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The Rezabek Fauna, a New Pleistocene Fauna from Lincoln County, Kansas

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ABSTRACT: A new Pleistocene mammalian assemblage is described from Lincoln county, Kansas. The mammals were found associated with other vertebrates and numerous invertebrates, which are known as the Rezabek fauna. The deposit from which the fauna was recovered is younger than the Meade formation into which it is channeled. The paper treats of the Mammalia, which are represented by 5 orders, 8 families, 15 genera, and 9 species, of which the following are described as new: *Blarina fossilis* sp. nov.; *Neofiber leonardi* sp. nov. With text figures.

INTRODUCTION

IN THE summer of 1941, Doctor John C. Frye, State Geologist, of the Kansas State Geological Survey, was engaged in a study of the ground-water resources of parts of Russell and Ellis counties, Kansas. During this study Frye located a number of fossil localities in the area under study. That fall Doctor A. B. Leonard and I visited the area and worked with him on the fossil localities. These were reported in a paper by Frye, Leonard and Hibbard (1943).

In the summer of 1942, the excess rains in Clark county delayed our work in that area because we were unable to travel the unimproved roads and trails. Advantage was taken of such conditions to haul a load of matrix from the Rezabek gravel pit to our camp. This matrix was subsequently washed out, and the fossils recovered form the basis of this paper.

Acknowledgment is made of the kindness of Mr. Frank Rezabek, who has given us the matrix for study and donated the horse tooth which he had taken from the exposure; to Mr. Lee Larrabee, chairman, and Mr. Guy D. Josserand, Director, of the Kansas State

Fish and Game Commission, Mr. Leonard Sutherland of the Meade County State Park for camping and washing facilities and other courtesies shown our party; to Mr. C. D. Bunker, Curator of Museum of Modern Vertebrates, Kansas University, for the loan of recent material for study; and to Dr. W. H. Burt, Curator of Mammals, Museum of Zoölogy, University of Michigan, for the loan of material used in this study and for the examination of specimens under question. I am further indebted to A. B. Leonard, George C. Rinker, Jack Twente, Faye Hibbard, Alice Leonard, and Henry Hildebrand, members of the field party, for their untiring efforts spent in sorting the fossils from the washed matrix and other field and camp duties. All drawings were made by Mrs. Frances Watson Horseman.

REZABEK FAUNA

The Rezabek fauna was taken from the Rezabek gravel pit in sec. 20, T. 13 S., R. 11 W., Lincoln county, Locality No. 5, Kansas. The fossils occur in compact, fine, gray silts, containing fine to coarse sand above the gravel of the above mentioned pit. These deposits are younger than the Meade formation and appear to be channeled into it at this locality.

MOLLUSCA

The Mollusks taken from this deposit were identified and reported by A. B. Leonard (Frye, Leonard and Hibbard, 1943, pp. 41-42). The following gastropods are known to occur in the deposit in association with the vertebrates.

Aquatic gastropods:

Amnicola limosa (Say)
Gyraulus cf. *hirsutus* (Gould)
Gyraulus parvus (Say)
Ferrissia parallela (Haldeman)
Helisoma trivolvis (Say)
Lymnea galbana (Say)
Lymnea humilis modicella (Say)
Lymnea palustris Müller
Lymnea sp.
Menetus kansasensis Baker
Physa anatina Lea
Planorbula armigera (Say)
Valvata tricarinata (Say)

Terrestrial gastropods:

Gastrocopta contracta (Say)
Gastrocopta procera (Gould)
Gastrocopta procera cf. *mcclungi* Hanna and Johnson
Gastrocopta tappaniana (C. B. Adams)
Hawaiia miniscula (Binney)
Helicodiscus parallelus (Say)
Succinea cf. *retusa* Lea
Stenotrema sp. (immatures)
Strobilops affinis Pilsbry
Vallonia costata (Müller)
Vallonia cf. *pulchella* (Müller)
Vertigo gouldi (Binney)
Vertigo hibbardi Baker

VERTEBRATA

A systematic description is given of the Mammalia only, although the occurrence of the other vertebrates is noted here.

CLASS PISCES

Fish bones, scales and teeth are the most abundant vertebrate remains recovered from the matrix. Associated with the Pleistocene fish remains are teeth of Cretaceous sharks which have been reworked from the surrounding Cretaceous deposits. The remains of the gar are most abundant, consisting chiefly of scales and vertebrae with a few dermal bones of the head and fragmentary jaws with teeth. Second in abundance are the remains of catfish (probably *Ameiuridae*) principally spines and a few head bones. Next in order are a number of spines apparently of sunfishes (*Centrarchidae*).

CLASS AMPHIBIA

A number of bones were recovered that belonged to frogs and toads. The remains are common in the deposit, though rather fragmentary. These are being studied by Dr. E. H. Taylor of the University of Kansas.

CLASS REPTILIA

Fragmentary remains of turtles were taken as well as a few snake and lizard vertebrae.

CLASS AVES

Bird remains appear rare in the deposit since only five fragmentary bones were found.

CLASS MAMMALIA

ORDER INSECTIVORA

FAMILY TALPIDAE

Scalopus aquaticus (Linnaeus)

(Plate XIX, fig. 16)

A right humerus, No. 6673, in nearly perfect condition was recovered that is slightly smaller than that of *Scalopus aquaticus machrinoides* Jackson from eastern Kansas. The greatest length of the humerous is 15.0 mm. The greatest width across the distal end is 9.7 mm.

FAMILY SORICIDAE

Sorex cinereus Kerr

Sorex cinereus Kerr, 1792, Animal Kingdom, p. 206.

A right ramus, No. 6674, bearing P_4-M_2, was taken, belonging to a small shrew that is referred to the above form. It is the ramus of an old adult as shown by the worn teeth. The anterior part of P_4 extends over the posterior part of P_3. The mental foramen is situated below the anterior part of M_1 and corresponds to the position observed in recent specimens from Emmit county, Michigan. The anteroposterior diameter of P_4-M_2 is 2.85 mm.

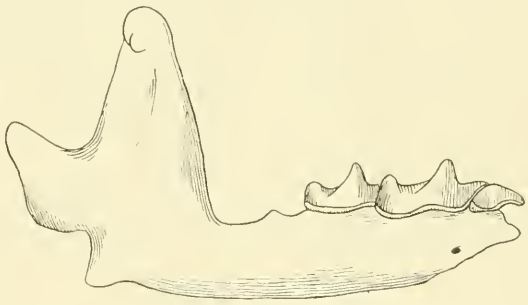

FIG. 1. *Sorex cinereus* Kerr, No. 6674, Kansas University Museum of Vertebrate Paleontology. Right ramus, P_4-M_2. × 10.

Sorex cinereus is also known from the Jones fauna (Hibbard, 1940) a later Pleistocene deposit in Meade county.

Blarina fossilis sp. nov.

Type. No. 6675, Kansas University Museum of Vertebrate Paleontology, fragmentary right ramus bearing M_3.

Horizon and type locality. Pleistocene, Locality No. 5, Lincoln county, Kansas, Rezabek fauna.

Diagnosis. The largest of the known forms of *Blarina;* M_3 larger and possesses a heavier developed cingulum.

Description of type. The ramus is that of a young adult. The anterior part is missing. It is broken at the alveolus of M_1. The roots of M_1 and M_2 are present. There is a well-developed angle on the lower border of the ramus below M_3 though not as strongly developed as in specimens of *B. b. talpoides* (Gapper) from Carroll county, New Hampshire. In comparison with specimens of eastern Kansas the angle is more strongly developed. The tip of the angular process is broken. The inferior notch between the angular process

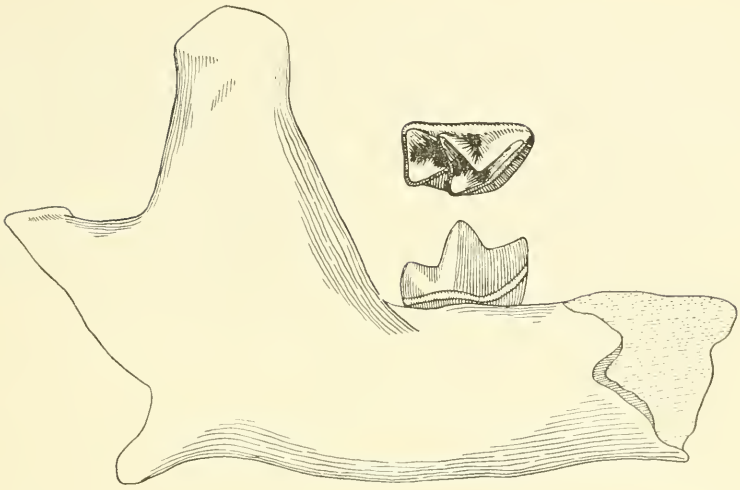

FIG. 2. *Blarina fossilis sp. nov.* holotype, No. 6675, Kansas University Museum of Vertebrate Paleontology. Right ramus, M_3. $\times 10$.

and the condyle is deeper and broader than those observed in recent specimens. Condyle and coronoid process corresponds with that of *B. b. talpoides*. The pterygoid fossa is well developed with a foramen below its ventral border that opens into it. Anterior to this foramen and slightly ventral is the mandibular foramen.

M_3 is larger in comparison to that tooth in recent forms; the cingulum is broader and forms a more pronounced ridge. The ramus is broader posterior to M_3.

MEASUREMENTS IN MILLIMETERS

	B. fossilis No. 6675 KUMVP	*B. b. hulophaga* No. 12925 KUMMV	*B. b. talpoides* No. 11279 KUMMV
M_3, anteroposterior diameter	1.55	1.25	1.25
M_3, greatest transverse width	0.9	0.7	0.8
M_3, anteroposterior length of trigonid	0.9	0.8	0.7
M_3, transverse width of trigonid above external cingulum	0.8	0.7	0.6
M_3, transverse width of talonid above external cingulum	0.6	0.6	0.5
Transverse width of ramus posterior to M_3	1.4	1.2	1.1
Depth of ramus below M_3	2.1	1.8	2.2

Discussion. *Blarina fossilis* is distinguished from *Blarina gidleyi* Gazin from the upper Pliocene of Idaho by its larger size and in that the trigonid is not elongate but the shape of that of *B. brevicauda.*

The metaconid of M_3 is more heavily developed than in the recent forms and the base is strongly developed and extends forward toward the paraconid. The protoconid is distinct and broad being constricted off from the metaconid and a more pronounced separation occurs between the protoconid and the paraconid than in the recent forms. The talonid is as large as in *B. b. talpoides* and not reduced as in *B. b. brevicauda* (Say) and *b. hulophaga* Elliot.

It differs from *Blarina b. ozarkensis* Brown from the Pleistocene of Arkansas in that it possesses a larger talonid on M_3 and a better developed angle below M_3 on the lower border of the ramus.

Blarina simplicidens Cope from the Pleistocene of Pennsylvania has the talonid of M_3 greatly reduced.

ORDER RODENTIA

FAMILY SCIURIDAE

Citellus sp.

A single right upper M^1 or M^2, No. 6730, was found that belongs to a squirrel slightly larger than *Citellus tridecemlineatus* (Mitchill). The tooth possesses a small mesostyle between the paracone and metacone such as occurs in *Citellus richardsonii* (Sabine).

FAMILY GEOMYIDAE

Geomys sp.

(Plate XIX, fig. 2)

A right M^3 and a left upper incisor, No. 6732, was found that belongs to the genus *Geomys*.

FAMILY CASTORIDAE

Castoroides sp.

(Plate XIX, fig. 1)

A fragmentary upper incisor, No. 6296, was found that belongs to the above beaver genus.

FAMILY CRICETIDAE

? *Reithrodontomys*

(Plate XIX, fig. 7)

A fragmentary right ramus, No. 6679, bearing a badly worn M_1 is questionably referred to the above genus. It is the size of *Reithrodontomys albescens* Cary.

Neotoma sp.

(Plate XIX, figs. 3, 4)

Two teeth were taken that belong to this genus. A RM^1, No. 6731a, of an immature specimen, differs from *Neotoma floridana* (Ord), found living in that area at the present time, in that the anterior reëntrant angle on the anterior loop is not as well developed. The tooth has an anteroposterior diameter of 3.4 mm. No. 6731b is a RM_2 of a young specimen. Its anteroposterior diameter is 2.8 mm.

Microtus cf. *pennsylvanicus* (Ord)

(Plate XIX, fig. 17)

A left lower ramus, No. 6289, bearing M_1 and M_2 is referred to the above species. M_1 consists of a posterior loop, six alternating closed triangles and a crescent shaped anterior loop. M_2 consists of a posterior loop and four alternating closed triangles. The anteroposterior diameter of M_1-M_2 is 4.8 mm. Twelve first lower molars were found with either five or six closed triangles.

Microtus (*Pedomys*) cf. *ochrogaster* (Wagner)

(Plate XIX, fig. 6)

Recovered from the deposit is a fragmentary left ramus, No. 6288, bearing incisor, M_1 and M_2. M_1 consists of a posterior loop, three alternating closed triangles, the fourth and fifth confluent and open broadly into the anterior loop. M_2 consists of a posterior loop, two alternating closed triangles. The third and fourth alternating triangles confluent. Anteroposterior diameter of M_1-M_2 is 4.45 mm.

I have found no definite characters by which I can separate with certainty the rami and dentitions of *Pedomys* and *Pitymys*. On the basis of the characters present the specimen resembles *Pedomys* more closely than *Pitymys*.

Neofiber leonardi sp. nov.

Type. No. 6653, Kansas University Museum of Vertebrate Paleontology, RM_1. Paratype, No. 6654, LM_1.

Horizon and type locality. Pleistocene, Lincoln county, Locality No. 5, Kansas, Rezabek fauna.

Diagnosis. Larger than *Neofiber alleni nigrescens* Howell, with external reëntrant angles broader and more forwardly directed.

Description of type. The RM_1 is that of an adult specimen. Tooth hypsodont, base open, reëntrant angles filled with cement. M_1 consists of a posterior loop, and five alternating closed triangles and an anterior loop. The external reëntrant angles broad and di-

rected more anteriorly than in the recent forms. The greatest contrast is in the third external reëntrant angle which is directed forward and is parallel to the anteroposterior axis of the tooth while in the recent specimens examined that angle is at right angles to the anteroposterior axis of the tooth. Anteroposterior diameter of M_1 is 5.55 mm. Greatest transverse width is 2.35 mm. Length of tooth is 8.5 mm.

This species is named for Doctor A. Byron Leonard who has devoted much of his time to collecting and studying Kansas faunas.

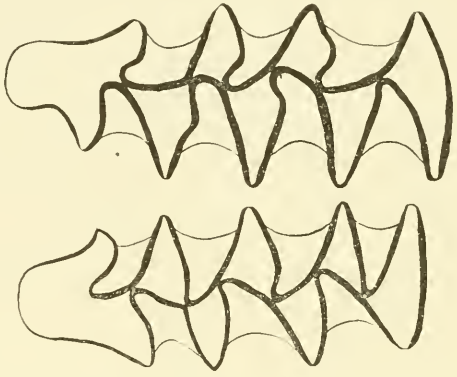

FIG. 3. Upper fig. *Neofiber leonardi sp. nov.*, holotype, No. 6653, Kansas University Museum of Vertebrate Paleontology. Right M_1 occlusal view. Lower fig. Paratype, No. 6654, KUMVP. Left M_1. $\times 10$.

Discussion. The paratype differs in that the fourth internal reentrant angle extends well past the third external reëntrant angle. The anteroposterior diameter of the tooth is 5.3 mm.

Remains of fossil *Neofiber* sp. and *Neofiber alleni* True have been reported from the Pleistocene of Florida by Sellards (1916) and others. These remains have been taken in the area of its present range. Gidley (1922, p. 127) assigned an upper tooth with closed roots from the Pleistocene deposits of Arizona (Curtis ranch fauna), to *Neofiber*. Gazin (1942, p. 511) assigns the same tooth to *Ondatra*. On the basis of the closed base of the tooth it cannot belong in the genus *Neofiber*.

Ondatra zibethica (Linnaeus)

(Plate XIX, figs. 9, 10, 11, 12)

Four molars were recovered that are indistinguishable from those of the above species. The base of the teeth are closed and possess well-developed roots. A RM^1, No. 6676, has anteroposterior di-

ameter of 4.5 mm. No. 6290b is a LM^2 of an adult specimen with an anteroposterior diameter of 3.6 mm. This tooth is slightly smaller than those of adult specimens of *O. z. cinnamomina* (Hollister) that now live in that area. No. 6290a is the LM_2 of an immature specimen, with an anteroposterior diameter of 2.95 mm. A LM^3, No. 6677, of an adult specimen has an anteroposterior diameter of 3.85 mm.

It is impossible to compare the Kansas material with the form *O. nebracensis* Hollister from the Pleistocene quarries near Hay Springs, Sheridan county, Nebraska, since the Nebraska species possesses teeth identical with those of the living species and is distinguished only by cranial characters.

ORDER LAGOMORPHA

FAMILY LEPORIDAE

? *Sylvilagus* sp.

(Plate XIX, figs. 13, 14, 15)

Three premolars or molars, No. 6678, of a small rabbit are questionably referred to the genus *Sylvilagus*. The teeth are the size of those of *Sylvilagus floridanus mearnsii* (Allen) though the reëntrant valleys of the upper molars are not as crenulated. This is the first known occurrence of what appears to be the cottontail in the Pleistocene deposits of Kansas.

ORDER PERISSODACYTLA

FAMILY EQUIDAE

Equus cf. *niobrarensis* Hay

(Plate XIX, fig. 5)

A fragmentary upper molar, No. 6287, is referred to the above form. This is the only fossil, except shark teeth, that has been recovered by Mr. Rezabek during the years that sand and gravel have been removed from the quarry.

ORDER ARTIODACTYLA

FAMILY CERVIDAE

Odocoileus sp.

(Plate XIX, fig. 8)

The base of a right antler, No. 6505, the size of the black-tailed deer, was recovered. The antler was well fossilized and broken in removing the silt layer that occurs above the sand and gravel deposit. This is the second specimen of *Odocoileus* to be recovered from the Pleistocene of Kansas, the other was an upper left molar from Harvey county, belonging to a much smaller deer (Hibbard, 1939, p. 469).

Discussion. From the genera and species of mammals known from the Rezabek fauna it is impossible at the present time to make any correlation with other known deposits in the Pleistocene of Kansas or Nebraska. It is a younger fauna than either the Cudahy of Meade county, the Tobin of Russell county or the Wilson Valley of Lincoln county, which occur in the silt directly below the Pearlette ash member of the Meade formation and which are considered as glacial faunas. The Rezabek fauna is also considered younger than the Borchers, an interglacial fauna, that occurs in the Meade formation just above the Pearlette ash. The Rezabek fauna was taken from a deposit that is channeled into the Meade formation.

The stream that laid down the deposit from which the Rezabek fauna was collected is considered as having been a large permanently flowing stream and is so considered because of the abundance of fish remains, especially gars. The climatic condition is considered as temperate (interglacial). The presence of *Neofiber* cannot be given too great a consideration since its Pleistocene distribution is not known. Its present distribution is restricted and it appears to be one of those forms that either became stranded at the close of the Pleistocene or is in the early stages of extinction.

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PLATE XIX

FIG. 1. *Castoroides* sp. No. 6296, part of upper incisor. × 1.

FIG. 2. *Geomys* sp. No. 6732, RM^3, occlusal view. × 10.

FIG. 3. *Neotoma* sp. No. 6731a, RM^1, occlusal view. × 6.

FIG. 4. *Neotoma* sp. No. 6731b, RM_2, occlusal view. × 6.

FIG. 5. *Equus* cf. *niobrarensis* Hay. No. 6287, part of upper molar, occlusal view. × 1.

FIG. 6. *Microtus* (*Pedomys*) cf. *ochrogaster*. No. 6288, LM_1-M_2, occlusal view. × 10.

FIG. 7. *?Reithrodontomys*. No. 6679, right ramus. × 10.

FIG. 8. *Odocoileus* sp. No. 6505, base of right antler. × 1.

FIG. 9. *Ondatra zibethica*. No. 6676, RM^1, occlusal view. × 6.

FIG. 10. *Ondatra zibethica*. No. 6290b, LM^2, occlusal view. × 6.

FIG. 11. *Ondatra zibethica*. No. 6677, LM^3, occlusal view. × 6.

FIG. 12. *Ondatra zibethica*. No. 6290a, LM_2, occlusal view. × 6.

FIG. 13. *?Sylvilagus*. No. 6678a, upper molar, occlusal view. × 6.

FIG. 14. *?Sylvilagus*. No. 6678b, right lower molar, occlusal view. × 6.

FIG. 15. *?Sylvilagus*. No. 6678c, upper molar, occlusal view. × 6.

FIG. 16. *Scalopus aquaticus*. No. 6673, right humerus. × 2.

FIG. 17. *Microtus* cf. *pennsylvanicus*. No. 6289, LM_1-M_2, occlusal view. × 10.

Plate XIX