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GENERAL BIOLOGY

A New Docodont (Docodonta, Mammalia) from the Middle Jurassic of Siberia

A. V. Lopatin* and A. O. Averianov**

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During the past decade, a number of localities containing Mesozoic mammals were discovered in Siberia, most of them dated to the Early Cretaceous [1–6]. A unique locality of Middle Jurassic vertebrates was found by S.A. Krasnolutskii in 2000 in the upper part of the Itat Formation of the Berezovsk quarry (the southern Krasnoyarsk krai). This locality was studied by joint expeditions of the Paleontological Institute of the Russian Academy of Sciences (PIN) and Krasnoyarsk Regional Museum (KKM) in 2001 and by St. Petersburg and Tomsk state universities in 2003. The locality has yielded dipnoans, palaeonisciform fishes, the caudate amphibians cf. Karauridae, the cryptodiran turtle *Xinjiangchelys* sp., the lizards cf. Paramacellodidae, the crocodyliforms Goniopholididae indet., the dinosaurs Theropoda indet. (cf. Dromaeosauridae), Titanosauriformes indet., and Stegosauria indet., the pterosaurs Pterodactyloidea indet., the cynodonts Tritylodontidae indet., and fragmentary mammal specimens, including a molar of a new docodont, which is described below.

ORDER DOCODONTA KRETZOI, 1946 FAMILY TEGOTHERIIDAE TATARINOV, 1994 GENUS *ITATODON* LOPATIN ET AVERIANOV, GEN. NOV.

Etymology. From the Itat Formation and the Greek odus (tooth).

Type species. *I. tatarinovi* sp. nov.

Diagnosis. The genus is characterized by the following unique combination of (–) primitive and (+) advanced characters: (1) pseudotalonid present, formed by well-developed *a–b, b–e, e–g*, and *a–g* crests (+); (2) additional cusp *ee* absent (–); (3) apex of cusp *a* inclined posteriorly (+); (4) crests *a–b* and *a–g* diverging at base of cusp *a* (+); (5) crest *a–c* and common part of crests *a–g* and *a–b* positioned longitudinally (+); (6) cusp *c* reduced (+); (7) posterior part of tooth crown reduced (+); (8) cusp *f* absent (+); (9) complete lingual cingulid present (+); (10) partial labial cingulid present, reaching anteriorly notch between cusps *a* and *b* (+); and (11) crenulation of enamel absent (–).

Species composition. Type species.

Comparison. *Itatodon* gen. nov. is assigned to the family Tegotheriidae [6] on the basis of the presence of an increased pseudotalonid, crest *e–g*, and well-developed cusp *e* and crest *b–e* and the absence of crest *b–g*. As compared to other tegotheriids, the new genus is distinguished from *Tegotherium* Tatarinov, 1994 from the Upper Jurassic of Mongolia [7] in characters 2–6 and 10; from *Tashkumyrodon* Martin et Averianov, 2004 from the Middle Jurassic of Kyrgyzstan [8] in characters 2–10 and the absence of a labial rudiment of the crest *b–g*; it differs from *Sibirotherium* Maschenko, Lopatin et Voronkevich, 2003 from the Lower Cretaceous of Western Siberia (Russia) [6] in characters 2–11 and in the better developed crest *e–g*.

Remarks. Docodonts had five to eight lower molars [9]; however, the structure of the posterior lower molar is only known in *Haldanodon exspectatus* Kühne et Krusat, 1972 from the Upper Jurassic of Portugal [10: Pl. 10, Figs. C, D; m5]. Judging from this tooth and alveoli in the dentary of other docodonts, the posterior lower molar and, to a lesser extent, the penultimate molar of docodonts were reduced; they were shorter than other molars and oval in shape. In m5 of *Haldanodon*, the cusp *c* is strongly reduced, but retains the posterolingual position with reference to the cusp *a*. In the other currently known lower molars of docodonts, the cusp *c* is substantially larger than in the holotype of *Itatodon tatarinovi* and is located more posterolingually than the cusp *a*. At present, it remains unknown whether the considerable reduction of the cusp *c*, its position strictly posterior to the cusp *a*, and the reduction of the posterior part of the crown, including the absence of cusp *f*, are characters related to the posterior position of the molar described in the tooth row, or these characters are typical of the new taxon. The large length of the crown of the holotype of *I. tatarinovi* is in conflict with the assumption that it is the posterior

* *Paleontological Institute, Russian Academy of Sciences, Profsoyuznaya ul. 123, Moscow, 117997 Russia*

** *Zoological Institute, Russian Academy of Sciences, Universitetskaya nab. 1, St. Petersburg, 199034 Russia*

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molar in the tooth row. A considerable reduction of the posterior part of the crown is also characteristic of the anterior molar of *Tegotherium* [7]. This character and the development of the lingual cingulid may be typical for a particular advanced *asiadocodontan* group within Tegotheriidae, which includes *Tegotherium* and *Itatodon* gen. nov. *Itatodon* is characterized by a more predatory specialization of the crown, which is expressed in the development of blade-like longitudinal crests descending anteriorly and posteriorly from the apex of the cusp *a*. Possibly, this specialization determinates with the reduction of the cusp *c*, its position posterior to the cusp *a*, and the longitudinal extension of the entire crown. The crests *a–b* and *a–g* diverge only at the base of the cusp *a*, whereas, in other docodonts, they are separate from the apex of the cusp *a.* The crest *a–g* with a posteriorly inclined apex of the cusp *a* and a carnassial-like notch in the middle is a functional analogue of the major cutting edge of the carnassial tooth of extant carnivorous placentals and other mammalian predators [11].

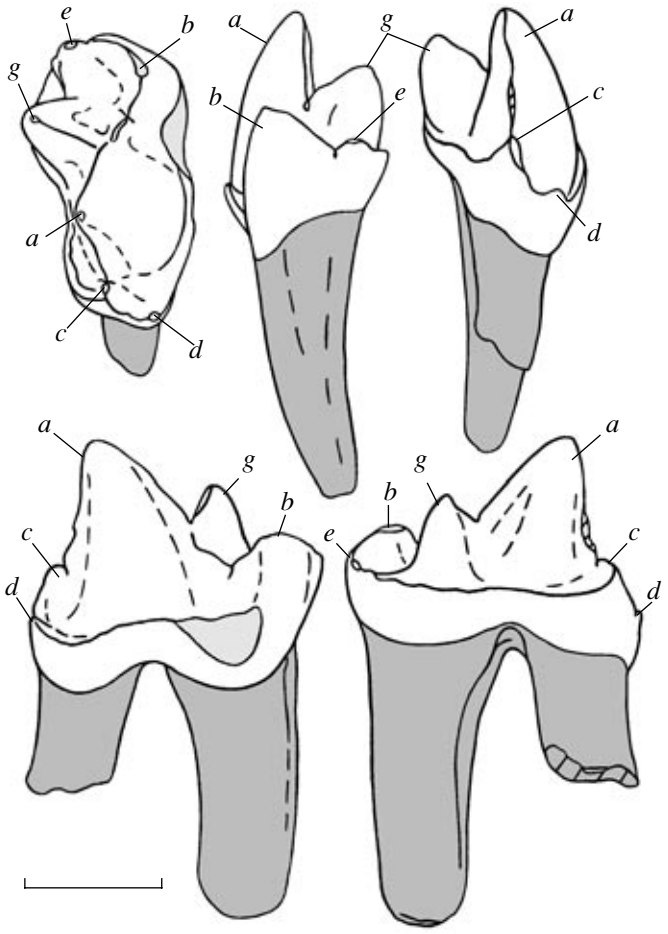
Itatodon gen. nov. is one of the earliest docodonts, which occur in the fossil record from the Bathonian to the Albian–Cenomanian. The discovery of such an early Asian docodont, which is rather advanced and specialized, suggests that the order emerged and differentiated into the groups of "eudocodonts" and asiadocodonts [6, 8] much earlier, probably, as early as the Early Jurassic.

I*TATODON TATARINOVI* LOPATIN ET AVERIANOV, SP. NOV.

Etymology. The species is named in honor of Academician Tatarinov, who described the first docodont from Asia [7].

Holotype. PIN, no. 5087/2, isolated right lower molar; Russia, Krasnoyarsk krai, Sharypovskii raion, 500 m south of the village of Nikol'skoe, Berezovsk quarry; Middle Jurassic, Bathonian Stage, upper part of the Itat Formation.

Description (figure). The crown is longitudinally extended. The cusp *a* is the largest; its base is located in the posterior portion of the crown, while the apex is inclined somewhat posteriorly. A sharp, convex crest descends anteriorly from the apex of the cusp *a* and is divided into the crests *a–b* and *a–g* at the base of this cusp. The crest *a–g* is higher than the crest *a–b* and forms a carnassial-like notch between the bases of the cusps *a* and *g*. The cusp *g* is approximately half as high as the cusp *a*, has a sharp apex, and is located anterolingual to the cusp *a.* The cusp *b* is lower than the cusp *g*, has a blunted apex, and is located anterior to, and a little labial to the cusp *a*. The anterior portion of the crown forms a pseudotalonid with an extensive basin, which is restricted by the crests *a–b, b–e, e–g*, and *a–g*. The crest *b–e* has a small notch. The cusp *e* is small, but clearly differentiated. The crest *e–g* is narrow and low. The



Itatodon tatarinovi Lopatin et Averianov, sp. nov., holotype PIN, no. 5087/2, isolated right lower molar, occlusal, anterior, posterior (upper row, from left to right), labial, and lingual (lower row) views; Russia, Krasnoyarsk krai, Sharypovskii raion, village of Nikol'skoe, Berezovsk quarry; Middle Jurassic, Bathonian Stage, upper part of the Itat Formation, upper Member. The enamel is white, wear facets on the enamel are light gray, and dentin is dark gray. Scale bar, 1 mm.

crest *a–c* is almost vertical and directed posteriorly. The cusp *c* is very small, located at the base of the posterior part of the cusp *a*. It is connected by a cingulid crest to a hardly discernible posterolabial cusp *d*. A distinct lingual cingulid connects the bases of the cusps *e* and *c*, and a labial cingulid extends anteriorly from the cusp *d* to the level of the notch between the cusps *a* and *b*. The anterior portion of the labial cingulid has an extensive wear facet, which has not been registered in other docodonts [12]; it is probably associated with the well-developed cusp *C* on the occlusal surface of the upper molar. The enamel of the crown is smooth, lacking crenulations. The tooth has two relatively narrow and long roots. The anterior root is slightly longer (anteroposteriorly) than the posterior root. The roots and crown of the tooth are slightly curved in the frontal plane (convex labially); in addition, the crown displays

a certain unilateral hypsodonty, so that the labial side of the crown is higher than the lingual side. These characters are evidence for a substantial transverse component of the molar movement, which is provided by the rotation of the dentary ramus about its axis during the occlusion of the tooth rows.

Measurements of the holotype, mm: crown length, 2.1; greatest crown width, 1.2; crown height on the labial side of the cusp *a*, 1.6; depth of the anterior root on the anterior side, 2.0.

Material. Holotype, found by A.O. Averianov and A.V. Lopatin in 2005 during picking the concentrate sampled by V.R. Alifanov (PIN) and N.V. Martynovich (KKM) in 2001.

Recent paleontological discoveries show that docodonts were widespread and very diverse in the Jurassic and Early Cretaceous of Asia. To date, they have been registered in the Jurassic of India, Kyrgyzstan, Mongolia, Xinjiang (China), and Siberia (Russia) and in the Lower Cretaceous of Siberia and, probably, Mongolia [6–8, 13].

Itatodon tatarinovi gen. et sp. nov. is the first Jurassic mammal taxon described from Russia. To date, a femur of Morganucodontidae indet. from the Bajocian–Bathonian of the Moscow oblast [14], fragmentary dentaries without teeth, and an isolated incisor or a premolar of Docodonta indet. from the Berezovsk quarry (Krasnoyarsk krai) have been found in the Jurassic strata of Russia.

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