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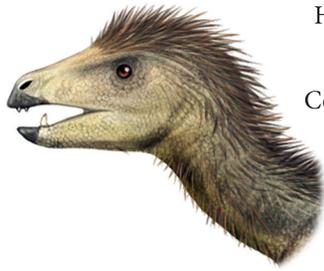
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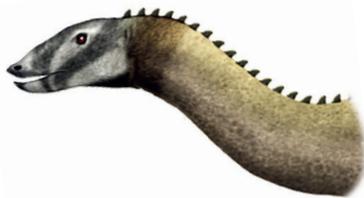
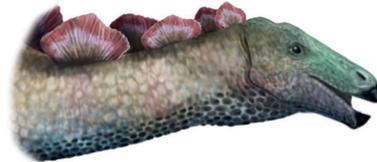


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KULINDADROMEUS



K. zabaikalicus

(Godefroit et al., 2014)

Length: 1.15 m (3.8 ft)

Height: 0.4 m (1.3 ft)

Hip height: 0.35 m (1.1 ft)

Body mass: 4 kg (9 lb)

Reconstruction:

Kulindadromeus zabaikalicus is notable for being one of the only ornithischian dinosaurs to clearly preserve feather-like structures. At the time of the animal's description, the most common idea regarding feather origins was that they evolved in the theropod dinosaurs, on a branch of the family tree far-removed from *Kulindadromeus*.

At least three different types of feathers have been identified on *Kulindadromeus*: the simple, hair-like filaments similar to the “fuzz” found on the theropod *Sinosauropteryx*; bundles of multiple filaments, originating from the same point; and sets of ribbon-like structures, unlike any sort of proto-feather seen in theropods.

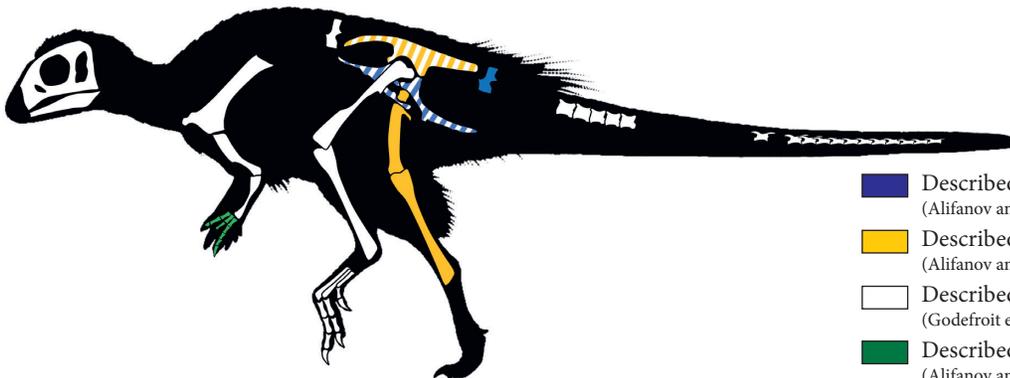
In addition, scale impressions were preserved along the shins and the tail of *Kulindadromeus*, allowing paleontologists to get a very precise picture of where the animal's feathers were not located.

Kulindadromeus is represented by several hundred fossil elements, which all originate from two neighboring bonebeds. Only a relative handful of these were figured and described in the publication that named the animal. The research was spearheaded by researchers from two institutions: the Institute of Natural Resources Ecology and Cryology (INREC) and the Royal Belgian Institute of Natural Sciences.

In a move that would turn out to be highly controversial, researchers from the Paleontological Institute at the Russian Academy of Sciences (PIN) published a paper *before* the aforementioned study, in which they described two feathery genera from the same locality: *Daurosaurus* and *Kulindapteryx* (Alifanov and Saveliev, 2014). The same researchers would later describe the similar genus *Lepidocheirosaurus* (Alifanov and Saveliev, 2015).

What makes this circumstance controversial is that the PIN researchers were swiftly alleged to have based their research on material that was “stole[n]” from the site and “illegally housed” and of publishing a paper with the intent to “claim jump” the description (Creisler, 2014). Some notable paleontologists, such as Andrea Cau, therefore consider the name *Kulindadromeus* to be “the only valid taxon” for the fossils (Cau, 2015).

Kulindadromeus zabaikalicus refers to the Kulinda region, within Zabaykalsky Krai, Russia; “dromeus” is Greek for “runner.” *Daurosaurus olovus* refers to the Dauria region of Russia and the Olov River. *Kulindapteryx ukureica* refers to the Kulinda region of Russia and the Ukureisk geological formation. *Lepidocheirosaurus natatilis* derives from the Greek “lepis” (meaning “scale”), the Greek “cheiros” (meaning “hand”), and the Latin “natatilis” (meaning “capable of swimming”).



- Described *Kulindapteryx* material (Alifanov and Saveliev, 2014)
- Described *Daurosaurus* material (Alifanov and Saveliev, 2014)
- Described *Kulindadromeus* material (Godefroit et al., 2014)
- Described *Lepidocheirosaurus* material (Alifanov and Saveliev, 2015)

25 cm 50 cm 75 cm 100 cm



A. asiaticus

(Yao et al., 2025)

Length: 1 m (3.3 ft)

Height: 0.3 m (1 ft)

Hip height: 0.25 m (0.8 ft)

Body mass: 1.8 kg (4 lb)

Reconstruction:



Archaeocursor asiaticus (meaning “old runner from Asia”) is known from a single femur, belonging to a young adult animal, which was unearthed during a residential construction project in 2022. It is the earliest known ornithischian dinosaur discovered from Asia.

Although the fossil record for early ornithischians from the southern supercontinent of Gondwana is fairly plentiful and diverse, the same cannot be said for the northern supercontinent of Laurasia, where ornithischian fossils are mostly limited to armored thyreophorans. Not only is *Archaeocursor* notable for being from Laurasia, but it seems to have been very closely related to the Gondwanan ornithischian *Eocursor*, from what is now South Africa. Having two animals that are so closely related, yet

geographically so far apart from one another, shows just how successful these dinosaurs were.

Archaeocursor’s location is also significant because it indicates that there must have been an earlier dispersal event of ornithischian dinosaurs during the Early Jurassic from Gondwana to Laurasia, separate from the event that led to the dispersal of armored thyreophoran dinosaurs. The presence of *Archaeocursor* helps to pinpoint the timing of the arrival of these animals in Laurasia, which is currently not well defined.

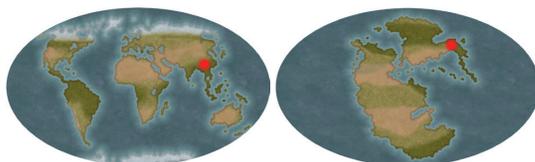
The generic name *Archaeocursor* combines the Latin “archaeo” (meaning “archaic” or “old”) and “cursor” (meaning “runner”). The specific name *asiaticus* is Latin meaning “from Asia.”

CLASSIFICATION

Dinosauria
Ornithischia

LOCATION

China



KNOWN REMAINS

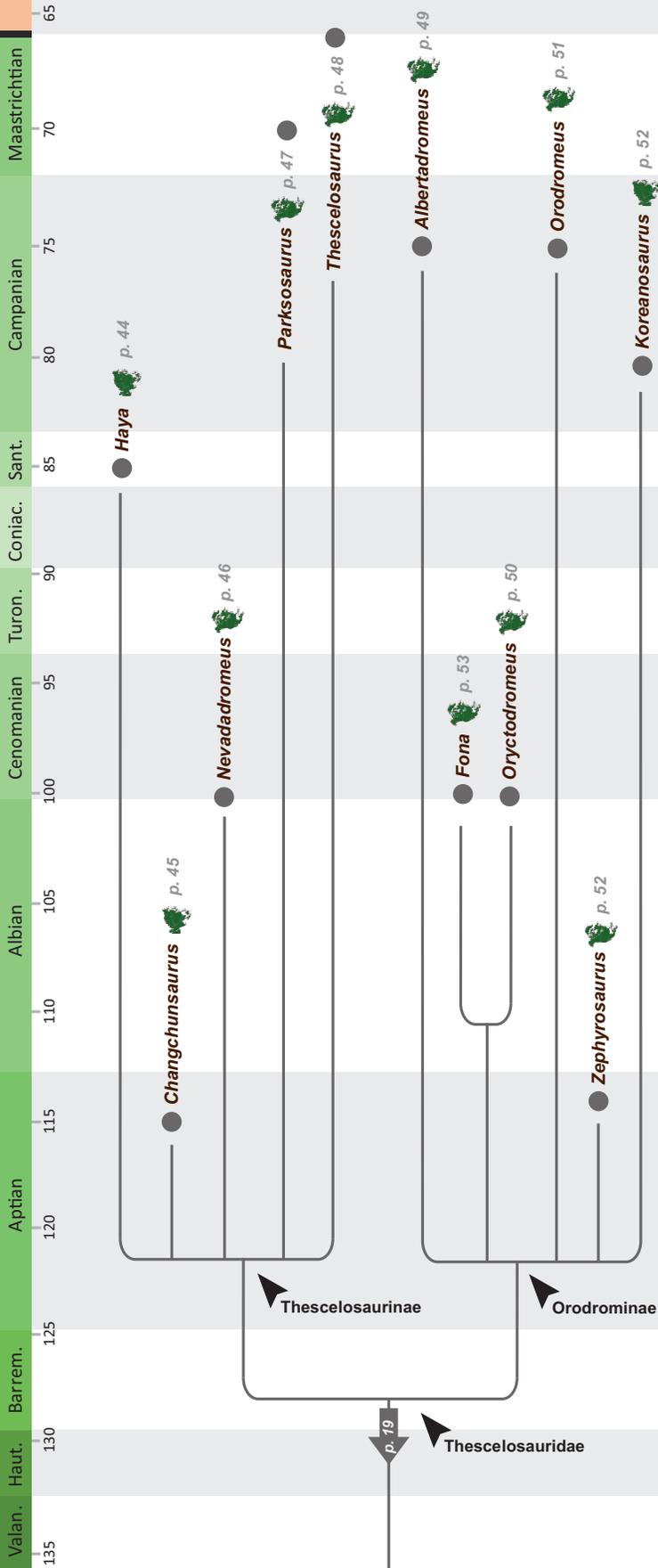
Femur



Cretaceous

Early

Late



Thescelosauridae

The thescelosaurids are a small, often overlooked group of dinosaurs. Sometimes thought of as the “sheep” of the Mesozoic, thescelosaurids are predominately small, nimble herbivores, lacking in any sort of flashy display or defensive structures. Although their lineage spanned most of the Cretaceous, thescelosaurid fossils are anomalously rare, meaning that we only have a few brief snapshots with which to piece together their evolution. This scarcity of fossils might have something to do with the relatively small, delicate nature of the animals, or perhaps they generally preferred a type of environment that was hostile to the fossilization process.

Recent consensus tends to split **Thescelosauridae** into two subgroups, Thescelosaurinae and Orodrominae (Brown et al., 2013; Boyd, 2015; Madzia et al., 2018), although some works (e.g., Dieudonné et al., 2020) find the group to be paraphyletic—in other words, not actually a single group after all.

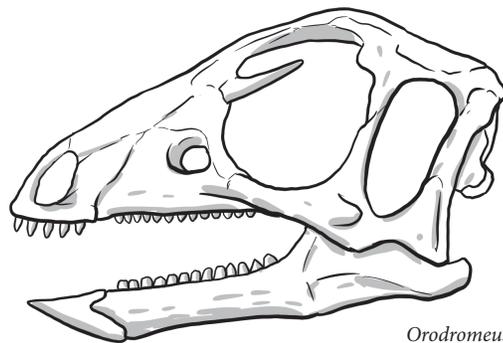
Orodrominae is generally thought to include *Albertadromeus*, *Koreanosaurus*, *Orodromeus*, *Oryctodromeus*, and *Zephyrosaurus* (Madzia et al., 2018; Barta and Norell, 2021; Manitkoon et al., 2023).

Aside from *Thescelosaurus* itself, the membership of **Thescelosaurinae** is somewhat less well-defined. Numerous analyses place *Parksosaurus* within the group (Barta and Norell, 2021; Manitkoon et al., 2023), but this is not a universal outcome (Herne et al., 2019). The describers of *Nevadadromeus* favored the interpretation of it belonging to Thescelosaurinae (Bonde et al., 2022).

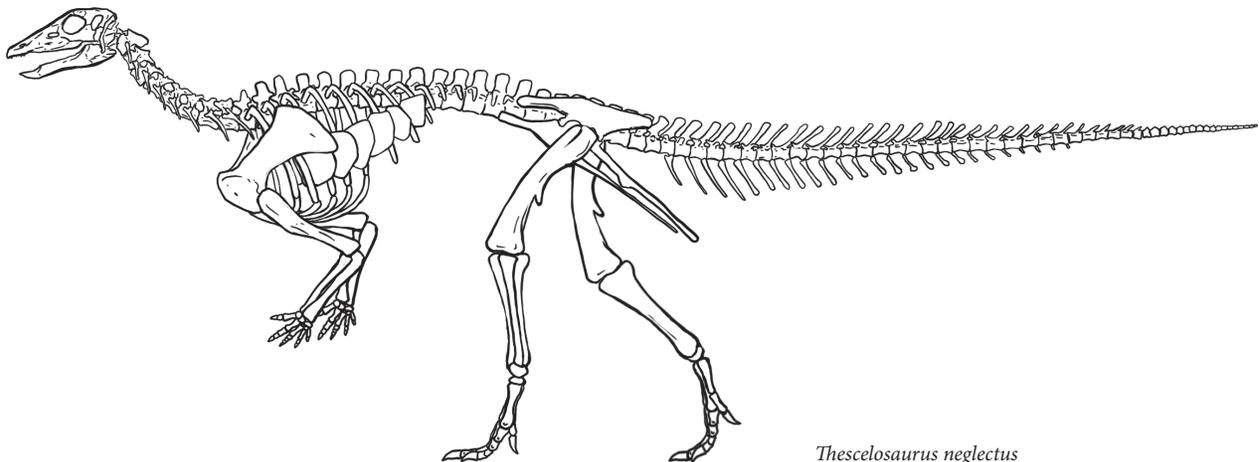
Haya has variously been found in Thescelosaurinae (Brown et al., 2013; Boyd, 2015), Orodrominae (Madzia et al., 2018; Manitkoon et al., 2023), a basal position within Thescelosauridae

(Barta and Norell, 2021), or outside of the clade entirely (Herne et al., 2019).

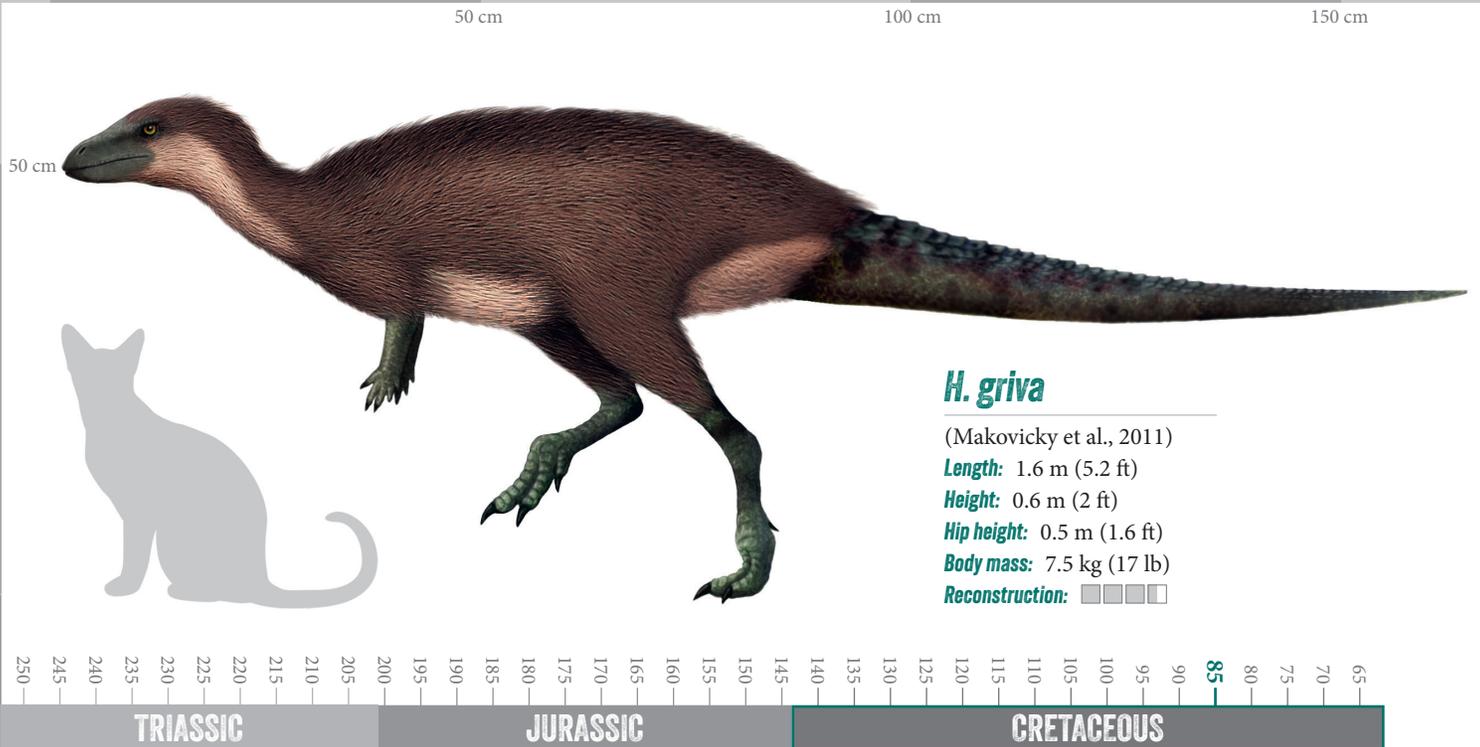
Similarly, *Changchunsaurus* has variously been found in Thescelosaurinae (Brown et al., 2013; Boyd, 2015), Orodrominae (Madzia et al., 2018; Barta and Norell, 2021; Manitkoon et al., 2023), or outside of Thescelosauridae entirely (Herne et al., 2019).



Orodromeus makelai



Thescelosaurus neglectus



H. griva

(Makovicky et al., 2011)

Length: 1.6 m (5.2 ft)

Height: 0.6 m (2 ft)

Hip height: 0.5 m (1.6 ft)

Body mass: 7.5 kg (17 lb)

Reconstruction: ■■■■

Although numerous dinosaur genera have been described from the Gobi Desert of Mongolia, *Haya griva* is the only basal ornithischian known from the region.

The first specimens were discovered in 2002 during a joint expedition of the Mongolian Academy of Sciences and the American Museum of Natural History. The specimens used to initially describe the genus were soon supplemented with more (Norell and Barta, 2016), representing individuals ranging from the very young to the subadult stage; notably, fully grown specimens are so far absent from the fossil record. Histological sampling of the internal bone tissue of several femora has determined that even in the largest known specimen, there are indications that the animal was still actively growing. This has been interpreted to mean that individual *Haya* rarely lived to reach skeletal maturity (Barta and Norell, 2021).

Several of the specimens were found with gastroliths, or “gizzard stones,” which are smooth stones that are swallowed to aid in the digestion process.

Some of the phylogenetic reports that have featured *Haya* have placed the taxon as a member of Jeholosauridae (Herne et al., 2019), or at least as being very closely related to *Jeholosaurus* (Dieudonné et al., 2020). However, several others—including the most recent, comprehensive analysis of all known *Haya* specimens—have placed the genus among **Thescelosauridae** (Barta and Norell, 2021; Manitkoon et al., 2023).

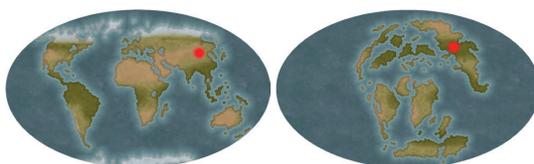
The animal’s binomial name derives from the name of the Hindu deity Haryagriva, who is often depicted with the head of a horse, in reference to the dinosaur’s elongated skull.

CLASSIFICATION

- Dinosauria
- Ornithischia
- Neornithischia
- Thescelosauridae
- Thescelosaurinae

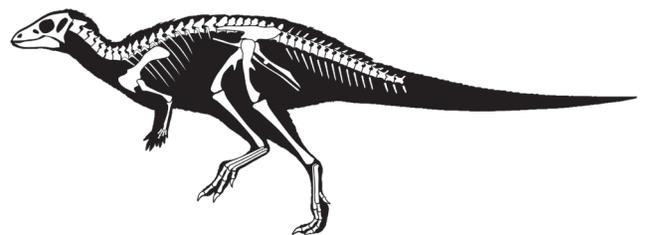
LOCATION

Mongolia



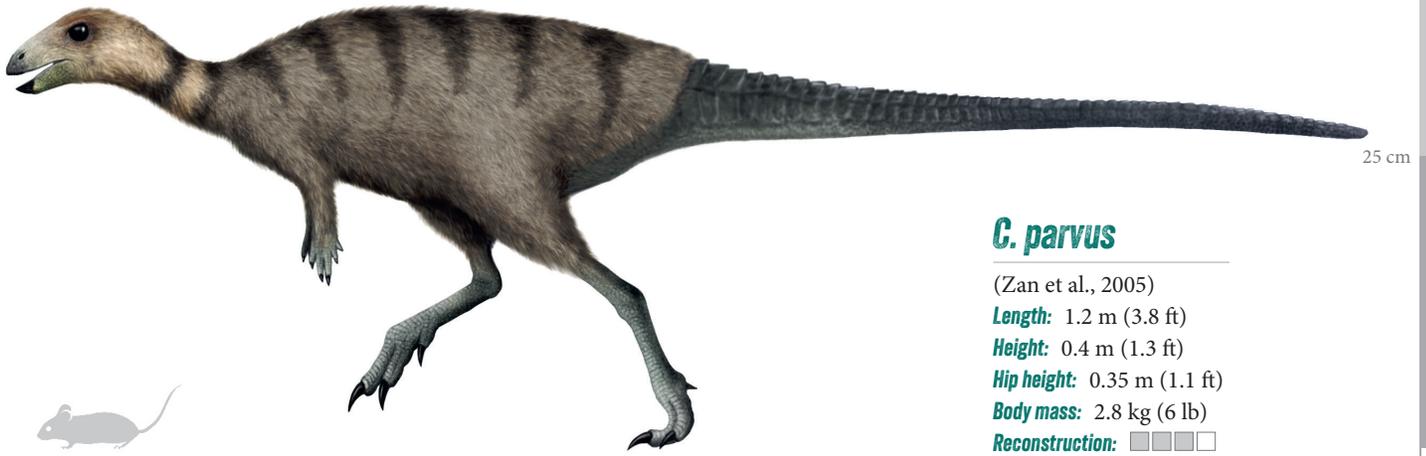
KNOWN REMAINS

Nearly complete



CHANGCHUNSAURUS

25 cm 50 cm 75 cm 100 cm 50 cm



C. parvus

(Zan et al., 2005)

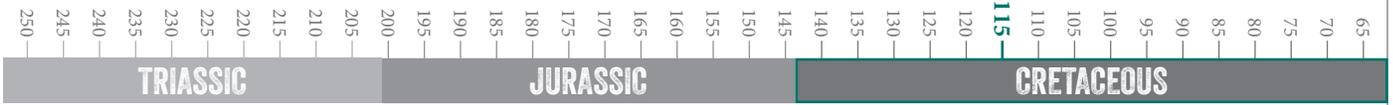
Length: 1.2 m (3.8 ft)

Height: 0.4 m (1.3 ft)

Hip height: 0.35 m (1.1 ft)

Body mass: 2.8 kg (6 lb)

Reconstruction: ■■■■



Changchunsaurus parvus (meaning “petite lizard from Changchun”) is primarily known from the holotype specimen, which preserves most of the skull and torso in relative articulation, as well as both feet. The skull has suffered from partial distortion and is slightly crushed. A number of other fragments from the locality have been assigned to the genus, but accurately identifying these partial specimens can be challenging since the similarly sized basal neoceratopsian *Helioceratops* is also known from the same quarry.

Since the brief publication that first described *Changchunsaurus*, the genus has been the subject of studies exclusively examining the animal’s cranial (Liyong et al., 2010) and postcranial anatomy (Butler et al., 2011).

A dedicated study of the animal’s dentition has shown that *Changchunsaurus* utilized an unusual yet effective method of tooth replacement, which would ensure that there were no

gaps caused by teeth that were naturally shed, thus retaining an optimal shearing edge. The animal’s teeth also had a “wavy” surface texture, which was quite unexpected as this is typically thought of as a hadrosaurid trait (Chen et al., 2018).

Changchunsaurus has sometimes been paired up with *Jeholosaurus* in phylogenetic research (Herne et al., 2019), with one *Changchunsaurus*-specific study listing a number of characteristics that are unique to those two genera (Liyong et al., 2010). However, the most common taxonomic conclusion at the moment is that *Changchunsaurus* most probably belongs within **Thescelosauridae** (Madzia et al., 2018; Manitkoon et al., 2023).

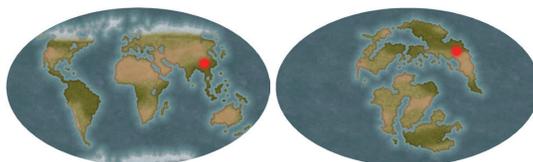
The generic name *Changchunsaurus* refers to the city of Changchun, which is the capital of Jilin Province, China. The specific name *parvus* is Greek for “petite.”

CLASSIFICATION

- Dinosauria
- Ornithischia
- Neornithischia
- Thescelosauridae
- Thescelosaurinae

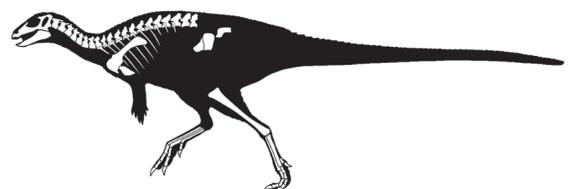
LOCATION

China

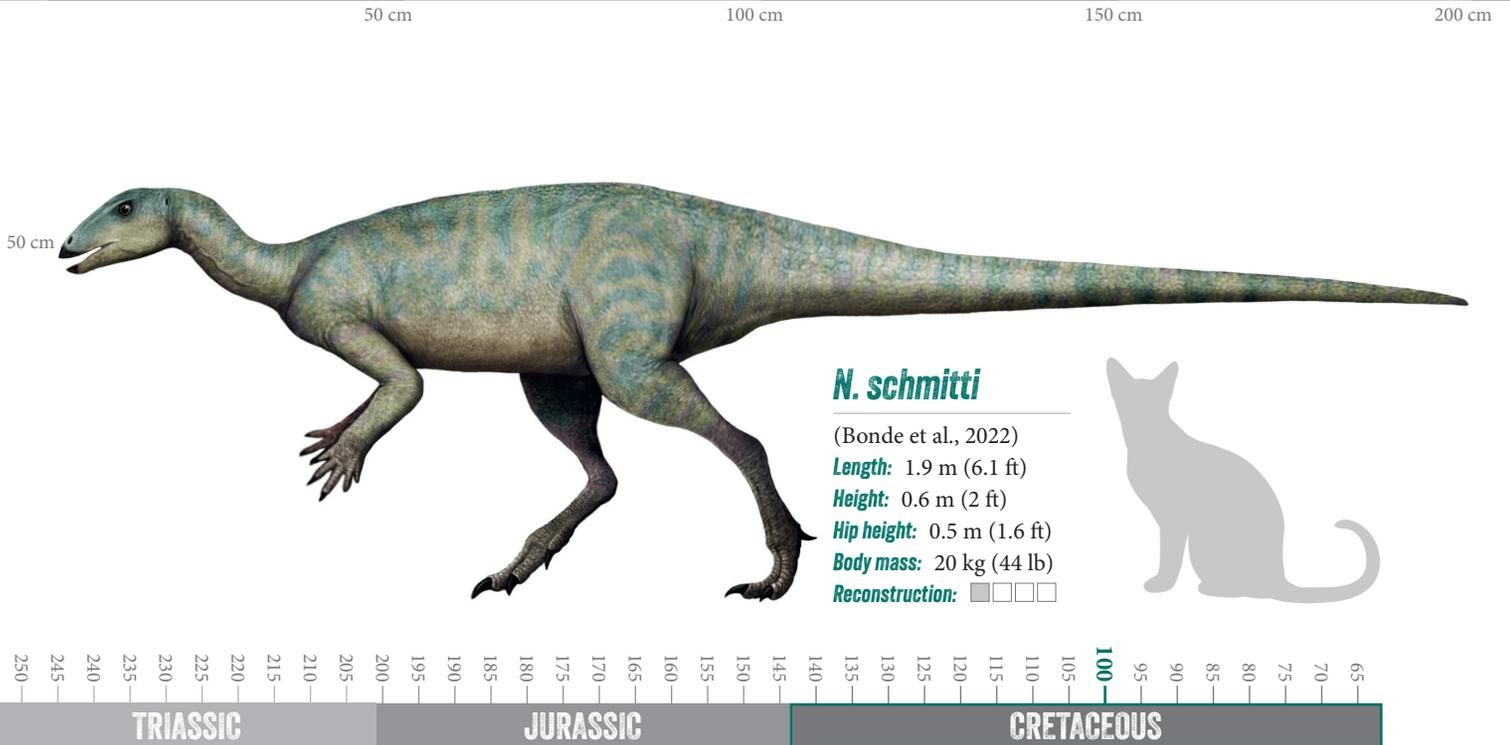


KNOWN REMAINS

Partial skull and skeleton



NEVADADROMEUS



N. schmitti

(Bonde et al., 2022)

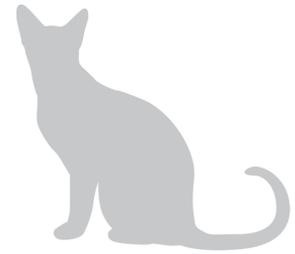
Length: 1.9 m (6.1 ft)

Height: 0.6 m (2 ft)

Hip height: 0.5 m (1.6 ft)

Body mass: 20 kg (44 lb)

Reconstruction:



Nevadadromeus schmitti (meaning “Schmitt’s runner from Nevada”) is the oldest known American thescelosaurid; the other regional members of the group have only been known from the end of the Cretaceous.

The fragmentary holotype of *Nevadadromeus* was discovered fortuitously on a routine fossil hunt in 2008. Paleontologist Joshua Bonde was leading students through the Valley of Fire State Park when the moisture from a sudden storm began to highlight the presence of fossilized bone fragments.

These fossils went largely unprepared for many years as their significance was not immediately evident. Eventually, though, Bonde began to realize that these fossils were from a thescelosaurid, and more importantly, that they were significantly older than would be expected. The specimen includes portions of the animal’s legs, toes, and vertebrae.

The description’s accompanying phylogenetic analysis has a limited degree of accuracy, considering the partial nature of the remains that are available to utilize. The study found that within **Thescelosauridae**, *Nevadadromeus* may be a member of either of the clade’s subgroups, Orodrominae or Thescelosaurinae, although the describers consider the latter option to be most probable.

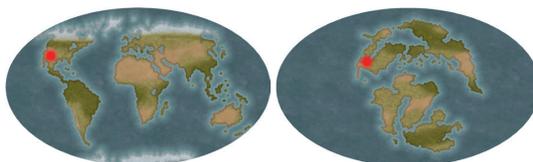
The generic name *Nevadadromeus* refers to the American state of Nevada; this is combined with the Greek “dromeus” (meaning “runner”). The specific name *schmitti* honors geologist James G. Schmitt, who has not only extensively studied the Willow Tank geological formation that bore *Nevadadromeus*, but also instructed Joshua Bonde during his studies at Montana State University.

CLASSIFICATION

- Dinosauria
- Ornithischia
- Neornithischia
- Thescelosauridae
- Thescelosaurinae

LOCATION

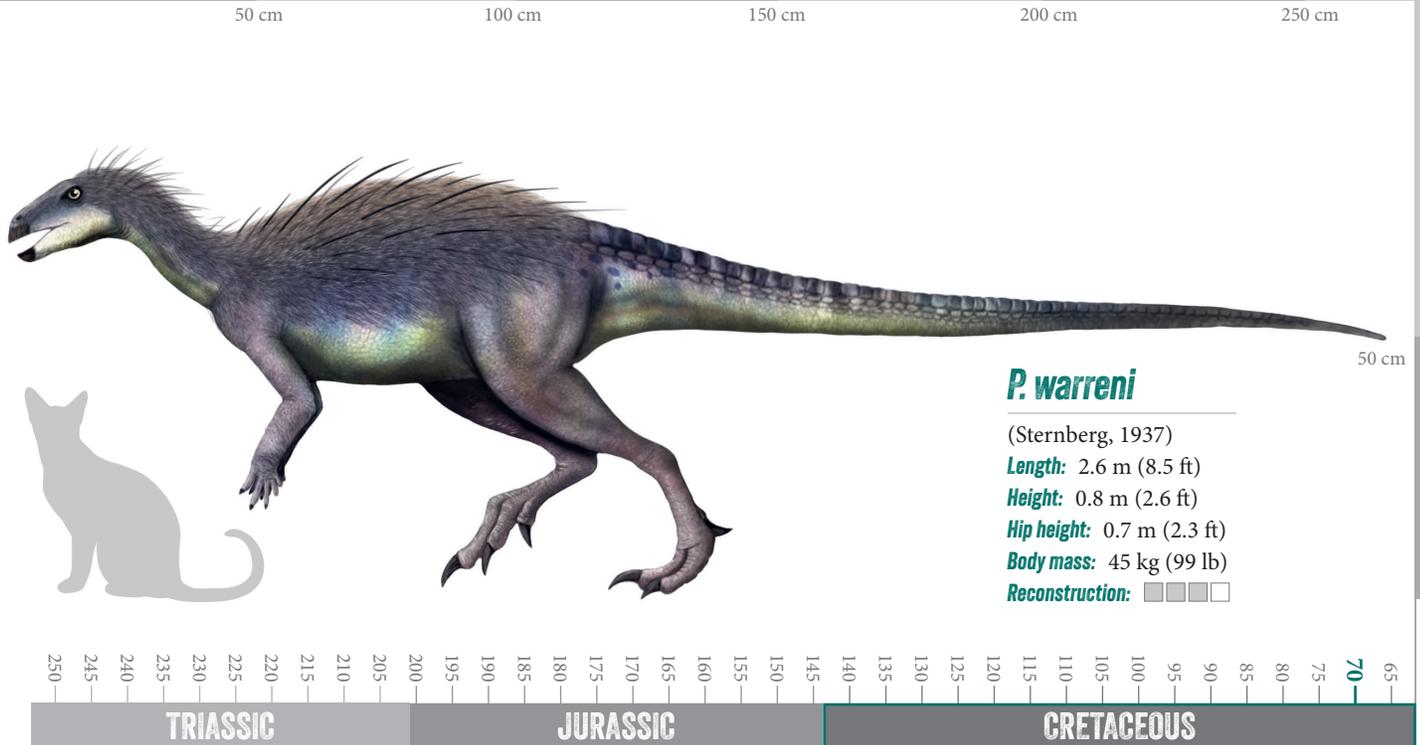
Nevada, USA



KNOWN REMAINS

Fragments





Parksosaurus warreni (meaning “Parks’s and Warren’s lizard”) was first described as a species of *Thescelosaurus* by William Parks in 1926. The reason why he did not choose to erect a new genus, despite noting numerous substantial differences between this new specimen and previous examples of *Thescelosaurus* is unknown. Shortly after Parks’s death, Charles Sternberg renamed and further described the animal.

As opposed to *Thescelosaurus*, which has a femur that is longer than its tibia, *Parksosaurus* has the opposite arrangement. *Parksosaurus* also has long toes, potentially used to wade through muddy environs (Paul, 2010).

The holotype’s level of preservation is such that several skeletal elements, which were likely cartilaginous, have been preserved. These include some intercostal plates along the rib cage, a suprascapular element located above the shoulder

blade, and a thick sheath of tendons that encompass most of the animal’s tail; these would likely have rendered the appendage stiff and nonflexible, best suited to aiding balance while running.

Taxonomically, *Parksosaurus* has been recovered in numerous different positions. Some works have placed it among the basal portions of Iguanodontia (Rozadilla et al., 2016) or Ornithopoda (Herne et al., 2019). The most common recent view, though, places the genus among **Thescelosauridae** (Boyd, 2015; Manitkoon et al., 2023), or at least in that general vicinity (Dieudonné et al., 2020).

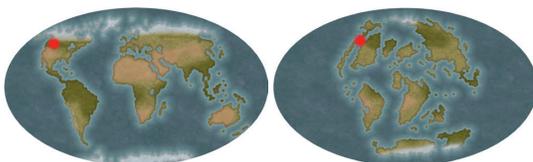
The generic name *Parksosaurus* honors paleontologist William Arthur Parks. The specific name *warreni* honors financial donor Mrs. H. D. Warren—according to pedantic rules, the proper species name should have taken the feminine form “warrenae.”

CLASSIFICATION

Dinosauria
Ornithischia
Neornithischia
Thescelosauridae
Thescelosaurinae

LOCATION

Canada



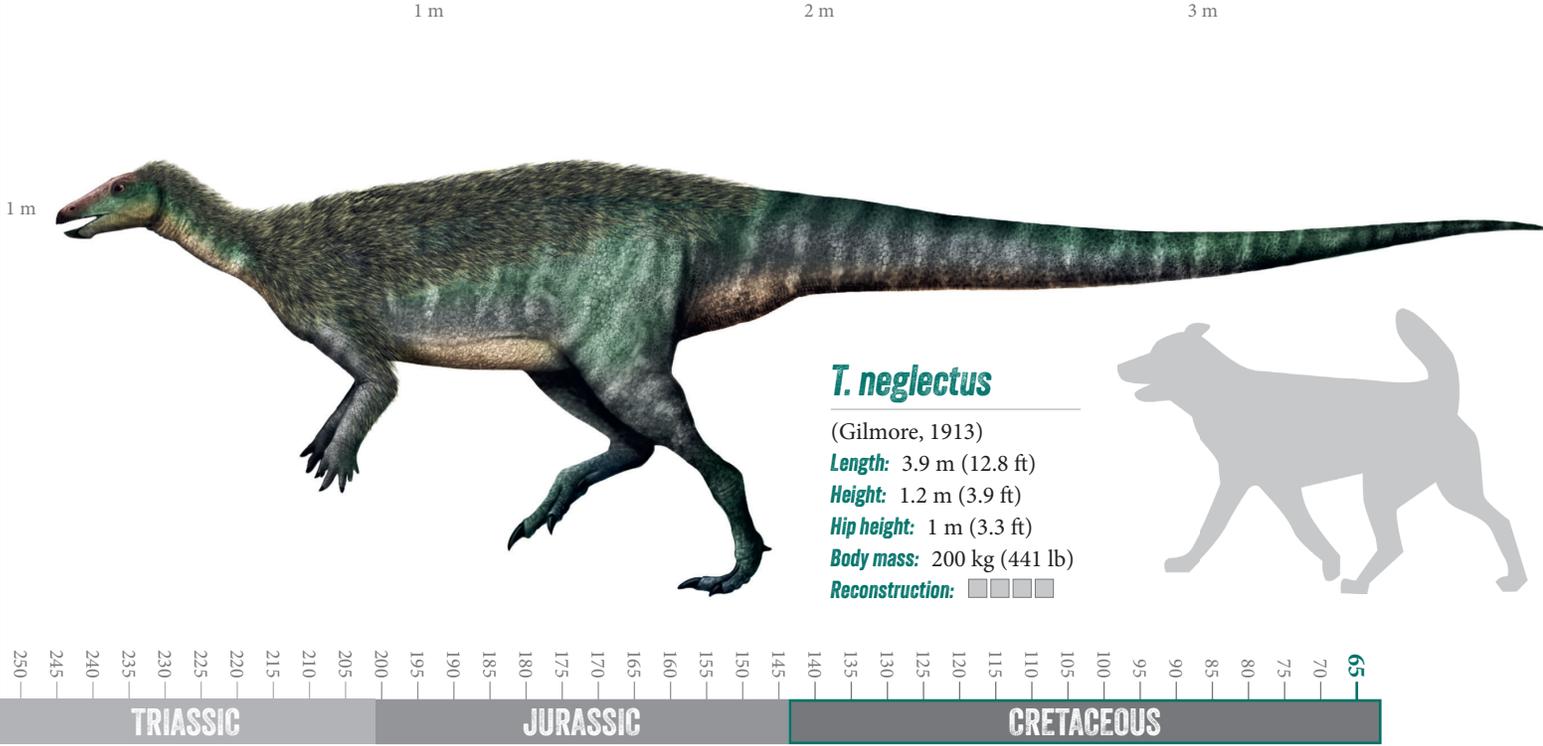
KNOWN REMAINS

Partial skull and skeleton



THESCÉLOSAURUS

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Thescelosaurus neglectus (meaning “neglected wonderful lizard”) is one of the latest surviving basal ornithischians. It retains some “primitive” characteristics, which most ornithischians had done away with by that time, such as having a large number of teeth in each jaw, roughly 80 in total.

Despite being the namesake for the clade **Thescelosauridae**, *Thescelosaurus* is quite the odd one out among the group’s members. The other thescelosaurids tend to be lightweight and nimble, but *Thescelosaurus* is much more heavily built, with thick appendages and strong musculature. This general body plan contrasts with the animal’s small, stubby hands and elongated, delicate skull.

Roughly a dozen *Thescelosaurus* specimens of relative completeness are currently known. Unlike some dinosaur genera, which have languished without modern analysis for decades, *Thescelosaurus* has been the subject of several

modern papers examining the animal’s taxonomy (Boyd et al., 2009) and skull morphology (Boyd, 2014). Two additional species have been named based on some of the more fragmentary remains, *T. assiniboiensis* and *T. garbanii*; others named over the years are now considered invalid.

One specimen in particular (NCSM 15728) made news when it was interpreted as containing traces of fossilized organs, particularly the animal’s heart (Fisher et al., 2000). This idea has largely been overturned, however (Cleland et al., 2011).

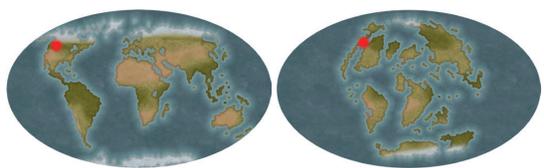
The generic name *Thescelosaurus* derives from the Greek, “theskelos” (meaning “wonderful”). The specific name *neglectus* is Latin for “overlooked” or “neglected”; this was because the holotype specimen was discovered in 1891, but then languished in a storage crate for more than two decades before it was studied.

CLASSIFICATION

- Dinosauria
- Ornithischia
- Neornithischia
- Thescelosauridae
- Thescelosaurinae

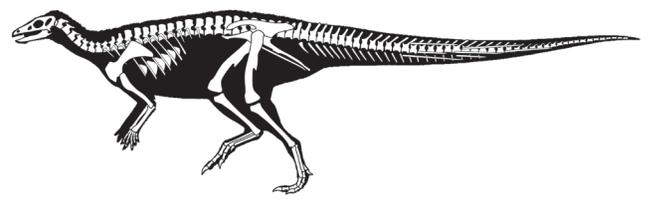
LOCATION

United States; Canada



KNOWN REMAINS

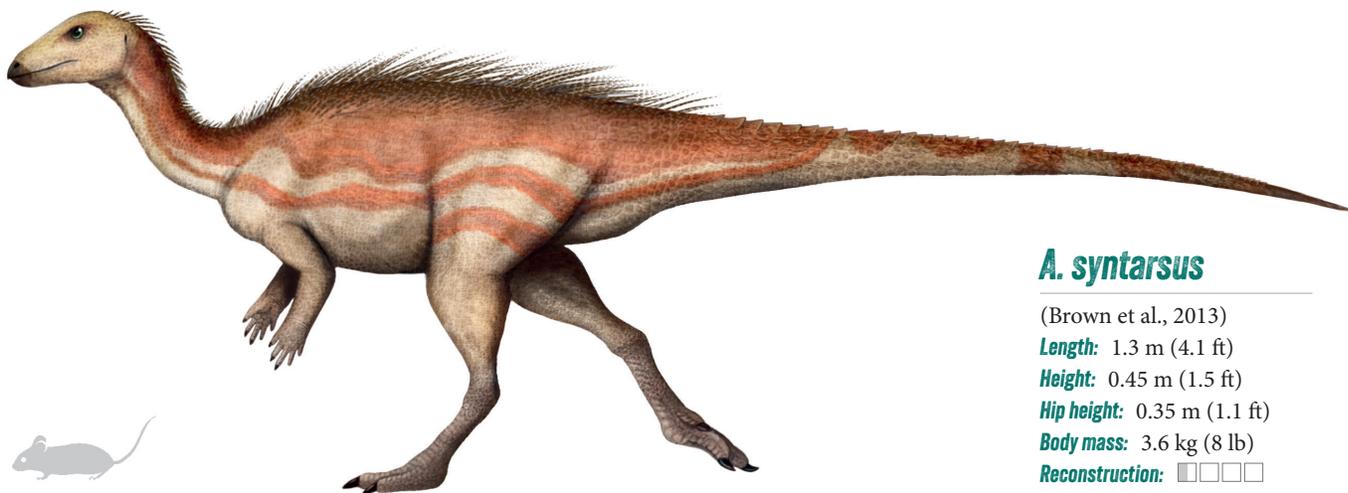
Complete



50 cm

100 cm

50 cm



A. syntarsus

(Brown et al., 2013)

Length: 1.3 m (4.1 ft)

Height: 0.45 m (1.5 ft)

Hip height: 0.35 m (1.1 ft)

Body mass: 3.6 kg (8 lb)

Reconstruction:



Albertadromeus syntarsus (meaning “fused-ankle runner from Alberta”) was hailed, at the time of its discovery, as the smallest herbivorous dinosaur ever found in Canada.

The most notable element of the holotype (and only known) *Albertadromeus* specimen is the lower leg. Aside from this part of the skeleton, only a few isolated fragments are included in the specimen. A few other sets of thescelosaurid remains—some quite substantial—have been found in the region, but have remained unidentifiable, and could possibly pertain to *Albertadromeus*, *Orodromeus*, or a different taxon altogether.

The scant nature of the holotype remains, and the general rarity of small dinosaurs in general, is understandable from a taphonomic standpoint: smaller bones are more fragile, and are thus more likely to be consumed by scavengers, eroded, or otherwise destroyed before they can fossilize.

The same research that described *Albertadromeus* also erected a new clade within **Thescelosauridae**, known as Orodrominae, for those species more closely related to *Orodromeus* than to *Thescelosaurus*.

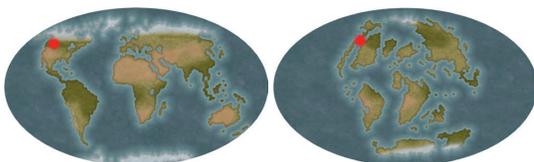
The generic name *Albertadromeus* refers to Alberta, Canada; this is combined with the Greek “dromeus” (meaning “runner”). The specific name *syntarsus* combines the Greek “syn” (meaning “together”) and “tarsus” (meaning “ankle”), referring to the partial fusion between the animal’s tibia and fibula. In ornithischians, this skeletal trait is only seen in a few species of heterodontosaurid, which are only distantly related to *Albertadromeus*. Together with the elongated nature of the tibia, it seems probable that *Albertadromeus* was adapted to a highly cursorial mode of locomotion.

CLASSIFICATION

- Dinosauria
- Ornithischia
- Neornithischia
- Thescelosauridae
- Orodrominae

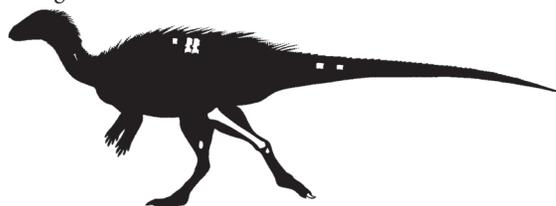
LOCATION

United States; Canada



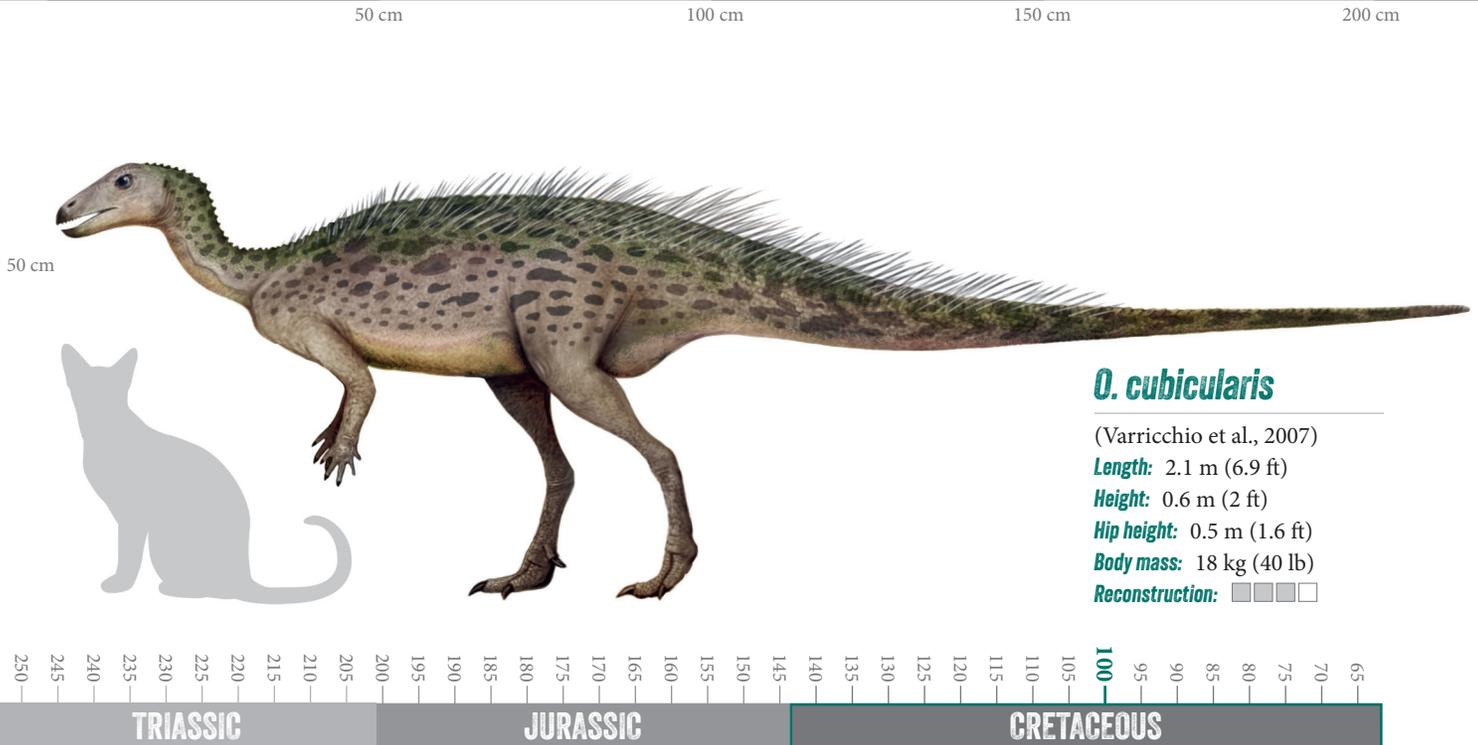
KNOWN REMAINS

Fragments



ORYCTODROMEUS

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O. cubicularis

(Varricchio et al., 2007)

Length: 2.1 m (6.9 ft)

Height: 0.6 m (2 ft)

Hip height: 0.5 m (1.6 ft)

Body mass: 18 kg (40 lb)

Reconstruction:

Oryctodromeus cubicularis (meaning “digging runner of the lair”) is famously the first burrowing dinosaur to ever be discovered. The holotype specimen, that of an adult, was found (along with the partial remains of two juveniles) at the end of a 2-meter burrow that had eventually filled in with sand in a floodplain environment. The burrow was s-shaped and was considered by the describers to be “very well constructed.”

Several pieces of evidence support the idea that *Oryctodromeus* actually constructed the burrow rather than simply finding and coopting a preexisting structure. One clue is that the size of the burrow matches what would be expected for an animal of this size to make.

Other clues have to do with *Oryctodromeus*’s anatomy. The animal’s shoulder blade is distinctively curved, suggesting strong shoulder muscles. Additionally, its pelvis is wide and held together by seven sacral vertebrae—an

unusually high number; this has been interpreted as an adaptation that would give *Oryctodromeus* a sturdy posture, to help counteract the forces exerted by digging actions. Finally, the animal’s unusually expanded and strengthened snout might be another adaptation for moving dirt.

Still, *Oryctodromeus* was likely not a hyperspecialized digger, as its hands lack any obvious adaptations that indicate constant burrowing behavior, and the anatomy of its legs suggests that it was an accomplished runner. Thus, rather than filling a mole-like ecological niche, *Oryctodromeus* had a lifestyle that was probably more akin to that of a rabbit.

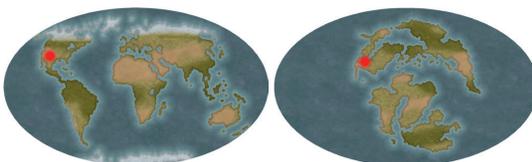
The generic name *Oryctodromeus* combines the Greek “orycto” (meaning “digging”) and “dromeus” (meaning “runner”). The specific name *cubicularis* is Greek for “of the lair.”

CLASSIFICATION

Dinosauria
Ornithischia
Neornithischia
Thescelosauridae
Orodrominae

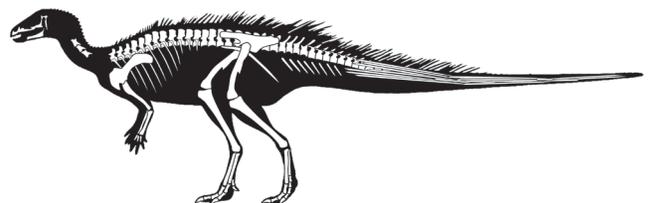
LOCATION

United States



KNOWN REMAINS

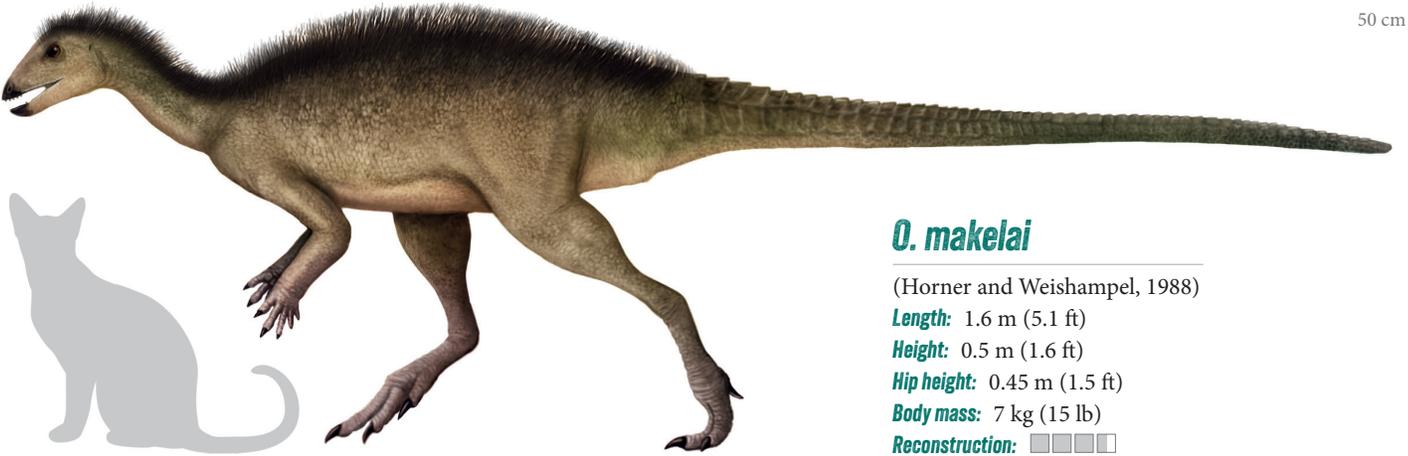
Partial skull and skeleton



50 cm

100 cm

150 cm



O. makelai

(Horner and Weishampel, 1988)

Length: 1.6 m (5.1 ft)

Height: 0.5 m (1.6 ft)

Hip height: 0.45 m (1.5 ft)

Body mass: 7 kg (15 lb)

Reconstruction: ■■■■



Orodromeus makelai (meaning “Makela’s mountain runner”) was discovered at “Egg Mountain,” a location most famous for the numerous fossilized nests that belonged to the hadrosaur *Maiasaura*. Initially, *Orodromeus* was thought to have a preserved nest of its own, but this was later determined to actually be the nest of a troodontid theropod (Varricchio et al., 1997).

The holotype specimen of *Orodromeus* preserves most of the animal’s skull and body. Additionally, the partial remains of several other individuals were found in close proximity, some of which were at different stages of growth; this has allowed for the study of how the animal’s anatomy changed as it grew.

While younger individuals had ten maxillary pairs of teeth, this number increased to thirteen in adults (Scheetz, 1999). Once the animal reached its late juvenile stage, its rate

of growth slowed considerably, as evidenced by the histological examination of inner bone tissue samples. In all growth stages, the bones of *Orodromeus* display reduced vascularization, compared with other species of small ornithischian (Horner et al., 2009).

A close relative of *Orodromeus*, *Oryctodromeus*, is known to have lived in burrows, and so it has been speculated that *Orodromeus* had a similar habit. Indirect evidence for this idea includes that the known remains of *Orodromeus* were found “packed” rather than “dispersed,” which could suggest that the individuals were huddled in burrows at the time of their death (Varricchio et al., 2007).

The generic name *Orodromeus* combines the Greek “oros” (meaning “mountain”) and “dromeus” (meaning “runner”). The specific name *makelai* honors fossil discoverer Robert Makela.

CLASSIFICATION

Dinosauria
Ornithischia
Neornithischia
Thescelosauridae
Orodrominae

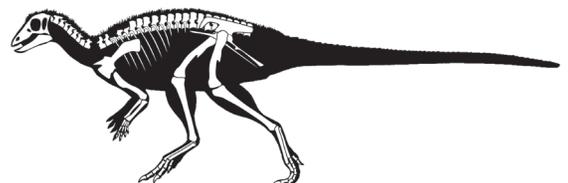
LOCATION

Montana, USA

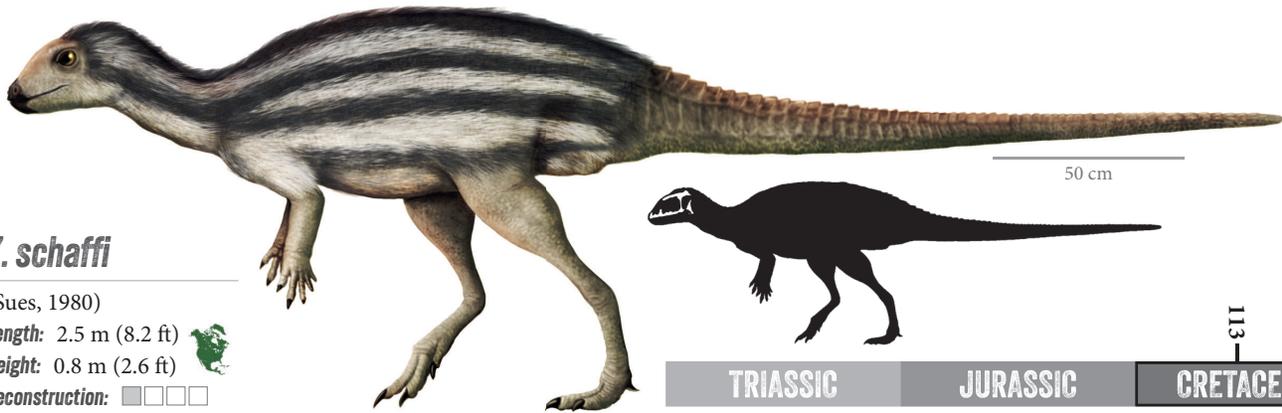


KNOWN REMAINS

Nearly complete



ZEPHYROSAURUS



Z. schaffi

(Sues, 1980)

Length: 2.5 m (8.2 ft) 

Height: 0.8 m (2.6 ft)

Reconstruction:

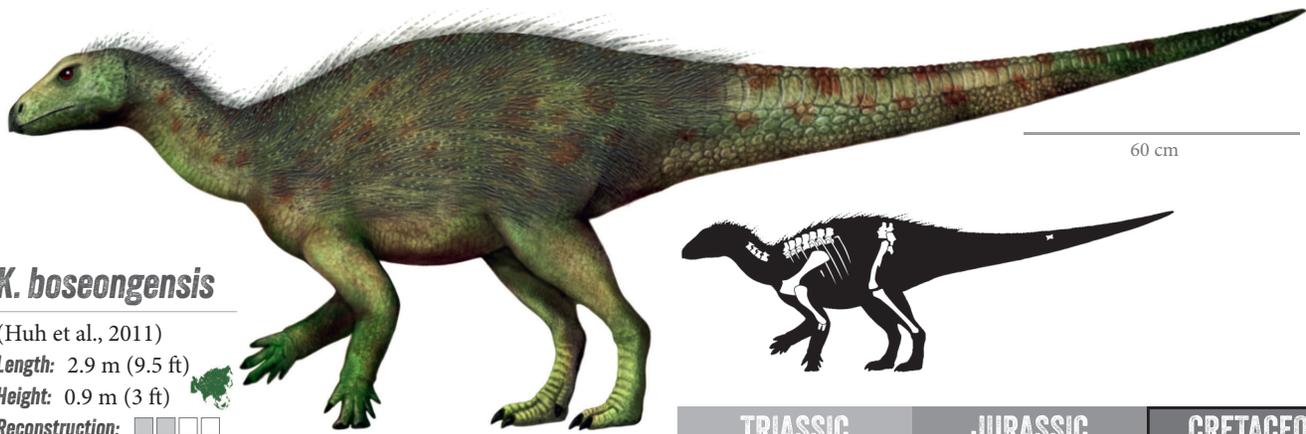
Zephyrosaurus schaffi was described on the basis of a single, fragmentary skull found in Montana. Other fossil material has been mentioned in a conference abstract—the cranial and skeletal remains of at least seven individuals (Kutter, 2003)—but as of 2025, none of this material has been described, documented, or figured in any publication. Fossilized trackways in Maryland and Virginia have been

attributed to a *Zephyrosaurus*-like animal (Stanford et al., 2004).

The generic name *Zephyrosaurus* derives from Zephyros, the Greek god of the west wind; this references the location of its discovery in the western reaches of the United States. The specific name *schaffi* honors fossil discoverer C. R. Schaff.



KOREANOSAURUS



K. boseongensis

(Huh et al., 2011)

Length: 2.9 m (9.5 ft) 

Height: 0.9 m (3 ft)

Reconstruction:

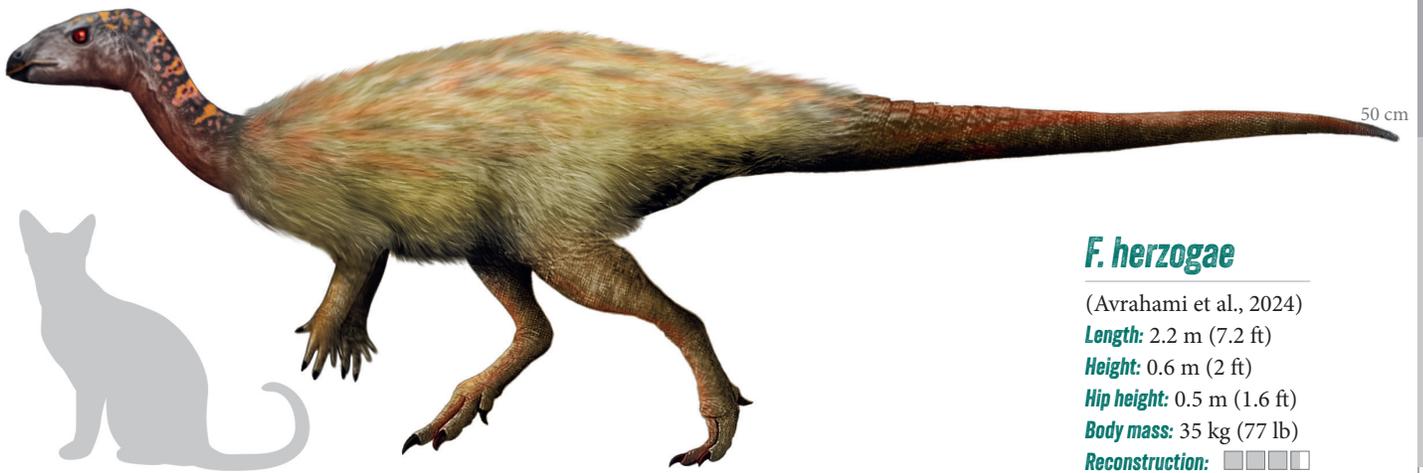
Koreanosaurus boseongensis is the only basal ornithischian that has been suggested to be quadrupedal, at least partially. This idea is based on the relative proportions and robustness of the shoulder and upper arm in comparison with the femur. Since its close relative *Oryctodromeus* is known to have been a burrower, it is possible that *Koreanosaurus* had

further specialized in this activity, and thus spent more time digging and less time running on its hindlegs. Additional indirect evidence for this behavior includes the existence of burrows in the same strata that bore *Koreanosaurus*.

The animal's binomial name refers to Boseong County, South Korea.



50 cm 100 cm 150 cm 200 cm



F. herzogae

(Avrahami et al., 2024)

Length: 2.2 m (7.2 ft)

Height: 0.6 m (2 ft)

Hip height: 0.5 m (1.6 ft)

Body mass: 35 kg (77 lb)

Reconstruction: ■■■■



Fona herzogae (meaning “Herzog’s origin”) seems to have been specialized to excel at digging burrows, inhabiting a “fossorial” ecological niche, much like its close cousin *Oryctodromeus*.

Fona exhibits several anatomical traits that are commonly seen in animals that are adapted for digging or burrowing. These include robust bones in the arm and shoulder, enlarged muscle attachment areas on the hips and legs, and fused pelvic bones, which could have provided added stability during digging.

Additionally, the several specimens of *Fona* that have been discovered are unusually complete and articulated, as if the animals had been rapidly buried upon their deaths—this

would have occurred most easily if the individuals had been huddled in a den or tunnel.

A number of subtle differences among the specimens have been cataloged, hinting at sexual dimorphism within the species (males and females appearing differently) or at changes that occurred during the animal’s lifecycle.

The phylogenetic study completed by the describers placed *Fona* as the oldest known member of the subfamily **Thescelosaurinae**.

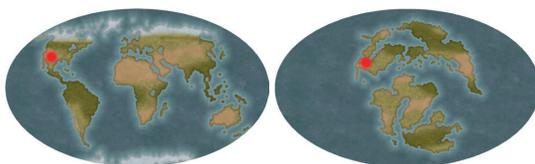
The generic name *Fona* means “the origin” in the Austronesian language of Fino’ CHamoru, referring to a cultural mythological figure. The specific name *herzogae* honors site discoverer Lisa Herzog.

CLASSIFICATION

- Dinosauria
- Ornithischia
- Neornithischia
- Thescelosauridae

LOCATION

Utah, USA



KNOWN REMAINS

Nearly complete



P.
P.

Cretaceous

Late

Early

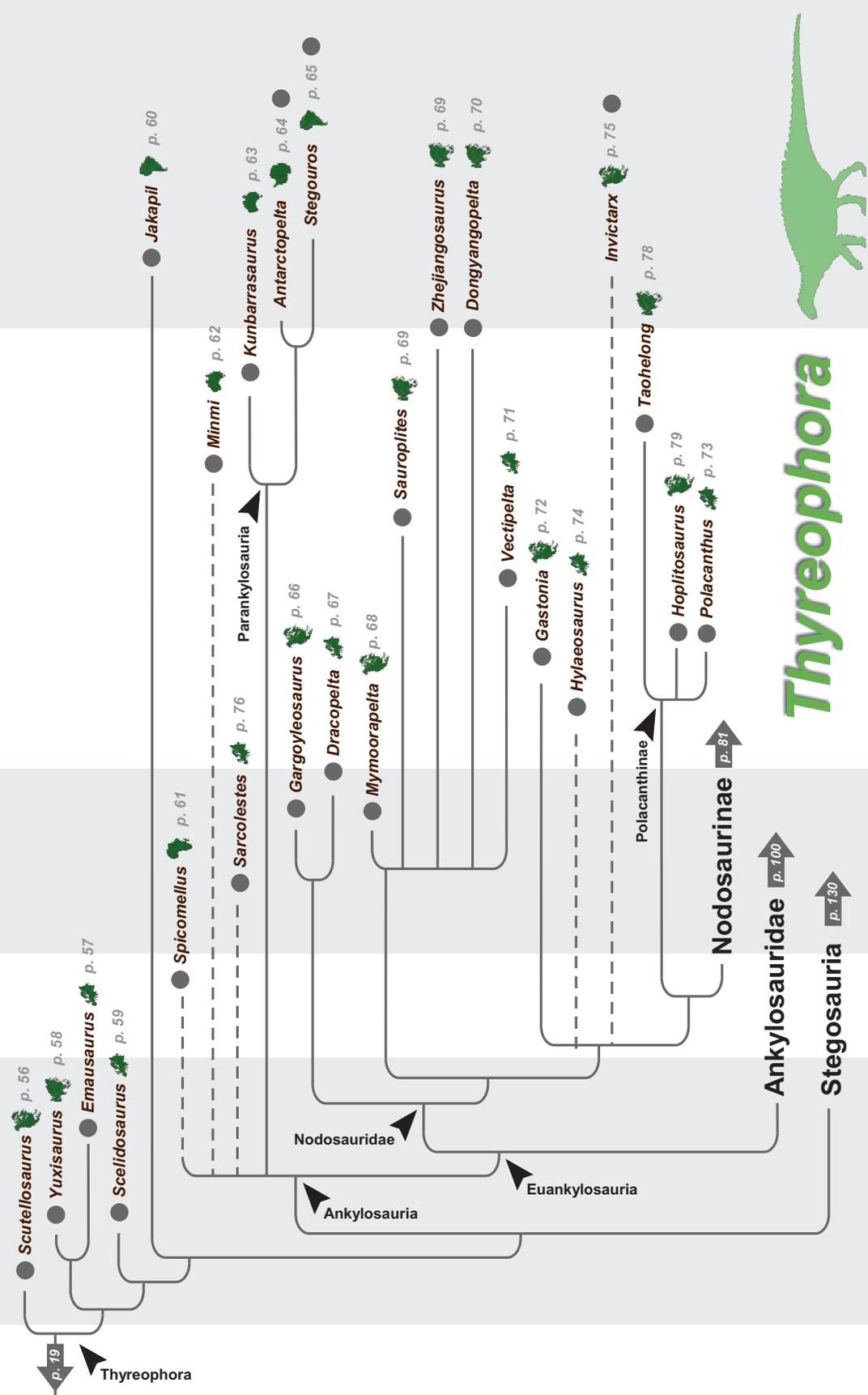
Jurassic

Late

Mid.

Early

Tr.
Late



Thyreophora



The Thyreophorans are the armored dinosaurs. The group quickly diversified into two varieties: the stegosaurs and the ankylosaurs. Near the base of the ankylosaur family tree, many species remained fairly small and featured bodies that were adorned with small armored plates, known as “osteoderms,” which were anchored in the animal’s skin and muscle.

Scutellostaurus is near-universally accepted as being among the very basalmost **thyreophorans** (Dieudonné et al., 2020). Most analyses place *Emausaurus* in the next most crownward position (Soto-Acuña et al., 2021), and the describers of *Yuxisaurus* considered it likely to be the sister taxon of the former (Yao et al., 2022). These are often followed by *Scelidosaurus* (Riguetti et al., 2022).

Jakapil is, understandably, a phylogenetically perplexing animal. Its describers considered it to be a representative of a heretofore unknown, basal thyreophoran lineage (Riguetti et al., 2022). The unique *Spicomellus* is equally as confounding (Maidment et al., 2021). The fragmentary *Sarcolestes* is, due to its age, likely a basal ankylosaur of some sort (Maidment et al., 2021).

It is at this point on the family tree that **Thyreophora** is bifurcated into its two halves, Stegosauria and **Ankylosauria**. Work done by Soto-Acuña et al. (2021) suggests the existence of a very basal clade of Southern Hemisphere ankylosaurs, **Parankylosauria**, which would encompass *Kunbarrasaurus*, *Antarctopelta*, and *Stegouros*.

Ankylosauria has historically been divided into two families, Ankylosauridae and **Nodosauridae**. It is worth noting, though, that some works have found Nodosauridae to be a paraphyletic group—a group that does share a common evolutionary ancestor, but does not include all of the subsequent descendant groups. This would essentially eliminate “Nodosauridae” in favor of several smaller families (Raven et al., 2023; Pond et al., 2023).

Most works that refer to *Minmi* are actually referring to the set of remains now known as *Kunbarrasaurus*. As of this

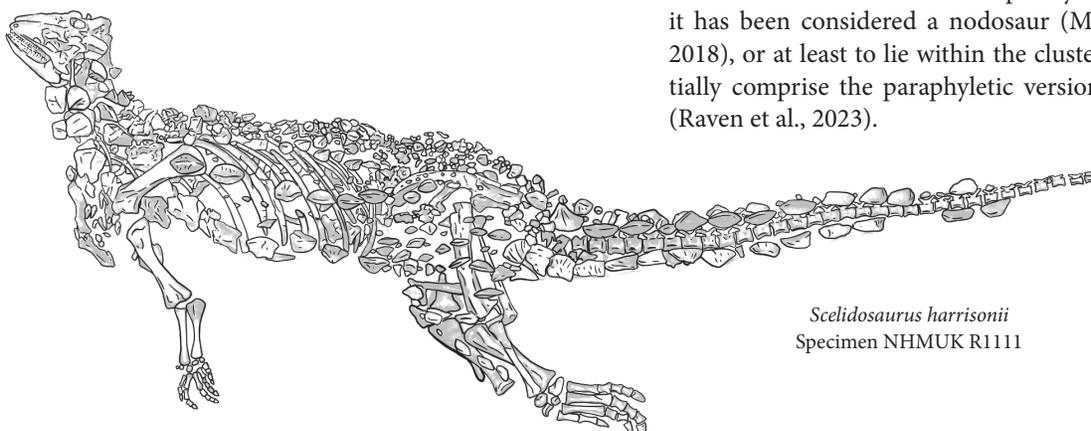
recategorization, the *Minmi* holotype remains have not been a part of any detailed taxonomic study, but it seems plausible that *Minmi* and *Kunbarrasaurus* were not-too-distant cousins.

There is little consensus regarding the phylogenetic position of *Gargoyleosaurus*. It has been found as a basal ankylosaur (Riguetti et al., 2022; Raven et al., 2023), the basalmost nodosaur (Arbour and Currie, 2015), or a slightly more derived nodosaur (Rivera-Sylva et al., 2018). One study has suggested that *Dracopelta* is the sister taxon of *Gargoyleosaurus* (Russo and Mateus, 2023).

Mymoorapelta is sometimes recovered as one of the basalmost nodosaurs (Soto-Acuña et al., 2021; Rivera-Sylva et al., 2018), although it has also been found in a more stemward position as a basal ankylosaur (Arbour and Currie, 2015). Its closest relatives might include *Dongyangopelta* and *Sauropeltis* (Rivera-Sylva et al., 2018; Arbour and Currie, 2015). *Dongyangopelta* has been suggested to be the sister taxon of *Zhejiangosaurus*, and the describers of *Vectipelta* considered it to be closely related to these two genera (Pond et al., 2023).

Whether or not the subfamily **Polacanthinae** falls within Nodosauridae, and which members actually belong to the group, is a matter of debate. Some sources include *Gastonia* (Pond et al., 2023), while others place it more basally (Madzia et al., 2021). Aside from *Polacanthus*, *Hoplitosaurus* has also been placed within the clade (Rivera-Sylva et al., 2018). The ever-enigmatic *Hylaeosaurus* has also been proposed as a member (Pond et al., 2023), although this is only the latest idea in a long series of hypotheses (Thompson et al., 2012). Some analyses have also included *Taohelong* as a member (Yang et al., 2013; Arbour and Currie, 2015), while another places it slightly crownward among Nodosaurinae (Rivera-Sylva et al., 2018).

The affinities of *Invictarx* are poorly understood, although it has been considered a nodosaur (McDonald and Wolfe, 2018), or at least to lie within the cluster of taxa that potentially comprise the paraphyletic version of “Nodosauridae” (Raven et al., 2023).



Scelidosaurus harrisonii
Specimen NHMUK R1111

SCUTELLOSAURUS

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50 cm 100 cm 150 cm

50 cm



S. lawleri

(Colbert, 1981)

Length: 1.7 m (5.4 ft)

Height: 0.45 m (1.5 ft)

Hip height: 0.35 m (1.1 ft)

Body mass: 10 kg (22 lb)

Reconstruction: ■■■■



Scutellosaurus lawleri (meaning “Lawler’s small-shield lizard”) is the basalmost thyreophoran currently known, potentially being the common ancestor to both *Stegosaurus* and *Ankylosaurus*.

Scutellosaurus was still bipedal, like other basal ornithischians. Some early studies concluded that *Scutellosaurus* might have spent at least some of its time on all fours, but more recent work has shown that it would actually have been incapable of quadrupedality (Breedon et al., 2021).

Scutellosaurus is known from numerous sets of remains, and is in fact the most common type of dinosaur unearthed from the Kayenta geological formation of Arizona, USA. This is notable, since other ecosystems that existed at the time seem to have possessed a different abundance of dinosaur genera. For example, in the Elliot Formation of

South Africa, ornithischians are quite rare, while sauropodomorphs dominate. This shows that even in Pangean ecosystems on the same continent, not every biome contained the same types of dinosaurian diversity.

The abundance of fossil material has also allowed for the comparison of smaller (presumably younger) and larger (presumably older) individuals. Histological study of inner bone tissues reveals that *Scutellosaurus* grew slowly, in contrast to other kinds of basal ornithischians; this shows that the slow metabolic rate of the derived thyreophorans is a trait that appeared very early in the group’s evolution (Breedon et al., 2021).

The generic name *Scutellosaurus* derives from the Latin “scutellum,” which refers to a “small shield.” The specific name *lawleri* honors fossil discoverer David Lawler, who found the first specimens in 1971.

CLASSIFICATION

Dinosauria
Ornithischia
Thyreophora

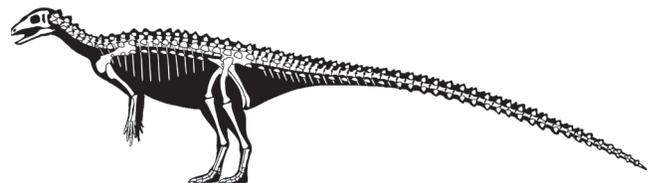
LOCATION

Arizona, USA

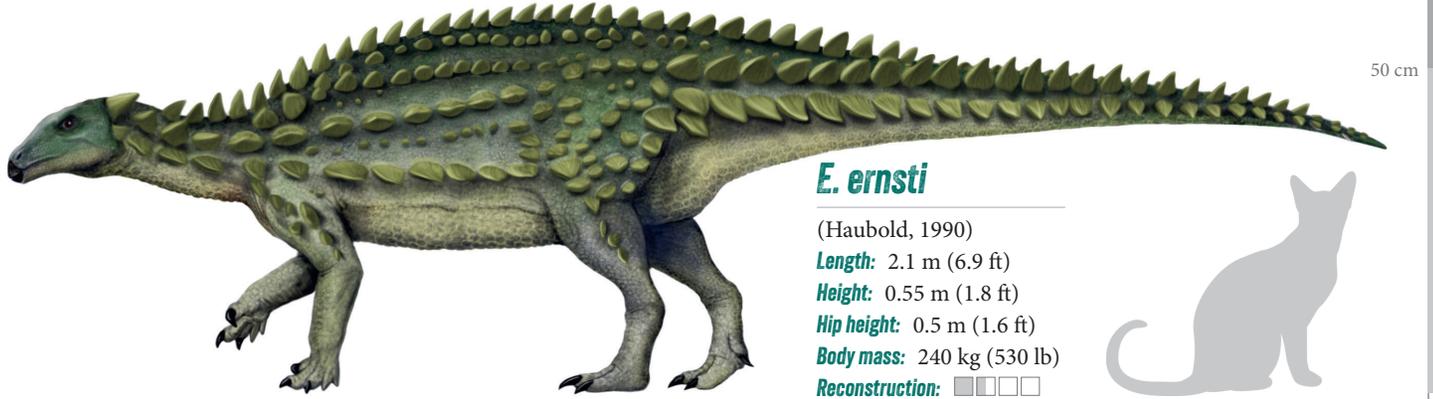


KNOWN REMAINS

Complete



50 cm 100 cm 150 cm 200 cm



E. ernsti

(Haubold, 1990)

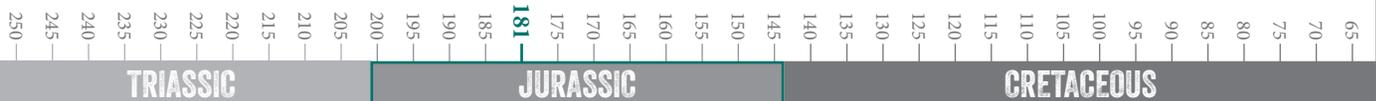
Length: 2.1 m (6.9 ft)

Height: 0.55 m (1.8 ft)

Hip height: 0.5 m (1.6 ft)

Body mass: 240 kg (530 lb)

Reconstruction: ■■■■



Emausaurus ernsti (meaning “Ernst’s EMAU lizard”) is only known from one highly incomplete set of remains; these fossils were unearthed by a groundworker and were acquired by scientists in 1963. They belonged to a juvenile individual, or at the very least a subadult (Schade and Ansoerge, 2022).

The most substantial elements among the remains include the right half of the skull and jaw, which share a similar morphology to that of the more famous *Scelidosaurus*. Only a few osteoderms (armor elements) are known, so it is unclear whether or not the armor coat of *Emausaurus* is also comparable to that of *Scelidosaurus*. The few foot bones known from *Emausaurus* are similarly proportioned to those of *Scelidosaurus*; this has been interpreted as evidence that *Emausaurus* was (at least mostly) quadrupedal (Norman, 2020a), although others have cautioned that there is not enough evidence, one way or the other, to make any

conclusions about the animal’s mode of locomotion (Breedon III et al., 2021).

The general consensus among phylogenetic studies is that that *Emausaurus* is a basal member of **Thyreophora**, being more derived than *Scutellosaurus*, but less so than *Scelidosaurus* (Serenio, 1997; Yao et al., 2022). Some have argued that this commonly found result is artificially skewed because the only known *Emausaurus* specimen is a juvenile, and opinions have been put forth for *Emausaurus* having a closer relationship to either Stegosauria (Stumpf and Meng, 2013) or Ankylosauria (Norman, 2020a).

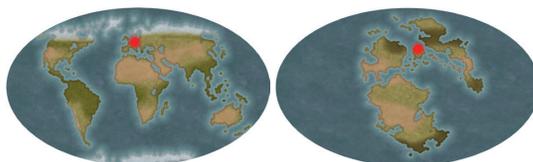
The generic name *Emausaurus* derives from the acronym EMAU, referring to the Ernst Moritz Arndt University of Greifswald, Germany. The specific name *ernsti* honors geologist Werner Ernst, who originally acquired the specimen.

CLASSIFICATION

Dinosauria
Ornithischia
Thyreophora

LOCATION

Germany



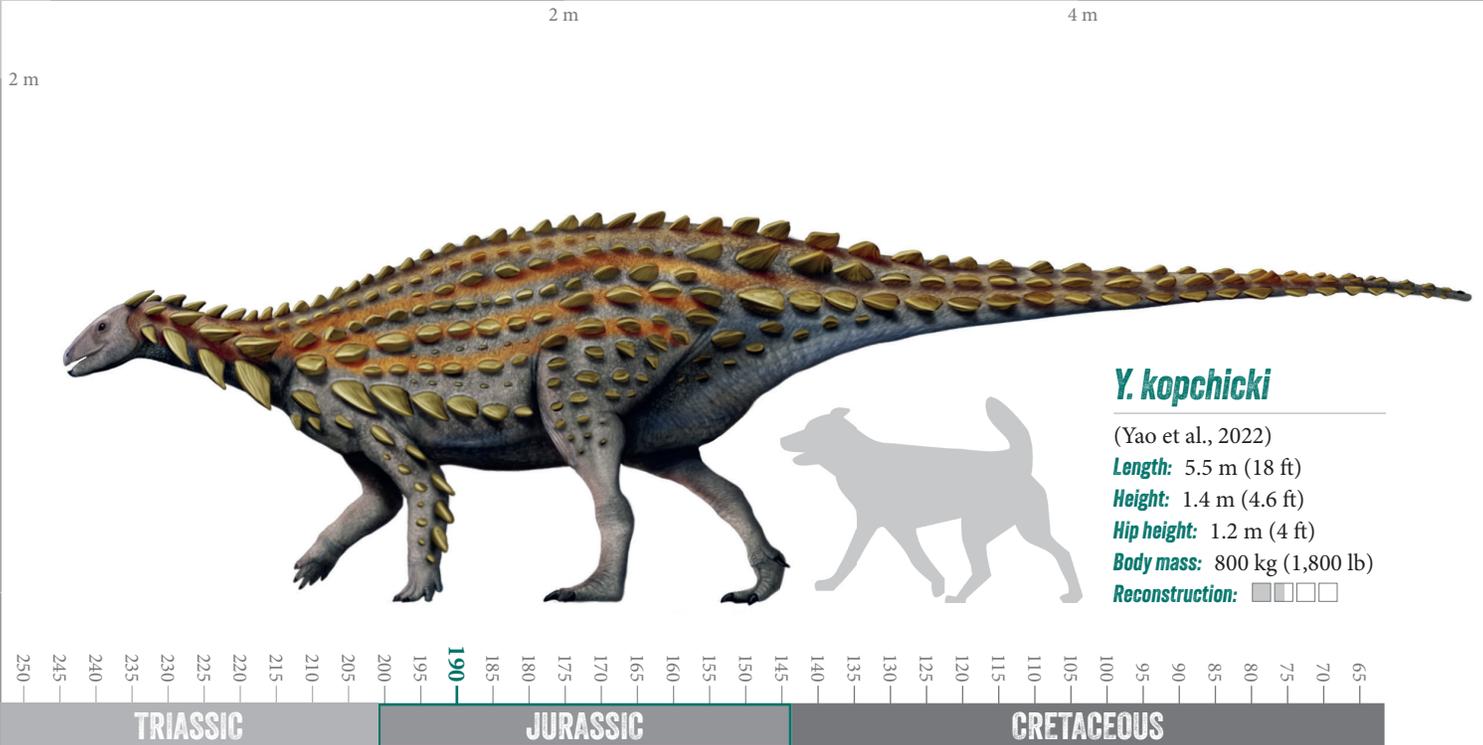
KNOWN REMAINS

Skull and fragments



YUXISAURUS

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Y. kopchicki

(Yao et al., 2022)

Length: 5.5 m (18 ft)

Height: 1.4 m (4.6 ft)

Hip height: 1.2 m (4 ft)

Body mass: 800 kg (1,800 lb)

Reconstruction:

Yuxisaurus kopchicki (meaning “Kopchick’s lizard from Yuxi”) is the oldest armored dinosaur to be discovered from Asia. Prior to the description of the genus, only scattered, largely unidentifiable fragments of thyreophorans had been found in Asian deposits from this era.

The holotype specimen of *Yuxisaurus* indicates that the animal was “sturdier and stockier” than its closest known relatives, such as *Scelidosaurus*, showing that early thyreophorans had already achieved considerable size by this early stage in their evolution. Even so, the describers left open the possibility that *Yuxisaurus* might have spent at least some of its time in a bipedal posture.

In addition to elements of the skull, vertebral column, shoulder, and limbs, more than 120 osteoderms have been identified among the *Yuxisaurus* material. One “pup tent-shaped” osteoderm, thought to have been situated near

the base of the tail, is unique in shape; this uniqueness might indicate some sort of pathological deformity.

The describers conducted a taxonomic analysis utilizing two different datasets, which each found *Yuxisaurus* to be most closely related to basal **thyreophoran** *Emausaurus*, a European genus. This indicates a “pan-Eurasian” geographic range for this particular early diverging clade. Together with the North American *Scutellosaurus*, it seems clear that Thyreophora spread and diversified quite rapidly after its initial emergence.

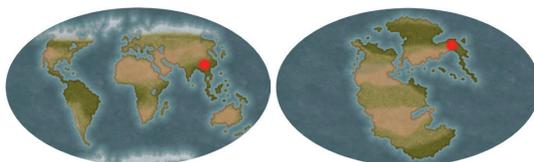
The generic name *Yuxisaurus* refers to the city of Yuxi in Yunnan Province, China. The specific name *kopchicki* honors biologist John J. Kopchick for his contributions to the Science Building of the Indiana University of Pennsylvania (IUP).

CLASSIFICATION

Dinosauria
Ornithischia
Thyreophora

LOCATION

China



KNOWN REMAINS

Cranial and skeletal fragments



1 m 2 m 3 m 4 m

S. harrisonii

(Owen, 1859)

Length: 4.4 m (14.4 ft)

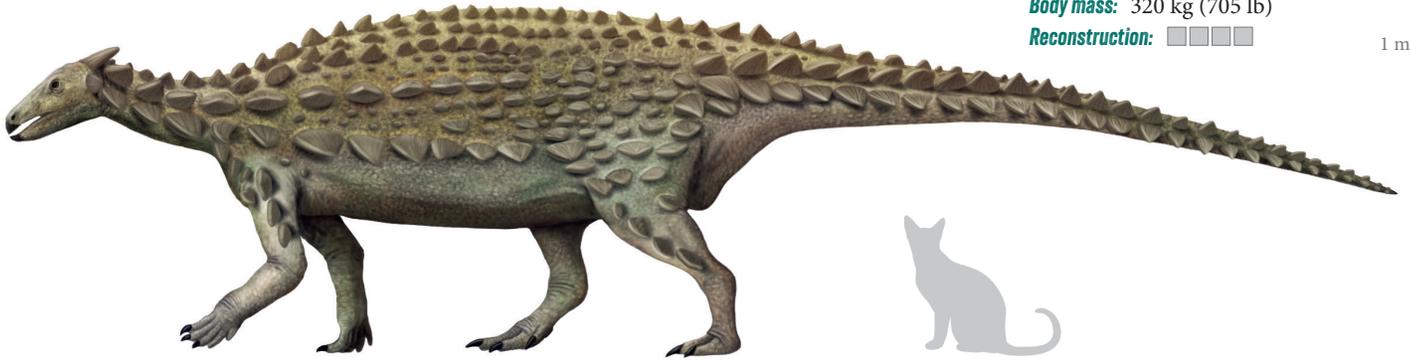
Height: 1 m (3.3 ft)

Hip height: 0.8 m (2.6 ft)

Body mass: 320 kg (705 lb)

Reconstruction: ■■■■

1 m



Scelidosaurus harrisonii (meaning “Harrison’s limb lizard”) was arguably the first “complete” dinosaur to ever be discovered. After the skull (lacking the tip of the snout) was found, the rest of the animal’s body (lacking the neck) was unearthed; the remains were preserved in articulation and included plentiful osteoderm elements. After this discovery, numerous other remains, ranging from individual bones to nearly complete individuals, were also found and identified as *Scelidosaurus*.

Despite the early date of the animal’s discovery, and despite its key place on the family tree of armored dinosaurs, *Scelidosaurus* remained little-studied and buried in obscurity for more than a century. In 2020, paleontologist David Norman rectified this situation by publishing a comprehensive series of four papers elucidating the creature’s cranial, postcranial, and dermal skeleton, as well as

its general biology and evolutionary relationships (Norman 2019, 2020a, 2020b, 2020c).

As a basal **thyreophoran**, *Scelidosaurus* lacks many of the specialized traits that one would expect to see in more derived species. In contrast to the narrow torso of the stegosaurs, *Scelidosaurus* has a wide and robust torso. But, unlike the condition found in ankylosaurs, the animal’s ribs are not fused to its vertebrae.

Most taxonomic studies find *Scelidosaurus* to be basal to both Stegosauria and Ankylosauria (Dieudonné et al., 2020). However, some do place *Scelidosaurus* on the branch of the family tree leading to Ankylosauria, after the point where Stegosauria had already separated (Norman, 2020a).

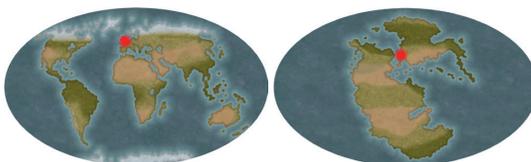
The generic name *Scelidosaurus* derives from the Greek “skelid” (meaning “limb”). The specific name *harrisonii* honors fossil discoverer James Harrison.

CLASSIFICATION

Dinosauria
Ornithischia
Thyreophora

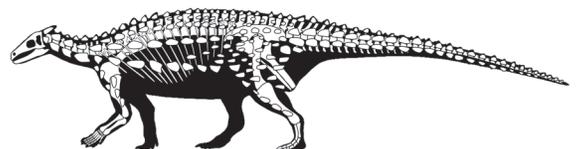
LOCATION

United Kingdom



KNOWN REMAINS

Complete





J. kaniukura

(Riguetti et al., 2022)
Length: 1.7 m (5.4 ft)
Height: 0.5 m (1.6 ft)
Hip height: 0.4 m (1.3 ft)
Body mass: 7 kg (15 lb)
Reconstruction:

Jakapil kaniukura (meaning “stone-crested shield-bearer”) is possibly the second-ever-discovered bipedal, armored dinosaur. The first, *Scutellosaurus*, was among the earliest of all thyreophorans and lived at the beginning of the Jurassic. *Jakapil*, on the other hand, lived nearly 100 million years later, which presents an evolutionary mystery regarding how it evolved, and why nothing else like it has ever been discovered.

It should be noted, however, that the bipedalism of *Jakapil* is not definitive. The highly fragmentary nature of the only known skeleton leaves a lot of questions unanswered. The proportions of the mostly intact scapula and the partial humerus are highly suggestive of an animal that is not an obligate quadruped; however, some quadruped-linked traits, such as stout metacarpals, are present in *Jakapil*. That the skeleton is from a subadult individual also obscures our picture of the animal’s true nature.

Jakapil is, understandably, a phylogenetically perplexing animal. Its describers considered it to be a representative of a basal thyreophoran lineage. One subsequent study noted differences in the animal’s teeth and jaws in comparison with other thyreophorans and instead suggested a possible marginocephalian classification (Raven et al., 2023). The describers do note that certain features of the jaw bear a resemblance to ceratopsian features. Additionally, the preentary bone—a feature that is a hallmark of ornithischians in general, but which has been absent in other basal thyreophorans—is present in *Jakapil*.

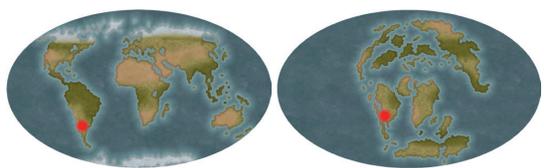
The generic name *Jakapil* derives from the indigenous Puelchean term “Ja-Kapil” (meaning “shield bearer”). The specific name *kaniukura* means “crest stone” in the indigenous Mapudungun language.

CLASSIFICATION

Dinosauria
 Ornithischia
 Thyreophora

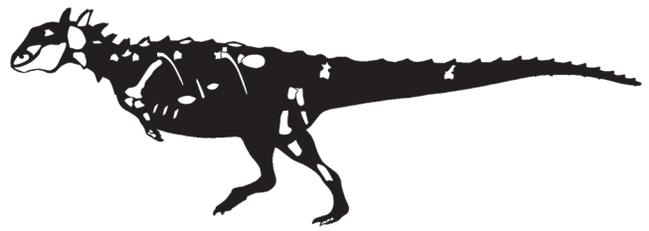
LOCATION

Argentina



KNOWN REMAINS

Cranial and skeletal fragments



50 cm 100 cm 150 cm 200 cm 250 cm

S. afer

(Maidment et al., 2021)

Length: 3 m (9.8 ft)

Height: 0.8 m (2.6 ft)

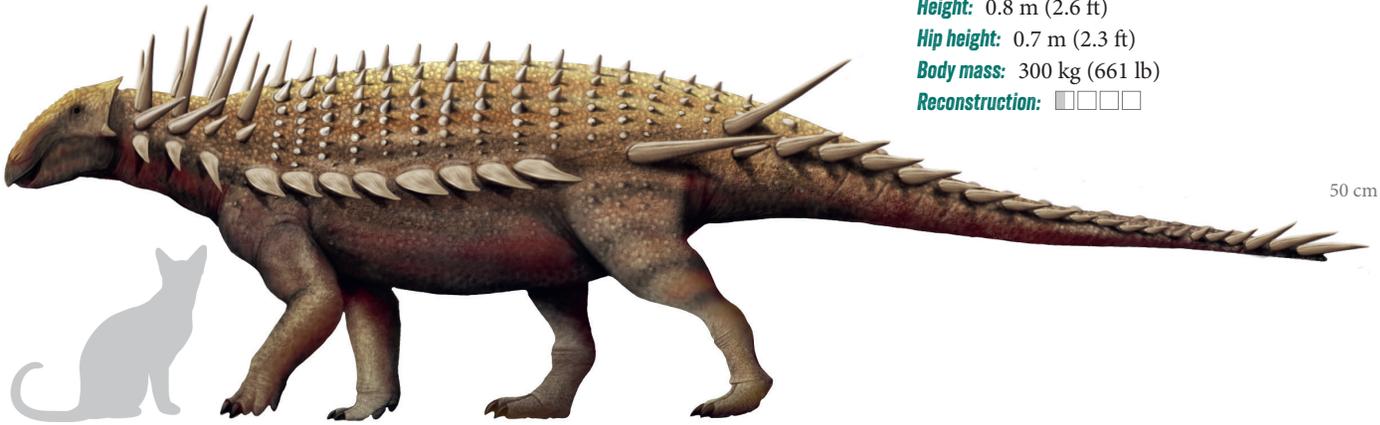
Hip height: 0.7 m (2.3 ft)

Body mass: 300 kg (661 lb)

Reconstruction:

100 cm

50 cm



The armor of *Spicomellus afer* (meaning “African collar of spikes”) is structured in a way that is unique in the entire animal kingdom. In all other known species of stegosaurs and ankylosaurs, the various armored elements (plates, spikes, etc.) are always individual, separate bones, which are anchored to the animal’s body by muscle, skin, and other soft tissue. The spines of *Spicomellus*, though, are projections that grow *directly* out of another bone, forming a single object.

The first *Spicomellus* bone discovered (a single rib) was so unusual that researchers initially suspected that it was an artificially constructed forgery; however, CT scans eventually revealed it to be genuine. Histological sampling of its interior structure provided further information, narrowing down the animal’s identity as being **ankylosaurian**.

The rib fossil was obtained by researchers via a commercial fossil dealer, so the exact circumstances of its discovery were not well-documented. Once the specimen’s

unique nature was realized, though, special effort was taken to track down the exact sediments from which the bone was unearthed. This effort was successful, and a much more complete specimen revealed that *Spicomellus* had some very large spikes, up to 87 cm (34 in) in length. Further, the shape of its tail vertebrae suggests that it used its tail as a weapon (Maidment et al., 2025).

These facts are highly remarkable, as *Spicomellus* is the earliest known definitive ankylosaur. This raises two important mysteries: one about the existence of even earlier ankylosaurs (there must be gaps in the fossil record showing how these traits evolved), and one about those that came later (why was the anatomy of armored spikes altered, and why would it take millions of years for other tail-weapons to appear?).

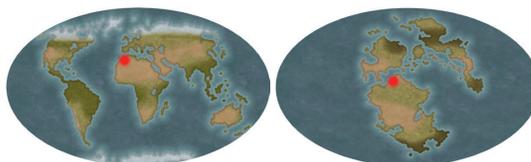
The generic name *Spicomellus* combines the Latin “spica” (meaning “spike”) and “mellum” (meaning “collar”). The specific name *afer* is Latin, referring to an inhabitant of Africa, as *Spicomellus* is the only known African ankylosaur.

CLASSIFICATION

Dinosauria
Ornithischia
Thyreophora
Ankylosauria

LOCATION

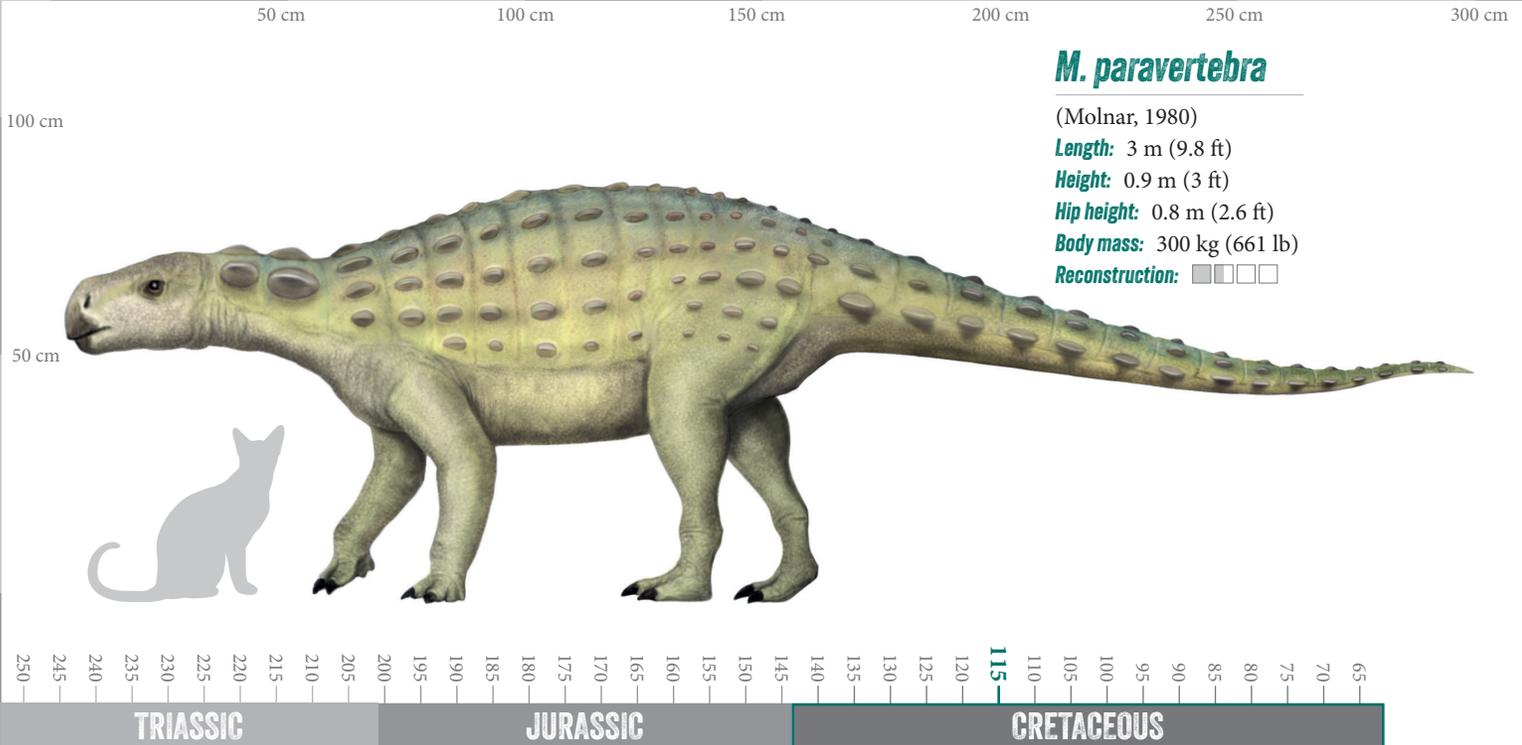
Morocco



KNOWN REMAINS

Partial skeleton





M. paravertebra

(Molnar, 1980)

Length: 3 m (9.8 ft)

Height: 0.9 m (3 ft)

Hip height: 0.8 m (2.6 ft)

Body mass: 300 kg (661 lb)

Reconstruction: ■■■■

Minmi paravertebra (meaning “paravertebra from Minmi”) is one of the most famous Australian dinosaurs, although its validity as a genus has been somewhat cast into doubt.

One of the distinguishing features of *Minmi* is the presence of horizontal plates composed of ossified tendons, which are present atop at least some of the dorsal vertebrae. Ossified spinal tendons are not wholly unusual among ornithischians in general, but these structures on *Minmi* were considered to be relatively distinct, with only one other ankylosaur, *Struthiosaurus*, bearing anything similar (Ősi and Makádi, 2009).

However, some researchers eventually came to the conclusion that these bony structures had been misinterpreted, and that, as a consequence, the *Minmi* fossils lacked any distinguishing characteristics. It was thus argued that the genus was *nomen dubium* (Arbour, 2014; Arbour and Currie, 2015).

This view has not been universally accepted, however. Subsequent researchers have argued that *Minmi* is indeed sufficiently distinctive to be considered valid (Leahey et al., 2015; Rozadilla et al., 2021).

The *Minmi* holotype specimen consists primarily of eleven dorsal vertebrae (which were unearthed in three articulated segments and may or may not represent a continuous sequence) and a partial foot. Other referred specimens include pelvic and leg elements. The formerly “most complete” specimen has since been erected to its own genus, *Kunbarrasaurus*.

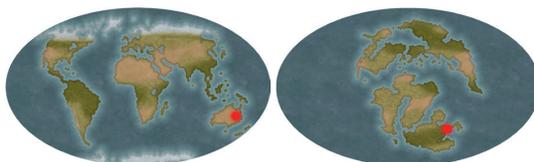
The generic name *Minmi* refers to Minmi Crossing in Queensland, Australia. The specific name *paravertebra* refers to the animal’s distinguishing “paravertebral” spinal elements.

CLASSIFICATION

Dinosauria
Ornithischia
Thyreophora
Ankylosauria

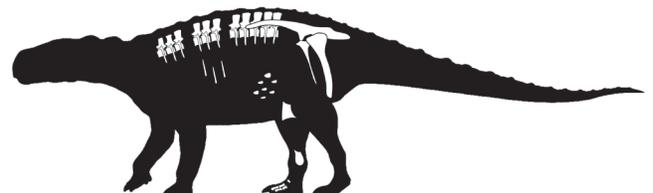
LOCATION

Australia



KNOWN REMAINS

Partial skeleton



50 cm 100 cm 150 cm 200 cm 250 cm

K. ieversi

(Leahey et al., 2015)

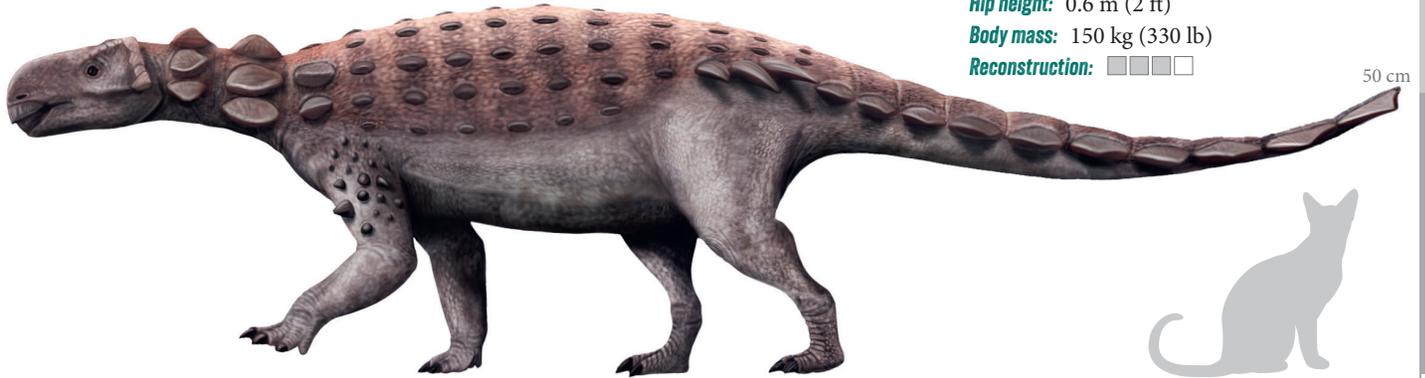
Length: 2.4 m (7.9 ft)

Height: 0.7 m (2.3 ft)

Hip height: 0.6 m (2 ft)

Body mass: 150 kg (330 lb)

Reconstruction:



Kunbarrasaurus ieversi (meaning “Ievers’s shield lizard”) is the second genus of ankylosaur to be named from Australia.

The mostly complete holotype specimen of *Kunbarrasaurus* was originally considered to belong to the ankylosaur genus *Minmi*. Discovered in 1989, the fossil was first described in 1996 by Ralph Molnar as an indeterminate species of that genus. This description was brief, and although a more in-depth review by Molnar was anticipated, it never materialized.

Finally, by 2015, a combination of further fossil preparation and detailed CT scans allowed Leahey et al. (2015) to confidently conclude that the specimen was distinct from *Minmi*. It was also hailed as “the most complete dinosaurian fossil from eastern Gondwana”; it included one of the few ankylosaurian skulls ever discovered that preserved the sutures between cranial bones. This lack

of complete fusion, combined with the smaller size of the specimen, suggests that the animal was a subadult at the time of its death.

One unique feature of *Kunbarrasaurus* regards the structure of its inner ear, which differs from any other known ankylosaur by being larger in size and lacking ossification.

Phylogenetically, studies agree that *Kunbarrasaurus* does not belong to either of the main ankylosaur families, Ankylosauridae or Nodosauridae (Arbour and Currie, 2015). Rather it could be a member of a proposed group of Southern Hemisphere ankylosaurs, **Parankylosauria** (Soto-Acuña et al., 2021).

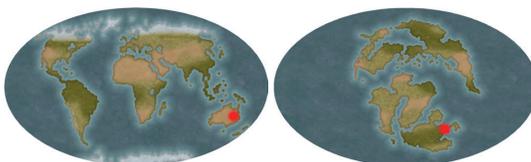
The generic name *Kunbarrasaurus* derives from the Mayi (i.e., Wunumara) word “kunbarra” (meaning “shield”). The specific name honors fossil discoverer Ian Ievers.

CLASSIFICATION

- Dinosauria
- Ornithischia
- Thyreophora
- Ankylosauria
- Parankylosauria

LOCATION

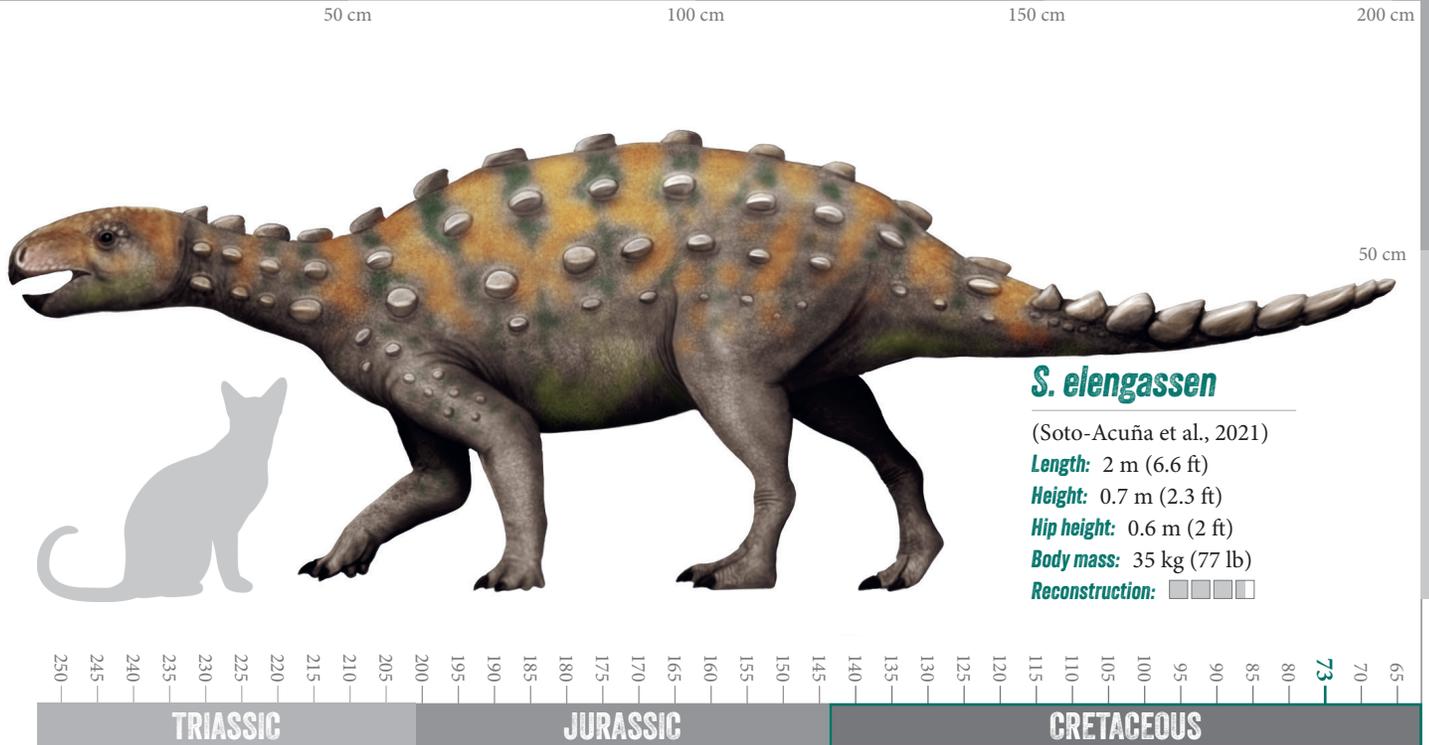
Australia



KNOWN REMAINS

Nearly complete





Stegouros elengassen (meaning “roof-tailed beast”) is quite notable, due to the unique arrangement of osteoderms along the end of its tail. Rather than having a club, like *Ankylosaurus* did, *Stegouros* instead possessed a fan-like projection of blade-like osteoderms. Of the seven pairs that comprise this arrangement, the rearmost five are fused together. This hatchet-like structure has been dubbed the “maquahuitl,” named after the similar-looking traditional Aztec melee weapon. It is presumed that *Stegouros* used its tail as a weapon.

The only known specimen of *Stegouros* was unearthed in 2018. The rear half of the animal was essentially fully articulated and intact, which made the unique configuration of the animal’s tail easy to determine. The bones recovered from the front half of the body were more dispersed but still recovered from a small area. Despite the specimen’s small

size, it is thought to have been fully grown at the time of its death.

Stegouros shares some traits in common with running quadrupeds, such as having a relatively a short femur and narrow feet. Contrastingly, its femur is straight, rather than curved, which is not typical for cursorial animals.

The describers of *Stegouros* erected the group **Parankylosauria**, into which they placed a few other south-Gondwanan ankylosaurs. Given the unique anatomy of *Stegouros*, it is possible these cousins (such as *Antarctopelta*) also possessed similar tail structures.

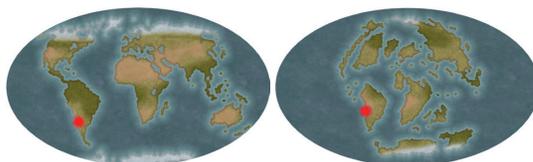
The generic name *Stegouros* combines the Greek words “stegos” (meaning “roof”) and “oura” (meaning “tail”). The specific name *elengassen* refers to a mythological armored creature in the folklore of the Indigenous Aónikénk (i.e., Tehuelche) people.

CLASSIFICATION

Dinosauria
 Ornithischia
 Thyreophora
 Ankylosauria
 Parankylosauria

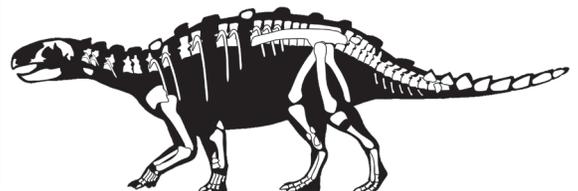
LOCATION

Chile



KNOWN REMAINS

Mostly complete



GARGOYLEOSAURUS

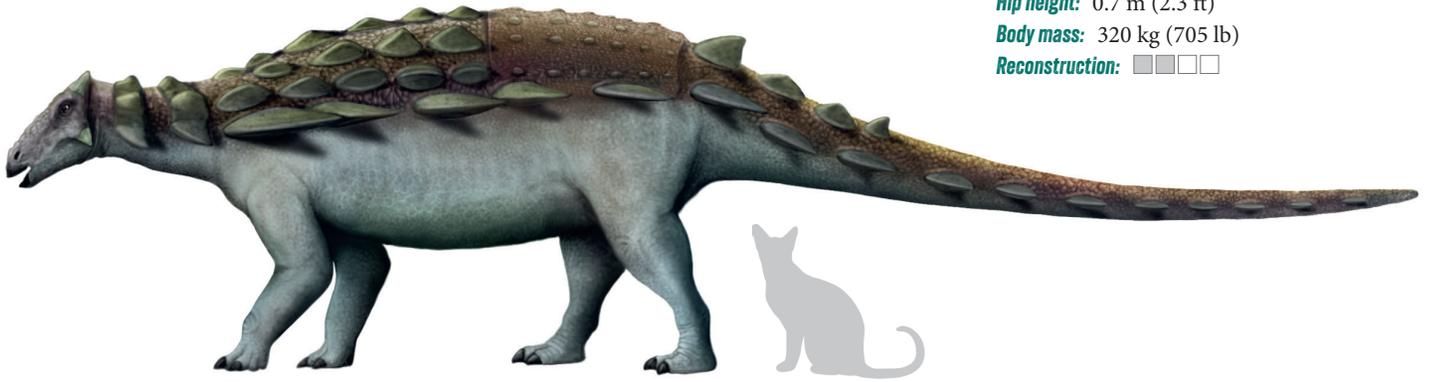
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1 m 2 m 3 m

G. parkpinorum

(Carpenter et al., 1998)
Length: 3.3 m (10.8 ft)
Height: 0.8 m (2.6 ft)
Hip height: 0.7 m (2.3 ft)
Body mass: 320 kg (705 lb)
Reconstruction:

1 m



Gargyleosaurus parkpinorum (meaning “Parker’s and Pinegar’s gargoyle lizard”) is one of the earliest known species of ankylosaur. It still retains the “primitive” trait of possessing teeth in the foremost portions of its jaws—most later ankylosaurs would go on to lose this characteristic.

The holotype specimen, discovered in 1995, is far from complete. Although each of the skeletal elements were associated within a relatively small area, many of the pieces were notably weathered. Additionally, the dig location has yielded the remains of about a dozen different taxa, so each fragment found in the vicinity may not necessarily belong to *Gargyleosaurus* (Kilbourne and Carpenter, 2005).

The skull and neck of the animal were the best-preserved portions of the body, and a large quantity of osteoderms were also recovered. Most of the armor plates were “keeled” in shape, having a ridge that ran along their midline.

Notably, the first “ring” of neck armor features one single osteoderm directly along the animal’s midline—this is quite unusual, as ankylosaurs typically have mirrored pairs of osteoderms.

In 2013, an additional specimen (consisting primarily of a well-preserved set of pelvic and other associated bones) was identified, and was used to study the transitional steps that ankylosaur evolution took over time (Carpenter et al., 2013).

The generic name *Gargyleosaurus* is based on the perceived physical similarity between the dinosaur and the fictional gargoyle creature. The specific name *parkpinorum* honors the fossil’s discoverers, Jeffrie Parker and Tyler Pinegar. The name was originally given as “*parkpini*,” but was changed in 2001 to conform with the grammatical Latin guidelines of the ICZN.

CLASSIFICATION

Dinosauria
 Ornithischia
 Thyreophora
 Ankylosauria
 Nodosauridae

LOCATION

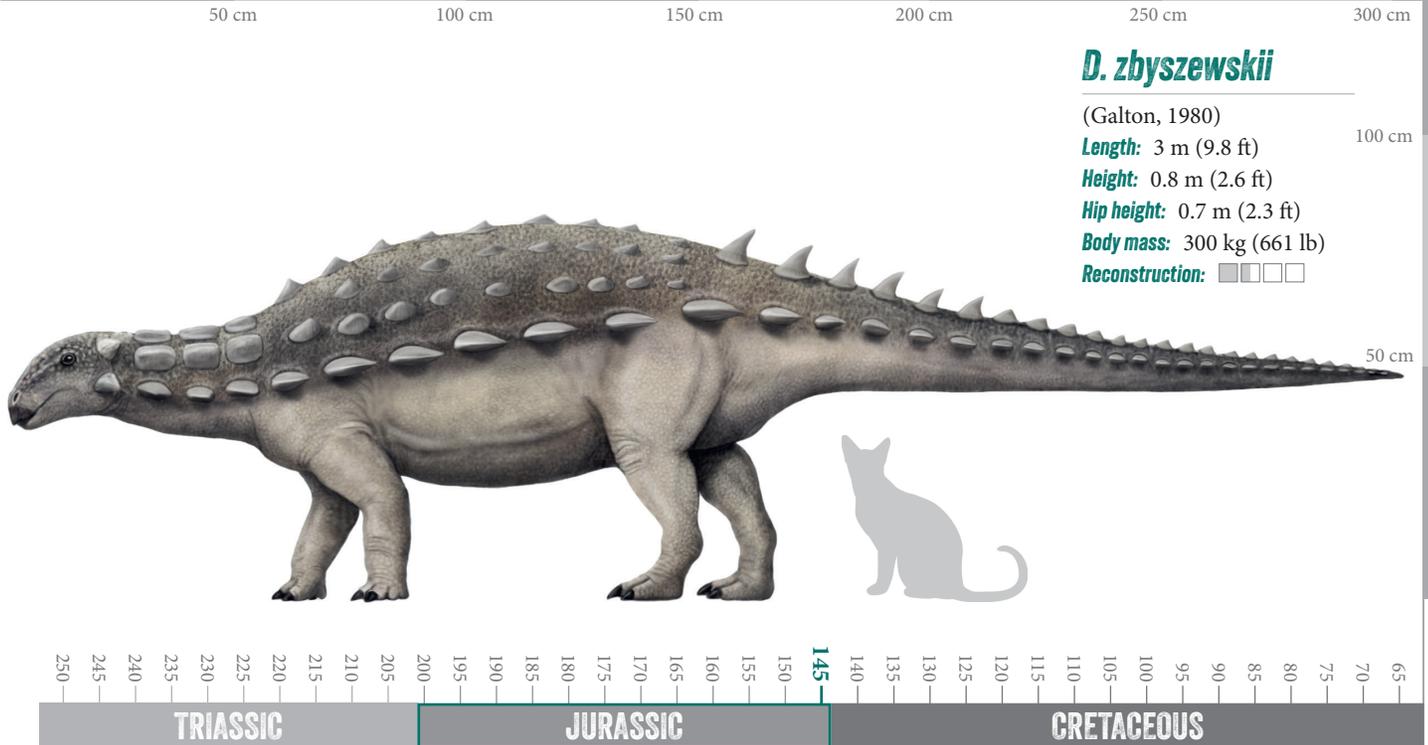
Wyoming, USA



KNOWN REMAINS

Skull and partial skeleton





D. zbyzewskii

(Galton, 1980)

Length: 3 m (9.8 ft)

Height: 0.8 m (2.6 ft)

Hip height: 0.7 m (2.3 ft)

Body mass: 300 kg (661 lb)

Reconstruction: ■■■■

100 cm

50 cm

The original specimen *Dracopelta zbyzewskii* (meaning “Zbysweski’s dragon shield”) was discovered in 1964 during road construction work. At the time of the specimen’s excavation, very little in the way of documentation was produced, and so the exact location of the fossil site was unknown until some sleuthing eventually tracked down the exact roadcut that had revealed the bones. The animal was long thought to have come from rocks that originated from the Kimmeridgian age of the Late Jurassic, but it is now known to have been from the Tithonian age (Russo and Mateus, 2021).

The holotype specimen consists primarily of the animal’s ribcage, vertebrae, and some associated osteoderms. Part of a foot was originally present but had been misplaced by the time the genus was formally described. These bones were later relocated and also described (Pereda-Suberbiola et al., 2005).

Additional elements of the specimen remained unnoticed until much later as they had been misplaced and/or

remained in an unprepared state. The most complete of these include elements of the lower hindleg and foot, although numerous other fragments are also present. A detailed description of these elements is pending (Russo and Mateus, 2021).

A second specimen, which includes an intact skull and a nearly complete vertebral series, is “the most complete dinosaur [found] in Portugal.” These remains have only been preliminarily mentioned, and a detailed description is pending from them also. Utilizing these new remains, *Dracopelta* has been placed as the sister taxon of *Gargoyleosaurus* (Russo and Mateus, 2023).

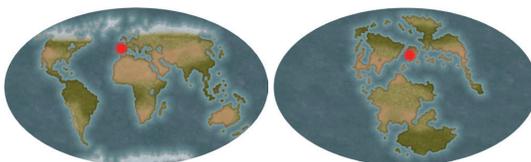
The generic name *Dracopelta* combines the Latin “draco” (meaning “dragon”) and the Greek “pelta” (meaning “shield”). The specific name *zbyzewskii* honors Georges Zbysweski of the Geological Survey of Portugal, who was one of the first scientists to examine the fossils at their site of discovery.

CLASSIFICATION

Dinosauria
Ornithischia
Thyreophora
Ankylosauria
Nodosauridae

LOCATION

Portugal



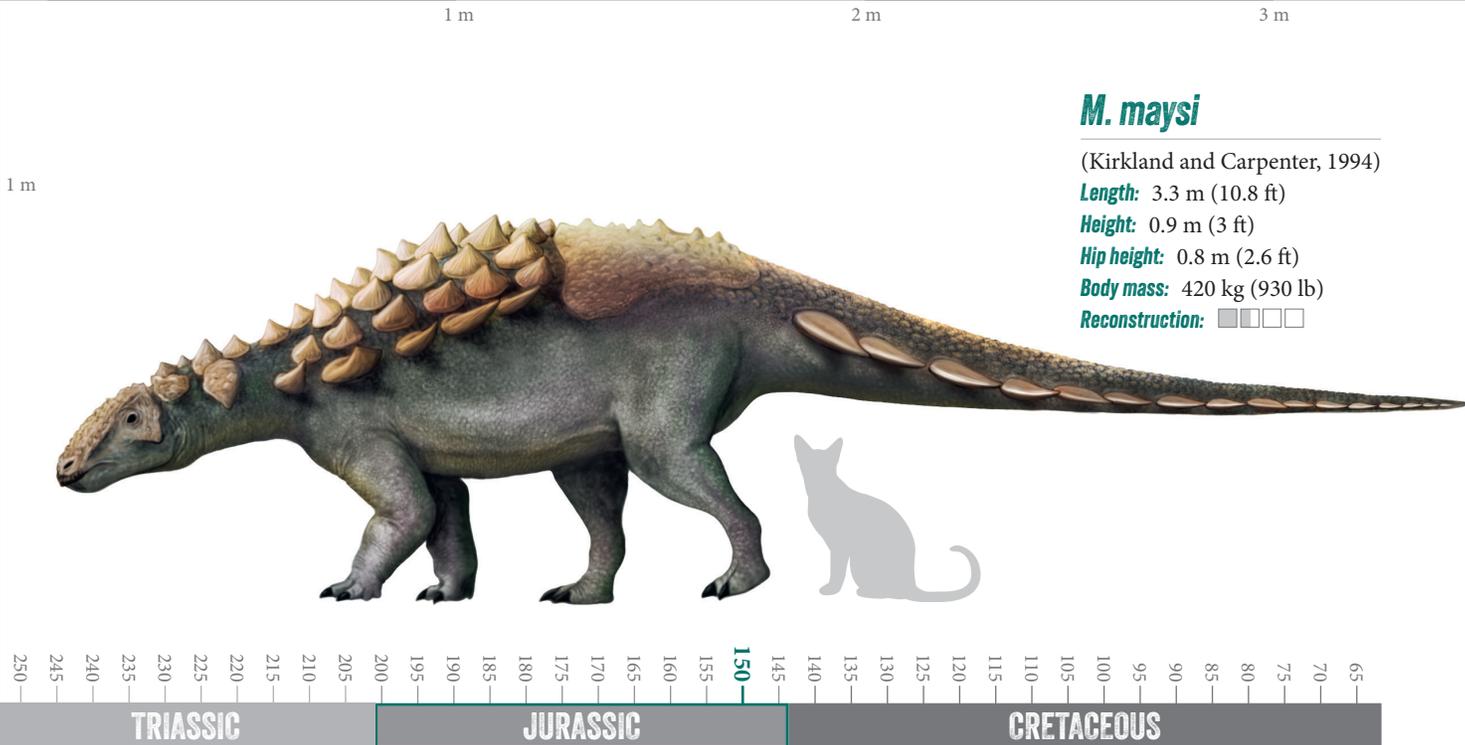
KNOWN REMAINS

Partial skeleton



MYMOORAPELTA

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M. maysi

(Kirkland and Carpenter, 1994)

Length: 3.3 m (10.8 ft)

Height: 0.9 m (3 ft)

Hip height: 0.8 m (2.6 ft)

Body mass: 420 kg (930 lb)

Reconstruction:

Mymoorapelta maysi (meaning “shield of Mygatt, Moore, and Mays”) has the distinction of being the first Jurassic ankylosaur to be named from North America.

Although several substantial *Mymoorapelta* specimens have been briefly mentioned or alluded to in the literature, the only one to have received a detailed description is the holotype (shown below). Most of these skeletal elements were described in the original paper, with a few more fragments found at the site making an appearance in a 1998 follow-up. This article also briefly describes a partially articulated second specimen from a separate site, known to preserve the rear foot and sacral shield, but more detailed information has yet to emerge (Kirkland et al., 1998). Brief abstracts have mentioned much more substantial remains, from both the original site and elsewhere, including a skull, but details have thus far remained unavailable (Kirkland et al., 2010; Tremaine et al., 2015).

The holotype’s hip bone preserves bite marks inflicted by a theropod dinosaur. As *Ceratosaurus* fossils have been unearthed from the same quarry, it might be assumed that this carnivore was responsible, but the spacing of the marks indicates that the predator was larger than *Ceratosaurus*. As such, *Torvosaurus* or *Saurophaganax* could potentially be the culprit that either hunted or scavenged *Mymoorapelta* (Drumheller et al., 2020).

Studies agree that *Mymoorapelta* is among the basalmost members of **Nodosauridae**, being in a phylogenetic position that is definitely stemward of the more specialized subgroup Nodosaurinae (Soto-Acuña et al., 2021).

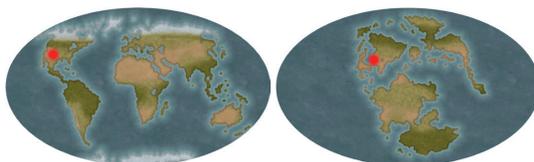
The generic name *Mymoorapelta* honors the founders of the Mygatt-Moore Quarry, where the holotype specimen was found. The specific name *maysi* honors Chris Mays, who helped fund the initial research of the specimen.

CLASSIFICATION

Dinosauria
Ornithischia
Thyreophora
Ankylosauria
Nodosauridae

LOCATION

Colorado, USA

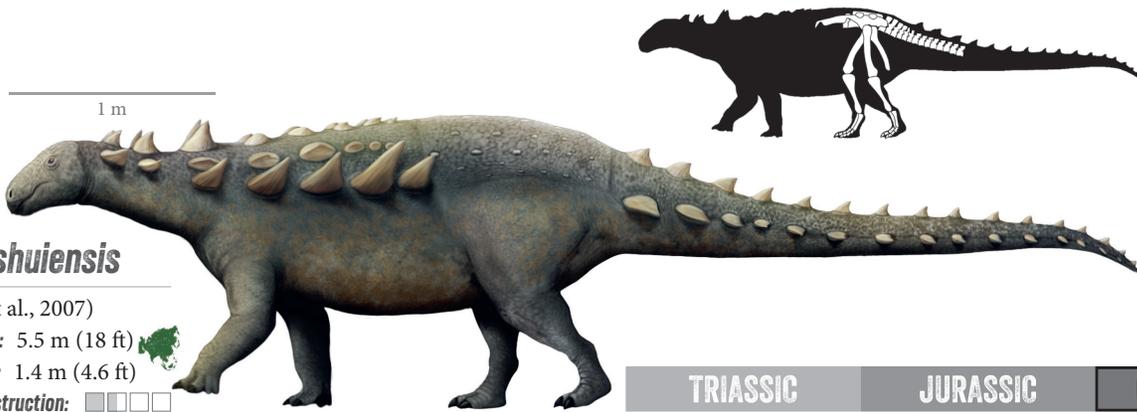


KNOWN REMAINS

Partial skeleton



ZHEJIANGOSAURUS



Z. lishuiensis

(Lü et al., 2007)

Length: 5.5 m (18 ft)

Height: 1.4 m (4.6 ft)

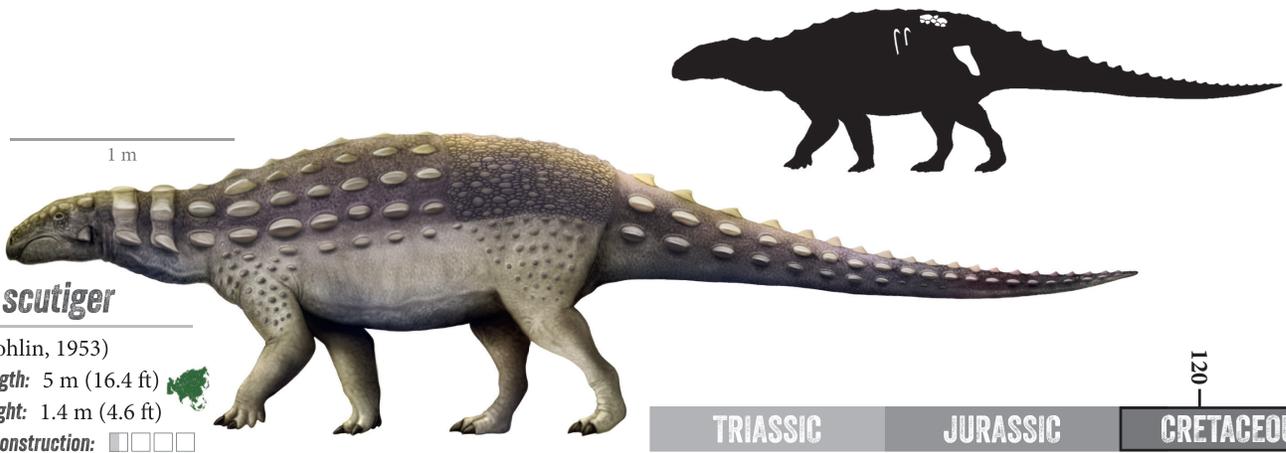
Reconstruction:

Zhejiangosaurus lishuiensis (meaning “lizard from Lishui, Zhejiang”) was originally described as a distinct genus within Nodosauridae based on a number of supposedly unique features. However, a later reanalysis of general ankylosaurid phylogeny found most of the specimen’s skeletal traits to either be widespread among ankylosaurs or shared by at least a few genera. Some of the specimen’s interesting features, such as the broadened ends of the sacral

neural spines, were not considered to be sufficient for the genus to be distinguishable, and thus it was considered by these authors to be *nomen dubium*. They also suggested that the specimen was more likely to represent a member of Ankylosauridae (Arbour and Currie, 2015).

However, a subsequent study treated the genus as valid and found it to be the sister taxon of *Dongyangopelta* (Pond et al., 2023).

SAUROPLITES



S. scutigera

(Bohlin, 1953)

Length: 5 m (16.4 ft)

Height: 1.4 m (4.6 ft)

Reconstruction:

Sauroplites scutigera (meaning “shield-carrying soldier lizard”) is known from very sparse remains, and as such, several authors have relegated the genus to the status of *nomen dubium* on the grounds that there is just not enough of the animal for a confident identification.

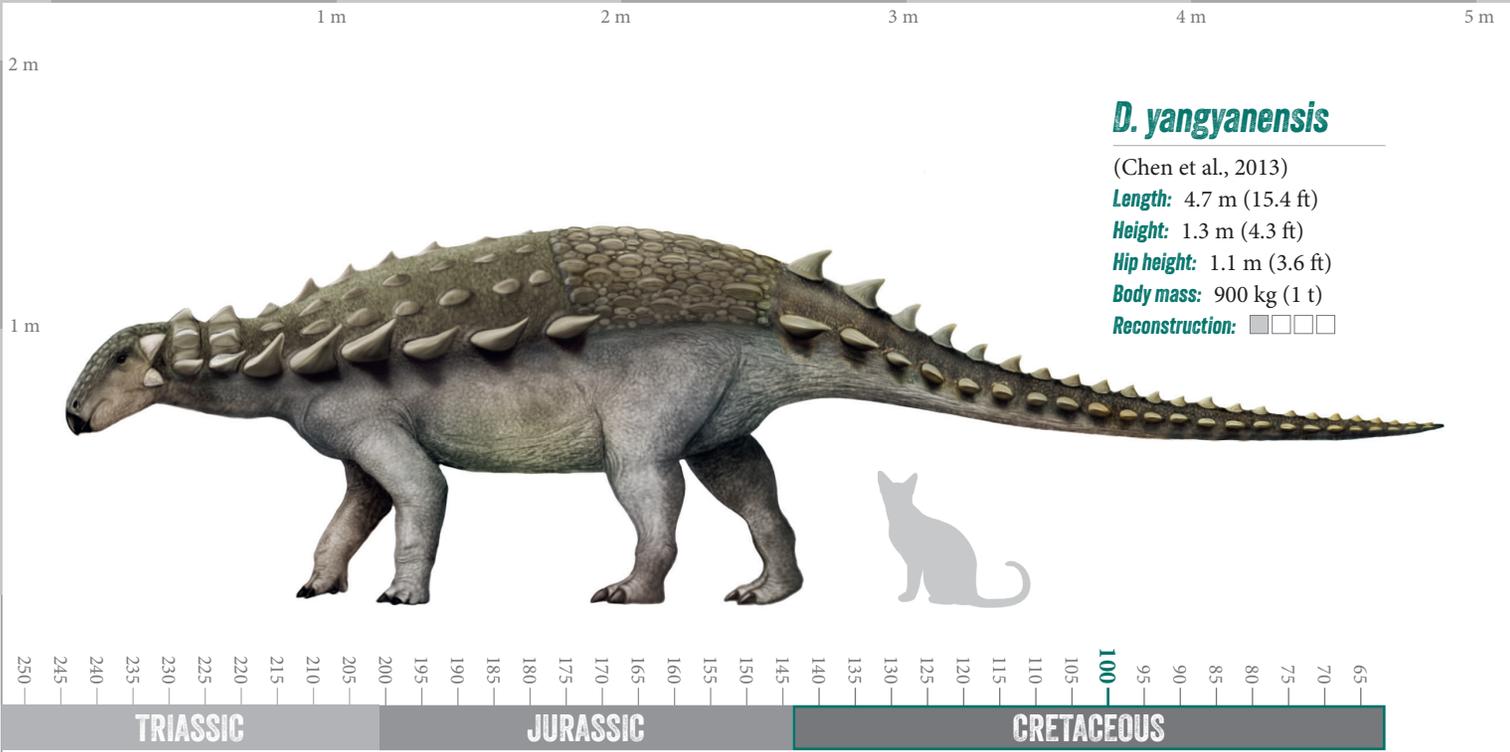
However, some of the pelvic osteoderms have been preserved in their original positions, and the pattern they form is unique. Only a few other ankylosaurs are known to

have a “rosette” pattern consisting of one larger scute surrounded by smaller ones, and *Sauroplites* has the unique distinction of having a single ring of smaller ones that separate the larger ones (Arbour and Currie, 2015).

The generic name combines the Greek “sauros” (meaning “lizard”) and “hoplites,” referring to a kind of armored soldier. The specific name combines the Latin “gerere” (“to bear”) and “scutum” (“shield”).

DONGYANGOPELTA

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D. yangyanensis

(Chen et al., 2013)

Length: 4.7 m (15.4 ft)

Height: 1.3 m (4.3 ft)

Hip height: 1.1 m (3.6 ft)

Body mass: 900 kg (1 t)

Reconstruction:

Dongyangopelta yangyanensis (meaning “shield from Yangyan, Dongyang”) possessed a “pelvic shield” composed of numerous individual osteoderms that had become fused to one another. This structure, in and of itself, is not unusual among ankylosaurs, although *Dongyangopelta* is one of the few Chinese ankylosaurs to include one and was the first such animal to be described outside of North America or Europe.

What makes *Dongyangopelta*’s pelvic shield unique has to do with the arrangement of the osteoderms that compose it; larger, central osteoderms are ringed incompletely by smaller ones, in a “rosette” pattern. This configuration differs from the pattern of a complete surround, which is seen in *Polacanthus*. It also differs from the arrangement seen in *Stegopelta*, which had a pelvic shield composed of osteoderms that are near equal in size.

Dongyangopelta was unearthed from the same geological formation as the closely related ankylosaur *Zhejiangosaurus*. The describers considered the two animals to be distinctly separate genera, although a subsequent study conversely concluded that there were “no major differences” between the two specimens (Arbour and Currie, 2015).

While the describers, and others, placed *Dongyangopelta* among the earliest diverging branch of **Nodosauridae** (Rivera-Sylva et al., 2018), the study that later described the closely related *Vectipelta* came to a different conclusion, placing these genera in their own basal ankylosaurian subgroup (Pond et al., 2023).

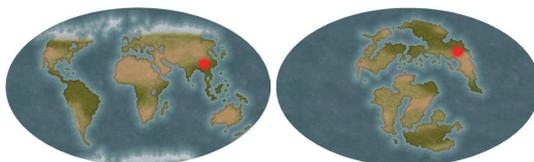
The animal’s binomial name refers to Yangyan Village, within Dongyang City, China, which is near where the specimen was discovered. “Pelta” is Greek for “shield.”

CLASSIFICATION

Dinosauria
Ornithischia
Thyreophora
Ankylosauria
Nodosauridae

LOCATION

China



KNOWN REMAINS

Partial skeleton



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