1967

Citellus kimballensis, A New Late Pliocene Ground Squirrel

Douglas C. Kent

BULLETIN OF
The University of Nebraska State Museum
VOLUME 6, NUMBER 2
JUNE, 1967

Douglas C. Kent

Citellus kimballensis, *A New Late Pliocene Ground Squirrel*

The University of Nebraska

The Board of Regents

RICHARD E. ADKINS
J. G. ELLIOTT
B. N. GREENBERG, M.D.
RICHARD L. HERMAN
ROBERT L. RAUN
EDWARD SCHWARTZKOPF
JOSEPH SOSHNIK, *Corporation Secretary*

The Chancellor

CLIFFORD M. HARDIN

The Vice Chancellors

ADAM CARLYLE BRECKENRIDGE
MERK HOBSON
G. ROBERT ROSS
JOSEPH SOSHNIK

Douglas C. Kent

Citellus kimballensis, *A New Late Pliocene Ground Squirrel*

BULLETIN OF *The University of Nebraska State Museum:* VOLUME 6, NUMBER 2
JUNE 1967

BULLETIN OF
The University of Nebraska State Museum
Pp. 17–26, FIGS. 1–3

VOLUME 6, NUMBER 2
JUNE 1967

ABSTRACT

Citellus kimballensis, *A New Late Pliocene Ground Squirrel*

DOUGLAS C. KENT

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*.

Kent[1]

Citellus kimballensis,
A New Late Pliocene Ground Squirrel

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 P^3-M^3; also U.N.S.M. 61434, a mandible with right and left I, P_4-M_3. (*See* figures 1 and 3B-C.) Paratype: U.N.S.M. 61406, a partial skull including right and left maxillae with I, P^3-M^3; also U.N.S.M. 61407, a left ramus with I, P_4-M_3. (*See* figures 2 and 3A.)

Referred Specimens.—U.N.S.M. 61421, partial skull with upper incisor, left M^1 and M^2, and right upper molar; U.N.S.M. 61423, partial skull with no dentition; U.N.S.M. 61419, right M^1-M^3; 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 M_1-M_3; U.N.S.M. 61417, left ramus with P_4 and M_3; and U.N.S.M. 61412, left ramus with M_1-M_3.

Type Locality.—U.N.S.M. Coll. Loc. Cn-101, Uptegrove Quarry, NE. ¼, sec. 23, T. 15 N., R. 49 W., Cheyenne County, Nebraska.

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 P^3, and dimensions of the skull and associated rami. See Table 1 for detailed measurements of examples of *C. kimballensis.*

[2] The stratigraphy is considered in a paper by the writer entitled, "Late Pliocene stratigraphy in Western Nebraska," recently submitted for publication.

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*.

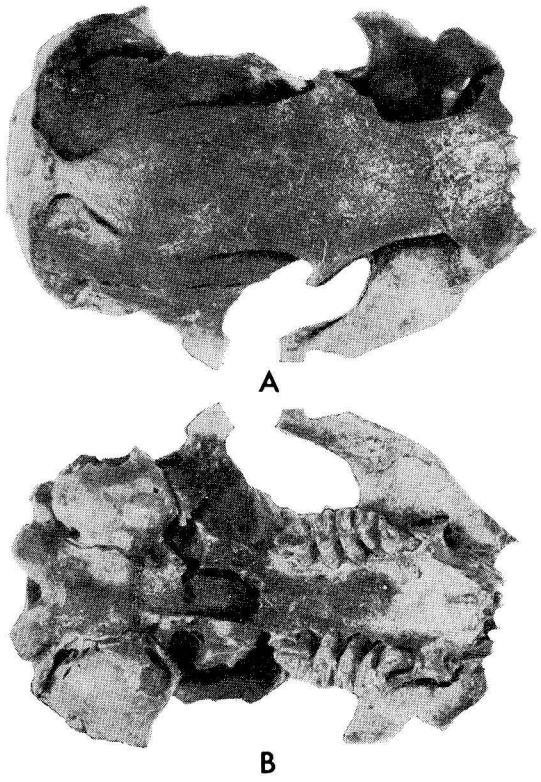

FIG. 1—*Citellus kimballensis*. U.N.S.M. 61405, holotype, dorsal and palatal views of partial skull including right and left maxillae with right and left P^3-M^3. A—dorsal view, X2. B—palatal view, X2.

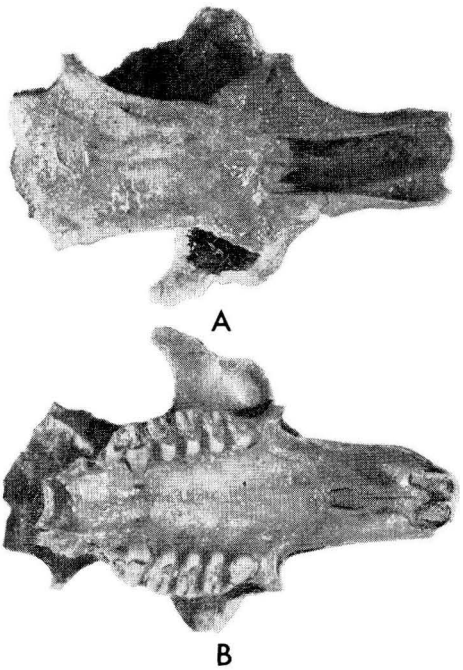

FIG. 2—*Citellus kimballensis*. U.N.S.M. 61406, paratype, dorsal and palatal views of partial skull including right and left maxillae with right and left I, P^3-M^3. A—dorsal view, X2. B—palatal view, X2.

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. juncturensis* 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 malheurensis* Gazin. The upper tooth-row is longer than in *Protospermophilus tephrus*. The upper diastema is shorter than in *C. ridgeway* Gazin, and *Protospermophilus malheurensis* Gazin; however, it is longer than in *Protospermophilus tephrus* and *Citellus richardsoni*. The skull and jaw proportions are smaller than those of *C. (Pliocitellus) fricki* Hibbard and the living *C. franklini* (Sabine). The anteroposterior length of M_1 is less than the transverse width; this is in contrast to

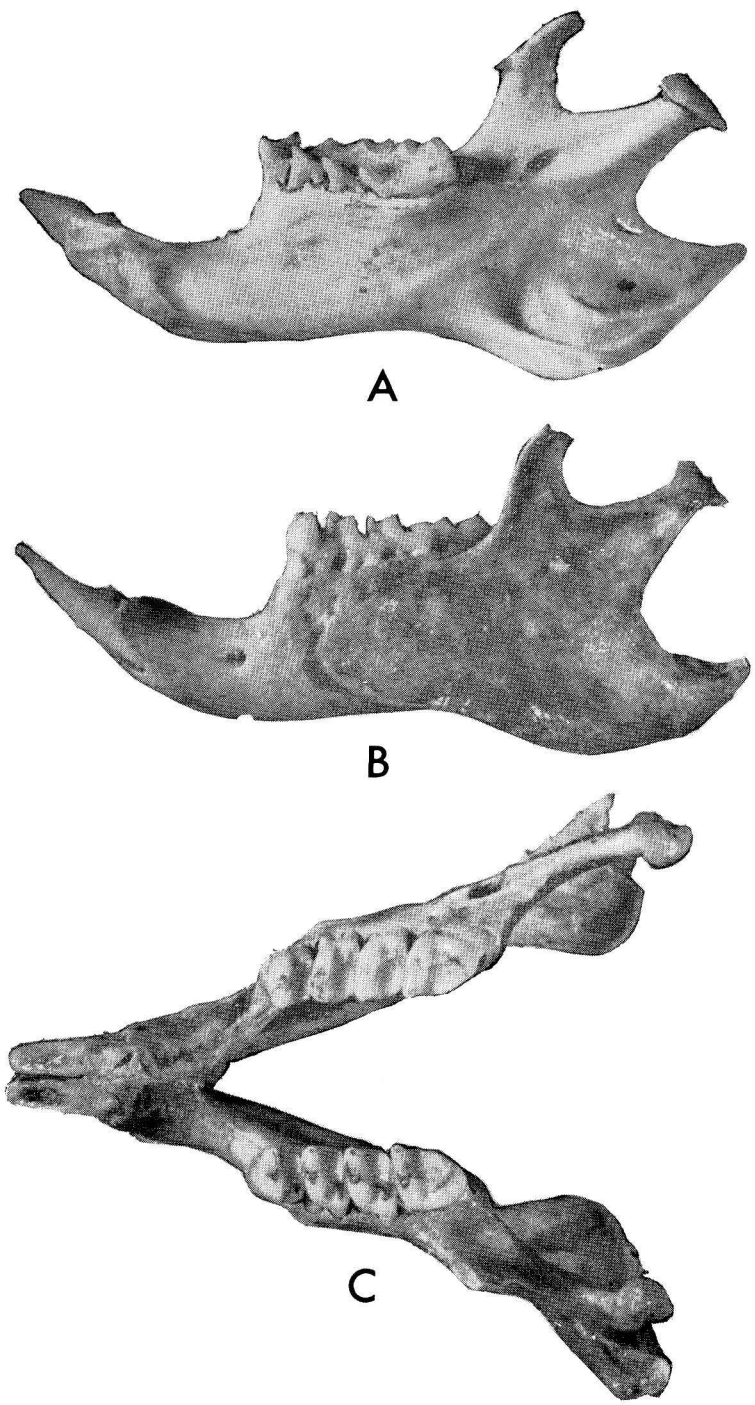

FIG. 3—*Citellus kimballensis*. A—U.N.S.M. 61407, paratype, lingual view of left ramus with I, P_4-M_3, X3. B—U.N.S.M. 61434, holotype, labial view of right ramus with I, P_4-M_3, X3. C—U.N.S.M. 61434, holotype, dental view of mandible with right and left I, P_4-M_3, X3.

TABLE 1

MEASUREMENTS OF EXAMPLES OF *Citellus kimballensis*, NEW SPECIES

Museum Number	Transverse width incisor	Diastema length	Tooth-row length	Depth of ramus below center of P_4	Palate width between P^3's	Palate width between P^4's	Palate width between M^1's	Anteroposterior length of P3	Anteroposterior length of P4	Anteroposterior length of M1	Anteroposterior length of M2	Anteroposterior length of M3
	mm.	mm.	mm.	mm.	mm.			mm.				
U.N.S.M.												
61406 (skull)	1.4	10.7	9.9	...	7.1	6.3	5.5	1.0	1.8	1.8	1.9	3.2
61405 (skull-holotype)	1.5	...	10.1	...	6.9	6.1	5.0	1.1	1.7	1.8	2.1	3.2
61407 (ramus)	...	6.3	9.2	6.4	...	...	...	...	2.0	1.9	2.2	3.5
61434 (mandible)	1.5	6.3	9.2	6.4	...	...	...	...	2.0	1.9	2.2	3.4

Museum Number	Transverse width of P3	Transverse width of P4	Transverse width of M1	Transverse width of M2	Transverse width of M3	Palatal bridge[1]	Skull height[2]	Occipital width[3]	Occipital height[4]	Palatal length
	mm.					mm.	mm.	mm.	mm.	mm.
U.N.S.M.										
61406 (skull)	1.9	2.8	3.0	3.0	3.1	17.0	...	...	...	25.0
61405 (skull-holotype)	1.8	2.6	2.8	3.0	3.0	ca. 16.5	20.6	ca. 20.1	6.1	...
61407 (ramus)	...	2.4	2.7	2.6	2.6	...	...	...	...	...
61434 (mandible)	...	2.3	2.7	2.6	2.6	...	...	...	...	...

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.

that of *C. (Otospermophilus) argonautus* Stirton and Goeris. The transverse width of P^3 and P^4 and the length and width of P_4 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 M^3 of *Citellus kimballensis*, however, is simpler than that found in *Cynomys*. The M^3 possesses only one well marked ridge, the protoloph, and there are no complicated enamel folds in the basin of the M^3. 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 saggital 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.

SELECTED REFERENCES

Allen, Joel Asaph. 1902. Mammal names proposed by Oken in his "Lehrbuch der Zoologie." Bull. Amer. Mus. Nat. Hist., 16 (27): 373–379.

Bryant, Monroe D. 1945. Phylogeny of Nearctic Sciuridae. Amer. Midland Naturalist, 33 (2): 257–390.

Burt, William H. *et al.* 1960. Report of the committee on nomenclature. Jour. Mammal., 41 (4): 537–539.

Ellerman, J. R. 1940. The families and genera of living rodents. Publ. British Mus. (Nat. Hist.), 1: 1–651, Figs. 1–189.

Hall, E. Raymond, and R. Keith Kelson. 1959. The mammals of North America. New York, Ronald Press Company, 1: 289–410.

Hay, O. P. 1930. Second bibliography and catalogue of the fossil vertebrata of North America. Carnegie Inst. Washington Publ. 390, Vol. 2: 868.

Hemming, Francis (editor). 1956. Opinion 417: Rejection for nomenclatorial purposes of volume 3 (Zoologie) of the work by Lorenz Oken entitled "Oken's Lehrbuch der Naturgeschichte" published in 1815–1816. Opinions and declarations, Internatl. Comm. Zool. Nomenclature, London, 14 (1): 1–42.

Hershkovitz, Philip. 1949. Status of names credited to Oken, 1816. Jour. Mammal., 30 (3): 289–301.

Hibbard, Claude W. 1941a. New mammals from the Rexroad fauna, Upper Pliocene of southwestern Kansas. Amer. Midland Naturalist, 26 (2): 337–368, 12 figures, 3 pls.

———. 1941b. Mammals of the Rexroad fauna from the Upper Pliocene of southwestern Kansas. Trans. Kansas Acad. Sci., 44 (30): 265–305, 4 pls.

———. 1942. A new fossil ground squirrel *Citellus (Pliocitellus) fricki* from the Pliocene of Clark County, Kansas. Trans. Kansas Acad. Sci., 45: 253–257, Pls. 1–2.

Hibbard, Claude W., and Dwight W. Taylor. 1959. Summary of Cenozoic geology and paleontology of Meade County area, southwestern Kansas and northwestern Oklahoma. Pre-publication manuscript of U. S. Geol. Survey, and Univ. Mich. Mus. Paleont.: 1–157, tables.

Howell, Arthur H. 1938. Revision of the North American ground squirrels and a classification of the North American Sciuridae. North Amer. Fauna, (56): 1–256, 20 figures, 32 plates.

Miller, Gerrit S., Jr., and Remington Kellogg. 1955. List of North American recent mammals. Bull. U. S. Natl. Mus. (205): 1–954.

Schultz, C. Bertrand, and Thompson M. Stout. 1948. Pleistocene

mammals and terraces in the Great Plains. Bull. Geol. Soc. Amer., 59 (6): 553–588, Figs. 1–4, Pl. 1, Tables 1–3.

———, ———. 1961. Field conference on the Tertiary and Pleistocene of western Nebraska. Special Publ. for Ninth Field Conference Soc. Vertebrate Paleont., Univ. Nebraska State Mus. (2): 1–55, figs. 1–47.

Seton, E. Thompson. 1929. Lives of game animals. New York, Doubleday and Doran Co., 4 (1): p. 267.

Shotwell, J. Arnold. 1963. The Juntura Basin: Studies in earth history and paleoecology. Trans. Amer. Philos. Soc., 53 (1): 1–77.

Simpson, George G. 1945. The principles of classification and a classification of mammals. Bull. Amer. Mus. Nat. Hist., 85: 1–350.

THE UNIVERSITY OF NEBRASKA
STATE MUSEUM

STAFF

C. BERTRAND SCHULTZ
Director; Curator, Vertebrate Paleontology

WARREN T. ATYEO
Curator, Entomology
HAI-YEN CHAO
Technical Asst., Herbarium
BELVA D. CLEMENT
Asst. Curator, Geology
LOWELL WADE COX
Artist
MARY L. CUTLER
Asst., Educational Services; and
Asst. Curator of Records
J. A. FAGERSTROM
Curator, Invertebrate Paleontology
ALLAN D. GRIESEMER
Curator, Educational Services
CARL W. GUGLER
Asst. Curator, Zoology
HARVEY L. GUNDERSON
Curator, Zoology and
Museum Records
ROSCOE E. HILL, Assoc.
Curator, Entomology
PRESTON HOLDER
Curator, Anthropology
PAUL A. JOHNSGARD
Asst. Curator, Zoology
JANE HOLDEN KELLEY
Assoc. Curator, Anthropology
GILBERT C. LUENINGHOENER
Consultant, Planetarium
DONALD C. MARTIN
Chief Preparator
FRANCIS MAUPIN
Guard
CHARLES L. MESSENGER
Preparator
NATHAN L. MOHLER
Chief Artist
ANNA E. MOYER
Museum Assistant, Museum Shop
CLAIR R. OSSIAN
Field and Research Assoc.,
Vert. Paleontology
W. WINFIELD RAY
Curator, Botany-Herbarium
KENNETH D. ROSE
Assoc. Curator, Health Sciences
J. FRED SILLS
Curator, Health Sciences
THOMPSON M. STOUT
Assoc. Curator, Geology
LLOYD G. TANNER
Assoc. Curator, Vertebrate
Paleontology
SAMUEL B. TREVES
Curator, Geology
NORMA D. WAGNER
Secretary to Director
H. LLOYD WEAVER
Consultant, Botany
DELIVEE L. WRIGHT
Asst. Curator, Educational Services

Research and Field Associates

I. C. G. CAMPBELL
Classical Archaeology
JOHN F. DAVIDSON
Herbarium
E. MOTT DAVIS
Archaeology
W. D. FRANKFORTER
Vertebrate Paleontology
WILFRED J. HANSON
Entomology
JOHN A. HOWE
Vert. Paleontology
GEORGE E. JAKWAY
Vert. Paleontology
J. KNOX JONES, JR.
Zoology
W. E. LABERGE
Entomology
A. L. LUGN
Geology
T. C. MIDDLESWART
Vert. Paleontology
JOHN M. ROBERTS
Anthropology
CARL F. VONDRA
Vert. Paleontology

Museum Consulting Committee

E. F. FROLIK
S. I. FUENNING
WENDELL L. GAUGER
PRESTON HOLDER
WALTER E. MILITZER
JAMES C. OLSON
EARLE S. RAUN
EUGENE C. REED
C. BERTRAND SCHULZ,
Chairman
THOMAS B. THORSON
SAMUEL B. TREVES