Big River Journey Classroom Activity: Geology

Make Your Own Fossil

Objective: The student will create an imitation fossil that employs at least two elements of the definition of what a fossil is.

Grade level/ time req't: 4-6; 30 minutes

Materials:
moist workable clay (any natural clay of type used by potters)
miscellaneous small bits of plant and animal material (e.g., leaves, stems, seeds, feathers, pieces of snail or shell, etc. – *These may be collected by students in advance.)*
sample fossil from a local Mississippi River bluff (very helpful, but not essential)
wash basin and towels (for washing hands after creating "fossil")

Introduction:
Ask students for ideas of how to find out about the origins of the Mississippi River and its surrounding landscape before people were here. Explain that rocks and fossils tell such a story of earth's history. Show a sample fossil from rock found along the Mississippi River. Ask a student to describe what she sees in the sample. *Define a **fossil** as any trace or remnant of a life form (plant or animal) from a past geological age, embedded in rock.* Explain that a fossil can be 1) a piece of the original plant or animal itself, or 2) an imprint of the plant or animal (e.g., a leafprint or footprint in solidified mud), or 3) a mineralized replacement of the animal or plant that takes its form.

Procedure:
1) Each student should get a lump of moist clay about the size of the palm of their hand. Work clay into flat "rock" form.
2) Whether previously collected by students or supplied by teacher, students should have a few very small pieces of plant (and optionally, clean animal remnants such as snail, shell or feather) to work into clay.
3) Each student must choose two of the following possible fossil types to show in their clay "rock." Choices must be clearly evident in final product.
- embedded plant material
- imprint of plant (e.g. leaf print or stem print)
- embedded animal remnant or evidence (e.g. snail or shell bit; …or Barbie shoe!)
- imprint of animal remnant or evidence (e.g. feather print, or human hand print)

4) Set aside to dry. The clay will harden into a hard "fossil."

Evaluation: Identify two types of "fossils" in final product.

Background for teacher: Fossils of sea life found may be found in sedimentary rock strata (limestone and shale) along the Mississippi River. These fossils tell us that tropical seas advanced and receded over Minnesota during the Ordovician period of the Paleozoic Era, approximately 500-435 million years ago.

River Geology Vocabulary

Basic Vocabulary:

geology - the study of the origin and history of the earth; the study of rocks

fossil - any trace or remnant of a life form from a past geological age, embedded in rocks

strata - layers of rock

erosion - breakdown or weathering of rocks, sediment or soil by wind, water, etc.

Ice Age - common name for time period during which glaciers were abundant

glacier - a large mass of slowly moving ice

Intermediate Vocabulary:

geological era - a basic division of geological time, composed of one or more periods

geological period - a portion of a geological era

geological epoch - a portion of a geological period

sedimentary - a classification of rocks created by deposits of sediment (particles of silt, sand, clay, etc.)

sandstone - a sedimentary rock composed chiefly of sandlike grains of quartz

shale - a fine-grained, layered sedimentary rock formed from clay, silt or mud; often gray

limestone - a sedimentary rock composed of calcium carbonate, often from shell fragments

Advanced Vocabulary:

Paleozoic era - a geological time from 570 million to 225 million years ago during which early forms of life appeared

Ordovician period - part of the Paleozoic era from 500 million to 430 million years ago, characterized by small sea-dwelling organisms (found in Mississippi River valley fossils)

Pleistocene epoch - ice age time period, 2 million to 10,000 years ago. (The Upper Mississippi River took its present route at the end of this time period.)

River Geology Extensions

Pre-trip activity ideas:

- **Science/math.** Create a timeline of geological eras and periods, and make corresponding descriptions of plant and animal life associated with each.

- **Art/science.** Find pictures of various eras and periods. Create your own picture of a specific geological period. Use the class's pictures to illustrate a geological timeline.

- **Science.** Classify rocks as belonging to one of three broad categories – igneous, sedimentary, or metamorphic – and learn the meaning of each. Identify examples of each type.

- **Writing.** Compose a story correctly using at least half of your vocabulary words.

- **Reading.** Read "Minnesota's Rocky Roots" (for young naturalists) about Minnesota geology in The Minnesota Volunteer, Sept.-Oct., 1995. Teacher guide and article: *www.dnr.state.mn.us/young_naturalists/rockyroots/index.html*

- **Career exploration.** Find out what a geologist does. Imagine that you are a geologist, and write about your work.

Post-trip activity ideas:

- **Art.** Draw and color the river gorge showing a rock outcrop. Make a display showing what you've learned about Mississippi River geology. Make a drawing of fossils seen. Or, use fossil patterns to create a larger abstract design.

- **Writing.** Write a poem or short story about your life as a brachiopod in the Ordovician sea that once covered Minnesota, or as a time traveler atop an ice age glacier melting to start the Mississippi River. Describe your surroundings.

- **Social studies.** Find out how people have utilized the geology of the river and river valley. What uses have been found for limestone, shale and sandstone in building, agriculture, gardening, food production and medicine?
  [Teacher note: these rocks are used as building materials and can be seen in buildings of St. Paul (though local sandstone is too soft for use in building.) Shale deposits have been used for brick-making; lime from limestone is used to make cement, to lower the pH of soils, and as an antacid; caves have been carved out of sandstone for growing mushrooms, sand from sandstone has been used for making glass. Gravel from river islands is widely used in construction.]

- **Science field study.** Explore for fossils in the Lilydale "brickyards" or other site along the Mississippi River.

- **Science.** Find out more about fossils. What kind of life is associated with each of the fossils you found?

- **Speaking.** Teach others what you have learned about the geology of the river.