Echinodermata

Echinoderms include any variety of invertebrate marine animals and are easily recognizable! Some of the tell-tale characteristics of echinoderms include a hard, spiny covering or skin and radial body structure, usually including five arms. They come in a variety of rich colors like purples, reds, greens, and yellows. Surprisingly, most tropical species are brown or black, while the lighter colors are common among species that are not exposed to strong sunlight. Typically, echinoderms are small, usually only about 4 inches in length or diameter, but some species, like the sea cucumber can grow to as much as 6 ½ feet in length. Echinoderms have been recognized by people since ancient times. Sea urchins, for example were used extensively by the early Romans and Greeks both for food and medicinal purposes.

There are five separate classes in the phylum Echinodermata. These include 1. Asteroidea (sea stars), 2. Ophiuroidea (brittle stars and basket stars), 3. Echinoidea (sea urchins and sand dollars), 4. Holothuroidea (sea cucumbers), and 5. Crinoidea (sea lilies and feather stars). All together, there are about 7,000 living species with about 6,500 more already extinct but discovered as fossil species.

In general, the shape of the echinoderm is considered to be radial symmetry, like that of a star with arms that extend from a central disk or with branched and feathery arms that extend from a body and are often attached to a stalk. Or, they can be round or cylindrical. Projections from the skeleton, often times resembling spikes, give the phylum its name. The word echinoderm comes from the Greek word ekhinos, meaning hedgehog or sea urchin, and the word derma, which means skin. Therefore, they are considered spiny-skinned animals. If you were to touch a sea cucumber though, it might just feel merely warty, while you might feel small spines on a sea star, and the spines on a sand dollar would feel much less pronounced.
Even though echinoderms are very diverse they all have some similarities. These characteristics can be found in their circulatory and reproductive systems. Instead of blood, echinoderms have a water vascular system, which is used for movement and predation. The echinoderm pumps sea water into its body through a sieve plate and this water fills the animals’ tube feet. The creature moves across the sea floor or over rocky reefs by filling its feet with water to then extend them and use their muscles within the feet to retract them. Those feet allow echinoderms to hold onto rocks and other substrates so that they can grip prey by suction. Sea stars have very strong suction in their tube feet that even allows them to pry open the two shells of a bivalve.

Most echinoderms reproduce sexually, although males and females are virtually indistinguishable from one another when viewed externally. During sexual reproduction, echinoderms release eggs or sperm into the water, which are fertilized in the water column by the male. The fertilized eggs hatch into free-swimming larvae that eventually settle to the ocean bottom. Echinoderms can also reproduce asexually by regenerating body parts, such as arms and spines. Sea stars are well-known for their ability to regenerate arms that are lost. In fact, even if the sea star has only a small part of its central disk left, it can grow an entirely new sea star.

Many echinoderms are omnivorous, feeding on a variety of living and dead plant and marine life. They serve an important function in digesting dead plant material on the ocean floor and thereby keeping waters clean. Plentiful echinoderm populations are essential to healthy coral reefs. The digestive system of echinoderms is relatively simple and primitive compared to other marine life; some species ingest and expel waste through the same orifice. Some species simply ingest sediments and filter out the organic material, while other species are capable of catching prey, usually plankton and small fish, with their arms.

While not an important source of food for humans, some forms of sea urchin are regarded as a delicacy in some parts of the world, where they are used in soups. Some echinoderms produce a toxin which is fatal to fish, but which can be used to make a medicine used to treat human cancers. Echinoderms are generally beneficial to ocean ecology, with a few exceptions. Starfish, which prey on oysters and other mollusks, have devastated some commercial enterprises. Off the coast of California, sea urchins have caused problems for commercial seaweed farms by eating young plants before they can become established.
1. Which of the following is a characteristic of an echinoderm?
   a. soft-bodied
   b. four distinct body parts
   c. radial symmetry
   d. all of the above

2. Most tropical echinoderms are brightly colored, while those that do not live in much sunlight are brown or black.
   a. true
   b. false

3. Echinoderms cannot grow much larger than 4 inches.
   a. true
   b. false

4. Echinoderms include ___ separate classes.
   a. two
   b. three
   c. four
   d. five

5. Which class do sea stars belong to?
   a. Asteroidea
   b. Ophiuroidea
   c. Echinoidea
   d. Holothuroidea
   e. Crinoidea

6. Which class contains sea lilies?
   a. Asteroidea
   b. Ophiuroidea
   c. Echinoidea
   d. Holothuroidea
   e. Crinoidea

7. Echinoderms do not actually have blood.
   a. true
   b. false

8. How do echinoderms move around?
   a. by pumping water throughout their bodies
   b. they swim with fins
   c. they move muscles when their blood pumps through their bodies
   d. none of the above

9. It is possible for echinoderms to reproduce asexually, and can grow an entirely new animal from one small piece.
   a. true
   b. false

10. How do echinoderms eat?
    a. by ingesting and expelling food and waste through one orifice
    b. ingest sediment and then filter out the organic material that can be consumed
    c. catching and digesting their own prey
    d. all of the above

11. Based on the article, which two echinoderms have devastated some marine ecosystems?
    a. starfish
    b. sea urchins
    c. sea cucumbers
    d. sand dollars
1. ______________________________ any variety of invertebrate marine species
2. ______________________________ body structure that centers around one central disk
3. ______________________________ containing sea stars
4. ______________________________ containing sea lilies and feather stars
5. ______________________________ containing sea cucumbers
6. ______________________________ containing sea urchins and sand dollars
7. ______________________________ containing brittle stars and basket stars
8. ______________________________ meaning hedgehog or sea urchin
9. ______________________________ meaning skin
10. ______________________________ meaning the ability to feed on both plant and animal species.
11. ______________________________ can be used by an echinoderm to stun fish or as a treatment for cancer.