

## VOCABULARY

**binary fission** – the method by which prokaryotes form new cells

**cell cycle** – the process cells go through to grow, copy their DNA, and divide to make new cells

**chromosome** – a tiny packet of DNA inside a eukaryote's nucleus

**eukaryote** – a cell that has a nucleus

**mitosis** – the separation of chromosomes

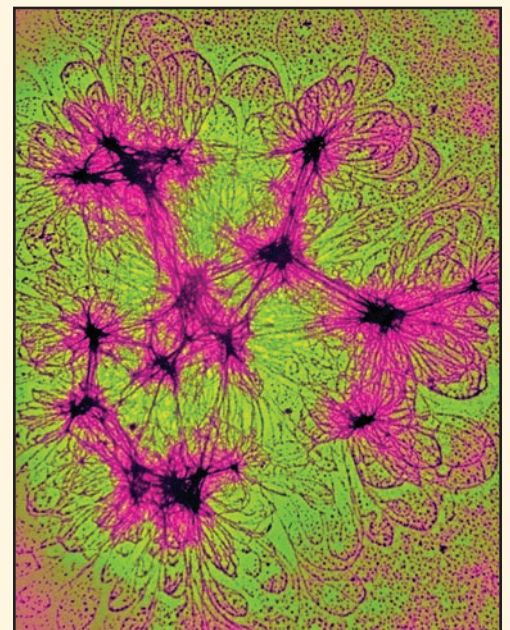
**prokaryote** – a cell that does not have a nucleus

Humans go through stages of life. Babies, children, teenagers, and adults are all at different stages. Cells go through stages too. When cells go through stages of life, it is called the **cell cycle**. The cell cycle is the process cells go through to grow, copy their DNA, and divide to make new cells. The cell cycle starts when a cell is formed and ends when the cell divides to make new cells.

Different types of cells divide in different ways. Before any cell divides, it makes a copy of its DNA. Remember, DNA is a molecule that determines what cells will do. A cell copies its DNA so that each new cell will have the code that is needed to make new proteins and survive. Cells make new cells in two different ways, depending on what type of cells they are.

### BINARY FISSION

Simple organisms have a simple method for making new cells. **Prokaryotes** are cells that do not have a nucleus. Bacteria cells are prokaryotes. Prokaryotes reproduce through **binary fission**. After a prokaryote copies its DNA, it splits into two parts and becomes two cells. Each cell has a copy of the DNA. After the cell splits, each new cell is exactly the same as the cell that it came from.



*Prokaryotes, like bacteria cells, reproduce through binary fission.*

## EUKARYOTIC CELL DIVISION

**Eukaryotes** are cells that have a nucleus. Animal cells are eukaryotes. Before this type of cell divides, it copies its DNA. It does this by copying its **chromosomes**. Chromosomes are tiny packets of DNA inside a eukaryote's nucleus. Once the chromosomes are copied, the cell goes through the second phase of its cell cycle, called **mitosis**. Mitosis is the separation of chromosomes. After the cell goes through mitosis, the cell divides and makes two new cells.

## STAGES OF MITOSIS

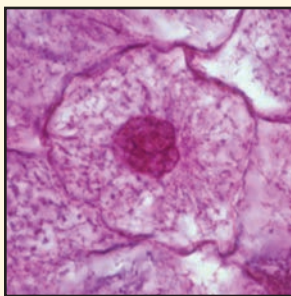
There are four stages of mitosis:

**Prophase** – The chromosomes thicken and shrink into rodlike structures. The nuclear membrane dissolves.

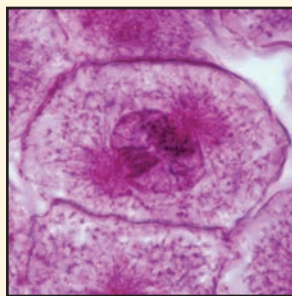
**Metaphase** – The chromosomes line up along the midline of the cell.

**Anaphase** – The chromosomes separate and move to opposite sides of the cell.

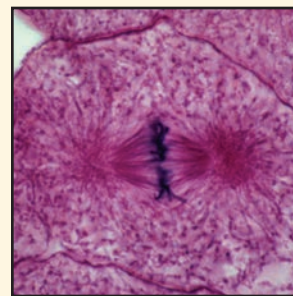
**Telophase** – The chromosomes start to grow back to their original size. The nuclear membrane reforms. The cytoplasm of the mother cell divides and forms two daughter cells. Each daughter cell has the same number and type of chromosomes as the mother cell.



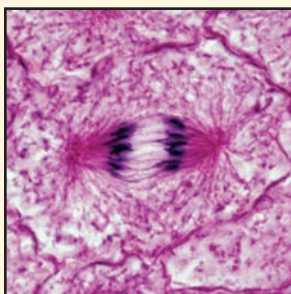
*Copying DNA*



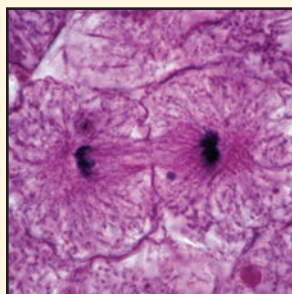
*Prophase*



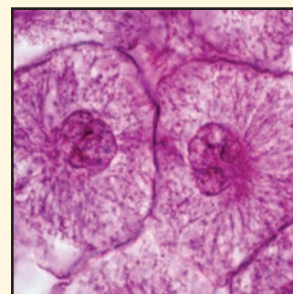
*Metaphase*



*Anaphase*



*Telophase*



*Cell division*



**VOCABULARY**

**taxonomy** – *the classification of organisms*

The classification of organisms is called **taxonomy**. Since ancient times, scientists have studied organisms and put them into groups based on their similarities. For example, the ancient Greek philosopher Aristotle classified all living things as either plants or animals.

Hundreds of years later, Carolus Linnaeus came up with the modern way of classifying and naming living things. Organisms were classified into groups based on shared characteristics, from the most general to the most specific. Scientists have built upon Linnaeus's model. Over the years, additional classifications have been created as scientists have discovered organisms that have never been described before.

These are the seven current divisions for organisms, from the most general to the most specific:

**Kingdom**

**Phylum**

**Class**

**Order**

**Family**

**Genus**

**Species**

Kingdom is the most general division. Each kingdom is further divided into more specific divisions. The most specific division is the species. So, each species belongs to a genus, each genus belongs to a family, each family belongs to an order, each order belongs to a class, and each class belongs to a phylum. Finally, each phylum belongs to one of the six kingdoms.

For example, look at the diagram below. It shows the classification of a lion, from the most general to the most specific divisions.

<b>Kingdom</b>	<b><i>Animalia</i></b> (includes all animals)
<b>Phylum</b>	<b><i>Chordata</i></b> (includes all vertebrate animals)
<b>Class</b>	<b><i>Mammalia</i></b> (includes all mammals)
<b>Order</b>	<b><i>Carnivora</i></b> (includes meat-eating mammals, like bears and seals)
<b>Family</b>	<b><i>Felidae</i></b> (includes all cats)
<b>Genus</b>	<b><i>Panthera</i></b> (includes large cats, like lions, tigers, jaguars, and leopards)
<b>Species</b>	<b><i>leo</i></b> (lions)



*Lions are members of the cat family.*



## VOCABULARY

**species** – a group made up of all the organisms of the same type that can reproduce young of the same kind

**KINGDOM**

The six-kingdom system is the most popular method of classification. The six kingdoms are Animalia, Plantae, Protista, Fungi, Archaeobacteria, and Eubacteria. You are a member of the kingdom Animalia, which includes all animals, like cats, fish, and insects. You are probably also familiar with the kingdom Plantae, which includes all plants, like grasses, trees, ferns, and mosses.

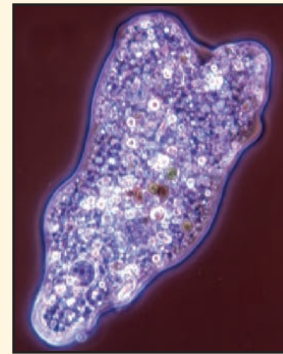
However, you might not be as familiar with the other four kingdoms. The kingdom Protista is made up of tiny organisms that can only be seen through a microscope. They include single-celled organisms and a few that have many cells. Algae are part of the kingdom Protista. The kingdom Fungi is made up of mushrooms, molds, and other organisms that are similar to plants but that do not make their own food. The kingdoms Archaeobacteria and Eubacteria are made up of bacteria, like the bacteria that cause strep throat. They have their own kingdoms because even though bacteria are single-celled organisms, they are different from protists.



The kingdom Animalia



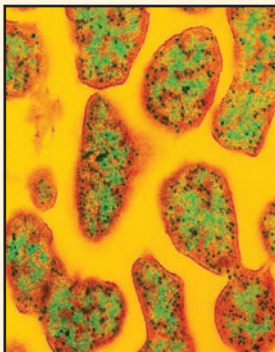
The kingdom Plantae



The kingdom Protista



The kingdom Fungi



The kingdom Archaeobacteria



The kingdom Eubacteria

## PHYLUM

Each organism is also part of a phylum. The plural of the word “phylum” is “phyla.” The word “phylum” is used to describe animals and plants. Organisms are classified into phyla by the way their internal parts are organized. There are about 35 phyla.

## CLASS, ORDER, AND FAMILY

Organisms are further divided into smaller and more specific subgroups. These groups include class, order, and family.

## GENUS AND SPECIES

Genus is the second-most specific grouping in the scientific classification of organisms. The plural of the word “genus” is “genera.” A genus has at least one **species**. Species are the most specific classification groups. A species is made up of all the organisms of the same type that can reproduce young of the same kind.

Each species is identified by a scientific name of two words. The first name is the genus to which the organism belongs. The second name is the species of the organism. For example, the scientific name that identifies humans is *Homo sapiens*. The first word names the genus, and the second word names the species.



*This is a group of Homo sapiens.*