

Dissection: The Clam

Objectives

- To learn some of anatomical structures of the freshwater clam.
- To be able to make contrasts and comparisons of structures between different animal phyla as additional organisms are observed.
- To deduce the adaptive significance of differences in the structures of animal phyla as additional organisms are studied.

Introduction

The following exercises allow you to carefully examine some of the morphological and anatomical structures of a member of the phylum Mollusca. The phylum Mollusca is a very large phylum having over 50,000 species. Most of these species are marine but many can also be found in freshwater environments. The members of this group are characterized by their soft, unsegmented bodies, a muscular foot used for movement, and a thin layer of tissue called the mantle. In most species, the mantle secretes a hard shell.

The phylum is divided into at least seven classes. Those classes that you are probably most familiar with are the class Gastropoda that included the snails and slugs, the class Bivalvia (also called the Pelecypoda) that includes the clams, mussels and oysters, and the class Cephalopoda that includes the squids and octopi. In this exercise you will be studying the structure and anatomy of a freshwater clam. To begin this exercise, go to the Diversity section of the BiologyOne DVD. Select Dissections and then, after the introduction screen, select the Clam from the list of organisms.

In the dissection exercises, you will be asked to examine the organisms and learn something of their individual anatomy. Equally important is a comparison of the anatomical structures of between organisms, noting how they are similar, how they differ, and how their differences may be adaptive to the different life styles of these organisms.

Activity 23c.1 **Body Morphology**

Observe the exterior of the clam. The soft part of the clam's body is protected by a shell consisting of two valves hinged along one side. Is its shell symmetrical from side to side? From front to back? You should be able to find a raised region anterior to the hinge. This is called the umbo and is the oldest part of the shell. Along the posterior edge of some shells you may be able to find two openings between the valves. The opening farther from the hinge is the incurrent siphon that allows water to flow to the inside of the shell. The opening closer to the hinge is the excurrent siphon that allows the water to exit.

Become familiar with the external features of the clam.

To open the shell and observe the body of the clam you must cut the adductor muscles that hold the two valves closed. One is located in front of the hinge and the other is located behind. To cut these muscles, insert a scalpel between the valves. Holding the blade against the inner wall of one of the valves, carefully work the blade through the muscle. Keep the blade as close against the shell as possible to avoid cutting the soft body of the muscle.

Repeat this process on the second adductor muscle. Click on the forward arrow in the lower right to complete this dissection.

Activity 23c.2 **Internal Anatomy**

The body of the clam is composed of three main parts. The thin layer of tissue that lines the inner wall of the shell is the mantle. The second part of the body is the muscular foot. The third part of the body is the visceral mass that contains the organs. Cut away the mantle that covers the body of the clam. Click on the forward arrow in the lower right to remove the mantle. The structures that you can see without opening the body are the gills that extend posteriorly from below the umbo and the labial palps that are at the anterior end of the body. The labial palps surround the mouth.

The gills are one of the respiratory organs of the clam. Cilia on the gills and mantle create a current that draws water through the incurrent siphon into the space surrounding the gills. Water then exits through the excurrent siphon. The gills serve a dual purpose in the clam. Not only do they exchange respiratory gases with the water but they also filter food particles from the water. These small food particles are moved by cilia along grooves to the mouth.

The mantle of the clam is also highly vascularized and serves as a second respiratory organ.

Most members of the phylum Mollusca have an open circulatory system. This means that the blood, once pumped by the heart, does not stay in blood vessels but flows through large spaces in the body called sinuses. The blood then is collected from these sinuses and returned to the heart through veins.

You can view the heart of the clam by carefully cutting and pulling back some of the mantle from just under the hinge. You should see a space here, the pericardial sinus. Within this space you should see the elongate heart of the clam. With careful examination you may be able to see the pores through which the blood is pumped out of the heart into the body sinuses. To complete this dissection, click on the forward arrow in the lower right.

Just below the pericardial sinus is nephridium that is responsible for filtering wastes from the blood. To observe the organs of the clam's digestive system, use your scal-

pel to carefully bisect the foot and visceral mass into left and right halves. Click on the forward arrow in the lower right to complete this dissection.

Once dissected, you should be able to follow the digestive system from the mouth, along a short tube to the stomach. The stomach sorts out the non-digestible material and receives enzymes to breakdown the digestible material. The enzymes are produced by the digestive gland which is the soft gray-green tissue surrounding the stomach and intestine. Undigested food passes from the stomach, through the intestine and out through the anus. The waste material is then flushed from the mantle cavity by the water flowing through the excurrent siphon.

Depending on the season during which the clam was collected, you may see a large or small mass of soft yellowish tissue. This is the gonad that produces sperm or eggs.

After studying the internal features of the clam, label the illustration located in the Results Section.

Results Section

Activity 23c.2 Internal Anatomy

Label the illustration below

