

DINOSAUR BASICS

SCIENCE ALWAYS CHANGES

Because of new discoveries, our understanding of dinosaurs is constantly changing. This section contains information and activities designed to introduce educators and students to the most up-to-date understanding of the definition of a dinosaur, what we think we know and how we know what we know about dinosaurs.

WHAT IS A DINOSAUR?

DINOSAURS:

- Were a special kind of dinosaur that walked with its legs directly under its body, like birds and most mammals. (Modern reptiles walk with their legs splayed out, their knees always bent, and their feet pointed out, rather than forward.)
- Lived during the Mesozoic Era (245 to 65 million years ago).
- Were terrestrial, meaning they lived on land. (Swimming and flying reptiles were not dinosaurs.)
- Are now extinct, but their descendants are alive today as birds.

BIRDS ARE LIVING DINOSAURS

As scientists have made discoveries and learned more about dinosaurs, they have realized that dinosaurs of the past and modern birds have very similar features including (but are not limited to—there are over 100 similarities discovered to date):

- Three toed feet
- Hard shelled, oblong eggs
- Wishbone (furcula)
- Nests
- Brooding
- Feathers
- Semilunate carpal
- Hollow bones

More and more evidence indicates that dinosaurs of the past and modern birds are not only related, but that birds evolved from one group of small meat-eating dinosaurs called Coelurosaurs. Modern birds are dinosaurs that came into existence as alongside the dinosaurs of the past and survived extinction to live through to the present.

Avian and Non-Avian Dinosaurs

Leading paleontologists now use the terminology “non-avian dinosaurs” and “avian dinosaurs”. Non-avian dinosaurs are those dinosaurs that lived during the Mesozoic Era and that are now extinct. Avian dinosaurs are a type of dinosaur that have feathers, can fly and that managed to survive the extinction event at the end of the Mesozoic era that killed all of the non-avian dinosaurs.

Flying Dinosaurs?

Non-avian dinosaurs can also be called non-flying dinosaurs, and avian dinosaurs can also be called flying dinosaurs. However, this can lead to confusion because many people think of animals like Pterodactyl and Pteranodon when they hear the words “flying dinosaur”. Actually, avian dinosaurs such as early and modern birds have much more similarity to non-avian dinosaurs than Pterodactyls and Pteranodons have to either avian or non-avian dinosaurs. We consider animals like Pterodactyls and Pteranodons to be “flying reptiles”.

Birds are Reptiles

In addition to the terminology above, by accepting birds as dinosaurs which are classified as reptiles, we must also now accept birds as reptiles. This seems strange to us because we have an idea in our head about what a reptile should be. We need to be open to changing our understanding based on the evidence provided by the natural world—science.

Why didn't I know about this before?

There are several reasons: 1. sometimes it takes a very long time for a confusing topic in science to become publicly understood, 2. many movies, books, news stories and teaching materials still avoid this topic or present it incorrectly, 3. because dinosaur and bird relationships are based on evolution the topic may be also be avoided. It is time to change our and our students, perception of dinosaurs based on the best scientific data that we have.

DINOSAURS IN MONTANA

Montana is famous for its dinosaurs because of its lucky juxtaposition of geology and time. Montana has the right kinds of rock units containing fossils and the right amount of time and erosion has taken place to bring the fossils to the surface. In other places, the rock from the Mesozoic Era, the age of dinosaurs, is still buried under thousands of feet of younger rock. In Montana, this rock now sits at the surface.

People have collected dinosaur fossils from Montana for over 150 years. The first dinosaur remains found in North America came from the Judith River in what is now central Montana. Ferdinand Hayden, a geologist doing a geological survey of the American west, stopped off at Fort Claggett near Judith Landing in 1855. While out

looking at the geology, he picked up several small teeth which he took back to Philadelphia and gave to Joseph Leidy, one of America's first paleontologists. Joseph Leidy examined each of the teeth and determined that they belonged to a variety of dinosaurs. He gave new names to the teeth including *Dienodon*, *Troodon*, *Trachodon*, and *Paleoscincus*.

SOME OF MONTANA'S MORE FAMOUS DINOSAUR DISCOVERY "FIRSTS" INCLUDE:

- First dinosaur remains found in the Western Hemisphere came from near the mouth of the Judith River in central Montana.
- First dinosaur eggshell reported from the Western Hemisphere came from Montana.
- First nest of baby dinosaurs found in the whole world
- World's first dinosaur embryos.
- First remains of the following dinosaurs: *Tyrannosaurus*, *Maiasaura*, *Deinonychus*, *Troodon*, *Orodromeus*, *Tenontosaurus*, *Einiosaurus*, *Ankylosaurus*, *Avaceratops*, and many more

DINOSAURS AT MOR

The Museum of the Rockies is a leading paleontology research institution. The Museum's dinosaur fossil collection has expanded from three specimens in 1982 to over 30,000 today. Research using dinosaur fossils has resulted in significant discoveries and the development of hypotheses or ideas about the relationship between dinosaurs and birds; dinosaur social behavior; dinosaur physiology; dinosaur extinction; and ideas about what dinosaurs ate, where they nested, and how they evolved.

THE MUSEUM OF THE ROCKIES IS FAMOUS FOR ITS DINOSAURS BECAUSE:

- It houses the largest collection of North American dinosaur fossil specimens in the United States (over 30,000).
- It is a national repository for dinosaur fossils on public lands.
- It conducts world-class paleontology research led by Jack Horner.
- It houses one of only three histology laboratories in the world and the only one in the United States devoted to dinosaur fossil research.
- It has the largest paleontology field program in the United States.

MOR'S JACK HORNER AND ASSOCIATED RESEARCH TEAMS HAVE DISCOVERED:

- The first dinosaur eggs in the western hemisphere.
- The first evidence of nesting colonies and parental care among dinosaurs.
- The first dinosaur embryos.
- The first flexible soft tissue found in fossilized bone.
- Medullary bone found only in egg-laying birds (found in "Catherine" (*B.rex*) indicating this *T.rex* was an ovulating female).

DO YOU WANT TO LEARN MORE ABOUT DINOSAURS?

- Book: Digging up Dinosaurs, Jack Horner
- Book: How Dinosaurs Took Flight by Christopher Sloan
- Book: Dinosaurs under the Big Sky: Jack Horner