Cnidarians and worms have different body plans.

**BEFORE, you learned**
- Invertebrates are a diverse group of animals
- Sponges are sessile organisms
- Sponges meet their needs with simple bodies and specialized cells

**NOW, you will learn**
- About body systems in cnidarians
- About body symmetry and feeding patterns
- About body systems in worms

**EXPLORE Worm Movement**

**How does body shape affect movement?**

**PROCEDURE**

1. Put a thin layer of soil on the tray and gently place the worm on it. Use the spray bottle to keep the soil and your hands moist.
2. Draw a sketch of the worm and try to identify the parts of its body.
3. Record your observations of its movement.
4. Follow your teacher’s instructions in handling the worm and materials at the end of the lab. Wash your hands.

**MATERIALS**
- worm
- tray
- soil
- spray bottle filled with distilled water

**WHAT DO YOU THINK?**
- How does the shape of a worm’s body affect its movement?
- How would you describe a worm to someone who has never seen one?

**VOCABULARY**
- cnidarian p. 418
- tentacle p. 418
- mobile p. 420

**Cnidarians have simple body systems.**

Cnidarians (ny-DAIR-ee-uhnz) are invertebrates. Like sponges, cnidarians are found only in water. This group includes jellyfish, corals, sea anenomes, and small freshwater organisms called hydias. Most cnidarians feed on small plankton, fish, and clams. Many cnidarians are sessile for most of their lives. Like sponges, cnidarians have adaptations that allow them to pull food in from the water that surrounds them.

All cnidarians have tentacles, fingerlike extensions of their body that reach into the water. Other animals have tentacles, but the tentacles of cnidarians have specialized stinging cells. The tentacles, with their stinging cells, are an adaptation that enables cnidarians to capture prey.
Each stinging cell has a nematocyst (NEHM-uh-tuh-SIHST), a capsule that holds a barbed filament. The filament is like a tiny hollow tube coiled up inside the capsule. When prey comes into contact with the stinger cell, the filament is released. Sometimes this stinger wraps itself around the prey. In most species of cnidarians, the stinger stabs the prey and releases a poison from its tip. These stingers are what produce the sting of a jellyfish. Stinging cells have a second function. They protect cnidarians from predators.

Check Your Reading Describe how the structure of a nematocyst allows it to function in capturing food and providing protection.

Tissues and Body Systems

A cnidarian’s body is made up of flexible layers of tissue. These tissues, along with specialized cells, make up its body systems. The tissues are organized around a central opening where food is taken in and wastes are released. The tentacles bring the prey into this opening. The opening leads into a cavity, a gut, where the food is digested.

Cnidarians have a simple muscle system for movement. Even though cnidarians are sessile during most of their lives, they still move their bodies. Cnidarians bend from side to side and extend their tentacles. Adult jellyfish swim. The movement is produced by muscle cells that run around and along the sides of its body. When the muscle cells shorten, or contract, they produce movement.
When cnidarians move, they interact with the environment. They sense and respond to the prey that come in contact with their tentacles. This behavior is the result of a simple nervous system. Cnidarians have a network of nerve cells, a nerve net that extends throughout their bodies.

**Reproduction**

Cnidarians reproduce both sexually and asexually, and water plays a role in both processes. Buds produced by asexual reproduction are carried away from the sessile parent by water. In sexual reproduction, sperm are carried to the egg. Fertilization results in a free-swimming larva. The larva, if it survives, develops into an adult.

Jellyfish are cnidarians with a life cycle that includes several stages. A jellyfish's body, or form, is different at each stage, as you can see in the diagram below. When a jellyfish larva settles on the ocean floor, it grows into a form called a polyp. The polyp, which is sessile, develops disk-shaped buds that stack up like a pile of plates. The buds, once they are released, are called medusas. Each medusa is an adult jellyfish. In the medusa stage, jellyfish are *mobile*, which means they can move their bodies from place to place.
Animals have different body plans.

Scientists sometimes use the term body plan to describe the shape of an animal’s body. Most cnidarians have a body plan with radial symmetry. This means the body is organized around a central point, a mouthlike opening that leads into a gut. You can see from the diagram of the jellyfish life cycle on page 420 that both the polyp and medusa have radial symmetry.

A radial body plan allows a sessile organism, such as the sea anemone shown in the photograph above, to capture food from any direction. A radial body plan also affects how a mobile animal moves. A jellyfish medusa moves forward by pushing down on the water. It has to stop moving to change direction.

Most animals, including worms, butterflies, birds, and humans, have a body plan with bilateral symmetry. One half looks just like the other, as you can see in the photograph of the butterfly above. You can recognize a bilaterally symmetrical shape because there is only one way to draw a line dividing it into two equal halves.

Animals with bilateral symmetry have a forward end where the mouth is located. This is the animal’s head. The animal moves forward, head first, in search of food. A bilateral body shape works well in animals that are mobile. Food enters at one end, and is processed as it moves through the body. Once all the nutrients have been absorbed, the remaining wastes are released at the other end.

Describe how radial symmetry and bilateral symmetry affect an animal’s feeding behaviors.
Most worms have complex body systems.

Some worms have simple bodies. Others have well-developed body systems. Worms have a tube-shaped body, with bilateral symmetry. In many worms, food enters at one end and is processed as it moves through a digestive tract. Worms take in oxygen, dissolved in water, through their skin. Because of this, worms must live in moist environments. Many live in water.

Segmented Worms

Segmented worms have bodies that are divided into individual compartments, or segments. These worms are referred to as annelids (AN-uh-lihdz), which means “ringed animals.” One annelid you might be familiar with is the earthworm. As the diagram below shows, an earthworm’s segments can be seen on the outside of its body.

An earthworm has organs that are organized into body systems. The digestive system of an earthworm includes organs for digestion and food storage. It connects to the excretory system, which removes waste. Earthworms pass soil through their digestive system. They digest decayed pieces of plant and animal matter from the soil and excrete what’s left over. A worm’s feeding and burrowing activity adds nutrients and oxygen to the soil.

Name two body systems found in earthworms.
Earthworms have several layers of muscle tissue in their body wall. Hairlike bristles on the segments help to anchor a worm in the soil as it moves. The nervous system includes a brain and a nerve cord that runs through the body. An earthworm can detect strong light and vibrations in the soil. These stimuli signal danger to a worm. An earthworm also has a circulatory system. It is made up of several hearts that pump blood through blood vessels.

Some annelids reproduce asexually, while others reproduce sexually. There are no distinct male or female worms. Earthworms, for example, carry both male and female reproductive structures. To reproduce, two worms exchange sperm. The sperm fertilize eggs the worms carry in their bodies. The eggs are laid and later hatch into larvae.

**Flatworms and Roundworms**

Flatworms are the worms with the simplest bodies. Some are so small and flat that they move with cilia, not muscles. These flatworms absorb nutrients directly through the skin. Many flatworms live as parasites, feeding off other organisms. For example, tapeworms are flatworms that infect humans and other animals. The tapeworm has no need for a digestive system because it gets digested nutrients from its host.

Roundworms are found just about everywhere on Earth. The bodies of roundworms are more complex than those of flatworms. They have muscles to move with, and a nervous system and digestive system. Some roundworms are important decomposers on land and in the water.