

Exploring Fossils: A Program of Epoch Proportions Grades 2-4

DESCRIPTION

Journey through the ages of deep time in the Museum's stunning new fossil-filled galleries. Meet iconic specimens while learning how scientists uncover Earth's past using paleontology and geology. Students will explore the history and interconnections of life while interacting with exciting Museum quality specimens. Prepare for an epic experience eons in the making!

OBJECTIVES

- Students began to scaffold a framework for understanding deep geological time. Spatial and temporal representations are used to facilitate grasping this large concept.
- Students understand the fossilization process and can recognize different types of fossils.
- Students understand how paleontologists date and recreate past environments, understanding the history of planetary life from the fossil record.
- Students begin to recognize the interconnections and differences between groups of organisms.
- Students understand the geological timeline contains several unique periods punctuated by extinctions and can name dominant forms of life from each era (Age of Fishes, Reptiles, Mammals).
- Students are introduced to science careers that sound fun, exciting and relatable.

OHIO'S LEARNING STANDARDS

Second Grade

- 2.LS.1 Living things cause changes on Earth.
- 2.LS.2 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.

Third Grade

- 3.LS.1: Offspring resemble their parents and each other.
- 3.LS.2: Individuals of the same kind of organism differ in their inherited traits. These differences give some individuals an advantage in surviving and/or reproducing.
- 3.LS.3: Plants and animals have life cycles that are part of their adaptations for survival in their natural environments.



Fourth Grade

- 4.LS.1: Changes in an organism's environment are sometimes beneficial to its survival and sometimes harmful.
- 4.LS.2: Fossils can be compared to one another and to present-day organisms according to their similarities and differences.

Social Studies: Historical Thinking and Skills.

- Time can be measured

Before your Program

If this will be your first trip to the Museum for some of your students, you may want to discuss the following questions:

- What is a Museum? Why are we going to the Cleveland Museum of Natural History?
- How should we handle objects at the Museum?
- Use the vocabulary and additional resources provided in this Teacher Guide to preview or review program content with your class.

VOCABULARY

birds (avian dinosaurs) – the direct descendants of two-legged, meat-eating dinosaurs.

Birds have feathers, are warm-blooded and lay hard-shelled eggs.

carnivore – a meat-eating animal. Carnivore teeth are all sharp and pointed.

dinosaur – a prehistoric reptile with upright legs that lived during the Mesozoic era.

fossil – preserved remains or impressions of a prehistoric plant or animal.

geological timescale – a representation of time based on the rock record of Earth covering 4.6 billion Years.

herbivore – a primarily plant-eating animal. Herbivores have teeth that tend to be flat or rounded.

limb – one of the projecting paired appendages (such as wings) of an animal body, typically used for movement and grasping.

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



omnivore - an animal that readily eats both plants and meat. Omnivores tend to have many different teeth with many different shapes.

paleontologist – a scientist responsible for studying fossils, fossil remains, and the fossilization process.

prehistoric – living more than 5,000 years ago.

reptile - an animal that is cold-blooded (cannot produce its own heat), has scales, breathes air with lungs and generally lays eggs with soft or leathery shells.

skeleton - the complete set of bones that some animals have inside their bodies.

skull (Crania) - an organism's head bones.

EXTENSION ACTIVITIES

Dino Drawings

Draw a picture or write a story describing how you would live in a world with dinosaurs. We don't know what colors all dinosaurs were, but they likely were not all grey or green. Scientists using powerful microscopes can look at something called melanosomes. These are microscopic packages of melanin pigments that give feathers their various coloration. Actual traces of chemically-degraded melanin pigments can also be seen in some fossils. Different shapes indicate the animals' different colors. Try creating dinosaurs in a variety of colors. Fossil evidence shows that many types of dinosaurs had colored feathers, and some may have even had patterns.

Create a rock layer drawing showing the age of the dinosaurs (the Mesozoic) with older rocks (the Paleozoic) below and newer rocks (the Cenozoic) above. Add fossils to the layers showing what life forms lived during each period. Which layer would you study if you were a paleontologist?

Fossil Fun Extensions

Usually the only parts of an animal that become fossils are the hard parts. The soft parts decay and disappear - so from dinosaurs we find bones and teeth, from snails and clams, we find their shells. We can also find things like eggs, impressions and footprints.

- Clean off some chicken bones by boiling them. Pour plaster about ½ inch deep in the bottom of



milk cartons or a few small boxes. Allow students to press bones into the soft plaster to "create" a skeleton. Before plaster gets too hard you can sprinkle some sand over it to create a "rocky" look.

- Similarly, have students press their hands, a clean chicken bone, clam shells or any other natural objects into clay to make impressions. These impressions are similar to mold fossils that leave an imprint of the organism in hardened sediment.
- If children have access to gravel like in some driveways or playgrounds, the gray limestone rock often used can contain fossils. Look for the imprints of small shells or ancient sea life in the limestone.

Make Your Own Fossil

- Prepare a chunk of potter's clay for each student, smoothing the pieces to approximately 2"x2"x1".
- Have students press a leaf, shell, or even a lost tooth into the clay and then remove the object. Explain to the students that this is one way in which fossils are formed, from the impression of a living thing. Another example would be a footprint. These are called mold fossils.
- Set the clay in the sun to dry (about 24 hours).
- As a paleontologist would do to study the fossil, pour plaster of Paris into the mold fossil and allow the plaster to dry. Pop out the cast of the fossil. Explain to students that the cast is not the actual fossil, but a copy of the real thing.
- Some of the examples that students will view and touch during the program are casts, as real fossils are often too fragile to touch.

ONLINE RESOURCES FOR TEACHERS AND STUDENTS

Click the link below to find additional online resources for teachers and students. These websites are recommended by our Museum Educators and provide additional content information and some fun, interactive activities to share with your class.

CMNH Educators regularly review these links for quality. Web addresses often change so please notify us if any links have issues.

[Earth Sciences Fossil Prep Lab | Cleveland Museum of Natural History](#)

[Molecular Paleontology Lab | Cleveland Museum of Natural History](#)

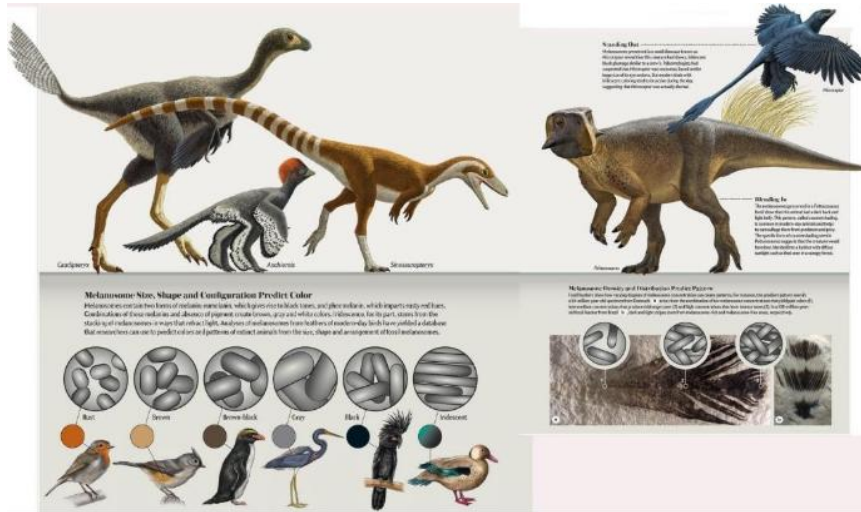


[Biological Sciences | Cleveland Museum of Natural History](#)

Neil Shubin Tetrapod Evolution Lesson: [Your Inner Fish](#)

[History of Life on Earth | Smithsonian National Museum of Natural History](#)

Natural History Museum, London: [What is a fossil? | Natural History Museum](#)



[Fossil Pigments Reveal the True Colors of Dinosaurs | Scientific American](#)