Cittellus kimballensis, A New Late Pliocene Ground Squirrel

Douglas C. Kent
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A New Late
Pliocene Ground Squirrel
The University of Nebraska

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Citellus kimballensis,
_A New Late Pliocene Ground Squirrel_
A new fossil sciurid, *Citellus kimballensis*, is described. This new species was found in the Kimball Formation, uppermost Ogallala (very late Pliocene) at the University of Nebraska State Museum Collecting Locality Cn-101, northeast of Sidney, Cheyenne County, Nebraska. Characters of the dentition and skull of *C. kimballensis* are compared with those of other species of the genus, and with those of *Cynomys*. 

**ABSTRACT**

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*A New Late Pliocene Ground Squirrel*

**Douglas C. Kent**
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INTRODUCTION

In 1956 and 1957, the University of Nebraska State Museum field parties collected a large number of vertebrate fossils from the U.N.S.M. Collecting Locality Cn-101 near Sidney, Nebraska. The fossils were discovered during the excavation of a salt-water disposal pit by the Marathon Oil Company.

A new ground squirrel, Citellus kimballensis, was found associated with other genera of the Uptegrove assemblage: Thomomys, Perognathus, Calippus, Neohipparion, several species of Pliohippus and Nannippus, as well as Teleoceras, Aphelops, ?Pliauchenia, and a giant camelid.

The writer recognizes the controversy concerning the usage of the generic names Citellus and Spermophilus, and chooses to use the former. The preferred use of Citellus over Spermophilus was endorsed at the Fortieth Annual Meeting of the American Society of Mammalogists (Burt, William H. et al., 1960), in opposition to a minority report and to Opinion 417 of the International Commission on Zoological Nomenclature (Hemming, 1956, p. 39). Miller and Kellogg (1955), Simpson (1945), and Howell (1938) used Citellus in their classification of the Sciuridae while Hall and Kelson (1959) preferred Spermophilus.

1 Member of the staff, Department of Geology, Iowa State University, Ames, Iowa. Field and laboratory research for this paper was accomplished while the writer was a graduate assistant with the Geology Department and a field assistant with the State Museum at the University of Nebraska.
DESCRIPTION

Citellus kimballensis, new species

Material.—Holotype: U.N.S.M. 61405, a partial skull including right and left maxillae with P3-M3; also U.N.S.M. 61434, a mandible with right and left I, P1-M3. (See figures 1 and 3B-G.) Paratype: U.N.S.M. 61406, a partial skull including right and left maxillae with I, P3-M3; also U.N.S.M. 61407, a left ramus with I, P1-M3. (See figures 2 and 3A.)

Referred Specimens.—U.N.S.M. 61421, partial skull with upper incisor, left M1 and M2, and right upper molar; U.N.S.M. 61423, partial skull with no dentition; U.N.S.M. 61419, right M3-M4; U.N.S.M. 61418, unassociated lower incisor, three upper incisors, and upper molar; U.N.S.M. 61415, lower incisor, and left upper molar; U.N.S.M. 61425, partial left ramus with M1-M3; U.N.S.M. 61417, left ramus with P4 and M3; and U.N.S.M. 61412, left ramus with M2-M3.


Geology.—Upper member of the Kimball Formation, Late Pliocene.2 The fossil material was found in a fine sand overlain by a thin green clay lens and twelve feet of fine-to-very fine, consolidated sand. The ground squirrel material was less fossilized than the other material in the quarry. The only evidence of later burrowing is the presence of nearly unfossilized Thomomys (pocket gopher). This is the only modern rodent from this locality known to burrow to this depth (Seton, 1929; personal communication from Harvey L. Gunderson). Burrowing by ground squirrels during the Pleistocene is impossible to evaluate with the present evidence.

Specific Characters.—The characters used to identify the specimens as a new species, distinct from the living and fossil forms, are: the greater posterior convergence of the tooth rows, the larger P3, and dimensions of the skull and associated rami. See Table 1 for detailed measurements of examples of C. kimballensis.

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2 The stratigraphy is considered in a paper by the writer entitled, “Late Pliocene stratigraphy in Western Nebraska,” recently submitted for publication.
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DISCUSSION

There is a close similarity in the characters of the skull and ramus between this species and Citellus richardsoni. The cheek-teeth of the new ground squirrel converge posteriorly to a greater degree than in most species of this genus. This convergence is intermediate to that found in Cynomys and Citellus. In contrast with most ground squirrels except C. richardsoni, the $P^3$ is larger and possesses a cutting surface. The roots of the cheek-teeth are larger and extend outward from the lingual side of the maxilla. Consequently, the degree of outward lateral expansion in the cheek-teeth is greater than that of other species of Citellus and approaches the condition found in Cynomys.

Fig. 1—Citellus kimballensis. U.N.S.M. 61405, holotype, dorsal and palatal views of partial skull including right and left maxillae with right and left $P^3$-$M^3$. A—dorsal view, X2. B—palatal view, X2.
Size comparison, on the basis of published measurements, was made with other fossil species of *Citellus*. Measurements of the skull and jaw elements of *Citellus kimballensis* are shown on Table 1. Appreciable dimensional differences of one millimeter or more are noted when compared with other fossil forms. The length of the mandibular cheek-teeth is greater than in *Citellus (Otospermophilus) gidleyi*, *C. juncavensis* Shotwell and Russell, and *C. howelli* Hibbard; and shorter than in *C. rexroadensis* Hibbard, and *C. (Otospermophilus) bensoni* Gidley. The width of the palate between the first molars is less than in *Protospermophilus quatalensis* Gazin, *C. ridgewayi* Gazin, and *Protospermophilus malheuarensis* Gazin. The upper tooth-row is longer than in *Protospermophilus tephres*. The upper diastema is shorter than in *C. ridgeway Gazin*, and *Protospermophilus malheuarensis* Gazin; however, it is longer than in *Protospermophilus tephres* and *Citellus richardsoni*. The skull and jaw proportions are smaller than those of *C. (Pliocitellus) fricki* Hibbard and the living *C. franklinii* (Sabine). The anteroposterior length of M₁ is less than the transverse width; this is in contrast to
Fig. 5—Citellus kimballensis. A—U.N.S.M. 61467, paratype, lingual view of left ramus with I, P₃-M₃, X₃. B—U.N.S.M. 61434, holotype, labial view of right ramus with I, P₃-M₃, X₃. C—U.N.S.M. 61434, holotype, dental view of mandible with right and left I, P₃-M₃, X₃.
### TABLE 1

**Measurements of Examples of *Citellus kimballensis*, new species**

<table>
<thead>
<tr>
<th>Museum Number</th>
<th>Transverse width of P3</th>
<th>Diastema length</th>
<th>Tooth-row length</th>
<th>Depth of ramus below center of P3</th>
<th>Palate width between P3's and M3's</th>
<th>Anteroposterior length of skull</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.N.S.M.</td>
<td>mm.</td>
<td>mm.</td>
<td>mm.</td>
<td>mm.</td>
<td>mm.</td>
<td>mm.</td>
</tr>
<tr>
<td>61406 (skull)</td>
<td>1.4</td>
<td>10.7</td>
<td>9.9</td>
<td>7.1</td>
<td>6.3</td>
<td>5.5</td>
</tr>
<tr>
<td>61405 (skull-holotype)</td>
<td>1.5</td>
<td>...</td>
<td>10.1</td>
<td>...</td>
<td>6.9</td>
<td>6.1</td>
</tr>
<tr>
<td>61407 (ramus)</td>
<td>...</td>
<td>6.3</td>
<td>9.2</td>
<td>6.4</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>61434 (mandible)</td>
<td>1.5</td>
<td>6.3</td>
<td>9.2</td>
<td>6.4</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Museum Number</th>
<th>Transverse width of P3</th>
<th>P4</th>
<th>M1</th>
<th>M2</th>
<th>M3</th>
<th>Palatal bridge</th>
<th>Skull height</th>
<th>Occipital width</th>
<th>Occipital height</th>
<th>Palatal length</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.N.S.M.</td>
<td>mm.</td>
<td>mm.</td>
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<td>mm.</td>
<td>mm.</td>
<td>mm.</td>
<td>mm.</td>
</tr>
<tr>
<td>61406 (skull)</td>
<td>1.9</td>
<td>2.8</td>
<td>3.0</td>
<td>3.0</td>
<td>3.1</td>
<td>17.0</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>25.0</td>
</tr>
<tr>
<td>61405 (skull-holotype)</td>
<td>1.8</td>
<td>2.6</td>
<td>2.8</td>
<td>3.0</td>
<td>3.0</td>
<td>ca. 16.5</td>
<td>20.6</td>
<td>ca. 20.1</td>
<td>6.1</td>
<td>...</td>
</tr>
<tr>
<td>61407 (ramus)</td>
<td>...</td>
<td>2.4</td>
<td>2.7</td>
<td>2.6</td>
<td>2.6</td>
<td>...</td>
<td>...</td>
<td>...</td>
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<td>...</td>
</tr>
<tr>
<td>61434 (mandible)</td>
<td>...</td>
<td>2.3</td>
<td>2.7</td>
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<td>2.6</td>
<td>...</td>
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</table>

**Definition of Measurements:**

1. Palatal bridge.—Measured from posterior end of anterior palatine foramen to anterior end of basisphenoid.
2. Skull height.—Measured from the base of tympanic bulla to top of skull.
3. Occipital width.—Maximum width of posterior portion of skull (excluding zygomatic arch).
4. Occipital height.—Measured from top of the foramen magnum to the top of the occipital crest.
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that of C. (Otospermophilus) argonautus Stirton and Goeris. The transverse width of P3 and P4 and the length and width of P4 are greater than in C. junturensis Shotwell and Russell. Some of the above compared types consist of incomplete skull or mandibular elements.

Certain characters of Citellus kimballensis similar to those of Cynomys have been discussed above. It is the writer's opinion, however, that C. kimballensis exhibits a greater affinity to the genus Citellus than to Cynomys. This would not necessarily negate the possibility that C. kimballensis might be in a near-ancestral position to Cynomys, branching from a main Citellus lineage during the Late Pliocene. T. M. Stout (personal communication) considers this new species a primitive form of Cynomys and would place it in that genus. The M3 of Citellus kimballensis, however, is simpler than that found in Cynomys. The M3 possesses only one well marked ridge, the protoloph, and there are no complicated enamel folds in the basin of the M3. The lingual side of the cheek-teeth is noticeably constricted, so that the teeth appear roughly three sided instead of rounded to nearly square as in Cynomys. The bullae and deeper braincase are more rounded, and the external auditory meatus is in a more central position than in the several specimens of Cynomys examined. In contrast to Cynomys, the parietal ridges do not converge to form a prominent posterior sagittal crest.
ACKNOWLEDGMENTS

The writer is indebted to Professors C. Bertrand Schultz, Thompson M. Stout, Glenn L. Jepsen, Don Baird, and Harvey L. Gunderson for their helpful comments and suggestions during the preparation of this paper. Thanks are also extended to Mr. Lloyd G. Tanner and to Professor John Howe, who worked with the University of Nebraska State Museum field parties in collecting the fossil material here described, and to Mr. John Hill who assisted the writer in collecting geological data during the summer of 1962. The writer also participated in the 1956-1957 field work. The project was financed in part by the Marathon Oil Company, the Shell Oil Company, and the late Mr. Childs Frick.
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