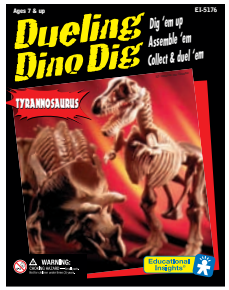

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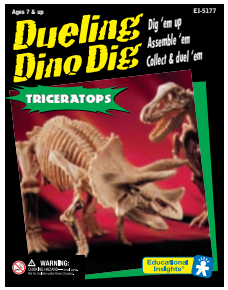

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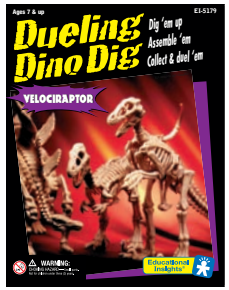

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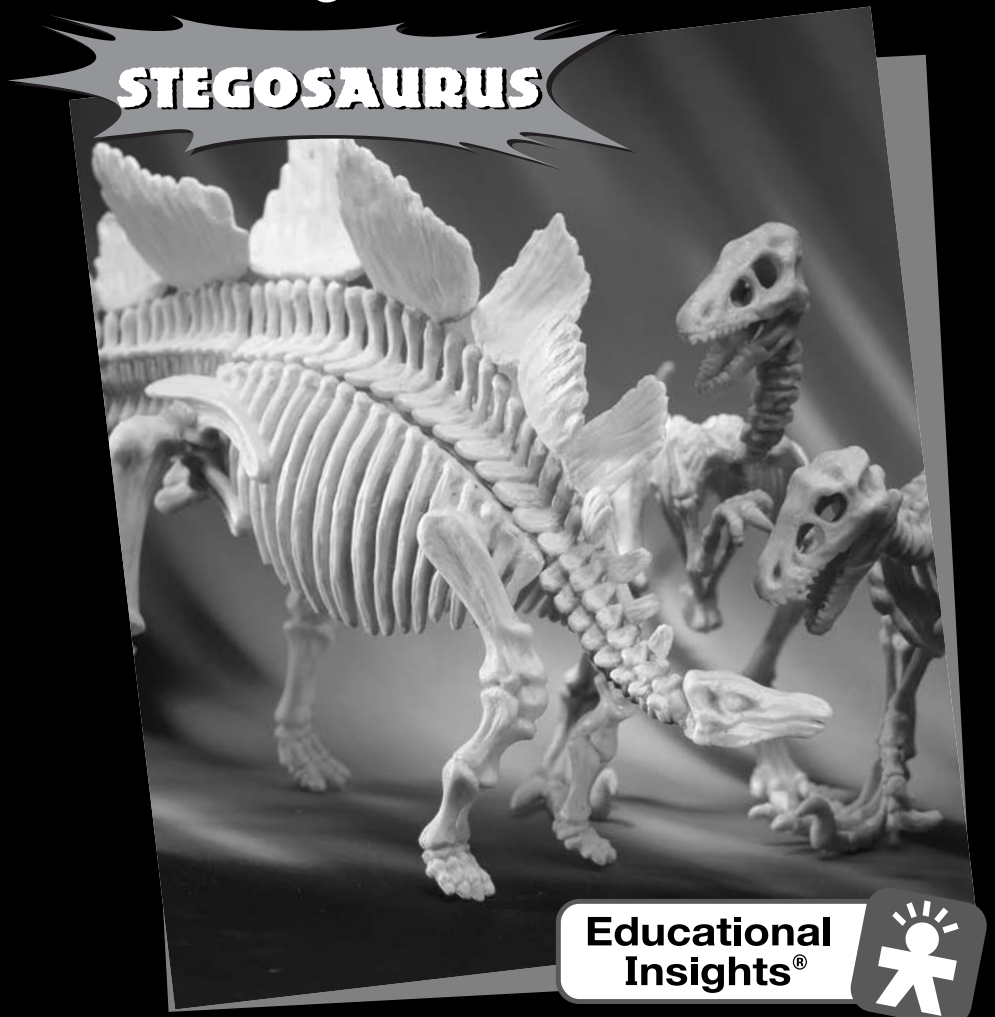
Dueling Dino Dig™

Guide Book



Educational Insights®

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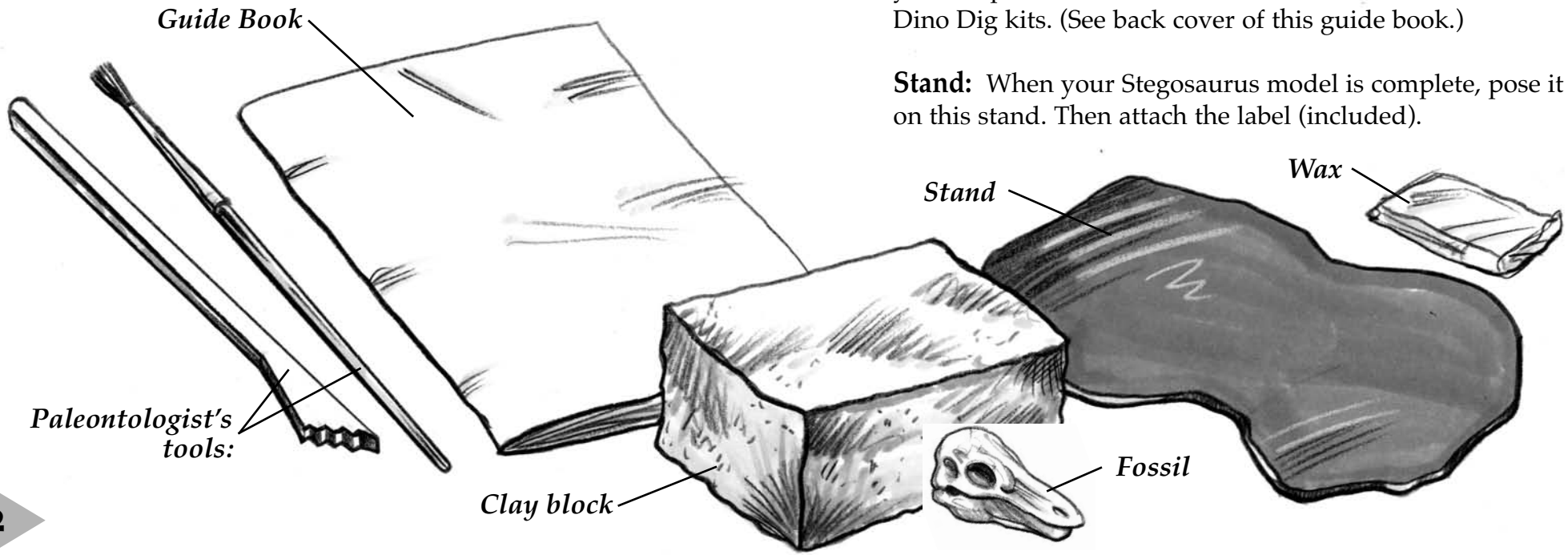
WARNING: CHOKING HAZARD — Small parts.
Not for children under three (3) years.

What Is in Dueling Dino Dig?

Dueling Dino Dig Guide Book—Stegosaurus kit: This book contains an exciting story featuring Stegosaurus, set in the Mesozoic era. You will also find background information and history, plus instructions on how to excavate your fossils, assemble them, and pose your model with other Dueling Dinos!

Clay block: This block of clay represents a piece of earth—millions of years old. Buried inside the clay, you will find fossil replicas of Stegosaurus bones.



Paleontologist's tools: Just like a paleontologist, you will get to dig "fossils" from the "earth." The digging tool will help you break apart the clay, separate the fossils from the clay, and clean bits of clay from the fossils. The brush will let you clean the dust from the fossils as you excavate.

Fossils: The fossils that you excavate will be smaller than real ones, but when you put them together you'll have a true-to-scale skeleton of Stegosaurus.

Wax: This wax will hold your fossil parts together. It will not harden and you can change poses or positions whenever you wish! The flexibility of this wax allows your dinosaur to have a little bit of movement, especially in the legs. Then you can pose them alone or with models from other Dueling Dino Dig kits. (See back cover of this guide book.)

Stand: When your Stegosaurus model is complete, pose it on this stand. Then attach the label (included).

Welcome to. . . Stegosaurus's World

Are you ready to find and study fossils, just like a paleontologist?

Are you ready to dig some fossils of your own?

Are you ready to build a model of a dinosaur and pose it in action?

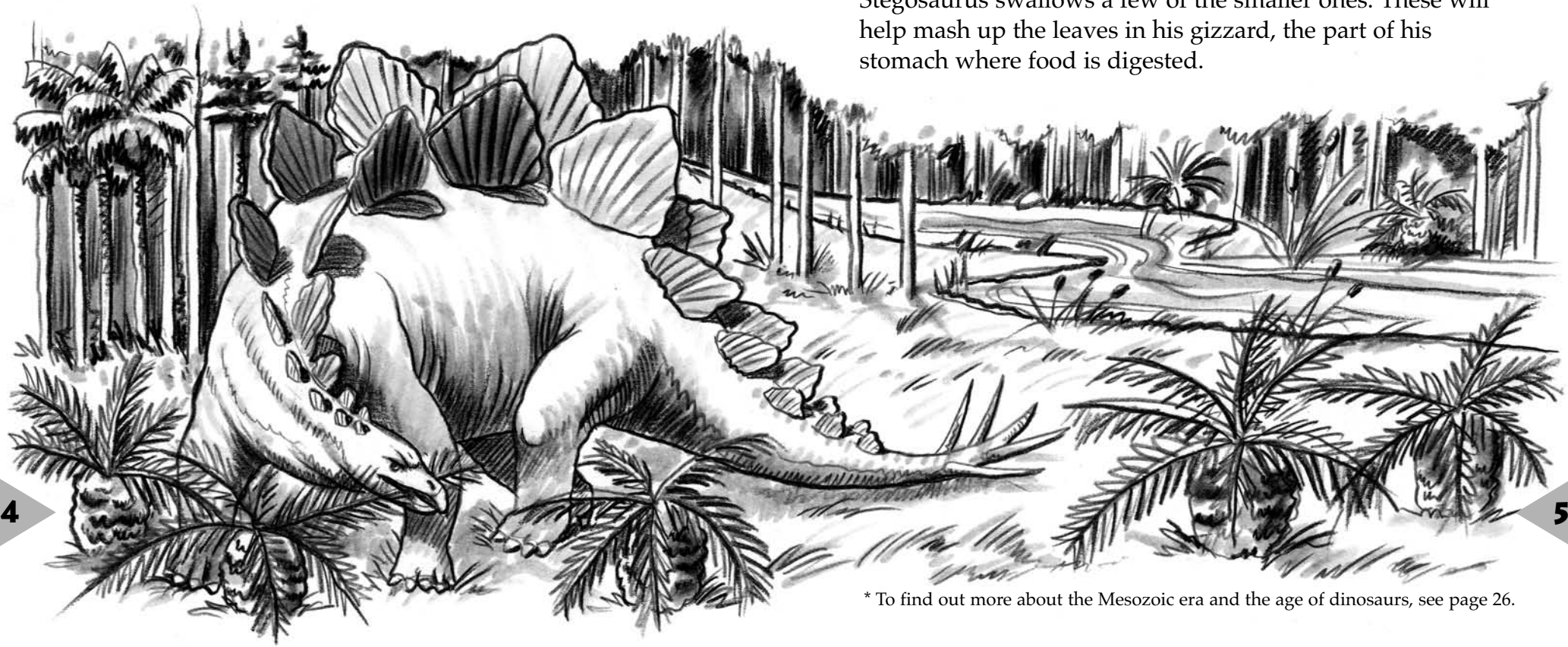
Then you are ready for Dueling Dino Dig!

Let's go back in time more than 208 million years to the world of dinosaurs—the time of Stegosaurus...

Stegosaurus Bites the Dust

Stegosaurus plods through the lush green tree ferns and palms. It is early morning about 208 million years ago, in the Jurassic period of the Mesozoic era*. The usually warm air is nippy today and his two-ton body feels cold. He leaves the shade of the tall trees to find a spot in the warm sun. The plates on his back soak up heat from the sun, then send warmth through Stegosaurus's huge body.

Once Stegosaurus is warmed he turns his attention to food. He lumbers over to the horsetails growing beside the stream and lowers his tiny head. He uses his narrow, toothless beak to snip horsetails. With his small jagged cheek teeth, he chews their leaves. Some stones lie at the edge of the stream. Stegosaurus swallows a few of the smaller ones. These will help mash up the leaves in his gizzard, the part of his stomach where food is digested.



* To find out more about the Mesozoic era and the age of dinosaurs, see page 26.

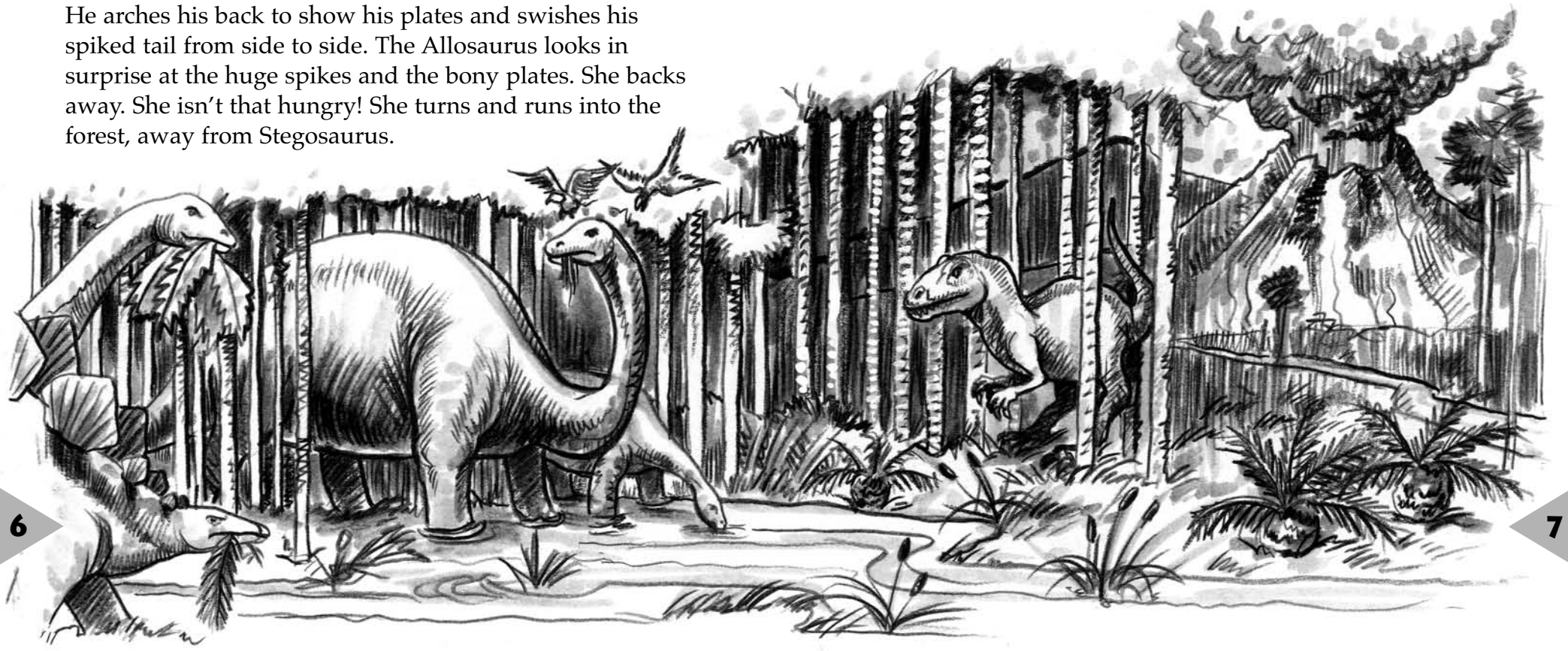
Encounter

Stegosaurus moves on to a new clump of horsetails, contentedly munching. Other plant-eating dinosaurs approach. Stegosaurus watches as several Apatosaurus drink from the stream. The younger members of the herd are protected by the older and larger Apatosaurus dinosaurs. They wade out into the water and lower their long necks to drink.

Small birds fly from branch to branch of a ginkgo tree. One swoops down to collect the seeds of a tree fern. All of a sudden, a young, half-grown Allosaurus springs out of the forest. Stegosaurus looks up from the leafy plants in sudden alarm. He sees the hungry carnivore and calls a warning. He arches his back to show his plates and swishes his spiked tail from side to side. The Allosaurus looks in surprise at the huge spikes and the bony plates. She backs away. She isn't that hungry! She turns and runs into the forest, away from Stegosaurus.

Earth Rumblings

Suddenly, the earth starts to rumble, then shake. A tall tree crashes to the ground. Stegosaurus grunts as he shakes with the earth. What is happening? He sees the herd of Apatosaurus run away from the mountains toward the plains, in terror. The young Allosaurus bounds back out of the forest. She doesn't even look at Stegosaurus. She runs as fast as she can. The sky—so clear and sunny just a few moments ago—becomes cloudy. The air feels thick. Stegosaurus raises his head and looks up toward the mountains. A shower—a red shower—shoots into the air, then flows down the mountain. What can it be?



Volcano!

Stegosaurus steps into a dark pool of water. The mud at the bottom of the pool sucks and pulls at Stegosaurus's heavy hind legs. He tries to lift his foot out of the pool. He can't! The mud is thick and sticky. Another violent jolt shakes the earth! More trees crash to the ground! Small mammals come running out from the underbrush. Several birds fly over Stegosaurus, screeching warnings in mid-air. They fly away from the mountains in the same direction as all the animals run. Stegosaurus is left all alone, stuck in the mud!

The End

Gray ash falls from the sky like a rain shower. The air is getting hot and thick with ash. It is getting hard to breathe! Ash covers the pool and settles on Stegosaurus's back and tail. Stegosaurus struggles to get loose from the pool. He lifts his low head as far as he can, then bellows with fear. Finally the ash fills his nostrils. Stegosaurus can't breathe. His last sight is of gray ash as it covers his world.

He is buried, never to be seen again...

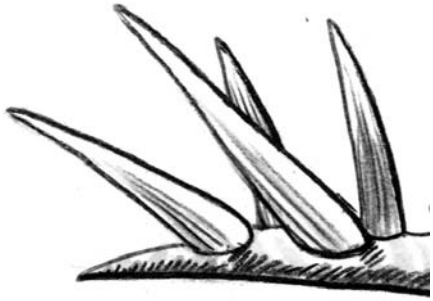
...at least, not for millions of years!

Stegosaurus Findings

Colorado, 1992

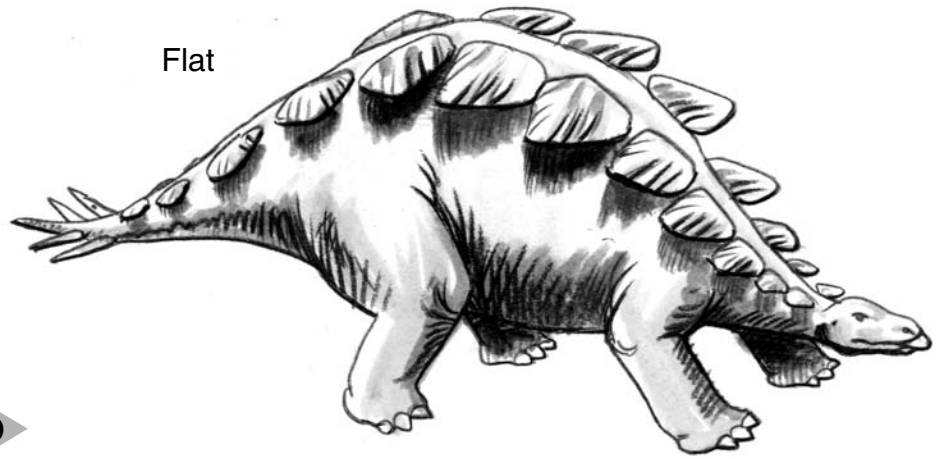
Stegosaurus dinosaurs lived during the Jurassic period, from about 208 to about 65 million years ago. In 1992, paleontologists discovered a 140 million-year-old Stegosaurus skeleton in Colorado, U.S.A. It is not known how the Stegosaurus died, but it may have been a volcano or earthquake that caused its death. The skeleton was huge, and scientists wanted to be careful not to damage any fossil parts while removing it from the ground. They covered the giant skeleton in plastic, then carefully lifted it from the earth by helicopter.

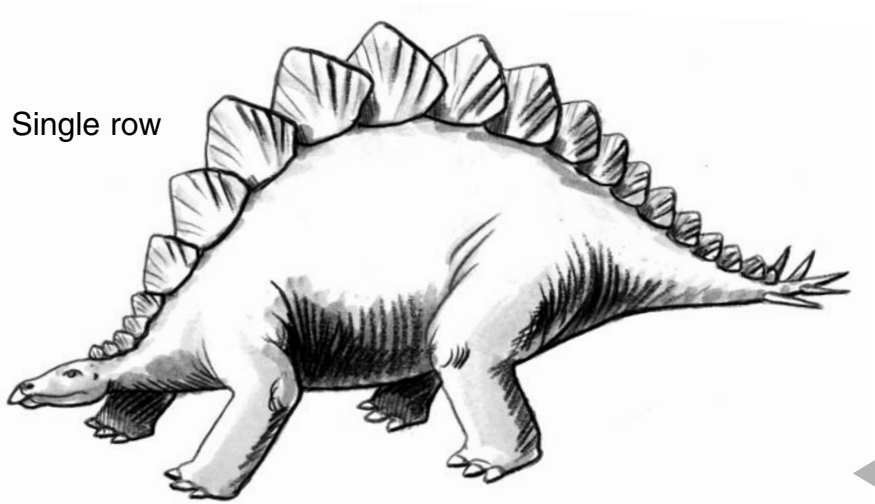
Stegosaurus, the "roof lizard," got its name because of the two rows of plates on its neck and back. At first, scientists believed those bony plates lay flat on its back, like a roof. Other scientists thought they lined up in a single, overlapping row. (See drawings.) Finally, fossil findings proved the plates ran in two rows down the neck and spine, ending near its spiked tail. Of all the dinosa plates (called stegosaurids), Stegosa was the largest and had the largest plates. Some were as big as 30 inche (76 cm) wide and 31 inches (79 cm) The plates helped control Stegosaur body heat. Blood ran through them the rest of the body. Like solar panels, the plates absorbed heat from the sun, then carried it through the body.



Stegosaurus's hind legs were the same height as a room—from floor to ceiling! A Stegosaurus might weigh 2–3 tons, and be 30 feet (9 m) long. Look at a huge truck on the highway, and imagine a Stegosaurus.

Stegosaurus walked on all four feet, and probably kept its head low to the ground. Its long tail had four large sharp spikes at the end. Stegosaurus's best weapon was this huge spiked tail that could swing from side to side. This dinosaur could even back into an enemy!





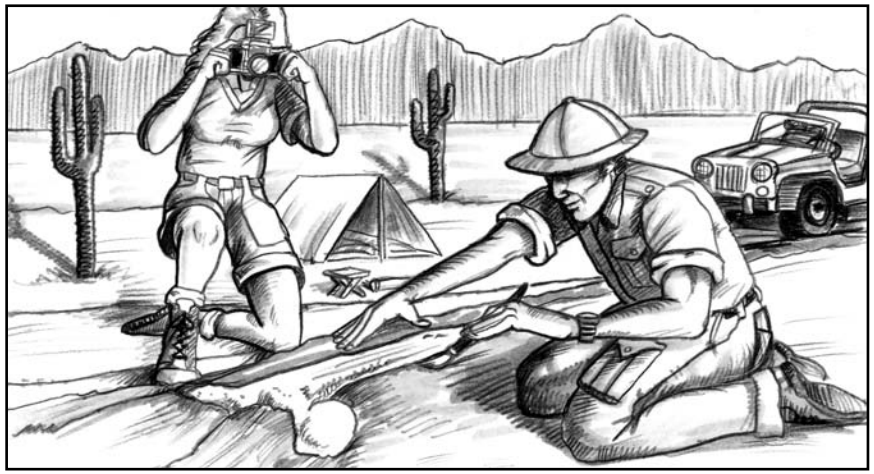
A Dinosaur Dig

Dinosaur digs require very hard work. It can take months, even years, and a lot of work to find a fossil and remove it from the earth. It's worth it, though, for the excitement of discovery and new scientific knowledge!

Let's take a look at what happens at many fossil digs:

1. Fossil hunters search rock layers of the Mesozoic era for fossils.

2. They use many tools, such as picks and hammers, bulldozers, and other heavy machinery to get to the fossils.



3. Once a fossil is found, the area is cleared and marked. Some of the rock and dirt is carefully removed from the fossil.

4. Photographs and drawings are made of the fossil while it is still in the ground. The fossil is numbered and labeled on a map of the site.

5. The fossil is uncovered with a brush. It is protected with wrappings of plaster-soaked cloth or sprayed with a resin to make it stronger.

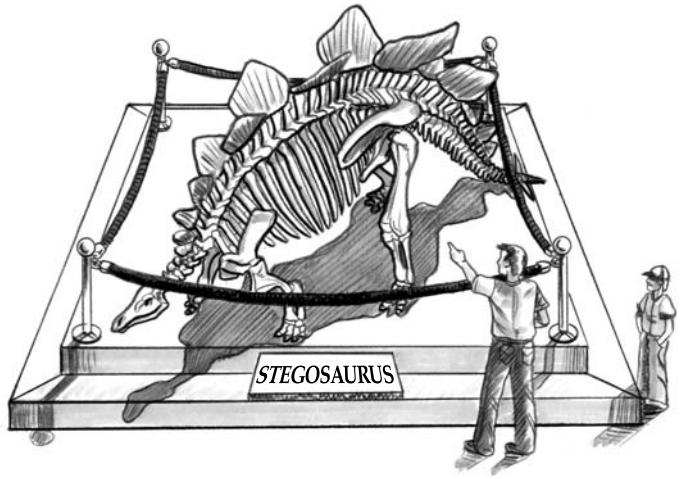
6. When the plaster hardens, it is safe to remove the fossil from the ground. Sometimes a whole rock is excavated to protect a fragile fossil.

7. After it is removed from the ground, each fossil is carefully placed in a padded crate. The crates are loaded onto trucks and shipped to the museum laboratory.

8. At the laboratory, the fossils are carefully removed from their protective plaster or from the solid rock in which they were moved.

9. Researchers use magnifying glasses, microscopes, dental drills, dental picks, and even needles to free the fossil.

10. It may take years, but the fossils are finally reconstructed as a whole or part of a skeleton for display in a museum.



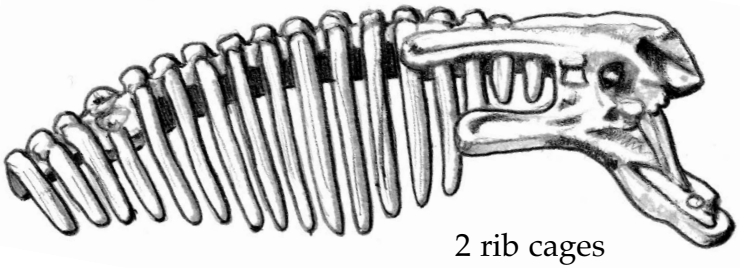
Now, are you ready to begin your own dinosaur dig?

You'll DIG These Fossils!

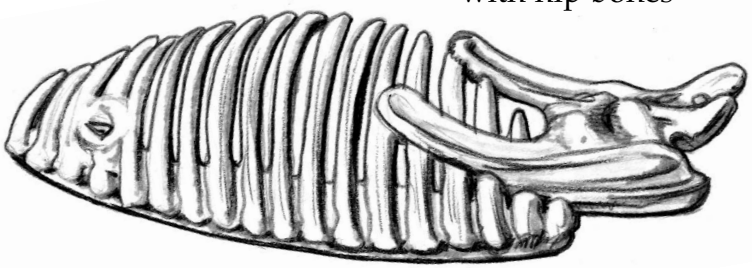
Buried inside the clay block you will find 9 different Stegosaurus "fossils." Of course, these bones aren't the true size of Stegosaurus. This dinosaur weighed about 2-3 tons and was about 30 feet (9 meters) long. You will, however, discover bones that will let you assemble a true-to-scale model of Stegosaurus.

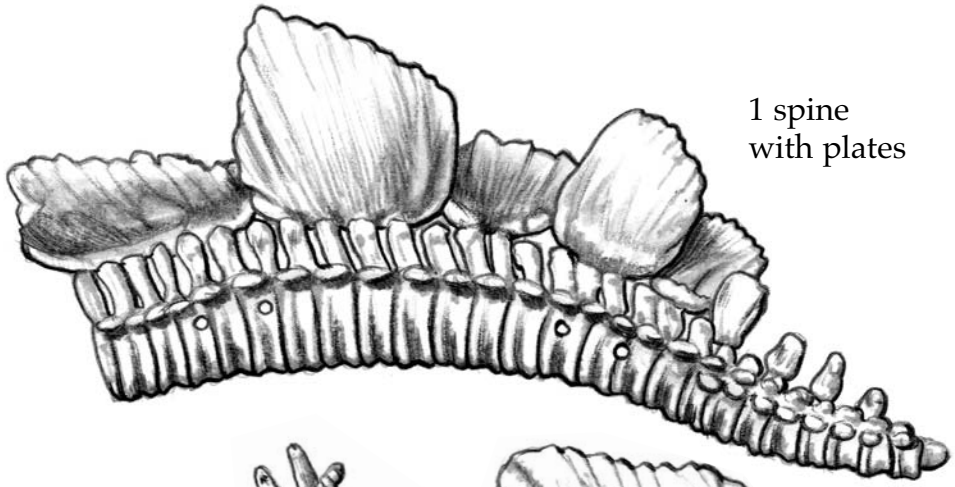
This is what you will find:

1 head—Note the small size of Stegosaurus's head compared to the rest of its body.

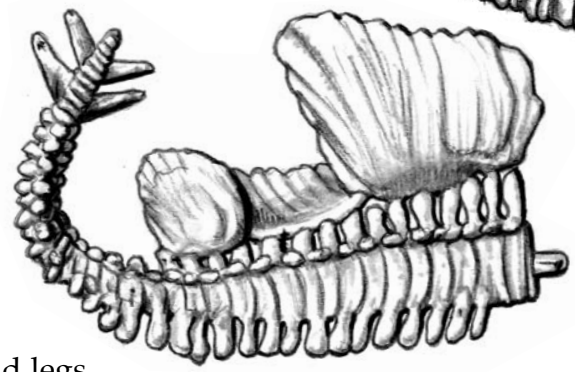


2 rib cages with hip bones





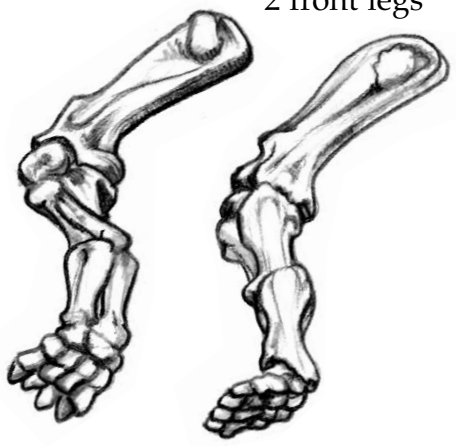
1 spine with plates



1 tail with plates and spikes

2 hind legs

2 front legs



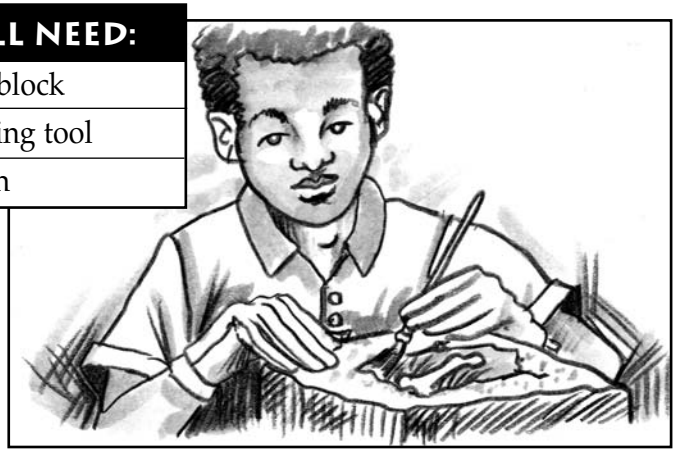
Get Ready to Dig

Before You Begin

Set up a place to work. The area you choose must remain undisturbed while you complete your excavation. Spread out plenty of newspaper. Digging creates a lot of dust. Work on a floor or table counter that can easily be cleaned off when you're finished.

YOU'LL NEED:

- clay block
- digging tool
- brush



NOTE: You won't need the wax until you begin to assemble your model. ***Be careful to keep the wax separate from the clay.*** *The clay dust will harm the wax.*

Follow These Steps

Before beginning, read all the directions carefully.

1. Carefully examine the surface of the clay block. Look for bumps or dents that might show where one of your fossils is buried.

2. Gently start to scrape away the edge of the clay with your excavation tool. Scraping the clay is the most effective way to uncover fossils without breaking them.

SAFETY NOTE: Be careful to keep the sharp end of the tool pointed away from your eyes, body, and other hand. Work slowly and carefully. Remember, the fossils could be buried anywhere inside the clay.

3. When you see a fossil showing through the clay, be careful not to scratch it with your tool. Carefully dig out the clay from around the fossil. When you've uncovered its top and sides, start to dig out the clay underneath it. Never try to pull a fossil from the clay before you've dug completely around it. The fossils might break if not removed gently.

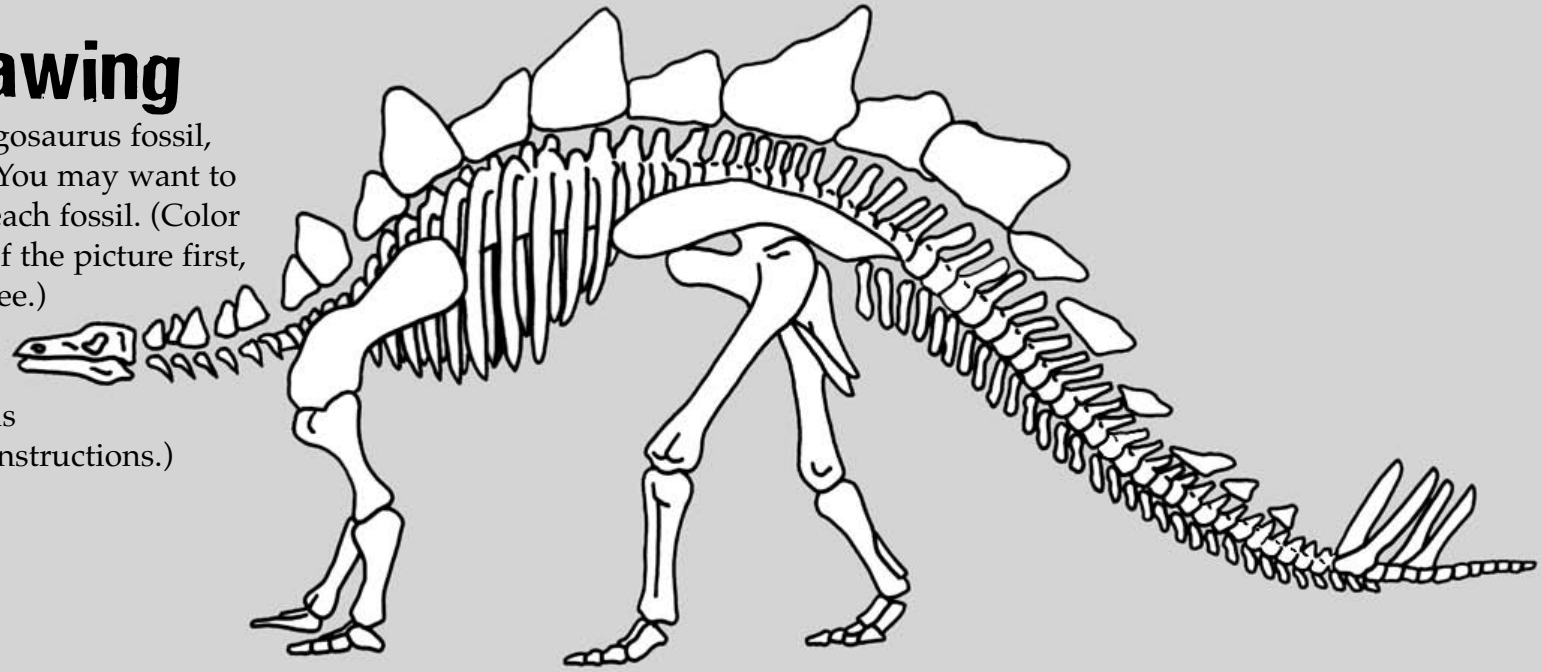
4. Use the excavation tool to remove any big clumps of clay from the fossil. Then use the brush to dust off the remaining clay. Use a damp cloth or carefully rinse the fossil in a bowl of water to clean off leftover dirt. *Do not wash clay down the drain—it might cause a clog!*

5. Follow these steps until you have unearthed all 9 of the fossils. Remember, good paleontology work is slow and methodical.

6. Record each fossil find by coloring that part of the Stegosaurus skeleton on pages 18 and 19. When you are ready to assemble Stegosaurus, turn to page 22 for directions.

Dino Drawing

Each time you find a Stegosaurus fossil, color it on this skeleton. You may want to use a different color for each fossil. (Color the rib cage in the back of the picture first, because it is difficult to see.) When the skeleton is complete, you are ready to make your Stegosaurus model! (See page 22 for instructions.)



Draw Your Own

Some paleontologists think Stegosaurus's hind legs were much stronger than its front legs. They think this might mean that Stegosaurus could stand on its two hind legs to reach higher plants. They even think the tail may have helped it balance itself when it stood on its two back legs. Not all scientists agree. What do you think?

Paleontologists make a detailed drawing of the fossils they find. Draw one of the hind legs you excavated.

Stegosaurus legs

Stegosaurus Fact Sheet

Use what you read about Stegosaurus in this guide book to complete the fact sheet.

Stegosaurus

Length:

Weight:

Its Name Means:

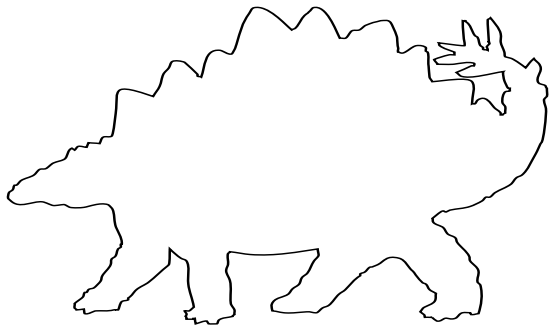
When It Lived:

Diet:

Special Notes:

Picture Gallery

Use this page to draw Stegosaurus's environment. Be sure to include details about plants, trees, and other animals that lived with Stegosaurus. (You can read more about the age of dinosaurs on pages 26-29.)

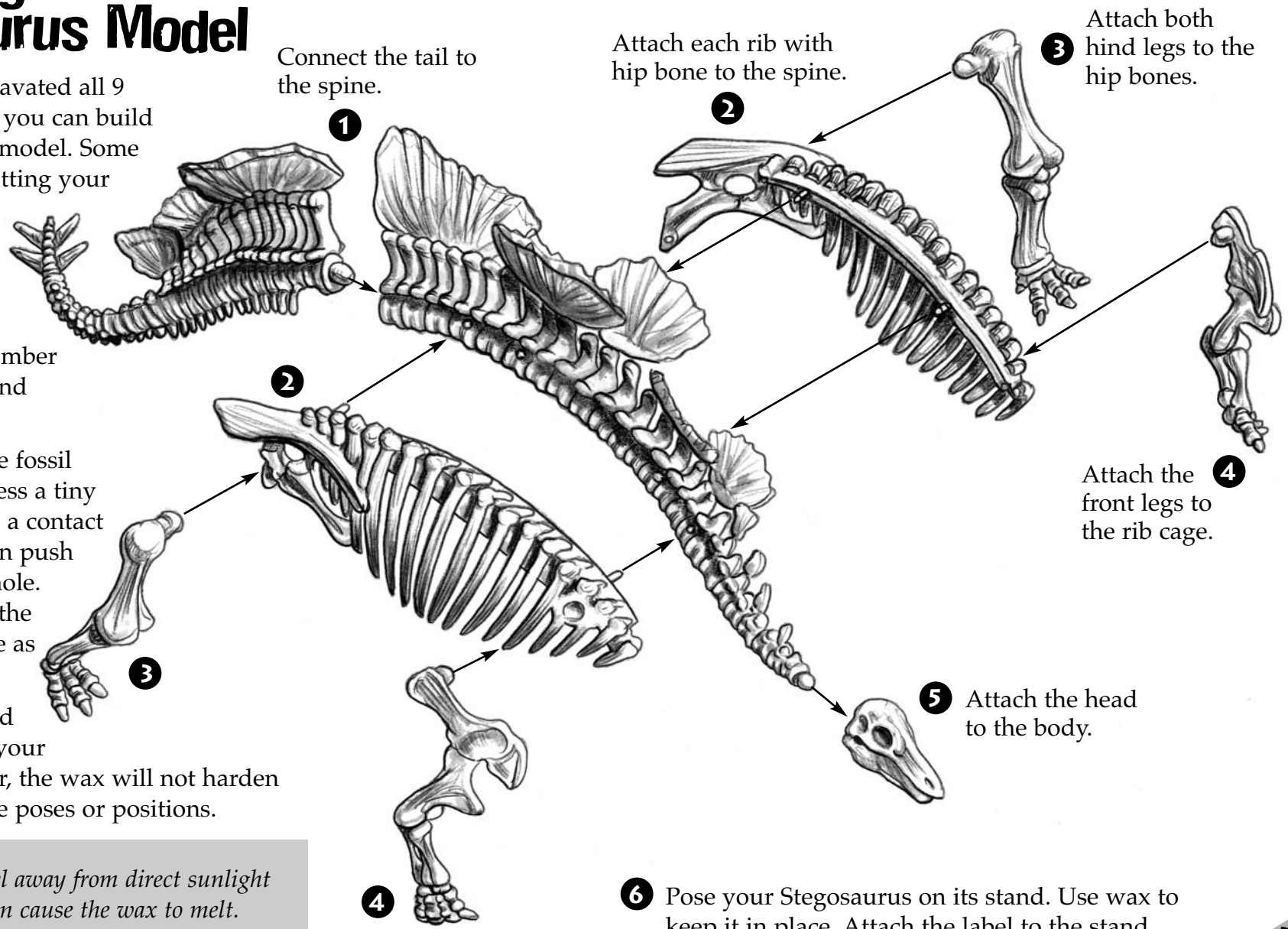


Making Your Stegosaurus Model

When you have excavated all 9 Stegosaurus fossils, you can build your Dueling Dino model. Some reminders about putting your model together:

- Prepare a clean work space.
- Clean and dry all fossil parts. Remember to keep the clay and wax separate.
- The wax holds the fossil parts together. Press a tiny piece of wax onto a contact point or nub. Then push the nub into the hole. Experiment with the wax, adding more as you need it.
- Experiment to find the best pose for your model. Remember, the wax will not harden so you can change poses or positions.

Keep your model away from direct sunlight or heat. They can cause the wax to melt.



Displaying Stegosaurus

When your Stegosaurus model is complete, you will want to put it on display. Here are some ideas and hints:

Do you have a shelf for models or special things? It would be the perfect place for your Stegosaurus model posed on its stand.

You may want to create a Jurassic diorama to place behind your model, complete with lush green plants! A *diorama* is a miniature scene. You have probably seen dioramas in museums.

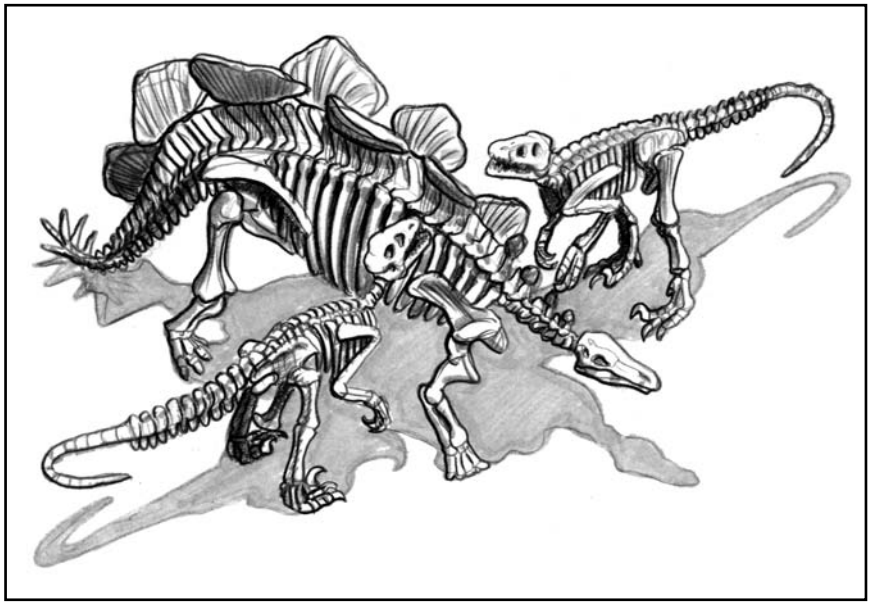
To create a diorama, you can use a shoe box or a long piece of cardboard that you can bend into a three-sided display.

If you have a shoe box, cut out one of the long sides. The other long side will be the background with the volcanoes and mountains. The bottom of the shoe box will be the ground. Illustrate the three sides and place your model inside. Here are some things you might want to draw on the background:

> Grassland, water, tall trees, pterosaur (flying reptile), and ferns.

You can combine Stegosaurus with dinosaurs from other Dueling Dino Digs for more action. There are four Dueling Dino Dig kits: Tyrannosaurus, Triceratops, Stegosaurus, and Velociraptor.

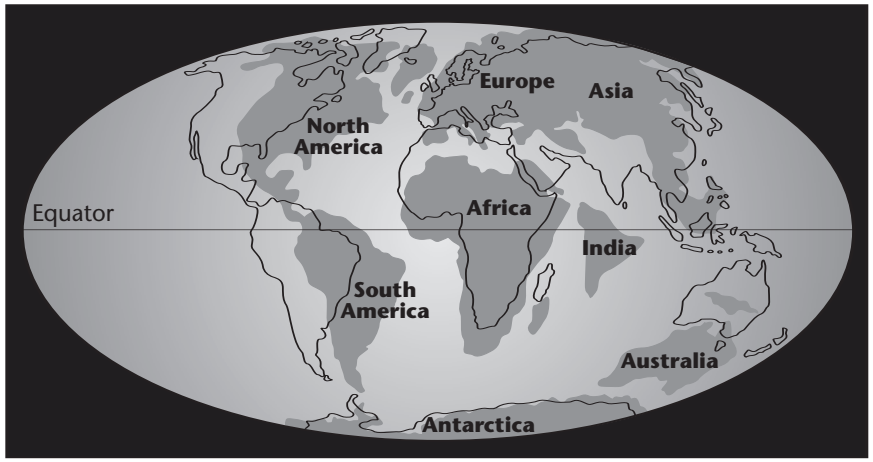
Below is a duel between Stegosaurus and two Velociraptors.



The Age of Dinosaurs

Dinosaurs lived on the earth millions of years ago, during the Mesozoic era. The Mesozoic era lasted from about 248 million years ago to about 65 million years ago. Not all of the dinosaurs lived on the earth at the same time during the Mesozoic era. The time is divided into three periods. They are the Triassic, from about 248 million years ago to 208 million years ago; the Jurassic, from around 208 million years ago to 145 million years ago; and the Cretaceous, which lasted from about 145 million years ago until the dinosaurs all mysteriously disappeared, about 65 million years ago.

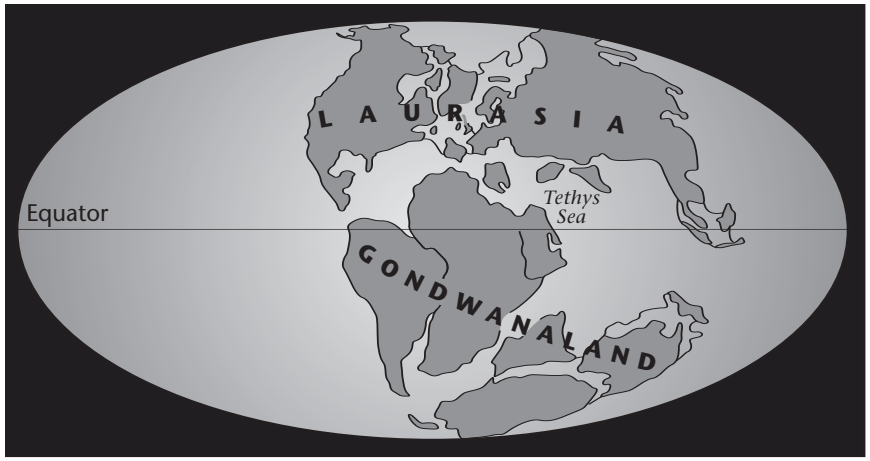
Triassic



During the Triassic period, the earth looked different than it looks today. All of the land was connected as one continent. This land mass is called Pangaea, a word that means "all earth."

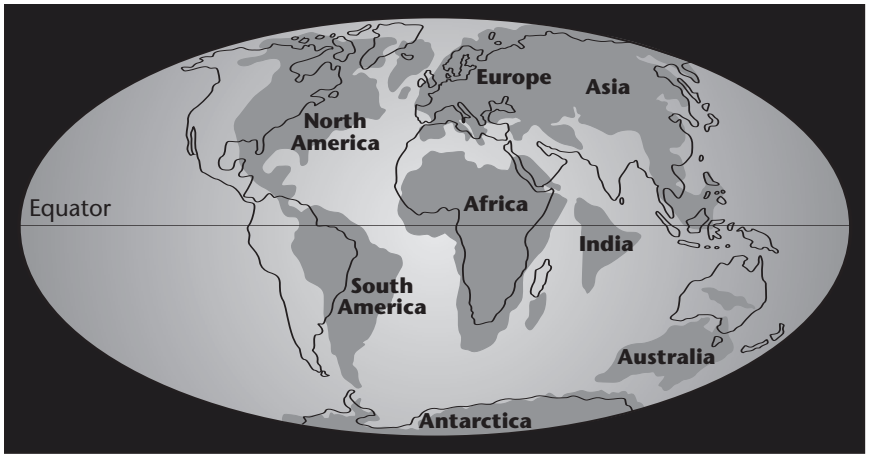
Scientists believe a group of bony fishes were ancestors of early reptiles. They lived on the earth about 370 million years ago. By about 245 million years ago, there were several kinds of reptiles roaming on the single land mass. The rhynchosaurs were ancestors of mammals. These plant-eaters had strong hind feet and curved beaks. Archosaurs, meat-eaters that looked similar to crocodiles, later evolved to pterosaurs (flying reptiles) and dinosaurs.

Jurassic—Stegosaurus's World



By about 208-213 million years ago, the single land mass had changed. Now the earth had two large land masses. Laurasia was in the north, and Gondwanaland was in the south. Plant life changed, and so did animal life. The lush vegetation became the food source for many dinosaurs. Giant meat-eaters, such as Allosaurus, evolved during the Jurassic period. This is the time when dinosaurs of many sizes, shapes, and ways of surviving shared the earth's air, land, and food sources.

Cretaceous



The black outline shows the world today compared to the shaded Cretaceous period.

During the Cretaceous period, the land masses continued to shift and break apart. Mountain ranges thrust up and shallow seas formed. Flowering plants began to appear along with many of the trees we know today—oaks, walnuts, maples, and magnolias.

Many of the hadrosaurs, such as Maiasaura, whose fossils have been found in western North America, lived and died during the Cretaceous period. Some snakes, birds, moths, and a few other animals that we recognize today first appeared during this time. But many other species, including all of the dinosaurs, mysteriously vanished from the earth during this period—about 65 million years ago.

Where Did They Go?

Despite all of our developments in science and technology, no one really knows the reason for the extinction of the dinosaurs. There are many theories. Some are:

A comet or asteroid caused huge masses of dust to block out the sun. Lack of sun caused plants to die. Then the plant-eating dinosaurs died, and finally, the meat-eaters died.

Massive volcanic eruptions shot dust containing poisons into the air. The poisons caused fewer and fewer eggs to hatch, until finally no more eggs were laid or new dinosaurs hatched.

Changes in the climate caused genes to change so that animals gave birth to only one gender. This would cause a species to die out.

A huge plague or disease wiped out a species or its food source.

The newly developing flowers poisoned the dinosaurs.

No one knows what *really* made the dinosaurs disappear. What do YOU think?