Activity 3.2

That's Gross Anatomy, or What's Under that Shell?

- Grade Level
  3-8
- Subject Areas
  Science, Math, Language Arts
- Duration
  One or two class periods
- Setting
  Classroom
- Skills
  Measuring, identifying, describing
- Vocabulary
  Mollusca, bivalve, invertebrate, species, tissue, filter feeder, plankton, larvae, sessile, keystone, taxonomy
- Correlation with Next Generation Science Standards
  4-LS1-1

Materials:

- ☐ Dissection trays (plastic plates will work)
- ☐ Oysters (can be purchased from local seafood purveyor, 1 per every 2-3 students)
- ☐ Oyster shucking knife
- ☐ Thick glove for shucking
- ☐ Oyster anatomy diagram (Student handout-Activity 3.3)

Charting the Course
Students will examine the morphology and anatomy of an oyster through a dissection exercise.

Objectives / Students will be able to:
1. Examine and describe external features of an oyster.
2. Identify and record other organisms living on or in an oyster's shells.
3. Measure and record shell height and length using a metric ruler.
4. Dissect an oyster and identify main body parts.
5. Identify key features of a bivalve mollusk.

Procedure / Warm Up
Discuss the significance of the oyster to the health of the bay. Introduce the oyster in terms of important taxonomic concepts (ie. Invertebrate (soft-bodied animal lacking an endoskeleton), mollusk, bivalve vs. univalve). Explain that the focus of the lesson will be oyster anatomy (the structural make-up of the animal, examination of its parts).

The Activity

1. Divide the class into groups of 2-3 students. Provide each group with a live oyster on a tray.
2. Have the students examine and describe the oyster.
3. Identify the two shells or valves and compare them (one is more cupped and rough, the other smooth and flat; note—in nature the deeper valve is the one that is cemented down, the flatter valve acts as a lid). Are the two shells the same size? Is one thicker than the other?
4. What is the shape of the oyster? Identify the hinge, or umbo area, the narrow point where the two shells come together. This is the oldest part of the shell, as the oyster grows, shell is laid down at the opposite end. It is also the point at which the shells are attached to one another. The other end (the ventral margin) is free to open.
5. Look for other organisms on the outside of the shell, or the "scars" of organisms that were once there (sponges leave many holes on the shell surface, barnacles and oyster spat, leave an oval to round mark, oyster drills leave a single hole, worms may leave networks of tubes).
6. Measure the shell height (the longest line from umbo to ventral margin) and the shell length (the longest point across in the other, perpendicular dimension).
7. Record the measurements.
8. Draw the exoskeleton, or shell of the oyster and label the umbo.
9. Have students discuss the function of the shell, what does it do for the oyster?.
10. Have students try to open the oyster by pulling the shells apart. Ask them how the shells are held together so tightly.

11. The oysters should be carefully shucked open by the teacher. Methods for shucking oysters can be found on the World Wide Web by searching the keywords *how to shuck an oyster.* Warning—This is somewhat of an art and should be practiced before lesson. Teachers may want to have a separate class session for the internal anatomy, and if possible have the oysters shucked before students arrive in class. Tissues should be carefully dissected from one shell and remain attached to the second valve. Set the removed shell on top of the exposed body.
12. Have students remove the loose shell and describe the oyster's body. Can they see or feel bones, is the tissue hard or soft, wet or dry? Is there a head? Do they see blood?
13. Have students refer to the oyster anatomy diagram in Student Handout-Activity 3.3. Using the diagram have them locate the:
    a. Muscle—this is a notably different type of tissue, generally shaped like an oval. The muscle controls the opening and closing of the shells. The muscle leaves a scar on the shell at the point where it is attached. Have students find the muscle scar.
    b. Mantle—this is the loose outer tissue that covers the entire body.
    c. Gills—pull back the edge of the mantle to view the gills. There are four layers of gills, you will be able to see tiny lines crossing the gill surface. The gills are covered by tiny hairs, known as cilia, that move water across the oyster's body and move food and remove oxygen from the water.
    d. Palps and mouth—follow the gills up toward the umbo area. There will be a slit followed by two thicker layers of tissue these are the palps and this is the area where the mouth can be found. Food enters the oyster through the mouth.
    e. Stomach and digestive glands—locate the area where the stomach can be found. The stomach lies under the mantle layer and will often be dark brown. In connects to the intestines and the digestive glands. This is where food is broken down into usable nutrients.
    f. Rectum—the rectum can be found along the edge of the muscle. It is a tube through which wastes are eliminated.
    g. Heart—the heart lies just above the muscle. Sometimes you can see it beating. It is located in a clear sac and looks like a tiny sponge connected to a tube. Oysters have blood, but it is not pigmented red like human blood. The heart pumps the blood through the oyster's body. Note mollusks have an open circulatory system, there are no definite veins, blood instead drains through open sinuses within the body.
    h. Tentacles on mantle edge— Oysters sense the surrounding world through tentacles that are present on the edge of the mantle. They can sense changes in light, chemicals in the water, sediments, and temperature. Oysters don't have a brain, but they do have simple nervous systems containing nerves and organs called ganglia. These will not be visible in the dissection.
    i. Inner shell surface—have students describe the inner surface of the shell.

Wrap Up / Without referring to the diagram, have students point out the main features of the oyster to one another and discuss the functions of the various structures. Discuss with students how the oyster's anatomy allows them to live in the environment that they inhabit. Have students describe and draw a real or fictional predator of the oyster.

Assessment / Have students draw and label their own oyster anatomy diagrams. Have students compare and contrast oyster anatomy with that of a human.

Extensions / Set up an aquarium containing oysters and allow the students to observe feeding and resting living oysters. Have students compare and contrast common bivalve mollusks, including mussels and clams. Discuss how they are similar and how they are different. Take the students to the beach for a mollusc scavenger hunt and use a field guide to identify the shells that they find. Have students, trace oyster shells, and construct 3-d models of oyster anatomy (include valves, mantle and muscle, and internal organs).

Have students calculate the average and graphically represent shell height and length measurements. Have students report on other common bivalve mollusks such as the hard clam, *Mercenarai mercenaria*, the blue mussel, *Mytilus edulis,* the soft shell clam *Mya arenaria,* the surf clam *Spisula solidissima,* and the ocean quahog, Arctica islandica. Students should identify the species habitat and size range. Using illustrations or real shells students can construct mobiles of common bivalves.

Figure 1.

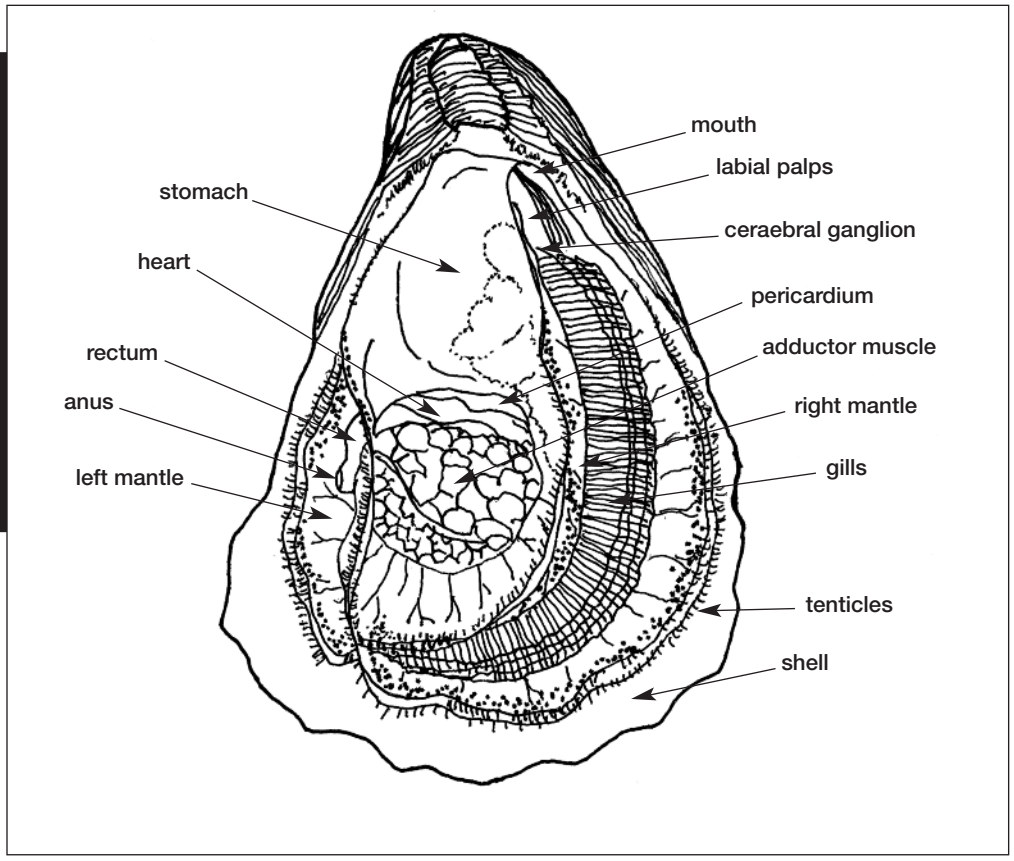

Figure 1. Anatomy of the oyster, Crassostrea virginica and proper methods for measuring shell height, length, and width. Figure modified from Galtsolf (1964)

Student Handout Activity 3.2—That's Gross! Antatomy