TEACHER GUIDE

Dino Detectives: Identifying Fossils

DESCRIPTION

"Calling all Jr. Paleontologists!" We need your help to identify the latest fossilized find! Become part of the Cleveland Museum of Natural History team, working together to uncover clues from the Cretaceous Period. By comparing your evidence with existing fossil records and known facts about modern wildlife, you'll soon discover this dinosaur's identity, and what its habitat was like over 75 million years ago.

OBJECTIVES

- Experience what work as a paleontologist is like by following scientific procedures on a mock dig site.
- Compare fossil evidence to both living animals and other fossils.
- Uncover how dinosaurs differed from one another and learn how this helped them survive.
- Connect Cleveland's fossil record to local geologic processes.

OHIO'S LEARNING STANDARDS

Grade 2

Life Science - Interactions within Habitats

- All organisms alive today result from their ancestors, some of which may be extinct. Not all kinds of organisms that lived in the past are represented by living organisms today.

Grade 3

Life Science - Behavior, Growth, and Changes

- Individuals of the same kind of organism differ in their inherited traits. These differences give some individuals an advantage in surviving and/or reproducing.

Grade 4

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Life Science - Earth's Living History

- Changes in an organism's environment are sometimes beneficial to its survival and sometimes harmful
- Fossils can be compared to one another and to present-day organisms according to their similarities and differences

BEFORE YOUR PROGRAM & HOW TO SET UP YOUR ROOM

- Set-up requirements:
    - Students will be working in small groups, sharing materials provided by the museum instructor.
    - Each student will need a pencil.
    - Museum educator will need to project slides. A classroom projector can be used if available. Otherwise, the educator will need a blank wall or white board to project from the Museum projector.
- Please have student desks clear before the program begins.
- Please provide an empty desk or small table for the museum educator to set up display items.
- Use the vocabulary and additional resources provided in this Teacher Guide to preview or review program content with your class.
- If booking multiple programs, transitions will be easier if museum staff sets up in only one location.

VOCABULARY

birds (avian dinosaurs) - any warm-blooded vertebrate of the class Aves that have a body covered with feathers, lay hard-shelled eggs, and forelimbs modified into wings. Birds are the only living group of Dinosauria.

carnivore - a meat-eating animal. Carnivoran teeth tend to be sharp and pointed for tearing flesh
cast - a duplicate of an object made from a natural or artificial mold

Cretaceous Period - the last period of the Mesozoic Era which lasted from 145 to 66 million years ago

dinosaur - a group of prehistoric reptiles that walked with their legs directly beneath their body. Dinosaurs first evolved during the Triassic Period, some 230 million years ago, and still live today.

See also: birds.

extinct - no longer in existence

fossil - traces or remains of prehistoric life

fossil preparation - the process of cleaning, restoring, and conserving a fossil before study or exhibition

herbivore - a plant-eating animal. Herbivore teeth tend to be flat or rounded for grinding plants.

mammal - a warm-blooded animal that has hair, gives live birth, and produces milk to feed its young

mold - an impression that preserves the surface appearance of an object (example: fossil casts)

paleontologist - a scientist who studies fossils to learn about prehistoric life

prehistoric - before the time of written records

reptile - an animal that is ectothermic (cannot produce its own heat), has a body covered by scales, breathes air with lungs and generally lays eggs (snakes, lizards, crocodiles, turtles, tortoises, etc.)

skeleton - An internal structure composed of bone and cartilage that protects and supports the soft organs, tissues, and other parts of a vertebrate organism

vertebrate - an animal possessing an internal backbone and skeleton

EXTENSION ACTIVITIES

1. **Making a Fossil**

   You can make your own molds and casts to illustrate that particular kind of fossil preservation. Use softened clay for the mold. Press a hard object, such as a shell, into the clay. Remove the shell. The impression in the clay is the mold. Shells also can be pressed into plaster, but be careful to coat the shell lightly with cooking oil and press into the plaster before it gets too hard. Play-dough is another mold material although it often cracks while drying. (Don't be too concerned about that! It lends an air of reality when the mold is slightly imperfect - nature is often that way). A play-dough mold can then be lightly sprayed with cooking oil and filled with plaster to produce a cast. Allow the cast to harden, and then separate it from the mold.

2. **Dino Teeth**

   Teeth give us clues to an animal's diet. Sharp, pointed teeth are characteristics of meat-eaters. Flat, chewing teeth are characteristics of plant-eaters. It is very important for herbivores to chew their food before they swallow it to help the stomach get all the nutrients out of the food. Look for pictures of animals in books, magazines or on-line and notice the shapes of the teeth. What kind of teeth do humans have? How do we use our front teeth? How do we use our back teeth? What about animals that don't have teeth? How do those animals eat?

3. **How Big is a Dinosaur?**

   How big is a dinosaur? Does 'big' mean 'long'? … tall?... or heavy? Measure a length of string to equal the length of a dinosaur. Have the class stretch it out to see the size of a giant dinosaur. If the students all hold hands and stretch out in a long line would the class be as long as one of the big dinosaurs? The longest known dinosaur is *Seismosaurus* which may have been 120-140 feet long. *Ultrasaurus* may have stood up to 55 feet. How many students would have to stand on top of each other to get that high? *Seismosaurus* and *Ultrasaurus* may have weighed up to 100 tons (200,000 pounds) each. How many students would it take to weigh that much? Don't forget there were smaller dinosaurs, too! *Aquilops* was the size of a small dog. Children may be taller or weigh more than some of the smaller species!

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EDUCATOR RESOURCE CENTER (ERC)

Educator Resource Center
CLEVELAND MUSEUM OF NATURAL HISTORY
Celebrating 30 years of supporting science education

The Educator Resource Center is dedicated to providing teachers with the classroom resources and professional development they need to create dynamic, enriching, and inquiry-based experiences for their students.

Contact the ERC at 216-231-2075 for information on individual or school membership.

Visit the Museum's ERC website for more information https://www.cmnh.org/ERC

MATERIALS FOR LOAN

With close to 100 dioramas and over 130 thematic teaching kits, our lending library has the materials you need to make science come alive for your students.

If you're interested in additional resources be sure to check out the following ERC materials or browse ERC materials online at https://cmnherc.myturn.com/library/

EDUCATOR PROFESSIONAL DEVELOPMENT

Get connected to trending teaching methods, best practices in science education, and hot topics in current scientific research.

To learn more visit https://www.cmnh.org/learn/educator-resource-center/educator-workshops

Email inquiries to erc@cmnh.org.

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