

AMERICAN MUSEUM NOVITATES

Number 91

Published by
THE AMERICAN MUSEUM OF NATURAL HISTORY
New York City

October 17, 1923

56.9,72(118:51.7)

TITANOTHERES AND LOPHIODONTS IN MONGOLIA¹

BY HENRY FAIRFIELD OSBORN

The object of this issue is to describe two of the Upper Eocene mammals first reported by the Third Asiatic Expedition in the Irdin Manha Formation (early Tertiary). It is stated (Granger and Berkey, 1922, p. 5)²: "1.—Small Lophiodonta of at least two species in great abundance. 2.—A perissodactyl about the size of the Upper Eocene titanotheres and possibly related to this family."

This constituted the first notice of the existence of the perissodactyl families Lophiodontidæ and Brontotheriidæ in Mongolia. Later there was reported by Berkey and Granger (1923, p. 12)³ another formation known as the Shara Murun:

"5.—SHARA MURUN. A hundred miles farther south another basin carries fossiliferous strata. The sedimentary area is very large and the best exposures occur along the borders of a 200-foot escarpment. At this place were found titanotheres remains very like those found at Irdin Manha early in the summer, in the Iren Dabasu area. These seem to be, therefore, early Tertiary in age, perhaps as early as Eocene."

The two new species of mammals described herewith appear to indicate that the Irdin Manha formation and the Shara Murun formation are alike of Upper Eocene age and comparable to the Uinta C formation, northern Utah. In 1883 Scott⁴ described *Desmatotherium* and *Dilophodon* as two new Eocene lophiodonts; Osborn later united them with the Middle Eocene *Helaletes* of Marsh; Osborn and Matthew in 1909 (U. S. G. S. Bull. 361, pp. 52, 98) and Peterson in 1919, p. 127,⁵ separated them, and Troxell, 1922, p. 367,⁶ also separated them.

¹Publications of the Asiatic Expeditions of The American Museum of Natural History. Publication No. 11.

²Granger, Walter, and Berkey, Charles P., 1922, 'Discovery of Cretaceous and Older Tertiary Strata in Mongolia,' Amer. Mus. Novitates No. 42, pp. 1-7, 1 text-fig.

³Berkey, Charles P., and Granger, Walter, 1923, 'Later Sediments of the Desert Basins of Central Mongolia,' Amer. Mus. Novitates No. 77, pp. 1-16, map.

⁴Scott, W. B., 1883, 'On *Desmatotherium* and *Dilophodon*, Two New Eocene Lophiodonts,' Contrib. E. M. Mus. Geol. and Arch. Prince. Mus., Bull. III, pp. 46, 47, Pls. v-viii.

⁵Peterson, O. A., 1919, 'Report upon the Material Discovered in the Upper Eocene of the Uinta Basin by Earl Douglas in the Years 1908-1909, and by O. A. Peterson in 1912,' Ann. Carnegie Mus., XII, Nos. 2-4, pp. 40-168, 14 plates.

⁶Troxell, Edward L., 1922, '*Helaletes* Redefined' (Contributions from the Paleontological Laboratory, Peabody Museum, Yale University), Amer. Journ. Sci., III, pp. 365-370, text-figs. 1-3.

We find that the Irdin Manha lophiodont, now reported as extremely numerous, is very close to *Desmatotherium guyotii*, a genus and species distinguished by double internal cones in the upper premolars; in *Helalestes* these cones are single.

***Desmatotherium mongoliense*, new species**

Fam. Lophiodontidæ, Subfam. Helaletinæ

In the Irdin Manha beds, twenty-three miles south of Iren Dabasu, there were discovered on April 26, 1922, parts of ten individuals of a small lophiodont which were described in field letters of Granger as representing an animal very similar to *Helalestes* of the Bridger and Uinta beds of Wyoming and Utah. Now that these materials have reached the Museum and been closely compared with the Lower Eocene *Heptodon* and with the Middle Eocene *Helalestes* and *Desmatotherium*, it is found that Granger's identification is entirely correct. These animals certainly belong to the family Lophiodontidæ, subfamily Helaletinæ of Osborn, and the best preserved specimens, namely, a right maxilla (Amer. Mus. 19161) and a left lower jaw (Amer. Mus. 19162) are selected as the type and paratype. The comparative measurements are as follows:

	Indices
<i>Desmatotherium guyotii</i> (Prince. Mus.)	$P^1-M^2=79$ $M^1-3=44$
" <i>mongoliense</i> , Type	M^2 diams. a-p. \times tr. = 14×15 107
	$P^1-M^2=75e$ $M^1-3=37$
" " Paratype	M^2 diams. a-p. \times tr. = 15×15 100
	$P^2-M^3=67$
<i>Dilophodon minusculus</i> (Prince. Mus.)	$P^1-M^3=42$

It thus appears that the species *Desmatotherium mongoliense* is intermediate in size between *D. minusculus* and *D. guyotii* of the Middle Eocene Bridger beds of Wyoming, as described by Scott in 1883. In revising these Eocene species of the Helaletinæ, Osborn (1892.67, p. 131)¹ pointed out that *Desmatotherium* is defined as follows: "Premolars $\frac{4}{3}$. Third and fourth upper premolars with two internal lobes. Third lobe of the last lower molar variable. Paracone conic, and metacone flattened, symmetrical, of equal length."

The new species from Mongolia is defined as follows: Vestigial P^1 indicated by a small alveolus; P^2 and P^3 with duplicate internal cusps, i.e., tritacone and tetartacone; P^4 with single internal tritacone only, and rudimentary conules; M_3 with a third lobe.

¹Osborn, H. F., and Wortman, J. L., 1892, 'Fossil Mammals of the Wahsatch and Wind River Beds. Collection of 1891,' Bull. Amer. Mus. Nat. Hist., IV, Art. 11, pp. 81-147, 1 plate and 18 text-figs. The definition is under the name of *Helalestes* but is based upon *Desmatotherium*.

Thus this animal is specifically but not generically distinguishable from *Desmatotherium*. Parts of the metapodials, complete calcanea, and complete isolated superior and inferior molar teeth found under the same field numbers support this reference.

Protitanotherium mongoliense, new species

The type (Amer. Mus. 18653) consists of lower jaw with well preserved series of lower grinding teeth, P_2-M_3 , of the right side, also foot bones, belonging to an animal superior in size to *Protitanotherium emarginatum* of the Uinta C beds, Utah, and somewhat inferior in size to *P. superbum* the largest and most robust animal thus far found in the Upper Eocene of Utah and of which only the jaw is known, but the skull of which doubtless presented osseous horns of considerable size. The relative size and proportions of the teeth in these three specimens may be indicated by the following comparative measurements.

		Indices
<i>P. superbum</i> (Amer. Mus. 2501)	$P_2-M_3=296$ $M_{1-3}=214$	
	M_1 diams. a-p. \times tr. = 51×31	61
	M_2 " " " = 62×32	52
	M_3 " " " = 98×42	43
<i>P. mongoliense</i> (Amer. Mus. 18653)	$P_2-M_3=293$ $M_{1-3}=200$	
	M_1 diams. a-p. \times tr. = 50×30	60
	M_2 " " " = 61×34	56
	M_3 " " " = 92×32	35
<i>P. emarginatum</i> (Prince. Mus.)	$P_2-M_3=276$ $M_{1-3}=199$	
	M_1 diams. a-p. \times tr. = 46×29	63
	M_2 " " " = 56×33	59
	M_3 " " " = 94×34	36

The above figures support the statement that *Protitanotherium mongoliense* is intermediate in size between the two Utah species in the total length of its grinding series. The grinding teeth are also intermediate in proportions, as shown by the indices of the three inferior molar teeth; this index tends to establish the generic relationship of the species *mongoliense* to *Protitanotherium* rather than to *Diplacodon*, in which the grinding teeth are relatively narrower. The internal and external aspects of the crowns are also closely similar in *P. superbum* and in *P. mongoliense*; the molarization or transformation of the premolars into the molar pattern appears to be somewhat more advanced in *P. mongoliense* than in *P. superbum*. The premolar measurements and indices are as follows.

				Indices
<i>P. superbum</i>	P_2	diams. a-p.	\times tr. = 28 \times 16	57
	P_3	" "	" = 29.5 \times 21	71
	P_4	" "	" = 34 \times 22	65
<i>P. mongoliense</i>	P_2	" "	" = 28.5 \times 16.5	58
	P_3	" "	" = 31 \times 21	68
	P_4	" "	" = 34 \times 23	68

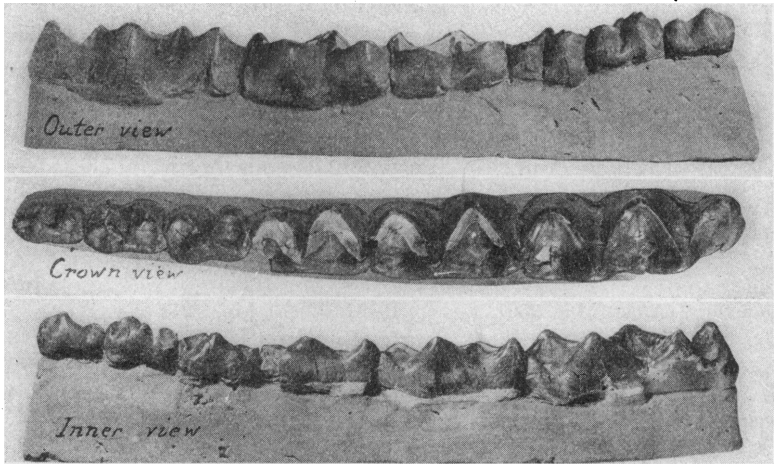


Fig. 1. *Protitanotherium mongoliense*, new species.

Type lower grinding teeth, P_2 - M_3 , of the right side (Amer. Mus. 18653). After a photograph reduced to one-third natural size. From the Upper Eocene of Iren Dabasu, southeastern Mongolia. Amer. Mus. Exped. 1922.

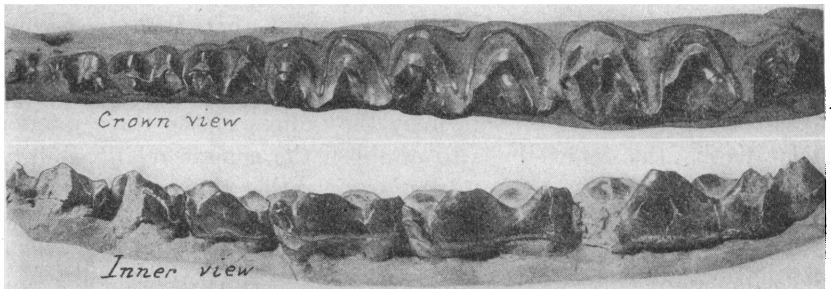


Fig. 2. Type of *Protitanotherium superbum* (Amer. Mus. 2501).

Lower grinding teeth, P_1 - M_3 , of the right side. After a photograph reduced to one-third natural size. From the Upper Eocene of Utah, Uinta C formation. Amer. Mus. Exped. 1895.

It remains to be seen whether these two formations are of similar geologic age. The two species above described give a most interesting American aspect to the fauna of this region of Mongolia in Upper Eocene time.

The Expedition of 1923 adds a large number and variety of titanotheres from Mongolia apparently of Upper Eocene and Lower Oligocene age. This material represents three or four species and probably three genera; the animals are very large, medium, and small. The titanotheres must have been exceedingly abundant. These animals will be described by the present writer in a succeeding number of American Museum Novitates.

