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Echinoderms

The ocean is home to different creatures from animals that are found on land and the phylum of echinoderms is a prime example. The phylum Echinodermata is a scientific classification of simple animals including sea stars, brittle stars, sand dollars, sea urchins, and sea cucumbers. While these are species that perhaps sound familiar, there are approximately 6,000 species of echinoderms found in the ocean worldwide.

One unique feature of echinoderms is the radial symmetry of their bodies. Humans and other mammals have bilateral symmetry. The prefix "bi" means two and "lateral" meaning side of the body. With bilateral symmetry humans and other mammals, birds and fishes have two equivalent sides relative to a middle line in the body. Echinoderms have a body that can be divided into five parts or segments; the most obvious example is the sea star with its five arms that radiate out from the center of the body. Some species of sea stars have more arms but the body can still be divided into five major segments. In the early stage of their lives echinoderms have bilateral symmetry but as adults they have radial symmetry based on the number five.

Echinoderms are primitive animals that lack a brain and developed sensory organs. They are lacking internal organs such as a heart. Another characteristic of echinoderms is that most species of echinoderms have an internal skeleton that is composed of interlocking plates and spines that are composed of calcium carbonate. Internal skeletons are called endoskeletons as opposed to external skeletons which are called exoskeletons. The structure of the endoskeleton varies among the species in the phylum but the endoskeleton is covered by a layer of tissue called epidermis. For example, the skeletal plates of sea stars move and give it flexible joints while the skeletal plates of sea urchins and sea dollars are fused to form a rigid shell.

Another common characteristic of echinoderms is tube feet which can be extended at will for slow locomotion. The tube feet also help with feeding and respiration. The tube feet are part of echinoderms' water vascular system which operates like a hydraulic system. A vascular system usually implies the existence of veins. In the case of echinoderms, the vessels are large and are called canals

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instead of veins. The tube feet can be extended with increased water pressure in the canals. These feet act like suction cups when the water pressure is decreased so the echinoderm can attach to rocks or prey.

Sea Stars

Sea stars are commonly called starfish but, of course, they are not fish at all. The sea star is well-known for having five arms surrounding a body center. The underside of the body center is the location of the sea star's mouth while the elimination channel, called the anus, is located on the top surface. Also on the top surface is the water intake valve, called the madreporite, for the vascular system. A sea star has hundreds of tube feet all along the radial arms. The tube feet are used for locomotion and feeding. A sea star can straddle a clam or mussel, use its jointed arms and tube feet to attach to and open the shell of its prey. A sea star has the unique ability to move its stomach outside the body and around the soft body of the clam in order to ingest it. Species of sea stars have the ability to regenerate an arm should one be lost to a predator.

There are numerous species of sea stars. The largest sea star species is called crown-of-thorns because it has ten to twenty arms that have long thorn-like spines. These spines release a highly toxic poison and crown-of-thorns feed on live coral. Some species of shrimp and small fish live between the spines.

Sea Urchins

Sea urchins have some characteristics unlike other echinoderms, namely an exoskeleton. Sea urchins still have a radial symmetrical body with five segments and tube feet for locomotion. Like some species of sea stars, many species of sea urchins also have spines. The multi-purpose spines are used for locomotion and capturing prey; most sea urchins feed on algae. Most sea urchins are nocturnal feeders. Even though these sea urchins are equipped with spines, they are preyed upon by several species of fish. There are about 700 species of sea urchins found around the world. They inhabit the deep waters of the ocean as well as tide pools in the intertidal zone.

Sea Cucumbers

Sea cucumbers get their name from their long cylindrical shape that resembles a cucumber. Sea cucumbers have five rows of tube feet that are

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positioned along the body. There are ten to thirty additional appendages that are like tube feet around the mouth that are positioned for feeding. Most sea cucumbers are bottom feeders that eat organic material but others filter zooplankton from the water. Like sea stars, sea cucumbers have the ability to regenerate some body parts.

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Circle True or False after analyzing each of the following statements.

1. True False Echinoderms have trilateral symmetry while mammals have bilateral symmetry.
2. True False Most species of echinoderms have an internal skeleton that is composed of interlocking plates and spines that are composed of calcium carbonate.
3. True False There are approximately 700 species of echinoderms found in the ocean worldwide.
4. True False Echinoderms have a body that can be divided into five parts or segments; the most obvious example is the sea star with its five arms that radiate out from the center of the body.
5. True False Tube feet are part of echinoderms' vascular digestive system which operates like a hydraulic system.
6. True False A sea star has five tube feet on each of its radial arms. The tube feet are used for locomotion and feeding.
7. True False Some species of sea stars and sea cucumbers have the ability to regenerate a missing body part.
8. True False The crown-of-thorns sea urchin is covered with highly toxic spines.
9. True False Most sea urchins are nocturnal feeders that eat algae.
10. True False Sea cucumbers get their name from their long cylindrical shape that resembles a cucumber.

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Answers

1. False
2. True
3. False
4. True
5. False
6. False
7. True
8. False
9. True
10. True