

X. SOME UNDESCRIBED REMAINS OF THE UINTA TITANOTHERE DOLICHORHINUS.

BY O. A. PETERSON.

The present paper is based upon the remains of an individual found by the writer in 1912 in a shaly stratum of the upper series of Horizon A of the Uinta Eocene on White River, Uinta County, Utah. The locality at which the specimen was found (a canyon leading into White River) is the one where Mr. E. S. Riggs and party from the Field Museum of Natural History, in 1910 secured a portion of the collection upon which a paper was published by Mr. Riggs.¹

Dolichorhinus longiceps (?) Douglass. Annals of the Carnegie Museum, Vol. VI, 1909, p. 312.

The specimen (No. 2865) consists of the greater portion of the skull, the posterior part of the mandible of the left and fragments of

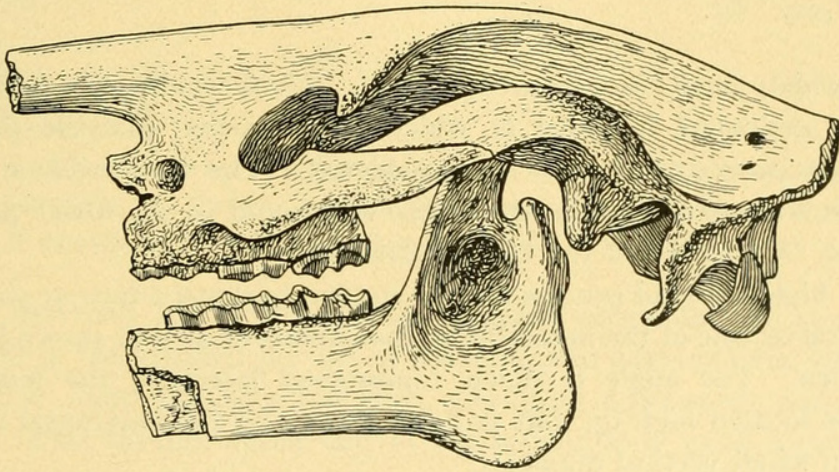


FIG. 1. *Dolichorhinus longiceps* (?) Douglass, No. 2865, $\frac{1}{6}$ nat. size.

the right side, the hyoid arch, the cervical vertebræ, two dorsal and two lumbar vertebræ, together with the fore limb and foot practically complete.

¹ "New or Little Known Titanotheres from the Lower Uinta Formation," Field Museum of Natural History, Publication 159, 1912, pp. 17-41.

THE CRANIUM AND MANDIBLE.

The cranium is somewhat smaller than the type of *Dolichorhinus longiceps*, the sagittal area of the parietals is more compressed laterally, the zygomatic portion of the squamosal is slenderer and less expanded laterally, and the basicranial axis has a greater bend.² These characters together with the slightly larger teeth constitute the most marked differences in the two crania compared, but that they should be regarded as of specific value is rather questionable.

The sudden downward bend of the occiput of *Dolichorhinus heterodon*, the flatter frontal region, the smaller pre-orbital ledge, and the smaller and more delicate nasals seem to separate that species

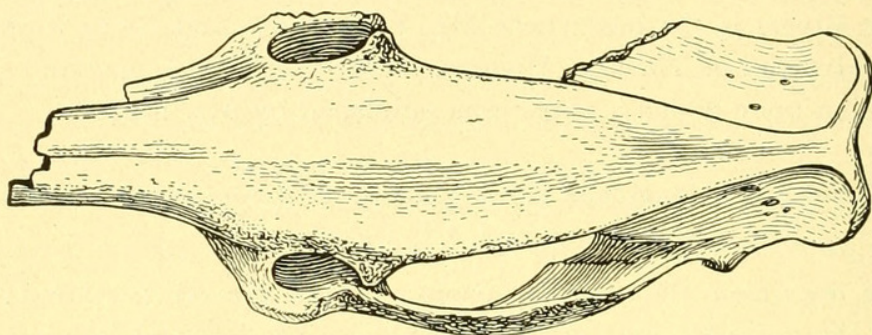


FIG. 2. *Dolichorhinus longiceps* (?) Douglass, No. 2865. Top view of cranium. $\frac{1}{6}$ nat. size.

more widely from the present specimen. Furthermore, the difference in the geological horizons in which *D. heterodon* and the present specimen were found is to be considered. The former came from horizon "Lower C" while the latter was found in the lower part of horizon "Upper A" of the Uinta sediments.

The high coronoid process and its sudden backward turn at the top, so characteristic of the mandible of *Dolichorhinus*, is well shown in this specimen. The angle is much compressed laterally, the temporal fossa is located high up, but is quite deep, and the horizontal ramus has but small vertical diameter.

THE HYOID ARCH.

The hyoid arch may best be compared with that of the tapir, because in that genus there is apparently no extended anterior appendix or process such as is seen on the basihyal of the horse or the

² The base of the skull has received some crushing fore-and-aft, a fact to which the greater curvature of the basicranial axis may partly be due.

rhinoceros. However, the bone as a whole, especially its anterior border, is relatively heavier than in the tapir. The thyrohyal is unfortunately broken off on both sides. This element was perhaps relatively less developed than in *Tapirus terrestris*. The ceratohyal is also unfortunately broken off at the upper end, but its length was no doubt proportionately equal to that of the American tapir, while the shaft is less constricted antero-posteriorly. The epihyal is not present; this bone no doubt was nodular in character, as is the case in *Tapirus terrestris*. The anterior portion of the shaft of the stylohyal is rounder in cross-section than in the tapir or the horse, but the upper

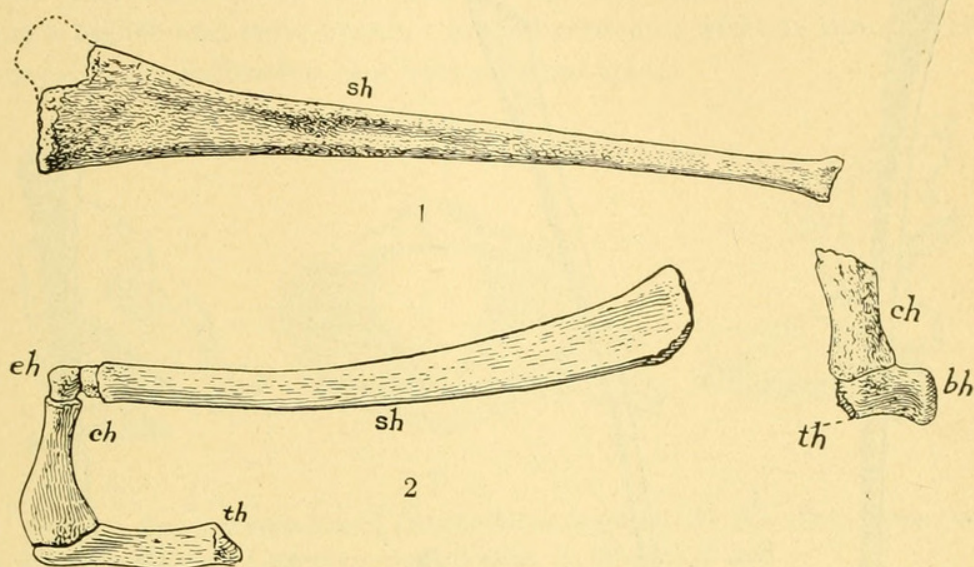


FIG. 3. Side view of hyoid apparatus. Figs. 1 and 3. *Dolichorhinus longiceps* (?), No. 2865; Fig. 2. *Tapirus terrestris*, $\frac{1}{2}$ nat. size. *th* = thyrohyal, *bh* = basihyal, *ch* = ceratohyal, *eh* = epihyal, *sh* = stylohyal.

end is flattened and terminates in enlarged processes, the superior attached to the hyoidial portion of the temporal bone and the inferior somewhat more obtusely rounded, extending downwards and outwards. This rib-like upper end of the stylohyal is more suggestive of the rhinoceros or the horse than of the tapir. * (See Figs. 3 and 4.)

MEASUREMENTS.

Length of skull from anterior border of the orbit to top of occiput.	365 mm.
Antero-posterior diameter of upper molar series.	125 "
Transverse diameter of frontals at postorbital processes.	145 "
Depth of mandible at M_3	71 "
Length of stylohyal, approximately.	168 "
Antero-posterior diameter of basihyal, median line.	15 "

THE VERTEBRÆ.

The Atlas.—In comparing the atlas with that of *Diploceras osborni* Peterson,³ it is at once observed that the bone is proportionally higher and longer, but of a less transverse diameter, which is due chiefly to the shorter transverse process in the present genus. The anterior cotyle is on the whole very nearly as large as, but is deeper than, in *Diploceras*, and its inferior surface is more distinctly separated. The

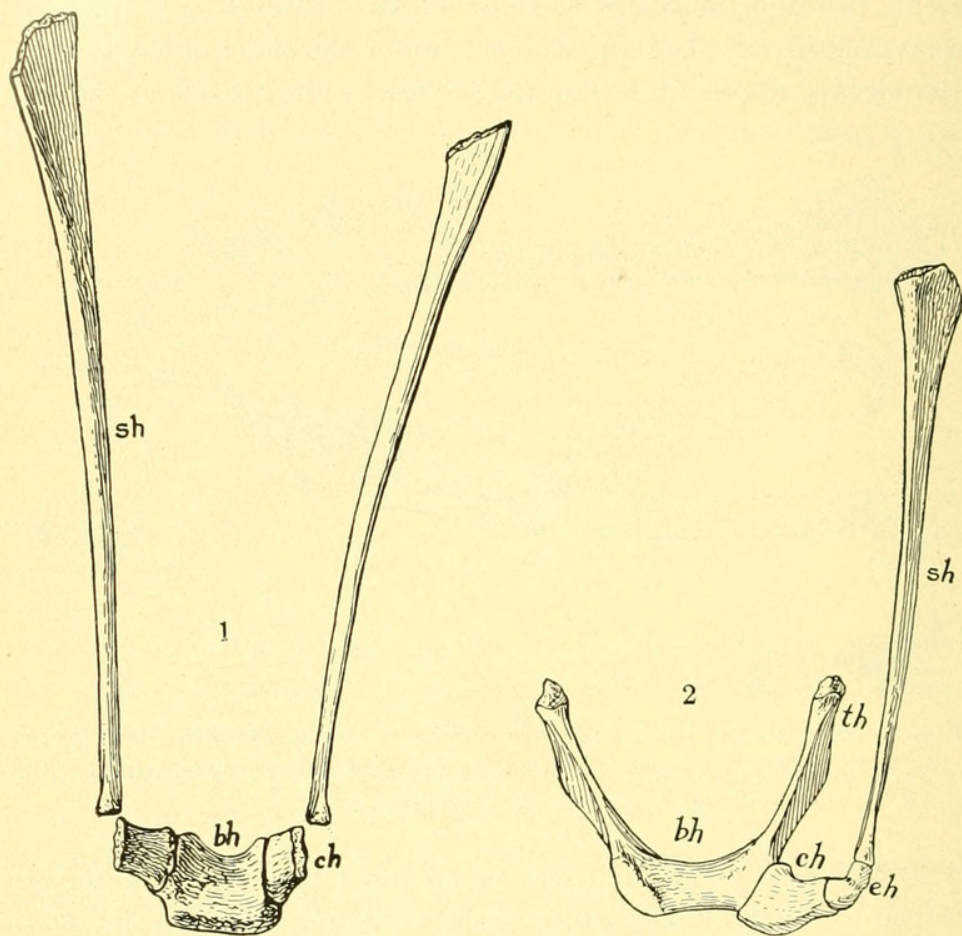


FIG. 4. Hyoid apparatus. 1. *Dolichorhinus longiceps* (?), No. 2865; 2. *Tapirus terrestris*, $\frac{1}{2}$ nat. size. bh = basihyal, th = thyrohyal, ch = ceratohyal, eh = epihyal, sh = stylohyal.

odontoid process of the axis is proportionally longer and reaches nearly through the inferior arch of the atlas, while in *Diploceras* it does not. The articulation for the axis is much deeper than in *Diploceras* and not nearly as broad, in this respect more nearly suggesting the condition found in some rhinoceroses (*Diceratherium*) than the horned

³ ANN. CARNEGIE MUSEUM, Vol. IX, 1914, pp. 37-38.

titanotheres. The transverse process is pierced by a large foramen, unlike *Diploceras*, in which this canal is small, or completely absent.

The Axis.—The body of the axis is possibly somewhat longer than in *Diploceras*, the anterior opening of the arterial canal located further back, and the postzygapophysis is smaller and less rounded in outline, while the neural spine and the ventral keel have approximately the same general proportions. The other cervical vertebræ present no characters of sufficient importance to mention in this connection.

The dorsal vertebræ.—The first dorsal has a short depressed centrum and a prominent keel. The spine and transverse processes are broken off. The other dorsal vertebra belongs well back in the series and has a higher and more evenly rounded centrum, without ventral keel, but with the indication of a heavy neural spine.

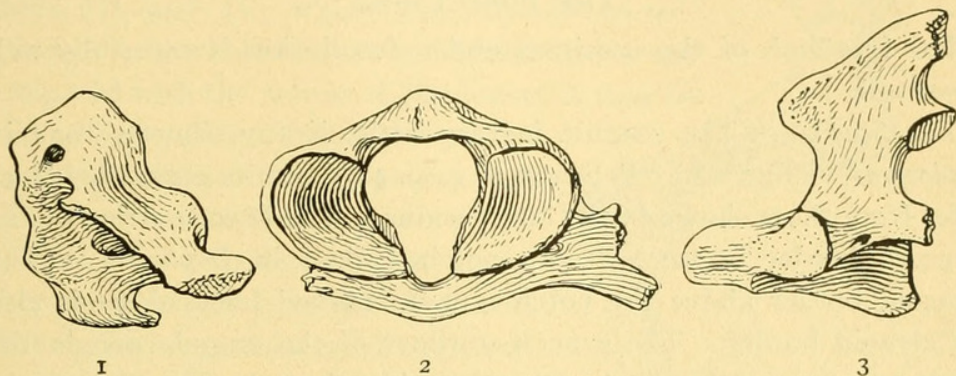


FIG. 5. Cervical vertebræ of *Dolichorhinus longiceps* (?) No. 2865, $\frac{1}{4}$ nat. size. 1 left side of atlas; 2, anterior view of atlas; 3, left side of axis.

The lumbar vertebræ.—The two last lumbar vertebræ are present; the body of the last being depressed, as is usual in the case of the last lumbar, and has also the neural spine suddenly reduced in the fore-and-aft direction. The transverse process of the same vertebra is quite heavy and projects outwards and forwards. Near the base of the process on the posterior face there is a heavy and rounded process, which possibly came in close contact with a similar process on the anterior face of the pleurapophysis of the first sacral vertebra.

When the vertebræ described above are compared with the vertebral column of *Dolichorhinus*, illustrated by Professor Osborn,⁴ it appears that the neural spine of the atlas of the specimen in New York is more prominent, while the position of the transverse process and the

⁴ *Bull. Amer. Mus. Nat. Hist.*, Vol. XXIV, 1908, p. 612.

anterior exit of the vertebrarterial canal of the axis appear to be the same in the two specimens. The cervical series as a whole appear to be slightly shorter in the specimen preserved in New York. No other comparison is possible, as there is no description of these parts in Professor Osborn's paper.

MEASUREMENTS.

Atlas, greatest antero-posterior diameter	105 mm.
Atlas, greatest transverse diameter, approximately	180 "
Atlas, greatest vertical diameter	88 "
Axis, antero-posterior diameter of centrum, odontoid process included . .	95 "
Axis, height, including neural spine	125 "
Cervical region, total length, approximately	395 "

THE FORE LIMB.

The fore limb of the specimen under description is especially well preserved.

The Scapula.—The scapula is very little, if any, shorter than in *Diploceras*, as figured by Peterson (*l. c.*, p. 42),⁵ but its general outlines differ from those shown in the latter genus. The lower portion of the coracoid border is more deeply notched than in *Diploceras*. The coracoid border above the notch is more curved forward, as is also the glenoid border. The general outlines of the scapula are on the whole more suggestive of the *Rhinocerotidæ* than the *Titanotheres*.

The Humerus.—The humerus is short and heavy. The bone is comparatively shorter than in *Diploceras*. Unfortunately, the greater tuberosity is broken on the postero-lateral face, but near the deltoid groove the superior face is complete and indicates very plainly that the tuberosity is not as high as in *Diploceras*. The lesser tuberosity accords more nearly with that shown in the latter genus. The deltoid groove is also of about the same size in the two genera here compared. The deltoid ridge is less prominent in *Dolichorhinus*, while the distal end of the bone is quite nearly alike in the two genera.

The Radius and Ulna.—The radius and ulna are much shorter than in *Diploceras* and proportionally also much heavier. There is a tendency to coössification of the two bones in the present specimen, the shaft is rounder, and the articulation for the humerus is less deeply excavated than in *Diploceras*. In comparing the ulna of the

⁵ The length of the scapula of *Diploceras* is conjectural, as the upper and lower portions do not pertain to the same bone.

two genera in more detail, it is seen that there is a less developed tubercle on the outer margin of the tendinal groove of the olecranon process in *Dolichorhinus* than in *Diploceras*. In consequence the groove is not as well defined in the genus under description, though the termination of the olecranon process is fully as well developed. In *Dolichorhinus* there is a greater constriction of the olecranon between the upper border of the great sigmoid notch and the termination of the process than is seen in *Diploceras*. Otherwise the ulna is quite similar in the two genera.

The Manus.—The manus of the specimen under description is complete with the exception of the ungual phalanges and the proximal phalanges of digits III and IV, which were not recovered. The foot as a whole is short and broad, and, when compared with the manus of *Diploceras*, it may be said to be heavier. In comparing the carpal elements of the two genera it is at once observed that they are all of greater height in the present genus than in *Diploceras*, which indicates that the latter genus was already well advanced in the direction of the low and broad carpals of the Oligocene Titanotheres. The distal ulnar angle (the articulation for the magnum) of the scaphoid of *Dolichorhinus* is produced more downwards, but is of smaller size than in *Diploceras*. The region of the upper facet for the lunar on the ulnar face is also more overhanging in the ulnar direction than in *Diploceras*, this is especially noticeable if the scaphoid of *Dolichorhinus* and

that of the Titanotheres of the Oligocene formation in the Carnegie Museum are compared. The lunar has a rather unusually broad contact with the unciform and a narrow and more nearly vertically placed facet for the magnum. A third feature of the lunar is the limited posterior extent of the facet for the unciform, and the lack of

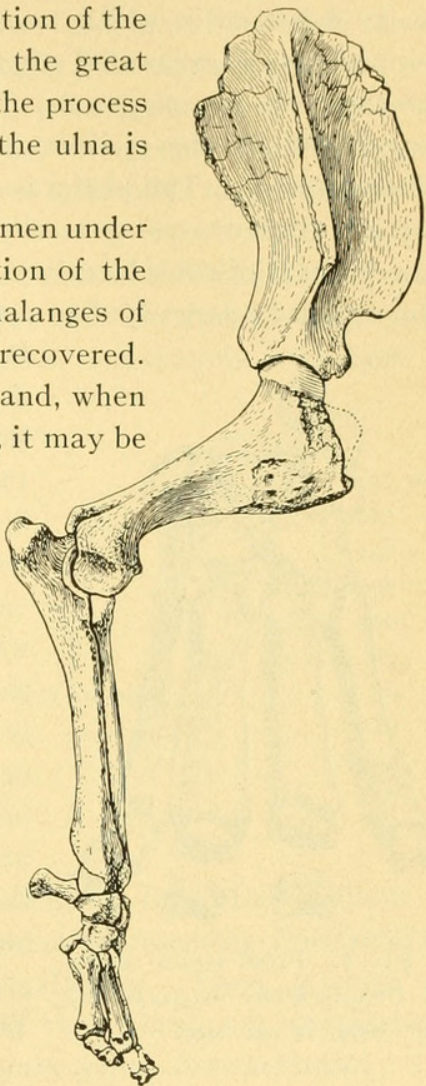


FIG. 6. Right fore limb of *Dolichorhinus longiceps* (?), No. 2865, $\frac{1}{6}$ nat. size.

the deep excavation of this facet posteriorly, so characteristic of the Oligocene Titanotheres. Unfortunately these features cannot here be compared with *Diploceras* as the lunar is wanting in the type of that genus, but when compared with the Oligocene Titanotheres one notices especially that the facets of the unciform and magnum are more nearly subequal in width, and the posterior portion of the facet for the unciform is excavated equally as much as the posterior portion of the facet for the magnum. The cuneiform carries a proportionally large facet for the pisiform and the bone is much higher than in *Titanotherium*. The pisiform differs from that of *Diploceras* and the horned titanotheres generally by being relatively heavier. The trapezium is of considerably large size and carries three facets on the ulnar angle; a large median surface for the trapezoid, and two smaller

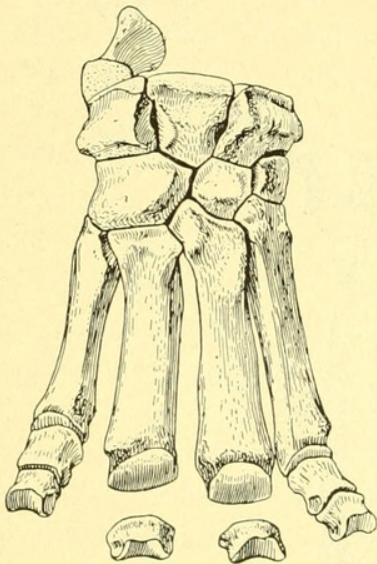


FIG. 7. Front view of manus of *Dolichorhinus longiceps* (?), No. 2865, $\frac{1}{3}$ nat. size.

facets separated from the larger by well defined ridges and articulating, one with the scaphoid, and the other with Mc. II. the dorso-palmar angle of the trapezoid bears indication of coming in contact with the lateral face of the posterior elevated facet of the magnum, a condition which is much more clearly revealed in the Oligocene Titanotheres, where there is a decided facet on the posterior superior face.⁶ With the exception of the nearly vertical articular facet for the unciform, the broader palmar hook, and the greater height of the magnum, this bone differs in comparatively slight degree from the same bone in *Titanotherium*. The magnum is wanting in the type material of *Diploceras*. The unciform

presents its most noticeable difference from the Oligocene Titanotheres in its greater height and in the proximal articulations. Although the facets for the cuneiform and lunar are separated by a prominent ridge, there is not found in *Dolichorhinus* that large hemispherical tubercle, which separates the two facets in the unciform in *Titanotherium*.

⁶ In comparing the trapezoid of the paratype of *Diploceras* I find that it has a larger facet in this region than is present in the type and is perhaps much better developed in that genus than in *Dolichorhinus*.

The metacarpals in proportion to the carpals, are shorter than in *Diploceras*. The metapodial keel of Mc. II is less oblique to the long axis of the bone than that in *Diploceras*, otherwise the differences between these two genera are slight. The head of Mc. III differs from that in *Titanotherium* by having the ulnar portion more squarely truncated, and by the much smaller size of the facet for Mc. II on the radial angle. Mc. IV presents only slight differences from the corresponding bone in *Titanotherium*. In its general details Mc. V is quite similar to the same bone in *Diploceras*, but proportionally shorter.

As in *Diploceras* and the Titanotheres generally, the phalanges are short, broad, and depressed.

In comparing Professor Osborn's restoration of *Dolichorhinus*⁷ with the above described fore limb it appears that the foot of the present specimen is shorter, while the radius, ulna, and scapula are longer.

MEASUREMENTS.

Total length of scapula.....	337 mm.
Total length of humerus head to distal end.....	285 "
Total length of ulna.....	340 "
Total length of radius.....	295 "
Total length of manus, approximately.....	200 "
Height of tarsus at unciform and cunciform.....	59 "
Transverse diameter of carpus at proximal row of carpals.....	90 "
Greatest length of Mc II.....	116 "
Greatest length of Mc III.....	124 "
Greatest length of Mc IV.....	109 "
Greatest length of Mc V.....	95 "

Since writing the above paper I received from Dr. William K. Gregory some outline tracings of material representing *Dolichorhinus* in the American Museum of Natural History. These tracings are especially welcome, since they show that there are considerable variations in the length of the limb of the genus *Dolichorhinus*. The humerus,⁸ and the radius, and ulna of specimen No. 1961 in the American Museum very nearly agree in general length with those of No. 2865 in the Carnegie Museum, while the fore foot of the former specimen is considerably longer than in the latter. On the other hand the specimen No. 13164 (American Museum) from the (?)

⁷ *Bull. Amer. Mus. Nat. Hist.*, Vol. XXIV, 1908, p. 612.

⁸ There seems to be a better development of the deltoid ridge of the humerus in No. 1961, in the American Museum than in No. 2865 in the Carnegie Museum.

Washakie (B) indicates that the humerus is relatively longer and the fore foot shorter than in the fore limb of *Dolichorhinus* in the Carnegie Museum, which is described in this paper.

Mesatirhinus, No. 10013, in the Museum at Princeton, has, according to an outline tracing, also sent me by Dr. Gregory, a proportionally longer fore foot than *Dolichorhinus*, and the facet for the magnum on the lunar is more vertical.

CARNEGIE MUSEUM,

June 26, 1914.



Peterson, Olof August. 1914. "Some undescribed remains of the Uinta Titanothera, Dolichorhinus." *Annals of the Carnegie Museum* 9(1-2), 129–138.
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