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GIANT CARNIVOROUS DINOSAURS OF MONGOLIA

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In 1946, in the Upper Cretaceous depositions of Nemegt (South Gobi), one of the paleontological expeditions of the Academy of Sciences USSR discovered a cranium and a series of cervical vertebrae of a giant carnivorous dinosaur belonging to the genus *Tyrannosaurus rex*, family Deinodontidae. Until recently this genus was represented by two incomplete skeletons excavated from the terrestrial formations of North America and deposited in the American Museum of Natural History. The cranium found in Mongolia belongs to this new species.

Genus *Tyrannosaurus* Osborn 1905

Tyrannosaurus bataar sp. nov.¹

H o l o t y p e . Skull and cervical vertebrae. Collection of the Paleontological Institute of Academy of Sciences USSR catalog # 551-1.

D e s c r i p t i o n . Figure 1 shows the affinity in the general characteristics of the skull to *T. rex* although it is more elongated and not as tall. The cranial part is obviously strongly reduced, while the facial is greatly developed.

Parietals are short, with triangular contours and fuse with the frontals by means of an almost straight transverse suture. The dorsal surface is strongly elevated in the center in the shape of a pointed sagittal crest and a powerful occipital crest. The latter protrudes above the surface of the

¹ Mongolian for giant.

cranium.

The frontals are insignificant in length and are firmly fused by a suture to one another and the elements surrounding them. Anteriorly the frontals are fused with the nasals and prefrontals, laterally with the postorbitals and lacrimals.

The nasals are long and narrow. The exterior surface is strongly tubercular anteriorly and is convex transversely, rather depressed posteriorly. The fusion of the nasals with the frontals is narrow, and the fused ends enter a deep V-shaped indentation. The medial margins of the nasals are separated by a large groove and terminate in a powerful superior process which is connected with the premaxillaries, and a poorly developed ventral process extends along the dorsal margin of the maxilla and meeting with the ascending process of the premaxilla. This process plus the premaxilla and the dorsal of the maxilla delineate the external nasal foramina.

The postorbital is massive and triangular in shape. Its anterior part shows strong tuberculation [rugosity], while the posterior extends in the shape of a pointed process joining with the squamosal. The lower process of postorbital is rather wide, strongly curved along the anterior margin and sutured with the ascending process of the jugal. The lacrimal consists of two branches: the upper with a strongly tubercular surface, adjoining maxilla, and the lower [branch] fusing with the jugals and forming the anterior rim of the orbit.

The jugal is triradiate. Its anterior part is elongated and adjoins the maxilla and lacrimal. Below the suture with the lacrimal, the jugal is perforated by an oval jugal foramen. The upper process of the jugal is sutured to the ascending process of the postorbital, forming a transversely broad strip, and tapers posteriorly. The exterior surface is furrowed by numerous grooves for blood vessels. The symphysis of the dentary are not coalesced, and instead developed cartilage or a ligament. The posterior end of the dentary is rather indented, and at this point the suture with the angular was observed. The mandible bears 15 teeth, and the most anterior one is somewhat smaller than the next ones. The second tooth and up to the eighth inclusive were the largest in the row, the length of their crown was about 120 mm, further posteriorly the teeth gradually decreased in size. In the transverse cross section the teeth were broadly oval, the edges serrated, the apices slightly recurved posteriorly. The interdental walls of alveoli are extended in the shape of triangular plates.

The teeth alternated during the course of the animal's life. The new tooth reappeared on the anterior side of the base of the old tooth or inside of the same. As the new tooth developed the root of the functional tooth became partially resorbed and gradually ejected. The teething tooth was double bladed, i.e. both its sides, the anterior as well as the posterior were pointed and slightly serrated; in the later stage the tooth curved slightly posteriorly and acquired the appearance of a blunt blade; its posterior margin remained sharp, while the anterior became blunt, adding the necessary firmness to the tooth; in this manner carnivorous dinosaurs had in all appearance a continuous change of teeth, whereby the new teeth were always protected from any possible injury. These peculiarities in the structure of the jaws and the teeth were undoubtedly the result of their adaptation to serving and gulping large clunks of flesh.

On each side of the cranium, in addition to the orbit and the nasal opening, there were still four more openings. The orbits were large and pisolitic, attaining the maximum height of 275 mm, and a maximum width of 125 mm. Its superior border of the orbit consisted of the lacrimal, prefrontal and postorbital. The first antorbital fenestra was the largest fenestra in the skull, attaining the maximum width of 250 mm and the maximum height of 225 mm. Its superior demarcations were the lacrimal and maxilla, while the ventral margin – the maxilla and jugal. The second antorbital fenestra was pentagonal, a great deal larger and is located almost entirely in the dorsal part of the maxilla. The third antorbital orifice is minute and oval; anteriorly it is demarcated by the premaxilla, posteriorly by the maxilla. The external nares are large, oval and elongated. The bones that demarcated the temporal fenestrae became obliterated.

The cervical vertebrae (Figure 2) are opisthocoelous, the centra are short and broad. The articular surfaces of the centra are slightly slanting so that the posterior surface is inclined more so than the anterior, i.e., it is almost parallel with the former; this indicates the fact that the head of the animal was continually raised, and also confirms the assumption that the neck was rather static (Figure 2).

C o m p a r a t i v e N o t e s . The cranium of the afore described giant carnivorous dinosaur from the Nemegt approximates by its dimensions and peculiarities of its structure to the cranium of the largest carnivorous dinosaur *Tyrannosaurus rex* from the Upper Cretaceous of North America

and excels in its size all the other deinodonts of the family Deinodontidae. It differs from *T. rex* by its elongated snout and a greater number of maxillary and dentary teeth (Table 1).

The strong elongation of the facial part of the cranium and the greater number of maxillary and dentary teeth show clearly that the new species was somewhat more primitive than *T. rex*. In the latter we observe a reduction of the facial part of the cranium and decrease in the number of teeth.

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Table 1

	<i>Tyrannosaurus bataar</i>	<i>Tyrannosaurus rex</i>
Length of cranium measured from premaxilla up to the occipital condyle	1220	1210
Number of teeth in the maxilla	13	12
Number of teeth in the mandible	15	13-14

Figure Captions

Figure 1. *Tyrannosaurus bataar* sp. nov. skull in lateral view. D – dentary, Ju – jugal, La – lachrymal, Mx – maxilla, Na – nasal, Orb – orbit, PO – postorbital, ant₁ – antorbital fenestra, ant₂ – second antorbital fenestra, ant₃ – third antorbital fenestra, Jf – jugal foramen.

Figure 2. *Tyrannosaurus bataar* sp. nov. Fourth cervical vertebra in anterior view.