

## SECTION

## 1

# Characteristics of Living Things

While outside one day, you notice something strange in the grass. It's slimy, bright yellow, and about the size of a dime. You have no idea what it is. Is it a plant part that fell from a tree? Is it alive? How can you tell?

An amazing variety of living things exists on Earth. But living things are all alike in several ways. What does a dog have in common with a bacterium? What does a fish have in common with a mushroom? And what do *you* have in common with a slimy, yellow blob, known as a *slime mold*? Read on to find out about the six characteristics that all organisms share.

## What You Will Learn

- Describe the six characteristics of living things.
- Describe how organisms maintain stable internal conditions.
- Explain how asexual reproduction differs from sexual reproduction.

## Vocabulary

cell	asexual
stimulus	reproduction
homeostasis	heredity
sexual	metabolism
reproduction	

## READING STRATEGY

**Prediction Guide** Before reading this section, write the title of each heading in this section. Next, under each heading, write what you think you will learn.

**cell** the smallest unit that can perform all life processes; cells are covered by a membrane and have DNA and cytoplasm

## Living Things Have Cells

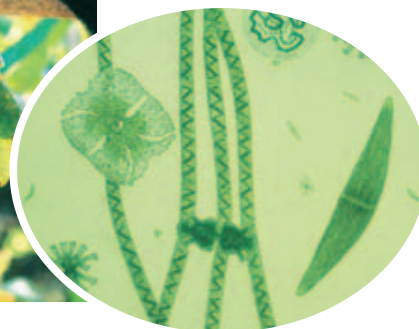
All living things, such as those in **Figure 1**, are composed of one or more cells. A **cell** is a membrane-covered structure that contains all of the materials necessary for life. The membrane that surrounds a cell separates the contents of the cell from the cell's environment. Most cells are too small to be seen with the naked eye.

Some organisms are made up of trillions of cells. In an organism with many cells, different kinds of cells perform specialized functions. For example, your nerve cells transport signals, and your muscle cells are specialized for movement.

In an organism made up of only one cell, different parts of the cell perform different functions. For example, a one-celled paramecium needs to eat. So, some parts of the cell take in food. Other parts of the cell break down the food. Still other parts of the cell excrete wastes.



**Figure 1** Some organisms, such as the protists on the right, are made of one cell or a few cells. The monkeys on the left are made up of trillions of cells.





**Figure 2** The touch of an insect triggers the Venus' flytrap to close its leaves quickly.

## Living Things Sense and Respond to Change

All organisms have the ability to sense change in their environment and to respond to that change. When your pupils are exposed to light, they respond by becoming smaller. A change that affects the activity of the organism is called a **stimulus** (plural, *stimuli*).

Stimuli can be chemicals, gravity, light, sounds, hunger, or anything that causes organisms to respond in some way. A gentle touch causes a response in the plant shown in **Figure 2**.

### Homeostasis

Even though an organism's outside environment may change, conditions inside an organism's body must stay the same. Many chemical reactions keep an organism alive. These reactions can take place only when conditions are exactly right, so an organism must maintain stable internal conditions to survive. The maintenance of a stable internal environment is called **homeostasis** (HOH mee OH STAY sis).

### Responding to External Changes

Your body maintains a temperature of about 37°C. When you get hot, your body responds by sweating. When you get cold, your muscles twitch in an attempt to warm you up. This twitching is called *shivering*. Whether you are sweating or shivering, your body is trying to return itself to normal.

Other animals also need to have stable internal conditions. But many cannot respond the way you do. They have to control their body temperature by moving from one environment to another. If they get too warm, they move to the shade. If they get too cool, they move out into the sunlight.

**✓ Reading Check** How do some animals maintain homeostasis?  
(See the Appendix for answers to Reading Checks.)

**stimulus** anything that causes a reaction or change in an organism or any part of an organism

**homeostasis** the maintenance of a constant internal state in a changing environment

### CONNECTION TO Physics

#### Temperature Regulation

Your body temperature does not change very much throughout the day. When you exercise, you sweat. Sweating helps keep your body temperature stable. As your sweat evaporates, your skin cools. Given this information, why do you think you feel cooler faster when you stand in front of a fan?

**Figure 3** Like most animals, bears produce offspring by sexual reproduction.



**Figure 4** The hydra can reproduce asexually by forming buds that break off and grow into new individuals.

**sexual reproduction** reproduction in which the sex cells from two parents unite, producing offspring that share traits from both parents

**asexual reproduction** reproduction that does not involve the union of sex cells and in which one parent produces offspring identical to itself

**heredity** the passing of genetic traits from parent to offspring

**metabolism** the sum of all chemical processes that occur in an organism

## Living Things Reproduce

Organisms make other organisms similar to themselves. They do so in one of two ways: by sexual reproduction or by asexual reproduction. In **sexual reproduction**, two parents produce offspring that will share characteristics of both parents. Most animals and plants reproduce in this way. The bear cubs in **Figure 3** were produced sexually by their parents.


In **asexual reproduction**, a single parent produces offspring that are identical to the parent. **Figure 4** shows an organism that reproduces asexually. Most single-celled organisms reproduce in this way.

## Living Things Have DNA

The cells of all living things contain the molecule **deoxyribonucleic** (dee AHKS uh RIE boh noo KLEE ik) acid, or DNA. DNA controls the structure and function of cells. When organisms reproduce, they pass copies of their DNA to their offspring. Passing DNA ensures that offspring resemble parents. The passing of traits from one generation to the next is called **heredity**.

## Living Things Use Energy

Organisms use energy to carry out the activities of life. These activities include such things as making food, breaking down food, moving materials into and out of cells, and building cells. An organism's **metabolism** (muh TAB uh LIZ uhm) is the total of all of the chemical activities that the organism performs.

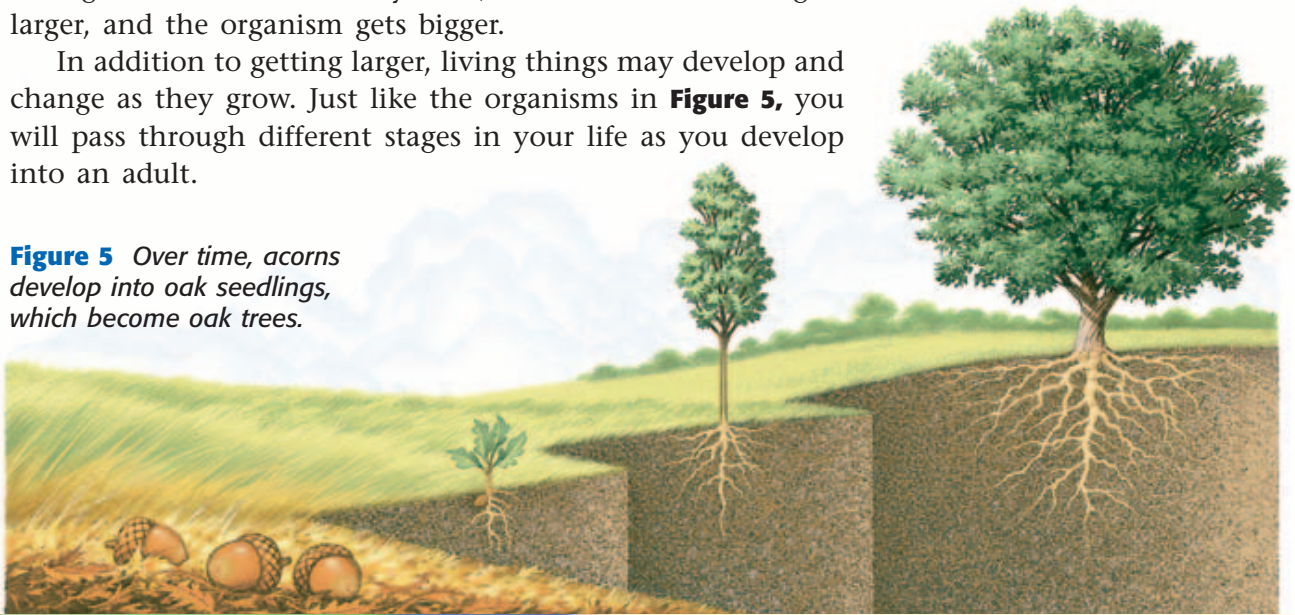
 **Reading Check** Name four chemical activities in living things that require energy.

## Living Things Grow and Develop

All living things, whether they are made of one cell or many cells, grow during periods of their lives. In a single-celled organism, the cell gets larger and divides, making other organisms. In organisms made of many cells, the number of cells gets larger, and the organism gets bigger.

In addition to getting larger, living things may develop and change as they grow. Just like the organisms in **Figure 5**, you will pass through different stages in your life as you develop into an adult.

**Figure 5** Over time, acorns develop into oak seedlings, which become oak trees.



## SECTION Review

### Summary

- All living things share six characteristics that are also used to classify organisms.
- Organisms are made of one or more cells.
- Organisms detect and respond to stimuli.
- Organisms reproduce.
- Organisms have DNA.
- Organisms use energy for their metabolism.
- Organisms grow and develop.
- Homeostasis is the maintenance of a stable internal environment.

### Using Key Terms

Complete each of the following sentences by choosing the correct term from the word bank.

cells                      stimulus  
homeostasis            metabolism

1. Sunlight can be a \_\_\_\_.
2. Living things are made of \_\_\_\_.

### Understanding Key Ideas

3. Homeostasis means maintaining
  - a. stable internal conditions.
  - b. varied internal conditions.
  - c. similar offspring.
  - d. varied offspring.
4. Explain the difference between asexual and sexual reproduction.
5. Describe the six characteristics of living things.

### Math Skills

6. Bacteria double every generation. One bacterium is in the first generation. How many are in the sixth generation?

### Critical Thinking

7. **Applying Concepts** How do you respond to some stimuli in your environment?
8. **Identifying Relationships** What does the fur coat of a bear have to do with homeostasis?

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