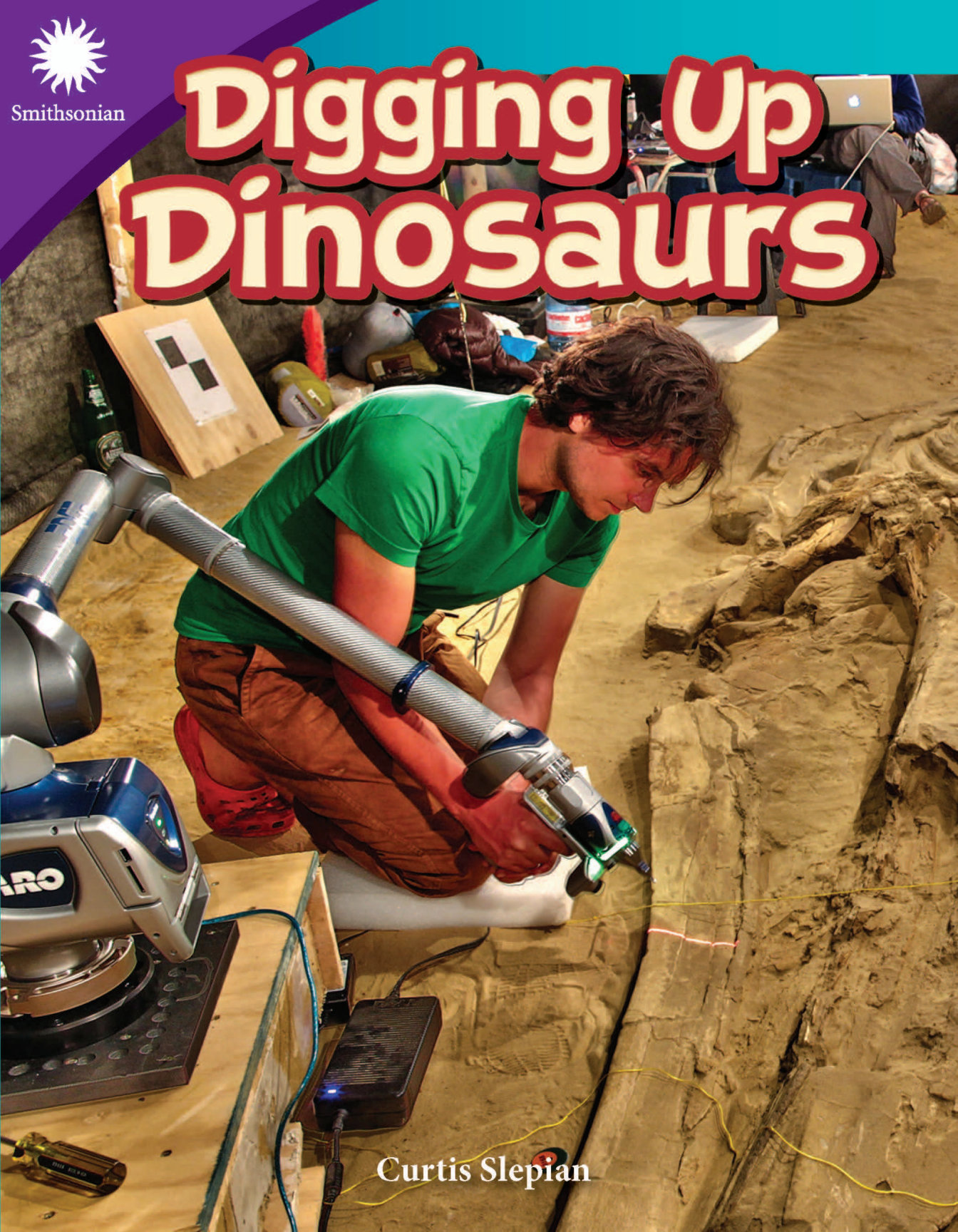
Smithsonian

Digging Up Dinosaurs



Curtis Slepian

Table of Contents

Prehistoric Wonders

You are face-to-face with a mighty monster. It rises almost 4 meters (13 feet) above you and stretches about 12 meters (40 feet) long. A 1.5-m (5-ft.) long skull holds razor-sharp teeth as long as bananas! Luckily, this beast died about 66 million years ago. You are merely looking up at a **fossil** skeleton of a *Tyrannosaurus rex* (*T. rex*). It amazes thousands of visitors at a museum. The dinosaur fills you with wonder. It might also make you ask how this huge skeleton ended up here.

The road that fossils take to reach museums is hard and can take many years. It all starts with the work of **paleontologists**. Fossils help them learn about the prehistoric world. These scientists need a lot of skill and patience to locate fossils. To dig them up is hard, sweaty work. Then, bones must be cleaned and preserved. Experts at museums have to figure out how bones fit together. They use tools and technology to help get it all done. Some tools are as old-fashioned as a chisel and hammer, while others are as high-tech as **CT scanners**.

This T. rex, named Sue, was found by Sue Hendrickson near Faith, South Dakota.

The oldest fossils ever found are 4.2 billion-year-old bacteria discovered in rocks in Canada.

This 3-D rendering shows what a *T. rex* might have looked like when it was alive.

Finding Fossils

Fossils have been found on every continent—even in Antarctica. But how do people find them? Fossils are often found in **sedimentary rock**. This kind of rock is made of tiny bits of rock, gravel, and dust. Over millions of years, layers of **sediment** pile on top of one another. The sediment **compresses** and hardens. People can't see fossils on the ground in most places. The best places to look are arid, or dry, areas called badlands. There, **erosion** can expose fossils in the rocks. The dry western parts of the United States and Canada are places like this. They are magnets for fossil hunters.

What is the best way to find sedimentary rock and dry places? Scientists might first study a topographic map. This type of map shows the elevation of the ground and its features. Scientists check for places with little vegetation so fossils won't be hidden. A geological map also helps. This type of map shows the type of rock found on Earth's surface. Scientists search this type of map to find layers of sedimentary rock. If the rock was formed during the time of dinosaurs, it might hold the fossils they want.

SCIENCE

Set in Stone

Most dinosaur fossils were formed when animals died near rivers or lakes and were quickly buried in mud, silt, or other sediments. Their flesh rotted away and left only hard parts, such as bones and teeth. Over thousands of years, layers of sediment piled over the bones. The pressure hardened the sediment into rock. Minerals in the rocks replaced the minerals in the remains of the animals. This process left fossils.

These fossils were found at Dinosaur National Monument in the United States.

topographic map made from a satellite image

It is against the law to hold, remove, dig, or even disturb any fossils found on U.S. Park Service land without a special permit.

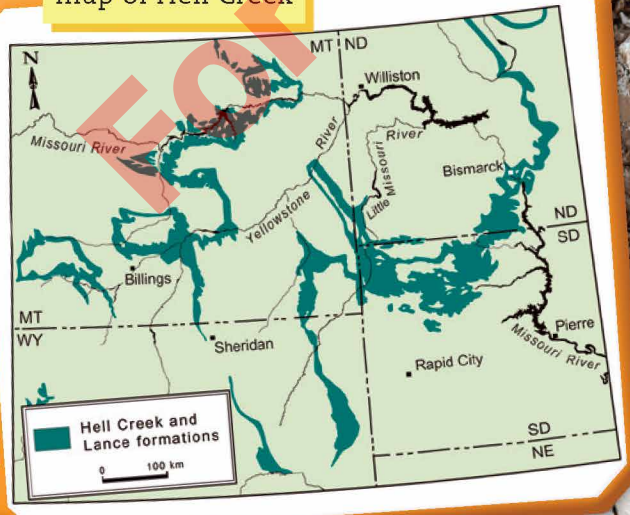
A Closer Look

Sometimes, paleontologists have to search for fossils in remote places. They can be hundreds of kilometers wide. Fossil hunters do not want to hike for hours or days. Instead, they need to narrow the search area. One way to do so is by using satellite maps. NASA satellites orbit Earth. They take detailed images of Earth's surface. Scientists study the images. Then, they highlight areas of rock formations that might contain fossils.

Another way to look for fossils is to search where fossils have already been discovered. A team from Smithsonian's National Museum of Natural History has been doing just that. They are digging in one of North America's richest fossil sites. It is called the Hell Creek Formation. The area covers parts of Montana, Wyoming, and North and South Dakota. Hell Creek was formed about 66–70 million years ago. It was the time right before dinosaurs died off. For years, scientists have been digging ancient plant and animal fossils out of Hell Creek.

A paleontologist digs fossils out of a pile of sedimentary rock.

map of Hell Creek



STEAM CHALLENGE

Define the Problem

You are a preparator for a natural history museum. The director of your dinosaur hall wants a new display for bones paleontologists have recently found. Your job is to create a model of a dinosaur that can be used as the model for the display.

Constraints: Your dinosaur model must be able to be viewed from all angles. Your model can be made from any materials (e.g., modeling clay, paper-mache, pipe cleaners, foil, etc.).

Criteria: Your dinosaur model must either have an armature to help it stand or be able to stand on its own.

Research and Brainstorm

What is the difference between a preparator and a paleontologist? What are the most important parts of a preparator's job? Why should a dinosaur be able to be viewed from all angles?

Design and Build

Sketch your dinosaur model. Will you have an armature or will it stand up on its own? What purpose will each part serve? What materials will work best? Build the model.

Test and Improve

Show your dinosaur model to a friend. Can they tell what type of dinosaur it is? Can your model stand up without falling over? How can you improve it? Modify your design and try again.

Reflect and Share

What other materials could you have used to make your model? How could you modify your display to make the dinosaur look like it was flying?