-science/Venus) fly trap in **Figure** [below](http://www.ck12.org/book/CK-12-Biology-Concepts/section/9.1/#x-ck12-QmlvLTE1LTAxLXZlbnVzLWZseS10cmFw) shows one way this occurs.

#### What Do Plants Need?

Plants need temperatures above [freezing](http://www.ck12.org/physical-science/Freezing-in-Physical-Science) while they are actively growing and photosynthesizing. They also need sunlight, carbon dioxide, and [water](http://www.ck12.org/biology/Water-Advanced) for [photosynthesis](http://www.ck12.org/biology/Photosynthesis). Like most other organisms, plants need oxygen for [cellular respiration](http://www.ck12.org/biology/Cellular-Respiration) and [minerals](http://www.ck12.org/earth-science/Minerals) to build proteins and other organic molecules. Most plants support themselves above the ground with stiff [stems](http://www.ck12.org/biology/Stems) in order to get light, carbon dioxide, and oxygen. Most plants also grow [roots](http://www.ck12.org/biology/Roots) down into the soil to absorb water and minerals. And, of course, we need the [energy](http://www.ck12.org/physics/Energy) stored in plants through photosynthesis to survive. Life as we know it would not be possible without plants.

**Kingdom Animalia**

### Characteristics of Animals

**Animals** are a kingdom of multicellular eukaryotes. They cannot make their own food. Instead, they get nutrients by eating other living things. Therefore, animals are **heterotrophs**.

#### Animal Cells

Like the [cells](http://www.ck12.org/biology/Cells) of all eukaryotes, animal cells have a nucleus and other membrane-bound organelles. Unlike the [cells](http://www.ck12.org/biology/Cells) of plants and [fungi](http://www.ck12.org/biology/Fungi), animal cells lack a cell wall. This gives animal cells flexibility. It lets them take on different shapes so they can become specialized to do particular jobs. The human nerve cell shown in is a good example. Its shape suits its function of transmitting [nerve impulses](http://www.ck12.org/biology/Nerve-Impulses) over long distances. A nerve cell would be unable to take this shape if it were surrounded by a rigid cell wall.

<http://www.ck12.org/life-science>