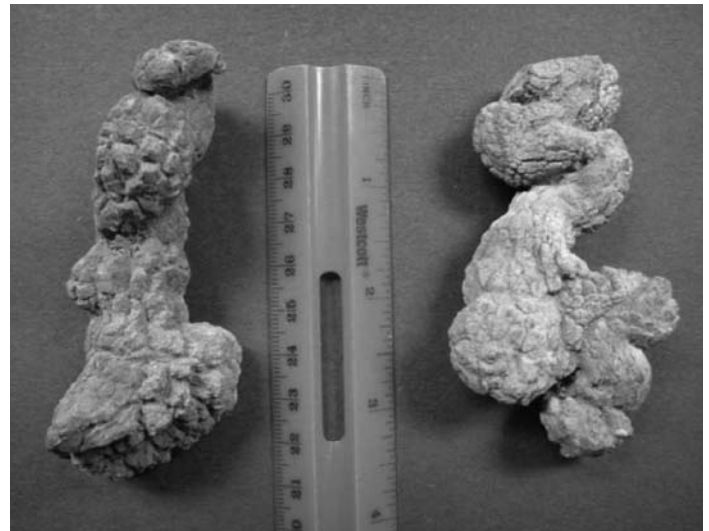

THE IMPORTANCE OF POOP (COPROLITES)

By Jamie Cummings and Steve Mattox-Grand Valley State University

When we visualize fossils we think of hard remains like dinosaur bones or trilobites. Paleontologists also glean information from trace fossils, the marks, impressions, and soft material left behind by plants and animals. Perhaps one of the most entertaining and intriguing types of trace fossils is coprolites, fossilized fecal material. Just as an owl pellet study reveals characteristics about owls, careful study of coprolites can tell us much about the animal that created it. In this activity, we will introduce students to the general appearance of coprolites, make some in the classroom (using modeling clay), and then interpret their composition to gain insights into their "creator."

This month's books and activities highlight how students can discover animal behavior and habitat using these trace fossils.



This Month's Trade Books

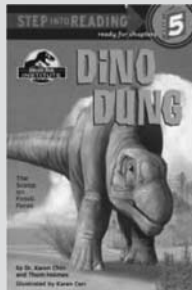
Dino Dung the Scoop on Fossil Feces

By Dr. Karen Chin.

Illustrated by Karen Carr.

Random House Publishers. 2004.

ISBN 0-375-82702-1. Grades 2-4



Synopsis

Dr. Chin, a paleontologist, has written an excellent and engaging summary of what scientists know about fossilized feces. She begins by describing how William Buckland first determined he had discovered fossilized hyena feces. She then provides background on body and trace fossils and the conditions needed to preserve feces as a fossil. Chin describes the ways scientists identify a coprolite and highlights the detective work needed to discover which animal was the "producer." This "ready for chapters" book is well illustrated and shows a female minority scientist.

Jurassic Poop What Dinosaurs (and Others) Left Behind

By Jacob Berkowitz.

Illustrated by Steve Mack.

Kids Can Press. 2006.

ISBN 10 1-55337-867-9. Grades 2-4



Synopsis

Berkowitz balances a detailed text with fun, humorous art and presentation. Although the book is focused on ancient feces it is full of insights into the nature of science, interesting scientists, and science history. Numerous scientists with diverse backgrounds are presented. The author skillfully reveals how scientists identify coprolites from other rocks and interprets their composition, texture, and setting to identify the maker and comment on the diet and habitat. The book contains contents, a glossary, an index, and a few activities.

Curricular Connections

Fossils provide evidence about the plants and animals that lived long ago and the nature of the environment at that time. In the grades K-4 activity, students look at real coprolites or photographs from the web to brainstorm and list the characteristics of coprolites. In the grades 5-8 activity, students use clay to sculpt "coprolites" and add plant and/or animal bones. The students exchange their specimens and then make interpretations on the "producer." Fossils provide important evidence about life and how environmental conditions have changed.

Dino Dung introduces coprolites as a useful type of fossil that provides details about an organism that are not available from the study of bones. It also presents several scientists, including Dr. Chin, a female, minority scientists. With the basics under their belt students can broaden their understand by looking at more diverse examples presented in *Jurassic Poop* and become skilled interpreters of coprolites.

THE IMPORTANCE OF POOP (COPROLITES)

Trade Book – Inspired Investigations

What are you holding? For Grades K-4

Properly identifying rocks and fossils is a basic skill for geologists. Geologists commonly describe the color, shape, and texture of a specimen. In this activity the students will be young geologists trying to describe a hand specimen or photo of a coprolite.

Purpose: Students use their prior experience to identify characteristics of coprolites.

Materials: Coprolites can be bought on Ebay™ for about 3-4 dollars and the same for shipping. Have the samples of coprolites ready to pass around to the students. Alternatively, pictures of coprolites can be passed around the classroom. Numerous, diverse, colorful photos of coprolites can be found using the Google™ images search engine.

Procedure: Pass the coprolites around the room. (Note: the age and producer of the coprolite might be provided by the fossil seller or the online source.) Direct the students to pull out a piece of paper and try to answer the questions:

**Do they look familiar? Are they hard or soft? Where did they come from?
What are these? Why might they be hard?**

As the students are writing their answers circulate among the students and see how they are doing. Make sure that all of the students are recording their observations in writing to generate ideas. Provide about five minutes to explore. Then, write their responses on the board and see if you can get to a consensus on what they are describing. Which animal or where it came from is not as important, just so that they understand and are able to recognize that it is a waste product and that it is preserved as a fossil. Here is a potential teacher (T) and student(S) exchange:

- T. Do they look familiar?
- S. Most will say yes and start to laugh when they are talking about waste.
- T. Are they hard or soft?
- S. Hard.
- T. **Where did they come from?**
- S. From a butt might be a common response, welcome the giggling, but try to keep the students on task with answering the questions.
- T. **What are these?**
- S. They are hard poop, might be a response, as well as old poop. They will learn later that the correct term is coprolites.
- T. **Why might they be hard?**
- S. Their responses will vary. Try to get the students to understand it is old poop, by directing them with open-ended questions. The fecal material has been through a fossilization process, much like dinosaur bones, that result in hard, rock-like material.

At the end of this engage activity, be sure that the students know that the words “dung” “crap” and “poop” are only to be used in the classroom when we are doing work on this project. They are also only to be used in correct context. This will be a precaution to take so that the students are not saying these words inappropriately. Explain that they are all words that mean feces.

THE IMPORTANCE OF POOP (COPROLITES)

Trade Book – Inspired Investigations

Who Dung It? For Grades 5-8

Animals have different diets. Some animals are herbivores while other animals are carnivores. In this activity students will construct “coprolites” that contain clues to diet, exchange with their classmates, and then interpret the diet of the producer and speculate on its environment. This activity is modified from Berkowitz’s Jurassic Poop.

Purpose: Students construct their own “coprolites” and interpret the contents to identify the producer as a carnivore, herbivore, or omnivore and whether it lived on land or in the ocean.

Safety: Be sure the bones or shell fragments are not sharp or pointed.

Materials:

- Flour (500 ml), salt (125 ml), water (250 ml), and several drops of food coloring (optional) to make about 10 specimens
- Plant debris: leaves, stems, etc. (we like dried ferns)
- Bones: clean chicken bones work well
- Shells: crushed sea shells (or crab legs...without the meat)

Procedure:

Prior to class assemble the materials. Mix the dry ingredients and then add the water.

The texture is about the same consistency as bread dough. You can add a dash of water or flour as needed. If these are prepared early, keep them wrapped tightly so they do not dry out before the dissection.

In class, hand out enough dough, about a small handful, to make one coprolite sample per student. Have each student insert (herbivore) and/or (carnivore) items to each coprolite sample. Safety reminder: be cautious of sharp edges on items such as chicken bones or crab shells. Ideally, the materials inside the dough should be hidden from view. Once the samples are made students can exchange their specimen for one that their classmate constructed.

Direct the students to dissect each specimen and record their findings. Once the students state whether they have a carnivore or herbivore, have them think of an animal that might create this type of feces.

After each student has completed their investigation, have her/him present their findings and explanations to the class. Have them justify how they got to their answer.

Finally, after the students have presented their interpretations have them explore the lithification process. They can leave the samples out for a week to dry out. When the students return, their specimens will be dry and you can discuss the similarities and differences between the original experiment and the lithification process. Jurassic Poop explains several lithification processes, including drying.

Here is a potential teacher and student exchange:

- T.** You have samples of coprolites in front of you. (Let them know that for the sake of being able to dig inside of them safely, they are soft) Some animals do not fully digest their food and the remains of what they eat, might still be in their waste. What did we say an herbivore was again? And a carnivore? (Make sure they know the difference between a carnivore, herbivore, and an omnivore.) You all can dig inside of them and record what you find in them. What do you see?
- S.** Some will say plant materials. Others will say animal remains. Some will find both.
- T.** If you have plant materials, what kind of animal do you think this came from?
- S.** Herbivore
- T.** If you have animal remains what kind of animal do you think this came from?
- S.** Carnivore
- T.** If you have both plant material and animal remains what kind of animal do you think this came from?
- S.** An omnivore.
- T.** Based on the type of material in your coprolite, was the producer on land or in the ocean? Justify your answer.
- S.** Definitely on land because these look like bird bones (or fern fronds). These are definitely in the ocean because these look like shells. Maybe these were found in shallow water.
- T.** How might digging into a real coprolite be different than digging into your sample?
- S.** It might be harder. They would be more like a rock so you would have to be careful not to break what is inside of them.

Now encourage the students to state some examples of these animals. Have them make a list and compile the responses on the board. Make one side of the board "Carnivore", one side "Herbivore", and "Omnivore" in the middle of them. Put a response from each student on the board and discuss how they fit into the correct group.

Note: At the end, you can have the students mold the copro-dough into any type of poop shape. Then you can put them in a spot in the room to let them dry for a week. At the end of the lesson they can see how the samples dried out and became hard just like a real coprolite.

Photo by Steve Mattox. Other photos available on Google images

ABOUT THE AUTHORS

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