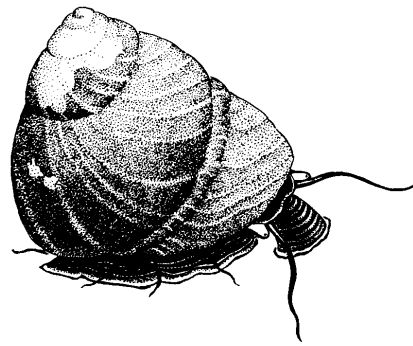


I Have a Shell



Topics

Shells, Adaptations

Grades

PreK- 2

Site

Indoor

Duration

20 minutes (minimum)

Materials

- Animals with shells, pictures of animals with shells and/or shells from seafood markets or restaurants
- Hand lenses
- Pencils, colored pencils
- Science notebooks
- Hinges from hardware stores (optional)
- Clay or play dough (optional)

Vocabulary

adaptation, mollusc, shell

National Science Education Standards

Science as Inquiry (K-4)

Abilities necessary to do scientific inquiry

Life Science (K-4)

Characteristics of organisms
Organisms and environments

Overview

How do animals survive at the rocky shore? Some have hard shells that help them deal with strong waves, receding tides and predators. Students will learn about two kinds of molluscs and examine, sort and illustrate shells.

Objectives

Students will be able to:

- Recognize different kinds of animals with shells that live at the rocky shore.
- Describe the benefits of having a shell at the rocky shore.
- Investigate and sort different kinds of single and paired shells.

Background

The rocky shore is a habitat with strong, pounding waves, rising and falling tides and many predators. To survive in this habitat, animals have **adaptations** to deal with these challenges. One of these adaptations is the presence of a shell. A **shell** is often a calcium carbonate structure that protects an animal's soft body from waves and potential predators. It also allows them to trap water so as to survive low tides.

Many animals with shells living at the rocky shore are **molluscs**. A mollusc is an animal that has a soft body, muscular foot for movement, "toothed tongue" called a radula and a mantle which is a heavy fold of tissue that secretes a shell. Molluscs are a diverse group of animals and do not always have all characteristics. For example, an octopus is a mollusc and only has a trace of a shell left; a slug is a mollusc but has no shell.

There are seven classes of molluscs. One class consists of the gastropods. Shelled gastropods only have a single shell. Gastropod means "belly-footed" and attempts to describe the muscular foot which is on the animal's underside. This class includes snails and slugs. Gastropods crawl in search of food, using their elongated, muscular foot. Some are creeping grazers, some are predatory and have biting jaws as well as a radula and still others have no radula and feed with a piercing proboscis. Gastropods are the largest and most varied class of the molluscs.



VOCABULARY

Adaptation: organism's behavior and body parts used for survival

Mollusc: a soft-bodied animal, some of which have a shell

Shell: calcium-carbonate structure that an animal uses for protection

Another class of molluscs are the **bivalves**. Bivalve means "two valves," a valve being a shell. This class includes clams, oysters, mussels, scallops and other animals which have two shells joined by an elastic ligament which functions as a hinge. Some can move, like clams, by contractions and expansions of their large muscular foot. Scallops can even swim by clapping their shells. Others rarely move, like mussels, which live most of their lives attached by threads secreted by their small, narrow foot. Oysters don't move at all and are cemented by one shell to a rock or other oyster shell. Most bivalves filter-feed by trapping fine food particles as water flows over their gills. As filter feeders, they do not actively search for their food but wait for their food to drift by.

Many bivalves are edible and have been an important part of the human food supply since prehistoric times. Also, by filter-feeding, they recycle vast amounts of organic material and strain harmful bacteria from polluted waters.

Teacher Preparation

1. Gather images of a variety of molluscs like marine snails, clam, mussels, oysters, and scallops. Find some on pages 26, 27, 42 and 43 of the Sea Searcher's Handbook at www.montereybayaquarium.org/lc/teachers_place/resources_seasearchers.aspx. You can also use actual molluscs if you have a classroom aquarium or terrarium.
2. Find a sampling of single and paired shells at local seafood markets or restaurants to bring in for students exploration. You will probably need to clean the shells by soaking or boiling them before classroom use. (We don't encourage collecting shells from a beach or other natural area due to habitat impact and local regulations.)
3. Gather hand lenses for student explorations. Read through the procedure to decide if you are going to provide examples of hinges and clay or dough for the students to make a model.



CONSERVATION TIP

Many people don't know that collecting empty mollusc shells at the beach can deprive an animal of a home (like hermit crabs who use empty shells for protection).

Remind students not to collect shells when visiting a beach, so shells will be available to animals who may choose to make them their home.

Procedure

Part One: Benefits of a Shell at the Rocky Shore

1. **AS A CLASS, OBSERVE ANIMALS WITH SHELLS.**
Pass out photos of animals with shells (e.g., turban snail, hermit crab, mussel, clam and so on) or look at animals with shells in a terrarium or aquarium. Ask students what they notice about the animals? *What similarities do they have? (shells) What are differences? (size, shapes, colors)*
2. **DISCUSS THE IMPORTANCE OF SHELLS FOR SURVIVAL AT THE ROCKY SHORE.**
Ask students why animals at the rocky shore might have a shell. This may be a good time to look at photos or do a visualization of a rocky shore. *What are challenges to animals living at a rocky shore? (waves, tides, predators) What adaptations or body parts do the animals have to survive those challenges? (shells, ability to stick, ability to "go with the flow") How does a shell help an animal survive in a rocky shore habitat? (protection from crashing waves, closes tightly to trap water inside during low tides, protects soft edible bodies from predators)* Have students look at the animals with shells again. *Are all shells alike? If they vary, how are they different?*

Part Two: Shell Exploration

3. IN SMALL GROUPS, STUDENTS EXPLORE AND SORT VARIOUS MOLLUSC SHELLS.

Pass out hand lenses and a variety of single and paired shells. Give students time to examine them. Challenge students to sort the shells by size, color, shape, or other characteristics. Match pairs of shells that are the same size, color, and shape. You may ask them questions like: *What do you notice? What colors do you see? What size are the shells? What shapes are the shells? What do you think the animals' that lived in the shells looked like?* Tell students that the shells belong to animals called molluscs. Some live on land, many live in fresh or salt water. The molluscs have a muscular "foot" for moving and a soft body

4. STUDENTS EXAMINE SINGLE SHELLS.

Have students sort the shells into groups of single shells and paired shells. One kind of mollusc (a gastropod) often has a single shell. (Note: not all gastropods have a shell, e.g., slugs) Can students think of any land animals with a single shell? (*a garden snail*) Gastropods are more commonly known as snails and slugs. Have students look at single shells and pictures of animals with a single shell. Ask: *How does a single-shelled animal like an abalone or turban snail survive in the rocky shore? (foot holds on to rocks, shell can clamp down on rock to hold water in during low tide, shell protects from waves and predators)* Have students choose one shell to illustrate in their science notebook.

5. STUDENTS EXAMINE PAIRED SHELLS.

Now have students examine the paired shells and pictures of animals like clams and mussels. These are other kinds of molluscs because they have two shells. Compare the joined connection to a hinge. What else has a hinge? (*door, window*) What does a hinge do? (*It allows flexibility and movement between two connected objects; in the case of doors or shells, hinges allow both to open or close.*) How might having "hinged" shells help a mussel or clam survive in the rocky shore? (*trap water inside, open to feed and move, close to protect itself*)

6. STUDENTS ACT OUT AND DRAW ANIMALS WITH PAIRED SHELLS.

Have students pretend to be animals with "hinged" shells. Sample instructions are: *Put your hands with palms together. Keep your fingers together and open your hands at the top. Then snap your hands shut! How do you get your food? How do you avoid predators?* Challenge students to illustrate one kind of bivalve in their notebooks.

Part Three: Create a Model Mollusc

7. STUDENTS CREATE A MODEL OF A MOLLUSC.

Pass out clay or dough to each student. Challenge them to make a model of a mollusc. They may choose to create one with either one shell or paired shells. Students can shape the clay or dough with their fingers and use a pencil to make an opening in the shell. Have them share their models with the class and describe their "animal" and how it survives at the rocky shore. You may want them to write this in their science notebooks too.



ELL TIPS

Building on prior knowledge is an important support for English Language Learners encountering new concepts.

Prior to the activity, explore components of a rocky shore by reading books or showing videos to provide context for the shell investigation.

**THE MISSION OF THE
MONTEREY BAY
AQUARIUM
IS TO INSPIRE
CONSERVATION OF THE
OCEANS.**

8. AS A CLASS, DISCUSS THE IMPORTANCE OF SHELLS FOR SURVIVAL AND HOW HUMANS CAN AVOID BEING ONE MORE CHALLENGE TO LIFE AT A ROCKY SHORE.

Discussion questions may include: *How do molluscs shells help them survive waves, predators and tides at the rocky shore? Do you think humans can be a challenge to molluscs living at the rocky shore? Why or why not? (trash and other pollution, stepping on animals, taking shells, taking animals out of the water) What are actions we can take to make sure we're not a challenge?* This may be an appropriate time to explain how things in the street can end up in the ocean by traveling through storm drains and local rivers and streams.

Extensions

- As a class, sort the modeling clay shells by size, shape, or color. Make a graph showing the number of each characteristic. Tally sizes—small, medium and large or by shapes—circles, squares and triangles.
- Challenge students to find pairs of things that match like the bivalve shells. How many different kinds of pairs can you find (socks, shoes, mittens and so on)?
- Have students search for hinges in the classroom or at home. Give them hints about objects to look for (e.g., piano, doors, cabinets, tool boxes, and so on).

Resources

Website

Monterey Bay Aquarium. www.montereybayaquarium.org
Find information about molluscs and many other marine animals.

Books

Eyewitness Books: Seashore. Parker, Steve. Alfred A. Knopf, 1990
One Small Square: Seashore. Silver, Donald M. Learning Triangle Press, 1993.
Shells Are Skeletons. Victor, Joan Berg. Harper Collins, 1977.
What's Inside? Shells. Bell, Simon. Dorling Kindersley, 1991.

Standards

California Science Standards

Grade K: 2a, c; 4a, b, d, e
Grade 1: 2a, c; 4a, b
Grade 2: 2a, c, d; 4a, c, f, g

Head Start Framework

- Observe and discuss common properties, differences and comparisons among objects and materials.
- Collect, describe and record information through discussion, drawings, maps, charts.
- Observe, describe and discuss natural world, materials, living things natural processes.
- Show awareness and beginning understanding of changes in materials, cause-effect relationships.