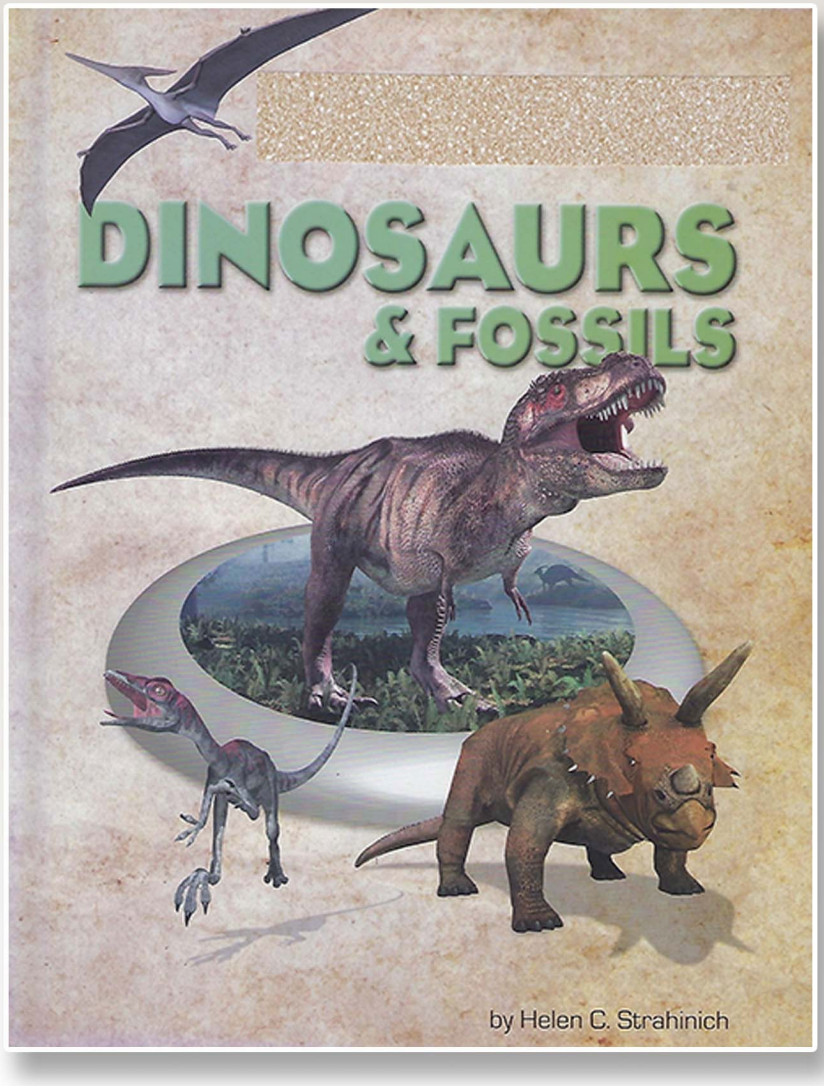

STORY + STUDY GUIDE

Dinosaurs & Fossils

Read/Learn Press

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Read/Learn Press

Readability: Grade 5

Interest Level: Grade 4 through Grade 7

Photographs from ISTOCK and UNSPLASH

To see a live dinosaur, you'd have to go back a long, long time. The first dinosaurs roamed the earth about 230 million years ago. The last dinosaurs died off about 65 million years ago.

A book on every dinosaur that ever lived would be huge. Some scientists believe that 10,000 kinds of dinosaurs walked on Earth. Others say that there were about 1,000 dinosaur groups.

Dinosaurs varied greatly in size. Some stretched 115 feet (35 m) and weighed 100 tons. That's longer than a whale and heavier than a dozen elephants. Others were as small as pigeons, no more than a foot long.

The largest dinosaurs probably traveled at a slow pace. After all, they were carrying around a lot of weight. But smaller dinosaurs probably moved quickly.

Dinosaurs differed greatly in appearance. Some had long necks and small heads. Others were short-necked. Some grew crests or frills on their head and neck.

Some had gigantic mouths and teeth, while others had toothless beaks. Still others had large duck-like bills. Dinosaurs' bodies were covered with scales. Some had fuzz, as well. Believe it or not, many dinosaurs probably had feathers.

Wouldn't a dinosaur zoo be a strange place to visit?

How do we know about dinosaurs?

No human being has ever seen a living dinosaur. Dinosaurs were long-gone before the first people. So how do we know about dinosaurs?

The answer is fossils.

A fossil is the hardened remains of a plant or animal from an earlier age. Fossils have been embedded and preserved in earth or rock over time.

The most common dinosaur fossils are teeth. Dinosaurs lost their teeth throughout their lives. Many dinosaurs are known from only a few bones or teeth. Dinosaur hunters have found very few complete skeletons.

How are fossils made? First, the animal (or plant) dies. Then it gets buried. Finally, the bone, tooth, or the whole skeleton turns to rock. This happens over a very long time.

Why didn't more dinosaur skeletons stay together?

Ancient scavengers probably tore off parts to eat. Water carried away other bones. Then wind, air, and water broke down dinosaur bones. As a result, most dinosaur bones never became fossils.

Wood Fossilization

What Do Fossils Teach Us?

For a long time, people didn't know what dinosaur fossils were. Some people thought that they were the bones of animals that lived in rock. Others thought that evil spirits had put the bones there.

Nobody knew about dinosaurs at all until around 200 years ago. Before then, people didn't understand that our planet was ancient. They had no idea that giant reptiles had once walked the earth, and then died off.

Iguanadon Footprints

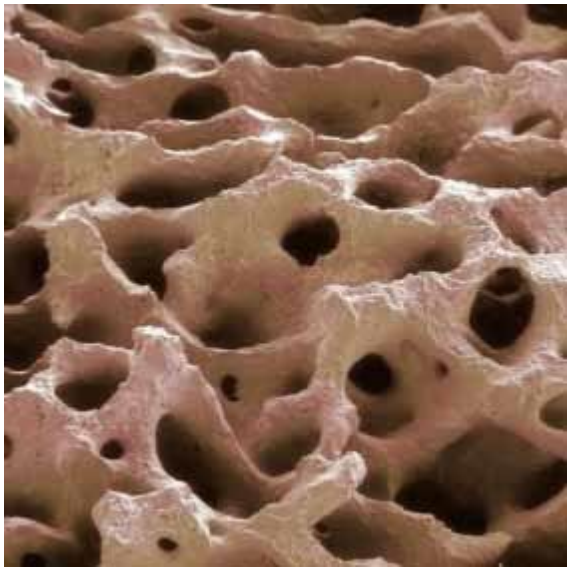
In the early 1800s, the first important dinosaur discoveries were made. Since then, scientists have been slowly unlocking the secrets hidden in dinosaur fossils.

Different fossils give different information. Some contain evidence about what dinosaurs ate. Others hold clues about how fast they moved.

Did dinosaurs travel in groups? Did they hunt alone? Fossils show that some groups traveled together. Other fossils suggest that some meat-eaters hunted in groups.

Paleontologists can look at a thin piece of dinosaur bone under a microscope. This helps them figure out how the animal grew. Did it grow all its life? Did it grow quickly or slowly?

The answers to these questions and many others are locked in dinosaur fossils. Today's scientists are working hard to find the answers.



Magnified Dinosaur Bone

Dinosaur skeletons and dinosaur fossils

In the movie, Jurassic Park, paleontologists created dinosaur clones from fossils. They actually brought the creatures back to life. In the real world, this could not happen. But some artists have taken on the job of re-creating dinosaurs.

These artists always start with science. Then they add imagination to make lifelike dinosaur models. Dinosaur fossils are mostly teeth and bones. The soft parts of dinosaurs disappeared long ago. The organs that let dinosaurs eat and breathe are gone. The muscles that gave them movement are gone. Any colors that brightened their skin have faded away.

Triceratops

How do artists make their models? First they use fossil clues to help them figure out each dinosaur. Then they use their knowledge of living animals.

Which living animals do they study to figure out dinosaurs? They study certain reptiles and birds. Scientists know that dinosaurs were reptiles. Scientists also believe that today's birds are related to dinosaurs.

So, these artists study living reptiles and birds. They study them inside and out. They use this knowledge to help figure out what dinosaurs looked like.

Coelophysis Dinosaur

Our Earth was very different during the age of dinosaurs. Today, the earth has seven continents and four oceans separating them from each other. At the time of the first dinosaurs, there was only one "super" continent. It was called Pangaea. Much of Pangaea was probably hot and dry.

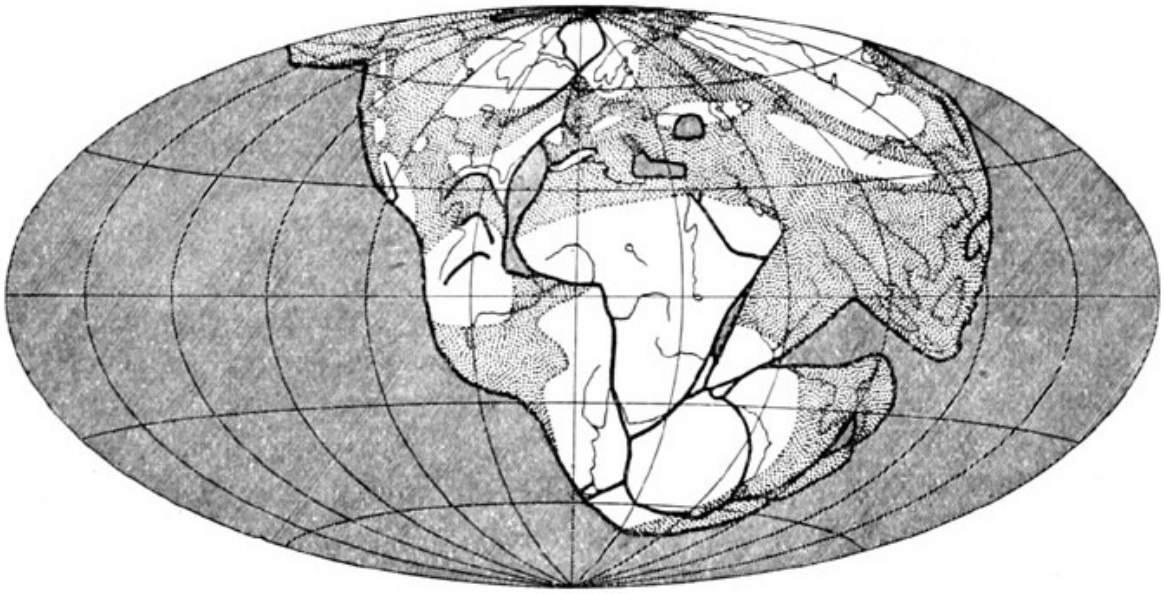
Back then, the early dinosaurs and other animals could move across Pangaea. An ocean surrounded this whole land area. As a result, there was not great animal variety. The same kinds of animals lived in many parts of Pangaea.

Dinosaurs shared Pangaea with other large reptiles. There were many small animals, too. The biggest plant-eaters were dinosaurs, but dinosaurs were not the biggest meat-eaters.

Some reptiles adapted to the sea. They hunted fish, squid, and shellfish. Other reptiles took to the air. They climbed trees and glided. Some were insect-eaters, while others ate fish and smaller animals, too.

As the earth started to change, earthquakes and volcanoes shook things up. The seas started to rise. About 200 million years ago, Pangaea began to break apart.

World map of Pangaea. This image was created by Alfred Wegener. It illustrates his idea (1912).

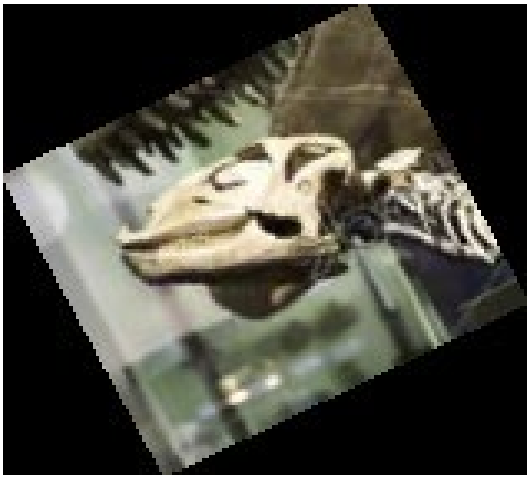


Plant-eaters

The new growth of plants meant more food for plant-eating dinosaurs. Over time, they became the largest land animals ever. Maybe they grew so big because of the large food supply. Many big planteaters had long necks and tails, like the Diplodocus and the Brontosaurus (imagined by artists on the next page).

Other plant-eaters were small to medium-size. The looks of these plant-eaters varied greatly. Some had heavy armor. Others had spikes, horns, or spines. These smaller plant-eaters mostly walked on four legs. Their size and build gave them speed.

The huge number of plant-eaters gave a boost to another group of dinosaurs: Hungry meat-eaters hunted them for dinner.



Diplodocus Skull

Meat-eaters

Meat-eating dinosaurs became the top hunters on land. What animals did they hunt? The big dinosaurs mostly hunted plant-eating dinosaurs. Smaller meat-eaters could be crushed by the big dinosaurs, so they went after smaller prey instead, such as frogs, mammals, and lizards.

How did meat-eaters differ from plant-eaters?

First of all, meat-eaters had bigger brains. Why? The job of tracking, hunting, and catching prey requires brainpower. Also, their jaws, teeth, and hands were made for catching, killing, and eating their prey.

Some scientists think that meat-eating dinosaurs hunted in packs. Many large plant-eating dinosaurs could probably fight off a single predator. But a group of meat-eating dinosaurs could bring down a big plant-eater. What proof do scientists have? Bones of several meat-eating dinosaurs have been found together, and some dinosaur footprints give clues. They show that the meat-eaters probably hunted in groups.

How did plant-eating dinosaurs survive? The answer is size, speed, and body protection. Their huge size protected some plant-eating dinosaurs. Others were small enough to hide. Still other planteaters were faster than their predators. What's more, many plant-eating dinosaurs had built-in protection. Long tails, body armor, horns, and spikes helped them to fight off attackers.

Dinosaur Nests and Eggs

All dinosaurs laid eggs. These eggs varied in size from 3 inches to 18 inches (8 to 46 cm). So, those baby dinosaurs must have been small.

Dinosaur nests have been found in deserts, forests, and seashores. Most dinosaur nests held at least a dozen eggs. Some held up to three dozen.

Scientists believe that dinosaurs guarded their eggs. Small dinosaurs likely sat on the eggs to keep them safe and warm. Other dinosaurs were too big. These big dinosaurs may have covered their eggs with plants to protect them.
Many kinds of dinosaurs cared for their babies after the eggs hatched.

Dinosaur Egg Fossils

Scientists base their ideas about dinosaur reproduction on fossils. In some cases, dinosaurs were buried with their eggs. They had been nesting when they died. Fossils of baby dinosaurs have been found near ancient nests. Their teeth show signs of wear from eating. How did they get food? A parent probably fed them.

Scientists have also found dinosaur nesting grounds. Some kinds of female dinosaurs laid their eggs in the same area. These dinosaurs may have guarded the nests together. Did the males come along, too? That is not known. But the dinosaur group likely returned to these nesting grounds time and again.

Other Creatures from the Dinosaur Age

Dinosaurs ruled the land after the breakup of Pangaea, but they shared the world with many creatures. Turtles, frogs, and lizards were present. Some small mammals survived. Crocodiles also lived on.

Pterosaurs flew overhead. These flying reptiles had beaks and long wings. Some were as small as seagulls, but later pterosaurs were the size of small airplanes. Their wings spread 40 feet (12 m) across. Some of these flying reptiles ate insects or plants. Many caught fish.

The seas were full of fish and other animal life. Clams and other shellfish lived on the ocean floor. One kind of fish reached 40 feet (12 m) long. This Leedsichthys was a gentle giant. But some sea reptiles, like the ichthyosaurus and plesiosaurus, were terrifying hunters.

The End of Dinosaurs

The world of dinosaurs ended about 65 million years ago. What caused this event? A giant rock smashed into Earth from outer space. This asteroid was an estimated 6 to 9 miles (10 to 15 kilometer) across.

The crash caused a huge explosion. It was like 4 million nuclear bombs going off at once. For miles around, everything was destroyed. The impact sent up a giant cloud of ash that blocked out all sunlight. This blackout lasted for weeks or even months.

And then there were birds.

Most paleontologists believe that dinosaurs didn't die off completely. They say that birds are really dinosaurs that fly. What gave them this odd idea? Fossils.

Dinosaur nests give one clue. Like birds, dinosaurs built nests, they guarded their nests, and many of them cared for the young.

The skeletons give another clue. The skeletons of some dinosaurs were like bird skeletons. Their bones were hollow and light. They had wishbones. Their hands, arms, legs, and feet were also similar. In 1996, the first feathered dinosaur fossils were found.

The fossil below is an archaeopteryx. It is from the age of dinosaurs. Like a bird, it had feathers. So, some scientists say that this creature was a bird. Others call it a dinosaur. Its tail, fingers, and teeth are like a reptile's. Either way, archaeopteryx fossils give evidence that birds are related to dinosaurs.

Next time you look at a bird, think of the dinosaurs. Large or small, that bird may really be a dinosaur in disguise.

Every year, paleontologists find new dinosaur fossils. Every year, they learn new things about these amazing creatures.

So far, scientists have identified about 700 groups of dinosaurs. But this number is just a small part of the number that once lived. (Remember, some scientists believe there were as many as 10,000 kinds of dinosaurs.)

Did Dinosaurs migrate? Did they hunt in groups? How did dinosaurs communicate. What sounds did they make? What color were dinosaurs. Were they warm-blooded. These are just a few questions that scientists have been working on.
They will probably find the answers to these questions when they find new fossils. Most fossils are found by accident. People have stumbled upon dinosaur fossils in many ways—even while taking a walk. Who knows? A new dinosaur discovery may be just around the corner from you.

Story Questions

(Possible answers are in parentheses.)

1. How long ago did dinosaurs live?
2. How many kinds of dinosaurs do scientists believe might have lived?
3. What are fossils?
4. What are the most common dinosaur fossils?
5. Before 1800, what did people think fossils were?
6. How do artists create models of dinosaurs today?
7. What were some other creatures which lived during the Age of Dinosaurs?
8. What do many scientists believe caused the end of dinosaurs?
9. What was the archaeopteryx?
10. What additional evidence suggests that birds may be related to dinosaurs?

Activities for Students

1. Make up a glossary of terms about dinosaurs.
2. Create a poster comparing and contrasting Pangaea with the Earth today.
3. Write a story about a visit to a dinosaur zoo.
4. Research one of the dinosaurs mentioned in this selection.