

The Evidence is In

Strand	Earth Patterns, Cycles, and Change
Topic	Investigating fossils in sedimentary rock
Primary SOL	5.7 The student will investigate and understand how Earth’s surface is constantly changing. Key concepts include c) Earth history and fossil evidence.
Related SOL	5.7 The student will investigate and understand how Earth’s surface is constantly changing. Key concepts include b) the rock cycle and how transformations between rocks occur.

Background Information

Not only does the presence of fossils tell us that certain organisms existed in a specific location in the distant past, but also their presence in particular layers of earth helps scientists determine the history of that area. A large ocean once divided the North American continent, and because of this, fossils found on the East Coast of the U.S. show a different kind of life than those found on the West Coast.

Until only recently, scientists believed that Virginia was not the home of much prehistoric life because few fossils had been found as evidence of life in our area during the age of dinosaurs. In recent years, however, scientists have discovered some significant evidence of prehistoric life in the Coastal Plain/Tidewater region of Virginia. Some of these finds are as recent as after Hurricane Isabel hit Virginia in the fall of 2003, when the fossilized bones of a prehistoric whale were uncovered by the storm.

Each region in Virginia has its own history, as evidenced through fossil discoveries. Although few dinosaur bones have been discovered in the state, enough dinosaur footprints have now been found to show that dinosaurs did exist here in great numbers. Students need to learn that inferences about changes in the Earth over time can be based on fossil evidence found throughout Virginia. Having exact answers is not as important as the inferences that can be made, which include that the shore of Virginia has moved eastward over much time as sand and sediments have washed ashore, changing the shoreline.

Fossils are formed slowly, over a long period of time. An object that has fallen into soft clay or mud (the mold) fills up with minerals as it deteriorates, and the mineral-filled object becomes a kind of cast of the object while the soft clay or mud becomes sedimentary rock. Usually, the hardest parts of an organism’s body, such as bones, teeth, and shells, are the objects that last long enough to become a fossil; rarely are they skin, muscle, or fur because these deteriorate so quickly. In other cases, such as footprints, the impression in the mud or clay is left completely free to fill with sedimentary rock over time.

Materials

- Pictures of Paleontologists at work
- Plaster of Paris
- Paper cups

- Modeling clay
- A variety of small shells, leaves, and other organic objects with which to make “fossils”
- Pictures of fossils
- Magnifying glasses
- Internet access

Vocabulary

paleontologist, fossil, sedimentary, erosion, weathering, sediment, silt

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

Introduction

1. Ask students to define the word *paleontologist*. If students do not know, show them pictures of scientists working with dinosaurs to help them infer what a paleontologist is. Explain to students that in this activity, they will be paleontologists trying to find out about the history of Virginia long before Jamestown was discovered. Ask students how a paleontologist could know what kind of life existed here before people were around to observe it and write it down. What kind of records do we have from the time of the dinosaurs and even before that? (*Scientists use fossils to find out about the history of a place before the time of recorded history.*)
2. Ask students: “What is a fossil?” Help them define and understand *fossil* as the remains, trace, or impression of an animal or plant of a past geologic age that has been preserved in sedimentary rock. Ask students how fossils are formed, and discuss with the class the process that turns part of an animal or plant into a fossil.
3. Brainstorm a class list of ideas about what fossils can tell us. These should include kinds of plants and animals that lived in a region during a certain time period.
4. Explain to students that they will be making their own fossil to demonstrate the process that forms fossils in sedimentary rocks.

Procedure

1. Give each student a paper cup and a ball of clay. Students are to soften the clay and push it into the bottom of the cup so it is about 1½ to 2 inches thick.
2. Have each student press a shell or other small organic object into the clay so that it leaves a clear impression, and then have them remove the object. At this point, the students have made a clay *mold* of their objects.
3. Have each student pour about 1 inch of wet Plaster of Paris over the impression. Set the cups aside to dry.
4. After the plaster is completely dry, have each student tear away the paper cup and gently remove the plaster from the clay mold. The student will now have both a clay mold and a plaster cast of the object.
5. Explain to students that they are going to be paleontologists as they identify the organism to which their fossil belongs and the time period and location in which the organism existed.

6. Let each student choose a picture of a fossil that was found in Virginia that closely mimics the fossil that they just created. Have the students use resources from the Internet to research their fossil to find out what organism it came from and when and where that organism lived.

Conclusion

1. Once students have identified the organism, time periods, and location, have the students infer why fossils of ocean animals' teeth and bones are found on land in the Coastal Plain/Tidewater region of Virginia. Allow students to use resources from the Internet and other resources you have gathered for this purpose to form these conclusions.
2. Ask students to share their fossils and discoveries about their fossils with a partner in the classroom.

Assessment

- **Questions**
 - What kinds of things would become fossils?
 - Could a banana peel become a fossil? Why or why not?
- **Journal/writing prompts**
 - Explain the process by which a fossil is made.
 - What would the job of a paleontologist entail?
 - Place the steps in the process of how a fossil is made in the proper order.
- **Other**
 - Have students fill out a log that details their "fossil find" and the information they were able to gather about it. Make sure they include their inferences about how the Earth has changed in Virginia since the time their organism lived at that place.

Extensions and Connections (for all students)

- Have students create a timeline of fossils, from the oldest (the deepest) to the youngest (closest to the top soil layer). You might also have students spot on a Virginia wall map the regions in which their assigned fossils were found. Mapping the number of fossils found in each region will help students make inferences about the history of Virginia in prehistoric times by showing where life was clustered. It is important to let the students know that our knowledge of life in Virginia in prehistoric times is changing even now, as more and more fossils are found when they move towards the surface through weathering and erosion and movement of the tectonic plates.
- Have students draw a picture of their fossil on a large piece of white construction paper and include the information they gathered about it. Allow the class to hang the pictures in the hallway in chronological order from oldest to youngest, using the timeline they created.

Strategies for Differentiation

- Choose resources on a variety of reading levels to allow for all students to access the materials.
- Give the students the opportunity to examine different fossils using a magnifying glass.