



3-5 Earth Science

3-5 Nature of Science

3-5 Life Science

Southern Nevada Regional Professional Development Program

Fossils Unit

INTRODUCTION

Some may say it's like looking at a family photo album; others like pieces to a puzzle. No matter how one thinks of them, fossils seem to pique the curiosity of many.

WHERE'S THE SCIENCE?

Fossils (preserved traces or remains of plants or animals that once existed on Earth) provide evidence of what the Earth was like ages ago. Not everything that dies becomes a fossil. Fossils can usually be found in sedimentary rocks such as sandstone, limestone, or shale but may also be found in amber and ice.

Fossils can be formed in a variety of ways. A **mold** is one type of fossil. This is when none of the original matter of an organism remains and only an imprint is left. Sometimes another layer of sediment fills in the mold to form a **cast**. A cast is also a type of fossil.

Trace fossils are those that capture an event such as an animal's footprints or ripple patterns. Fossilized animal excrement (**coprolite**) and burrows are also trace fossils.

If you have seen a photo or replica of an insect encased in amber or an animal in ice, these are also fossils. Petrified wood is a fossil

which was formed when minerals gradually replaced the organic material.

MATERIALS

(Groups of four students)

For all lessons

- Safety goggles
- Hand lenses
- Science notebooks
- Newspapers for lessons 2, 5, and 6
- Chart paper
- Class *Question Board* with sentence strips or sticky notes
- Digital camera(s) (optional)
- Informational texts to support the content – biographies of paleontologists, books on fossils, paleontology

For Lesson 1

- Clear plastic container
- Small plastic cups or aluminum foil disposable tins (approximately the size of individual margarine tubs)
- Seashells, twigs, leaves, feathers
- Plaster of Paris
- Petroleum jelly
- Cotton swabs or eye shadow applicators (new not used)

For Lesson 2

- No new materials needed

For Lesson 3

- Teacher-created mold from lesson 2
- Plaster of Paris
- Petroleum jelly
- Syrup – such as light Karo syrup
- Plastic insect
- Ice cube with plastic insect frozen inside

For Lesson 4

- Square aluminum cake pans or similar containers (one for every group of four students) for group excavation sites
- Earth materials for layers (make prior to lesson) – mixture of sand, clay, and water to get the consistency of moist beach sand
- Food color
- Bits of twigs, shells, seeds, feathers, leaves, plastic animals for making footprints, aquarium gravel to represent “bones and teeth”
- String for gridding

For Lesson 5

- Plastic spoons
- Small brushes (tiny paintbrushes, children’s toothbrushes (new not used))
- Spray bottles to moisten layers if they become too hard

For Lesson 6

- No new materials needed

PROCEDURES

Lesson 1: *Making a Mold*

1. Begin with the following focus question: *How do fossils provide evidence of the past?* Keep the question posted so that it can be revisited. Explain to students that over the course of the unit they will be conducting investigations to find answers to this question. If some students have ideas about the question, ask them to share and record on chart paper.
2. Have an empty clear container (so students can view from sides) available. Place a layer of the moist earth material (sand, clay, and water mixed together to the consistency of moist beach sand) in the bottom of the container. Have some fairly detailed seashells. Place the shells in the sediment. Explain that sometimes when an animal died its remains

became quickly buried in the moist sediment. Repeat, adding two more layers. In order to give students a visual that the bottom-most layer is the oldest, record either the dates or **Layer 1, Layer 2, etc.** on the side of the container with either a marking pen or a sticky note or add food color to each layer.



1. Point out that there are bits of twigs, shells, dead animals and plant life that are deposited in each layer. When **paleontologists** excavate an area, they may find evidence of what was living and occurring over the ages of the earth. This evidence, the **preserved traces or remains of plants or animals that once existed on Earth**, are called **fossils**.
2. Tell students that they will be making a model of how one type of fossil is formed. This fossil is called a **mold**.
3. **Have students put on safety goggles before manipulating the materials.**
 - a. Cover desktops with newspaper.
 - b. Give each student a small container. **NOTE: Instead of asking the students to mix the plaster of Paris have it made up prior to being used. The plaster of Paris must be mixed and used immediately, or it will harden.** Have students pour the mixture into their containers, then let the mixture set for a minute or two.
 - c. While the plaster of Paris is setting, have students choose one of the objects to make their mold. **Note: Detailed objects work best.** Once they have chosen it, instruct them to lightly coat it using the swab or applicator with petroleum jelly. This will help prevent the object from sticking in the plaster of Paris mixture and allow for easy removal.
 - d. Once they have chosen their object, have them press it into the mixture. Be sure to remind them not to submerge the object. Allow the mixture to dry overnight.



Note: Teacher creates one to be used in Lesson 4 for modeling purposes.

Lesson 2:

1. **Have students put on safety goggles before manipulating the materials.**
2. Have students get their molds and remove the objects from the plaster of Paris. Revisit vocabulary – **fossil and mold**. Give students time to observe their object and the mold they created. Have them draw both the object and the mold in their notebooks. Digital photos can be taken and added to students' notebooks. Encourage students to record any questions that they may have in notebooks. These can be added to the class *Question Board*.



← Example of a **mold**

Lesson 3: *Other ways fossils are formed*

1. Introduce today's lesson by explaining that not all fossils are formed like molds.
2. Use the **mold** that you made to demonstrate how a **cast** is formed (be sure to lightly coat the mold with petroleum jelly). A **cast** is formed when additional sediments fill in the mold. Model for students by pouring plaster of Paris (to represent additional sediments) over the mold.



← Example of a **cast**.

Paul Fuqua. "Fossil imprint of scallop shell in clay."
Discovery Education:
<http://streaming.discoveryeducation.com/>

3. Explain that sometimes animals became entrapped in the sap from trees. Simulate this with a plastic insect and syrup. Model for the students an insect climbing up a tree.

Simulate sap running down the tree and show how the insect would get entrapped. Eventually the sap hardens.

4. Bring out the ice cube and explain how an animal may have become entrapped in ice.
5. Revisit initial question – How do fossils provide evidence of the past? Chart student responses.

Lesson 4: *Creating excavation sites* (Note: This will take a few days to complete)

1. Open today's lesson by showing students the model of the cast you made. They can compare what the cast looks like to their molds.
2. Bring out the class model that you made in lesson 2 when you demonstrated how organisms become buried in sediment. Tell the students that each group will be responsible for creating an excavation site that will be exchanged with another group. Have each group make a reference map of their excavation site in their notebooks. **DO NOT have them share the maps at this time.** Once this is done, they can begin to create their site.
3. **Have students put on safety goggles before manipulating the materials.**
4. Give some guidelines for creating excavation sites (adjust to meet your needs):
 - a. Each group will have three food- colored layers
 - b. Objects must be included in each layer
 - c. Do one layer per day
 - d. Grid the site with string and label for the other group (see example below as one way to grid)

1.	2.
4.	3.

Be sure to have each group label their site with a title such as Green Site or Team 1 Site.

Lesson 5: *Let the excavating begin!*

1. **Have students put on safety goggles before manipulating the materials. Have spray bottles with water for each team to moisten dig sites if they become too hard to dig.**
2. Have students cover desktops with newspapers. Group excavation sites will be exchanged.
3. Explain to students that each person in the group will have one section to dig. All groups will refer to the bottom-most layer as layer 1, the middle one as layer 2, and top-most as layer 3 for consistency.
4. Students will document in their notebooks which site they created as well as the section they excavated in. They must also include what they unearthed and in what layer it was found. Detailed drawings, questions, and thoughts should also be included in their notebooks.

Lesson 6: *How do fossils provide evidence of the past?*

1. Have each group discuss everything they found in their site and make claims about what might have “lived” in their site.
2. As a whole class, have groups share their findings and conclusions. Site maps can be shared at this time so teams can compare what they found to the team maps.
3. After all groups have shared, refer back to the focus question - *How do fossils provide evidence of the past?* Have students record in their science notebooks then share out whole class.

Extensions

Find out if your state has a state fossil and research it.

Vocabulary

Fossils – preserved traces or remains of plants or animals that once existed on Earth

Paleontologist – a scientist who studies fossils

Additional Resources

<http://www.paleoportal.org/>

<http://www.ucmp.berkeley.edu/>

<http://www.fossils-facts-and-finds.com/index.html>

<http://www.statefossils.com/>

Ring, Susan. *Fantastic Fossils*. Steck-Vaughn. ISBN – 0-7398-7667-8

Stewart, Melissa. *Fossils*. Heinemann. ISBN – 140340091-1

Taylor, Paul. D. *Fossils Eyewitness Books*. Alfred A. Knopf ISBN-0-679-80440-4

Nevada State Science Standards

E5C1 Students know fossils are evidence of past life. E/S

L5D2 Students know fossils are evidence of past life. E/S

N5A1 Students know scientific progress is made by conducting careful investigations, recording data, and communicating the results in an accurate method. E/S

N5A3 Students know how to draw conclusions from scientific evidence. E/S

N5A6 Students know models are tools for learning about the things they are meant to resemble. I/S

N5B1 Students know that, throughout history, people of diverse cultures have provided scientific knowledge and technologies. E/S

N5B3 Students know the benefits of working with a team and sharing findings. E/L

Safety Reminders

- Have students wear safety goggles while working with materials.