Activity: Make an Impression Fossil

A *fossil* is any evidence of a once-living organism. These include body fossils (bones, teeth, hair, shells, etc.) and trace fossils (evidence of activities or movements, including tracks, skin impressions, and nests).

Scientists have found numerous fossils in Denali National Park & Preserve, including plants, birds, and dinosaurs. This fossil record allows us to learn about what the environment was like millions of years ago.

Main Ideas

1) Scientists study fossils to learn about ancient life and environments.
2) Museum collections teach us about landscapes and life of the past.

Learning Objectives

Students will:

- Define what a fossil is.
- Describe how an impression fossil forms.
- Explain how scientists study fossils to learn about the past.

Learning Standards

Alaska Science Content Standards: C.1. Develop an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution.

Additional Resources

Fossils-Denali National Park & Preserve: www.nps.gov/dena/learn/nature/fossils.htm

Time Needed: 30-45 minutes

Materials

- Handouts: *What is a Fossil?* and *Fossils of Denali*
- Fossils or Fossil Replicas, if available
- Air-dry clay (available at craft stores)
- Variety of small objects for making imprints: dinosaur figurines, leaves, twigs, shells, etc.
- Small paper plates
- Straws and yarn (optional)
- Scissors

A replica impression fossil made with clay. UAMN photo.

Plant fossils found in Denali's Cantwell Formation.
Left: Angiosperm leaves. Right: Gymnosperm leaves.
Photos by David Sunderlin, National Park Service.

Activity: Make an Impression Fossil

Directions

Advance Preparation: Divide clay into small balls, about 5 cm (2 in) in diameter. Make enough for each student to have one.

- *Introduction:* Ask students to brainstorm answers to the question "What is a fossil?"

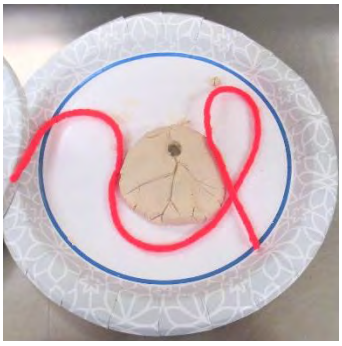
- Show photos of various fossils. Go over the *What is a Fossil*? handouts, and discuss the differences between body and trace fossils.
    - If you have fossils or replicas available, have students examine them. Ask students what they observe, and to list similarities and differences among the specimens.

- Discuss what kinds of fossils have been found in Denali National Park & Preserve. (Refer to *Fossils of Denali* handout, or look at the Denali Fossils website with your students: www.nps.gov/dena/learn/nature/fossils.htm).

- Have students make their own impression fossils.
    - Give each student a ball of clay and a small paper plate. Have them flatten the clay to about 1 cm (3/8 in) thick.
    - Instruct students to choose a small object and press it into the clay to make an impression.
    - *Optional:* Press the end of a straw into the clay to make a hole for hanging.
    - Let the clay dry for 24 hours. Tie yarn through the hole to hang it up, if desired.

Making an impression fossil from clay. UAMN photo.

- *Optional:* After the clay has dried, have student exchange their fossil with a classmate. Ask students to observe the new fossil. Can they tell what organism made the impression? What can they learn about the organism and its environment from the fossil?



Clay fossil drying. UAMN photo.

- Discuss the following questions with your students:
    - What is the difference between a body fossil and a trace fossil?
    - How does an impression fossil form?
    - What objects in this activity made good impression fossils? Which ones didn't work well? What does that tell us about what parts of plants and animals become fossils?
    - What can we learn about an organism and its environment from an impression fossil? What can't we learn?

What is a Fossil?

A fossil is any evidence of a once-living organism. Specimens are usually considered to be fossils if they are over 10,000 years old.

Body fossils include any part of the actual animal or plant, such as bones, teeth, shells, and leaves. Body fossils can be preserved through *preservation* (usually by freezing or drying), *petrification* (organic matter is replaced by minerals), or *permineralization* (the organic material's pores are filled with minerals).

Fossil skull of an extinct bison, painted with red ochre. DENA 6476. Photo by Lucy Tyrrell.

Petrified wood fossil. DENA 5530.

Trace fossils are evidence of an organism's activities or movements. Trace fossils include tracks, nests, eggshells, coprolites (fossilized feces), and gastroliths (stomach stones).

Impression fossils are a type of trace fossil. Impression fossils form when a leaf, shell, skin, or foot leaves an imprint in soft earth. When the imprint hardens, it forms a fossil in the shape of the original object.

Sometimes sediment will fill the imprint. Over time, the surrounding material will erode away, leaving a 3-D replica of the original material. This is called a *natural cast*. In Alaska, many dinosaur footprints occur as natural casts.

Natural cast of a dinosaur footprint in Denali National Park. Photo by Pat Druckenmiller.

Impression fossils of plants (L: Angiosperm leaves, R: Gymnosperm leaves.) NPS photos / David Sunderlin.

Fossils of Denali

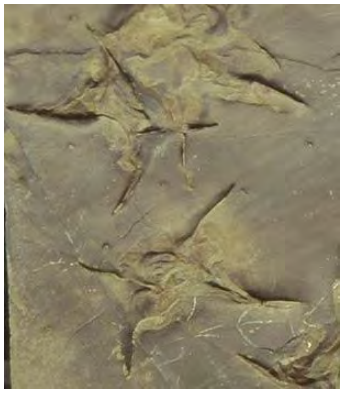
Denali National Park is home to the fossilized remains of many plants and animals that have lived there through time.

Around 80 million years ago, the earth's crust warped and created a basin on the north side of the mountains that have become the Alaska Range. This filled in with rocks and soil from the mountains for the next 10 million years. The area, called the Cantwell Formation, is rich in fossils including plants, birds, and dinosaurs. The fossil record allows us to see what the environment was like millions of years ago.

Heather MacFarlane with a dinosaur bone fragment discovered in 2016. Photo by Pat Druckenmiller.

Fossil track from a theropod dinosaur. NPS photo / Jake Frank

Petrified wood fossil. DENA 5530.



Fossil tracks from an Ignotornis bird. NPS photo.

Fossil hadrosaur skin impression. Photo by Anthony Fiorillo

Fossil impressions of plant leaves. DENA 5999.

Mammoth tooth fossil. DENA 449.