# *Ankylosaurus*

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Introduction:

***Ankylosaurus*** is a genus of thyreophoran dinosaur. Fossils of *Ankylosaurus* have been found in geologic formations dating to the very end of the Cretaceous Period, between about 68–66 million years ago, in western North America, making it among the last of the non-avian dinosaurs. It was named by Barnum Brown in 1908, and the only species classified in the genus is ***A. magniventris***. A handful of specimens have been excavated to date, but a complete skeleton has not been discovered. Though other members of Ankylosauria are represented by more extensive fossil material, *Ankylosaurus* is often considered the archetypal member of its group.

**Description**

**Appearance:**

The Ankylosaurus was a quadrupedal animal, with a broad, robust body and its hind limbs were longer than the forelimbs. *It*  It had a wide, low skull, with two horns pointing backwards from the back of the head, and two horns below these that pointed backwards and down. The front part of the jaws were covered in a beak, with rows of small, leaf-shaped teeth further behind it. It was covered in armor plates, or osteoderms, with bony half-rings covering the neck, and had a large club on the end of its tail. While the feet of *Ankylosaurus* are incompletely known, the hindfeet probably had three toes, as is the case in related animals. Bones in the skull and other parts of the body were fused, increasing their strength, and this feature is the source of the genus name. The cervical vertebrae of the neck had broad neural spines that increased in height towards the body. The front part of the neural spines had well developed entheses, which was common among adult dinosaurs, and indicates the presence of large ligaments which helped support the massive head.

**Measurements:**

*Ankylosaurus* is the largest known ankylosaurid dinosaur, estimated to have been up to 6.25 m (20.5 feet) long, 1.5 m (4.9 feet) wide, and 1.7 m (5.6 feet) tall at the hip. This length has been proposed by American palaeontologist Kenneth Carpenter, and is based on the largest known skull (specimen NMC 8880), which is 64.5 cm (25.4 inches) long and 74.5 cm (29.3 inches) wide. The smallest known skull (specimen AMNH 5214) is 55.5 cm (21.9 inches) long and 64.5 cm (25.4 inches) wide, and this specimen is estimated to have been 5.4 m (18 feet) long and around 1.4 m (4.6 feet) tall. Other authors have proposed a body length of 7 m (23 feet), 8–9 m (26–30 ft), or more than 9 m (30 feet). The weight of the animal was estimated by American science writer Gregory S. Paul at 6 tonnes (13,000 lb).

## History of discovery

In 1906, an American Museum of Natural History expedition led by paleontologist Barnum Brown discovered the type specimen of *Ankylosaurus magniventris* (AMNH 5895) in the Hell Creek Formation, near Gilbert Creek, Montana. The specimen (found by collector Peter Kaisen) consisted of the upper part of a skull, two teeth, part of the shoulder girdle, cervical, dorsal, and caudal vertebrae, ribs, and more than thirty osteoderms.

In 1910, another AMNH expedition led by Brown discovered an *Ankylosaurus* specimen (AMNH 5214) in the Scollard Formation by the Red Deer River in Alberta, Canada. This specimen included a complete skull, mandibles, the first and only tail club known of this genus, as well as ribs, vertebrae, limb bones, and armor. In 1947, fossil collectors Charles M. Sternberg and T.P. Channey collected a skull and mandible (specimen NMC 8880), a kilometre (0.6 miles) north of where the 1910 specimen was found. This is the largest known *Ankylosaurus* skull, but is badly preserved. A section of caudal vertebrae (specimen CCM V03) was discovered in the 1960s, in the Powder River drainage, Montana, also part of the Hell Creek Formation. In addition to these five incomplete specimens, many other isolated osteoderms and teeth have been found. In 1990, American palaeontologist Walter P. Coombs pointed out that the teeth of two skulls referred to *A. magniventris* differed from those of the holotype specimen in some details, and though he expressed a "considerate temptation" to name a new species of *Ankylosaurus* for these, he refrained from doing so, as the range of variation in the species was not completely documented.He also raised the possibility that the two teeth associated with the holotype specimen perhaps did not belong to it, as they were found in matrix within the nasal chambers. Kenneth Carpenter accepted the teeth as belonging to *A. magniventris* and that all specimens belonged to the same species, noting that the teeth of other ankylosaurs are highly variable.

## Classification

Brown scientifically described the animal in 1908; the genus name is derived from the Greek words '*αγκυλος*/*ankulos* ('bent' or 'crooked'), referring to the medical term ankylosis, the stiffness produced by the fusion of bones in the skull and body, and *σαυρος*/*sauros* ('lizard'). The name can be translated as "fused lizard", "stiff lizard", or "curved lizard". The type species name *magniventris* is derived from the Latin *magnus* ('great') and *venter* ('belly'), referring to the great width of the animal's body.Brown considered *Ankylosaurus* so distinct that he made it the type genus of a new family, Ankylosauridae (members of which are called ankylosaurids), typified by massive, triangular skulls, short necks, stiff backs, broad bodies, and osteoderms. He also classified *Palaeoscincus* (only known from teeth), and *Euoplocephalus* (then only known from a partial skull and osteoderms) as part of the family. Due to the fragmentary remains, Brown was unable to fully distinguish between *Euoplocephalus* and *Ankylosaurus*. Only having few, incomplete members of the family to compare with, he believed the group was part of the suborder Stegosauria.

Ankylosauria and Stegosauria are now grouped together within the clade Thyreophora. In addition to Ankylosauridae, Ankylosauria has been divided into the families Nodosauridae, and sometimes Polacanthidae (these families lacked tail clubs). *Ankylosaurus* is considered part of the subfamily Ankylosaurinae (members of which are called ankylosaurines) within Ankylosauridae.