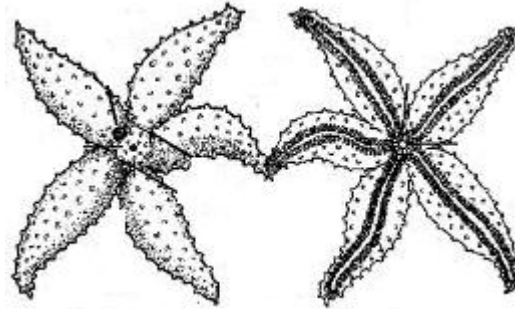
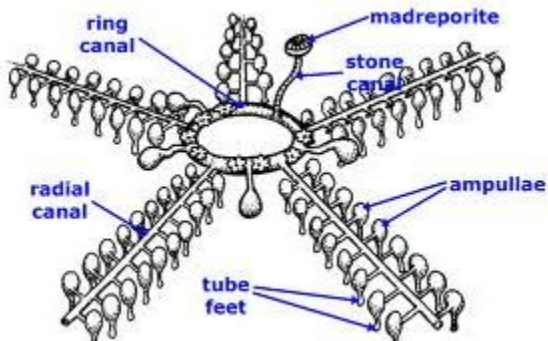


Phylum Echinodermata: Investigating the Sea star

Sea stars (a.k.a. starfish), are found in abundance in coastal waters and along seashores. Sea stars vary greatly in size and colour. These organisms are important because they demonstrate many features of echinoderms in general. Use the Miller and Levine textbook as a reference pp 636-44.



1. How are sea stars related to members of our own phylum (Chordata)?

Echinoderms have an endoskeleton (internal) just as Chordates

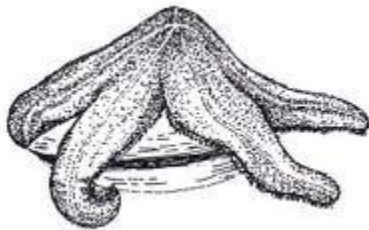
2. Describe the functions of the madreporite (sieve plate) the ring canal, radial canal, and the tube feet in the water vascular system of a sea star.

Madreporite / sieve plate is the place where water is able enter the water vascular system; the **ring canal** takes the water to the radial canals; the **radial canals** take water to the ampulla and tube feet; the **tube feet** have many functions – movement, feeding, sensory, adhering to substrate, excretion & respiration.

3. How do the tube feet act like living suction cups?

When water is pushed into the tube foot by the ampulla the tube foot expands. When the sea star removes water from the tube foot, it shrinks causing a partial vacuum to form which allow the sea star to have a strong hold of whatever it is attached to or touching

4. Why does a sea star have hundreds of tube feet rather than just a few?



There is strength in numbers. One tube foot would be weak, but with hundreds of tube feet working together, the sea star can be very strong. Also, it allows the sea star to maintain a strong pull because it can rest some tube feet while others continue pulling or adhering to whatever it is attached to.

5. How can a sea star get to a clam that is inside a shell?

It uses its tube feet to pry open the clam shell. It can outlast the clam which only has two adductor muscles. The clam will tire before the sea star which is able to rest some tube feet while others continue to pull on the shell

6. Explain how a sea star feeds on a bivalve once its shell is opened?

Once the clam is open, it brings its stomach outside of its mouth and puts it into the shell. It then secretes digestive enzymes to digest the clam in its shell. It will then absorb the digested clam through its stomach wall. Once it has finished, it will bring its stomach back into its mouth

7. What are the functions of the tube feet?

The **tube feet** have many functions – movement, feeding, sensory, excretion & respiration.

8. What are skin gills? What are they used for?

Skin gills are outgrowths on the surface of the sea star that are used for gas exchange - respiration

9. Sea stars have scattered sensory cells that enable them to detect potential sources of food. In addition, they can determine whether it is light or dark. Explain how this is possible.

There are eyespots (cluster of 200 light-sensitive cells) located at the end of each arm of the sea star that are capable of detecting light.

10. Explain how the following echinoderms move:

a. Sea stars

Tube feet are used so it can crawl slowly across the ocean floor

b. Feather star

Waves / flaps its arms so it can swim through the water.

c. Sea cucumber

Contracts the muscles of its body wall so it can crawl along the ocean floor

11. What happens during the reproductive season when a sea star detects gametes of its own species?

They release their own gametes into the water. Most echinoderms are dioecious / separate sexes.

12. Where does fertilization take place?

It occurs in the open ocean. The egg and sperm will fuse to form a zygote

13. Describe what happens to sea star larvae after fertilization?

The sea star larvae swim around for a period of time and then they swim to the ocean floor where they settle and mature by undergoing metamorphosis into its adult form.

14. Why do sea stars produce millions of eggs?

Since fertilization occurs in the open ocean, millions of gametes are released at one time to ensure that a sperm, of the correct species will meet up with the egg.

15. Discuss how sea stars can repair themselves?

They are able to regenerate so that every piece of torn sea star can grow and develop into a completely new individual.