

NOTICE OF A NEW PALEOCENE MAMMAL, A POSSIBLE RELATIVE OF THE TITANOTHERES.

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While recently in the vicinity of old Fort Union, (Buford), North Dakota, Dr. Vernon Bailey, of the United States Biological Survey, made an accidental discovery of a few associated fossil teeth and jaw fragments which he found in the bad land deposits, of Fort Union age (Paleocene) at that locality. This proves to be an important find, as the specimen represents a mammal of much larger size and apparently of different ordinal affinities than any hitherto reported from this horizon. The specimen has been kindly presented to the United States National Museum by Doctor Bailey, and is here described.

TITANOIDES, new genus.

Lower molars brachyodont-lophodont; with the **W** pattern characteristic of the Titanotheres but; with talonid less elevated than trigonid; paraconid elevated and well separated from the metaconid so that the anteroposterior diameter of the trigonid is but slightly less than its transverse; last molar largest, the series gradually diminishing in size forward; hypoconulid present in m_3 but this tooth has no true third lobe; premolar with molariform (i. e. **V** shaped) trigonid but with talonid rudimentary; jaw symphysis relatively short, wide and shallow, not sutured; canine, as indicated by a portion of the alveolus preserved, appears to have been of about the same relative size and position as in the Titanotheres.

Type of the genus.—*Titanoides primaevus*, new species.

TITANOIDES PRIMAEVUS, new species.

Plate 36, figs. 1,2.

Type.—Lower m_2 and m_3 , anterior half on m_1 and $p(?)_4$, all of the right side; a portion of m_2 of the left side; and two portions of the jaw symphysis. (Cat. No. 7934 U.S.N.M. Coll.). While the teeth are all detached there is no reasonable doubt that they and the jaw portions belong to a single individual.

Type-locality.—Bad Lands, about 3 miles northeast of Buford (Fort Union of early days), North Dakota.

Horizon.—Paleocene, Fort Union formation (type section).

Diagnosis.—Teeth indicate an animal about the size of the smaller *Paleosyops* of the Bridger or of one of the smaller species of *Caenopus* of the Oligocene; talonid of last molar relatively elongated with large hypoconulid which shows distinct evidence of budding off to form a third lobe; talonid of molars relatively low and narrower than the trigonid; basal cingulum continuous except on lingual border of crowns, talonid of $p(?)_4$ rudimentary being little more than a cingulum cusp situated almost in line with the inner cusps row at the base of the metaconid; cusps of the trigonid, both in the molars and in p_4 , relatively high and pointed.

Measurements.

	Anteroposterior.	Transverse.
M_1	22.5+	15.5
M_2	27	19
M_3	32.8	19.4
$P_4(?)$	5	14.5

Discussion of characters and possible relationships.—The specimen constituting the type above described while very fragmentary fortunately is of a young adult in which only m_1 of the tooth series shows any degree of wear and all the teeth are well preserved, hence what characters they possess are not confused.

This species represents by far the largest mammal yet known from the Paleocene. The teeth are about one-third larger than those of the largest species of *Pantolambda* of this horizon, and about equal those of *Coryphodon simus* of the Wasatch or one of the smaller species of *Caenopus* of the Oligocene.

In the absence of other parts of the skeleton to substantiate the evidence of tooth characters, the ordinal position of this animal admittedly does not stand on unassailable grounds. However these teeth from the Fort Union seem certainly to be those of an ungulates and their general characteristics suggest Titanotheres affinities.

Compared in detail with the Titanotheres they present similarities, which, when the much older horizon and consequently more primitive stage of development is considered, are rather striking. These similarities consist in (1) the like relative proportions of the molars to each other in the series; (2) the correspondence in form and general contour of the triconid and talonid, both of which are V shaped and uniting form the W pattern characteristic of the Titanotheres lower molars; (3) the cingulum development is like that observed in those Titanotheres in which this element is present; and (4) the bone fragments show the lower jaw to be of heavy massive type, with broad, shallow and unsutured symphysis, while the canine and submental

foramen are in about the same relative positions respectively as in the Oligocene Titanotheres.

The principal differences observed are: (1) The relatively low and less transversely expanded talonid (in *Paleosyops* the talonid is also depressed, slightly in the molars, very pronouncedly in the premolars); (2) the somewhat greater angulation of the principal cusps of the trigonid; (3) the rudimentary condition of the talonid of p_4 ; and (4) the absence of a third, or heel lobe of the last molar. These morphological differences and especially the last two cited, are undeniably very considerable, yet it seems to me they may all be attributed to the more primitive stage in which we find the teeth of *Titanoides*.

In a general way the teeth of *Titanoides* also resemble those of the Amblypoda. Especially is this noticable in the form of the premolar, which is in the same stage of development as the corresponding one of *Coryphodon*. Comparing the teeth of *Titanoides* with those of *Pantolambda*, *Coryphodon*, and *Uintatherium*, however, they show the following important differences, and be it noted these same differences are observable in comparing the Titanotheres with the Amblypoda. In the Amblypoda the basal cingulum, when present, is confined to the anterior and posterior borders of the tooth crown, continuous in the Fort Union species; trigonid short, its anteroposterior diameter being much less than that of the talonid, trigonid and talonid about equal in length in *Titanoides*; paraconid small and low in *Pantolambda*, much depressed and vestigial in *Coryphodon*, and *Uintatherium* relatively high, prominent and well separated from the metaconid in *Titanoides*.¹ The Amblypoda are further distinguished (1) by the progressive tendency to depression of the anterior lophs of the trigonid and talonid respectively in *Pantolambda* and finally to their almost entire disappearance in *Coryphodon* and the Uintatheres where the teeth have developed two subequal cross lophs with an open valley between; and (2) by the development on the talonid of a low median shelf, or spur, which is incipient in *Pantolambda*, well masked in *Coryphodon* and the Uintatheres.

From the above it will be seen that, whether related to the Titanotheres or not, the teeth of *T. primaevus* have no amblypod characteristics, and the line of development marked out is evidently fundamentally different from that observed in the Amblypoda.

It is unfortunate that the upper dentition of *T. primaevus* is not known, since this series is usually more characteristic than the lower, and therefore more reliable for purposes of group determination. However, because of certain definite mechanical relationships between cusps of corresponding upper and lower cheek-teeth in mammals, the

¹ In the Chalicotheres, which also resemble the Titanotheres in some respects, the paraconid is depressed while the entoconid is high and prominent.

main features of either series can be predicted with some degree of accuracy by a critical study of the opposing series. This is true especially as regards the number, relative size, general form and proportions of the principal cusps.

To those who have studied tooth structure it is well known that the trigonid of the lower molar bites on the inner side of the tooth row and between or over the interspaces of the molars of the upper series, in forms of the interlocking brachyodont type. The talonid, when present, is opposed to the protocone of the corresponding upper

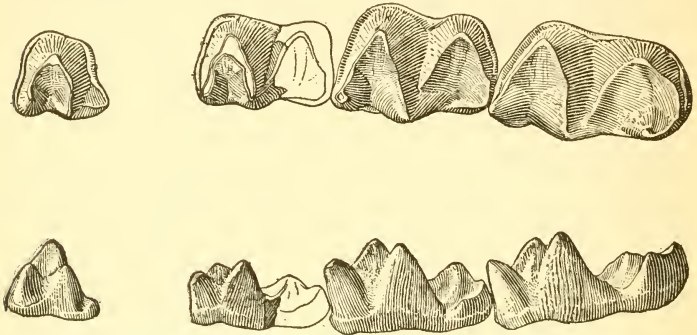


FIG. 1.—LOWER CHEEK-TEETH OF *TITANOIDES PRIMAEVUS*. NATURAL SIZE.

molar, and the development of the hypocone is always correlated with and contingent upon the development, in the lower series, either of the entoconid of the corresponding tooth or the paraconid of the next tooth behind. Also the hypoconid bites into the middle basin of the upper tooth crown between the paracone and the metacone.

Based on these known relations of cusps, I have attempted a construction in clay of the upper series (see fig. 2, pl. 36) of the side corresponding to the lower teeth of the type (see fig. 1, pl. 36). The details as worked out are of necessity largely conjectural and will probably prove incorrect. I feel considerably more confident, however, regarding the main features.

Thus constructed these upper teeth are decidedly titanotheroid in general form and structure. The principal characteristics obtained are: (1) The paracone and metacone are higher than the cusps of the inner row and are selenodont in form; (2) to conform with the two shallow basins of the lower molars, namely, the larger one of the talonid, and the smaller and higher one of the trigonid, all the upper molars have low, broad, conate protocones, and m^1 and m^2 small but well-defined hypocones; (3) p^4 and p^3 are wide and short, and are composed of two main cusps, the outer (paracone) high and the inner (protocone) low. If the lower premolar of the type is properly identified as p_4 , the p_4 above had probably not yet developed the

second main cusp of the outer row, since the former has no functional talonid.

While it is freely admitted that the foregoing observations on the possible structure of the upper cheek-teeth can not be submitted as evidence in the present case, they seem to lend some weight to the conclusions at which I have arrived concerning the probable affinities of this new mammal from the Fort Union.

These conclusions may thus be briefly summarized: From the evidence at hand I conclude that *Titanoides primaevus* can not be classed with the Amblypoda, that it is probably a Perissodactyl, and certain features make it not improbable that it is rather closely related to the Titanotheres. Future discoveries, however, may prove that its relationship is so remote as to necessitate the establishment of a new family for the reception of this genus.

EXPLANATION OF PLATE 36.

Fig. 1.—*Titanoides primaevus*, page 431. Crown view of lower cheek-teeth. Type, $\times \frac{3}{8}+$. Cat. No. 7934 U.S.N.M. Coll.

Fig. 2.—Cast of restoration representing conjectural upper cheek-teeth of *Titanoides primaevus*. $\times \frac{3}{8}+$. Page 434.

Fig. 3.—Bad Lands about 3 miles northeast of Buford, North Dakota. X indicates the spot where the type of *Titanoides primaevus* was found.



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A NEW PALEOCENE MAMMAL FROM NORTH DAKOTA.

FOR EXPLANATION OF PLATE SEE PAGE 435.

