

# Clues to the Past

Grades 6-8  
Educational Program Guide

OAS

Science Practices: 1, 2, 3, 4, 6, 7, 8

## Program Overview

The Clues to the Past program will introduce students to several 300 million years old ecosystems from Oklahoma's Carboniferous past. Students will work in teams to map out marine, swamp, damp earth and dry upland habitats by identifying both plant and animal fossils of the period.

## Objectives

After participating in this program, students will be able to:

- Understand what factors define a paleo-ecosystem
- Identify plant and animal fossils
- Students will use their skills of observation and analysis to map out Oklahoma's Carboniferous habitats

## Background

During the Carboniferous Period, geologic age 354 – 290 million years ago, portions of Oklahoma were covered by a shallow sea with a swampy shoreline. As the name implies, the Carboniferous Period is the one in which coal formed in Oklahoma. This was brought about by the numerous plants decomposing in a damp environment allowing peat to form and eventually coal. Numerous plant and animal fossils are found across southeast Oklahoma that aid paleo-ecologists in mapping out the various prehistoric ecosystems of Oklahoma's prehistoric past.

## At the Museum

### Hall of Ancient Life

Have students explore the various exhibits of the Carboniferous Period in the Paleozoic section of the Ancient Life Gallery. Lead students in a discussion on the above exhibits using the information acquired in the classroom.

## Vocabulary

<i>Carnivore</i>	An animal that eats meat; a predator.
<i>Calamites</i>	The ancestor of today's horsetail rushes. During the Pennsylvanian Period these grew to be 70 feet high.
<i>Coal</i>	Compressed remains of ancient plants deposited during the Mississippian and Pennsylvanian periods (often called the Carboniferous) 350 mya to 290 mya. Thick deposits of plant remains accumulated in swampy areas along with mud and other sediments were deposited on the decaying vegetation. The weight of the sediments created pressure and heat. The heat drove out the hydrogen and oxygen leaving only carbon, which was compacted into coal. Coal was the most important "fossil fuel" of the 1800 and early 1900's.
<i>Deinonychus</i>	Deinonychus was a small, active meat eater that probably hunted in packs. It lived during the Early Cretaceous, about 110 million years ago. It was named for the sickle-shaped claw found on the first toe of its hind feet.
<i>Ecology</i>	The study of the interrelationships among living things and between living things and their environment.
<i>Fern</i>	Today Ferns reproduce by spores and evolved before seed plants. During the later Paleozoic, there were many types of ferns and some species grew to be the size of trees.
<i>Food Chain</i>	The transfer of energy from one type of life form to another.
<i>Fossils</i>	Traces of prehistoric animals and plants. Fossils include both preserved body parts of organisms and traces those organisms have left behind. Many fossils are formed when hard minerals replace the pore spaces or original material in bones, shells, or wood.



## Vocabulary (cont.)

***Habitat***

The place where an animal or plant naturally lives or grows.

***Herbivore***

A plant eater; an animal that eats plants or parts of plants.

***Lycopod***

Fossil lycopods are characterized by a diamond-shaped pattern on the bark made up of leaf scars. They grew in swampy areas.

***mya***

Abbreviation for Million Years Ago.

***Paleo-ecology***

The study of prehistoric relationships between once living things and their environment.

***Tenontosaurus***

(Ten ON toe SORE us) A plant-eating dinosaur that lived in Oklahoma during the Early Cretaceous, about 110 mya. Tenontosaurus was about 19' long and weighed 1,300 pounds. Scientists think they lived in herds since fossils of babies, juveniles, and adults are often found together.

***Terrestrial***

Living on land.

***Trilobite***

An extinct group of marine animals that belonged to a larger group of animals called arthropods. Trilobites lived in marine environments for the entire Paleozoic Era, about 250 million years, and lived all over the world, including in Oklahoma.



## Vocabulary (cont.)

### Geologic Ages:

**Paleozoic Era (540 mya to 248 mya):** Paleozoic means “early life.” It is the first time period with abundant preserved fossils. The end of the Paleozoic is defined by the Permian extinctions, the largest extinction event in Earth history.

**Cambrian Period (540 mya to 490 mya):** Trilobites, an extinct group of arthropods, first appeared during this time and became the dominant life form in the ocean.

**Ordovician Period (490 mya to 443 mya):** During this period, graptolites (a marine animal) became abundant and jawless fish appear.

**Silurian Period (443 mya to 417 mya):** Sea life became abundant and diverse. Plants still had root systems in the water.

**Devonian Period (417 mya to 354 mya):** Plants move onto land, as do amphibians and invertebrates.

**Mississippian Period (354 mya to 323 mya):** Sea life becomes more diverse. The amniote (closed) egg allows early reptiles to move away from watery habitats. Land plants are abundant and include trees that can reach a 100 feet in height, such as lycopods and giant horsetails (Calamites).

**Pennsylvanian Period (323 mya to 290 mya):** Huge ocean reefs provide habitats for diverse sea life, and bony fish and sharks are dominant predators. Warm and humid climate conditions encourage the growth of lush forests (coal swamps). Students will handle fossil plants representative of Oklahoma’s tropical past.

**Permian Period (290 mya to 248 mya):** reptiles diversify into lineages that lead to dinosaurs and mammals. The climate becomes more arid and the period ends with a mass extinction event that destroys a majority of marine and land animal groups.

## Vocabulary (cont.)

**Mesozoic Era (“middle life”):** The next era of geologic time; began about 225 million years ago and ended about 65 million years ago; often called the Age of the Dinosaurs.

**Triassic Period (248 mya to 206 mya):** The first period of the Mesozoic Era. Many new animal groups appear during the Triassic, including the first dinosaurs and mammals.

**Jurassic Period (206 mya to 144 mya):** The second period of the Mesozoic Era. During this time, reptiles flourished and dinosaurs diversified into many new types. The first birds appeared. Mammals remained small and probably were most active at night. Plant eating sauropod dinosaurs, like Apatosaurus (Brontosaurus), were preyed upon by meat eating theropod dinosaurs like Saurophaganax, probably the largest carnivore of the Jurassic. You will see specimens of both these dinosaurs at the museum.

**Cretaceous Period (144 mya to 65 mya):** The last period of the Mesozoic Era. High sea levels created a sea that cut across central Oklahoma and divided North America, providing a habitat for many large marine reptiles. Also, during this time period, the plant eater Tenontosaurus lived in herds in southeastern Oklahoma and was preyed upon by the pack-hunter Deinonychus. You will learn about both these dinosaurs during the class.

**Cenozoic Era (from 65 mya):** Cenozoic means “recent life” and is also known as the “Age of Mammals.” Dinosaurs, marine reptiles, ammonites and other animals became extinct at the end of the Mesozoic. Mammals now have the opportunity to diversify into numerous groups and many become quite large. The museum has specimens of many of the Cenozoic “megafauna.”

