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CHAPTER 27

Mollusks and Annelids
Section 27–1

SKILL ACTIVITY
Making charts

Mollusks in Our World

Charts are used to present data or information in a clear and orderly way. In this activity you will organize information about the economic importance of mollusks.

Mollusks have had a significant impact on humans and human societies throughout history. The most important use of mollusks has been as a source of food. Mollusks are a rich source of protein, vitamins, and minerals.

Bivalves are among the most popular mollusks used for food in the United States. They are usually steamed, baked, or fried, but clams and oysters are sometimes eaten raw. Gastropods are also used for food. Escargot—land snails—are considered a delicacy in many places. Conch and abalone are also eaten in many areas. Of the cephalopods, squid and octopus are popular foods. Calamari, for example, is squid cooked in a variety of ways.

In addition to their use as food, mollusks have been used as money and as decoration. Tusk shells, beads cut from clam shells, and cowrie shells have all been used as money in different societies. In addition, many rare and beautiful shells are collector's items that are worth a great deal of money. The pearls produced by certain bivalves are valuable gems.

1. Use the information in the passage to construct a chart that lists some of the mollusks and their uses.

Class of Mollusk	Used for	
	Food	**Trade/decoration**
Bivalve		
Gastropod		
Cephalopod		

Most of the uses that you listed in your chart are probably not new or unfamiliar to you. However, people working in biology, medicine, and genetic engineering are suggesting additional uses for some of these mollusks.

Mussels, for example, produce a protein that acts like glue and works in salt water. Doctors are interested in this sticky protein because they think it could be used as a glue inside the wet, salty environment of the human body. Scientists also realize that since bivalves are filter feeders, they concentrate pollutants and microorganisms in their tissues.

2. What uses might the mussel protein have for the United States Navy?

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3. Only very small amounts of mussel protein can be extracted from mussels. How might scientists use these small amounts to produce more of it in the laboratory?

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4. How can bivalves be used as environmental monitors?

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CHAPTER 27

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SKILL ACTIVITY
Drawing conclusions

Investigating the Behavior of an Octopus

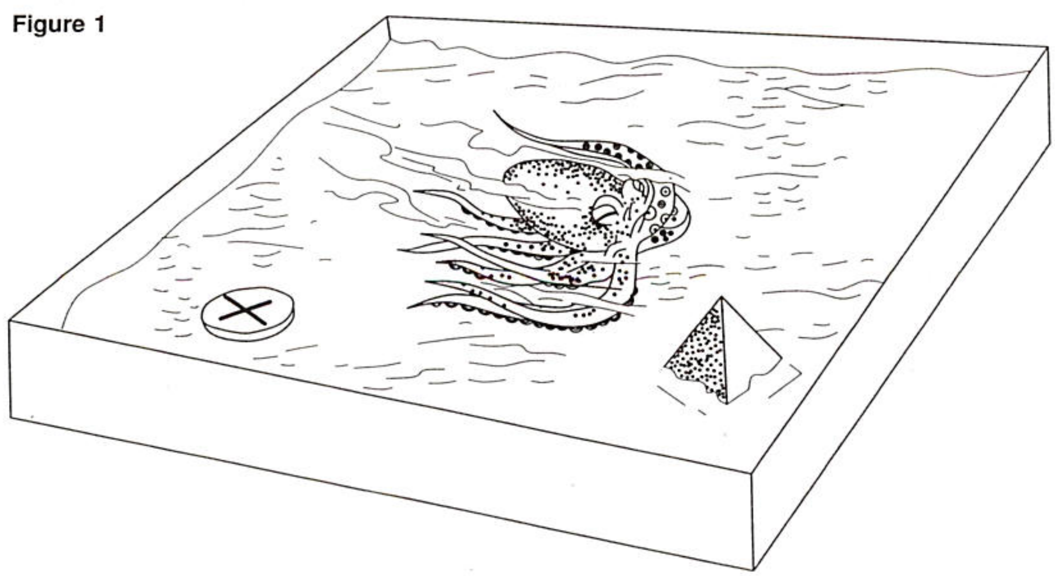
Drawing conclusions from experimental data is an important skill in science. Biologists must be careful when they draw conclusions about animal behavior so that they will not make incorrect interpretations. In this activity you will draw conclusions about the learning capability of a cephalopod—the octopus—and how its nervous system coordinates sensory data.

The behavior of an octopus is often described as showing "curiosity." It investigates its surroundings and is attracted to some objects and avoids other objects. This behavior makes it possible for the octopus to adapt to life on the sea floor, where it must find food and avoid predators.

An octopus has well-developed eyes similar to human eyes. Images received by the octopus's eyes are processed by brain regions called optic lobes. The suckers on the tentacles of an octopus are sensitive to touch and to a variety of chemicals. In a way, the octopus uses its tentacles to smell and taste.

The following experiments were done to study the behavior of an octopus. Figure 1 shows an experimental setup used to study the learning capability of the octopus.

Figure 1



When the octopus approached the disk marked *X,* it was given a mild shock. When it approached the pyramid-shaped object, it was rewarded with food. In an earlier experiment, it was shown that in the absence of shock or reward, an octopus approached both objects and showed no particular preference for the disk or for the pyramid.

After being trained, the octopus responded differently. It was placed into a tank that contained each of the objects described. Its behavior is summarized in Figure 2.

Figure 2

BEFORE TRAINING Approaches Object		AFTER TRAINING Approaches Object	
Disk 42	Pyramid 40	Disk 8	Pyramid 81
Avoids Object		**Avoids Object**	
Disk 44	Pyramid 46	Disk 92	Pyramid 11

1. What conclusion about the learning capability of the octopus can be made from this experiment?

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2. Suggest ways in which the response of the octopus to the experiment helps it adapt to its environment.

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3. Speculate about what the results of these experiments might have shown if the octopus had no "curiosity."

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An octopus can gather and process different kinds of information from various sense organs. The areas of its brain that process visual information and information about touch do not communicate with each other very well. A receptor is a sense organ that receives sensory stimuli. An effector is a muscle or organ that carries out a response to a stimuli. With this in mind, use the experiment on the next page to draw conclusions about the nervous system of the octopus.

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Crabs are the preferred food of the octopus. A hungry octopus will approach and attack a crab if it is not too large. Figure 3 shows an octopus trying to attack a crab through a glass plate. By chance, one of the tentacles of the octopus reaches over the glass and it grabs the crab. The octopus does not attempt to move around the glass even though it can see the crab and feel it with its tentacle.

Figure 3

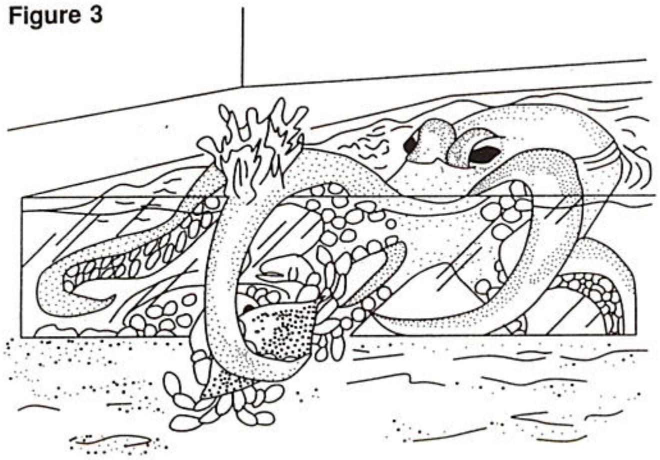

Figure 4

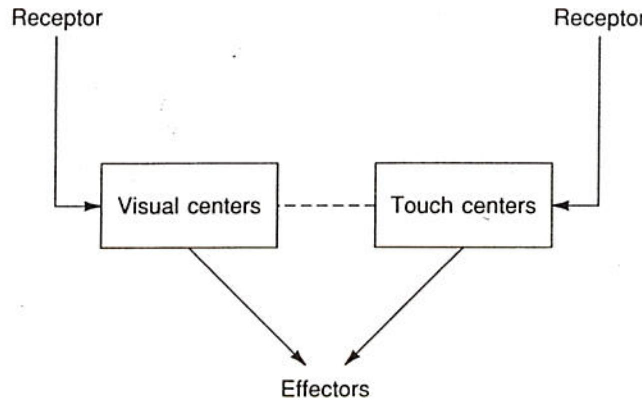

Figure 4 is a diagram illustrating how the nervous system of the octopus might have functioned in the experiment shown in Figure 3.

4. Use Figure 4 to describe how the visual and tactile (touch) centers of the octopus operate. Discuss the kind of information that is communicated or processed by each area.

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5. What conclusions can be made about the link between the visual and the tactile centers of the nervous system of the octopus based on the experiment shown in Figure 3?

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6. Imagine that a similar experiment was performed with a cat or dog. Draw a diagram on the next page to show how the animal might respond to the glass. Give a reason for your predicted response on the lines below.

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Word Game

On the lines below, write the word or words that best fit the description on the left. When you are finished, the boxed-in letters will spell out one of the topics discussed in the chapter. Fill in that word or phrase in the space provided.

1. "Head-foot" mollusk with tentacles ______ ☐ ___
2. Softbodied animals that have an internal or external shell ___ ☐ ____
3. Tube-shaped organs that remove ammonia from the blood and release it to the outside _____ ☐ ___
4. Name meaning "stomach foot" ☐ ________
5. Soft, muscular body part that contains the feeding structures of mollusks _ ☐ __
6. Part of a mollusk that contains the internal organs ___ ☐ ____ ____
7. Blood-sucking external parasite that lives in fresh water ____ ☐
8. Tongue-shaped feeding structure in mollusks _ ☐ ____
9. Worm characterized by paired paddlelike appendages on its body segments _______ ☐ __
10. Thin, delicate tissue layer that covers most of a mollusk's body ___ ☐ __
11. Segmented worm ___ ☐ ___
12. Hard covering made of calcium carbonate secreted by mantle glands ☐ ____

Worms that have few bristles and lack appendages ____________