



Review of Cretaceous sauropod dinosaurs from Central Asia



Alexander Averianov^{a, b, *}, Hans-Dieter Sues^c

^a Zoological Institute, Russian Academy of Sciences, Universitetskaya nab. 1, 199034 Saint Petersburg, Russia

^b Department of Sedimentary Geology, Geological Faculty, Saint Petersburg State University, 16 Liniya VO 29, 199178 Saint Petersburg, Russia

^c Department of Paleobiology, National Museum of Natural History, Smithsonian Institution, MRC 121, P.O. Box 37012, Washington, DC 20013-7012, USA

ARTICLE INFO

Article history:

Received 6 August 2016

Received in revised form

13 September 2016

Accepted in revised form 20 September

2016

Available online 20 September 2016

Keywords:

Sauropoda

Cretaceous

Kazakhstan

Kyrgyzstan

Tajikistan

Uzbekistan

ABSTRACT

There are 24 known localities for skeletal remains of sauropod dinosaurs in the republics of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan). Sauropod remains are very rare at all these localities and represented usually only by isolated teeth. Only narrow-crowned teeth are known from the Cretaceous of Central Asia. The oldest record of such teeth is from the Aptian Sultanbobu Formation of Uzbekistan. Exposures of the Turonian Bissekty Formation at the most productive vertebrate locality in the region, Dzharakuduk in Uzbekistan, has yielded many isolated teeth and a few skeletal remains that can be attributed to a non-lithostrotian titanosaur. Similar narrow-crowned, cylindrical teeth from Cenomanian-to Coniacian-age strata in the Kyzylkum Desert, Uzbekistan, may belong to a closely related taxon. Another taxon, with teeth that are pentagonal in cross-section, is known from the Santonian Yalovach and Bostobe formations of Tajikistan and western Kazakhstan, respectively. A femur reported from the Santonian Syuksyuk Formation of southern Kazakhstan possibly belongs to a lithostrotian titanosaur. The change in tooth structure at the Coniacian–Santonian boundary in the region possibly suggests replacement of non-lithostrotian titanosaurs by lithostrotians. The titanosaur from the Bissekty Formation is similar to *Dongyangosaurus sinensis* from the Cenomanian–Turonian of Zhejiang (China) in the extensive pneumatization of the neural arch on the anterior caudal vertebrae with several fossae. It also resembles *Baotianmansaurus henanensis* from the Cenomanian of Henan (China) in the possession of very short anterior caudal centra. These three taxa possibly represent an as yet formally unrecognized endemic clade of Asian non-lithostrotian titanosaurs.

© 2016 Elsevier Ltd. All rights reserved.

1. Introduction

Sauropod dinosaurs, large to gigantic, quadrupedal herbivores, dominated in the Jurassic and Early Cretaceous ecosystems worldwide (McIntosh, 1990; Upchurch et al., 2004; Wilson, 2005a). During the Late Cretaceous, one surviving clade of sauropods, Titanosauria, flourished in the Southern continents but was fairly common in parts of the Northern Hemisphere, although there the dominance among plant-eating dinosaurs shifted to ornithomimids and ceratopsians. In recent decades, a number of Cretaceous titanosaurian or titanosauriform sauropods, usually documented by partial skeletons, have been described from East Asia, mostly China (D'Emic, 2012; Mannion et al., 2013). By contrast, sauropod remains from the Cretaceous of Central Asia are quite rare and represented mostly by isolated bones, bone fragments, and teeth (Nesov, 1995; Maryańska, 2000).

Moreover, few of these specimens have ever been described (Sues et al., 2015). However, they are of interest because they date from the otherwise poorly known Cenomanian–Santonian interval of sauropod evolution (Mannion et al., 2011: fig. 5). In this report, we summarize data for 24 localities with Cretaceous sauropod fossils in Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan (Fig. 1) and describe all specimens that can still be located in collections.

Nesov (1995) published the first review of sauropod records from the Cretaceous of Central Asia. Some identifications of indeterminate sauropods were based on bones or bone fragments. He assigned all narrow-crowned, 'pencil-shaped' teeth to indeterminate diplodocids or titanosaurids. Nesov (1995: p. 89) mentioned a metapodial and another limb-bone fragment of a sauropod from the lower Cenomanian locality Krasnaya gora [Red Mountain] in the central Kyzylkum Desert of Uzbekistan. This identification was possibly based on the distal fragment of a third metatarsal of indeterminate hadrosauroid ornithomimid (ZIN PH 1906/16) because no other dinosaurian metapodials can be identified in the collections from this locality. Thus, this occurrence is not included in our review.

* Corresponding author. Zoological Institute, Russian Academy of Sciences, Universitetskaya nab. 1, 199034 Saint Petersburg, Russia.

E-mail addresses: dzharakuduk@mail.ru (A. Averianov), suesh@si.edu (H.-D. Sues).



Fig. 1. Map of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan) showing sauropod localities discussed in the text. Localities: 1, Karakul'; 2, Khodzhakul'; 3, Sheikhdzheili; 4, Khodzhakul'sai; 5, Chelpyk; 6, Itemir; 7, Karachadalsai; 8, Gul'cha; 9, Suzak; 10, Kulkuduk; 11, Dzharakuduk; 12, Zenge Kurgan 3; 13, Dzharara; 14, Tyulkili; 15, Kansai; 16, Kyzylpilyal' I; 17, Changet IV; 18, Shakh-Shakh; 19, Kyrkkuduk I; 20, Syuk-Syuk; 21, Shatyrtyube I; 22, Muinak; 23, Kshi-Kalkan; 24, Kara-Cheku.

1.1. Institutional abbreviations

CCMGE, Chernyshev's Central Museum of Geological Exploration, Saint Petersburg, Russia; IZANUZ, Institute of Zoology, Uzbek Academy of Sciences, Tashkent, Uzbekistan; USNM, Department of Paleobiology, National Museum of Natural History, Smithsonian Institution, Washington, D.C., U.S.A.; ZIN PH, Paleoherpological Collection, Zoological Institute, Russian Academy of Sciences, Saint Petersburg, Russia.

1.2. Measurements

Teeth: LLD, labiolingual diameter; MDD, mesiodistal diameter. Tooth measurements and wear facet terminology follows Averianov and Sues (2016). SI is the slenderness index, which is calculated by dividing the height of the tooth crown by the mesiodistal diameter of the crown (Upchurch, 1998).

Vertebrae: ACH, anterior height of centrum; ACW, anterior width of centrum; CL, centrum length (ventral); PCH, posterior height of centrum; PCW, posterior centrum width.

All measurements are in millimeters.

2. Review of sauropod localities

2.1. Karakul'

Geographic position. NNE coast of Karakul' Lake, close to the Zengbobo Ridge, southwestern Kyzylkum Desert, Karakalpakistan, Uzbekistan.

Stratigraphy. Sultanbobob Formation, upper Aptian (Nesov, 1997).

Material. Titanosauria indet.: one tooth fragment (ZIN PH 2431/16; Fig. 2A, B).

Description. The crown of this apparently lower tooth is lingually recurved and almost round in cross-section, with LLD (5.3) slightly greater than MDD (5.1). There are four irregular wear facets all around the crown, the largest of which is on the convex (labial) side (Fig. 2B). The enamel is smooth.

Comments. ZIN PH 2431/16 is the only record of dinosaurs from the Karakul' locality, which otherwise has only yielded remains of marine vertebrates (Mertiniene et al., 1994; Nesov, 1995).

2.2. Khodzhakul

Geographic position. Escarpment N of the dried-up Khodzhakul Lake, southwestern Kyzylkum Desert, Karakalpakistan, Uzbekistan.

Stratigraphy. Lower or middle part of Khodzhakul Formation, uppermost Albian (?) or lower Cenomanian (Nesov, 1997).

Material. Titanosauria indet.: 12 tooth fragments, seven with preserved apices of the tooth crowns.

Description. Among the tooth crowns preserving the apex there is an unerupted replacement tooth lacking the root and enamel. One apparently lower tooth has a single lateral wear facet (ZIN PH 2428/16; AOL1 wear pattern; Fig. 2F, G). The remaining five specimens are small upper teeth, each with a lingually curved crown and variably developed single elliptical wear facets on the lingual side (A1L0 wear pattern; Fig. 2C–E, H, I). On ZIN PH 2429/16, the wear facet is set at a steep angle and extends down to the root (Fig. 2E). The enamel is either smooth around the perimeter of the crown or smooth in the apical half and covered by fine sculpture in the basal half (ZIN PH 2428/16; Fig. 2F, G). Most tooth crowns bear variably developed apicobasal ridges.

Comments. Nesov (1995) assigned long and slender sauropod teeth from the Khodzhakul locality to Diplodocidae or Titanosauridae. On

Download English Version:

<https://daneshyari.com/en/article/4746694>

Download Persian Version:

<https://daneshyari.com/article/4746694>

[Daneshyari.com](https://daneshyari.com)