

# A FOSSIL RHINOCEROS (*DICERATHERIUM ARMATUM* MARSH) FROM GALLATIN COUNTY, MONTANA

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The United States National Museum has in its collections a partial skull of a rhinoceros (No. 11682), consisting of the front with nasals and most of the upper cheek teeth. Associated are two skull fragments, one including the right glenoid region, the other the left glenoid region, the skull roof, and the basisphenoid. The material was collected by C. A. Kinsey, of Belgrade, Mont., about 2 miles south by west of the present town of Three Forks and 1½ or 2 miles west of the Madison River. The position (see 1928 U. S. Forest Service map of Gallatin National Forest) is in sec. 11, T. 1 N., R. 1 E., at the end of a point jutting out from the western side of the bench in the fork of the roads south from Three Forks. On the Three Forks sheet of the United States Geological Survey topographic map, edition of 1895, reprinted in 1920, Three Forks occupies its former position. The locality, on this map, is situated near the northern end of the intermittent stream that drains toward the Jefferson River, between the Madison River and Willow Creek. The nearest outcrops of the Madison Valley formation on the east bank of the Madison River are 2½ to 3 miles to the east.

With exemplary public spirit, Mr. Kinsey presented this material to the United States National Museum. He furnished the data regarding the locality and sent me, for study, the other rhinoceros material from this region, referred to in this paper. C. W. Gilmore kindly submitted the specimen to me for description. I am indebted to Prof. C. C. Mook, who checked my interpretation of the stratigraphy of this occurrence on the basis of his personal acquaintance with the region.

The skull in question (see pls. 1-3) is that of one of the larger American pair-horned rhinoceroses, and is clearly referable to the genus *Diceratherium* in the restricted sense. It is equally clear that it is close to the type species, *D. armatum* Marsh. (For figures of the type of *D. armatum*, see Peterson, 1920, fig. 10 and pl. 57; also Troxell, 1921, fig. 5.) The tooth pattern is rather simple. All four premolars have their cross-lophs complete and parallel. Except for the mures,

which dam the median valleys of  $P^{2-4}$ , no accessory folds occur on the cheek teeth. Although the teeth are worn, there can be no doubt of the presence of mures on  $P^{2-4}$  as in *D. armatum* (Yale Peabody Museum No. 10235) from the Upper Oligocene of the north fork of White River (presumably in South Dakota rather than Nebraska). The type (Y. P. M. No. 10003), from the John Day of Oregon, likewise has mures on  $P^{2-3}$ , but differs in their absence on the fourth premolars. The internal cingula are interrupted by both protocone and hypocone in  $P^1$  and  $M^1$ , and are complete in  $P^{2-4}$  and  $M^3$ . The protocone of  $M^2$  is moderately demarked from the protoconule by grooves, both anteriorly and posteriorly; that of  $M^3$  is barely demarked from the protoconule anteriorly and is set off by a moderate constriction to the rear. This is the typical condition in members of the *Subhyracodon-Diceratherium* line. The nasal horn cores are somewhat less elongated and rather more prominent and everted than in either of the other two skulls of *D. armatum*. The infraorbital canal opens above the anterior portion of  $P^3$ .

The greatest apparent difference from the type specimen is that in the Montana individual the nasals extend almost twice as far in front of the horn cores. However, as indicated by Peterson (1920, fig. 10, p. 415, and pl. 57), the anterior ends of the nasals are broken off in the type so that this difference has no real significance. The Montana specimen is almost exactly the same size as the type of *D. armatum*, as shown by the measurements in Table 1; in fact, my measurements of the Montana skull are as close to either Troxell's or Peterson's measurements of the type skull as their measurements of that skull are to each other. Inspection of these figures indicates that such discrepancies as occur are due to choice of different loci for taking measurements. The chief discrepancy is in the antero-posterior dimension of the individual teeth. If the greatest measurement along the ectoloph is taken, instead of the length along the midline of the tooth, the agreement is considerably closer. There is, then, every reason for referring the Montana skull to *Diceratherium armatum* Marsh, as even the individual differences are of rather a minor character.

From the viewpoint of paleogeographic distribution, this specimen of *D. armatum* partially connects the two previously widely separated occurrences of this species in Oregon and the Great Plains.

This specimen's chief importance, however, is that it dates, in part at least, the beds on the west side of the lower Madison River, which are apparently unconformable below the late Miocene or early Pliocene Madison Valley formation. Douglass, in 1903 (p. 149), perhaps referred to these beds, saying: "In the lower Madison Valley, where the upper [White River] beds are so well exposed, the material is mostly fine. The exact horizon of these upper beds is uncertain, as no good mammals have been found, but they lie unconformably under the

Loup Fork. I have always considered them as White River." The discovery of this skull is an approximate confirmation of Douglass's opinion.

That the beds on the west side of the Madison River, south of Three Forks, may not be of John Day age, throughout, is suggested by a right  $M^3$  referable to (?) *Aphelops ceratorhinus* Douglass in Mr. Kinsey's collection. (Douglass collected the type specimen in the lower Madison Valley, about 5 miles south of Logan.) Mr. Kinsey found this tooth, in loose dirt, on the opposite (southern) side of the westwardly jutting point on which he found the *Diceratherium* skull.

TABLE I.—Measurements of two specimens of *Diceratherium armatum Marsh*

MEASUREMENT	U.S.N.M. No. 11682		Y.P.M. No. 10093 (HOLOTYPE)	
	Right	Left	After Troxell, 1921	After Peterson, 1920
	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>	<i>Mm</i>
P1-M <sup>3</sup> .....	250.0	-----	254	248
P2-M <sup>3</sup> .....	225.0	-----	-----	-----
P1-1.....	128.0	128.7	129	-----
P2-1.....	102.0	104.6	-----	-----
M1-3.....	126.1	-----	144	-----
P1, A-P.....	26.5	26.5	29	29
P1, Tr.....	° 22.4	° 23.1	27	24
P2, A-P.....	31.1	31.5	33	31
P2, Tr.....	° 41.0	° 42.7	39	40
P3, A-P.....	35.5	36.1	39	35
P3, Tr.....	51.0	50.5	47	45
P4, A-P.....	35.3	36.5	40	38
P4, Tr.....	54.3	53.5	51	49
M1, A-P.....	40.0	-----	52	44
M1, Tr.....	54.3	-----	53	53
M2, A-P.....	43.4	-----	55	53
M2, Tr.....	57.6	-----	57	53
M3, A-P.....	44.6	-----	47	45
M3, Tr.....	52.8	-----	50	50
A-P, rear of nasal rugosity to anterior tip of nasal.....	124.5	116.0	-----	-----

° Measured across metaloph.

About 5 years ago, a rhinoceros lower jaw with left  $P_3$ - $M_3$ , which also is probably referable to (?) *Aphelops ceratorhinus*, was collected about a mile south of this locality, the exact location and condition of occurrence being unknown. It was this discovery that led to Mr. Kinsey's collecting in this region. If the two specimens were in place they indicate the presence of otherwise unrecognized Madison Valley beds on the west side of the Madison River. The matrix adhering to the outside of this skull is a coarse sandstone, indicating deposition in a stream channel; some of the matrix inside the fragment of the brain case is much finer. This bed, then, is uppermost Oligocene, or,

according to some, lowermost Miocene. It is entirely distinct from the earlier Oligocene Thompson Creek Beds, northwest of Three Forks, and from the late Miocene or early Pliocene Madison Valley Beds, on the east side of the river. When more is known about this bed, it may deserve a special geographic name, but for the present it will probably be sufficient to call it the John Day equivalent in the lower Madison Valley. It may possibly prove to be synchronous with some one of the scattered Oligocene patches of western Montana, named by Douglass.

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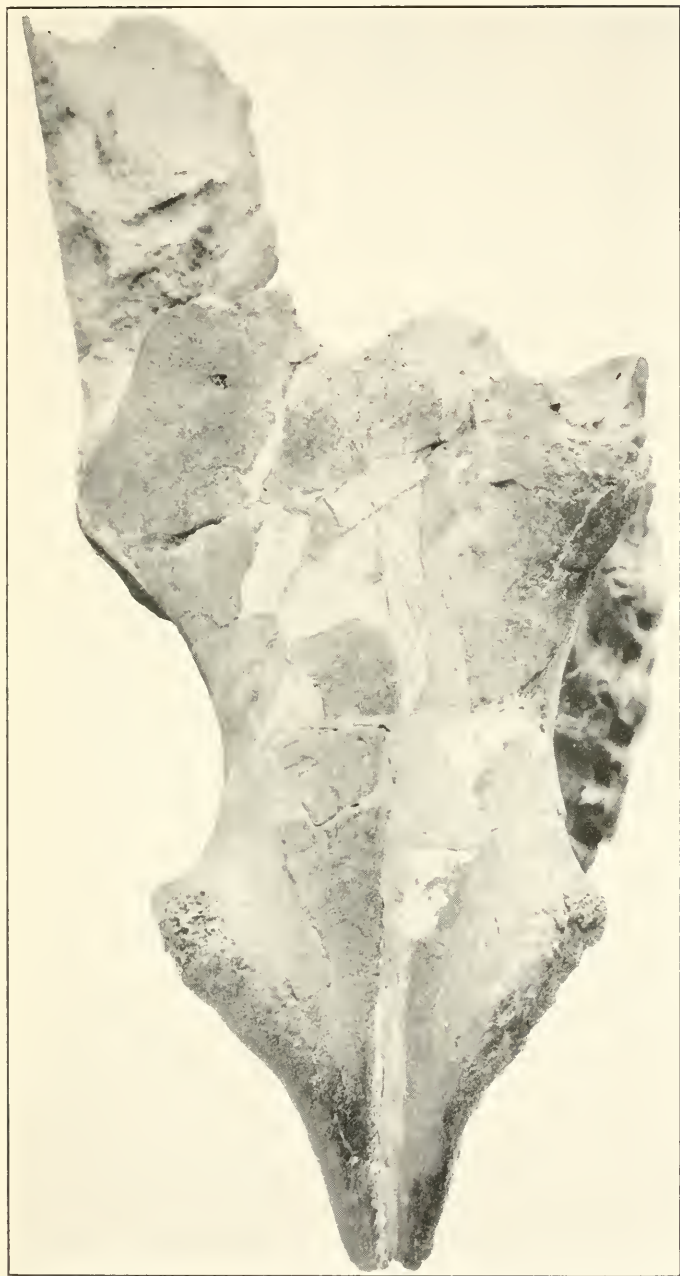
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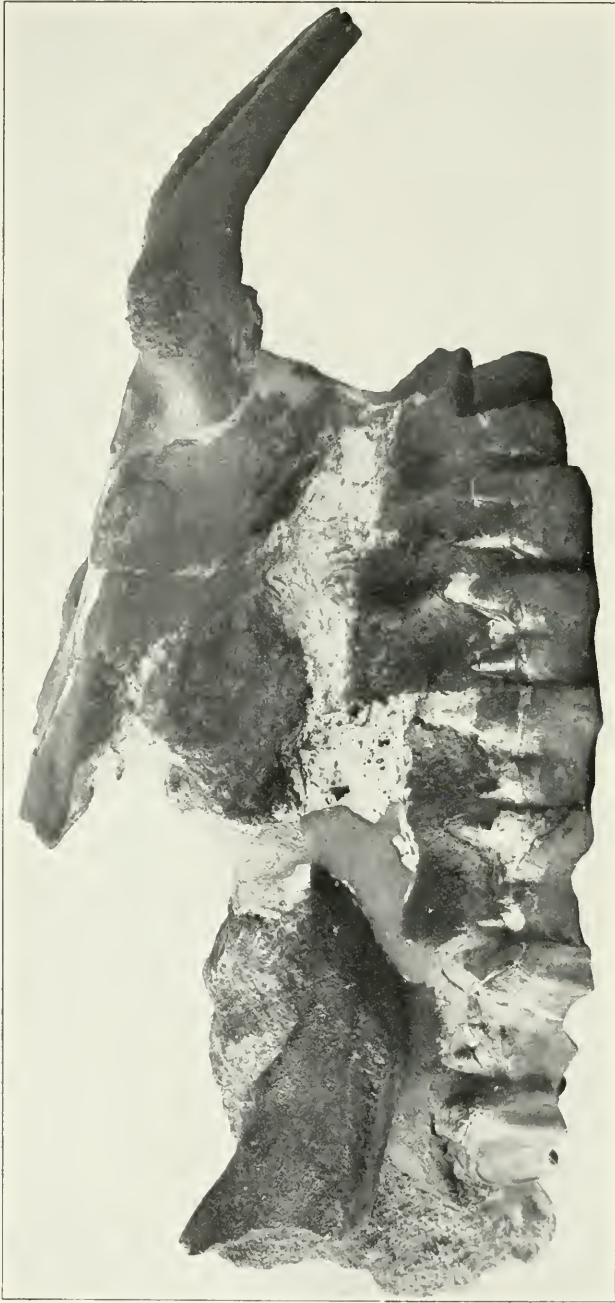
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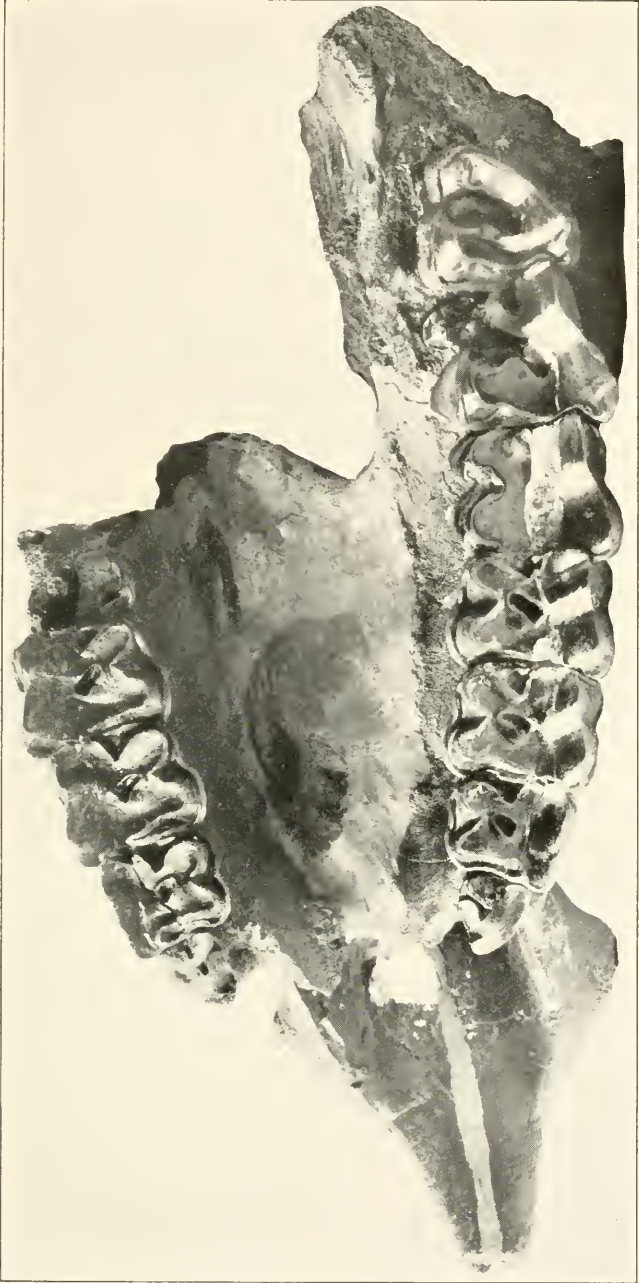
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SKULL ROOF OF DICERATHERIUM ARMATUM MARSH  
U. S. N. M. No. 11682. Two-fifths natural size.



RIGHT SIDE OF SKULL OF DICERATHERIUM ARMATUM MARSH  
U.S.N.M. No. 11682. Two-fifths natural size.



PALATE OF DICERATHERIUM ARMATUM MARSH  
U.S.N.M. No. 11682. Two-fifths natural size.

