Poke A Squid

(HHMI/PWSSC Marine Science class, 6-8)

Objectives

After participating in Poke A Squid, students will be better able to:

· discuss the general adaptations of squid to the marine environment [better appreciate how structural differences among organisms are related to their habitats].
· classify living things based on shared characteristics
· understand the value of dissection to learn about anatomical features and utilize as a scientific skill, along with observation

Materials

Squid (15)	paper plates	scissors (17)
Forceps (17)	paper towels	flippers Squid
dissection tents (17)	goggles	snorkel piece
Mollusk poster	magnifying glasses (17)	squid mounts
Dissection poster		

Before the Class

Defrost squid. Set up groups, students will work in pairs, with the materials needed for the dissection – each group will need a plate, a paper towel, one pair of scissors, forceps, magnifying glass and squid dissection tent. Provide squid only when ready to start observations.

Outline

I. Introduction – you're a merman…(5 minutes)
   a. Welcome and review of assembly, quick preview of class
   b. Using a volunteer and swimming pieces, discuss what kinds of adaptations would make a human suitable for a marine environment while contrasting what characteristics make life on land possible

II. Mollusca (5 minutes)
   a. Introduce this phylum and its species with pictures. Take general characterizations of Mollusks and examples from students.
   b. Discuss their similarities and differences compared to other marine life, their similarities and differences with humans – focus this comparison on squid

III. Squid – poke, poke (25-30 minutes)
   a. Review dissection rules and explain its usefulness to scientists. Discuss names and proper usage of tools.
   b. Pass out squid. Help students orient themselves and their squid by using the Squid Dissection Tents.
   c. Work through dissection with students; have a guide to help with the process

IV. Review
   a. Bring class back together. Have students share observations and questions about the process and squid.
   b. Clean up – students should keep the Dissection Tent, all other things can go away.
   c. Go through the questions on the Squid Tent that you may not have covered, highlight the various similarities and differences between squid and humans. Share random squid facts.

Modifications

If there are examples of mollusks available for observation, share these and discuss their characteristics instead of using the pictures. These can also be dissected if time and interest allow. The class can be taught with an emphasis on taxonomy if students are familiar or are learning about classification. Depending on number of students and resources, group size can change – individuals can dissect a squid or the groups can be larger. Despite early objections by a squeamish few, most students warm up to the idea quickly and enjoy the process.

Description of Activities

1. **Make a Merman** – Utilize swimming tools (flippers, goggles, etc.) to makeover a student as a sea creature to highlight the differences between marine and terrestrial life. Use this fun welcome to introduce the concept of adaptation, the development of physical and behavioral characteristics that allow organisms to survive and reproduce in their habitats.

2. **Mollusks** – Mollusk is the common name for members of a phylum of soft-bodied animals, usually with a hard external shell. Familiar mollusks include the clam, oyster, snail, slug, octopus, and squid. The mollusk phylum is the second largest in the animal kingdom, after the arthropods. Have students share their observations, focusing on the characteristics that allow them to thrive. The distinction of mollusks as vertebrates should be highlighted. One feature that appears to be missing in Squid (and octopus too) is the hard external shell. Challenge students to remember this while dissecting.

~SQUID FACTS~

- There are about 400 species of squid.
- They range in size from 4 inches long to the giant squid at 57 feet long.
- They are found from the Arctic to Antarctic in all depths of water.
- They are carnivores and eat fish, jellyfish, crab and shellfish
- They are eaten by fish and seals and even sperm whales eat the really big giant squids.
- Squid are the fastest swimmers among the invertebrates. Some species of "flying squid" have been known to leap out of the water for short distances reaching speeds of 16- 20 mph.

3. **Squid: poke, poke** –Before any investigating begins, go over the rules of dissection and name the tools that they will work with. Work through the pages to orient students to the process and to set a pace at which to work. The first job is to arrange the squid and learn some vocabulary to make the rest of the process easier – direct students to use the picture as a guide. Read the tip together – "In all steps, try not to squish your squid as it makes identifying organs difficult."
    a. Go over the questions:
        i. What are the spots and what are they for? – They are chromatophores. They can change shape and color to allow the squid to camoflauge itself.
        ii. How do squid move through the water? – Water enters the mantle portion and then is jet through the funnel to propel the squid. (Have kids find the siphon/funnel.) The fins provide steering.
        iii. How many arms does the squid have? How many tentacles? What is the difference? What's the purpose of each? – There are 8 arms and two tentacles. The arms are shorter and have suction cups all along their length. The tentacles have the suckers only at the ends. The tentacles catch prey, which can be passed along to the arms and then to the mouth.
    b. The following questions appear in the Dissection Tent, whether they are answered completely depends on time and student interest.
        i. How is the squid eye similar/different from our eye? The eye structures are similar, including a lens, retina, and covering. (The squid does not have a cornea, though the structure is similar.) The squid's lens moves around the eye, focusing only when something catches their attention. They have keen eyesight.
        ii. What might this squid eat? Small fish and invertebrates
        iii. What is surrounding the squid's beak? The brain; the spinal cord may also be attached to the brain tissue.
        iv. What is the purpose of the pen? The pen is the squid's only remnant of a protective shell. It may provide support to the mantle.
        v. What is the purpose of the ink? Defense from predators

4. Review – Add information that interests you. Let student interest drive the summative conversation.

Squid Vs. Human Systems:

The Circulatory system (Human)
In the human body, blood is needed to transport oxygen, nutrients, and carbon dioxide to the body's cells and transports wastes to the excretory organs. The heart is the primary organ of the circulatory system. The heart has four chambers that are separated by valves. Blood is pumped by the heart and moves through the body in arteries, which carry blood away from the heart. Veins return blood to the heart and capillaries connect veins to arteries at the cell level.
Circulatory System (Squid)
The squid have three hearts. One heart pumps blood to the body and the other two pumps blood to the gills.

Respiratory system (Human)
The respiratory system is a group of organs working together to get the oxygen form the air to the body's cells. Air enters your body through your mouth or nose where it is warmed, moistened and filtered. Air then travels to the lungs through the trachea or windpipe where the exchange of oxygen and carbon dioxide takes place.
Respiratory system (Squid)
Squid respire with gills. They must constantly circulate seawater over their gills where the oxygen from the water diffuses across the cell wall into their gills. The blood that is pumped through the gills picks up the oxygen and carries it throughout the body.

Excretory system (Human)
The kidneys remove wastes form the blood and maintain the body's water and salt balance, are the primary organs of the excretory system. Urine a mixture of urea, excess salts and water flow through the urethra to the urinary bladder where it is stored until discharged.
Excretory system (Squid)
Squid also have an excretory organ (kidney) to expel wastes from the body.

The Reproductive system (Human)
The reproductive system is not necessary for the survival of an individual but for the survival of the species. The gonad is the primary organ. Female reproductive organs are the ovaries and produce eggs. The male's reproductive organs are the testes and produce sperm.
Reproductive system (Squid)
Squid females produce eggs and males produce sperm. In some species the gonads are quite large and the eggs may be see through the membrane of the organ. Some species of squid have a nidamental gland that produces the egg yolk

Digestive system (Human)
Two groups of organs make up the digestive system. One forms the digestive tract, which includes the mouth, esophagus, stomach, small intestine and large intestine. Other organ groups include the digestive glands such as the pancreas and liver. These glands produce the digestive liquids that break down food that is eaten and passed through the digestive tract.
Digestive system (Squid)
The esophagus may be followed from the mouth to the stomach. And like humans, they too have digestive glands, such as a liver.

Vision: (Human)
Humans have keen eyesight. The structure of the eyes includes a lens, retina, and a cornea covering the eye.
Vision (Squid)
Squid also have keen eyesight. Their eye structure includes a lens, retina and a covering over the eyes, similar to the human cornea.