

THE ULTIMATE



DINOSAUR GUIDE

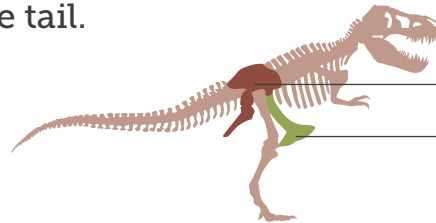


THE GOOD AND THE BEAUTIFUL LIBRARY

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

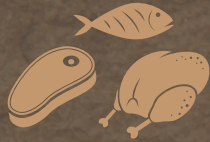


Velociraptor | pages 32–33

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

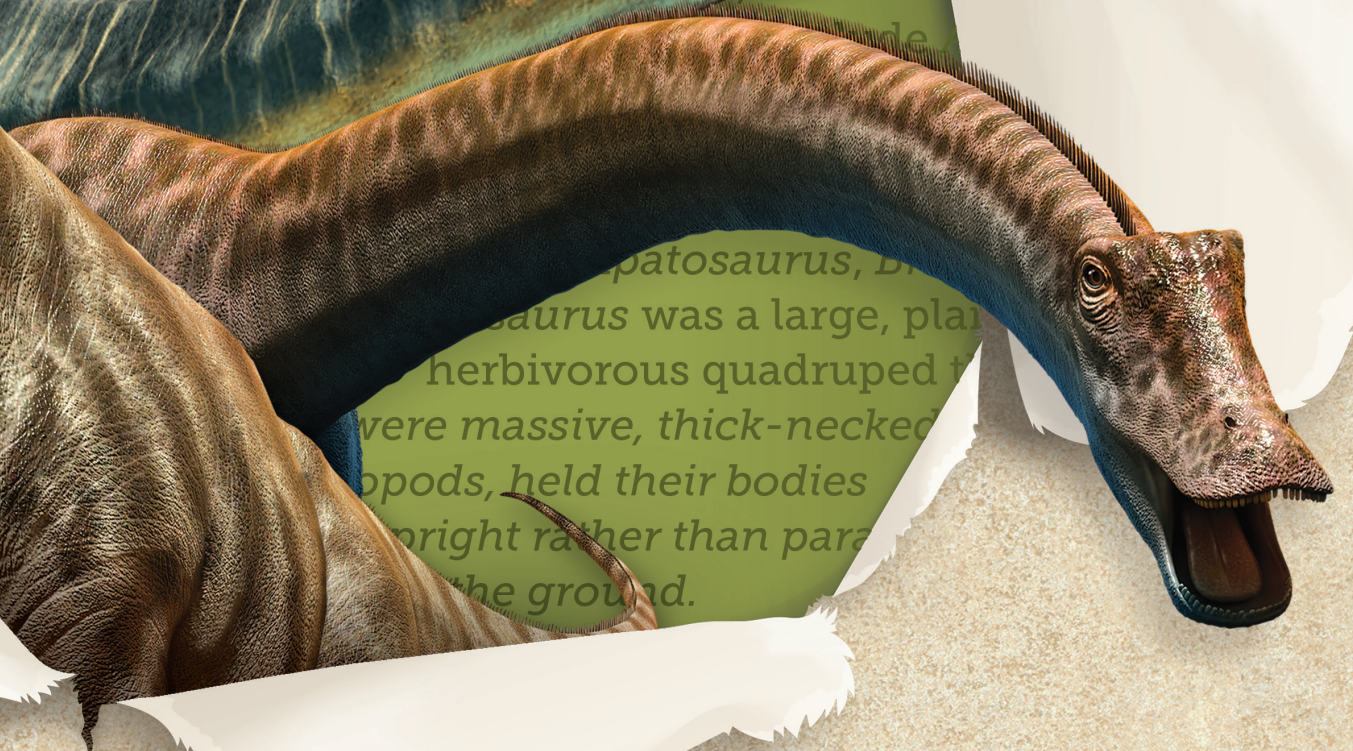
an area containing a large number of the same kind of dinosaur fossils



SAUROPODS

Sauropods include Alamosaurus, Diplodocus, and Camarasaurus.

patosaurus, Diplodocus was a large, plant-eating herbivorous quadruped. These dinosaurs were massive, thick-necked animals. They held their bodies upright rather than parallel to the ground.



CLASSIFICATION

Fossilized
Apatosaurus
bones

Order *Saurischia*

Group *Sauropod*

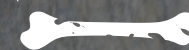
LENGTH *21-22.8 m (69-75 ft)*

WEIGHT *27,215 kg (60,000 lb)*

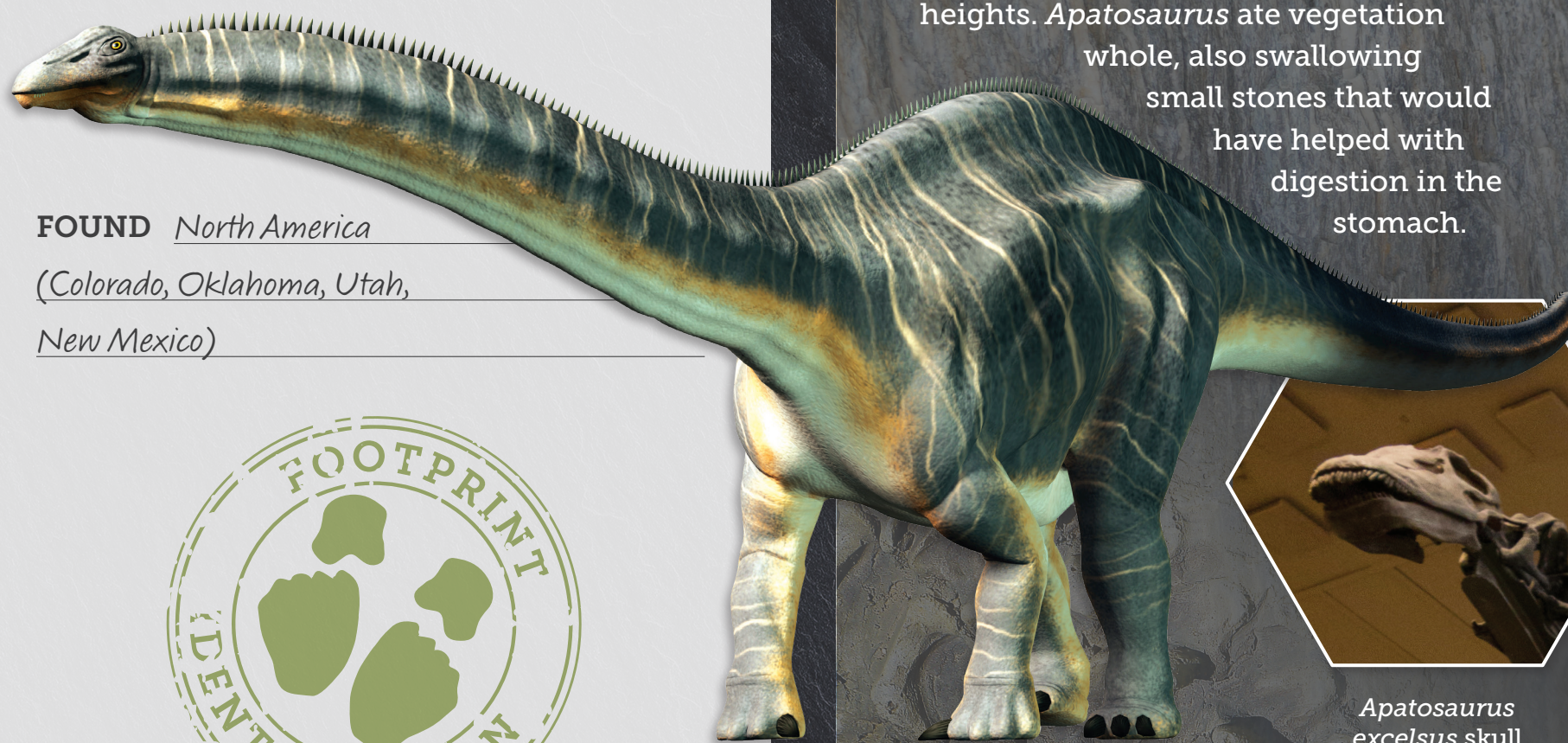
NAME MEANING *"Deceptive Lizard"*



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

...and dinosaurs include Allosaur
Spinosaurus, Tro
Ther
...nosar
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ALLOSOSAURUS

[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

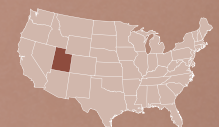
15 cm (6 in) long and were used as hooks

to grab and tear meat.



FASCINATING FACT

Allosaurus is the official state fossil of Utah.

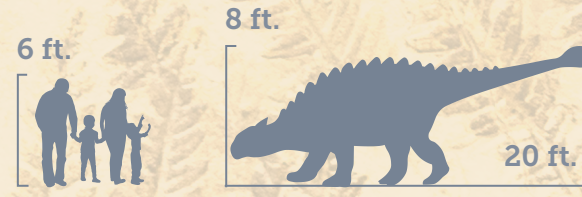


ANKYLOSOSAURUS

[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]



E*dmontonia*, 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]



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.



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

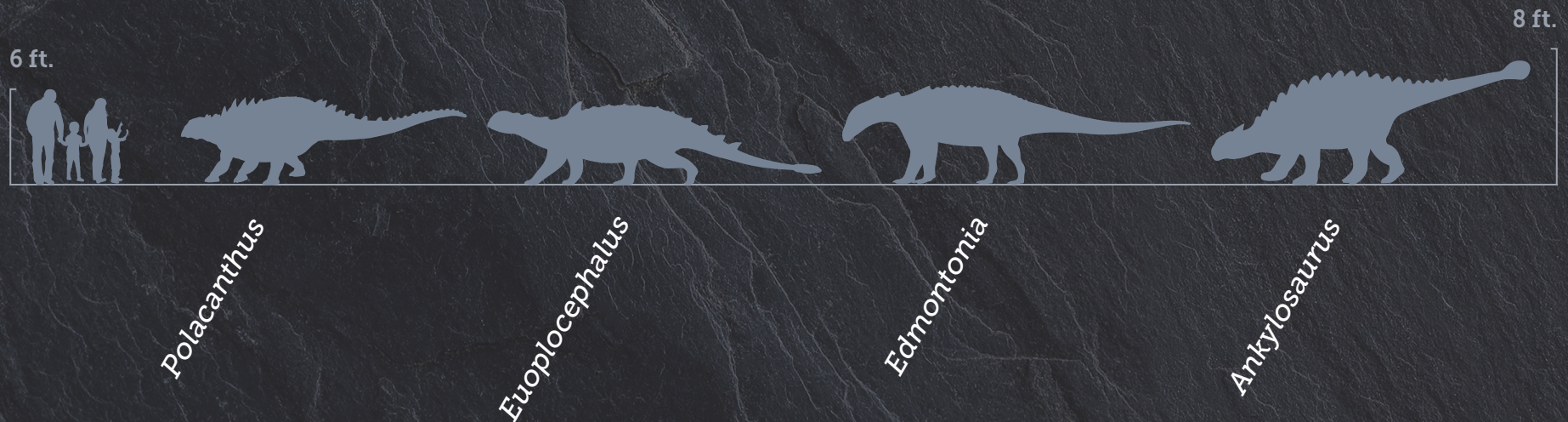
Ankylosaurs were bulky, quadrupedal plant eaters with fully-armored backs formed from fused bony plates. Most Ankylosaurs had a club at the end of the tail, likely used as a defensive weapon.

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!



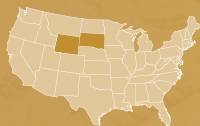
Triceratops
foot bones

Triceratops
skull



FASCINATING FACT

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



CORYTHOSAURUS

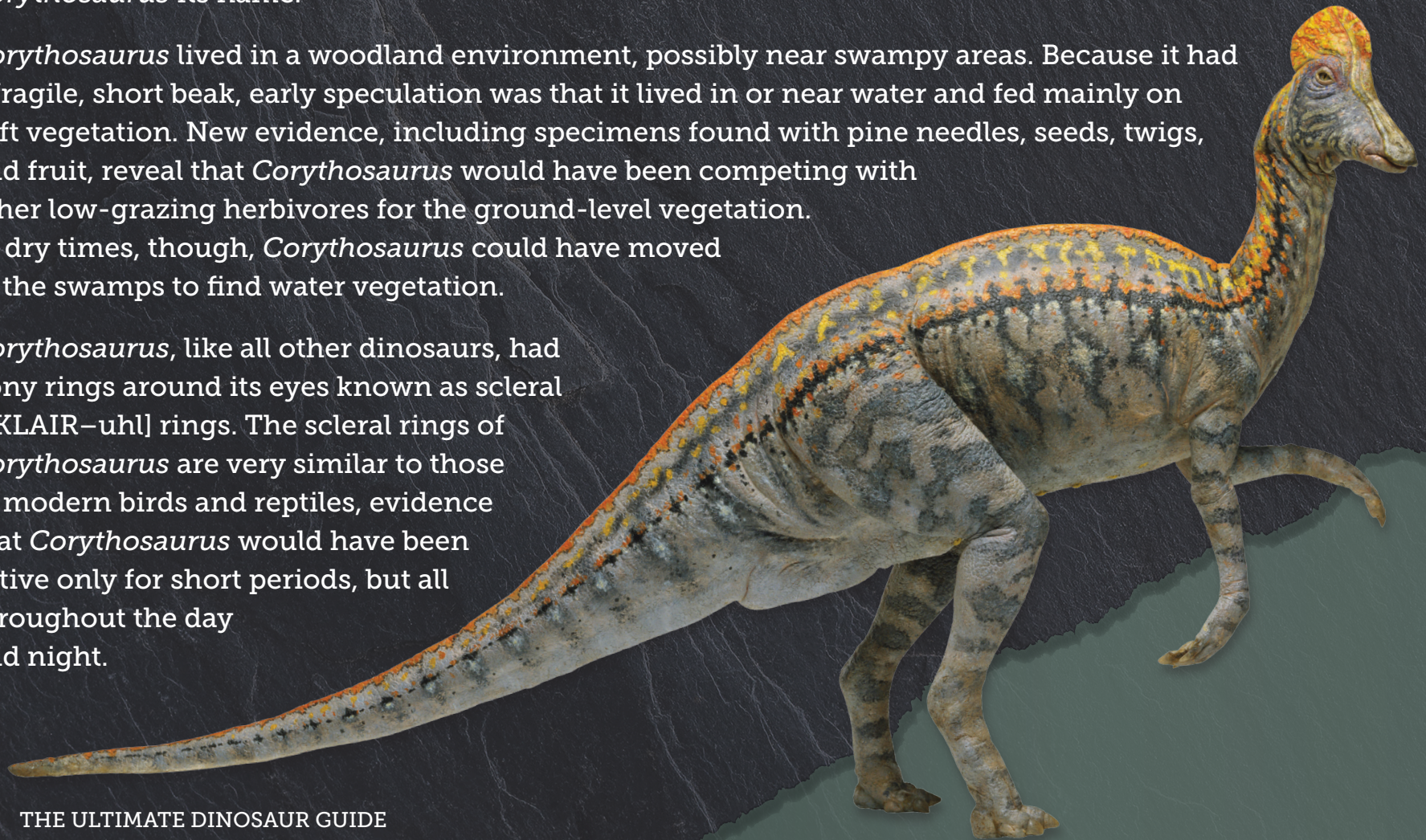
[ko-RITH-oh-SOR-us]

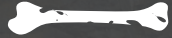


Corythosaurus is an Ornithopod dinosaur, specifically part of a sub-group called hadrosaurs, or duck-billed dinosaurs. These large herbivores all display a hollow crest or helmet-like structure on their heads, likely used for ornamentation and communication. The unique crest of *Corythosaurus* looks 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



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Pachycephalosaurus fossils have been fou
throughout North America

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 *Pachycephalosaur* 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 *Pachycephalosaur*, 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 Pachycephalosaurs of which we have any fossils other than the skull.





STEGOSAURS

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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*.

 ORIGINAL PUBLICATION



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