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By

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A New Sciurid of Blancan Age from Kansas and Nebraska

CLAUDE W. HIBBARD * AND C. BERTRAND SCHULTZ

THE COLLECTING of vetebrate fossils from deposits of Blancan age in Kansas, Nebraska, and Texas during the past twelve years has revealed many interesting forms. Some species have been found to have wide geographic distribution. A large sciurid related to the woodchucks has been recognized from both Kansas and Nebraska and is here described as a new genus and species.

Paenemarmota barbouri, new genus and species
Marmota sp., Schultz and Stout 1948, p. 563.

Holotype.—No. 6994, Kansas University Museum of Natural History, nearly complete left ramus with incisor, P_4 -M_3, (Pl. 1, Figs. 1 and 2 and Pl. 3, Fig. 1) collected September, 1944, by Dick Rinker and Claude W. Hibbard.

Paratypes.—No. 42427a, University of Nebraska State Museum, premaxillae bearing incisors (Pl. 2, Fig. 2 and Pl. 3, Fig. 2); No. 42427b, frontal region with left maxilla; No. 42427c, right upper molar; No. 42428, part of left ramus bearing fragment of incisor and P_4–M_3 (Pl. 2, Fig. 1).

Horizon and Type Locality.—Blancan age, Rexroad formation, sec. 34, T. 34 S., R. 30 W., Meade County, Kansas, Locality No. 22, Rexroad fauna.

* Museum of Paleontology, University of Michigan.

Locality of Paratypes.—Lisco member of Broadwater formation, University of Nebraska State Museum Locality Gd-14 (Lisco Locality C), W ½, sec. 21, T. 18 N., R. 45 W., Garden County, Nebraska.

Diagnosis.—The new genus and species represents the largest known woodchuck-like sciurid from the late Cenozoic deposits of North America. The paraconulid of P_4 is absent (see Bryant 1945, Fig. 43); agreement does not exist in regard to the tritubercular terminology as applied to rodent teeth, thus the terms used in this paper apply only to topographic location of cusps and are not intended to imply conclusive homology with the cusps of other mammals. P_4 is molariform and larger than M_1. The hypoconid of P_4 is not enlarged and is not situated laterally to the protoconid of M_1 as in *Marmota monax* (Linnaeus), *Marmota flaviventris* (Audubon and Bachman) and *Marmota caligata* (Eschscholtz). The hypoconid of P_4 -M_2 is continuous with posterolophid and not constricted at the lingual base where it joins the posterolophid as in *Marmota*. A complicated enamel fold is present in the basin of M_3; also, well developed in the basins of M_2, M_1, and P_4. Upper and lower incisors have numerous longitudinal grooves (see Pl. 2, Fig. 2). Upper incisors are decidely procumbent. The depressions posterior to the alveolae of the incisors and anterior and lateral to the incisive foramina are strongly developed in comparison with the incisive pits of the recent forms of *Marmota* and *Cynomys* (see Pl. 3, Fig. 2).

Description of Type.—The holotype consists of a nearly complete left ramus bearing incisor, P_4 -M_3. The ramus is that of a young individual. The tip of the incisor is broken. The ventral part of the ramus is missing and exposes the lower surface of the incisor. There are a number of longitudinal grooves in the enamel on the ventral surface of the incisor which extend from the alveolar border posteriorly as far as the under surface of the incisor is exposed. The grooves increase in depth posteriorly and would have probably increased in distinctness with an increase in the age of an individual. P_4 is larger than M_1, although the lingual surface of the tooth is missing (see table of measurements). The tooth is not as highly specialized as the P_4 of recent forms of *Marmota*, being more molariform in structure. The anterior part of P_4 is developed like the anterior

part of P_4 in *Cynomys*. There is a pit developed on the anterior surface of the tooth in line with the junction of the paraconid and protoconid. The hypoconid is posterior to the protoconid in P_4 -M_2 and not labiad to the protoconid as in *Marmota*.

M_1 is smaller than P_4, and lacks the well-developed reentrant angle between the mesostylid and the entoconid which occurs in *Marmota monax bunkeri* Black and is present in *Marmota nevadensis* (Kellogg). The hypoconid is not as enlarged as in the recent forms of *Marmota*. The paraconid of M_1, M_2 and M_3 is not as high above the apex of protoconid nor does it extend as far forward or lingually as in the recent forms of *Marmota*. With the exception of the metalophid of M_3, which is nearly lacking as in recent *Marmota*, the form of that tooth is more like the M_3 of *Cynomys* than the M_3 of the recent forms of *Marmota*. There is a well developed fold in the basin of P_4, M_1, M_2 and M_3, which is the outgrowth of mesostylid and entoconid. The folds increase in size and complexity in the basins of the teeth posteriorly. In M_3 the enamel fold fills the basin of the tooth and is very complicated.

There are two mental foramina; the principal foramen is the most anterior and is situated on the side of the jaw as in *Marmota* though it is approximately midway between the alveolus of the incisor and the anterior root of P_4. The second foramen is situated posteriorly and ventrally and is below the anterior root of P_4. The dorsal masseteric ridge is not as well developed as the ventral ridge nor are the ridges as strongly developed as in *Marmota monax*, though the masseteric fossa is more clearly marked anteriorly than the fossa of *Marmota nevadensis*. The masseteric ridges in the fossil form do not extend as far forward or dorsally as in the recent forms of *Marmota*. The capsular process for the base of the incisor is more pronounced and is situated more posteriorly than in the recent woodchucks. The dental foramen is large and situated intermediately in comparison with the condition observed in recent forms of *Marmota* and *Cynomys*.

This species is named in honor of the late Erwin H. Barbour, who devoted his life to the study and collecting of High Plains fossil vertebrates.

Description of the Paratypes.—No. 42428, University of Nebraska State Museum, is part of the left ramus bearing P_4 -M_3.

The teeth are well preserved and are more worn than those of the type. P_4 is larger than M_1 and does not possess a paraconulid. There is a well-developed pit between the protoconid and paraconid the same as occurs in *Cynomys*. The dentition differs from the type only in that the valleys separating the protoconids from the hypoconids of the premolar and molars are slightly broader in the type, especially the valley of M_3, (see table for measurements). A portion of the incisor is present which possesses longitudinal grooves along its ventral surface. The type and paratype both differ from *Marmota nevadensis* in the development of P_4 and the possession of a striated incisor. P_4 in *Marmota nevadensis* is smaller than M_1 and possesses a slightly developed protoconid. Complicated enamel folds are present in the basins of P_4 and M_1 of *Marmota nevadensis*.

Paratype No. 42427a consists of premaxillae bearing the upper incisors. The upper incisors are well worn and possess on their anterior enamel surfaces five well-developed longitudinal grooves. The incisors are decidely procumbent. Well-developed incisive pits are present at the base of the alveolae of the incisors and are anterior and lateral to the incisive foramina. This character alone distinguishes it from *Marmota*. The animal apparently possessed well-developed cheek pouches. Specimen No. 42427b is the frontal region of the skull and the left maxilla, which has been crushed mesially. The frontal region is basined. The parietal ridges converge more readily than in *Marmota monax bunkeri*. The postorbital process is strongly developed. The postorbital notch is broader than in *Marmota monax*. No. 42427c is a right upper molar. The tooth has an anteroposterior width of 8.3 mm., and a greatest transverse width of 8.9 mm. The parastyle is strongly developed, being broader at its base than the paracone; due to this character the tooth may be a dP^4. The protocone is on a level with the paracone and metacone. The enamel ridges connecting the metacone and paracone with the protocone are horizontal, strongly developed and level with those cusps, a distinguishing feature from the recent forms of *Marmota* where the lophs are constricted and concaved where they join the protocone. The posterior cingulum is enlarged where it joins the metacone. The cingulum is separated from the metaloph by a deep pos-

PLATE 1

Fig. 1—*Paenemarmota barbouri,* holotype, left ramus, KUM 6994, lingual view. x 1.5.

Fig. 2—*Paenemarmota barbouri,* holotype, left ramus, KUM 6994, labial view. x 1.5.

terior valley. The metaconule is larger than the metacone but it does not project into the posterior valley as in *Marmota*. It differs from *Cynomys* in that the reentrant valley between the paracone and metacone is deep, broad, and extends across the crown of the tooth to the protocone. Specimens Nos. 42427a, b, and c were taken from the same block of matrix and specimen No. 42427a was only three inches from specimens b and c. Specimen No. 42428 was collected from the same locality and quarry as 42427.

TABLE OF MEASUREMENTS IN MILLIMETERS

	KUMNH No. 6994	UNSM No. 42428	TYPE OF *M. nevadensis*
Distance from outer tip of incisor to base of capsular process	79.2		
Distance from alveolus of incisor to mandibular foramen	68.2		
Depth of ramus below M_2 on inside	21.6		
Diastema	22.7		21.5
Transverse thickness of lower incisor at alveolus	5.8		4.3
Greatest anteroposterior length of P_4 –M_3	33.1	33.7	....
Greatest anteroposterior length of P_4	7.7	8.2	6.4
Greatest transverse width of P_4	....	8.5	6.2
Greatest anteroposterior length of M_1	6.5	6.7	6.5
Greatest transverse width of M_1	7.9	7.8	7.3
Greatest anteroposterior length of M_2	7.5	7.2	
Greatest transverse width of M_2	8.3	8.4	
Greatest anteroposterior length of M_3	11.4	11.4	
Greatest transverse width of M_3	9.2	9.1	

Discussion.—The character of the grooved upper and lower incisors appears to be a common character of *Paenemarmota barbouri*, though some recent forms of *Marmota* possess well-developed longitudinal grooves on the upper incisors. A specimen (No. 6708 KUMNH) of *Marmota flaviventris nosophora* Howell, from Bannock County, Idaho, possesses as well developed grooves in the upper incisors as those of the fossil form. The lower incisors of this recent specimen have shallow longitudinal grooves on their ventral surface. Grooved upper incisors appear in a number of forms of the sciurids, such as some forms of *Citellus, Palaearctomys, Rheithrosciurus,* and usually in *Tamias.*

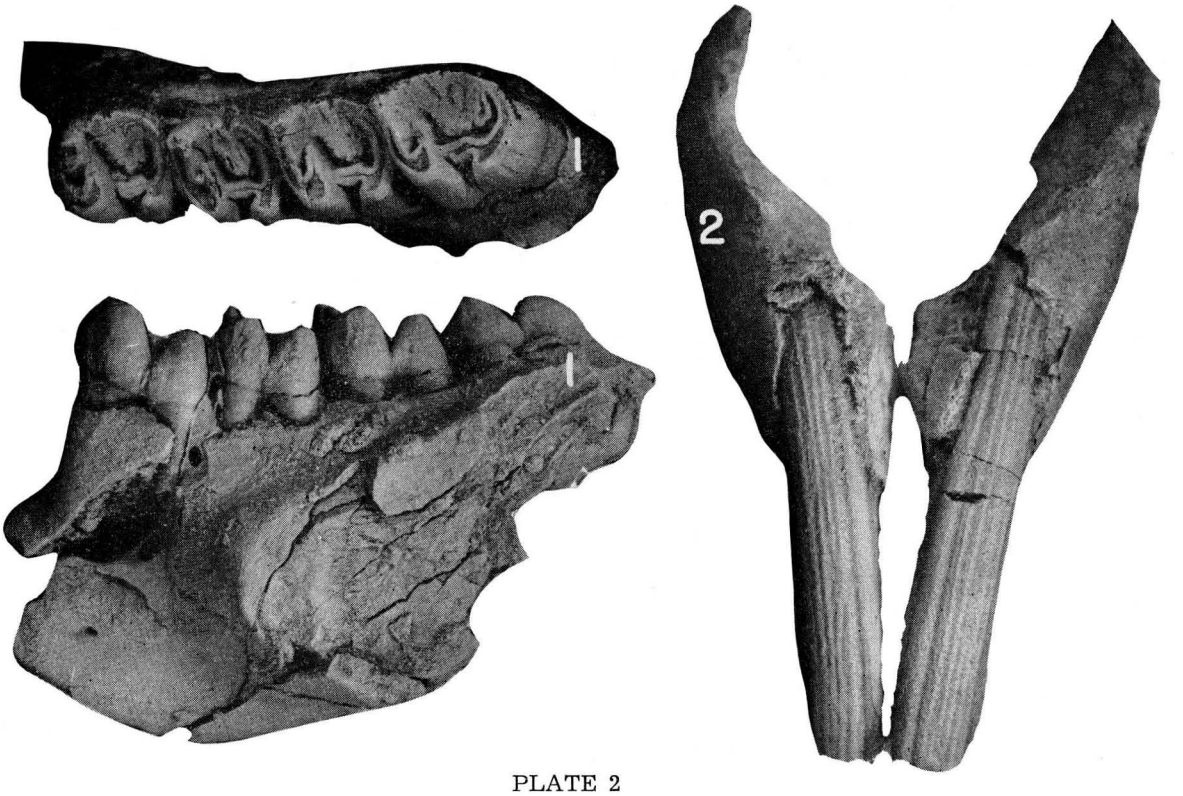

PLATE 2

Fig. 1—*Paenemarmota barbouri*, paratype, left ramus, UNSM 42428, labial and occlusal views. x 2.

Fig. 2—*Paenemarmota barbouri*, paratype, premaxillae and incisors, UNSM 42427a, anterior view. x 2.

For further discussion of deposits of Blancan age (Elias, M. K. *et al,* 1945) and of forms found occurring with this large sciurid, one is referred to Cummins (1890) who reported fossil bearing deposits in Crosby County, Texas, as the "Blanco Canyon Beds." Cope (1892) published upon these vertebrates found by Cummins. Cope became interested in the Blanco vertebrates and accompanied Cummins into the field to secure a larger collection from these deposits which he published on in 1893. The American Museum worked the "Blanco Canyon Beds" during the summers of 1900, 1901, and 1924. A report of the additional vertebrates recovered from the Blanco deposits was made by Gidley (1903). Later work was done on the vertebrates taken from deposits of Blancan age in Randall County, Texas, by Miller and Johnston (1937); Johnston (1938); Stirton and Christian (1940); and Meade (1945).

Barbour and Schultz (1936, 1937a, 1937b, and 1939) and Schultz and Stout (1941, 1945, and 1948) reported on the vertebrates collected from the Lisco member of the Broadwater formation (Blancan age) from quarries near Broadwater and Lisco in Morrill and Garden counties, Nebraska. McGrew (1944) reported on some vertebrates recovered from the Sand Draw locality in Brown County, Nebraska, of equivalent age.

The deposits of Blancan age in southwestern Kansas and the fossils recovered from them have been reported by Baker (1938); Frye and Hibbard (1941); Hibbard (1938, 1939, 1941, 1941a, and 1948); Taylor (1941 and 1942) and Wetmore (1944).

The Benson Locality in the San Pedro Valley of Arizona which has yielded fossils of Blancan age was recently reviewed by Gazin (1942).

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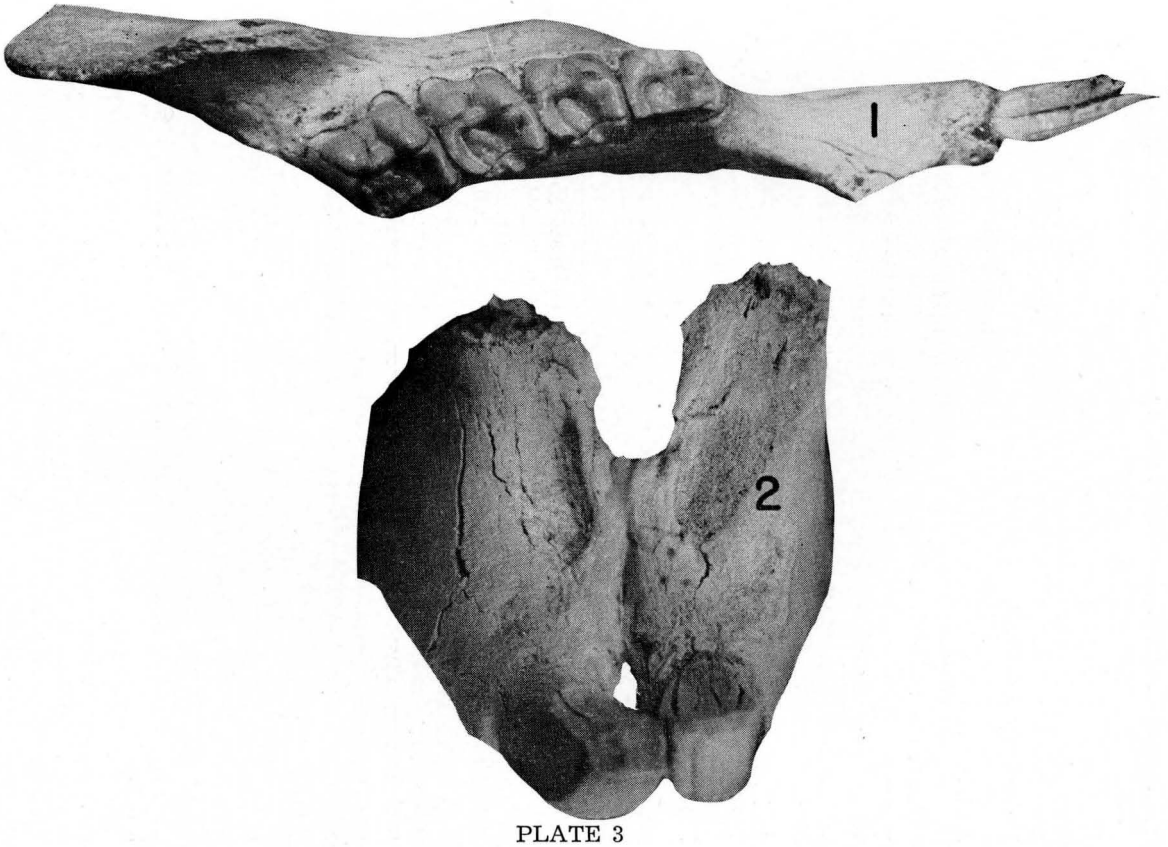

PLATE 3

FIG. 1—*Paenemarmota barbouri,* holotype, left ramus, KUM 6994, occlusal view. x 1.5.

FIG. 2—*Paenemarmota barbouri,* paratype, premaxillae and incisors, UNSM 42427a, palatal view. x 2.

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