

A detailed illustration of a Tyrannosaurus Rex in a lush, prehistoric jungle. The dinosaur is shown in profile, facing right, with its mouth open, revealing sharp teeth. It has a brown and grey textured skin. In the background, there are tall trees, palm trees, and a misty atmosphere. A large, light brown, rounded rectangular title card with an orange border is overlaid on the right side of the image. The card contains the title 'ANCIENT ANIMALS' in large, green, stylized capital letters. Above the title card is a green, cracked, circular shape. Below the title card is a green, cracked, circular shape. The entire image is framed by a thin orange border.

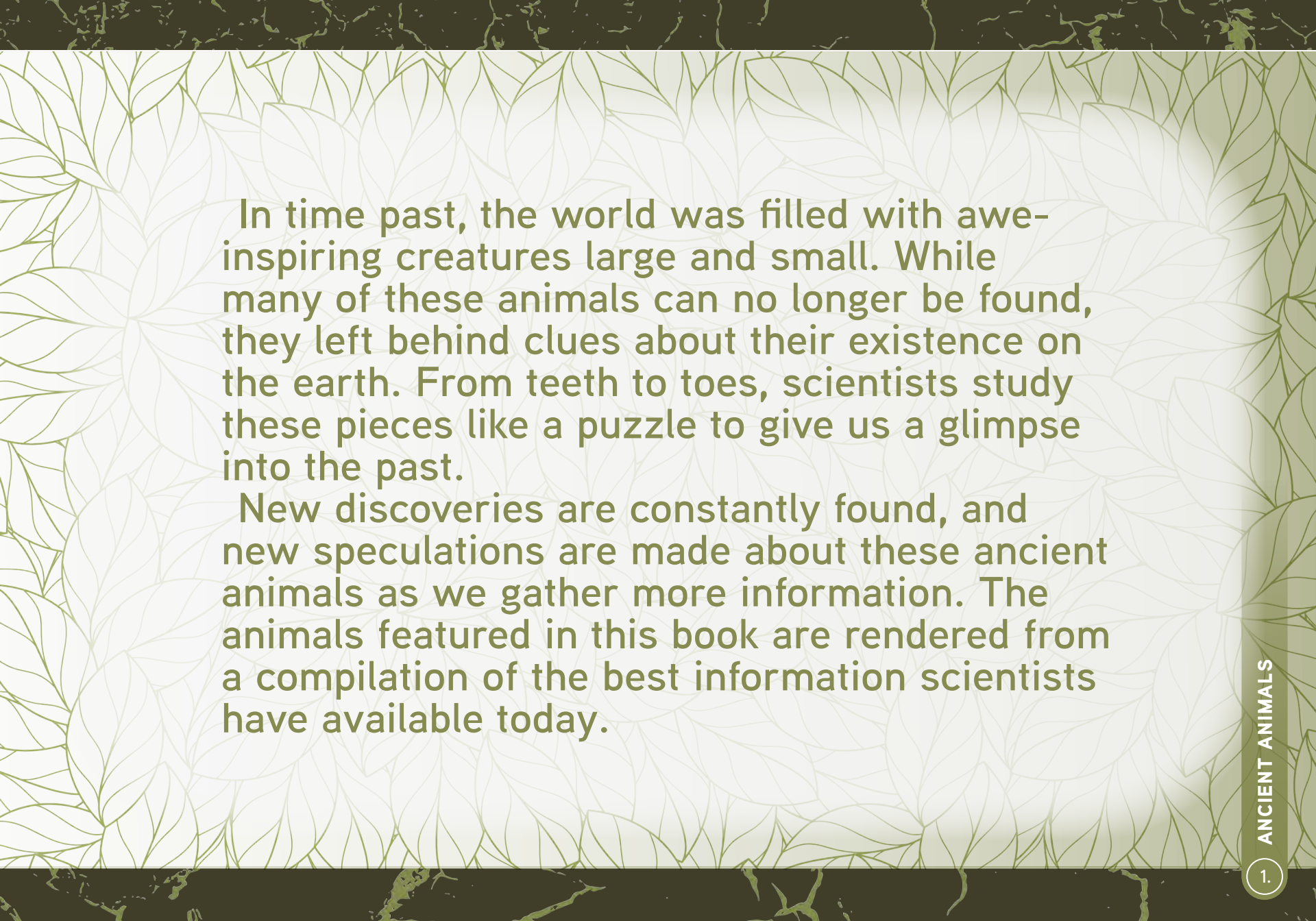
ANCIENT ANIMALS

WRITTEN BY:
Molly Sanchez and
The Good and the Beautiful Team



THE GOOD AND THE BEAUTIFUL LIBRARY





In time past, the world was filled with awe-inspiring creatures large and small. While many of these animals can no longer be found, they left behind clues about their existence on the earth. From teeth to toes, scientists study these pieces like a puzzle to give us a glimpse into the past.

New discoveries are constantly found, and new speculations are made about these ancient animals as we gather more information. The animals featured in this book are rendered from a compilation of the best information scientists have available today.

DIMETRODON

Dimetrodon, often mistaken for a dinosaur, was a mammal-like creature that fed on fish, reptiles, and amphibians. Since its initial discovery in 1878, twenty species have been identified. This animal walked on four legs and had a magnificent sail down its back. Many scientists believe that Dimetrodon's sail was used to help regulate its temperature, though other studies indicate that this may not have been the case.



FUN FACT:

Dimetrodon means “two measures of teeth.” It had long teeth in the front and shorter teeth in the back.



 **NORTH AMERICA**

INFO:

SIZE:

1.83–4.57 m (6–15 ft) long

WEIGHT:

27.22–249.48 kg (60–550 lb)

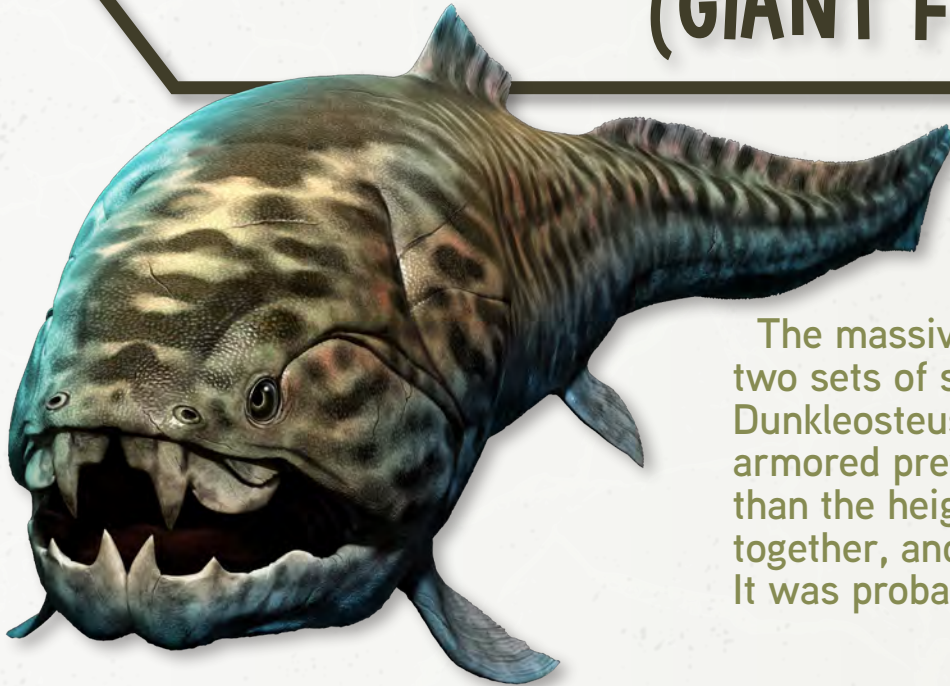
CARNIVORE

FOUND:

North America

DUNKLEOSTEUS

(GIANT FISH)



The massive self-sharpening jawbones and two sets of sharp, bony plates in the mouth of Dunkleosteus allowed it to prey on sharks and armored prey with ease. This fish was longer than the height of two adult humans added together, and its head was covered in thick armor. It was probably a slow but powerful swimmer.

FUN FACT:

Dunkleosteus had a bite force of 611.9 kg (1,349 lb), thanks to a unique four-part jaw mechanism.



INFO:

SIZE:

6 m (20 ft)

WEIGHT:

900+ kg (2,000+ lb)

CARNIVORE

FOUND:

North America and Europe



ANOMALOCARIS

(GIANT SHRIMP)

In Greek, anomalocaris means “unusual shrimp.” At a length of around 91.44 m (3 ft) long, this ancient arthropod was certainly unusual. Anomalocaris was able to swim at great speeds due to its undulating motion, and it had sharp spikes on its limbs, useful for grabbing prey. With 32 overlapping plates in its mouth, Anomalocaris may have been able to crush the thick armor on food like trilobites, but it has also been theorized that it was a filter feeder, using its spiky arms to sift through gravel for smaller prey.



FUN FACT:

Anomalocaris' large stalked eyes had 16,000 lenses each, which gave it 360-degree eyesight.



INFO:

SIZE:

Up to 91.44 cm (3 ft)

WEIGHT:

9.07 kg (20 lb)

CARNIVORE

FOUND:

Utah USA, Canada, China, Australia, and Greenland



MEGALANIA

(VARANUS PRISCUS)

Categorized in the monitor family of lizards along with today's Komodo dragon, fossils from the gigantic Megalania lizard have been found all over Australia. At about 5 m (16.4 ft) long and with sharp, curved teeth, Megalania would have

been able to take down large prey

such as pygmy elephants (now extinct), kangaroos, and tortoises. It is believed that Megalania also carried venom in its bite.



FUN FACT:

Megalania is the largest known land lizard. The Komodo dragon is one of its closest relatives.



AUSTRALIA

INFO:

SIZE:

3.5–7 m (11.5–23 ft)

WEIGHT:

Up to 1,940.02 kg (4,277 lb)

CARNIVORE

FOUND:

Australia

ANDREWSARCHUS

By studying the skull of the Andrewsarchus, scientists have theorized that this animal was either a hunter or a scavenger. It appears to have had characteristics such as a very strong jaw and wide cheekbones. Not much else is known about Andrewsarchus, but perhaps one day more fossils from this meat-eating creature will be found.





PALAEUDYPTES

(GIANT PENGUINS)

Including four species of large ancient penguins, fossils of the *Palaeudyptes* genus of birds have been found on Seymour Island, Antarctica and in New Zealand. The largest of the four species was taller than most humans at about 2 m (6.7 ft) tall, while the smallest was closer to the size of modern emperor penguins. Based on their size, scientists think these “colossus penguins” were able to stay underwater for around 40 minutes at a time.

FUN FACT:

A similar penguin today is the emperor penguin at 1.22 m (4 ft) tall and close to 45 kg (100 lb).



INFO:

1.83 m (6 ft) tall

WEIGHT:

CARNIVORE

Antarctica



MEGAPIRANHA



Only the teeth from this ancient fish have been found, making it difficult to decipher what this fish looked like and what it ate. What scientists do know is that the teeth of the Megapiranha were arranged in a zig-zag pattern across the front jaw and could have been useful for either a carnivorous or herbivorous fish species.



STUPENDEMYS



Stupendemys, the largest freshwater turtle known to exist, ate plants, animals, and nearly anything that would fit in its mouth. This side-necked turtle would fold its long neck into one side of its shell for protection, and its heavy weight allowed it to stay under water for extended periods of time. Scientists discovered that the male Stupendemys had horns on the upper part of its shell, which is called the carapace. These horns are speculated to have been used for defense.



ANCIENT ANIMALS

Have you ever thought about the extraordinary animals that lived long ago? Paleontologists and other scientists have made many fascinating discoveries about these incredible, often spine-chilling ancient creatures.

Join us for a ton of fun as we learn about them one by one!



ORIGINAL PUBLICATION



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THE ULTIMATE



DINOSAUR GUIDE

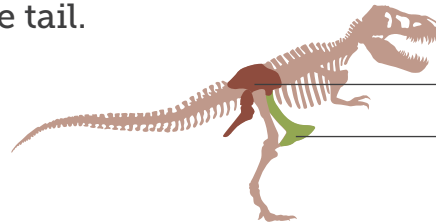


THE GOOD AND THE BEAUTIFUL LIBRARY

Heather Hawkins

All dinosaurs belong to one of two orders: **Saurischia** or **Ornithischia**. Dinosaurs of the order Saurischia, meaning “lizard-hipped,” have pubis bones pointing downward and to the front, like those of lizards. Dinosaurs belonging to the order Ornithischia, which means “bird-hipped,” have hip bones shaped like those of birds, with the pubis bone pointing downward and toward the tail.

SAURISCHIA



Saurischian (“lizard-hipped”) Hip Bones

Pelvis (Ilium and Ischium bones)

Pubis

SAUROPODS



Alamosaurus | pages 6–7



Apatosaurus | pages 8–9



Brachiosaurus | pages 10–11



Camarasaurus | pages 12–13



Diplodocus | pages 14–15



Plateosaurus | pages 16–17

THEROPODS



Allosaurus | pages 20–21



Compsognathus | pages 22–23



Gallimimus | pages 24–25



Spinosaurus | pages 26–27



Troodon | pages 28–29



Tyrannosaurus rex* | pages 30–31



Velociraptor | pages 32–33

The order Saurischia is made up of two groups of dinosaurs: **Sauropods** and **Theropods**. These groups can be divided into several *genuses*. Some of the most common *genuses* for each group are shown to the left. Details for these *genuses* can be found on the pages listed next to each genus name.

*Unlike the other *genuses* shown on these pages, *Tyrannosaurus rex* is a distinct species belonging to the genus *Tyrannosaurus*.

DEFINITIONS



Carnivore

an animal that eats meat



Herbivore

an animal that eats plants



Omnivore

an animal that eats meat
and plants



Carnosaur

any large theropod dinosaur
of the Carnosauria group



Biped(al)

an animal with two legs



Quadruped(al)

an animal with four legs



Paleontologist

a scientist who studies the
life and fossils of the past



Bone bed

an area containing a large
number of the same kind of
dinosaur fossils

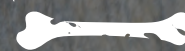


SAUROPODS

Sauropods include Alamosaurus, Diplodocus, and

Camarasaurus

patosaurus, Brachiosaurus was a large, plant-eating herbivorous quadruped that was one of the largest animals that ever lived. They were massive, thick-necked dinosaurs, held their bodies high off the ground rather than parallel to the ground.

CLASSIFICATION**Order** *Saurischia***Group** *Sauropod***LENGTH** *21-22.8 m (69-75 ft)***WEIGHT** *27,215 kg (60,000 lb)***NAME MEANING** *"Deceptive Lizard"*Fossilized
Apatosaurus
bones**FOSSIL STUDY**

The small head of *Apatosaurus* was filled with peg-shaped teeth. It had a square, stout head with nostrils on the top, rather than the front, of the skull. *Apatosaurus* held its head out horizontally about 4 m (13 ft) off the ground. This would have enabled it to easily graze shrubs and trees of varying heights. *Apatosaurus* ate vegetation whole, also swallowing small stones that would have helped with digestion in the stomach.

**FOUND** *North America**(Colorado, Oklahoma, Utah,
New Mexico)**Apatosaurus
excelsus* skull



THEROPODS

...nd dinosaurs include Allosaur
Spinosaurus, Tre
Ther... Allosaur
...nus S
... Veloc

Sp
... dino
...nnos

ALLOSAURUS

[AL-oh-SOR-us]

CLASSIFICATION

Order *Saurischia*

Group *Theropod*

LENGTH *8.5 m–12 m*
(28–39 ft)

WEIGHT *2,300 kg (5,070 lb)*

NAME MEANING *“Different Lizard”*

FOUND *Mostly North America; recent finds have also occurred in Europe*



At around 11 m (36 ft) long from the tip of its thick tail to the front of its fearsome jaws, *Allosaurus* was one of the largest carnosaurs (meat-eating dinosaurs).

Allosaurus, whose name means “different lizard,” had two powerful back legs that propelled it forward at running speeds of up to 55 km/hr (34 mph)

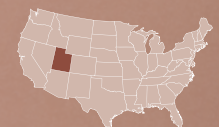
when chasing prey. That’s similar to the speed of a grizzly bear! Its

short arms had three curved, pointed claws that were

15 cm (6 in) long and were used as hooks to grab and tear meat.

FASCINATING FACT

Allosaurus is the official state fossil of Utah.



ANKYLOSAURUS

[AN–kil–uh–SOR–us]

Many plant-eating dinosaurs were at a disadvantage when pitted against their meat-eating predators, but *Ankylosaurus* was an exception. This armored dinosaur, with its heavy defenses and its built-in weapons, is often compared to a tank ready for battle. It was well protected against all its enemies—including the fierce *Tyrannosaurus rex*.

Even though *Ankylosaurus* averaged a lengthy 6 m (20 ft), it sat low to the ground, only rising to about 1.7 m (5.6 ft) tall at the hips. This kept its center of gravity low, which meant that it could not be flipped over easily by larger predators. *Ankylosaurus* had a heavily rounded back covered in oval, bony plates called scutes. These thick plates protected *Ankylosaurus* and were virtually impenetrable to hungry enemies.



CLASSIFICATION

Order Ornithischia

Group Ankylosaur

LENGTH 6 m (20 ft)

WEIGHT 3,600 kg (8,000 lb)

NAME MEANING "Fused Lizard"

FOUND North America (Canada, Montana, Wyoming)



Ankylosaurus
tail club

EDMONTONIA

[ed-mon-TOH-nee-uh]



Edmontonia, an Ankylosaur found in the Edmonton Formation in Alberta, Canada, was an armored dinosaur with no clubbed tail. That doesn't mean that it was without protection, though! From its head to its tail, it was covered in ridged, armored plates. It had spikes along its sides, with four large ones positioned behind its shoulders and pointing forward. The plates covering the head, back, and tail were small and oval with ridges, while three rows of larger, ridged plates that were fused together covered its neck and shoulders.

A short neck, short legs, and low-slung body kept *Edmontonia* close to the ground, eating low-growing vegetation. It had, like other Ankylosaurs, a horned beak and teeth tucked back into its cheeks. These small, ridged teeth would have been perfect for this herbivore's plant diet of ferns and cycads.

Rings of petrified wood from trees native to *Edmontonia*'s environment lend evidence to the theory that the animal's habitat underwent drastic changes between dry and wet seasons. Some Ankylosaur specimens appear to have died during periods of drought, their bones later covered in sediment by the floodwaters of the following wet seasons. This created a perfect environment of preservation, allowing paleontologists to find *Edmontonia* specimens with the spikes still attached to the bodies.



POLACANTHUS

[pol-uh-CAN-thus]

6 ft.



5 ft.



Polacanthus was an armored dinosaur that walked close to the ground on four short legs. It had a huge, shield-like covering, formed from a single sheet of fused bony plates that protected its hips. It also had spikes covering much of its body, which is how it got its name (meaning “many thorns”). All of its armor would make any predator think twice about trying to attack it!

Like many Ankylosaurs, *Polacanthus* had front legs that were shorter than its hind legs. Because of this, the animal could not lift its head more than 1.5 meters (5 feet) off the ground! *Polacanthus* was a plant eater with a diet consisting of low-growing tubers, roots, and fruit. It lived in a warm climate that provided lush vegetation during the rainy parts of the year. During the hot, dry summer months, however, it needed to stay close to ponds and creeks in order to find enough plants to eat.



ooo

FASCINATING FACT

Polacanthus may have roamed in mixed herds, not only with other *Polacanthus* but also with *Iguanodon* (pages 60–61). These large, mixed herds offered even more protection from predators!

ANKYLOSAURS GROUP GUIDE

CHARACTERISTICS

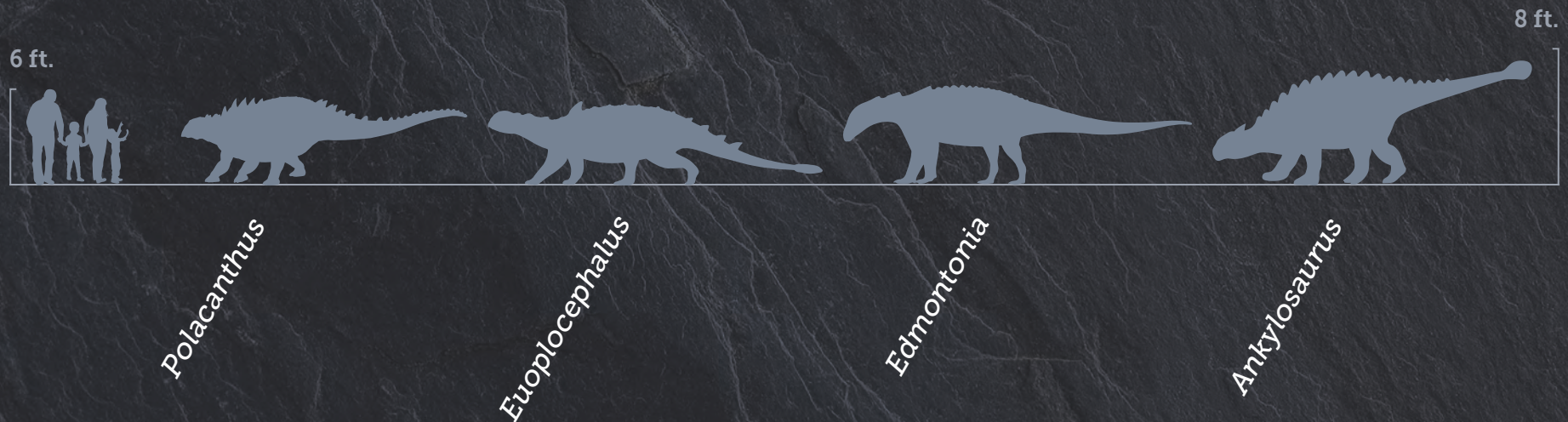
Ankylosaurs were bulky, quadrupedal plant eaters with fully-armored backs formed from fused bony plates. Most Ankylosaurs had a club at the end of the tail, likely used as a defensive weapon.

FOSSIL SITES



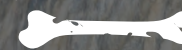
Ankylosaur dinosaur fossils have been found in North America, Europe, Antarctica, Africa, Australia, and Asia.

SIZE COMPARISON



Roaming the marshes and forests of western North America during the same time period as *Tyrannosaurus rex*, *Triceratops* is thought to have been a favorite meal of *T. Rex*. But it would not have been an easy meal, for *Triceratops* could fight off the best of the hunters with its formidable horns. *Tyrannosaurus rex* would have had to attack from the side or behind to avoid *Triceratops*' swordlike horns and to bypass the defensive protection of its large neck frill. Teeth marks from *Tyrannosaurus rex* on some *Triceratops* bones, however, reveal that *Triceratops* lost many of these battles.

FOSSIL STUDY



In Montana in 2006, a *Triceratops* and a juvenile *Tyrannosaurus rex* were found encased in sediment where they had died, possibly while in battle. This find has been given the name "Dueling Dinosaurs." What is remarkable is that both sets of bones are some of the most complete specimens of these dinosaurs ever found. The *Triceratops* fossils even preserved skin impressions on its hips and frill!

FASCINATING FACT

Triceratops is the official "State Fossil" of South Dakota and the official "State Dinosaur" of Wyoming!



Triceratops
skull



Triceratops
foot bones



CORYTHOSAURUS

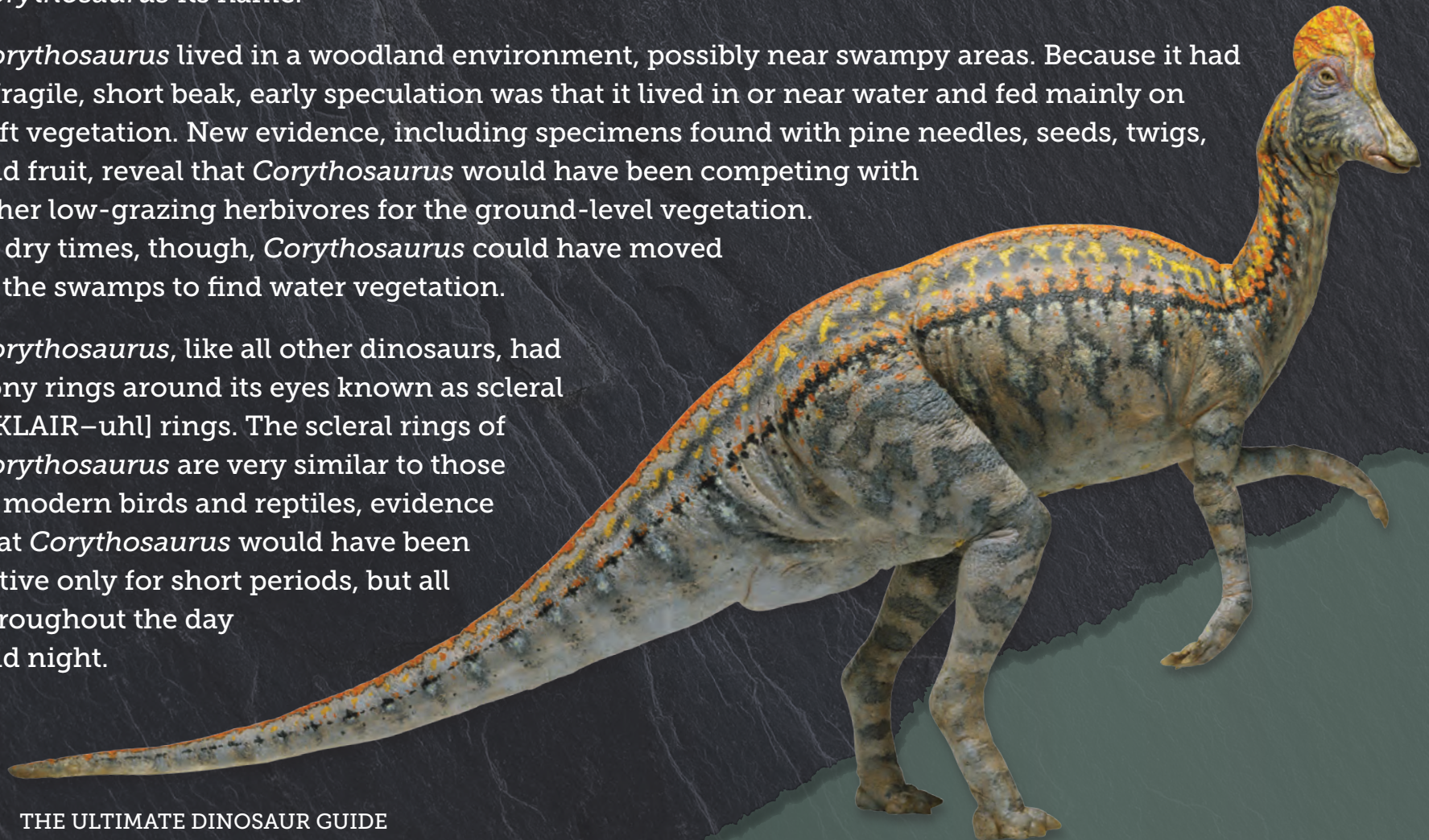
[ko-RITH-oh-SOR-us]

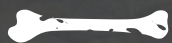


Corythosaurus is an Ornithopod dinosaur, specifically part of a sub-group called hadrosaurs, or duck-billed dinosaurs. These large herbivores all display a hollow crest or helmet-like structure on their heads, likely used for ornamentation and communication. The unique crest of *Corythosaurus* looks very similar to the helmets worn by ancient Greek soldiers from Corinth, thereby giving *Corythosaurus* its name.

Corythosaurus lived in a woodland environment, possibly near swampy areas. Because it had a fragile, short beak, early speculation was that it lived in or near water and fed mainly on soft vegetation. New evidence, including specimens found with pine needles, seeds, twigs, and fruit, reveal that *Corythosaurus* would have been competing with other low-grazing herbivores for the ground-level vegetation. In dry times, though, *Corythosaurus* could have moved to the swamps to find water vegetation.

Corythosaurus, like all other dinosaurs, had bony rings around its eyes known as scleral [SKLAIR-uhl] rings. The scleral rings of *Corythosaurus* are very similar to those of modern birds and reptiles, evidence that *Corythosaurus* would have been active only for short periods, but all throughout the day and night.



FOSSIL
STUDY

Scientists are still not sure what *Heterodontosaurus* used its tusks for. One theory is that they were actually used as a tool for digging. Perhaps *Heterodontosaurus* needed to dig up underground roots or tubers or to dig into termite mounds for a tasty feast! Another theory is that they were somehow used in defense, warding off other males.



Heterodontosaurus skull

CLASSIFICATION

Order Ornithischia

Group Ornithopod

LENGTH 1.2-1.75 m (4-5.75 ft)

WEIGHT 3.5 kg (7.5 lb)

NAME MEANING "Different Teeth Lizard"

FOUND Southern Africa



Dinosaurs related to *Heterodontosaurus* had long, coarse bristles similar to a mammal's thick fur, which has caused some scientists to speculate that this Ornithopod did as well. However, there is nothing from the recovered specimens of *Heterodontosaurus* to suggest the presence of bristles.

FASCINATING FACT



The complete skull of a *Heterodontosaurus*, one of the smallest dinosaur skulls in the world, was discovered in a drawer in the Iziko South African Museum in 2008. It had been stored away there, unidentified and forgotten, since the 1960s!

Iguanodon was a herd animal, traveling in groups that made use of their large numbers and speed to evade enemies. *Iguanodon* often grew very large, larger than its carnivorous predators, which gave it another layer of defense.



FASCINATING FACT

Iguanodon's thumb spike was initially believed to be a horn. When the animal was first reconstructed, the spike was placed on its nose!

FOSSIL STUDY



Iguanodon's curious spiked thumb could be wrapped around branches and used to bring them down to its mouth to eat. The thumb also could have been used to break open nuts or seeds, or as dagger-like protection against predators.

Iguanodon
foot



Iguanodon
hand





PACHYCEPHALOSAURS



PACHYCEPHALOSAURUS

[PACK-ih-SEF-uh-luh-SOR-us]

CLASSIFICATION

Order Ornithischia

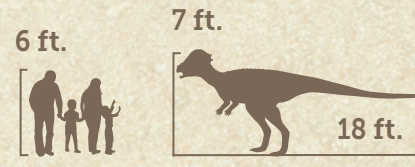
Group Pachycephalosaur

LENGTH 5.5 m (18 ft)

WEIGHT 1,800 kg (4,000 lb)

NAME MEANING "Thick-Headed Lizard"

FOUND Montana; South Dakota; Wyoming;
Saskatchewan, Canada; Mongolia



FASCINATING FACT

Because a few skulls and skull fragments were the only *Pachycephalosaurus* bones found for many years, paleontologists initially thought that their unique skulls were actually dinosaur kneecaps!

STEGOCERAS

[STEG–oh–SAIR–us]

CLASSIFICATION

Order *Ornithischia*

Group *Pachycephalosaur*

LENGTH *2 m (6.6 ft)*

WEIGHT *10–40 kg (22–88 lb)*

NAME MEANING *“Horned Roof”*

FOUND *Alberta, Canada; Saskatchewan, Canada; New Mexico; Montana*



Top of
Stegoceras
dome



Stegoceras was a bipedal herbivore in the *Pachycephalosaur* family. It was smaller than some other bone-headed dinosaurs, only about the size of a goat. It might be easy to get the name of *Stegoceras* confused with *Stegosaurus*, but the lightweight, bipedal dinosaur with the domed head looks very different from the stout quadruped with armor! *Stegoceras* lived in the forests of North America, specifically from New Mexico all the way north into Alberta and Saskatchewan, Canada.

Similar to *Pachycephalosaurus*, for many decades the only *Stegoceras* fossils that had been discovered were fragments from skulls. That changed in 1902 when a nearly complete skeleton was found. This was the first skeleton of *Stegoceras* that was more than just a skull or a few random bones. This makes *Stegoceras* one of the best-known dinosaurs and still one of the few *Pachycephalosaurus* of which we have any fossils other than the skull.





STEGOSAURS

Stegosaurs were large, herbivorous dinosaurs that lived during the Late Jurassic and Early Cretaceous periods. They were characterized by a row of large, bony plates along their back and a series of sharp spikes along their tails. These features were thought to be used for defense against predators. The word "Stegosaurus" is derived from the Greek words "stegos" meaning "roof" and "saurus" meaning "lizard". There are several species of Stegosaurus, including Stegosaurus stenops and Stegosaurus longispinus. The Stegosaurus is one of the most well-known and popular dinosaurs, often depicted in books, movies, and other media.



STEGOSAURS GROUP GUIDE

CHARACTERISTICS

Stegosaurus were quadrupedal herbivores with short legs that kept them close to the ground. The bodies of Stegosaurus were protected by double rows of bony plates and spikes. They had small heads with hard beaks, useful for chomping plants.

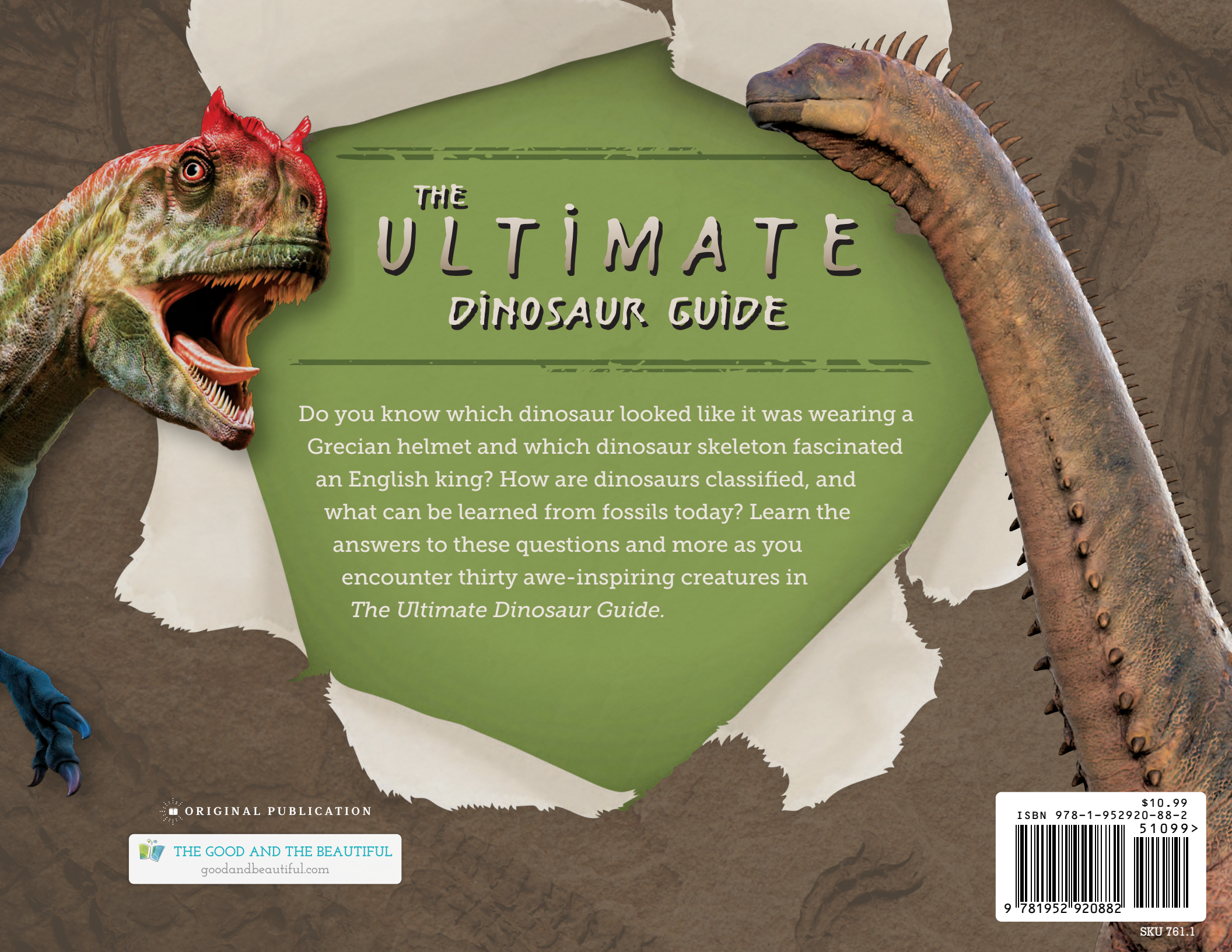
FOSSIL SITES



Stegosaurus fossils have been found in North America, South America, Africa, Europe, and Asia.

SIZE COMPARISON





THE ULTIMATE DINOSAUR GUIDE

Do you know which dinosaur looked like it was wearing a Grecian helmet and which dinosaur skeleton fascinated an English king? How are dinosaurs classified, and what can be learned from fossils today? Learn the answers to these questions and more as you encounter thirty awe-inspiring creatures in *The Ultimate Dinosaur Guide*.



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