1996

A New Genus of Prairie Dog (Sciuridae, Rodentia) From the Miocene (Barstovian of Montana and Clarendonian of Nebraska) and the Classification of Nearctic Ground Squirrels (Marmotini)

William W. Korth
Rochester Institute of Vertebrate Paleontology

Follow this and additional works at: http://digitalcommons.unl.edu/tnas

Part of the Life Sciences Commons

Korth, William W., "A New Genus of Prairie Dog (Sciuridae, Rodentia) From the Miocene (Barstovian of Montana and Clarendonian of Nebraska) and the Classification of Nearctic Ground Squirrels (Marmotini)" (1996). Transactions of the Nebraska Academy of Sciences and Affiliated Societies. 85.
http://digitalcommons.unl.edu/tnas/85

This Article is brought to you for free and open access by the Nebraska Academy of Sciences at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Transactions of the Nebraska Academy of Sciences and Affiliated Societies by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.
A NEW GENUS OF PRAIRIE DOG (SCIURIDAE, RODENTIA)
FROM THE MIocene (BARSTOVIAN OF MONTANA AND CLARENDONIAN OF NEBRASKA)
AND THE CLASSIFICATION OF NEARCTIC GROUND SQUIRRELS (MARMOTINI)

William W. Korth
Rochester Institute of Vertebrate Paleontology
928 Whalen Road
Penfield, NY 14526

ABSTRACT

A new genus of sciurid, Cynomyoides, is named. The new genus includes a new species from the late Clarendonian of Nebraska, C. vatis (type species), and an unnamed species from the early Barstovian of Montana. The dental and mandibular morphology of Cynomyoides is reminiscent of that of the latest Tertiary to Recent prairie dog Cynomys and is believed to be part of the lineage leading to Cynomys. The recognition of a Miocene genus of prairie dog extends the known record of these ground squirrels well back into the Tertiary and makes it much less likely that Cynomys was derived from a species of the ground squirrel Spermophilus in the latest Tertiary, as has been suggested by previous authors. A new scheme for the classification of nearctic marmotines is proposed.

Dental terminology follows that of Wood and Wilson (1936). Lower cheek teeth are denoted by lower case letters (e.g. p4, m1). Abbreviations for institutions: CM, Carnegie Museum, Pittsburgh; UNSM, University of Nebraska State Museum, Lincoln.

SYSTEMATICS

Order Rodentia Bowdich, 1821
Family Sciuridae Gray, 1821
Subfamily Sciurinae Gray, 1821
Tribe Marmotini Pocock, 1923
Genus Cynomyoides new

Type species: Cynomyoides vatis n. sp. Referred species: Cynomyoides sp. (Sutton and Korth, 1995). Range: Early Barstovian of Montana and late Clarendonian of Nebraska. Diagnosis: Cheek teeth highly lophate and anteroposteriorly compressed as in Cynomys (greater than in Spermophilus or Marmota), but lower crowned; trigonids of lower molars small and elevated as in Cynomys but have only weak or incomplete metalophulid II (strongly developed, elevated and enclosing trigonid basin in Cynomys); m3 posteriorly enlarged with broad, curved central loph as in Cynomys; mesostylids strongly developed on lower molars and attached to metaconid (lacking in Cynomys); accessory cusps in talonid basins of p4-m2 present, but smaller than those of Cynomys molars. Etymology: Cynomys, the genus of prairie dog, and the suffix -oides, Greek, like.

Discussion. Cynomyoides is distinguishable from any species of Spermophilus or Marmota by its highly...
Cynomyoides vatis n. sp.
(Fig. 1; Table 1)

Type and only specimen: UNSM 101817, left mandible with p4-m3. Horizon and locality: Blue Jay Quarry (UNSM locality Ap-112), NW 1/4, SW 1/4, NW 1/4, NE 1/4, sec. 22, T28N, R7W, Antelope County, Merritt Dam Member, Ash Hollow Formation. Age: Late Clarendonian. Diagnosis: Cheek teeth larger and higher crowned than Barstovian Cynomyoides sp.

Etymology: Latin, vatis, seer or prophet. Description: Little is observable about the mandible except that it is more robust and transversely thick than in species of Spermophilus. The masseteric scar is a raised ridge that ends anteriorly in a broad U-shape, reaching a point even with the posterior margin of p4. The ascending ramus originates at the posterior end of the tooth row. Due to breakage, the position of the mental foramem and morphology of the diastema cannot be determined. The lower incisor is broad and strongly convex anteriorly with a flat medial surface.

The lower cheek teeth are mesodont (higher crowned than those of species of Spermophilus, lower crowned than those of Cynomys), and strongly anteroposteriorly compressed (except m3), being much shorter than wide. The trigonids of the lower cheek teeth are elevated well above the level of the talonid basins. The trigonid basin is small and oval. It is enclosed anteriorly and posteriorly on p4 and m1, and open posteriorly on m2 and m3. The ectolophid is strongly developed on all the lower cheek teeth and runs from the hypoconid into the posterior wall of the trigonid posterior to the protoconid. There is no indication of a mesostylid.

The last lower molar is, by far, the largest of the cheek teeth. The trigonid is elevated and small but open posteriorly as in m2. The talonid is widely expanded posteriorly. The talonid basin contains a large, low crescentic loph near its center that is attached to its posterior end to a partial hypolophid that runs buccally from the entoconid. Posteriorly, the tooth is rounded.

Discussion. The holotype of Cynomyoides vatis differs from the Barstovian specimen of m3 from Montana (CM 27842) by its larger size and slightly higher crown height (Sutton and Korth, 1995: p. 232, fig. 2f). The central, crescentic loph in the talonid basin and elevated trigonid of m3 is nearly identical for the two species, making the Barstovian specimen clearly referable to Cynomyoides.
CONCLUSIONS

Previously, the origin of prairie dogs was believed to be from an ancestral ground squirrel sometime in the latest Tertiary (Black, 1963; Bryant, 1945; Eschelman, 1975; Hafner, 1984). It was even suggested that the ancestor of Cynomys was to be found within Spermophilus (Spermophilus) (Eschelman, 1975; Hafner, 1984). Since the earliest definite occurrence of the former subgenus was the Hemphillian (Shotwell, 1956) and only possibly Clarendonian (Black, 1963), and the first occurrence of the only previously known genus of prairie dog Cynomys, was late Blancan (Hibbard, 1942; Eschelman, 1975), the ancestor of the prairie dogs was naturally suspected to have existed sometime in the late Hemphillian or early Blancan. Hafner (1984) even suggested that the genus Spermophilus might even be paraphyletic because of the similarity of the subgenus Spermophilus to Cynomys.

However, the recognition of a Barstovian and Clarendonian species with dental morphology similar to that of Cynomys suggests that the origin of the prairie dogs was much earlier than previously believed and the relationship between prairie dogs and Spermophilus is not as close. The distinct dental and mandibular morphology of prairie dogs appears in the fossil record as Cynomyoides in the Barstovian, about the same time as the first occurrence of Spermophilus (see Korth, 1994: 123). This suggests that the prairie dog lineage and Spermophilus have been separate since their respective origins. It is not unlikely that the Cynomyoides-Cynomys lineage evolved from a primitive marmotine. The earliest marmotine is Miospermophilus from the Hemingfordian (Black, 1963) and has been suggested as the ancestor of all later marmotines (Hafner, 1984). However, these early spermophiles did not have any indication of the amount of compression of the cheek teeth with elevated trigonids and deep mandible present in the prairie dogs.

Hafner (1984), in a study of Nearctic sciurids, included Cynomys in a subtribe of marmotines, the Spermophilina, along with Spermophilus and the Hemingfordian Miospermophilus, separate from all other marmotines. He also recognized two other subtribes, the Marmotina (including Marmota and the fossil forms Palaearctomys and Paenemarmota) and the Ammospermophilina (including Ammospermophilus only). With the first occurrence of a prairie dog now known to be from the early Barstovian, it is clear that Spermophilus and the prairie dogs have been separate throughout their known records of existence. The subgenus Spermophilus is not a likely ancestor of the prairie dogs based on the fossil record because the earliest record of this subgenus is unquestionably Clarendonian (Black, 1963), much later than the early Barstovian occurrence of Cynomyoides.

Based on first occurrences as the major factor of separation between the lineages of marmotines, it appears that the prairie dogs were the first to appear along with Spermophilus and the lineage leading to Marmota represented by Palaearctomys in the early Barstovian. The next separation was that of Ammospermophilus in the Clarendonian along with the probable first occurrence of the subgenus Spermophilus.

Based on this criterion, the prairie dogs are as distinct phylogenetically from Spermophilus as is Marmota. This implies that, based on the fossil record, the inclusion of Spermophilus and Cynomys into a single subtribe that excludes Marmota and its relatives is not warranted. In fact, the separation of Cynomyoides and Cynomys into their own separate subtribe is more likely. The fossil record also suggests that Ammospermophilus is more closely related to Spermophilus and does not warrant a separate subtribe. With the recognition of a Barstovian to Clarendonian prairie dog, Hafner's (1984) classification of the subtribes of the nearctic marmotines should be amended as follows (see Fig. 2):

### Table 1. Dental measurements of Cynomyoides vatis, UNSM 101817 (holotype). Measurements in mm. Abbreviations: a-p, anteroposterior length; tra, anterior transverse width; trp, posterior transverse width.

<table>
<thead>
<tr>
<th></th>
<th>p4</th>
<th>m1</th>
<th>m2</th>
<th>m3</th>
<th>p4-m3</th>
</tr>
</thead>
<tbody>
<tr>
<td>a-p</td>
<td>2.96</td>
<td>2.26</td>
<td>2.58</td>
<td>4.06</td>
<td>11.88</td>
</tr>
<tr>
<td>tra</td>
<td>3.84</td>
<td>3.31</td>
<td>3.50</td>
<td>3.57</td>
<td></td>
</tr>
<tr>
<td>trp</td>
<td>3.24</td>
<td>3.32</td>
<td>3.56</td>
<td>2.62</td>
<td></td>
</tr>
<tr>
<td>p4-m3</td>
<td>11.88</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ACKNOWLEDGMENTS

This paper is part of a project on Clarendonian rodents funded in part by the Theodore Roosevelt Fund of the American Museum of Natural History. Access to the UNSM collections and loan of specimens was permitted by M. R. Voorhies.

LITERATURE CITED


Figure 2. Proposed phylogeny of Nearctic marmotines (modified from Hafner, 1984, fig. 1.4). Heavy vertical lines represent known occurrences, thin horizontal lines represent proposed relationships.


