

Name _____

The Starfish

The starfish is a good example of the phylum Echinodermata. These spiny-skinned animals have been around for about 60 million years and are exclusively marine and include sea stars (starfish), sea urchins, sand dollars, sea cucumbers and sea lilies. They all share the same characteristics; tube feet; five point, radially-symmetrical body plan; endoskeleton below the skin; water-vascular system, can regenerate body parts and most are separate sexes and fertilization is external in the water.

The starfish's favorite foods are the clam and the oyster, but they also eat coral polyps and other smaller echinoderms.

PURPOSE:

The purpose of this lab is to observe the body plan of the sea star and compare it to other members of its phylum and other marine organisms studied.

MATERIALS:

Starfish Scissors Dissecting pan Dissecting and regular microscope.

PROCEDURE:

USE THE DRAWINGS TO HELP LOCATE THE ORGANS

I. A. The starfish has definite dorsal and ventral sides. These are also called the aboral, or non-mouth side and the oral side, or mouth side. Starfish have five rays or arms. **Locate a small circular disc near the center of the dorsal/upper surface.** This is the sieve plate (or madreporite). This regulates the movement of water in and out of the water vascular system. This system is involved in the functioning of the tube feet that line the grooves on the undersurface of the starfish.

1. What is the major difference between the human vascular system and that of the starfish?

B. At a point about one inch from the tip of a ray, force the point of some sharp scissors through the upper surface of the starfish. To expose the internal organs, **cut the skin along the sides of the ray and lift the top piece off. Continue to cut the upper body wall almost to the central disk leaving the madreporite plate intact.** Locate and observe the parts of the body once you lift the top off.

2. Are the organs in the rays the same for each ray or different? _____

C. Note that the most of the space in the ray is taken up by two highly branched digestive glands. Examine these structures under the dissecting microscope and note the numerous lobed surfaces which secrete digestive juices. Lift the glands off and locate their connection to the pyloric duct which should lead back to the stomach. During feeding the stomach everts through the mouth and the food is partially digested (outside the body) and passed into the pyloric region (of the stomach) and then into the anus where waste products of digestion are discharged to the outside.

Remove the digestive glands from one arm and locate a pair of feathery gonads. Be able to tell the two apart. If your starfish was caught during breeding season, the gonads will occupy most of the ray but otherwise they are usually small. The male and female gonads look alike and sex may be determined only by examination of the gonads under the microscope. The males have flagellated sperm and the females produce spherical eggs considerably larger than the sperm. **Remove a small piece of the gonad and mince it in a drop of water on a slide. Add a cover slip and examine under high power of the microscope.**

3. Is your starfish a male or female? _____

D. You can now remove the digestive and reproductive structures from the starfish to examine the water vascular system. This is a complex system of tubes that brings seawater in through the madreporite plate or sieve tube and moves the water through the canals to all parts of the body. These pressures create a hydraulic force that causes the rays to move. Locate the parts of the system and answer the questions about it.

The STONE CANAL connects the madreporite plate with the RING CANAL which surrounds the mouth. The RADIAL CANALS extend from the ring canal into each ray, running inside the groove on the ray. TRANSVERSE CANALS lead from each radial canal to the AMPULLAE, which are pink and bulb-like. Each ampullae is connected to a TUBE FOOT, a cylindrical tube which ends in a suction cup or disk. When the ampullae contracts, it forces water out

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of the foot, exerting a force on the inside of the foot, making it rigid and this action causes the foot to move and thus the animal to move.

4. What do tube feet do? _____

5. List, in order of water direction, the structures of the water vascular system. _____

E. Make a cross-section of the ray and try and find the parts you have examined.

6. Make a drawing and label these parts.

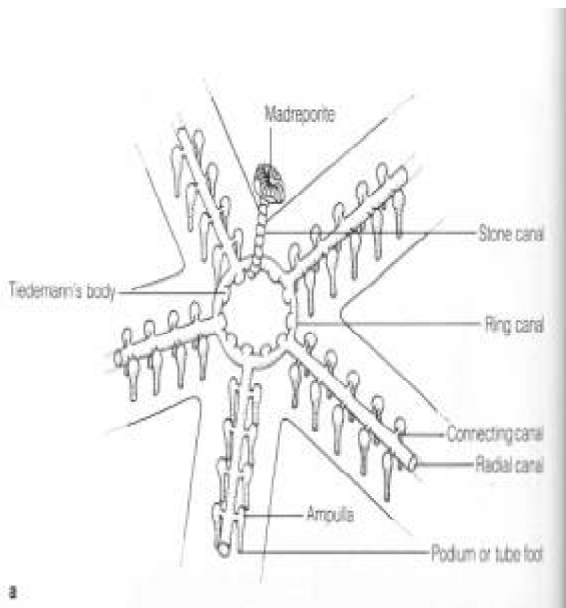
F. Examine other echinoderms displayed and answer the questions.

7. Examine the sea urchins. What similarities and what differences are there between these and the starfish?

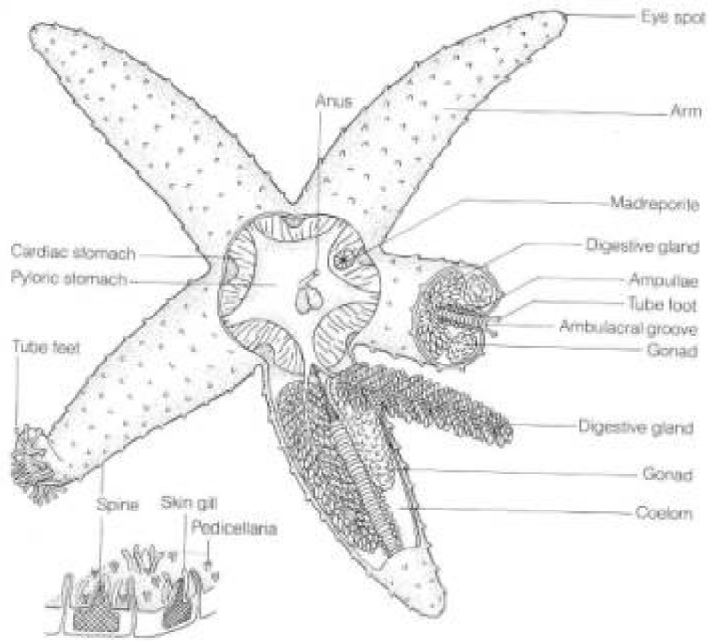
8. Examine the sea cucumbers. Where are the "tube feet"? _____

9. 9. Examine the starfish embryo under the microscope. How is it different than the adult you just dissected....how is it similar?

10. Examine the slide of the tube feet and make a sketch, providing labels.

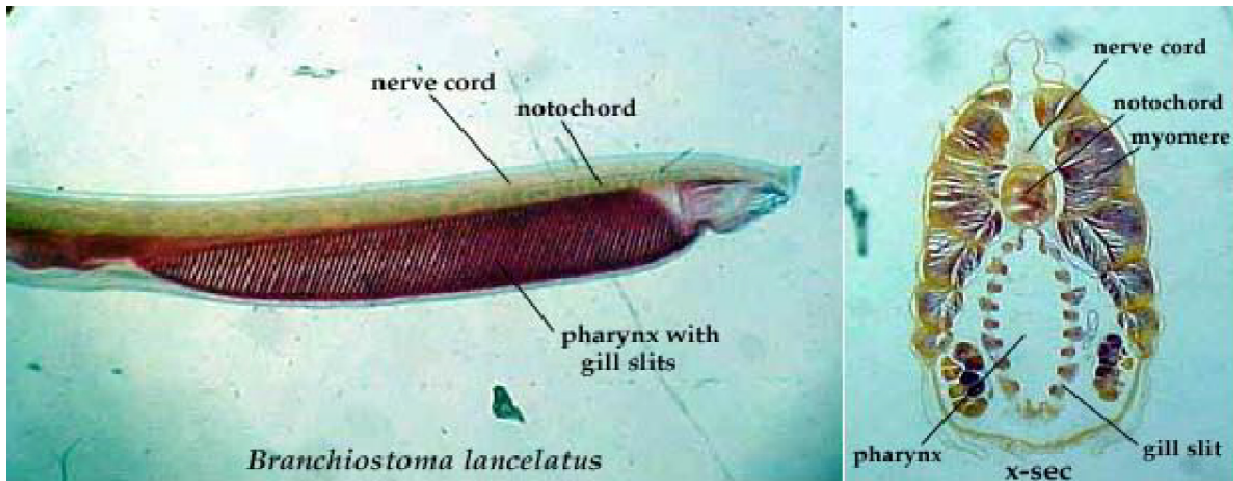


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Phylum Chordata

1. LANCETS :

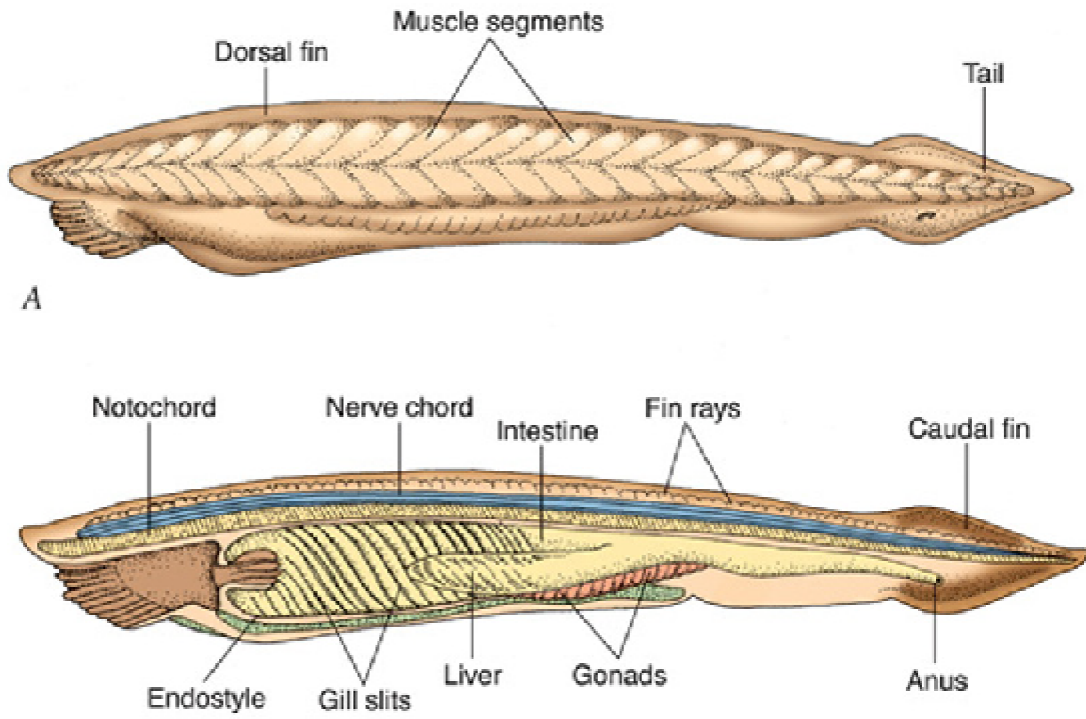


a. Where are they found?

DRAW Use a prepared slide to locate and draw the Pharyngeal gill slits, notochord and nerve cord.

Draw the lancet larva (Amphioxus)

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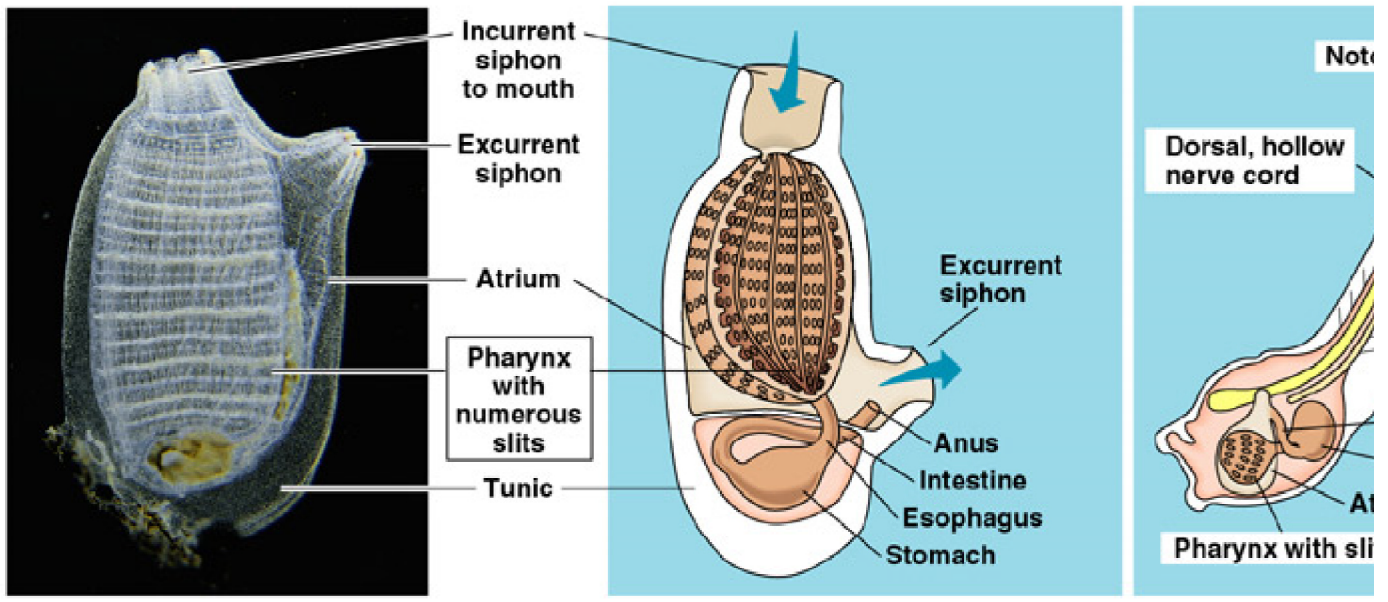
A

B

b. TUNICATES

Examine the tunicates, sketch them so you will remember them later.

c. What does the tunicate in the dish feel like?



(a)

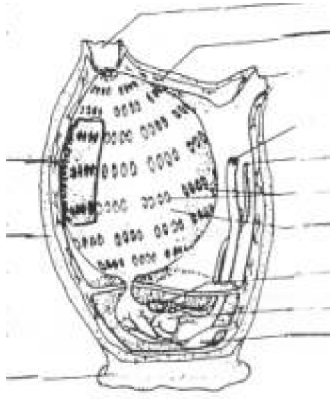
(b)

(c)

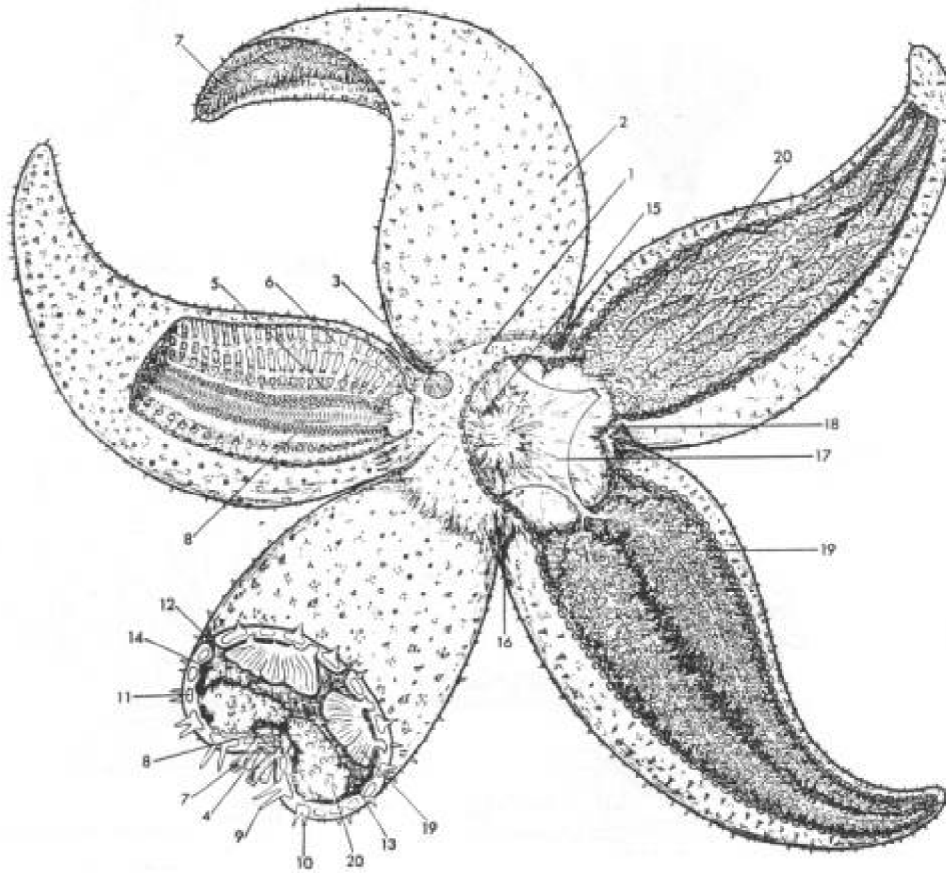
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Remember, these are your cousins!

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STARFISH ANATOMY



STARFISH LIFE CYCLE

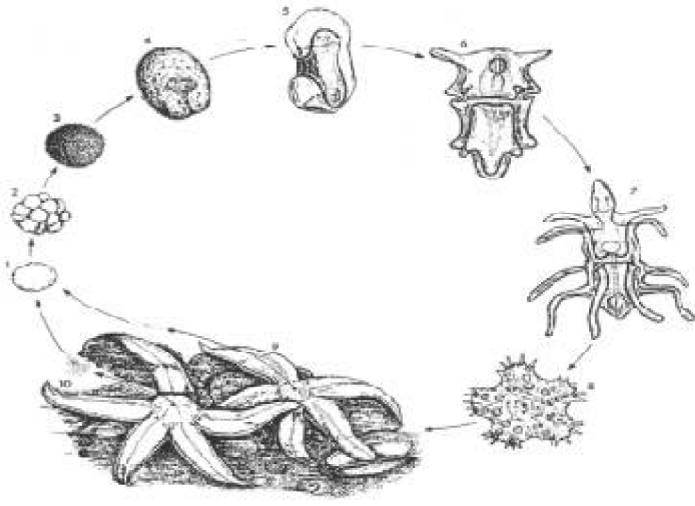


Figure 1



Figure 2

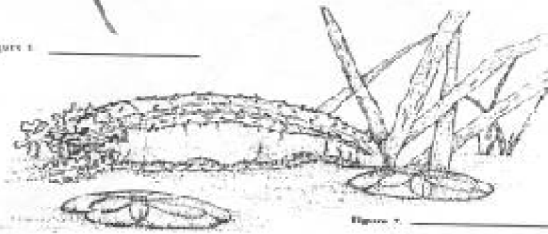


Figure 3

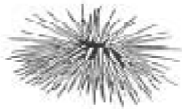


Figure 4



Figure 5

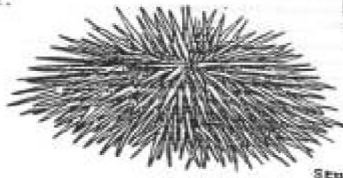
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PHYLUM ECHINODERMATA.

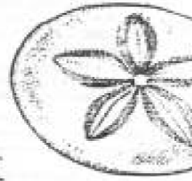
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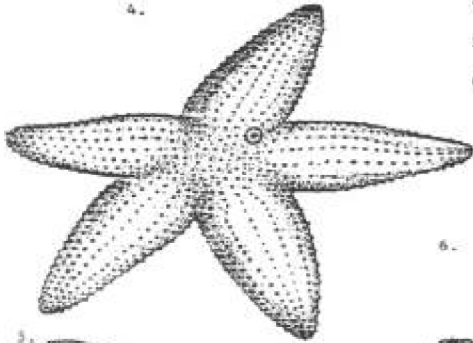


Student's Name _____

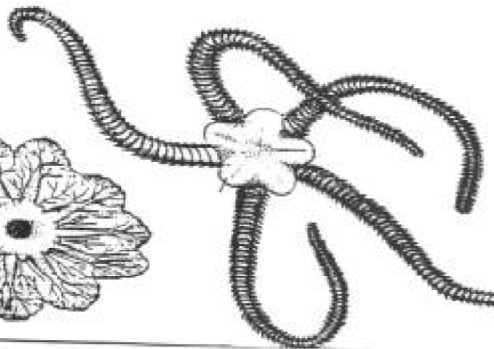
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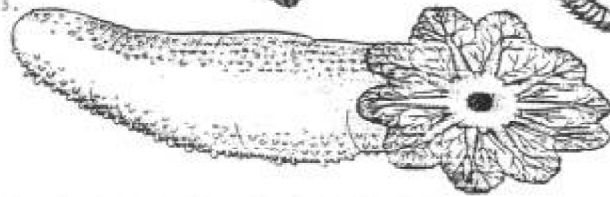
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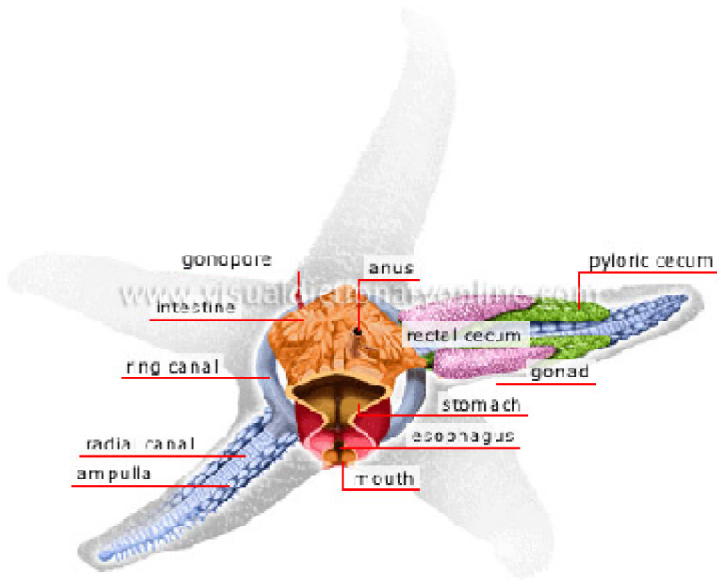
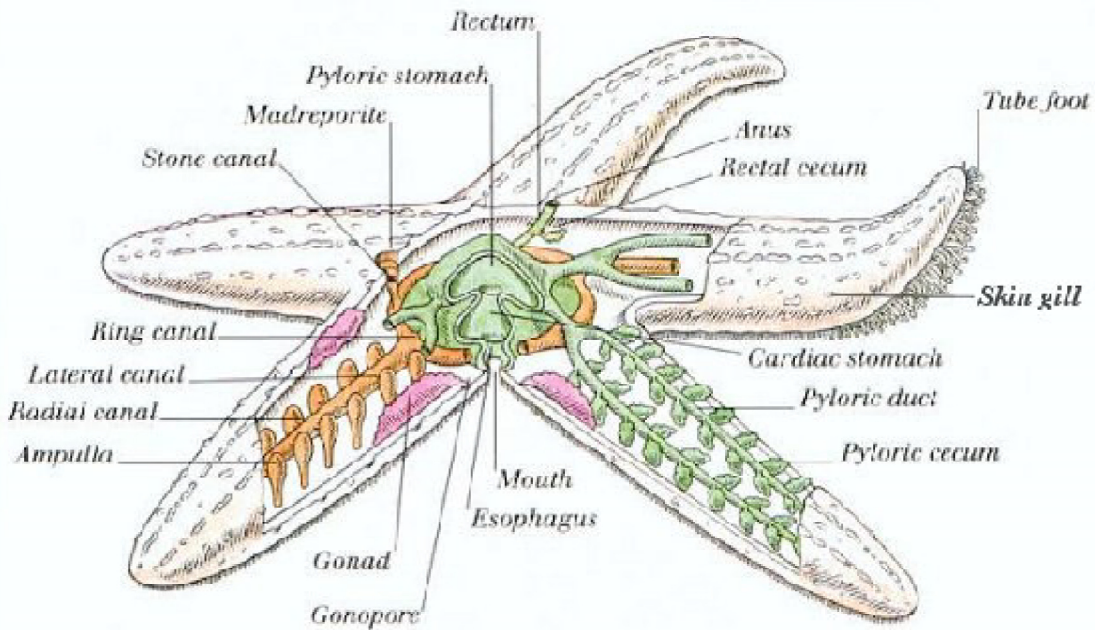


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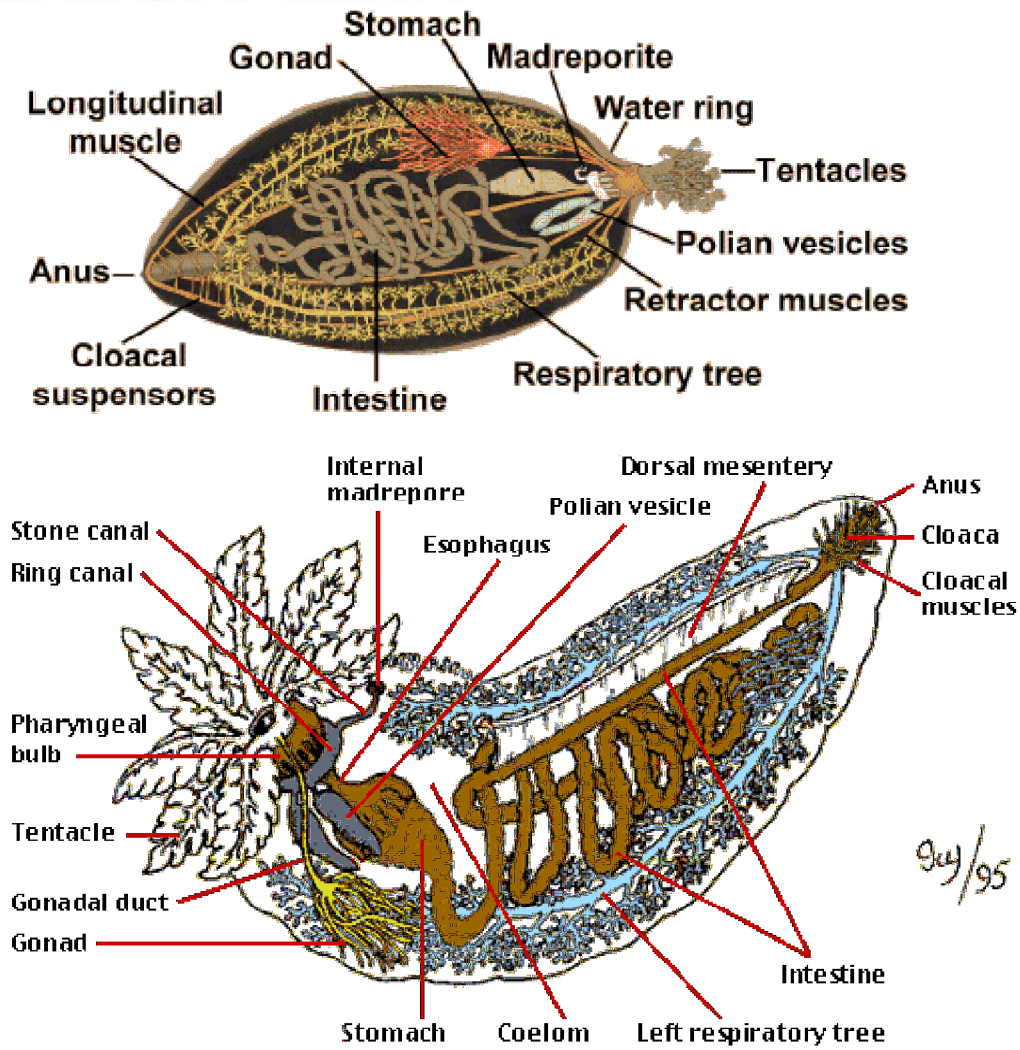


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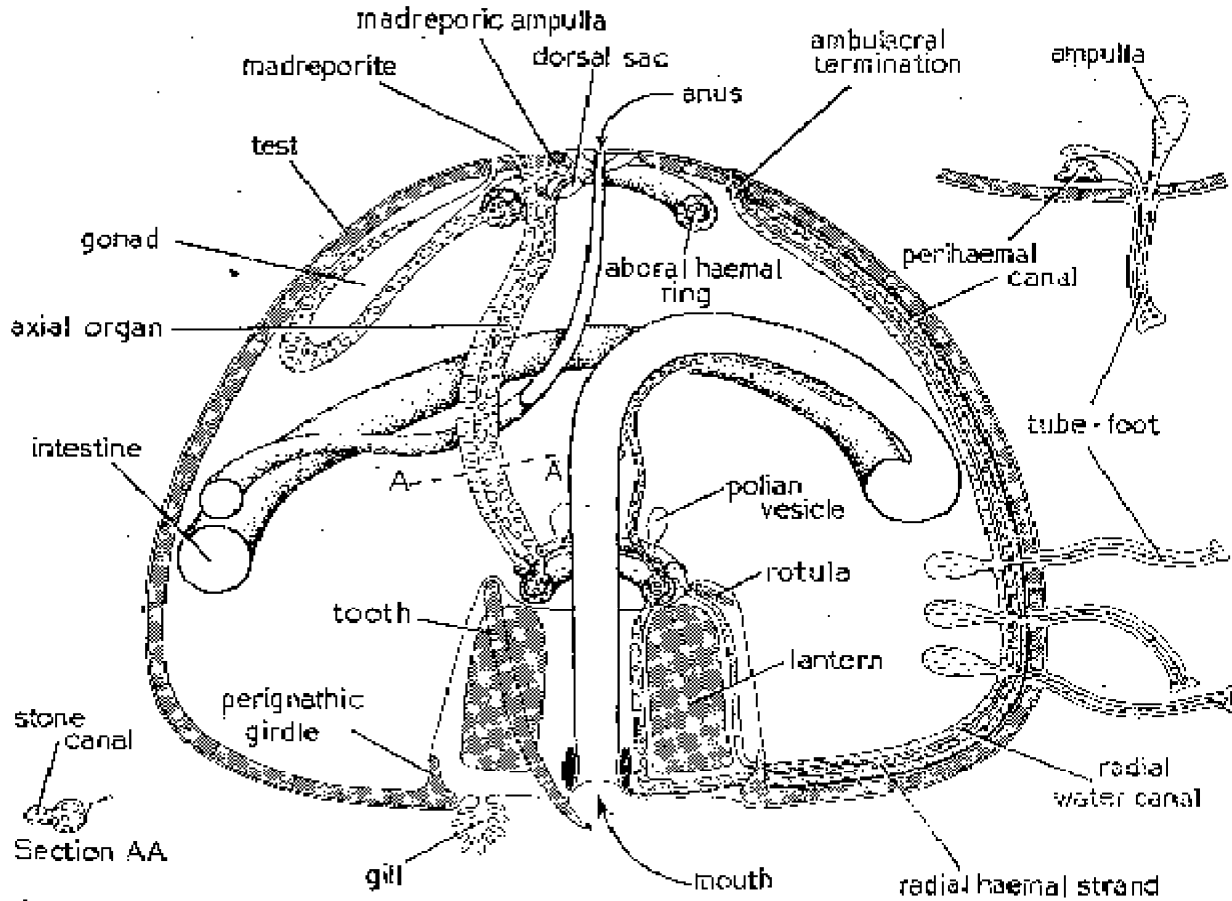
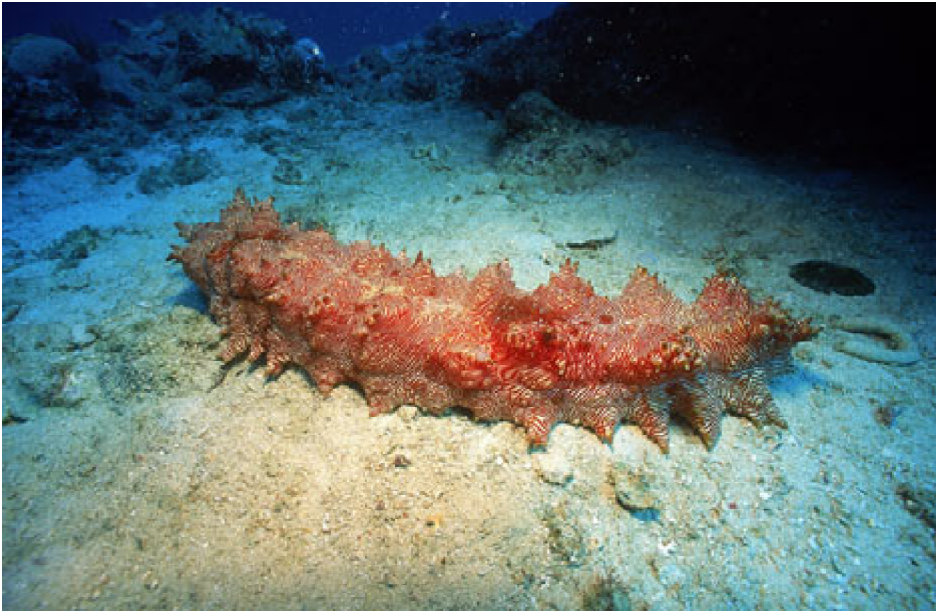
INTERNAL ANATOMY OF A STARFISH



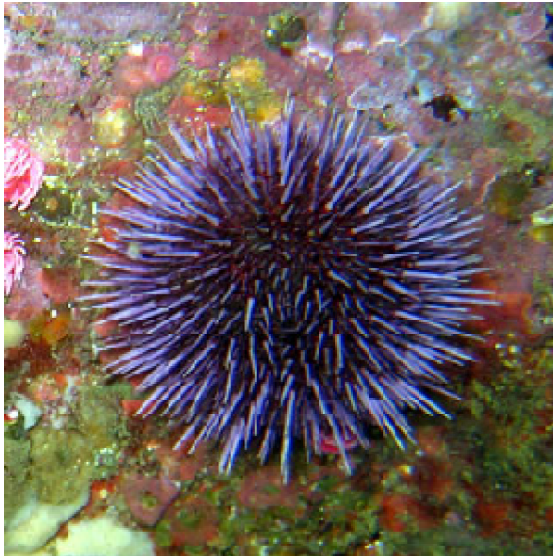
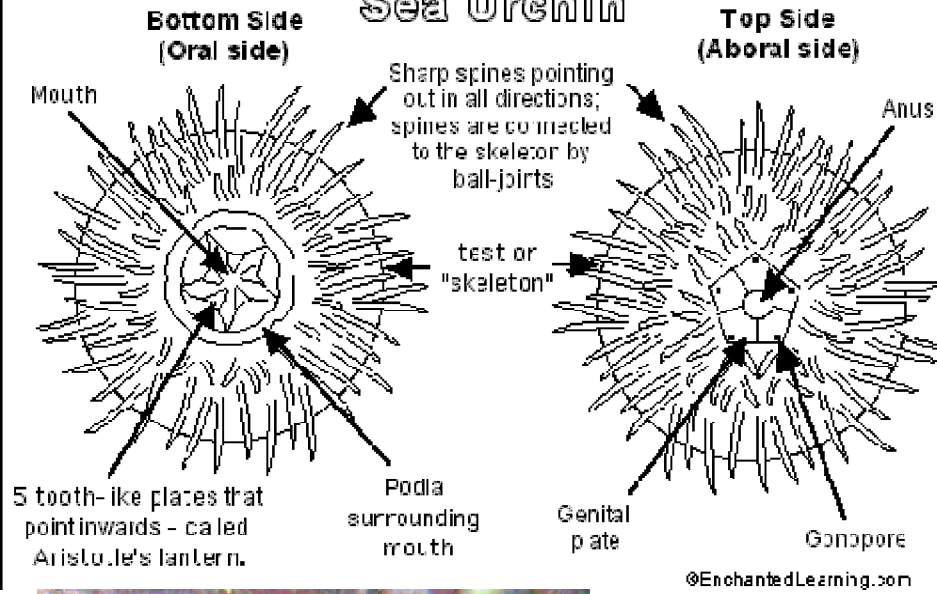
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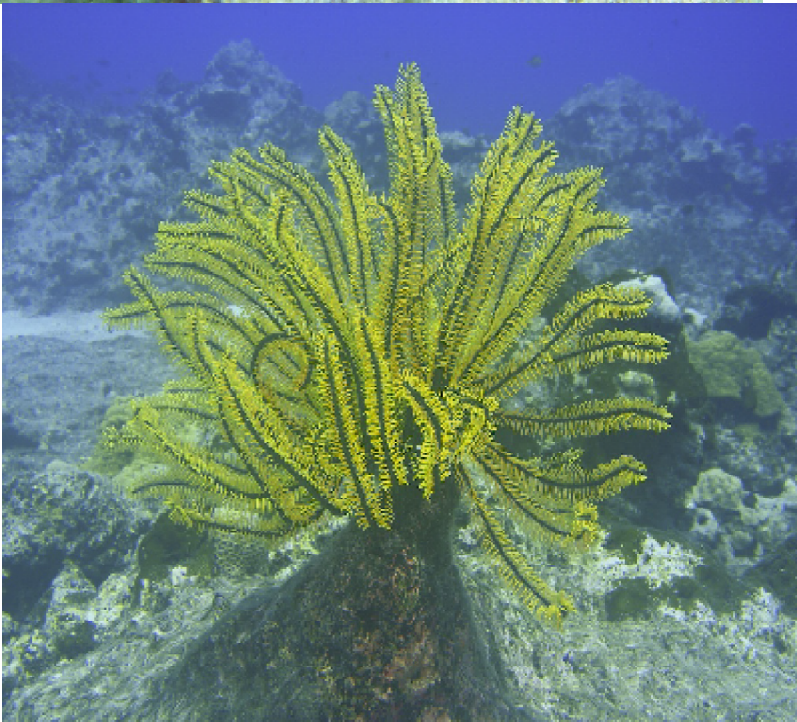
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Sea Urchin



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