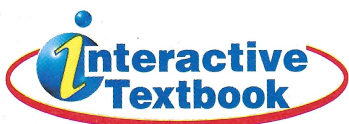


# Sponges, Cnidarians, and Worms

## Chapter Preview

- 1 What Is an Animal?**  
 Discover *Is It an Animal?*  
 Try This *Get Moving*
- 2 Animal Symmetry**  
 Discover *How Many Ways Can You Fold It?*  
 At-Home Activity *Front-End Advantages*
- 3 Sponges and Cnidarians**  
 Discover *How Do Natural and Synthetic Sponges Compare?*  
 Active Art *Structure of a Sponge*  
 Math Skills *Calculating a Rate*  
 Consumer Lab *Soak It Up!*  
 Try This *Hydra Doing?*  
 Science and Society *Coral Reefs in Danger*
- 4 Worms**  
 Discover *What Does a Flatworm Look Like?*  
 Analyzing Data *Roundworm Numbers*  
 Skills Lab *Earthworm Responses*



A purple flatworm glides along the ocean bottom. ▶



# What Is an Animal?

## Reading Preview

### Key Concepts

- How are animal bodies typically organized?
- What are four major functions of animals?
- How are animals classified?

### Key Terms

- cell • tissue • organ
- adaptation
- sexual reproduction
- fertilization
- asexual reproduction
- phylum • vertebrate
- invertebrate

## Target Reading Skill

**Asking Questions** Before you read, preview the red headings. In a graphic organizer like the one below, ask a *what* or *how* question for each heading. As you read, write the answers to your questions.


### Structure of Animals

Question	Answer
What is a cell?	A cell is . . .

Lab  
zone

## Discover Activity

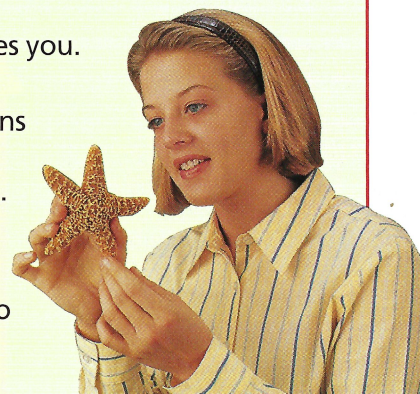
### Is It an Animal?

1.  Carefully examine each of the organisms that your teacher gives you.
2. Decide which ones are animals. For each organism, write down the reasons for your decision. Wash your hands after handling each of the organisms.

### Think It Over

#### Forming Operational Definitions

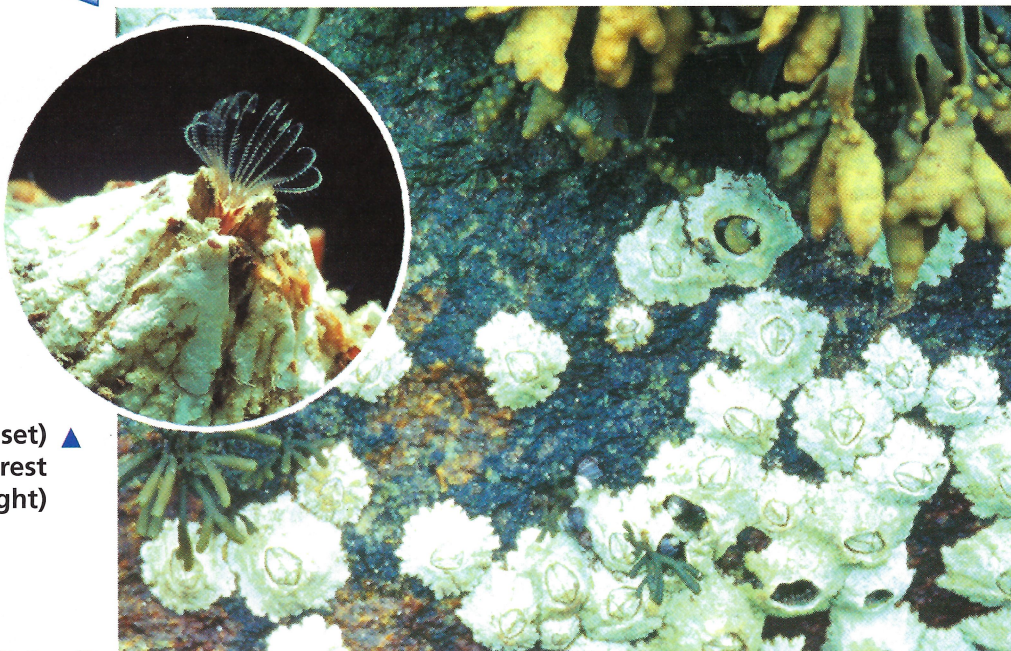
Use your notes about each organism to write a definition of "animal."



Your parents may have told you not to eat with your fingers, but they probably never worried that you'd eat with your feet! But animals called barnacles do just that.

A barnacle begins life as a many-legged speck that floats in the ocean. After a while, it settles its head down on a hard surface and fixes itself in place. Then it builds a hard cone around its body. To feed, the barnacle flicks its feathery feet in and out of the cone, as shown below. The feet trap tiny organisms, or living things, that float in the water.

A barnacle may look like a rock, but it is actually an animal. Animals are many-celled organisms that feed on other organisms.



A barnacle feeding (inset) ▲ and many barnacles at rest (right)

# Structure of Animals

Animals are composed of many cells. A **cell** is the basic unit of structure and function in living things. **The cells of most animals are organized into higher levels of structure, including tissues, organs, and systems.** A group of similar cells that perform a specific function is called a **tissue**. One type of tissue is nerve tissue, which carries messages in the form of electrical signals from one part of the body to another. Another type of tissue is bone tissue, a hard tissue that gives bones strength.

Tissues may combine to form an **organ**, which is a group of several different tissues. For example, a frog's thigh bone is composed of bone tissue, nerve tissue, and blood. An organ performs a more complex function than each tissue could perform alone.

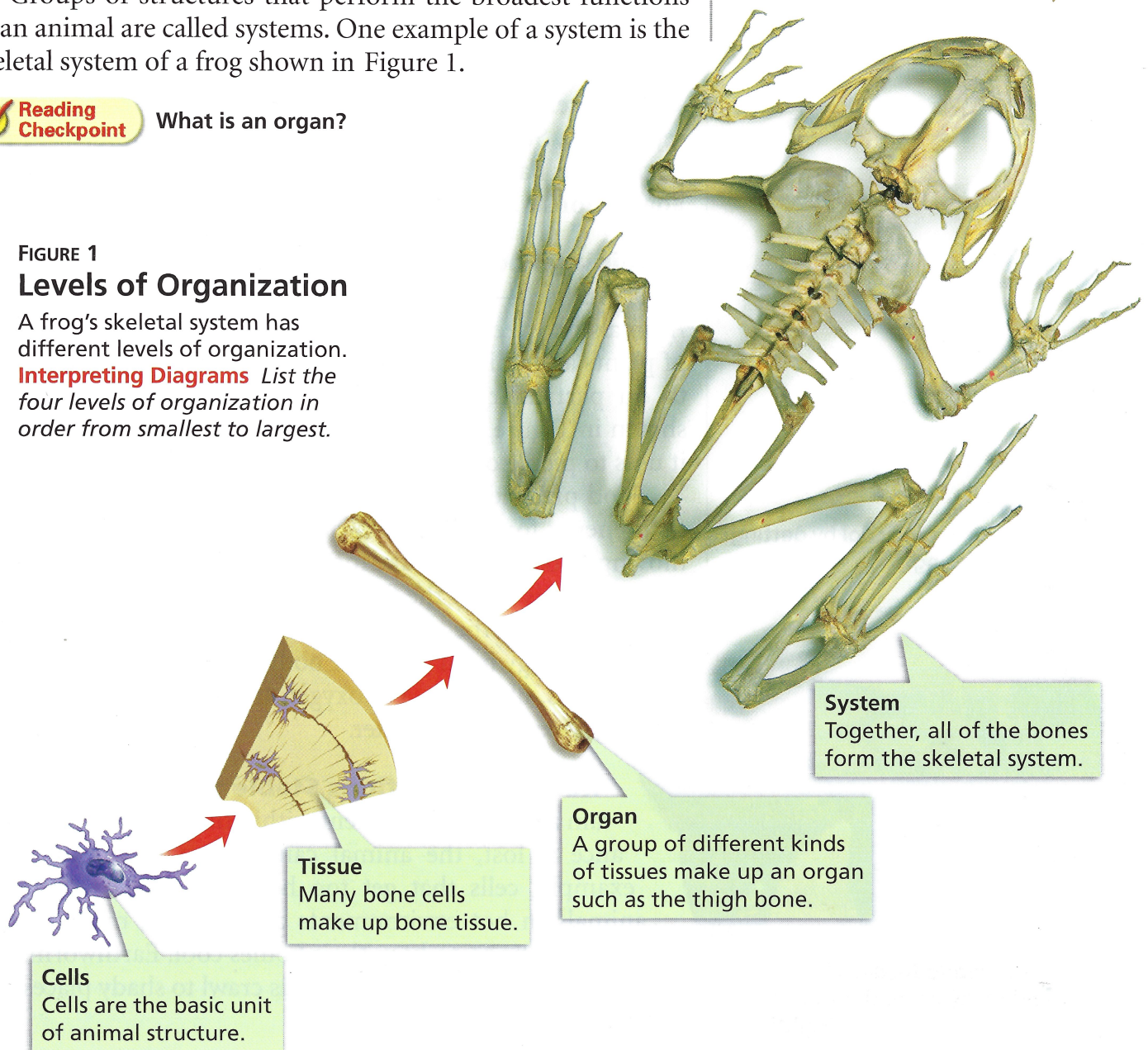
Groups of structures that perform the broadest functions of an animal are called systems. One example of a system is the skeletal system of a frog shown in Figure 1.



**Reading Checkpoint** What is an organ?

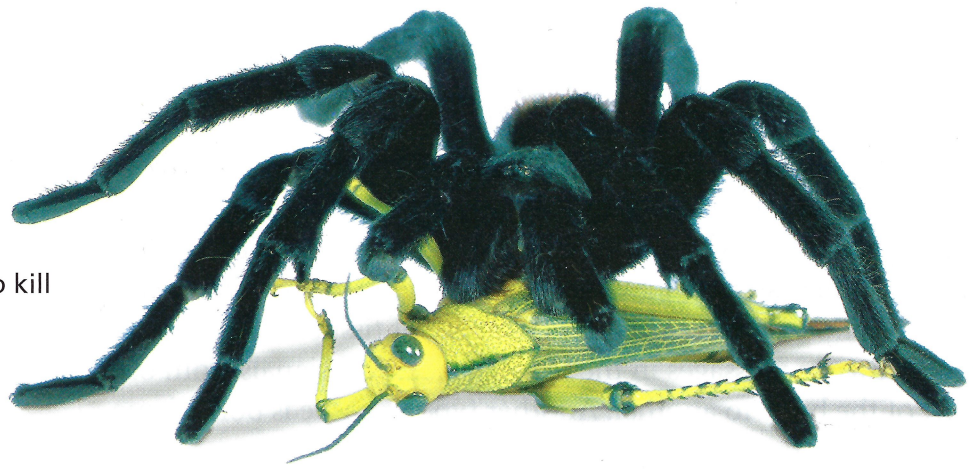
**FIGURE 1**  
**Levels of Organization**

A frog's skeletal system has different levels of organization. **Interpreting Diagrams** List the four levels of organization in order from smallest to largest.



**FIGURE 2**  
**Obtaining Food**

This tarantula uses its fangs to kill a grasshopper.



## Functions of Animals

From tiny worms to giant whales, animals are diverse. Animals vary not only in size but also in body structure, outward appearance, and the environments in which they live. Despite their diversity, however, all animals carry out the same basic functions. **The major functions of animals are to obtain food and oxygen, keep internal conditions stable, move, and reproduce.** Structures or behaviors that allow animals to perform these basic functions in their environments are called **adaptations**.

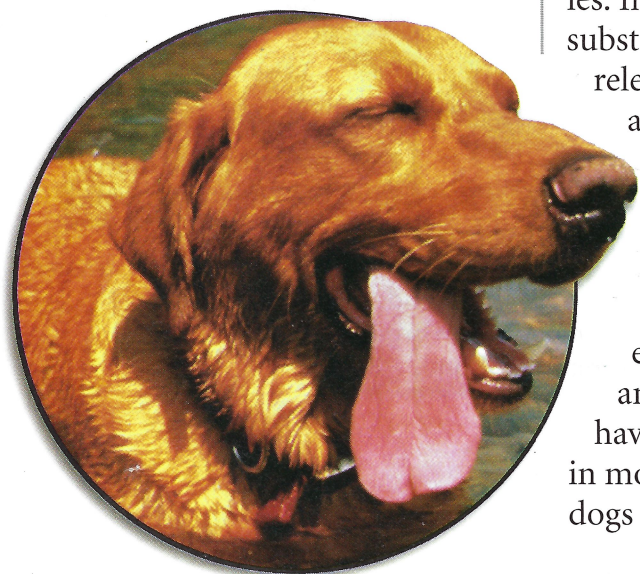
**Obtaining Food and Oxygen** An animal cannot make food for itself—it obtains food by eating other organisms. Animals may feed on plants, other animals, or a combination of plants and animals. They have adaptations that allow them to eat particular kinds of food. For example, the tarantula shown in Figure 2 has an adaptation called fangs—structures it uses to pierce other animals and suck up their juices.

Food provides animals with raw materials for growth and with energy for their bodies' activities, such as breathing and moving. Most animals take food into a cavity inside their bodies. Inside this cavity the food is digested, or broken down into substances that the animal's body can absorb and use. To release energy from food, the body's cells need oxygen. Some animals, like birds, get oxygen from air. Others, like fish, get oxygen from water.

**Keeping Conditions Stable** Animals must maintain a stable environment within their bodies. If this balance is lost, the animal cannot survive for long. For example, cells that get too hot start to die. Therefore, animals in hot environments are adapted, meaning they have adaptations, to keep their bodies cool. Earthworms stay in moist soil during hot days, lizards crawl to shady places, and dogs pant.

**FIGURE 3**  
**Keeping Cool**

This dog is keeping cool by getting wet and panting.



**Movement** All animals move in some way at some point in their lives. Most animals move freely from place to place throughout their lives; for example, by swimming, walking, or hopping. Other animals, such as oysters and barnacles, move from place to place only during the earliest stage of their lives. After they find a good place to attach, these animals stay in one place.

Animal movement is usually related to meeting the basic needs of survival and reproduction. Barnacles wave feathery structures through the water and trap tiny food particles. Some geese fly thousands of miles each spring to the place where they lay eggs. And you've probably seen a cat claw its way up a tree trunk to escape from a barking dog.

**Reproduction** Because no individual animal lives forever, animals must reproduce. Most animals reproduce sexually. **Sexual reproduction** is the process by which a new organism develops from the joining of two sex cells—a male sperm cell and a female egg cell. The joining of an egg cell and a sperm cell is called **fertilization**. Sperm and egg cells carry information about the characteristics of the parents that produced them, such as size and color. New individuals resulting from sexual reproduction have a combination of characteristics from both parents.

Some animals can reproduce asexually as well as sexually. **Asexual reproduction** is the process by which a single organism produces a new organism identical to itself. For example, animals called sea anemones sometimes split down the middle, producing two identical organisms.



What is asexual reproduction?



## Lab zone Try This Activity

### Get Moving

Design an animal with a new and different way of moving. Your design should help your animal obtain food or get out of danger.

1. Make and label a drawing that shows how the animal would move.
2. Using clay, aluminum cans, construction paper, pipe cleaners, and whatever other materials are available, create a three-dimensional model of your animal.
3. Compare your animal to those of other classmates. What are some similarities? What are some differences?

**Making Models** What features of your design help your animal obtain food or escape danger?

FIGURE 4

#### Owl Family

Baby owls are produced by sexual reproduction. **Classifying** Which kind of reproduction involves fertilization?

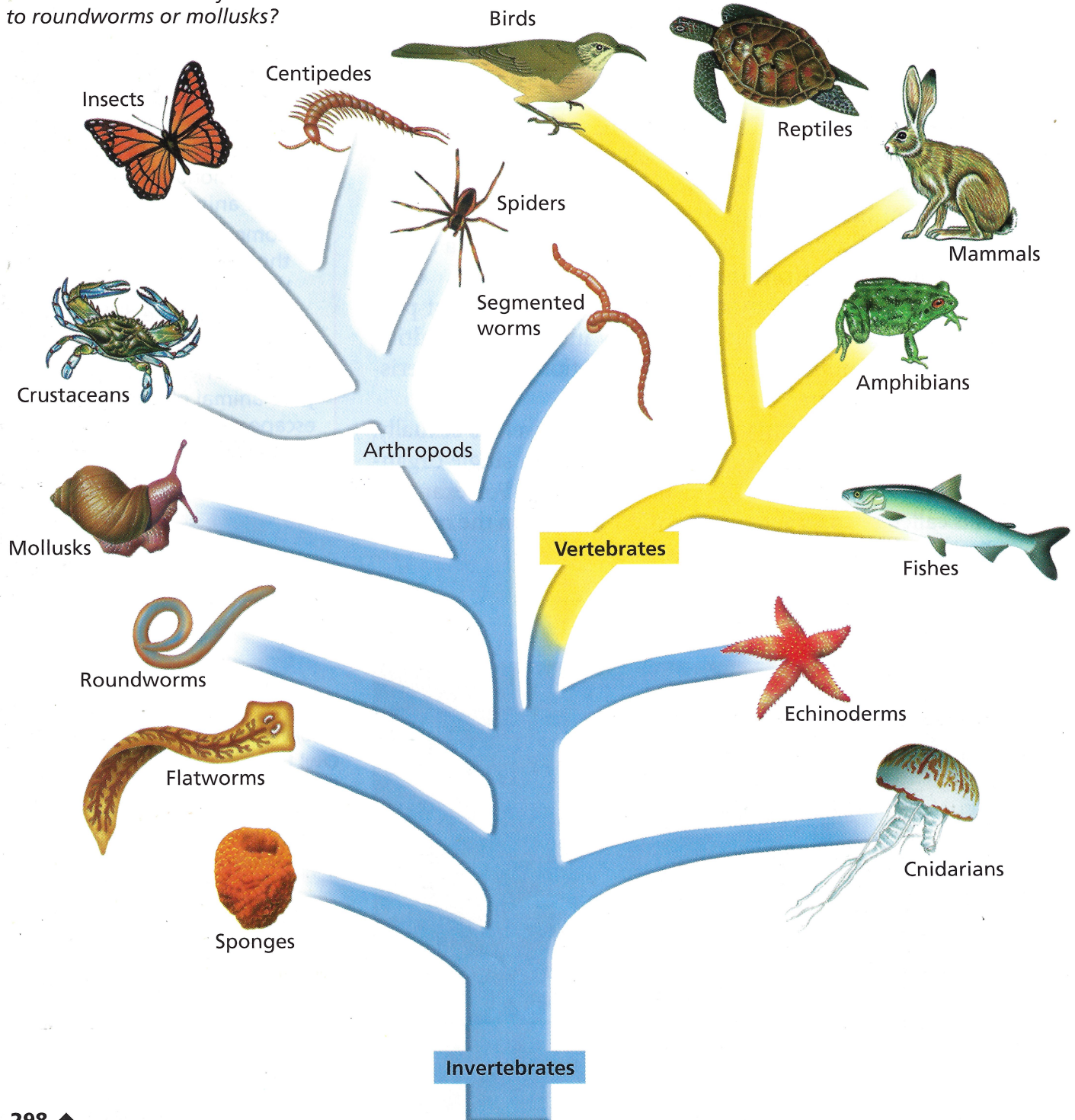
# Classification of Animals

Biologists have already identified more than 1.5 million species, or distinct types, of animals. Each year they discover more. Classifying, or sorting animals into categories, helps biologists make sense of this diversity. Biologists have classified animals into about 35 major groups, each of which is called a **phylum** (FY lum) (plural *phyla*). In Figure 5 you can see some animals from the largest phyla. Notice that the phyla are arranged like branches on a tree.

**FIGURE 5**  
**Major Animal Groups**

This branching tree shows one hypothesis of how the major animal groups are related.

**Interpreting Diagrams** Are flatworms more closely related to roundworms or mollusks?



The branching pattern of the tree in Figure 5 shows how many biologists think the major groups of animals are related. For example, you can see that segmented worms are more closely related to arthropods than to sponges from their positions on the tree.

A branching tree can also show how biologists think animal life has evolved, or changed over time. This process has resulted in all the different phyla that exist today. Biologists do not know the exact way in which evolution took place. Instead, they can only make inferences on the basis of the best evidence available. Biologists hypothesize that all animals arose from single-celled ancestors.

**Animals are classified according to how they are related to other animals. These relationships are determined by an animal's body structure, the way the animal develops, and its DNA.** DNA is a chemical in cells that controls an organism's inherited characteristics. All **vertebrates**, or animals with a backbone, are classified in only one phylum. All the other animal phyla contain **invertebrates**, or animals without backbones. Of all the types of animals, about 97 percent are invertebrates!



What is a phylum?

FIGURE 6

**Discovering New Species**

This biologist is surveying the leaves of rain forest plants, looking for new insect species.



## Section 1 Assessment

### Target Reading Skill Asking Questions

Use the answers to the questions you wrote about the headings to help you answer the questions below.

#### Reviewing Key Concepts

- a. **Defining** What is the basic unit of structure and function in an animal?

b. **Sequencing** Arrange in order from simplest to most complex structure: tissue, system, cell, organ.
- a. **Reviewing** What are four major functions of animals?

b. **Summarizing** How do animals obtain food?

c. **Drawing Conclusions** Why is movement important for animals?

- a. **Defining** What is a vertebrate?

b. **Classifying** How do biologists classify animals?

c. **Interpreting Diagrams** According to the branching tree shown in Figure 5, are reptiles more closely related to mammals or to fishes? Explain your answer.

### Writing in Science

**Functional Description** Write a few paragraphs about how your classroom pet or a pet at home performs the basic functions of an animal.