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An Irvingtonian Fauna from the Oldest Quaternary Alluvium in Eastern Pumpkin Creek Valley, Morrill and Banner Counties, Nebraska

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ABSTRACT

Vertebrate fossils of *Mammuthus meridionalis* (Nesti) and *Equus* sp. cf. *E. scotti* Gidley occur at two sites in the capping alluvium of the highest strath terrace along the south side of Pumpkin Creek Valley, Nebraska. The presence of these two species supports the conclusion that the age of the capping sediments is probably early Irvingtonian (early Pleistocene).

INTRODUCTION

Diffendal and Corner (*in press*) have described the Quaternary alluvial fills preserved in Pumpkin Creek Valley, Morrill and Banner counties, Nebraska. Remnants of three different principal fills are preserved on strath terraces on the south side of Pumpkin Creek. Horse and mammoth fossils have been found at two gravel-pit sites (Fig. 1) in the oldest alluvial fill.

The purposes of this paper are to describe the only older Quaternary fossils reported from deposits in Pumpkin Creek Valley, and to interest workers in seeking more vertebrate material from the Quaternary alluvial fills so that the general description of the development of Pumpkin Creek Valley can be refined in the future.

LOCATION AND DESCRIPTION OF FAUNAL SITES

The first faunal site (Fig. 1, Loc. 1), the Wright Ranch Gravel Pit, is designated as University of Nebraska State Museum (UNSM) Collecting Locality Mo-142. It is located 5.2 km west and 3.2 km south of Redington, in SE¼ SW¼ SE¼, Sec. 5, T.18N., R.52W., Morrill County, Nebraska, Redington Quadrangle, U.S.G.S. 7.5 Minute Series. The altitude of Mo-142 is 1270 ± 6 m.

The basal 2 to 2.5 m of the alluvial fill at site 1 are cross-bedded sands containing a few gravel clasts. Above these sands is a cross-bedded sand and gravel from 7 to 8 m thick (Fig. 2). The axes of trough cross-beds trend east to east-southeast in directions that are sub-parallel to the long axes of the hills that the alluvial fill caps. All of the fossils have come from the gravel-rich upper part of the alluvial fill.

The second faunal site (Fig. 1, Loc 2), the Muhr Ranch Gravel Pit, is designated as UNSM Collecting Locality Bn-117, 12.1 km west and 2.4 km south of Redington. It is in the NW¼ SE¼ NE¼, Sec. 3, T.18N., R.53W., Banner County, Nebraska, Hackberry Creek Quadrangle, U.S.G.S. 7.5 Minute Series. The altitude of the Muhr Ranch Gravel Pit is 1280 ± 6 m.

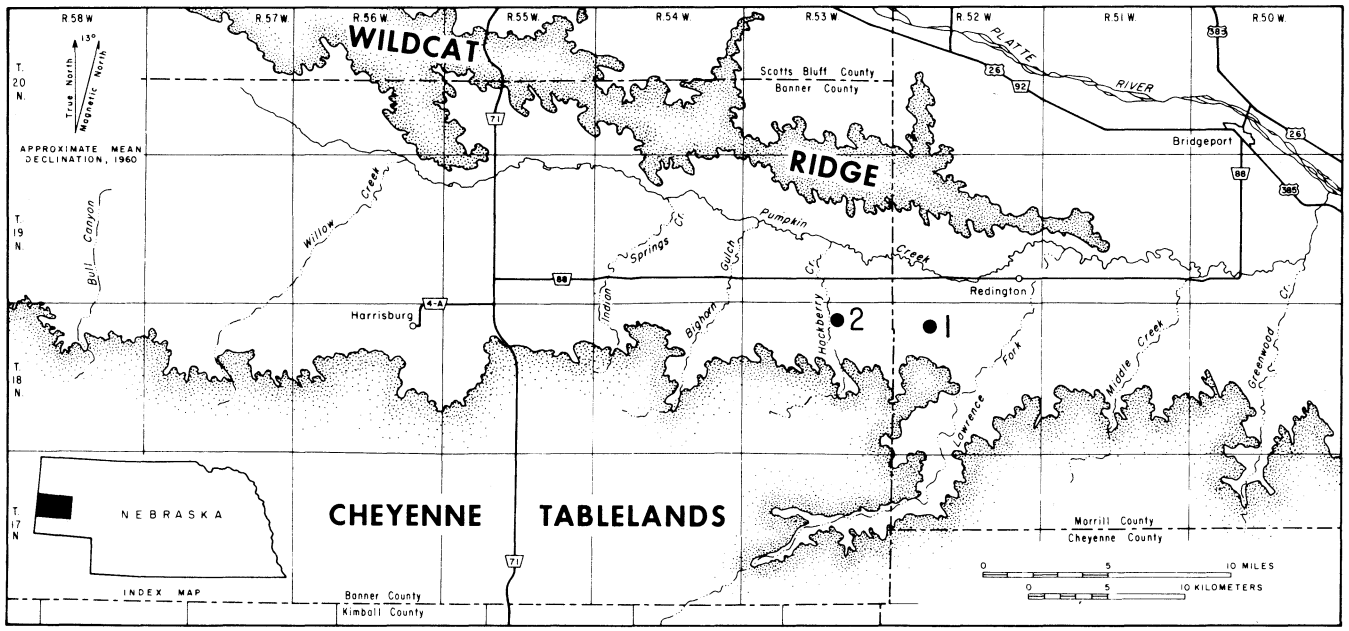

Figure 1. Map of sample site locations and principal physiographic features along Pumpkin Creek Valley.

Figure 2. Sand and gravel deposits at Wright Ranch Gravel Pit.

About 3 to 4 m of horizontally-bedded sand and gravel are exposed at this site. Fossils are found throughout the deposit.

SYSTEMATIC PALEONTOLOGY

All of the fossil specimens from the Wright Ranch Gravel Pit (Mo-142) are housed in the University of Nebraska State Museum, Division of Vertebrate Paleontology collections. The fossils from the Muhr Ranch Gravel Pit (Bn-117) were cast by UNSM lab technicians and sent back to their original collector, Mr. Ron Bright of Bridgeport, Nebraska. A set of casts was retained by UNSM, although the originals were studied and figured for this report. Mo-142 and Bn-117 are considered as small local faunas: Wright Ranch Local Fauna and the Muhr Ranch Local Fauna, respectively. These two local faunas comprise the Pumpkin Creek Fauna. All measurements are in millimeters.

Class MAMMALIA
Order PROBOSCIDEA
Family ELEPHANTIDAE
Mammuthus meridionalis (Nesti)
Fig. 3A-C

A complete left scaphoid (UNSM 49475) from Mo-142 and a cheek tooth fragment (cast of original, UNSM 49477) from Bn-117 are referred to *Mammuthus meridionalis.*

Although only a single plate from a third molar (or, much less probably, a second molar) of the Pumpkin Creek mammoth is preserved, its great enamel thickness places it well outside the range of known Rancholabrean and late Irvingtonian species and allows identification with *M. meridionalis,* the geologically earliest of known North American mammoths. Measured according to the method of Maglio (1973, p. 13) the enamel is 3.3 mm thick, which is greater than the reported enamel thickness of any of the large sample of Nebraska mammoth molars measured by Schultz and Martin (1970, p. 349). Among American mammoths, only early Irvingtonian *M. meridionalis* is reported to exhibit enamel thickness exceeding 3.2 mm (Kurtén and Anderson, 1980, p. 350-352; Maglio, 1973, p. 62-63). Maximal enamel thickness (on third molars) has been observed to decline in successively younger species of North American mammoths (Kurtén and Anderson, 1980; Maglio, 1973; Schultz and Martin, 1970). But great care must be taken in using enamel thickness as a taxonomic character because the thickness declines not only with geologic age but also declines forward along the molar row. The anterior molars (M1 and M2) of early Pleistocene thick-enameled mammoths display maximal enamel thickness in the same range as that in *third* molars of later Pleistocene thin-enameled forms. Single plates of mammoth teeth are therefore often useless for specific identification because of uncertainty of position in the toothrow. Such uncertainty is removed in the present instance, we believe, because of the great thickness of the enamel in UNSM 49477. Even the thickest enamel in the most primitive late Irvingtonian or later mammoth molars is thinner than in the Pumpkin Creek specimen. Maximal enamel thicknesses for North American mammoth species in mm given by Kurtén and Anderson (1980, p. 350-352 are: *M. meridionalis* 2.4-4.0; *M. imperator* 2.5-3.2; *M. columbi* 2.0-2.3; *M. jeffersoni* 1.5-2.0; *M. primigenius* 1.0-2.0).

Proboscidean scaphoids are not often encountered in the fossil record, even though they are composed of dense bone and appear to be quite durable. Saunders (1977, p. 90) found no scaphoids from the late Pleistocene Bony Spring, Missouri site that produced parts of 31 individuals of the American Mastodon, *Mammut americanum,* and Dutrow (1977, p. 225) reported only one scaphoid from the late Pleistocene Hot Springs Mammoth Site, South Dakota, that produced parts of nine individuals of the Columbian Mammoth, *Mammuthus columbi.*

The scaphoid from Mo-142 (Fig. 3B-C) is very well preserved, and is only slightly abraded on the dorsal and ventral margins of the lateral face of the bone. UNSM 49475 is long and narrow as observed in lateral view, and is more like *Mammuthus* than its dorsoventrally compressed counterpart in *Mammut* (Olsen, 1972, p. 26). A probable *Stegomastodon* scaphoid (UNSM 49476) is even more compressed and sub-circular in outline when compared to UNSM 49475. The entire specimen (UNSM 49475) is smaller and the anteroventral lunar facet is more dorsoventrally compressed than an example of *Mammuthus columbi* (UNSM 2449), which is more rounded anteriorly. However, since few examples of Pleistocene proboscidean scaphoids are known, the differences described above might be accounted for by specific or individual variation. We could find no examples of *M. meridionalis* or *M. imperator* scaphoids in the UNSM collections for comparison, but since the scaphoid does not compare with other late Pleistocene proboscideans and since there is no evidence to indicate a second species of Pumpkin Creek proboscidean, the scaphoid is questionably referred to *M. meridionalis.*

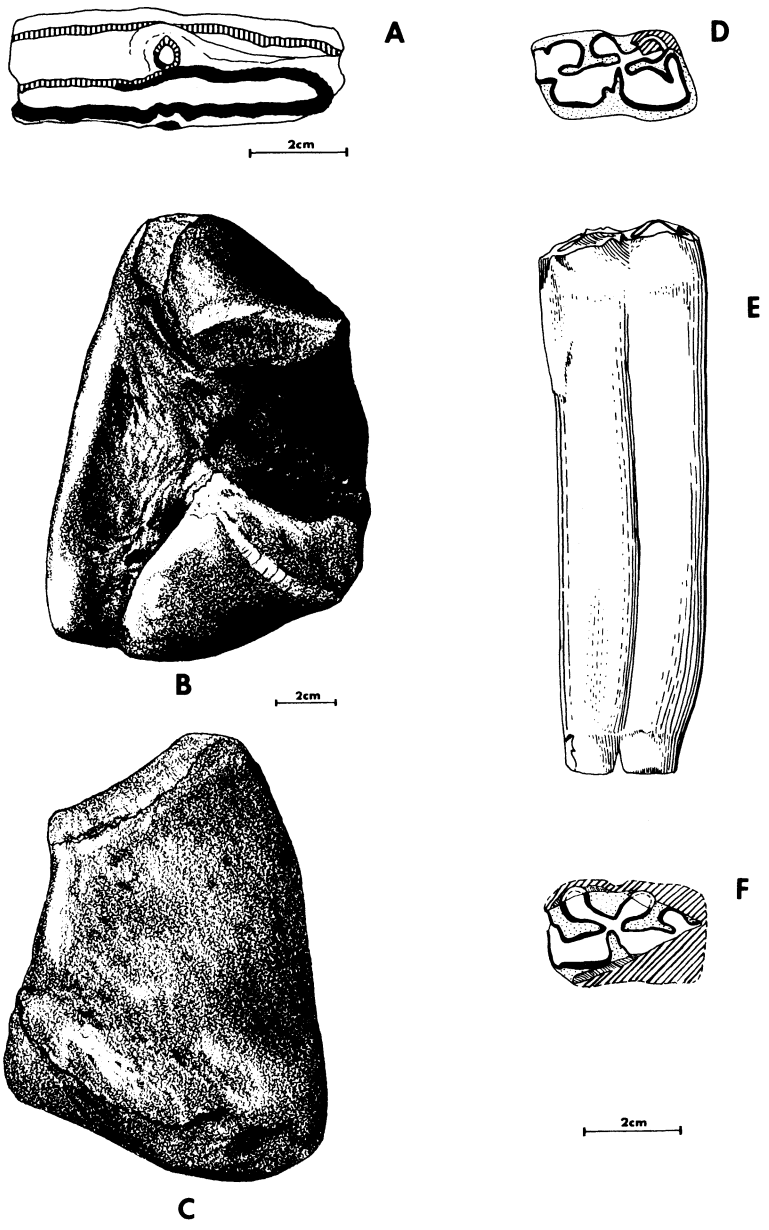

Figure 3. *Mammuthus meridionalis.* **A. cheek tooth fragment (UNSM 49477), occlusal view. B-C. left scaphoid (UNSM 49475). B, medial view; C, lateral view.**
Equus **sp. cf.** *E. scotti.* **D-E. right M/2 ? (UNSM 49478). D. occlusal view; E, labial view. F. broken left M/1 or M/2 (UNSM 49472), occlusal view.**

Order PERISSODACTYLA
Family EQUIDAE

Equus sp. cf. *E. scotti* Gidley
Fig. 3D-F

A broken left P3/? (UNSM 49471), a broken left lower molar (UNSM 49472), a right metacarpal III (UNSM 49473), and a proximal phalanx (UNSM 49474) were recovered at Mo-142; and the casts of specimens from Bn-117 include a broken upper molar (UNSM 49479) and a well preserved right M/2 ? (UNSM 49478).

All of the equid material so far recovered represents a very large horse falling outside the range of most species of *Equus* (e.g., *E. conversidens, E. niobrarensis,* and *E. occidentalis*) common in medial and late Pleistocene faunas (Harris and Porter, 1980). These specimens are larger than any of the equids represented in several very large samples of late Irvingtonian horses in the UNSM collections, for example those from Sheridan County (Rushville, Gordon, and Hay Springs Quarries) recently described by Howe (1979). They also exceed any Nebraska Rancholabrean specimens in the UNSM collections.

The P3/? is broken and heavily worn. The enamel folds are simple. The anteroposterior length is 27.8 mm and the length of the protocone is 13.7 mm. The upper tooth fragment (UNSM 49479) is too incomplete for description, but, like the other Pumpkin Creek equids, it is from a large species of horse.

In the lower molars (Fig. 3D-F), the ectoflexid is deep, but only barely penetrates the isthmus, and the enamel is not complexly folded. UNSM 49478 is only slightly worn and has a crown length of 101.9 mm and a total length of 121.9 mm. The anteroposterior width of the occlusal surface is 31.4 mm and the transverse width is 17.5 mm. UNSM 49472 is too badly damaged to obtain any measurements.

The metacarpal (UNSM 49473), even though it is from an immature individual with the distal epiphysis missing, is very robust. The metacarpal had attained a length of 227 mm at the point where the distal epiphyseal fusion occurs. The transverse width of the proximal end is 55.9 mm. The least transverse width of the shaft is 33.6 mm and the anteroposterior width at the same point is 26.0 mm.

The large size of the proximal phalanx (UNSM 49474) would probably indicate that it is from the hindfoot, being 92.0 mm in total length (Hibbard and Dalquest, 1966, p. 37; Harris and Porter, 1980, p. 51). The maximum transverse width of the proximal end is 54.9 mm and the anteroposterior width of the proximal end is 38.0 mm. The least median transverse width is 40.6 mm. The distal end measures 49.3 mm in transverse width.

Another large Pleistocene horse to which comparisons must be made is the stilt-legged form, *E. calobatus.* The latter ranges from the late Blancan to the early Rancholabrean (Kurtén and Anderson, 1980, p. 288) and is present in several Irvingtonian faunas (e.g., Rock Creek, Texas and several unpublished faunas in the UNSM collections) which also contain *E. scotti.* It would therefore not be surprising to find both large equids in the Pumpkin Creek Fauna. It would appear, however, that a single species is represented in the Pumpkin Creek material. Neither the phalanx nor the metacarpal are slender and elongate as they are in *E. calobatus* (Hibbard, 1953; Dalquest, 1967; Schultz, 1969). The molars differ, too. Compared to the Pumpkin Creek teeth, in *E. calobatus* the linguaflexid is more broadly "U"-shaped, the enamel is more complexly folded, the isthmus is longer, and the plicaballinid is better developed (Skinner and others, 1972, fig. 58; Mooser and Dalquest, 1975. fig. 8).

The Pumpkin Creek horse material compares best with *Equus scotti,* the holotype of which is a skull and jaws and nearly complete skeleton from the early Irvingtonian of Rock Creek, Texas (Gidley, 1900). The measurements of the isolated teeth and postcranials all fall within the range of *Equus scotti* (Troxell, 1915; Hibbard, 1953; Hibbard and Dalquest, 1966; Dalquest, 1977) and are tentatively referred to that form.

CONCLUSIONS

Vertebrate fossils from the oldest alluvial fill preserved in eastern Pumpkin Creek Valley are probably early Irvingtonian (early Pleistocene) in age. The fossils are correlative with the Cudahy fauna of Kansas and the Gilliland fauna of Texas (Hibbard and Dalquest, 1966), the Holloman fauna of Oklahoma (Dalquest, 1977), and several, as yet undescribed, faunas from southwestern Nebraska. The fauna described here and possible future finds in and adjacent to the study area may allow us to refine the concepts of geomorphic development of terrace sequences along river valleys across the Great Plains.

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