

# Arthropods

## Reading Preview

### Key Concepts

- What are the four major groups of arthropods and what are their characteristics?
- How do crustaceans, arachnids, and centipedes and millipedes differ?

### Key Terms

- arthropod • exoskeleton
- molting • antenna
- crustacean • metamorphosis
- arachnid • abdomen

## Target Reading Skill

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

Characteristics of Arthropods

Question	Answer
What is an arthropod?	

FIGURE 7

### A Spider at Work

This spider wraps its prey, a grasshopper, in silk. Both animals are arthropods.

Lab  
zone

## Discover Activity

### Will It Bend and Move?

1. Have a partner roll a piece of cardboard around your arm to form a tube that covers your elbow. Your partner should put three pieces of tape around the tube to hold it closed—one at each end and one in the middle.
2. With the tube in place, try to write your name on a piece of paper. Then try to scratch your head.
3. Keep the tube on your arm for 10 minutes. Observe how the tube affects your ability to do things.

### Think It Over

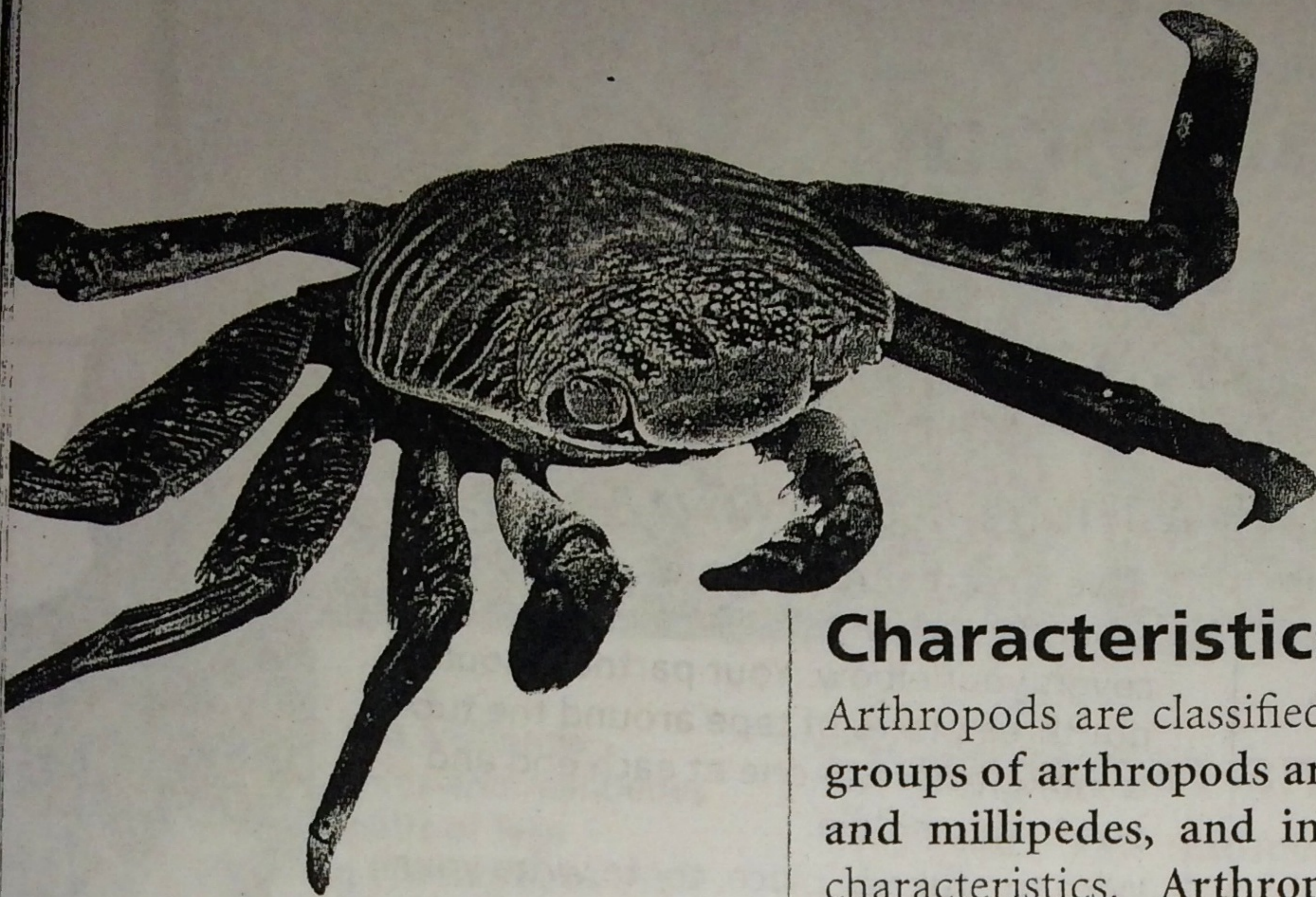
**Inferring** Insects and many other animals have rigid skeletons on the outside of their bodies. Why do their skeletons need joints?



At dusk near the edge of a meadow, a grasshopper leaps through the grass. Nearby, a hungry spider waits in its web. The grasshopper leaps into the web. It's caught! As the grasshopper struggles to free itself, the spider rushes toward it. Quickly, the spider wraps the grasshopper in silk. The grasshopper cannot escape. Soon it will become a tasty meal for the spider.

The spider and grasshopper are both **arthropods**, or members of the arthropod phylum (phylum Arthropoda). Animals such as crabs, lobsters, centipedes, and scorpions are also arthropods.





**FIGURE 8**  
**Arthropod Characteristics**  
 This Sally lightfoot crab shows the tough exoskeleton, the segmented body, and the jointed appendages that are characteristic of arthropods.

## Characteristics of Arthropods

Arthropods are classified into four major groups. The major groups of arthropods are crustaceans, arachnids, centipedes and millipedes, and insects. All arthropods share certain characteristics. Arthropods are invertebrates that have an external skeleton, a segmented body, and jointed attachments called appendages. Wings, mouthparts, and legs are all appendages. Jointed appendages are such a distinctive characteristic that arthropods are named for it. *Arthros* means "joint" in Greek, and *podos* means "foot" or "leg."

Arthropods share some characteristics with many other animals, too. They have bilateral symmetry, an open circulatory system, and a digestive system with two openings. In addition, most arthropods reproduce sexually.

**Outer Skeleton** If you were an arthropod, you would have a waterproof covering. This waxy covering is called an **exoskeleton**, or outer skeleton. It protects the animal and helps prevent evaporation of water. Water animals are surrounded by water, but land animals need a way to keep from drying out. Arthropods may have been the first animals to live on land. Their exoskeletons probably enabled them to do this because they keep the arthropods from drying out.

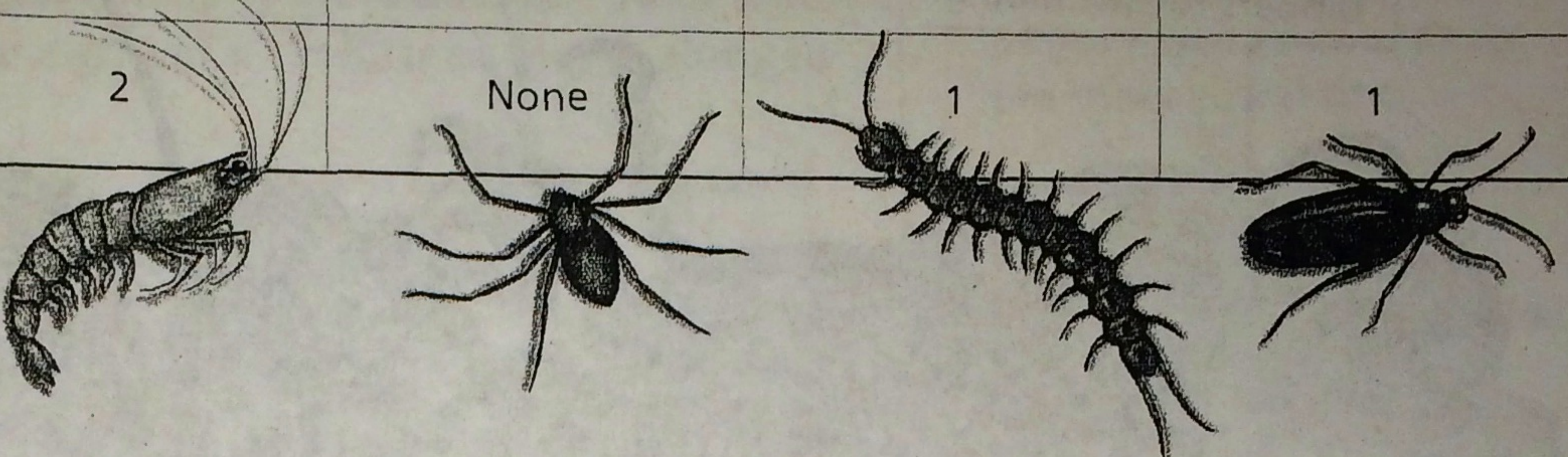
As an arthropod grows larger, its exoskeleton cannot expand. The growing arthropod is trapped within its exoskeleton, like a knight in armor that is too small. Arthropods solve this problem by occasionally shedding their exoskeletons and growing new ones that are larger. The process of shedding an outgrown exoskeleton is called **molting**. After an arthropod has molted, its new skeleton is soft for a time. During that time, the arthropod has less protection from danger than it does after its new skeleton has hardened.



**FIGURE 9**  
**A Molting Cicada**  
 This cicada has just molted. You can see its old exoskeleton hanging on the leaf just below it.  
**Applying Concepts** Why must arthropods molt?

## Comparisons of the Largest Arthropod Groups

Characteristic	Crustaceans	Arachnids	Centipedes and Millipedes	Insects
Number of body sections	2 or 3	2	2	3
Pairs of legs	5 or more	4	Many	3
Pairs of antennae	2	None	1	1



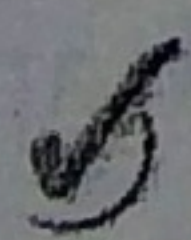
**FIGURE 10**

Members of the largest arthropod groups differ in several characteristics. **Interpreting Tables** Which group of arthropods has no antennae?

**Segmented Body** The bodies of arthropods are segmented. A segmented body plan is easiest to see in centipedes and millipedes, which have bodies made up of many identical-looking segments. In fact, their bodies look something like the bodies of earthworms. You can also see segments on the tails of shrimp and lobsters. In some groups of arthropods, several body segments become joined into distinct sections. An arthropod may have up to three sections—a head, a midsection, and a hind section.

**Jointed Appendages** Just as your fingers are appendages attached to your palms, many arthropods have jointed appendages attached to their bodies. The joints in the appendages give the animal flexibility and enable it to move. If you did the Discover activity, you saw how important joints are for allowing movement. Arthropod appendages tend to be highly specialized tools used for moving, obtaining food, reproducing, and sensing the environment. For example, arthropods use legs to walk and wings to fly. In addition, most arthropods have appendages called antennae (singular *antenna*). An **antenna** is an appendage attached to the head that contains sense organs.

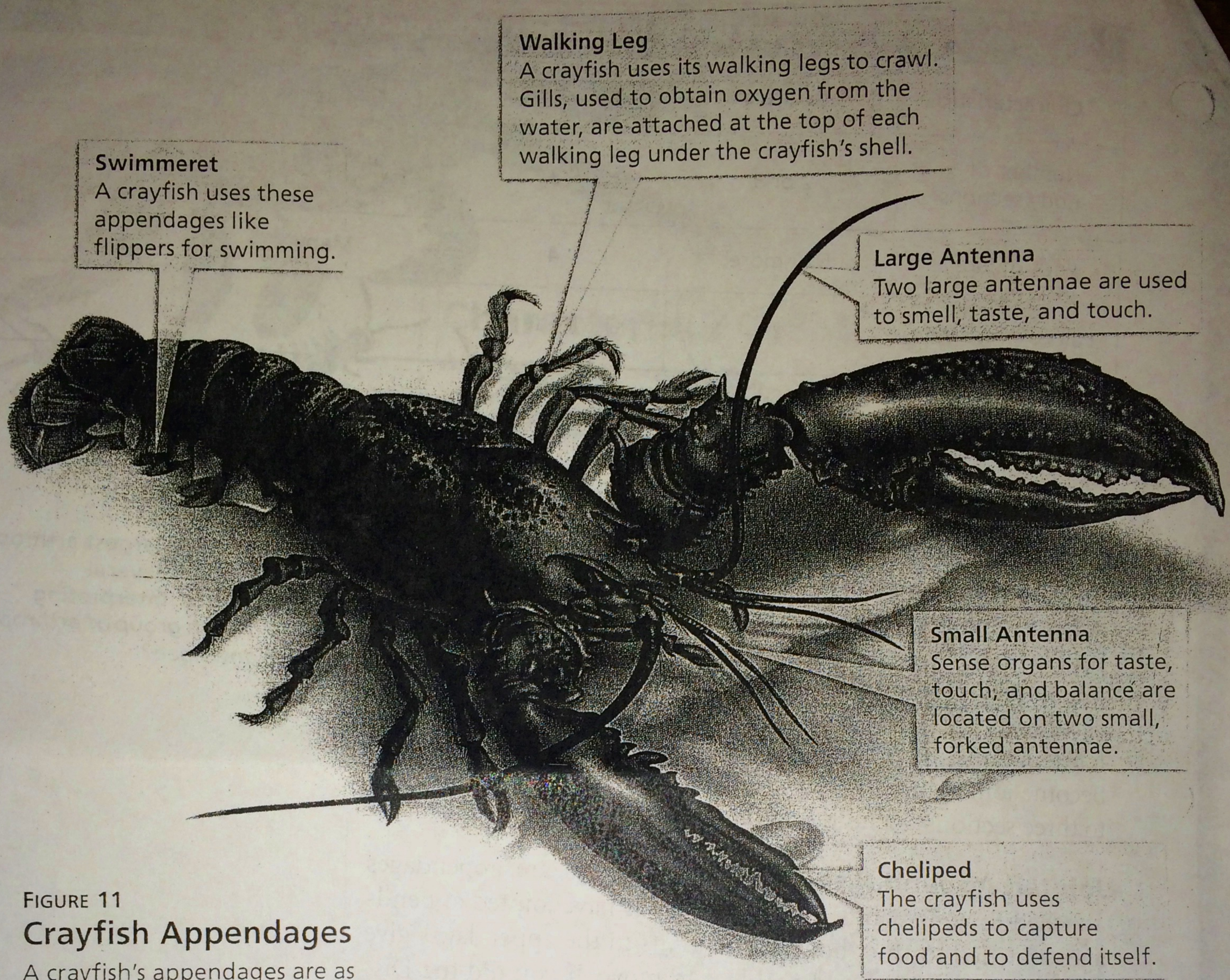
**Diversity** Scientists have identified more species of arthropods—over one million—than all other species of animals combined! There are probably many others that have not yet been discovered. Look at Figure 10 to compare some characteristics of the four major groups of arthropods.

 **Reading Checkpoint** What does an antenna do?

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**Swimmeret**

A crayfish uses these appendages like flippers for swimming.

**Walking Leg**

A crayfish uses its walking legs to crawl. Gills, used to obtain oxygen from the water, are attached at the top of each walking leg under the crayfish's shell.

**Large Antenna**

Two large antennae are used to smell, taste, and touch.

**Small Antenna**

Sense organs for taste, touch, and balance are located on two small, forked antennae.

**Cheliped**

The crayfish uses chelipeds to capture food and to defend itself.

FIGURE 11

**Crayfish Appendages**

A crayfish's appendages are as varied as the tools on a Swiss army knife. The appendages are adapted for different functions.

**Interpreting Diagrams** *What functions do the chelipeds serve?*

**Crustaceans**

If you've ever eaten shrimp cocktail or crab cakes, you've dined on **crustaceans** (krus TAY shunz). Crayfish and lobsters are other familiar crustaceans. Crustaceans thrive in freshwater lakes and rivers, and even in puddles that last a long time. You can find them in the deepest parts of oceans and along coastlines. A few, like the pill bug, live in damp places on land.

**Body Structure** Crustaceans share certain characteristics. A crustacean is an arthropod that has two or three body sections, five or more pairs of legs, and two pairs of antennae. Each crustacean body segment has a pair of legs or another type of appendage attached to it. The various types of appendages function differently, as you can see in Figure 11.