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A NEW ANKYLOSAUR FROM THE UPPER CRETACEOUS OF MONGOLIA

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Armored dinosaurs make a considerable part of the collections of reptiles made by the Mongolian paleontological expedition of the Academy of Sciences of the USSR of the year 1948. Numerous remains of the new representatives of the family Ankylosauridae, description of which is given below, were found in addition to the *Syrmosauridae* (1-4). This is the first discovery of the Ankylosauridae in Mongolia; it is of exceptional interest, as it permits a more complete paleofaunistic characterization of the continental Upper Cretaceous successions of Mongolia and Middle Asia.

Locality: Bayn-Shire, 130 km southwest from the Aimak center of Bayn-Shanda, Mongolian Peoples' Republic.

Age: Upper Cretaceous.

Material. Fragment of a skull (posterior part of the cranium), occipital area, base of the skull and the postcranial skeleton. Collection No. 557, Paleontological Scientific Institute, Academy of Sciences, USSR.

Description

**Skull.** The skull is small, of a trapezoidal form, and the bones of the cranium are thickened. The basioccipital is short and wide. Its external surface in front of the condyle is deeply bent lengthwise and convex crosswise. Its upper surface is concave in the middle and forms the lower part of the foramen magnum. The foramen magnum has a rounded outline. The occipital condyle is tilted ventrally from the long axis of the skull in such a way as to cause the longitudinal axis of the skull to form an obtuse angle with the longitudinal axis of the first and second cervical vertebrae where it joins the neck. This has undoubtedly resulted from the particular structure of the neck vertebrae; these form a neck which is elevated at an angle toward the body, similar to that described in *Syrmosaurus* (4). On the side surfaces of the basioccipital, there is a beveled seam surface for the joint with the exoccipitals. The exoccipital are extended laterally and posteriorly; the base of the exoccipital form the upper third of the occipital condyle. The supraoccipital is not large. Its lower part is slightly convex and forms the upper rim of the foramen magnum. The basisphenoid is long and has a triangular outline.

**Vertebrae.** The cervical vertebrae are short, high, their articular surfaces are slightly beveled so that their posterior surface is lower than the anterior one. The dorsal vertebrae are long, with high centra, which are feebly flattened at the ends. The neural arches and diapophyses are high.

**Sacrum.** The sacrum consist of 9 vertebrae: 4 sacral, 4 lumbar, and 1 caudal. The vertebral bodies are thickened and widened anteriorly and posteriorly. The transverse processes are fused into one with the sacral ribs.

**Caudal Vertebrae.** The anterior caudal vertebrae are short and tall, with their articular surfaces strongly flattened. The posterior caudal vertebrae are long and low. The neural spines are reduced and fused with the neural arch. The prezygapophyses are long and split fork-like. The postzygapophyses are fused and wedge-like. The haemal arch is considerably stronger developed than the neural arch. The haemal process has a crest-like form. Its anterior part is cut out in a

V-shape; the posterior part is wedge-shaped. The junction of these vertebrae is accomplished by means of the two-sided jointing; in this jointing the postzygapophyseal part of the arch of the preceding vertebra is completely embraced by the prezygapophyseal part of the next following vertebra, and the wedge-like constriction of the hemal process enters into the V-like notch.

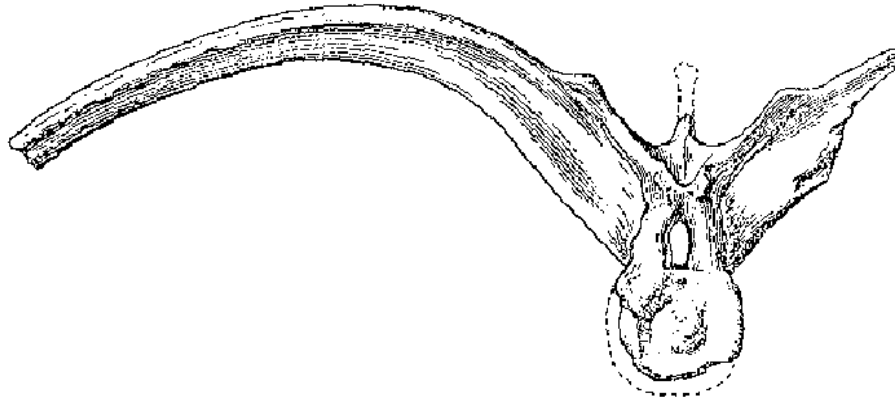


Fig. 1. *Talarurus plicatospineus* gen. et sp. nov. A body vertebra with ribs in the natural jointing. 1/5 of the natural size.

**Ribs.** ribs massive, and have an arch-like curve. The proximal part is thickened and widened, the middle part is a little contracted, and the distal end is flattened. The notch between the capitulum and the tuberculum is shallow and extended. The last ribs of the thorax (4-5) are fused with the transverse process of the vertebrae (Fig. 1).

**Sacral Ribs.** The sacral ribs are short, thick, compressed bilaterally in the middle, and strongly widened at the ends. The indentation is deeply concave.

**Shoulder Girdle.** The scapula is massive and wide. Its blade is strongly bent. It tapers somewhat in the distal direction and then after a slight waist, widens and thickens to form the upper part of the glenoid fossa. The outline of the coracoid approaches an irregular tetrahedron. With its proximal end it accues closely to the distal part of the scapula, forming the lower half of glenoid fossa. Glenoid fossa is groove-like, opened in front and at the rear. The direction of its long axis coincides with the direction of the long axis of the scapula.

**Anterior Extremities.** The humerus is short and wide. Its proximal end has the form of a concave, oval-triangular plate. The humeral head is large. The deltopectoral crest is very strongly developed. The distal end carries a massive radial condyle and a somewhat smaller ulnar condyle. The forearm bones are short. Their length is half the length of the humerus. The olecranon is very strongly developed.

**Pelvic Girdle.** The ilium is wide, elongated, and comparatively flat. Its total length is about 1 m. The acetabular part is approximately 25-30 cm. The preacetabulum is thin and 45-50 cm long. The postacetabulum is triangular in outline and is strongly shortened. The acetabulum forms a wide, shallow and rounded hole, which is directed vertically downward as in all armored dinosaurs. The ischium is represented by a flattened, long bone. The proximal part is widened, the distal part is somewhat constricted.

**Posterior Extremities.** The femur is long and wide; the greater trochanter is fused with the little one. The interspace between it and the head of the femur is almost absent. The tibia is massive, short, contracted in its middle part and strongly widened at the ends. The cnemial crest

is well developed. The fibula is represented by a thin, flattened bone with a widened proximal end. The digits of the manus and pes ended with flat, hoof-like phalanges.

**Skin Armor.** The armor consists of bony, boat shaped plates, from 20 to 50 mm thick; these plates are joined longitudinally together by means of feebly flexible seams and form collar, dorsal and pelvic shields (Fig. 2). Hollow bony spines, with corrugated sculpture were symmetrically situated on the external surface of shields, on the lateral surface of the extremities, and on the tail; they formed the external ornament of the armor (Fig. 3).

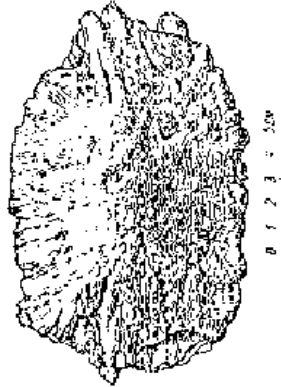


Fig. 2. *Talarurus plicatospineus* gen. et sp. nov. Plate of the armor.



Fig. 3. *Talarurus plicatospineus* gen. et sp. nov. Spine of the armor.

Moving on to the systematic position of the Baynshirenian armored dinosaurs, it should first be noted that our form is a typical representative of the suborder Ankylosauria in the character of the structure of its skull, axial skeleton, girdles, extremities, and armor. Heavy armor, great sacralization of the spinal column (9 vertebrae), and the ankylosis of ribs with the transverse processes of the vertebrae - determine it being a representative of the family Ankylosauridae (5). Among the most completely known Cretaceous ankylosaurids (*Polacanthus*, *Palaeoscincus* (6), *Panoplosaurus* (7), *Scolosaurus* (7), *Dyoplosaurus* (8), *Euplocephalus* (5), *Ankylosaurus* (5)), the genus *Ankylosaurus* B. Brown (1908) known from the middle and upper horizons of the Upper Cretaceous of U.S.A. - Lance Formation, Hell Creek beds, Montana, Edmonton, Alberta (5) - is most closely allied to the here described form in the structure of the skull, postcranial skeleton, and armor. Our form differs, however, from

*Ankylosaurus* and other forms in the following peculiarities of its structure.

1) The skull of our form is more flat and narrow than the skulls of *Paleoscincus*, *Euoplocephalus*, and *Ankylosaurus*. Namely: the width of the posterior rim of the skull of our form is 350 mm; the width of *Palaeoscincus* is 470 mm of *Euoplocephalus* 450 mm, and of *Ankylosaurus* 700 mm.

2) The plates composing the armor (boat-like - keeled) are completely similar only with the plates of the armor of *Ankylosaurus*. In all other forms they are flat, triangular or polygonal.

3) Finally, the presence of the corrugated spines, forming the external ornament of the armor distinguishes our form from all known representatives of the family Ankylosauridae (5).

The above listed distinctions are so essential that they exceed the limits of the specific and generic distinctions and represent the complete justification to separate the armored dinosaurs from Bayn-Shire in a new, independent genus and species of the family Ankylosauridae, which I propose to name *Talarurus plicatospineus* genus et. sp. nov. - "lash-tailer with plicated spines." The specific name is given according to the form of the spines forming the external ornament of the armor. The systematic position of the described form is following: suborder Ankylosauria, family Ankylosauridae B. Brown (1908), genus *Talarurus* genus nov., species *Talarurus plicatospineus*.

**Diagnosis:** Large quadrupedal dinosaur with a heavy protective armor. Skull small, trapezoidal in form. Roof of the skull bones covered with numerous osteoderms. Cervical vertebrae short and tall. Dorsal vertebrae long; centra tall; articular surfaces feebly flattened. Lumbar ribs (4-5) firmly fused with transverse processes of vertebrae. Iliia long, trough-like, strongly widened and thickened in acetabular part. Sacrum of 9 vertebrae: 4 true sacrals, 4 lumbar, 1 caudal. Forelimb shorter than hind. Digits of pes and manus end in flat, hoof-like phalanges. Tail long (20-25 vertebrae). Anterior caudal vertebrae short, with tall centra. Posterior caudals long, low, with strongly developed neural and haemal arches firmly joined into striking end of tail - "mace". Armor of boat-like bony plates 20-50 mm thick conjoined longitudinally along long axis into cervical, dorsal and pelvic shields. Corrugated, hollow, bony spines on external surface of shields.

The total length of skeleton with skull 5-6 m. Upper Cretaceous, Mongolia

The discovery of armored dinosaurs at Bayn-Shire, which are analogous in their evolutionary level to the armored dinosaurs of North America, and are especially close to the genus *Ankylosaurus* known from the upper and middle horizons of the Upper Cretaceous (Lance Formation, Hell Creek beds of Montana, and Edmonton of Alberta; the faunistical complex of which is almost identical with the complex of the Bayn-Shire locality - ankylosaurs and trachodonts in both instances, makes it possible to correlate these formations. Because of the close similarity of faunas, the beds of Bayn-Shire can be correlated with the upper horizons of the Upper Cretaceous, which are higher than the horizons of Bayn-Dzak, Shiregen-gashun, Nemegtu and apparently correspond to the top parts of the Senonian in the terms of the geological time scale.

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