

Reading Preview

Key Concepts

- What are the three main phyla of worms?
- What are the main characteristics of each phylum of worms?

Key Terms

- parasite • host
- free-living organism
- scavenger • anus
- closed circulatory system

Target Reading Skill


Using Prior Knowledge Before you read, write what you know about worms in a graphic organizer like the one below. As you read, write what you learn.

What You Know
1. Worms are long and skinny. 2.
What You Learned
1. 2.

Lab zone

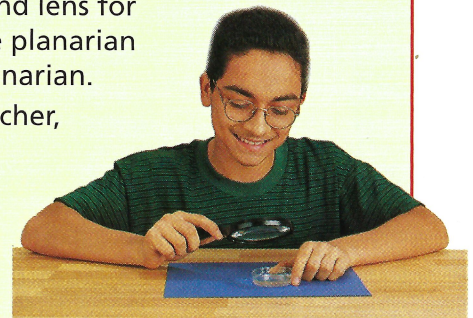
Discover Activity

What Does a Flatworm Look Like?

1.  Your teacher will give you a planarian, a kind of flatworm. Pick the worm up with the tip of a small paintbrush. Place it carefully in a container. Use a dropper to cover the planarian with spring water.
2. Observe the planarian with a hand lens for a few minutes. Describe how the planarian moves. Draw a picture of the planarian.
3. Return the planarian to your teacher, and wash your hands.

Think It Over

Observing How does a planarian differ from a sponge?



You might think that all worms are small, slimy, and wriggly. But many worms do not fit that description. Some worms are almost three meters long and are as thick as your arm. Others look like glowing, furry blobs. Worms may glide through water or climb around with paddle-like bristles. Still others are very small and live underwater in tubes cemented to rocks.

Characteristics of Worms

There are many kinds of worms, all with their own characteristics. **Biologists classify worms into three major phyla—flatworms, roundworms, and segmented worms.** Flatworms belong to the phylum Platyhelminthes (plat ee HEL minth eez); roundworms belong to the phylum Nematoda; segmented worms belong to the phylum Annelida.

FIGURE 19

Giant Earthworm

A giant Gippsland earthworm can grow to be more than 1 meter long. It is one of approximately 1,000 earthworm species found in Australia.

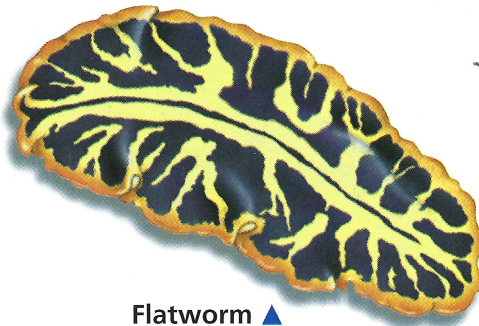


FIGURE 20

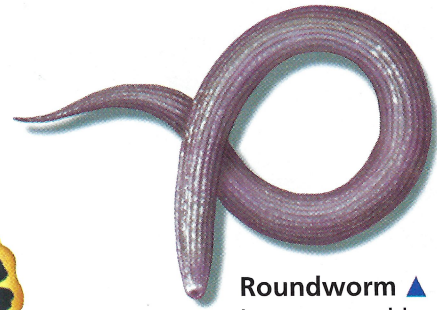
Three Phyla of Worms

The three major phyla of worms are flatworms, roundworms, and segmented worms.

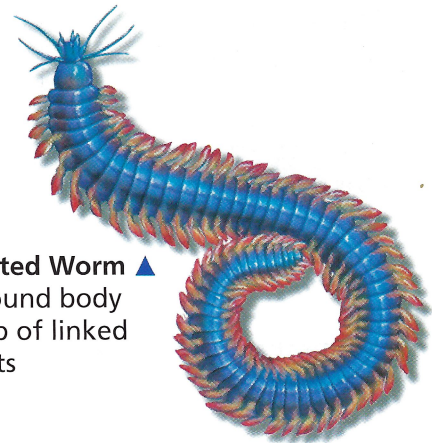
Observing How are the body shapes of these three types of worms similar?



Flatworm ▲
Long, flat body



Roundworm ▲
Long, round body



Segmented Worm ▲
Long, round body
made up of linked
segments

Body Structure All worms are invertebrates that have long, narrow bodies without legs. In Figure 20, you can compare the body shapes of three types of worms. Unlike sponges or cnidarians, worms have bilateral symmetry. Therefore, they have head and tail ends. In addition, they all have tissues, organs, and body systems.

Nervous System Worms are the simplest organisms with a brain, which is a knot of nerve tissue located in the head end. Because a worm's brain and some of its sense organs are located in its head end, the worm can detect objects, food, mates, and predators quickly. It can respond quickly, too. Sense organs that are sensitive to light, touch, and vibrations pick up information from the environment. The brain interprets that information and directs the animal's response. For example, if an earthworm on the surface of the ground senses the vibrations of a footstep, the worm will quickly return to its underground burrow.

Reproduction Both sexual and asexual reproduction are found in the worm phyla. In many species of worms, there are separate male and female animals, as in humans. In other species of worms, each individual has both male and female sex organs. A worm with both male and female sex organs does not usually fertilize its own eggs. Instead, two individuals mate and exchange sperm. Many worms reproduce asexually by methods such as breaking into pieces. In fact, if you cut some kinds of worms into several pieces, a whole new worm will grow from each piece.



**Reading
Checkpoint**

What type of symmetry do worms have?



FIGURE 21

Planarian

Planarians are free-living flatworms that live in ponds, streams, and oceans.

Comparing and Contrasting

How does a free-living organism differ from a parasite?

Flatworms

As you'd expect from their name, flatworms are flat. They include such organisms as tapeworms, planarians, and flukes. Although tapeworms can grow to be 10 to 12 meters long, some other flatworms are almost too small to be seen. All flatworms share certain characteristics. **Flatworms are flat and as soft as jelly.**

Many flatworms are parasites. A **parasite** is an organism that lives inside or on another organism. The parasite takes its food from its **host**, the organism in or on which it lives. Parasites may rob their hosts of food and make them weak. They may injure the host's tissues or organs, but they rarely kill their host. All tapeworms and flukes are parasites.

In contrast, some flatworms are free-living. A **free-living organism** does not live in or on other organisms. Free-living flatworms may glide over the rocks in ponds, slide over damp soil, or swim slowly through the ocean like ruffled, brightly patterned leaves.

Planarians Planarians are free-living flatworms. Planarians are **scavengers**—they feed on dead or decaying material. But they are also predators and will attack any animal smaller than they are. A planarian feeds like a vacuum cleaner. The planarian glides onto its food and inserts a feeding tube into it. Digestive juices flow out of the planarian and into the food. These juices begin to break down the food while it is still outside the worm's body. Then the planarian sucks up the partly digested bits. Digestion is completed within a cavity inside the planarian. Undigested food exits through the feeding tube.

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If you look at the head of the planarian shown in Figure 21, you can see two dots. These dots are called eyespots. The eyespots can detect light but cannot see a detailed image as human eyes can. A planarian's head also has cells that pick up odors. Planarians rely mainly on smell, not light, to locate food.

Tapeworms Tapeworms are one kind of parasitic flatworm. A tapeworm's body is adapted to absorbing food from the host's digestive system. Some kinds of tapeworms can live in human hosts. Many tapeworms live in more than one host during their lifetime. You can see the life cycle of the dog tapeworm in Figure 22. Notice that this tapeworm has two different hosts—a dog and a rabbit.

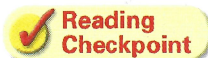
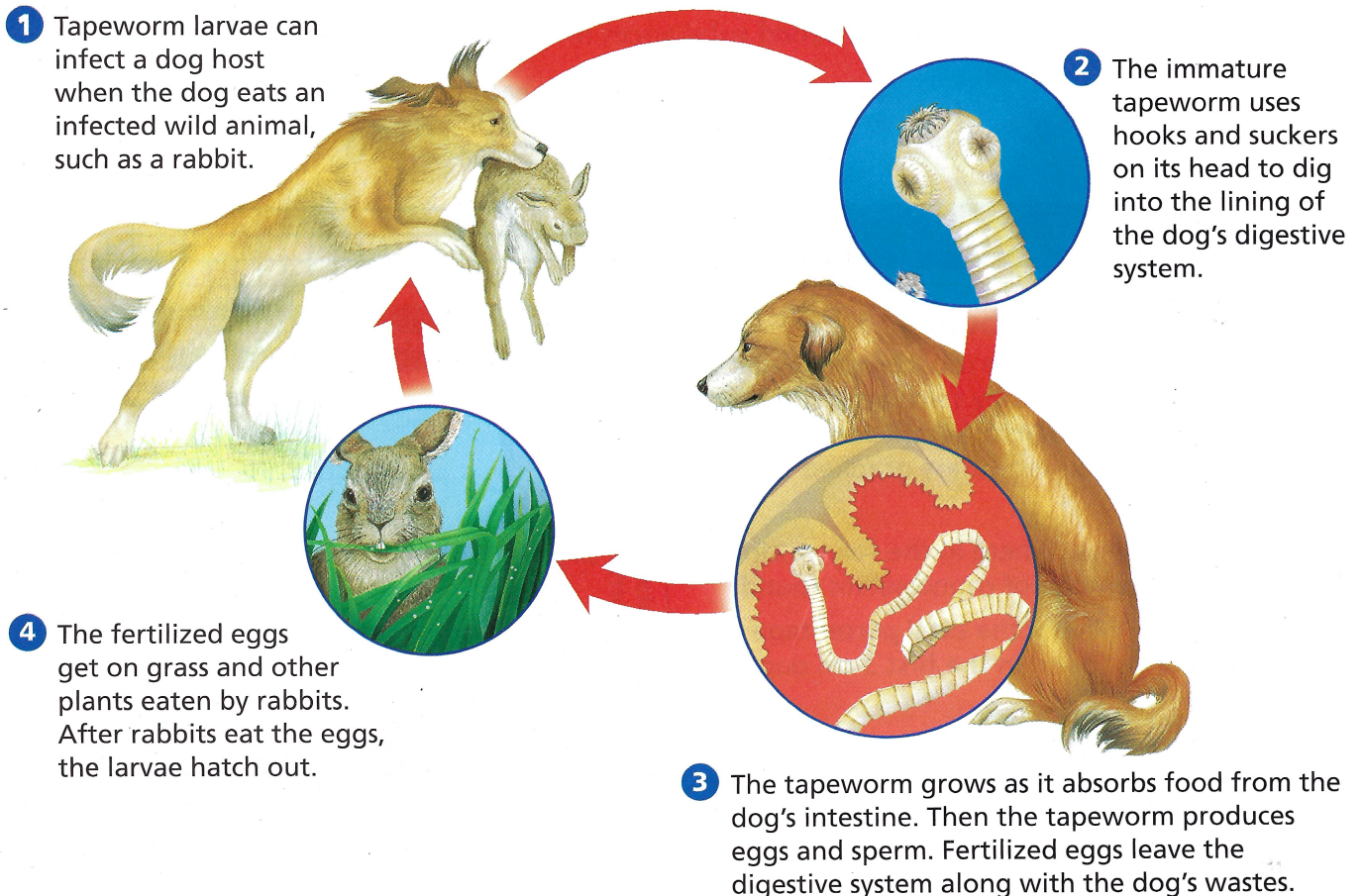
 **Reading Checkpoint** How does a scavenger obtain food?

FIGURE 22
Life Cycle of a Dog Tapeworm

The tapeworm is a parasite that lives in more than one host during its life cycle.



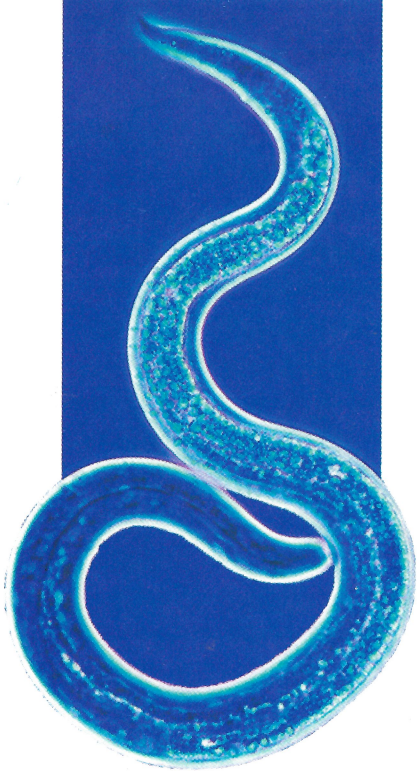


FIGURE 23

A Roundworm

The transparent body of this roundworm has been stained for better viewing under a microscope.

Roundworms

The next time you walk along a beach, consider that about a million roundworms live in each square meter of damp sand. Roundworms can live in nearly any moist environment—including forest soils, Antarctic sands, and pools of super-hot water. Most roundworms are tiny and difficult to see, but they may be the most abundant animals on Earth. Some species are free-living and some are parasites.

Unlike flatworms, roundworms have cylindrical bodies. They look like tiny strands of cooked spaghetti that are pointed at each end. **Unlike cnidarians or flatworms, roundworms have a digestive system that is like a tube, open at both ends.** Food travels in one direction through the roundworm's digestive system. Food enters at the animal's mouth, and wastes exit through an opening, called the **anus**, at the far end of the tube.

A one-way digestive system is efficient. It is something like an assembly line, with a different part of the digestive process happening at each place along the line. Digestion happens in orderly stages. First, food is broken down by digestive juices. Then the digested food is absorbed into the animal's body. Finally, wastes are eliminated. This type of digestive system enables the animal's body to absorb a large amount of the needed substances in foods.



**Reading
Checkpoint**

What is each opening at opposite ends of a roundworm's digestive tube called?

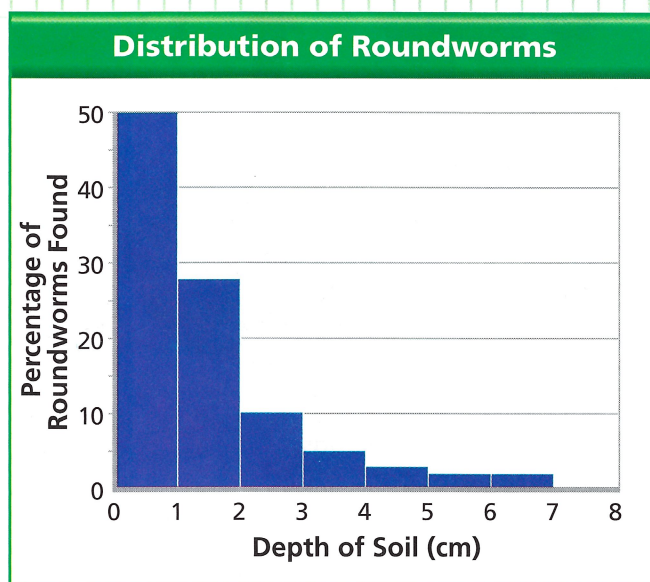
Math

Analyzing Data

Roundworm Numbers

Biologists counted all the roundworms living in a plot of soil. Then they calculated the percentage that lives in different centimeter depths of soil. Their results are graphed to the right.

- Reading Graphs** Where in the soil was the largest percentage of roundworms found?
- Calculating** What is the total percentage of roundworms found in the first 3-cm depth of soil?
- Drawing Conclusions** What is the relationship between the depth of the soil and the abundance of roundworms in the soil?



Segmented Worms

If you have ever dug in a garden, you have probably seen earthworms wriggling through the moist soil. Earthworms are segmented worms. So are leeches and some sea-floor worms.

Body Structure When you look at an earthworm, you see a body made up of a series of rings separated by grooves, something like a vacuum cleaner hose. **Earthworms and other segmented worms have bodies made up of many linked sections called segments.** On the outside, the segments look nearly identical, as you can see in Figure 24. On the inside, some organs are repeated in most segments. For example, each segment has tubes that remove wastes. Other organs, however, such as the earthworm's reproductive organs, are found only in certain segments.

All segmented worms have a long string of nerve tissue called a nerve cord and a digestive tube that run the length of the worm's body. Like roundworms, segmented worms have a one-way digestive system with two openings.

Circulatory System Segmented worms have a closed circulatory system. In a **closed circulatory system**, blood moves only within a connected network of tubes called blood vessels. In contrast, some animals, such as snails and lobsters, have an open circulatory system in which blood leaves the blood vessels and sloshes around inside the body. In both cases the blood carries oxygen and food to cells. But a closed circulatory system can move blood around an animal's body much more quickly than an open circulatory system can.

FIGURE 24

Structure of an Earthworm

An earthworm's body is divided into more than 100 segments. Some organs are repeated in most of those segments. Other organs exist in only a few segments.

Interpreting Diagrams Name an example of a body system that runs through all of the worm's segments.

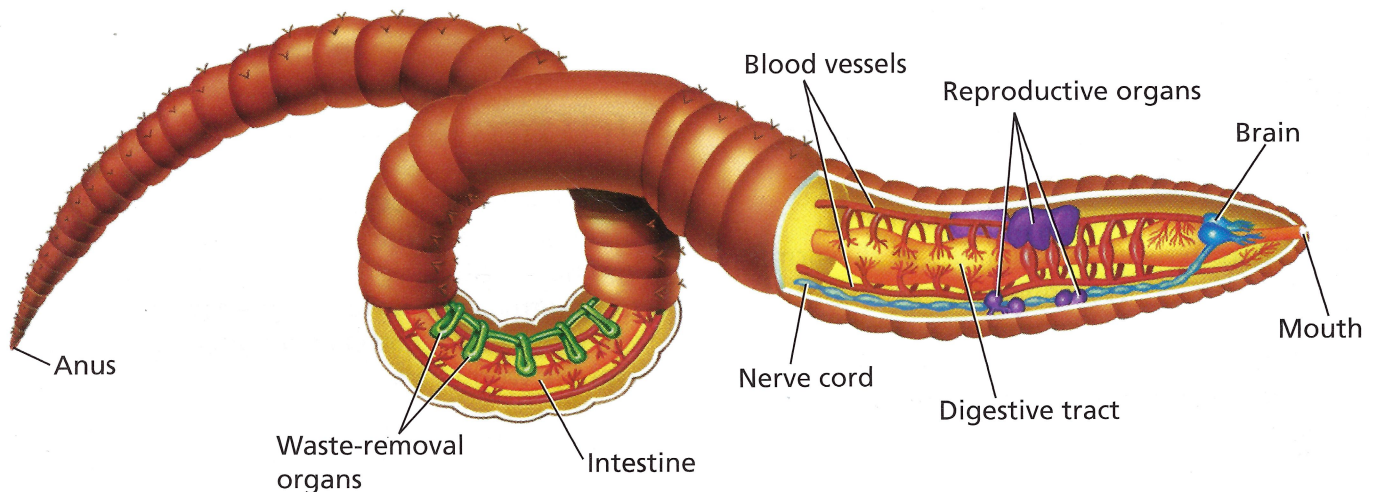
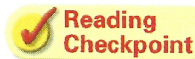


FIGURE 25
Earthworms and Garden Health
You are likely to find earthworms when you dig in garden soil.



Earthworms in the Environment Like many segmented worms, earthworms tunnel for a living. On damp nights or rainy days, they come up out of their burrows. They crawl on the surface of the ground, seeking leaves and other decaying matter that they will drag underground and eat. Staying in moist soil or damp air is important because this keeps the worm's skin moist. An earthworm obtains oxygen through moisture on its skin.

Did you know that earthworms are among the most helpful inhabitants of garden and farm soil? They benefit people by improving the soil in which plants grow. Earthworm tunnels loosen the soil, allowing air, water, and plant roots to move through it. Earthworm droppings make the soil more fertile.



Why must earthworms stay moist?

Section 4 Assessment



Target Reading Skill Using Prior Knowledge

Review your graphic organizer about worms and revise it based on what you just learned in the section.

Reviewing Key Concepts

- Listing** What are the three main phyla of worms?
 - Describing** What are the common characteristics of the bodies of all worms?
 - Explaining** How do worms get information about their environments?
- Reviewing** What are the main differences among the three main phyla of worms?
 - Classifying** Suppose you use a microscope to look at a tiny worm. What characteristics would you look for to classify it?

- Comparing and Contrasting** Compare and contrast the types of digestive systems found in worms.

Writing in Science

Interview Suppose that worms can talk, and that you are an editor for *Worm* magazine. You have been assigned to interview a tapeworm about its feeding habits. Write a transcript of your interview—your questions and the worm's answers.