Earth

The Dynamic Earth

Fantastic Fossils

Science Background

A fossil is the remains of a living thing that has been preserved in stone. The most common fossils are prints of the exterior of an organism left in soft sediments that eventually hardened into stone. Shells, leaves, footprints, trails, and even dinosaur skin all form fossils this way. In many cases, fossil prints get filled in with additional sediment, which also hardens, forming a cast of the original organism. Another common way fossils are made is when water deposits minerals into small pores of bones or wood. Over time, the minerals completely replace the organic material, leaving an exact stone replica of the original organism.

While fossils can provide a wealth of information about the size and shape of an organism, it's almost impossible to tell what color an animal or plant was by its fossil. Also, since many fossils are often incomplete or broken, it's hard to know how much of the organism you have and which way the pieces go together. To help fill in the blanks, paleontologists often try to compare the fossil with some modern-day organisms that they believe are related. By using "the present as the key to the past," they can often figure out what different fossil parts might have been used for or where they fit into the big picture. Any way you look at it, there is still a great deal of guesswork when it comes to putting together the fossil record. A good scientist will always be aware of his or her limits when trying to reconstruct an organism of the past.

Before You Begin

If you don't have access to fossil shells, you can easily make a "pseudo fossil" by taking a seashell and pressing it into a piece of modeling clay or play dough. Roll the clay into a small ball and then press it to form a thick pancake. Coat the outside of the shell with some cooking oil or nonstick cooking spray to keep it from sticking to the clay. Then firmly press the shell into the clay pancake. Remove the shell and allow the clay to dry for a day or two so that it becomes hard like a genuine fossil.

Make a copy of the "Fossil Features" worksheet for each student.

Objective

- Students discover how fossils can provide scientists with some important clues about past life-forms.

Standards Correlation

- Fossils provide evidence about the plants and animals that lived long ago and the nature of the environment at that time.
- The earth processes we see today are similar to those that occurred in the past.
- Fossils provide important evidence of how life and environmental conditions have changed.

You'll Need

(for demo)

- actual fossil shells or "pseudo fossil" shells (made with modeling clay and a seashell)

Introducing the Topic

Tell students that they are going to have a chance to act like paleontologists. Ask: *What do paleontologists study? (Dinosaurs and other forms of past life) Is it possible to see a living dinosaur? (No, dinosaurs are extinct.)* Explain that even though dinosaurs are extinct, they do have some living relatives such as birds and lizards. Ask: *How do paleontologists know that these modern-day animals are related to dinosaurs? (Fossils of dinosaurs show similarities to the structure of modern-day animals.)*

Ask: *What is a fossil? (The remains of an animal from long ago)* Most students will know that dinosaur bones are fossils, but explain that this is only one type of fossil. Fossils come in many forms. They can be as simple as a print or track preserved in a rock, or they can be extremely complex, like a dinosaur bone.

Next, ask: *What kind of information can dinosaur bones tell us about the dinosaur? (The size of the animal, its shape, how it moved, and, if you find the teeth, what type of food it ate)* Explain that not all fossils are of dinosaurs. Any living thing can leave a fossil if the conditions are right.

Pass the shell fossil around the room and invite students to examine it carefully. Ask: *What do you think this is a fossil of? (A shell)* Explain that when paleontologists find fossils, they try to identify them based on what they look like. To do this, they use what they already know and compare the fossil to something that is living today. By using the present as the key to the past, paleontologists can usually come up with a good guess about what type of animal or plant made the fossil.

Explain that while fossils can give us some idea about what an animal or plant looked like, they can't tell us everything. Invite students to do their own investigation to see what they can learn about fossils. Pair up students and give each pair a set of materials and copies of the "Fossil Features" worksheet.

Name _____ Date _____

Earth

Student Worksheet

Fossil Features

What information can fossils give us about things that lived in the past?

Get It Together

- ★ 3 pieces of modeling clay or play dough
- ★ a collection of small items (e.g., building block, small nail or screw, toy car, toy animal)
- ★ ruler
- ★ cooking spray or cooking oil
- ★ paper towel
- ★ a partner

1. Pick one item from the collection (without your partner seeing the item) and describe it in as much detail as possible below. Make sure to include information like size, shape, color, and texture. Use the ruler to get exact measurements of the object.

_____

_____

_____

2. Roll each piece of clay into a small ball and then press it down on the table to form a thick pancake. You should have three clay pancakes.

3. Take your item and examine it. Predict: What features will appear in its fossil print?

_____

_____

4. Coat your item with a little cooking oil so that it won't stick to the clay. Press one side of the item into a clay pancake to make an imprint. Remove the item.

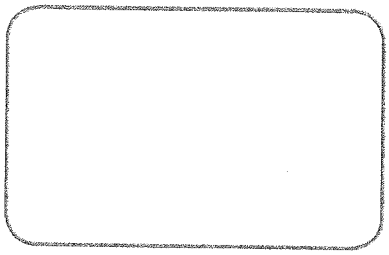
5. Examine the print you made. How does it compare with the actual item? What features are the same? What features are different? Record your observations below and draw a picture of the imprint in the box:

_____

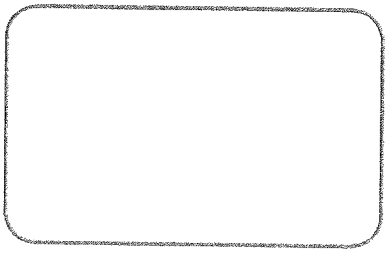
_____

Fossil Features *continued*

6 On another clay pancake, press a different side of the item onto the clay. Remove the item. How is this imprint different from the first one? How does it compare with the actual item? Record your observations and draw a picture of the second imprint here:



7 Repeat Step 6 on the third clay pancake. Record your observations and draw a picture of the third imprint.



8 Wipe the item clean with a paper towel and return it to the collection. Then show your partner your imprints. Have him or her guess which item made the imprints. Did your partner guess correctly? Which imprint helped him or her the most?

Think About It

What kinds of information could you *not* get from a fossil?

Going Further

Puzzle Problems: Often, when paleontologists find fossils like dinosaur bones, they are jumbled and broken. More often than not, pieces from several different individuals or species are mixed together. This can cause some serious sorting problems and has led to several mistakes in identifying new species. To get a sense of how complex assembling fossils is, get a few different jigsaw puzzles (all with the same-sized pieces) and mix the pieces together. You might even remove a few dozen pieces from each puzzle before trying to reconstruct each puzzle without referring to the completed picture. While it is not an impossible task, you'll soon discover that it is extremely difficult and time-consuming.