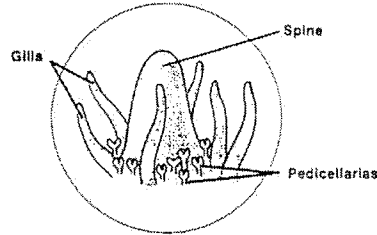


# Starfish Dissection

## Part A. External anatomy (aboral surface)

1. Place your starfish in the dissecting tray so the dorsal (aboral) surface faces upward.
2. There is a central disk in the center of the starfish and the five arms or rays that extend from it.
3. There are many spines scattered over the surface of the arms and the central disk. These spines are attached to the plates of the starfish skeleton just under the skin. These plates are called ossicles and make up the endoskeleton of the starfish.
4. Among the spines are skin gills and small pincer-like pedicellarias. The skin gills are the respiratory structures of the starfish and the pedicellarias keep the skin gills free of debris. You can see these structures on the diagram below.



5. Locate the small, round, wart like madreporite plate on top of the central disc. Water enters through this structure into the water vascular system of the starfish.
6. The tip of each arm has a small eyespot and a single tentacle used to detect light, touch and light pressure.
7. Label the *central disc*, *arm*, *madreporite plate* and *eyespot* on figure 1.

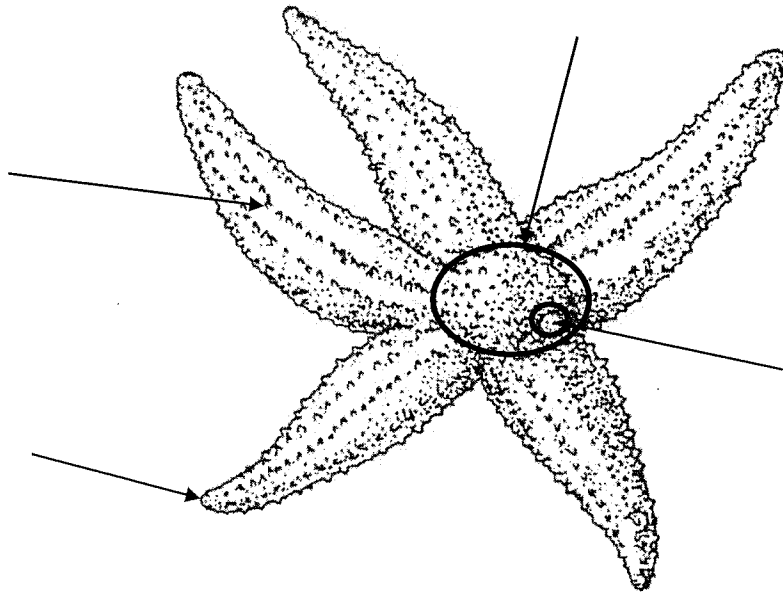


Figure 1

## Part B. External anatomy (oral surface)

8. Turn the starfish over to its ventral (oral) surface.
9. Locate the mouth in the center of the central disc. Find the ring of oral spines surrounding the mouth. These spines filter what go into and out of the starfish

10. Find the groove that extends down the underside of each ray. This is called the ambulacral groove. Feel the numerous, soft tube feet inside each groove. These are part of the water vascular system and aid in movement and feeding.
11. *Draw and label the mouth, oral spines, ambulacral groove and tube feet on figure 2.*

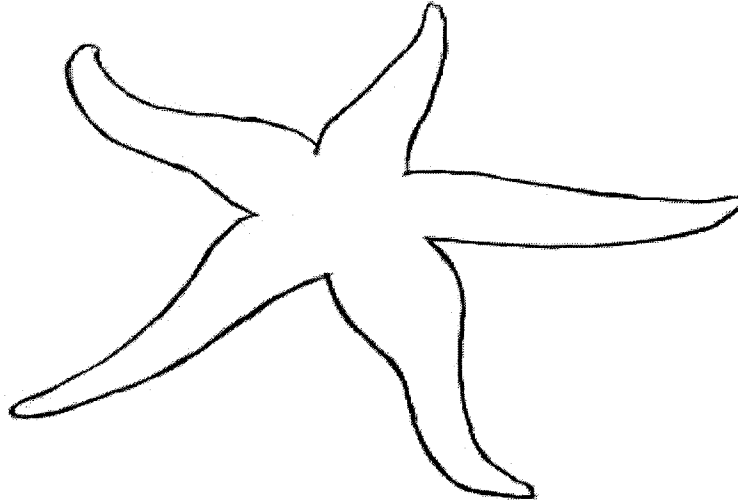
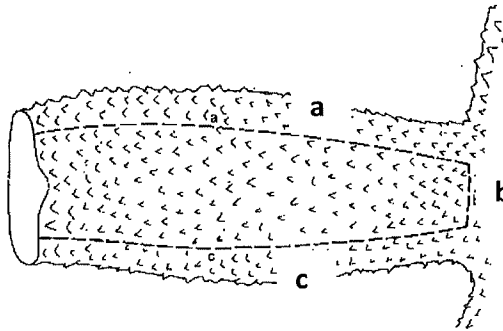


Figure 2

### Procedure (Internal anatomy)

12. With the starfish's aboral surface facing you, cut off the tip of a ray. Cut along lines a, b and c as shown below and remove this flap of skin.



13. Inside each arm, locate two long digestive glands called the pyloric caeca. They are branched, feather-like, olive-green in color and secrete enzymes used to digest food in the stomach.
14. Cut a circular flap of skin from the central disc (you will have to also cut around the madreporite). Observe the pouch-like cardiac stomach attached to the mouth under the central disc. This stomach allows a starfish to swallow up large food outside their body. Food is passed from this stomach to another stomach connected to the pyloric caeca, known as the pyloric stomach. This is where the majority of chemical digestion takes place. The anus is located on the pyloric stomach.
15. Remove the pyloric caeca from the dissected ray and find the gonads. Starfish are dioecious and have separate sexes. During spawning, the gonads are very large, but in preserved specimens, they are

usually quite small. The male and female gonads look very much alike in preserved specimens. In living starfish, the testes are gray and the ovaries are orange.

16. Label the pyloric caeca, cardiac stomach, pyloric stomach, anus and gonads in figure 3 located below.

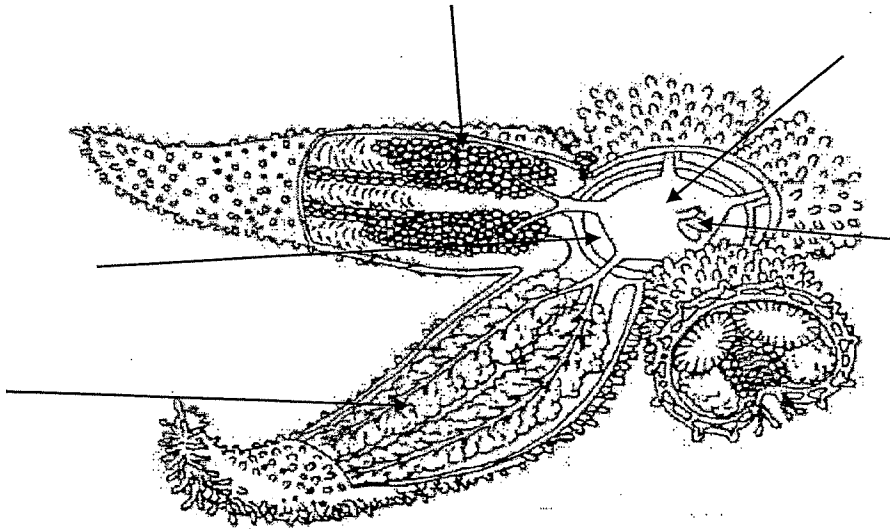
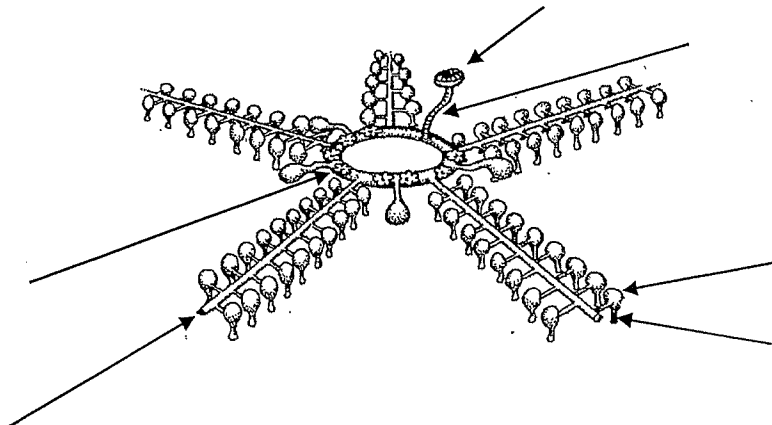


Figure 3

17. Carefully remove the reproductive organs and the remaining parts of the digestive system (including the stomach). Be careful not to damage the madreporite plate. This will expose the water vascular system.
18. Water enters the water vascular system through the madreporite plate. The madreporite plate is connected to the circular ring canal by the stone canal. The water is then distributed to the radial canals that are in each of the rays. These canals deliver water to the tube feet. Each tube foot contains an ampullae (bulb like structures) attached to a sucker disc. By alternating between contracting and expanding the ampullae, the starfish is able to move. As the ampullae contract, they force water into the tube feet, and the tube feet lengthen. The starfish places the lengthened tube feet in the direction it is going. Then the ampullae relax, and expand. When this happens, water leaves the tube feet, thus shortening each tube foot and creating suction at its end.
19. Starfish also use their tube feet to eat. Starfish will attach to clams and oysters, then use their powerful tube feet and suction cups to open the shell of their prey. Once a bivalve is opened up, a starfish will push its cardiac stomach out through the mouth and up against the body of the prey. Digestive enzymes are then secreted and once digestion is finished, the starfish will pull its stomach back in through its mouth.
20. Label the madreporite plate, a stone canal, ring canal, a radial canal, tube foot and ampullae in figure 4 located below.



# Sea Star Dissection Anatomy

