

## Echinoderms

## Key Words

- echinoderms:** spiny-skinned invertebrates that live in the ocean
- radial symmetry:** body plan in which body parts repeat around an imaginary line drawn through a central area
- tube feet:** water-filled suction cups that are used in movement and in feeding

## KEY IDEAS

Echinoderms are complex invertebrates that live in the ocean. Unlike most other animals, echinoderms have radial symmetry.

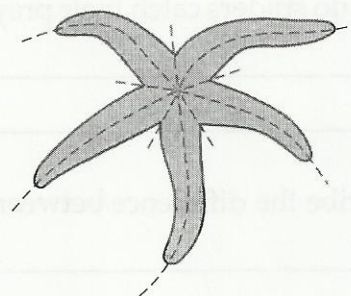
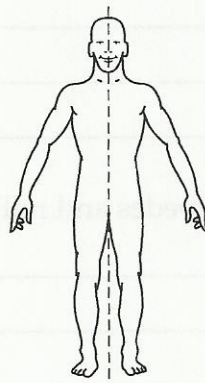
Have you ever walked along a beach and found a starfish? Despite the name, starfish are not really fish. That is why starfish are sometimes called sea stars. Starfish are **echinoderms** (ee-KEYE-noh-dermz), spiny-skinned invertebrates that live in the ocean.

**Body Form.** The first thing you probably notice about an echinoderm is its overall shape. Unlike arthropods and most other animals, most adult echinoderms do not have left-right symmetry. Instead, an adult echinoderm has radial symmetry. **Radial symmetry** (RAY-dee-uhl SIHM-uh-tree) is a body plan in which body parts repeat around an imaginary line drawn through a central area. Imagine drawing a line down the center of your body. There is only one way that you could draw this line to form mirror images of the two halves of your body. This is left-right symmetry. But if you were to draw a line through an animal with radial symmetry, such as a starfish, there are many different places you could form mirror images. See Fig. 31-1.

Fig. 31-1

Left-right symmetry

Radial symmetry





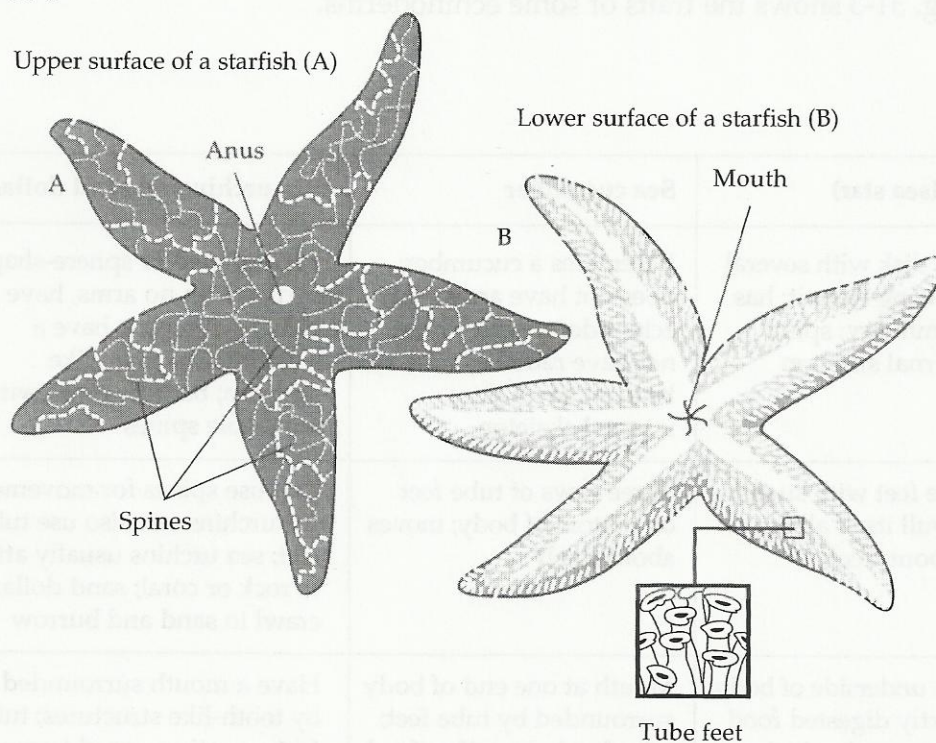


1. How does the symmetry in an adult echinoderm differ from that of most other animals? \_\_\_\_\_

The word *echinoderm* means "spiny skin." Most echinoderms are covered with spines that help protect the animal. These spines stick out from the skeleton beneath the echinoderm's skin. Unlike arthropods, echinoderms have an internal skeleton.

On the underside of each of the five arms of a starfish are tiny tube feet. **Tube feet** (toob feet) are water-filled suction cups that are used in movement and in feeding. See Fig. 31-2. Water-filled tubes run throughout the echinoderm's body and connect to the tube feet. When water moves within these tubes, the tube feet become longer or shorter and function as suction cups. By stretching out and attaching to surfaces, the tube feet can pull the animal forward.

Fig. 31-2



2. What are tube feet? \_\_\_\_\_

**Feeding.** Echinoderms have several ways of feeding. For example, a starfish feeds by wrapping its arms around a clam and attaching its tube feet to both of the clam's shells. The tube feet pull against the shells and tire the clam, which uses its strong muscles to keep its shells closed. In the end, the clam loses the "tug of war" and its shells open slightly. The starfish then

turns its stomach inside out through its mouth and pushes it into the clam. Once the stomach is inside the clam, it digests the soft body of the clam. Later the stomach and partly digested clam are sucked back into the starfish.

**Reproduction.** Echinoderms reproduce sexually. Most often the eggs of females are fertilized by sperm of males in open water. Some echinoderms can also reproduce asexually by regeneration. For example, if a starfish loses one of its arms, it can grow a new one. In the same way, if a starfish is cut into many pieces, each piece can grow into a whole new animal. However, each piece must contain a portion of the central part of the body for regeneration to occur.

## TAKE ANOTHER LOOK

Fig. 31-3 shows the traits of some echinoderms.

Fig. 31-3

	Starfish (sea star)	Sea cucumber	Sea urchin and sand dollar
Body form	A central disk with several arms growing from it; has radial symmetry; spiny skin; internal skeleton	Resembles a cucumber; does not have arms; only echinoderm which does not have radial symmetry; leathery small skin; internal skeleton	Disk-shaped or sphere-shaped bodies with no arms, have radial symmetry; have a solid internal shell-like skeleton; body covered with moveable spines
Movement	Uses tube feet with suction cups to pull itself along; moves about freely	Three rows of tube feet on bottom of body; moves about freely	Can use spines for movement; sea urchins can also use tube feet; sea urchins usually attach to rock or coral; sand dollars crawl in sand and burrow
Feeding	Mouth in underside of body; sucks partly digested food through stomach which can be pushed out through mouth opening	Mouth at one end of body surrounded by tube feet; tube feet help gather food into the mouth	Have a mouth surrounded by tooth-like structures; tube feet sometimes used to push food toward mouth
Reproduction	Sexual; eggs are fertilized by sperm; sexes are separate; can regenerate	Sexual; sexes can be separate or both sexes in same animal; can regenerate	Sexual; sexes are separate; can regenerate



## Check Your Understanding

Write a sentence explaining the connection between each pair of words.

3. echinoderm, spiny \_\_\_\_\_  
\_\_\_\_\_
4. radial symmetry, body plan \_\_\_\_\_  
\_\_\_\_\_
5. tube feet, food \_\_\_\_\_  
\_\_\_\_\_

Complete the following sentences.

6. Echinoderms live in the \_\_\_\_\_.
7. Unlike arthropods, echinoderms have an \_\_\_\_\_ skeleton.
8. Tube feet are used in both \_\_\_\_\_ and \_\_\_\_\_.

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9. What is the difference between left-right symmetry and radial symmetry?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

10. Because starfish eat clams, some people have tried to get rid of starfish in certain areas. People have cut up all the starfish they have caught, and have thrown the pieces back in the water. What do you think happened next? Did the number of starfish increase or decrease? Did the number of clams increase or decrease? Explain.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



What  
Do You  
Know?