

PALEO SLEUTHS

— DIGGING DEEPER —

Creating Fossil Field Jackets

Grade 4-8



Students, as preparators, will make a fossil field jacket using a seashell fossil. Seashells are used because they are larger to manage for this activity and can be ordered in a larger quantity. Other fossils or rocks can be used depending on the size. Palm size is recommended. They will only cover the topside of the seashell fossil or other fossil in this activity.

1. Activity length: 30-40 minutes
2. Grades 4 - 8 can experience this activity. Some extensions for Grades 6 - 8 have been noted.
3. Vocabulary:
 - fossil - the remains or impression of a prehistoric organism preserved in petrified form or as a mold or cast in rock.
 - paleontologist - a person who works with preserving and studying animal and plant fossils
 - preparator - a person who prepares the fossil to be preserved
 - adhesive - a substance used to stick objects or materials together
 - taxon - a taxonomic group of any rank such as species, family, or class
 - consolidant - an adhesive put onto the fossil to harden it

The following background information about paleontology courtesy of Dr. Ross Secord, Associate Professor, and Robert Skolnick, Preparator, UNL Vertebrate Paleontology Staff.

What is a field jacket?

A field jacket is a plaster covering placed over and around a fossil, while in the field, to protect the fossil as it is removed and transferred safely back to the lab or museum for further study.

How do you use a field jacket?

When a paleontologist goes into the field, the main purpose often is geological mapping of sedimentary rock layers, which may contain fossils. While the paleontologist is mapping, the preparators and students are prospecting for fossils, carefully looking at the ground for fossils bone fragments. If bones are found, the layer in the rock is identified by looking for any other bones in the same area to confirm they come from that layer in the rock. If they aren't weathering out of that rock layer, we know we have to go upslope because over time a fossil weathers out of its rock layer and moves downslope due to gravity.

Once the source of the fossils is found, then digging around the fossils is done very carefully getting an idea of how much of the fossil is there. Fossils are very fragile, full of cracks, so a chemical consolidant or adhesive is put onto the fossil to harden it. Next, toilet paper is used in layers as a separator on the fossil because it is very pliable. Then on top of that, burlap strips soaked with plaster mixed in water are placed over the fossil. The toilet paper is used as a separator between the fossil and the plaster so the plaster doesn't stick to the bone. Paper towels can be substituted for toilet paper. The number of layers of toilet paper and plaster depends on the shape and size of the fossil you are collecting.

The best technique for excavating a fossil is to carefully dig around the edges of the fossil leaving it on a base of rock called a pedestal. After applying a plaster field jacket to the top of the pedestal, the fossil and pedestal

can be safely undercut and removed from the rock. Then the rest of the fossil on the underside is covered in the same way as the top, with toilet paper and a plaster cast.

The most important part of the excavation of a fossil is the data collection! Documentation of the rock layers where the fossil was located is done using GPS. All fossils and field jackets are labeled in the field with a field number, their location, and a preliminary identification as to what type of animal they were or taxon. A stratigraphic rock column is drawn to show the location of the fossil within the sequence of rock layers. This information, or data, is recorded in a field book by the paleontologist. As a famous field paleontologist once said, "Without the data, a fossil is just a pretty rock!"

On arrival to the lab, or museum, the cast is cut in half to lift the top half of the field jacket off the fossil. A chemical consolidant hardener is applied on the fossil. It is transparent so it doesn't stain the bone. The consolidant needs to be reversible, so that bones can be taken apart and put together again. Taking apart the bones is done by using a heated device to warm the consolidant, which makes it flexible.

Extension for Grades 6 - 8:

What is GPS?

- Students discover through research the science behind Global Positioning Systems (GPS).
- Gather research about GPS:
- What questions do you have about GPS?
- What facts have you uncovered about GPS?

How do paleontologists use GPS?

- Discover the Landsat program, a joint project of NASA and the U.S. Geological Service, using an earth imaging program at <http://landsat.gsfc.nasa.gov>
- Under search, type: How do paleontologists use GPS?
- Research other ways GPS is used.

National and State Standards

Next Generation Science Standards

Grade 4 4-ESS1-1. Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

Middle Level MS-LS4-1. Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.

Nebraska State Standards

Grade 3-5 SC5.1.1 Students will plan and conduct investigations that lead to the development of explanations.

SC5.1.2 Students will describe how scientists go about their work.

SC5.1.2.a Recognize that scientific explanations are based on evidence and scientific knowledge

Grades 6-8 SC8.1.1 Students will design and conduct investigations that will lead to descriptions of relationship between evidence and explanations.

SC8.1.2 Students will apply the nature of science to their own investigations.

SC8.1.2.a Recognize science is an ongoing process and the scientific community accepts and uses explanations until they encounter new experimental evidence not matching existing explanations

Activity Resources

1. Purchase seashells through a science catalog, palm size recommended
2. Bucket of Fossils- Contact Debbie Hetzel, Customer Service, at Potash Corporation, North Carolina, (847) 849-4389 or email dahetzel@potashcorp.com with your name, school address to request a free 5 gal. Bucket of Fossils, small fragment fossils of parts of vertebrates, shark teeth. Ms. Hetzel will send your request to the Aurora Quarry Plant and they will send you the fossils

Creating Fossil Field Jackets

Activity

Miocene camels, 3-toed horses, rhinos and much more. Just some of the many bone specimens found in Nebraska over time and preserved in field jackets to be opened by preparators in the lab.

One of the paleontologists who locate fossil specimens is Shane Tucker. He spends his days checking the construction excavations of highways and roads across Nebraska for signs of fossils and salvages them for study. He discovers all kinds of fossils. Once he finds these fossils, he needs to make sure they get back to the lab all in one piece. He does this by creating a field jacket to surround the fossil which protects it for its travel back to the museum. With this activity, you are the paleontologist who will create a field jacket to preserve a specimen.

Objective:

Students will

- describe how paleontologists go about their work when they are at a dig site to preserve a fossil
- recognize science is an ongoing scientific process that involves field work, categorizing and describing evidence

Vocabulary to Know:

- paleontologist - a person who works with preserving and studying animal and plant fossils
- preparator - a person who prepares the fossil to be preserved
- adhesive - a substance used to stick objects or materials together
- taxon - a taxonomic group of any rank such as species, family, or class
- consolidant - an adhesive put onto the fossil to harden it

Questions:

- What is a fossil?
- What is a fossil field jacket?
- What important information would a paleontologist collect about the fossil before preparing a field jacket and taking it from the field?
- What is the role of a paleontologist? What is the role of a preparator?

Materials:

- 1 roll of plaster cloth (Dick Blick Supplies at <http://www.dickblick.com/products/blick-plaster-cloth/>)
- 1 plastic bucket or container
- warm water
- 1/2" paintbrush per each pair of students
- scissors
- Choose to use: seashells, palm size fossils or rocks
- rolls of toilet paper
- newspapers
- rubber gloves (if needed, students with sensitive skin may want to use gloves)



Student Procedures:

1. Cover surface area with newspaper.
2. Take seashell or other fossil and place on newspaper
3. Fill plastic bucket 1/2 full with lukewarm water.
4. Take 1-2 folds of toilet paper and dampen it.
5. Place dampened toilet paper over one side of exposed fossil area and use brush or fingers to lightly press toilet paper into crevasses, surrounding fossil. Add more dampened toilet paper as needed.



6. Measure and cut a piece of plaster cloth the size of the area covered by the toilet paper on the fossil and fold the plaster cloth over to double it. Cut the fold of the double piece of cloth so you have 2 pieces laying one on top of the other. Soak both pieces together 15 seconds in water. Drain off excess water by moving hands over cloth while over bucket.



7. Place plaster cloth over top point of toilet paper. Add more plaster cloth as needed. Press and smooth from inside outward of plaster cloth.



8. If needed, take another long strip of plaster cloth and fold in half length-wise to make a band around the edge of the toilet paper and fossil covered area. Connect plaster to the top cap of the cloth. Smooth over with fingers to spread plaster into seams. Let set and harden. This is the field jacket. You can cover the underside of the mold, but for this activity, this would conclude how to make a field jacket.

