FOSSIL EXCAVATION

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Level: Upper elementary

Anticipated Learning Outcomes

• Students will excavate a fossil.
• Students will be able to obtain information about prehistoric life from a single fossil. The importance of data collection is emphasized.

Background

Fossils fascinate most kids. A lab where students prepare a fossil which they get to keep is an exciting way to learn about geologic history and prehistoric life. In the field, fossils are generally excavated out of the rock just enough for the paleontologist to map it in his/her field notebook, along with information on when and where it was collected. Much of the rock is left on the fossil to help protect it during transport from the field to the lab. The rock is trenched out from the bed with enough rock or matrix left to protect the fossil, but unnecessary rock removed to keep the package as light as possible. Once it is trenched out, the fossil-bearing rock is undercut, so as to create a pedestal. Then the fossil is covered with paper towel or similar material to protect it, and the rock with fossil is covered with a plaster-burlap jacket (or if it is a light, small fossil, a plaster-gauze jacket). This is wrapped over the top, sides, and undercut edge. Once the plaster jacket is dry, the supporting pedestal is cut, and the entire rock-fossil-plaster jacket package is quickly flipped. This is a critical step; the fossil could fall out and break into numerous pieces if not wrapped well enough. Once it is turned, the bottom is then covered with a plaster jacket, and the package is marked with identifying data. It is then well-protected for transportation back to the lab, where most of the excavation, or fossil preparation, actually occurs. The tools used during fossil preparation are determined by the hardness of the matrix, the fragility of the fossil, and what types of information is being sought. For vertebrate animal fossils, old dental tools, ice picks, needles (to chip around delicate fish ribs), and paint brushes are common equipment. Microscopes and an airpick are also used for very fine detail preparation.

Materials

• beaker for measuring
• plaster of Paris
• small fossils
• paper cups
• sawdust
• paper towels
• spoon for mixing
• sand
• goggles, if required
• wooden stirring rods
• brushes (stiff glue brushes are good)

"Rock" Biscuit Recipe

• 2 parts sawdust
• 2 parts plaster of Paris
• 1 part sand
• 2 parts water

Mix dry ingredients thoroughly, then add water. Mix well. The mixture should be about the consistency of drop-cookie dough, but it may come out a little wet with no problem. Put one big spoonful of mixture in a paper cup along with a shark tooth. Stir to be sure the tooth is covered and shake cup down against the table to settle the mixture and loosen any large bubbles. Allow to set up overnight and remove from paper cup. Allow to dry about one week for best results. If used before dry, biscuits will be softer and less powdery. For younger students, this might be desirable.

One batch (about 110-125 cc/part) makes about 8 biscuits. Larger size batches may require adjustments in the proportions and more thorough mixing. Get the plain plaster of Paris, not the casting plaster. Sand can be any kind; sift to remove pebbles. Dark beach sand gives a more rock-like appearance to the finished product than the white play sand available at hardware stores.

Fossil and material suppliers:

• Geoscience Resources: 1-800-742-2677
• Scott Resources: 1-800-289-9299
• Ward's Natural Science Establishment: 1-800-962-2660

Procedures

A lecture utilizing a basic 35 mm slide set (available from commercial suppliers) helps introduce the topic of fossil collecting, the importance of recording data, and different preparation methods. A trip to a museum with fossils on display also works as a good introduction to the types of materials preserved (bone, shell, plant, impressions), and the information derived from them (paleoenvironment, past life forms, behavior of organisms such as eating habits if teeth marks are found on a bone or if there are preserved stomach contents). The lesson culminates with each student excavating her/his own fossil from a teacher-prepared "rock" biscuit. Each student is given a biscuit, wooden rod, brush and some paper towels. The students chip away the matrix with wooden stirring rods (or sharpened wooden dowels) and glue brushes. In each biscuit is one, genuine fossil. Fossil shark teeth work well, as they are hard, an easily recognized
shape, and have the attraction of being from a predator. After all students have uncovered their fossil, washed it off, and cleaned up their area, the teacher can explain the importance of labeling the fossils. Without data, the fossil is little more than a curiosity. We recommend passing out small glassine envelopes with labels onto which the age of the fossil and location they were collected can be written. The age and location information is available with the fossils purchased from most distributors.

Fossil "rock" biscuits are simple to make from a mixture of plaster, sawdust, and sand, in which a fossil has been embedded. It is important to use real fossils. Shark teeth are easily obtainable from a number of sources and generally inexpensive (30-50 cents @). Suitable local fossils could be substituted. Whatever fossils are used, they can then become the focus of further study about the animals themselves, their role in their prehistoric world, and their presence or absence in modern times. If shark teeth are used, it would be interesting to show students a modern shark's jaw, to see the continuous tooth replacement of sharks. While fossil shark teeth are common, fossil shark skeletons are rare, as their skeleton is cartilaginous. The shape of the tooth itself (needle or a wedge) indicate the size of prey the shark would commonly go after. A needle-shaped tooth is suitable for piercing a fish it may eat in a gulp. A wedge shaped tooth is designed for cutting off chunks of meat, for a shark that may attack prey too large to eat in a single bite. Frequently, both types of fossil shark teeth are found in a bulk buy from a distributor.

Reference

KLEIN, Sarah E., 1982, Making and Mining a Mountain: Science and Children, March, v. 19, no. 6, p. 7-8. Recipe modified from one included in this article.