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SERRIDENTINUS AND *BALUCHITHERIUM*, LOH FORMATION, MONGOLIA[1]

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In a thin deposit of olive-colored clays and light gray sandstone resting on the red-banded beds of the Hsanda Gol formation at Loh, and believed to be of Lower Miocene age, were found two highly characteristic fossils:

1) Proboscidean. A fragmentary series of lower mastodont teeth (Amer. Mus. 19152) which first reveals the presence of an undoubted *Serridentinus* in Mongolia, which we name *Serridentinus mongoliensis.*

Serridentinus probably marks the arrival of a proboscidean related to the *M. angustidens* of the Lower Miocene of Europe. Osborn has recently (1923) separated the generic phylum *Serridentinus* as a medium-jawed trilophodont readily distinguished from the true *Trilophodon angustidens* phylum by the trefoil conules arising from the side of the external cones (protoconids) in the lower molars and from the side of the internal cones (protocones) in the upper molars. This trefoil characteristic is clearly displayed in the crown view of $r.m_{2-3}$ (Fig. 1). In the true *Trilophodon angustidens,* as in *Phiomia,* the trefoil conules are directly in the center of the crown. Thus distinguished, *Serridentinus* forms a phylum parallel with *Trilophodon,* which together migrated from Eurasia into North America. Species of *Serridentinus* appear to characterize forested and swampy habitats; they are never found in exactly the same areas as species of *Trilophodon.* We conclude that *Serridentinus* had a different adaptive radiation from *Trilophodon.*

2) Rhinocerotine. The facial portion of a skull (Amer. Mus. 19185) containing three grinding teeth and perfectly preserved nasals, which we name *Baluchitherium mongoliense.*

Serridentinus mongoliensis, new species

TYPE.—Amer. Mus. 19152. A series of right inferior grinding teeth, p_4 (dp_4), m_2, m_3; also one left grinder, m_1 (reversed in drawing); in juvenile condition, dp_4 greatly worn, m_1 partly worn, m_{2-3} embedded in the jaw.

[1]Publications of the Asiatic Expeditions of The American Museum of Natural History. Contribution No. 36.

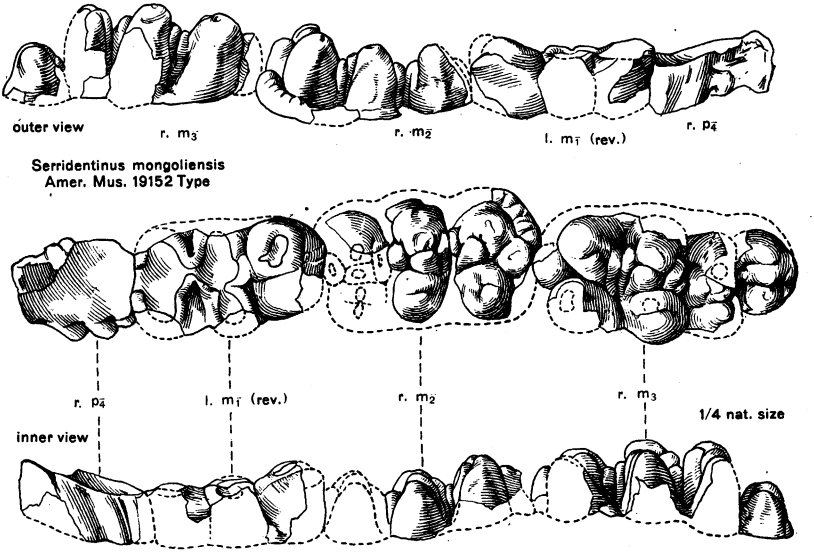

Fig. 1. Type of *Serridentinus mongoliensis* (Amer. Mus. 19152), four lower grinding teeth, p_4 (dp_4)-m_3, Loh formation, ? Lower Miocene, Mongolia.

(Upper) external view. (Middle) crown view. (Lower) internal view. All one-fourth natural size. The teeth are from the right side, except the first lower molar, l. m1 (rev.), which is from the left side.

HORIZON.—Loh formation, ? Lower Miocene, Mongolia.

LOCALITY.—Loh, near camp. Upper olive clays. Found by J. B. Shackelford, July 15, 1922, Field No. 71 (Amer. Mus. 19152).

This is one of the most welcome discoveries of the 1922 expedition, because it serves to demonstrate the arrival of what appears to be a true species of trilophodont mastodon of the phylum *Serridentinus*.

The type specimen was found in an extremely fractured condition and was restored, as shown in figure 1. It required great skill in reconstruction; the restored parts are indicated by dotted lines. The principal measurements in millimeters, all estimated, and indices (I.) are:

p_4 (dp_4)–m_3 inc. =	420e
p_4 (dp_4), much worn,	ap. 65, tr. 51, I. .78
m_1, left,	ap. 99, tr. 58, I. .59
m_2, right,	ap. 108, tr. 59, I. .55
m_3, right,	ap. 138, tr. 63, I. .46

Comparing these measurements and indices with those of the type of *Serridentinus* (*Mastodon*) *productus* Cope from the Upper Miocene of Texas, we observe the following:

	p_4 (dp_4)			m_1			m_2			m_3		
	ap.	tr.	I.	ap.	tr.	I.	ap.	tr.	I.	ap.	tr.	I.
Upper Miocene												
Serridentinus productus type, and referred m^3	55	43	78	93	63	68	138	75+	54	163[1]	76[1]	46[1]
?Lower Miocene												
Serridentinus mongoliensis type,	65[1]	51[1]	78[1]	99[1]	58[1]	59[1]	108[1]	59[1]	55[1]	138[1]	63[1]	46[1]

As compared with *S. productus*, the type of *S. mongoliensis* is a smaller animal, m_{1-3} measuring 340 mm. *S. mongoliensis* is also less progressive, each loph consisting of four conelets (by reduplication of the two primary cones, corresponding with the protoconid and metaconid in each loph), and two large trefoil conules on each side of the external cones (corresponding with the protoconid). More in detail: the crown of dp_4 is entirely worn off; the crown of left m_1 is largely worn off; in the crown of m_2 the protolophid is wanting; the metalophid has the typical structure described above, namely, four conelets, two trefoil conules; in the tritolophid the cones are less distinctly paired into conelets, there is a small anterior trefoil conule and a large posterior. In the right m_3, the protolophid has a very large anterior trefoil conule, a small posterior; the metalophid is typical, consisting of four symmetrical conelets and two symmetrical trefoil conules; the tritolophid is less progressive; the tetartolophid is depressed and consists of three main conelets. These specific characters may be verified by applying the magnifying lens to figure 1.

As shown in the comparative table above, the tooth proportions of *S. mongoliensis* are very similar to those of *S. productus;* we may thus readily designate the specific stage.

SPECIFIC CHARACTERS.—Ridgecrest formula of *S. mongoliensis:* $Dp4_{?\frac{2}{2}}$ $M1_{\frac{3}{3}}$ $M2_{\frac{3}{3}}$ $M3_{\frac{4}{4}}$. In each typical ridgecrest (e.g., the metalophid) three conelets and two trefoil conules attached to the external cones. Molar proportions as in *S. productus*.

Baluchitherium mongoliense, new species

TYPE.—Amer. Mus. 19185. Anterior portion of skull including right zygoma, complete orbit, frontals, nasals and portions of four grinding teeth, p^4–m^3. The type fortunately preserves the long, smooth and beautifully arched nasal bones, which, with the relatively complete smooth frontals, indicate the entire absence of horns. In profile view the facial region is similar to that of the type of *Baluchitherium grangeri*[2] except that the nasals are more prominently arched and exhibit a lateral flange not

[1]Estimated.

[2]Osborn, H. F. 1923. "*Baluchitherium grangeri*, a Giant Hornless Rhinoceros from Mongolia." Amer. Mus. Novitates, No. 78. Contribution No. 8, Asiatic Expeditions of The American Museum of Natural History.

observed in the former species. The type skull of *B. mongoliense* indicates an animal little more than half the size of the type skull of *B. grangeri*, the actual proportions being clearly indicated in the following comparative measurements:

	Baluchitherium grangeri mm.	*Baluchitherium mongoliense* mm.
Length, fourth superior premolar to third molar, p^4-m^3	288	163[1]
Fourth superior premolar, p^4, anteroposterior	52	32
Fourth superior premolar, p^4, transverse	92	42
Nasals, length from tip of nasals to maxillary suture	334[1]	224
Facial height above orbit	430	220

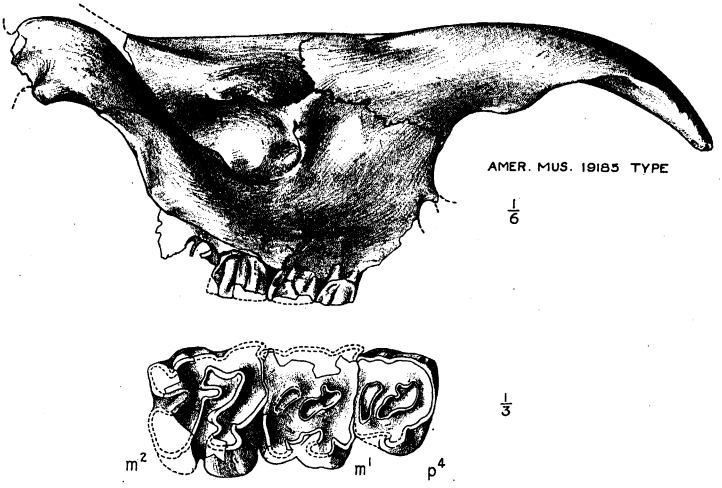

Fig. 2. Type of *Baluchitherium mongoliense* (Amer. Mus. 19185), anterior portion of skull, Loh formation, ? Lower Miocene, Mongolia. Skull one-sixth natural size. Crown, p^4-m^2, one-third natural size.

HORIZON.—Loh formation, ? Lower Miocene, Mongolia.

LOCALITY.—Loh, upper light gray sandstone, approximately the same level as hind foot of *?Rhinoceros* (Amer. Mus. 19151). Found by R. C. Andrews, July 1, 1922, Field No. 67.

DESCRIPTION.—These measurements indicate that *B. grangeri* is not far from double the size of *B. mongoliense*. Size, however, is not a reliable specific character. A very marked specific distinction is found in the progressive condition of the protoloph and metaloph in the fourth superior premolar, p^4, of *B. mongoliense;* the protocone is constricted as in m^1; the metaloph is elongate and develops a crista; thus the fourth premolar of *B. mongoliense* is much more progressive than the fourth premolar

[1]Estimated.

of *B. grangeri* (compare Osborn, *op. cit.*, Fig. 4C) in which the protoloph extends into a broad simple loop around the inner side of the abbreviated metaloph, as in Oligocene aceratheres generally. An additional character is the apparent hypsodonty of the molar teeth, the crown of m^2 showing the following measurements: ap. 45 mm., tr. 44 mm., index .98; height of ectoloph 39 mm.; protocones strongly constricted in m^{1-2}; prominent postcrochet on the metaloph.

SPECIFIC CHARACTERS.—Nasals strongly arched with lateral flange. P^4 submolariform with constricted protocone, a metaloph and crochet. Molars subhypsodont with constricted protocone, antecrochet and crochet. Type cranium about half the size of the type skull of *B. grangeri*.

REFERRED RHINOCEROTINE PES

In the same horizon with the type skull of *B. mongoliense* and in the upper olive clays, Loh formation, was found the pes labeled "?*Rhinoceros*, hind foot, found by J. B. Shackelford, Field No. 50, Amer. Mus. 19151, June 27, 1922." This pes certainly belongs to a different individual and probably to a different species. It includes the astragalus, calcaneum, cuboid, navicular, ectocuneiform, mesocuneiform and metatarsalia II, III, IV. Unfortunately, the metatarsals are incomplete below, so that we cannot estimate their length, although it would not appear from Mts. IV that the metapodial was extremely elongate as in *B. grangeri*. The foot is undoubtedly rhinocerotine.

NOTES by W. D. Matthew (October 3), "I regard the above descriptions as erroneous in two points:

1. The distinction that you draw between teeth of your *Serridentinus* and *Trilophodon* phyla appears to me non-existent, as both *Trilophodon* and *Phiomia* have the cusp construction that you ascribe to *Serridentinus* alone.

2. The molars of "*Baluchitherium*" *mongoliense* are so widely different from *B. grangeri* that I cannot believe there is any near relationship. On the other hand, both molars and premolars show a marked approach to the Cœlodonta group in the hypsodont wavy ectoloph and in many other details. Of course I am fully aware of the superficial resemblance to *Baluchitherium* in the nasals, but would rather expect to see some such construction in a hornless member of the Cœlodonta group."