

Piecing Together the Story of Dinosaurs from Fossils

by American Museum of Natural History

This text is provided courtesy of the American Museum of Natural History.

You've probably seen pictures, models, or movies about dinosaurs that lived millions of years ago. But how do we know so much about these animals? How do we know what they looked like and how they lived? Since the early 1800s, scientists have been piecing together this mystery with fossils.

Fossils are the remains of ancient life that are usually buried in rock. Most fossils formed from the hard parts of organisms such as teeth, shells, and bones. They also form from things a plant or animal leaves behind, like a footprint, a leaf print, and even eggs. Fossils show us what Earth was like long ago. They give us a picture of ancient environments. Scientists compare fossils from different time periods to investigate how life on Earth has changed over time.



Photo Credits: © AMNH

From left to right: fossil skin impressions, fossil eggs, fossil theropod foot, fossil dinosaur trackway

Think of fossils like puzzle pieces. The more pieces you have, the easier it is to put them together and tell what the whole picture looks like. And sometimes when you find and add new pieces, the picture looks very different from how you thought it would be.

Egg Thief or Egg Protector?

In 1923, a team of paleontologists from the American Museum of Natural History made a surprising discovery in Mongolia's Gobi Desert. They found three large rocks that turned out to be fossilized dinosaur eggs. Then they discovered another fossil nearby: a toothless dinosaur.

The leader of the expedition, Roy Chapman Andrews, guessed that the dinosaur had been stealing the eggs from the nest. He named it *Oviraptor* (OH-vee-rap-tor) or "egg thief."

Seventy years later, in 1993, another team from the Museum found very similar fossil eggs in the same desert. One of the eggs held an embryo, or developing baby dinosaur. It turned out to be a baby *Citipati* (sit-uh-PAH-tee), a kind of dinosaur very similar to *Oviraptor*. Later, the team discovered an adult *Citipati* over a nest. It was brooding, or sitting on the nest, the same way birds do: with its arms spread to protect the eggs. And if its arms were covered with feathers, as scientists suspected, these wings would have shielded the eggs from heat and cold. Paleontologists realized that these dinosaurs nested like birds living today.



Photo Credit: © AMNH / M. Ellison

This is one of the Citipati fossils. The feathered wings are spread over the nest to protect the eggs, the same way birds do today.

These dinosaurs didn't steal eggs. They were caring parents!

When the discovery was made, the group of dinosaurs that includes *Citipati* and *Oviraptor* had already been named "oviraptorids." Even though scientists no longer think these dinosaurs were "egg thieves," the name stuck.

The Link Between Ancient Dinosaurs and Birds

Over 100 years ago, scientists started to notice similarities between birds and a group of dinosaurs called theropods (THERE-uh-pods).

This group included *Tyrannosaurus rex*, *Velociraptor*, and *Citipati*. As new theropod fossils were discovered, the link with birds became even clearer. Scientists discovered that like birds, theropods laid eggs. And they walked on two feet with their legs directly underneath them. They also had three-toed feet with claws, an s-shaped neck, and hollow bones. Some even had sharp, bird-like beaks. And many theropods had feathers!



Illustration Credit: Zhao Chuang, Courtesy of Peking Natural Science Organization

Citipati lived about 80 million years ago. These bird-like theropods grew to about nine feet long, with a toothless beak and feathered tail and front limbs.

Because birds are so similar to these animals, scientists have placed them in the same group. Birds are theropods. This means birds are a kind of dinosaur! By piecing together fossils of extinct dinosaurs, we've learned that dinosaurs aren't extinct after all.