Section Page Page < Page 1 of 6 ≪<

Section

 $\gg$ 

## **KEY CONCEPT** Single-celled organisms have all the characteristics of living things.

## **BEFORE**, you learned

 All living things are made of cells

**Full Page View** 

目)

- Organisms respond to their environment
- Species change over time

### NOW, you will learn

- About the various sizes of organisms
- About characteristics that are shared by all living things
- About needs shared by all organisms

## VOCABULARY

microorganism p. 10 kingdom p. 11 binary fission p. 12 virus p. 14

### **EXPLORE** Organisms

## What living things are in the room with you?

#### PROCEDURE

- Make a list of all the living things that are in your classroom.
- Compare your list with the lists of your classmates. Make one list containing all the living things your class has identified.

#### WHAT DO YOU THINK?

- How did you identify something as living?
- Were you and your classmates able to see all the living things on your list?

## MATERIALS

- paper
- pencil

Living things come in many shapes and sizes.

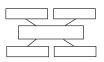
You can spot mushrooms in many places while walking through a forest. Scientists have discovered mushrooms that come from the same individual fungus more than 5 kilometers (3 miles) apart in an Oregon forest. Most of this honey mushroom fungus is below ground, stretching over an area covering more than 1600 football fields. This mushroom is one of the largest known living things on Earth.

Many other living things share the soil in the Oregon forest. Earthworms, insects, and many other organisms that are too small to be seen with a naked eye, also live there. For every living thing that is large enough to be seen, there are often countless numbers of smaller living things that share the same living space.



#### MAIN IDEA WEB

Make a web of the important terms and details about the main idea: Living things come in many shapes and sizes.



READING TIP

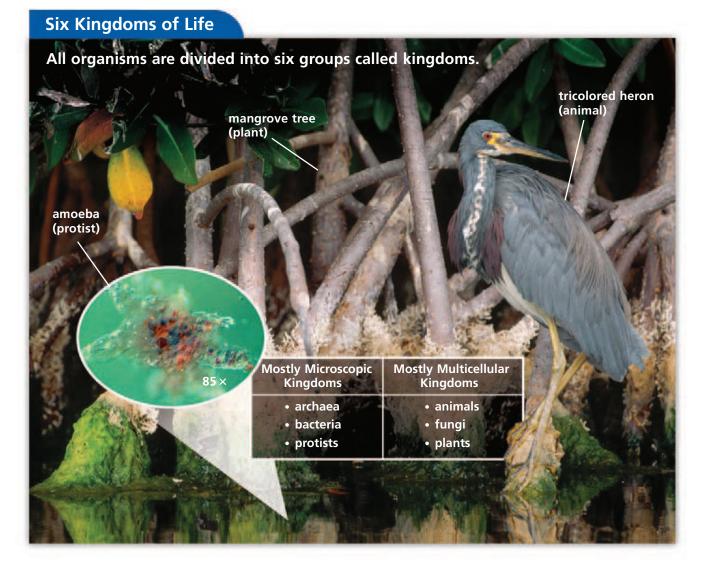
The prefix *micro*- means "very small." Therefore, *microscope* means "very small scope" and *microorganism* means "very small organism." The honey mushroom fungus is one example of an organism. You, too, are an organism, and tiny bacteria living inside your body are also organisms. In fact, any living thing can be called an organism.

When you identify living things, you probably begin with those you can observe—plants, animals, and fungi such as mushrooms. However, most living things are too small to observe without a microscope. Even the tiniest organisms are made of cells. Very small organisms are called **microorganisms**. Some microorganisms are made of just one cell.

#### CHECK YOUR READING Compare a

## Compare and contrast the words *microorganism* and organism.

A visitor to a mangrove swamp forest can find an amazing variety of organisms. The mangrove trees themselves are the most obvious organisms. Roots from these trees grow above and below the muddy bottom of the forest. Other organisms live in almost every part of the mangrove tree.



A single drop of water from a mangrove swamp may be living space for many microorganisms. The circled photograph on page 10 was taken using a microscope, and shows an amoeba that may be found in the water of the swamp. Larger organisms, such as manatees and fish, swim around the roots of mangrove trees. Birds, such as tricolored herons and roseate spoonbills, live on branches.

**Full Page View** 

目)

Scientists divide the organisms they identify into groups called **kingdoms.** This unit will cover all of the kingdoms of life, listed in the table on page 10. You are already familiar with plants and animals. Fungi are another kingdom. Fungi include mushrooms found in a forest. The other three kingdoms are composed of mostly microscopic life. You will learn more about microscopic organisms later in this chapter.

## Living things share common characteristics.

All living things—from the microorganisms living in a mangrove swamp to the giant organisms living in the open ocean—share similar characteristics. Living things are organized, grow, reproduce, and respond to the environment.

#### Organization

Cells, like all living things, have an inside and an outside. The boundary separating the inside from the outside of an individual cell is called the cell membrane. Within some cells, another structure called the nucleus is also surrounded by a membrane. Cells perform one or more functions that the organism needs to survive

In this chapter, you will read about organisms made of a single cell. Some types of single-celled organisms contain a nucleus and some do not. All single-celled organisms contain every structure they need to survive within their one cell. They have structures to get energy from complex molecules, structures to help them move, and structures to help them sense their environment. All of the structures are part of their organizations.

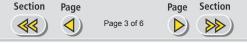
#### Growth

Living things increase in size. Organisms made of one cell do not grow as large as organisms made of many cells. But all living things consume food or other materials to get energy. These materials are also used to build new structures inside cells or replace worn-out structures. As a result, individual cells grow larger over time. VOCABULARY Add a description wheel for *kingdom* to your notebook. The spokes of your wheel should include examples from the six kingdoms.

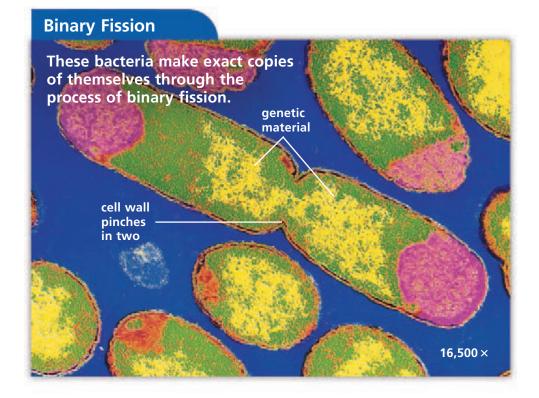


#### READING TIP

As you read about the four characteristics of all living things, note the examples of how single-celled organisms meet these four standards.



Section Page Page Section



**Full Page View** 

(目)

 $(\mathbf{Q})$ 

## Reproduction

Living things reproduce, forming other organisms like themselves. Every organism contains genetic material, which is a code contained in a special molecule called DNA. The code contains every characteristic of the individual organism. In order to reproduce, an organism must make a copy of this material, which is passed on to its offspring.

Single-celled organisms reproduce by a process called **binary fission**. In binary fission, material from one cell is broken apart into two cells. The genetic material of the original cell doubles so that each daughter cell has an exact copy of the DNA of the original cell. You might say that single-celled organisms multiply by dividing. One cell divides into 2 cells, 2 cells divide into 4, 4 into 8, 16, 32, 64, and so on. In some cells, binary fission can repeat in as little as 20 minutes.



**CYOUR** Describe how a single-celled organism is organized, grows, and reproduces.

## Response

Organisms respond to changes in the environment. Even microscopic organisms respond to conditions such as light, temperature, and touch. The ability to respond allows organisms to find food, avoid being eaten, or perform other tasks necessary to survive.



Observe the process of binary fission.

C

## **INVESTIGATE** Microorganisms

# How do these organisms respond to their environment?

#### PROCEDURE

Place a drop of the hydra culture on a microscope slide. Using the microscope, find a hydra under medium power and sketch what you see.

**Full Page View** 

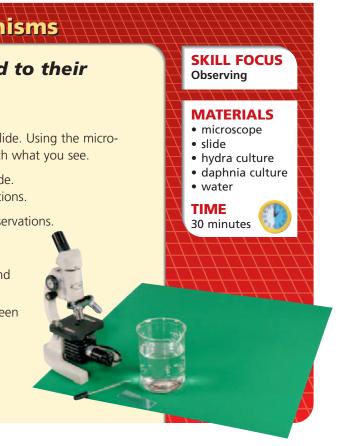
(目)

- Add a drop of warm water to the culture on the slide. How does the hydra respond? Record your observations.
- 3 Add a drop of the daphnia culture. Record your observations.

#### WHAT DO YOU THINK?

- Which observations, if any, indicate that hydras respond to their environment?
- Daphnia are organisms. What is the relationship between hydra and daphnia?

**CHALLENGE** What other experiments could you do to observe the responses of hydra or daphnia to their environment?



# Living things need energy, materials, and living space.

Have you ever wondered why you need to eat food, breathe air, and drink water? All living things need energy and materials. For most organisms, water and air are the materials necessary for life.

Food supplies you with energy. You—like all living things—need energy to move, grow, and develop. All animals have systems for breaking down food into usable forms of energy and materials. Plants have structures that enable them to transform sunlight into usable energy. Some microorganisms transform sunlight, while others need to use other organisms as sources of energy.

Most of the activities of living things take place in water. Water is also an ingredient for many of the reactions that take place in cells. In addition, water helps support an organism's body. If you add water to the soil around a wilted plant, you will probably see the plant straighten up as water moves into its cells.

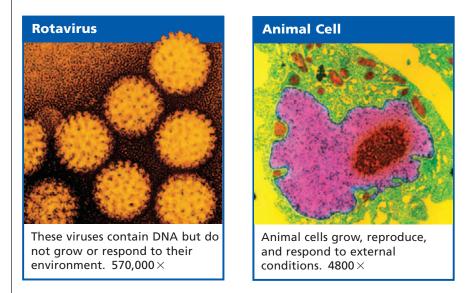
Materials in the air include gases such as carbon dioxide and oxygen. Many of the processes that capture and release energy involve these gases. Some organisms—such as those found around hydrothermal vents—use other chemicals to capture and release energy. Table of Contents

## Viruses are not alive.

**Full Page View** 

目)

Sometimes it's not easy to tell the difference between a living and a nonliving thing. A **virus** is a small collection of genetic material enclosed in a protein shell. Viruses have many of the characteristics of living things, including DNA. However, a virus is not nearly as complex as an animal cell and is not considered a living thing.



Animal cells have structures that allow them to get materials or energy from their environment. Viruses do not grow once they have formed, and they do not take in any energy. Animal cells can make copies of their genetic material and reproduce by dividing in two. Viruses are able to reproduce only by "taking over" another cell and using that cell to make new viruses. Animal cells also have many more internal structures than viruses. Viruses usually contain nothing more than their DNA.

# Review

## **KEY CONCEPTS**

- **1.** Give examples of organisms that are very large and organisms that are very small.
- **2.** Name four characteristics that all living things share.
- **3.** Name three things that living things must obtain to survive.

## **CRITICAL THINKING**

- **4. Synthesize** Give examples of how a common animal, such as a dog, is organized, grows, responds, and reproduces.
- 5. Predict In a certain lake, would you expect there to be more organisms that are large enough to see or more organisms that are too small for you to see? Why?

## **CHALLENGE**

6. Design Try to imagine the different structures that a single-celled organism needs to survive in pond water. Then use your ideas to design your own single-celled organism.