

Overview and Purpose

The most apparent purpose of this unit was to prepare a group of students to map, collect and prepare fossils in such a manner that they can be accessioned properly into a museum collection. Although it is still crucial that we follow proper procedures and maintain good quality control in our scientific fieldwork, the true purpose for this unit was to excite students about science by getting them right out into the field and working side-by-side with professional paleontologists.

Unit Overview:

To begin the unit, I review some of the necessary geologic and biologic background information and then we get right into learning different field techniques. Here is a listing of the lessons in the unit:

1. Review geologic time – For this, I use a variety of geologic time scales, and the classic comparisons of geologic time to a one year calendar, a 24 hour day, and a meter stick. Then we go outside and to “Geologic Time Along Picadilly.” Using a metric wheel to count off the distances and huge neon signs to mark the various eras, epochs and events, we create a geologic timeline that stretches all the way down Picadilly Street to the nearby park.
2. Compare and contrast the animals in Colorado and Wyoming in the Eocene to those present in those locations today.
3. Diagram a possible Eocene foodweb.
4. Diet and dentition type matching activity and comparison of fossil jaw and tooth casts on loan from local museum.
5. Review fossil types and fossilization processes.
6. An activity on which parts of a skeleton are most diagnostic for paleontological study.
7. Lesson on taphonomy and paleoecology.
8. “Leaf Litter Activity” see Selected Activity section below for more detail.
9. “Sherlock Bones” Students use three sets of bone diagrams (they cut out the bones) to try to determine what a fossil animal looked like. The catch? The first set of bones are only the few that are most likely to survive the fossilization and exposure process (a lesson in taphonomy). The second set are the next most fragile, the last set is the most fragile and least likely to be recovered. They learn a lot about how difficult it sometimes is to actually know what a fossil animal might have looked like.

2007

Winning Lesson Plan from Aurora, Colorado

Eocene Park – A Field Paleontology Unit

by Pam Schmidt
Thunder Ridge Middle
School

Subject: Field paleontology
Grade Level: 6–8
Duration: 4 to 6 Weeks

Overview and Purpose (Cont'd)

Unit Overview (Cont'd):

10. Discussion of fossil collection laws and quarrying vs. prospecting.
11. Plaster jacketing lab – We use modern bones that I have pre-buried in mud boxes and allowed to dry.
12. Review of rock types.
13. “Stratigraphy in the Bleachers” – Students measure, sample, draw and stratigraphic sections based on the “cliff faces” that I build in the bleacher section of our gym.
14. Topographic mapping exercise.
15. Demonstrations of correct fossil wrapping and labeling techniques and practice in making proper field notebook entries.

Educational Standards Addressed:

This unit address Colorado Science Standards One (Scientific Investigation and Design – all six grade 6-8 benchmarks), Three (Life Science – grade 6-8 benchmarks 1, 2, 11, 12, and 13) Four (Earth Science – grade 6-8 benchmarks 1, 3, 5, 6, and 9), and Five (Nature of Science – all five grade 6-8 benchmarks). Please go to http://www.cde.state.co.us/cdeassess/index_olr.html for details about the standards.

Objectives, Materials, Procedures:

These are addressed below in the Selected Activity section.

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Extensions:

There are two main extensions that I include in this unit, but it is rich for the development of many more. The ways that I extend it are with a field trip to the Denver Museum of Nature and Science (DMNS) and our week long field school to the southwest corner of Wyoming. At DMNS, the students meet and talk to the paleontologists, tour the Collections area and study the Eocene fossils that we have found in previous years, and get a “behind the scenes” tour of the Prehistoric Journey exhibit, focusing especially on the Eocene fossils.

Our week in Wyoming is always quite an adventure! In addition to prospecting for mammal fossils (which then go back to the museum for accession), we also quarry fossil plants, collect silicified invertebrate fossils from ant hills, and quarry fossil fish at a commercial quarry. For many of the 26 – 32 kids that I take up each year, it is their first time camping without family so they learn a lot besides paleontology...especially since it is a dry camp meaning we have to haul in all of our water, and our first task of the week is to dig a pit and erect our outhouse. Like I said, quite an adventure!

Selected Activity:

I wrote this activity (along with “Sherlock Bones”) when I was a member of the Education Advisory Committee for production of the permanent exhibit, Prehistoric Journey. It designed to support a visit to Prehistoric Journey (they have pre-visit, during visit and post-visit components), but can be used effectively without a field trip also. In addition, it is published in the Prehistoric Journey Educator’s Sourcebook which was sent out to Colorado schools when the exhibit opened and given to teachers at the trainings. It is still available from DMNS or people can contact me for full copies of the lesson and the black-line masters.

I also helped modify the Fossil Leaf Litter activity for use with the JASON Project; it was part of an activity using leaf margins to predict forest mean annual temperature. It was in the JASON X Rainforests: A Wet and Wild Adventure curriculum and may still be available from them.

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Fossil Leaf Litter

Objectives:

During this lesson, students will:

1. Develop skills in observation, identification, and classification.
2. Utilize the clues and techniques paleontologists use to re-create ancient environments from fossil data.
3. Be introduced to the concept of relative abundance—which trees are most abundant in a given area and why.
4. Formulate hypotheses, and present and support hypothesis to peers in an appropriate manner.

Materials:

To complete all three parts of the lesson, you will need pencils, crayons or colored pencils, blank white paper, copies of the Fossil Leaves black-line masters, lawn bags, copies of the leaf count worksheet, and copies of the answer keys.

Procedures:

Take A Hike Around Your School (pre-visit) = Students observe leaves, branches, and bark patterns; collect a few leaves; make drawings or rubbings of the collected leaves; compare and contrast the leaves in regards to shape, vein structure, and leaf margins; and classify the leaves according to their characteristics.

Leaf Count (pre-visit) = Students observe, sort and classify a bag full of the fossil leaves and partial leaves; complete the Leaf Count worksheet and describe the markings or characteristics they used to determine the number of leaf species represented; make drawings of each leaf type and then draw what they think each leaf species looked like when attached to the branch; share and compare drawings and classification systems used by each student.

Classify a Creekbed (during museum visit) = Students observe the Cretaceous Creekbed exhibit focusing on the trees and leaves; locate the three species they learned about in the Leaf Count activity; using their field notebook, respond to a series questions about the other tree species, species abundance and the type of climate represented.

Leaving Leaves (post-visit) = Students discuss their field notes and answer questions addressing such issues as trying to reconstruct ancient trees, classifying fossils, comparing modern and fossil species, and ancient climate reconstruction. A summative class discussion is also very effective here.

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