Making a Good Impression

Concept Development

Challenge: What conditions are necessary to make fossils? What inferences can be made by observing the evidences found in fossils?

Materials: three stations

Let's Dig In:

In this activity, you will be rotating through three different stations. At each station you will explore some aspect of fossils and their formation. Follow the directions provided at each station.

Station #1: Comparing Fossils with Recent Counterparts

- Observe the fossils and their recent counterparts.
- On your paper, sketch and label each of the items found at the station.
- Conduct any tests that you think might help you tell the difference between the samples. (Hint! You may want to use some of the same techniques you used to test minerals.)

Station #2: Making Molds and Casts

- Smear a shallow container with petroleum jelly.
- Place a leaf or a shell on the bottom of the container then fill the container with plaster of Paris.
- When the plaster dries, take the plaster out of the container and peel away the leaf.
- Sketch what you see on your paper.

Station #3: Making a Carbon Fossil Imprint

- Using a piece of carbon paper, a sheet of white paper, a newspaper, and a leaf, figure out a way to create an imprint of the leaf on the white paper.

Go Figure:

1. What similarities did you observe between the fossil samples at Station #1? Be specific.
2. How are today's life forms helpful in understanding life forms of the past?
3. Are the fossils and real life examples exactly the same? If not, describe the difference.
4. What criteria do you think scientists use to determine if fossils have current relatives on earth?
5. Explain the difference between a mold and a cast.
6. Explain how you could make a cast from a mold.
7. What conditions have to be present for a fossil to be made?
8. Do you think fossils are being made today? What is your evidence?
9. When you made a carbon fossil imprint, you created artificial forces by using your hands and layers of newspaper. When imprint fossils are made in nature, what provides the pressure to create an imprint fossil?
10. In making the carbon fossil imprint, you created an artificial coating of carbon on the leaf. What really happens in nature to create fossilized imprints?

Teacher Notes

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GEOMES Topic: Geologic History – Fossils and Ancient Life

Lab setup:	none	easy	**moderate**	difficult
Reasoning level:	easy	**moderate**	difficult	
Time required:	**20-40 minutes**	40-60 minutes	60-90 minutes	
Process skills:	**observing**	**measuring**	**interpreting data**	
	inferring	**utilizing models**	**predicting**	

Objectives: Students will create models of fossils, demonstrating fossil formation and will interpret the evidence provided by the fossils.

National Science Education Standards:

Content Standards: Earth & Space Science - Structure of the earth system
Earth's history, Geochemical cycles

Unifying Concepts & Processes: Evidence, models and exploration

Materials:

Station #1
- fossils with corresponding real life examples
- Mineral ID Kit

Station#2
- containers for mixing plaster of Paris and making molds
- petroleum jelly
- plaster of Paris
- fossils
- waxed paper
- water

Station #3
- carbon paper
- white paper
- plant leaves
- newspaper

Watch Out! Make sure no students ingest the plaster of Paris. The dust can be thick if poured too quickly. The more newspaper laid down in the mixing area, the easier the clean up. Buckets of warm soapy water at mixing stations help students stay clean. Cleanup should be planned into your schedule. By taking the time to discuss clean-up before students begin working at the stations, the activity will stay much more organized.

Teaching Strategies:

Fossils are both the basis for the geological timetable and an important part of the rock record. A fossil is any evidence of earlier life preserved in a rock. The evidence can be shells, bones, petrified trees, impressions made by plant leaves, footprints or even burrows made by worms. In this lab, your students will look at many different types of evidence, thinking about what that evidence tells scientists.

Fossils are a subject of special interest for students, many of whom have been intrigued with dinosaurs for years. Others are starting to ask questions about evolution and our relationship to other living and previously living organisms. It is imperative that students understand how fossils are formed and dated. By this age, students feel some pride in being able

to carry on a discussion using the correct names of fossils. Deliberately saying the names of the fossils a number of times as well as providing pictures and the written names in your introduction helps all learners to pronounce the names. Don't shy away from using the proper names when talking about local fossils. A mini lesson could be developed around the meaning of the names.

It is important for students to understand how signs of ancient life have been preserved. Students should be able to describe the processes that have preserved evidence of ancient life. It would be helpful to hold a discussion of how scientists go about finding and piecing together these clues to recreate ancient environments and reconstruct ancient plants and animals. You will need to discuss the differences between **observations** and **inferences** with the students. Observations being what can actually be described by using the five senses like texture, color, smell, crystal shape, and testing of the rock for traits such as hardness, response to acid. Inferences are what can be figured out based on the observations. Inferences are usually also based on our previous experience and aim to explain the observations. It might be interesting to ask students why young scientists are more likely to make discoveries of unexplainable phenomenon than are older, more experienced scientists.

Form groups of 2-3 students. There will be 3 stations for the students to rotate through. If you have large classes you may want to set up two or three sets of each station. Create a sign for each station prior to class. A timer may be helpful to keep the student on a reasonable schedule. The noise of the timer indicates to the students that they need to move to the next station.

Station #1: Comparing Fossils with Recent Counterparts.

Set up samples that provide examples for the students to compare. Good samples might include fossil corals and corals (especially the colonial brain corals); fossil clams and clamshells; petrified wood and tree rings; fossilized bone and bone.

The mineral ID Kits are the materials that were used for mineral identification. The reasoning for using these kits would be to find differences in hardness, acid testing, etc., This evidence should help differentiate between a fossil and its recent counterpart which is not yet rock.

Station #2: Making Molds and Casts

One method of fossil preservation is through molds and casts of the original animal or plant. Sometimes a fossil shell or bone is dissolved completely out of the rock in which it has been deposited. This leaves a hollow depression in the rock called a mold. The mold shows only the original shape of the fossil. When new materials fill the mold, this material forms a cast of the original fossil. Molds and casts of shellfish are common fossils. The molds of ferns, leaves, and fish are also found in the rock layers of some areas.

Common seashells are good for this station, especially if you have some that have both the top and bottom. Feet of animals (models or real bones) could also be used.

Station #3: Making a Carbon Fossil Imprint:

Carbon imprint fossils are formed when decaying tissues are broken down into their chemical compounds. Most of the chemicals disappear, but a thick black layer of carbon remains in the shape of the decayed organism. Many soft-bodied organisms have been preserved

in great detail in this manner. **Make sure that the carbon paper is fresh so that a good imprint is made**.

An alternative, but more expensive model could be made with sun sensitive paper. In this case, you lay the paper or material in the sun with the leaf on the paper and allow the reaction to proceed.

Sample Data and Observations:

Observations should include very specific drawings with any noticeable differences, such as texture.

Sample Responses to Go Figure:

1. Similarities between fossil samples will depend on what samples you provide. Any reasonable response should be accepted.
2. Modern life forms provide a model for what organisms might have been like, which is a good starting point when looking at the fossil record.
3. Students should be able to see some differences in shape, general structure, and size between the fossils and real life examples.
4. Criteria for determining current relatives would be if they can find similar plants or animals in similar environments. When possible, scientists put together a family tree that shows the evolution of a specific organism showing how it has changed over time. Since the fossil is a rock, DNA is likely not present for more specific testing.
5. A mold is a hollow depression in rock that shows only the original shape of the fossil. When new material fills the mold, a cast is formed.
6. You could make a cast from a mold by filling the mold with material that would take the shape of the mold and harden.
7. Fossils can be made when the original organism or its traces (footprints, dung, etc.) are preserved in their original shapes.
8. Fossils are being made today. Evidence can be found in current areas where sedimentary rock is being formed, such as coral reefs and the sea floor in general.
9. The pressure to create fossilized imprints requires several layers of sediments to be deposited on top of the specimen.
10. Fossilized imprints are made when specimens fall into soft materials (like mud) that later hardens and captures the impression of the original specimen.

Internet Connection:

Suggested keywords to find sites with related information: fossils, imprint fossils, archaeology, and paleontology.