

THE PRIMITIVE VOLE, *OGMODONTOMYS*,
FROM THE LATE CENOZOIC OF KANSAS
AND NEBRASKARICHARD J. ZAKRZEWSKI
The University of Michigan

INTRODUCTION

INTENSIVE fossil collecting by Claude W. Hibbard and parties under his supervision in southwestern Kansas has amassed large amounts of both vertebrate and invertebrate specimens. Detailed faunal and stratigraphic analyses have documented the occurrence of fossil horizons in beds ranging from the Early Pliocene to the Wisconsin Age. Although much work has been done on the faunas as a whole, it is only recently that single taxonomic groups have been studied in detail. Morphological works, both geographic and temporal, have been produced: Taylor's on mollusks (1960); Hazard's on *Citellus* (1961); and Hibbard's on rabbits (1963). These have shed new light on the phylogeny of those groups and on the relationships of the localities at which they are found.

The microtine rodents are a group which is known to have undergone rapid evolution. Since their first appearance in the Middle Pliocene, they have evolved from forms with low-crowned, rooted teeth without cement to forms which, with few exceptions, have hypsodont ever-growing cheek teeth that contain cement. Because of this rapid change it was thought that work on a member of this group, the primitive vole, *Ogmodontomys*, might present more information in regard to the early evolution among the microtines, and in turn to the relationships of the localities where *Ogmodontomys* is found.

MATERIALS AND METHODS

The genus *Ogmodontomys* is known from 11 localities in southwestern Kansas. During the summer of 1965 a left lower jaw of *Ogmodontomys* was found in the Sand Draw local fauna of northern Nebraska by P. R. Bjork. This find extends the geographic range of this genus from the Meade Basin.

All specimens used in this study are in the collections of the University of Michigan, Museum of Paleontology (UMMP) and the University of Kansas, Museum of Natural History (KUMNH). Only those specimens from which reliable measurements could be

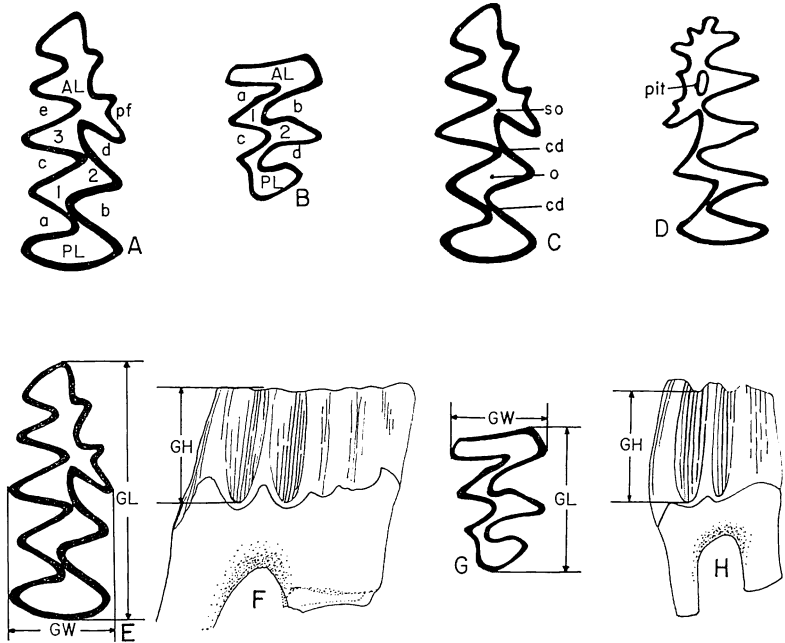


FIG. 1. Dental nomenclature and measurements of microtine teeth.

- (A, C, E-F). *Ogmodontomys p. poaphagus* Hibbard, UMMP 53877, RM₁. (A, C, E) occlusal view. $\times 10$. (F) labial view. $\times 8$.
 (B, G-H) *Ogmodontomys p. poaphagus* Hibbard, UMMP 53879, RM³. (B, G) occlusal view. $\times 10$. (H) labial view. $\times 8$.
 (D) *Ogmodontomys p. poaphagus* Hibbard, UMMP 53878, LM₁. occlusal view. $\times 10$.

ABBREVIATIONS; AL, anterior loop. PL, posterior loop. 1, 2, 3; first, second, third alternating triangles. a, b, c, d, e; reentrant angles. pf, prism fold. Lower teeth are described by beginning with posterior loop (PL), and upper teeth are described by beginning with the anterior loop (AL). cd, closed. so, slightly open. o, open. GL, greatest length. GW, greatest width. GH, greatest height.

obtained were studied. The number of specimens is listed under the individual localities. The measurements were determined to the nearest tenth of a millimeter.

Tooth development in the microtines imparts a great degree

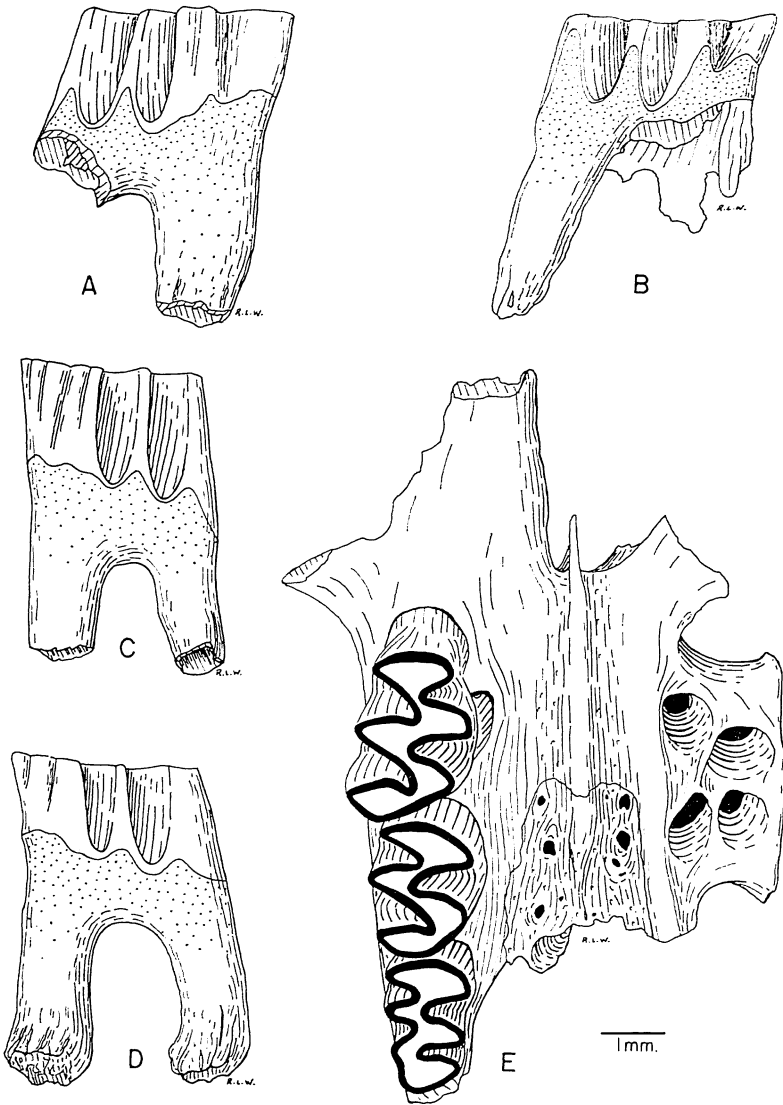


FIG. 2. *Ogmodontomys*; (A) *O. p. poaphagus* Hibbard UMMP 51853, RM₁. (B) *O. p. poaphagus* Hibbard UMMP 51854, RM₁. (C) *O. p. transitionalis* subsp. nov. UMMP 51852, LM₁. (D) *O. sawrockensis* Hibbard UMMP 51851, LM₁. (A-D) labial view. × 8. (E) *O. p. transitionalis* subsp. nov., holotype, UMMP 28234, maxillaries and palate with RM¹-RM³. occlusal view. × 8.

of variation to the M_1 and the M^3 . Because these teeth also possess characters of generic and specific grade, they have been given special attention. Fig. 1 denotes the nomenclature of microtine teeth and the measurements which were made in this study. Statistical analyses, i.e. the computation of the first and second moment, mean (\bar{X}), and standard deviation (δ), were made for the M_1 and the M^3 from each of the localities.

To allow for any variation due to age, five groups, based on root development and wear of crown, were defined as follows: *immature*, no roots developed; *young adult*, roots developed but open at base; *adult*, roots closed; *late adult*, crown greatly reduced (usually less than 1 mm) but no interrupted enamel pattern or enamel lakes; and *old adult*, crown greatly reduced, interrupted enamel pattern, and enamel lakes.

Factors which could be considered qualitatively were the degree of closure among the alternating triangles and the development of dentine tracts on the labial side of the M_1 . Three degrees of closure are defined: *closed*, where the continuation of the dentine on the occlusal surface is impeded by the joining of the enamel from the opposite sides of the tooth near the midline; *slightly open*, where the enamel does not meet but allows a narrow strip of dentine to continue between the triangles; and *open*, where a wide tract of dentine exists between the enamel of the triangles (Fig. 1C).

Dentine tracts are found on the labial side of the M_1 . They are caused by the retraction of the enamel from the base of the crown toward the occlusal surface. Tracts can be absent, incipient, slightly developed, or well developed (Fig. 2 A-D).

Reduction from the normal three-rooted condition to two roots, by fusion of the anterior pair, was observed in the M^2 and the M^3 . These features are discussed in more detail under the localities where they are pertinent.

SYSTEMATICS AND DISCUSSION SAW ROCK CANYON LOCAL FAUNA

Ogmodontomys sawrockensis Hibbard, 1957

Cosomys primus Wilson, Hibbard 1949.

Cosomys primus Wilson, Hibbard 1953.

Horizon and locality.—Upper Middle Pliocene, XI member, Rex-

road formation; Seward County KU Loc. 6, Saw Rock Canyon, Sec. 36, T. 34 S., R. 31 W., Seward County, Kansas.

Diagnosis.—Slightly smaller than *Ogmodontomys poaphagus* with shorter crowned teeth. The lateral palatal grooves are distinctly deeper than those of *O. poaphagus*.

Material.—4 lower jaws, 7 isolated M_1 s, 2 palates, 6 isolated M^3 s, and 8 isolated M^2 s.

Comparison.—*Ogmodontomys sawrockensis* is distinguished from *O. poaphagus* in the palatal region by the possession of distinctly deeper palatal grooves and by the fact that the maxillary which forms the outer wall of each groove is vertical rather than sloping outward and upward to the alveolar plane, as in the latter form. The lower jaw of *O. sawrockensis* is characterized by the position of the mental foramen on the labial side of the jaw anterior to the root of the M_1 and just anterior to the masseteric crest, regardless of age. This position varies in *O. poaphagus* and is more dorsal in a majority of individuals. *O. sawrockensis* does not have the well-developed capsular process on the ascending ramus, which is found in some members of *O. poaphagus*. Dentine tracts are absent on the labial side of the M_1 of *O. sawrockensis* and the alternating triangles are closed, the only exception being one late adult individual which exhibits a slightly open condition between triangles one and two. In *O. poaphagus* a majority of the M_1 s possess incipient or slightly developed dentine tracts on the labial side of the teeth, and the alternating triangles vary in degree of closure.

Characteristics of the M_1 which are common to both *Ogmodontomys* and the genus *Cosomys* are the presence of a prism fold (Fig. 1A) as an accessory development of the anterior loop; and enamel pits or islets, developed in the central portion of the anterior loop by the infolding of accessory crenulations on the loop and their subsequent isolation during wear of the tooth. In *Cosomys* the prism fold and the pit are for the most part retained longer in life, and the latter character occurs more frequently in *Cosomys* than in *Ogmodontomys*.

Ogmodontomys also differs from *Cosomys* by the dominance of the three-rooted condition in the M^3 as opposed to the two-rooted condition in the latter form. The apices of the reentrant angles on the lingual side of the M_1 are at right angles to the longitudinal

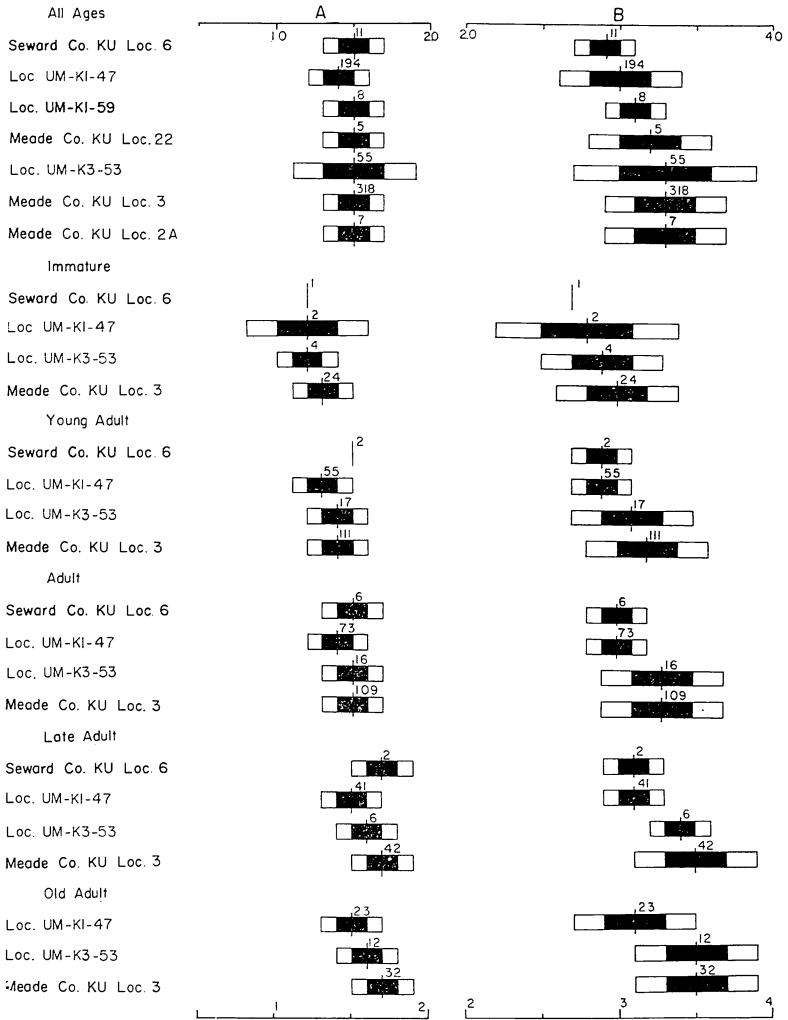


FIG. 3. Diagrams showing measurements (in mm) of width (A) and length (B) in the M_1 of *Ogmodontomys*. Vertical lines—mean; solid rectangles—one standard deviation; open rectangles—two standard deviations; sample size beside mean.

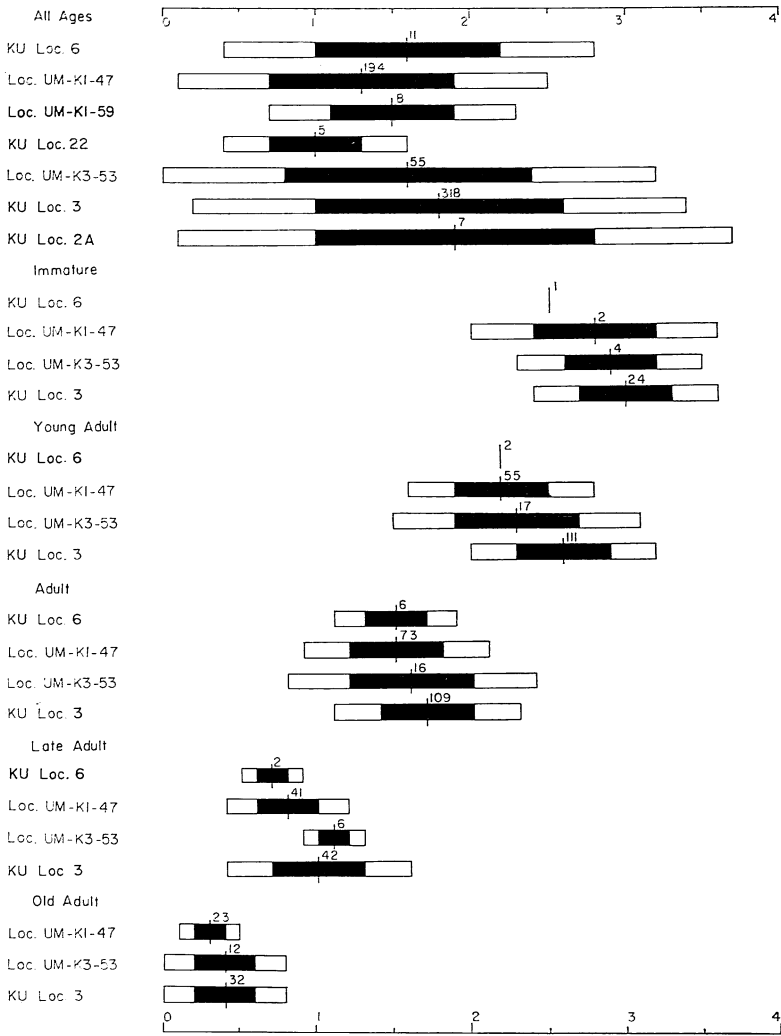


FIG. 4. Diagram showing measurements (in mm) of height in the M_1 of *Ogmodontomys*. Vertical lines—mean; solid rectangles—one standard deviation; open rectangles—two standard deviations; sample size beside mean.

plane of the tooth in *Ogmodontomys*; in *Cosomys*, these reentrant angles are narrower and constrict just before the apices turn forward.

Discussion.—Other members of the Saw Rock Canyon local fauna and its stratigraphic position have been previously discussed by Hibbard (1949, 1953, 1964) and Taylor (1960). Hibbard considers the Saw Rock Canyon fauna older than the Rexroad; and he regards some species which occur in the former as ancestral to similar species which occur in the latter. Because of its small size, less hypsodont teeth, lack of dentine tracts, and closure of its alternating triangles on the M_1 , *Ogmodontomys sawrockensis* is considered the most primitive member of the genus and ancestral to *O. poaphagus* and *Cosomys*.

FOX CANYON LOCAL FAUNA

Ogmodontomys poaphagus transitionalis subsp. nov.

(FIG. 2E)

Horizon and locality.—Upper Pliocene, Rexroad formation; Loc. UM-K1-47, Fox Canyon, Sec. 35, T. 34 S., R. 30 W., Meade County, Kansas.

Holotype.—UMMP 28234, palate and maxillaries bearing right M^1 - M^3 and alveoli for left M^1 - M^2 .

Diagnosis.—Teeth slightly smaller in all dimensions than those for *Ogmodontomys p. poaphagus* and intermediate between that form and *O. sawrockensis* in degree of closure and the development of dentine tracts on the M_1 .

Material.—90 partial lower jaws, 104 isolated M_1 s, 6 palates, 8 maxillaries with teeth, 75 isolated M^3 s, and 59 isolated M^2 s.

Comparisons.—*Ogmodontomys p. transitionalis* is similar to *O. p. poaphagus* in the possession of a sloping maxillary border of the palatal grooves; and in the degree and nature of variation which is found in the position of the mental foramen on the ramus, the foramen being more dorsal in the majority of the lower jaws. *O. p. transitionalis* is similar to *O. sawrockensis* in the size of the teeth. *O. p. transitionalis* is intermediate to the other members of

the genus in the degree of closure between the alternating triangles; also the dentine tracts on the labial side of the M_1 and the capsular

TABLE I
PARAMETERS OF THE M^3 (IN MM)

	$\bar{x}L$	δ	$\bar{x}W$	δ	$\bar{x}H$	δ
COMBINED AGE GROUPS						
KU Loc. 6 (6)	2.0	0.2	1.3	0.2	1.3	0.6
Loc. UM-K1-47 (83)	2.0	0.2	1.3	0.2	1.3	0.5
Loc. UM-K1-59 (5)	2.2	0.2	1.4	0.1	1.3	0.6
Loc. UM-K3-53 (34)	2.1	0.2	1.4	0.1	1.3	0.6
KU Loc. 3 (149)	2.1	0.2	1.4	0.1	1.7	0.6
KU Loc. 2A (10)	2.1	0.2	1.4	0.1	1.7	0.6
IMMATURE						
KU Loc. 6 (1)	1.5	0.0	1.0	0.0	2.0	0.0
Loc. UM-K1-47 (1)	1.7	0.0	1.1	0.0	2.3	0.0
KU Loc. 3 (8)	1.9	0.1	1.1	0.1	2.8	0.1
YOUNG ADULT						
Loc. UM-K1-47 (25)	1.8	0.2	1.1	0.2	1.9	0.3
Loc. UM-K3-53 (7)	1.8	0.1	1.3	0.1	2.1	0.3
KU Loc. 3 (32)	1.9	0.1	1.3	0.1	2.3	0.2
ADULT						
KU Loc. 6 (3)	2.0	0.1	1.3	0.1	1.4	0.6
Loc. UM-K1-47 (46)	2.0	0.1	1.3	0.1	1.2	0.2
Loc. UM-K3-53 (12)	2.0	0.1	1.4	0.1	1.6	0.2
KU Loc. 3 (78)	2.1	0.2	1.4	0.1	1.7	0.3
LATE ADULT						
KU Loc. 6 (2)	2.2	0.1	1.5	0.0	0.7	0.1
Loc. UM-K1-47 (8)	2.1	0.1	1.4	0.1	0.7	0.1
Loc. UM-K3-53 (13)	2.3	0.1	1.5	0.1	0.8	0.3
KU Loc. 3 (28)	2.4	0.2	1.5	0.1	0.8	0.3
OLD ADULT						
Loc. UM-K1-47 (3)	2.1	0.0	1.4	0.1	0.3	0.1
Loc. UM-K3-53 (2)	2.4	0.1	1.4	0.1	0.4	0.1
KU Loc. 3 (3) (3)	2.3	0.3	1.4	0.1	0.4	0.1

process on the lower jaw are either absent as in *O. sawrockensis* or present as in *O. p. poaphagus*.

Specimens from Fox Canyon and Saw Rock Canyon measure slightly smaller than those from KU Loc. 3, although there is some

TABLE II
SUMMARY OF VARIATION IN THE M_1 OF *Ogmodontomys*

	<i>O. sawrochenkensis</i>		<i>O. p. transitionalis</i>		<i>O. p. poaphagus</i> *		<i>O. p. poaphagus</i> †	
	N	%	N	%	N	%	N	%
Number of M_1 s	11		194		294		55	
Posterior loop and								
Triangle 1 closed	11	100	192	99	216	73.5	37	67.4
slightly open	-	-	2	1	78	26.5	17	30.8
open	-	-	-	-	-	-	1	1.8
Triangle 1 and								
Triangle 2 closed	10	91	32	16.5	2	0.6	-	-
slightly open	1	9	125	64.5	125	42.6	17	30.8
open	-	-	37	19	167	56.8	38	69.2
Triangle 2 and								
Triangle 3 closed	11	100	189	97.5	147	50	30	54.5
slightly open	-	-	1	0.5	140	47.7	23	42
open	-	-	4	2.0	7	2.3	2	3.5
Triangle 3 and anterior								
loop closed	11	100	77	39.7	46	15.6	8	14.5
slightly open	-	-	97	50.0	206	70.1	36	66.5
open	-	-	20	10.3	42	14.3	11	20
Dentine tracts absent	11	100	20 ‡	10.3	- ‡	-	- ‡	-
incipient	-	-	151	78	69	23.5	15	27
slightly developed	-	-	-	-	191	65	18	51
Prism folds	6	54.5	110	56.8	175	61	34	62
Pits	4	36.4	6	3.1	4	1.3	-	-

* Specimens from Meade Co. KU Loc. 3.

† Specimens from Loc. UM-K3-53.

‡ Tract length indeterminate on remainder of specimens.

overlap of size ranges. *Ogmodontomys p. poaphagus* is difficult to separate from other members of the genus on size alone, but comparison of means for the various age groups show a closer relation in the length and height of the M_1 and M^3 between *O. p. transitionalis* and *O. sawrockensis* than with *O. p. poaphagus* from KU Loc. 3. Parameters obtained as a result of statistical analyses of the M_1 and the M^3 measurements are shown in Figs. 3-4 and Table I. Localities with less than five specimens are not listed.

Comparisons of the M_1 and the M^3 in *Ogmodontomys p. transitionalis* and *O. p. poaphagus* by use of the mean and standard deviation; i.e., $\bar{X} + \delta = 32\%$ of the population, $\bar{X} + 2\delta = 48\%$, show that for most age groups at least 82% of the population of *O. p. transitionalis* lies below the mean of *O. p. poaphagus* from KU Loc. 3, and in some situations even 98% of the population of *O. p. transitionalis* lies below the mean of the latter form. This means that in most age groups at least 50%, and in some cases 82%, of the population from KU Loc. 3 is larger than the population from Fox Canyon.

The degree of closure between the alternating triangles of the M_1 varies in the different members of the genus. This is clearly seen from Table II. The amount of closure between the alternating triangles is considered to be of an intermediate nature in *Ogmodontomys p. transitionalis*.

Although dentine tracts are well developed on only two specimens (see Bender local fauna), they are slightly developed on at least 50% of the specimens considered to be *Ogmodontomys p. poaphagus*. These tracts are absent or incipient on the M_1 s from the population at Fox Canyon, Fig. 2 (A-D). These differences are enough to contribute toward a subspecific separation of the two forms.

Ogmodontomys p. transitionalis, in all probability, descended from *O. sawrockensis* and in turn gave rise to *O. p. poaphagus*.

Discussion.—Other workers have considered the relationship of Fox Canyon locality to Rexroad Loc. 3. Taylor (1960), in his work on the High Plains molluscan faunas, discussed the genus *Gastrocopta*. Populations of this genus at Upper Pliocene localities exhibited characters of two Recent species. Taylor described a new fossil species based on these populations and suggested they served as a "pool" from which the Recent species became isolated. Study

of the relationships of the species led Taylor to believe that those specimens present at his Loc. 4b, which is equivalent in part to Loc. UM-K1-47, might represent an intermediate stage in time between the Saw Rock local fauna and the Rexroad local fauna from KU Loc. 3.

Hazard (1961) found that isolated cheek teeth of *Citellus rexroadensis* from Fox Canyon measured slightly smaller than those from KU Loc. 3, although a broad overlap of their size ranges occurred. Hazard considered the difference to be due to chronological variation rather than ecology.

Because of the intermediate stage of development of these species and the faunal difference between KU Loc. 3 and the Fox Canyon locality (Hibbard 1950), the latter is removed from the Rexroad local fauna and is here named the Fox Canyon local fauna.

REXROAD LOCAL FAUNA

Ogmodontomys poaphagus poaphagus Hibbard 1941

Horizon and locality.—Upper Pliocene, Rexroad formation; Meade County KU Loc. 3, W $\frac{1}{2}$, SW $\frac{1}{4}$, Sec. 22, T. 33 S., R. 29 W., Meade County, Kansas.

Diagnosis.—*Ogmodontomys p. poaphagus* is distinguished from other members of the genus by larger and more hypsodont teeth, the slight development of dentine tracts on the labial side of the majority of M₁s, and the presence of a well-developed capsular process on the ascending ramus.

Material.—56 lower jaws, 262 isolated M₁s, 12 palates, 3 maxillaries, 149 isolated M³s, and 182 isolated M²s.

Discussion.—The features of *Ogmodontomys p. poaphagus* have been discussed when considering other members of the genus. The characters of the specimens present at KU Loc. 3 suggest a position slightly later in time for this locality than Loc. UM-K1-47. Populations at the remaining nine localities are all believed to belong to *O. p. poaphagus*. Each of the other localities will be discussed individually, and any relationship to or variation from KU Loc. 3 will be noted.

Loc. UM-K3-53.—Upper Pliocene, Rexroad formation; Wendell Fox Ranch, SW $\frac{1}{4}$, SW $\frac{1}{4}$, Sec. 33, T. 33 S., R. 29 W., Meade County, Kansas.

Material.—22 lower jaws, 33 isolated M_1 s, 5 maxillaries, 34 isolated M^2 s, and 29 isolated M^3 s.

Discussion.—Loc. UM-K3-53 is one of the three localities with a large enough sample to be statistically adequate. Measurements of tooth length and width in this sample equate Loc. UM-K3-53 with KU Loc. 3. The teeth at KU Loc. 3, however, are slightly more hypsodont (Fig. 4 and Table I). The isolated upper teeth from Loc. UM-K3-53 were all found to be three-rooted (Table III). Whether these two features imply a slightly older age for Loc. UM-K3-53 is not known. Hibbard (1963), discussing the origin of the P_3 pattern in rabbits, suggests the possibility of a slightly younger age for Loc. UM-K3-53. It may well be that the two localities are contemporaneous.

KU Loc. 2A.—Upper Pliocene, Rexroad formation; NE $\frac{1}{4}$, SE $\frac{1}{4}$, NW $\frac{1}{4}$, Sec. 22, T. 33 S., R. 29 W., Meade County, Kansas.

Material.—1 lower jaw, 6 isolated M_1 s, and 10 isolated M^3 s.

Discussion.—The sample from this locality is inadequate; the specimens possess no characters which would eliminate them from *Ogmodontomys p. poaphagus*.

Loc. UM-K1-59.—Upper Pliocene, Rexroad formation; Cottrell pasture, NW $\frac{1}{4}$, SE $\frac{1}{4}$, Sec. 16, T. 33 S., R. 29 W., Meade County, Kansas.

Material.—2 lower jaws, 6 isolated M_1 s, and 5 isolated M^3 s.

Discussion.—Miller (1964) placed mollusks from Loc. UM-K1-59 in the Bender local fauna, but Hibbard and Taylor (personal communication) consider that Loc. UM-K1-59 is part of the Rexroad fauna proper. The population of *Ogmodontomys* present at this locality cannot be separated from the population occurring at KU Loc. 3.

KU Loc. 22.—Upper Pliocene, Rexroad formation; Keefe Canyon, SW $\frac{1}{4}$, SW $\frac{1}{4}$, Sec. 34, T. 34 S., R. 30 W., Meade County, Kansas.

Material.—4 lower jaws and 1 isolated M_1 .

Discussion.—The sample at KU Loc. 22 is inadequate. The specimens are placed in *Ogmodontomys p. poaphagus* on the basis of size and the degree of closure between the alternating triangles.

TABLE III
SUMMARY OF VARIATION IN THE M² AND M³ OF *Ogmodontomys*

	<i>O. sawrockensis</i>		<i>O. p. transitionalis</i>		<i>O. p. poaphagus</i> *		<i>O. p. poaphagus</i> †	
	N	%	N	%	N	%	N	%
Number of M ² s	8		59		182		29	
M ² two-rooted	-	-	1	1.6	7	3.8	-	-
Number of M ³ s	6		75		126		34	
M ³ two-rooted	-	-	1	1.3	13	10.3	-	-

* Specimens from Meade Co. KU Loc. 3.

† Specimens from Loc. UM-K3-53.

Loc. UM-K6-53.—Upper Pliocene, Rexroad formation; Big Springs Ranch, NW $\frac{1}{4}$, NE $\frac{1}{4}$, Sec. 24, T. 32 S., R. 29 W., Meade County, Kansas.

Material.—2 lower jaws and an isolated M³.

Discussion.—All specimens are of adult individuals. Their large size, the degree of closure between the alternating triangles, and slight development of dentine tracts on the labial side of the M₁ places them in *Ogmodontomys p. poaphagus*.

BENDER LOCAL FAUNA

Horizon and locality.—Upper Pliocene, Rexroad formation; Loc. 1c, SW $\frac{1}{4}$, SW $\frac{1}{4}$, SE $\frac{1}{4}$, Sec. 22, T. 33 S., R. 29 W., Meade County, Kansas.

Material.—11 isolated teeth.

Discussion.—From this locality the 11 isolated teeth are identified as *Ogmodontomys p. poaphagus*. There are no M₁s or M³s. Comparison of the teeth with those from other localities show, with one exception, no significant differences in any of the diagnostic characters considered earlier. One M₂ possesses a dentine tract development intermediate to that found in teeth from KU Loc. 3, and the M₁ from Loc. UM-K2-57.

This fauna occurs above the massive caliche bed which is found in the uppermost part of the Rexroad formation. Taylor (1960) separated this fauna from the Rexroad local fauna on the basis of the molluscan fauna and on the climatic inferences from the fauna and the sediments in which it is found.

Loc. UM-K2-57.—Upper Pliocene, Rexroad formation; Big Springs Ranch, south side of Hart Draw, NW $\frac{1}{4}$, NE $\frac{1}{4}$, Sec. 18, T. 32 S., R. 28 W., Meade County, Kansas.

Material.—2 isolated teeth, RM₁ and RM³.

Discussion.—These 2 teeth present a most interesting problem. Of all samples studied, they possess features which are considered to be the most advanced. The M₁ is characterized by well-developed dentine tracts on the labial side of the tooth, which would impart an interrupted enamel pattern to the tooth during an early stage of wear (Fig. 2D). In none of the other samples of teeth are the dentine tracts as well developed. The presence of these tracts is of

generic significance in the separation of *Ondatra* from *Pliopotamys* (Hibbard 1956); and the degree of tract development is important in distinguishing between species in the former form. The M^3 is two-rooted.

Well-developed dentine tracts and two-rooted upper molars are characters which become dominant among some microtines in faunas which are considered younger than the Rexroad local fauna. Whether these features are of taxonomic significance in this genus, or imply a younger age, cannot be determined on the basis of this small sample. At this locality the Ballard formation overlies the Rexroad formation.

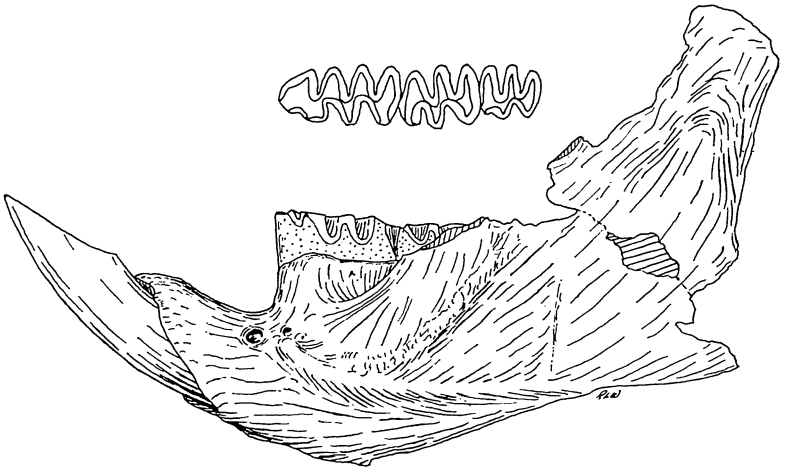


FIG. 5. *Ogmodontomys p. poaphagus* Hibbard. UMMP 52224, a left jaw with M_1 - M_3 . Sand Draw local fauna. Lateral and occlusal views. $\times 4$.

SAND DRAW LOCAL FAUNA

Horizon and locality.—Lower Pleistocene, SE $\frac{1}{4}$, Sec. 25, T. 31 N., R. 22 W., Brown County, Nebraska.

Material.—Left lower jaw, M_1 - M_3 (Fig. 5).

Discussion.—This specimen is the first reported find of *Ogmodontomys* outside of the Meade Basin. The jaw represents an individual in an old adult stage of wear, and in no way differs from individuals found at localities which contain *O. p. poaphagus*. The specimen is therefore placed in this subspecies.

DEER PARK LOCAL FAUNA

Horizon and locality.—Lower Pleistocene, Missler member, Ballard formation; Meade County Loc. 1, SE $\frac{1}{4}$, Sec. 15, T. 33 S., R. 29 W., Meade County, Kansas.

Material.—2 isolated M₁s.

Discussion.—The Deer Park is thought to be the youngest local fauna from which remains of *Ogmodontomys* have been reported. The specimens, although originally referred to either *Ogmodontomys* sp. or *Mimomys* (*Cosomys*) sp. by Hibbard (1956), can definitely be placed in the former genus on the basis of the occlusal pattern. These teeth are similar to those found at KU Loc. 3.

The recovery of *Ogmodontomys* from the Sand Draw local fauna lends credence to the primary occurrence of this form in the Deer Park local fauna. The 2 teeth at this locality lack the well-developed dentine tracts found on the 2 teeth in the Bender local fauna. The possibility of these specimens having been reworked from the subsurface had been considered, because the Deer Park local fauna was recovered from a sand tube originating near the top of the Rexroad formation.

The lack of well-developed dentine tracts on the specimens from the Sand Draw and the Deer Park only points up the need for more work in strata containing faunas of this age.

SUMMARY

A systematic study of the primitive vole, *Ogmodontomys*, reveals morphological trends of evolutionary significance. Analyses of these trends, i.e. increase in tooth length and hypsodonty, development of dentine tracts and the degree of closure of the alternating triangles, provide a basis for the relative dating of the localities at which *Ogmodontomys* is found in southwestern Kansas.

These trends also permit the naming of a new subspecies, *Ogmodontomys poaphagus transitionalis*. The intermediate nature of this form, combined with the findings of Hazard (1961) and Taylor (1960) for material at Loc. UM-K1-47, permits the removal of the fauna in this locality from the Rexroad local fauna proper and the consideration of it as a distinct and older local fauna, the Fox Canyon.

ACKNOWLEDGMENTS

I am especially indebted to Claude W. Hibbard for his inspiration and encouragement throughout this study, and to him and F. R. Bjork for critical reading of the manuscript. I am also indebted to D. W. Taylor for information regarding the mollusks, and to W. A. Clemens, Jr., of the University of Kansas, Museum of Natural History, for the loan of specimens in his care. Financial support for Fig. 1's artist, Christina Bertoni, was provided by NSF Project GB-1528. Other drawings were made by Richard L. Wilson.

LITERATURE CITED

- HAZARD, E. B. 1961. The Subgeneric Status and Distribution in Time of *Citellus rexroadensis*. Jour. Mammal. 42: 477-483.
- HIBBARD, C. W. 1941. New Mammals from the Rexroad Fauna, Upper Pliocene of Kansas. Am. Midl. Nat. 26: 337-368.
- . 1949. Pliocene Saw Rock Canyon Fauna in Kansas. Univ. Mich. Contrib. Mus. Paleon. 7: 91-105.
- . 1950. Mammals of the Rexroad Formation from Fox Canyon, Kansas. *Ibid.* 8: 113-192.
- . 1953. The Saw Rock Canyon Fauna and Its Stratigraphic Significance. Pap. Mich. Acad. 38: 387-411.
- . 1956. Vertebrate Fossils from the Meade Formation of Southwestern Kansas. *Ibid.* 41: 145-203.
- . 1957. Two New Cenozoic Microtine Rodents. Jour. Mammal. 38: 39-44.
- . 1963. The Origin of the P₃ Pattern of *Sylvilagus*, *Caprolagus*, *Oryctolatus*, and *Lepus*. *Ibid.* 44: 1-15.
- . 1964. A Contribution to the Saw Rock Canyon Local Fauna of Kansas. Pap. Mich. Acad. 49: 115-127.
- MILLER, B. B. 1964. Additional Mollusks from the Late Pliocene Bender Local Fauna, Meade County, Kansas. Jour. Paleon. 38: 113-117.
- TAYLOR, D. W. 1960. Late Cenozoic Molluscan Faunas from the High Plains. U.S. Geol. Surv. Prof. Pap. 337. 94 pp.