

The Late Pleistocene Vertebrate Fauna

Robert G. Dundas

Introduction

The Pleistocene fauna of southwestern Montana is not well understood. This is largely because little attention has been given to fossil sites in the region until recently. Since the late 1980s, fossil remains at the Merrell Locality have been the subject of a major research effort undertaken, in part, to enhance our knowledge of the region's fauna during the Late Pleistocene (Dundas 1992; Dundas, Hill, and Batten 1996).

This discussion provides a systematic account of the Pleistocene vertebrate fauna recovered from the Merrell Locality and Site, with comments on species paleoecology. Hill and Batten (this report) report the spatial distribution of the fossil remains. At present, the vertebrate fauna is composed of 19 species (Table 8), most of which occur at other Late Pleistocene sites in Montana and the surrounding region (Graham, Semken, and Graham 1987; Kurtén and Anderson 1980; FAUNMAP 1994; Harris 1985). Two species at Merrell are of particular interest; *Homotherium serum* (Scimitar cat) and *Olar buccinator* (Trumpeter swan), the second of which is reported for the first time in the fossil record of Montana. In addition to the vertebrate fauna, specimens of bivalves and gastropods were also recovered, but have not been studied.

Specimen Repository

Fossil material collected from the Merrell Locality in 1988 and 1989 by the BLM and the UM-Missoula is housed along with other specimens recovered from the site, at the Museum of the Rockies, Montana State University-Bozeman, Bozeman, Montana. A complete listing of all faunal remains in the Museum of the Rockies collections is provided in Appendices C and D.

Abbreviations and Institutional Acronyms

i - lower incisor
m - lower molar
p - lower premolar
M - upper molar
P - upper premolar

MOR - Museum of the Rockies

UMT - University of Montana Paleontology Museum

UMZM - University of Montana Zoology Museum

USNM - United States National Museum - Smithsonian Institution

Systematic Paleontology

Phylum Chordata (chordates)
Class Osteichthyes (bony fishes)

Referred specimens: MOR LI94.5.246, parietal fragment; MOR LI94.5.248, suborbital fragment; MOR LI94.5.249, skull bone fragment; MOR LI94.5.247, an opercular fragment and a parietal fragment; MOR LI95.2.21, skull bone fragment; MOR LI95.2.536, trunk vertebra.

Remarks: The fish remains were examined by paleoichthyologist Dr. Douglas Long. Dr. Long determined that the material is insufficient for further identification below the level of Osteichthyes (bony fishes). However, the specimens compare best with the Catostomidae (suckers) and Cyprinidae (carps and minnows). Both families of fish are found

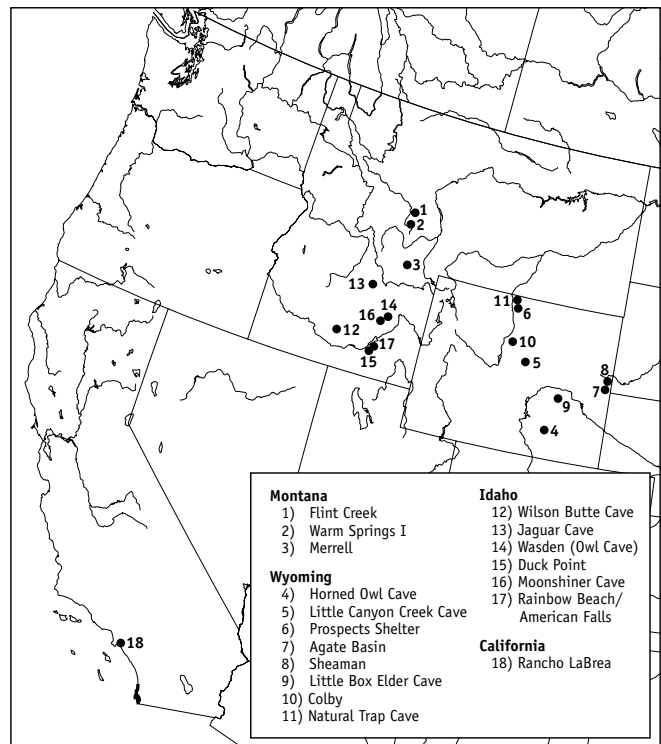


Figure 81. Late Wisconsinan localities and sites referenced in the text by R. G. Dundas.

Table 8. Late Pleistocene Merrell Locality Fauna.

Phylum Mollusca (mollusks)
Class Bivalvia (clams and others)
Class Gastropoda (snails)
Phylum Chordata (chordates)
Class Osteichthyes (bony fishes)
Class Aves (birds)
Order Anseriformes (waterfowl)
Family Anatidae (ducks, geese, swans)
Genus <i>Anas</i> cf. <i>A. platyrhynchos</i> (Mallard duck)
Genus and species <i>Olar buccinator</i> (Trumpeter swan)
Class Amphibia (amphibians)
Order Anura (frogs and toads)
Family Ranidae (ranids)
Genus cf. <i>Rana</i> (true frogs)
Class Mammalia (mammals)
Order Rodentia (rodents)
Family Muridae (voles, lemmings, muskrats, mice, and others)
Genus and Species <i>Lemmiscus curtatus</i> (sagebrush vole)
Genus and Species <i>Ondatra zibethicus</i> (muskrat)
Family Sciuridae (squirrels and others)
Genus <i>Spermophilus</i> sp. (ground squirrels)
Family Castoridae (beavers)
Genus and Species <i>Castor canadensis</i> (beaver)
Order Carnivora (carnivores)
Family Canidae (canids, i.e., dogs)
Genus and Species <i>Canis latrans</i> (coyote)
Genus and Species <i>Canis lupus</i> (gray or timber wolf)
Family Felidae (cats)
Genus and Species <i>Homotherium serum</i> (Scimitar cat)
Family Ursidae (bears)
Genus and Species <i>Ursus</i> sp. (bear)
Order Artiodactyla (artiodactyls)
Family Antilocapridae (pronghorns)
Genus and Species cf. <i>Antilocapra americana</i> (American pronghorn)
Family Cervidae (deer)
Genus indeterminate (large species)
Genus cf. <i>Odocoileus</i> sp. (white-tail or mule deer)
Family Bovidae (bovids)
Genus <i>Bison</i> sp. (bison)
Family Camelidae (camels)
Genus <i>Camelops</i> sp. (large camel)
Order Perissodactyla (perissodactyls)
Family Equidae (horses)
Genus <i>Equus</i> sp. (horse)
Order Proboscidea (proboscideans)
Family Elephantidae (elephants)
Genus and Species <i>Mammuthus columbi</i> (Columbian mammoth)

in Montana today (Gould 1992). It is not unreasonable to suggest that the fossil specimens may represent one or both of these groups. A Holocene specimen of cf. *Catostomus*, right operculum, was recovered during the 1995 excavations at Merrell.

Class Aves (birds)
 Order Anseriformes (waterfowl)
 Family Anatidae (ducks, geese, swans)

Referred specimen: MOR LI94.5.245, thoracic vertebra.

Remarks: This specimen was examined by Dr. Steve Emslie, who referred it to the Anatidae. Further identification is not possible because of the lack of additional diagnostic features.

Anas cf. *A. platyrhynchos* (Mallard duck)

Referred specimen: MOR L194.5.455 (MS-685, EN-20-2), distal end of a left humerus.

Remarks: This specimen was examined by Dr. Steve Emslie and found to best compare with *Anas platyrhynchos*. The Mallard is a wide-ranging duck, found throughout most of North America, particularly around ponds and fresh-water marshes (Robbins, Bruun, and Zim 1966).

Genus *Olar* (swan)
Olar buccinator (Trumpeter swan)

Figure 82

Referred specimen: MOR LI96.4.190, proximal end of a left humerus.

Remarks: MOR LI96.4.190 was compared with all of the North American swans: *Cygnus olor* (Mute swan), *Olar buccinator* (Trumpeter swan), and *Cygnus columbianus* (Whistling swan). The Mute swan is an introduced species in North America, having been brought from Europe in the 1800s (Stokes and Stokes 1996). The MOR specimen compares best in size and morphology to *Olar buccinator*. It compared especially well to a specimen of *Olar buccinator*, USNM 430266, from Alaska (Emslie, pers. comm., 1997).

The Trumpeter swan (*Olar buccinator*) is particularly interesting. Few fossil remains of this species are known. Fossil specimens have been recovered from Alaska, Oregon, Iowa, Illinois, Ohio, and Florida (Brodkorb 1964). Although widespread in North America in historic times,

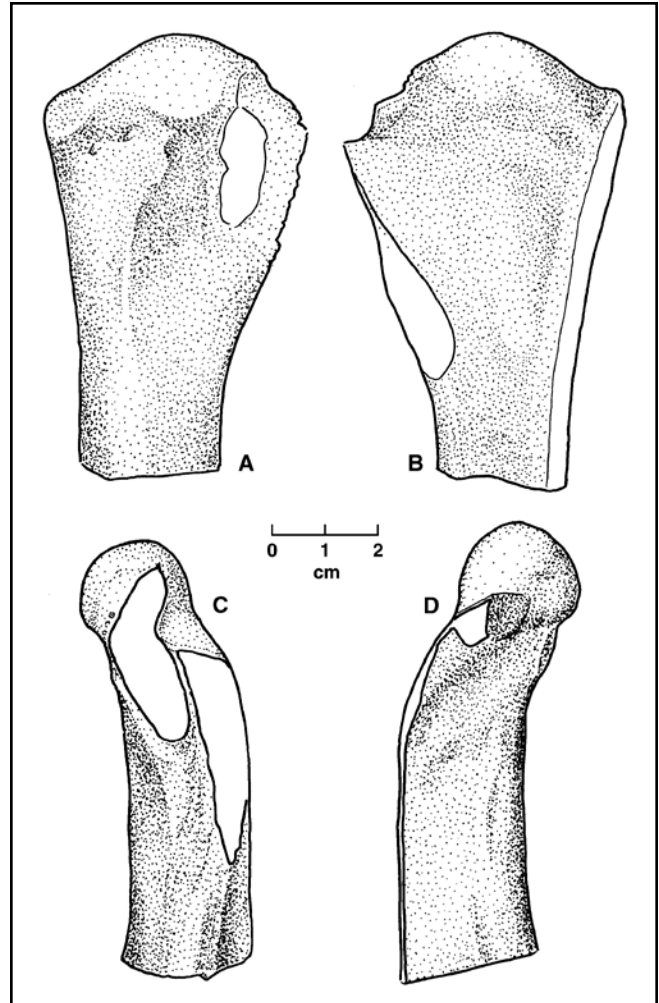


Figure 82. Trumpeter swan (*Olar buccinator*) (MOR LI96.4.190) proximal end of partial left humerus: a, anconal; b, palmar; c, ventral; and d, dorsal views.

from Alaska to southern California and the Gulf Coast, it is rare today, and once nearly extinct (Pough 1953). Early this century, the draining of marshes, hunting, lead poisoning, and other environmental disturbances nearly resulted in the extinction of the Trumpeter swan. Only a small number survived by the 1930s, but, with conservation efforts and reintroduction back into former habitat, the population increased to more than 3,000 by the 1970s (Udvardy 1977). It is one of North America's largest birds, and the largest member of the swan family in North America, with a length of up to 65 in (1.65 m), a wingspan of 100 in (2.54 m), and weighing about 30 lbs (13.6 kg). Their habitat is typically marshes, lakes, or rivers with dense vegetation. They are known to nest in old muskrat or beaver houses or small islets in shallow ponds or marshy areas. Food includes leaves, roots, and seeds of sedges and other aquatic plants, and mollusks (Pough 1953). They dip their head

and neck in the water similar to a duck when feeding on bottom vegetation (Stokes and Stokes 1996). They also forage along the shore. The Red Rock Lakes area to the east of Lima Reservoir is one of the few breeding grounds left for this species in the contiguous United States (Robbins, Bruun, and Zim 1966).

Class Amphibia (amphibians)
 Order Anura (frogs and toads)
 Family Ranidae (ranids)
 cf. *Rana* (true frogs)

Figure 83

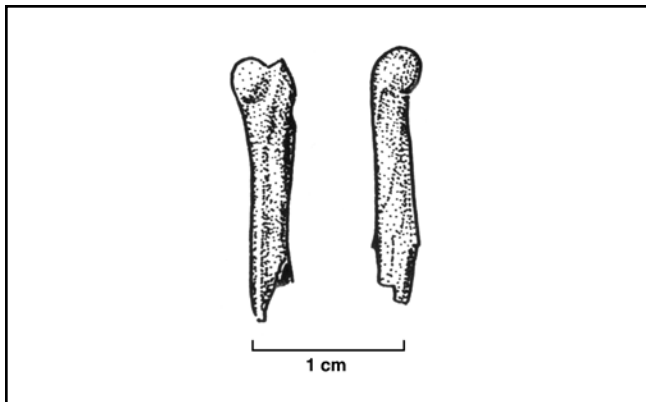


Figure 83. *Rana* distal lft. humerus.

Referred specimen: MOR LI95.2.535, distal end of a left humerus.

Remarks: The specimen is not *Scaphiopus* (Pelobatidae) because the condylar morphology is different for that group. The specimen is too robust for a hylid. Of Ranidae and Bufonidae, the specimen compares best with *Rana*. Twenty-five species of this genus occur in North America today, at least 10 of which are known from the Pleistocene. Most are aquatic frogs that prefer quiet water, although some species venture well into grassy and moist woodland areas (Holman 1995).

Class Mammalia (mammals)
 Order Rodentia (rodents)
 Family Muridae (voles, lemmings, muskrats, mice, etc.)
 Genus *Lemmys*
Lemmys curtatus (sagebrush vole)

Figure 84

Referred specimen: MOR LI95.2.36, right dentary with i1, m1, and m2.

Remarks: The identification is based on the specimen being

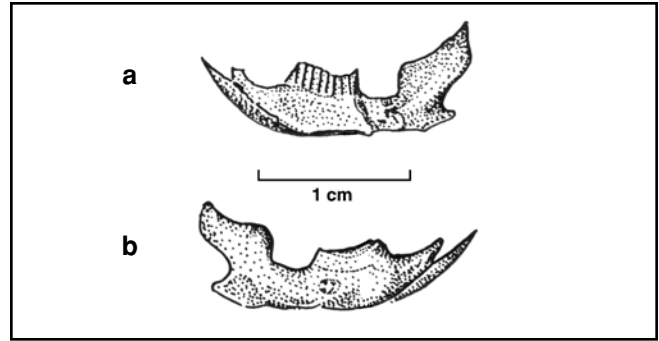


Figure 84. *Lemmys* rt. dentary: a, medial; and b, lateral views.

a microtine rodent with five triangles and no lingual wing development on the lingual side of the anterocap.

The sagebrush vole has been recovered from several Late Pleistocene localities in the region and occurs in the area today. Fossil occurrences in Idaho include Wilson Butte Cave, Jaguar Cave, Moonshiner Cave, and Wasden, while Bell Cave, Horned Owl Cave, Little Canyon Creek Cave, Prospects Shelter, Natural Trap Cave, Agate Basin, and Little Box Elder Cave record the species in Wyoming (Kurtén and Anderson 1980; FAUNMAP 1994). In Montana, *Lemmys* is known from the Late Wisconsinan-age Warm Springs site (Rasmussen 1974; Kurtén and Anderson 1980) and False Cougar Cave (FAUNMAP 1994). The species is typically found in semiarid, open environments. Usually, their habitat is dominated by sagebrush and bunchgrasses. They are often found living under sagebrush plants, constructing nests from its shredded bark, as well as leaves, stems, and grass seed-heads (Zeloff 1988).

Genus *Ondatra* (muskrat)
Ondatra zibethicus (muskrat)

Figure 85

Referred specimens: UMT 10034, upper right incisor; MOR LI94.5.28, right calcaneum; MOR LI94.5.97, left

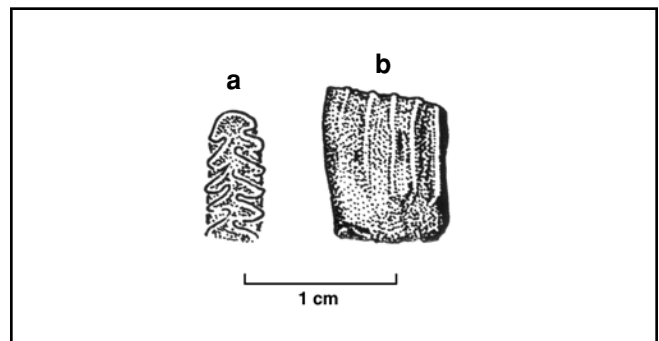


Figure 85. *Ondatra* lft. m1: a, occlusal; and b, side views.

m1; MOR LI94.5.454, partial left dentary with m2 and m3.

Remarks: UMT 10034 was compared to rodent specimens in the University of Montana Zoology Museum. Of all rodents inhabiting North America during the Late Pleistocene, the size and morphology of the incisor compares best with *Ondatra zibethicus*. The remainder of the specimens are clearly identifiable as muskrat, based on comparisons with modern specimens.

Muskrat occur in the area today. Found in almost any aquatic environment, they are common around beaver ponds in the western United States. Aquatic plants compose much of the diet, with a preference for cattails. However, they also forage for animals such as freshwater clams, snails, frogs, crayfish, turtles, and fish. Muskrats build lodges from aquatic vegetation and also burrow into banks (Zelovoff 1988; Jones and Birney 1988). *Ondatra zibethicus* is also known from the Late Wisconsinan Warm Springs #1 site in Montana (Rasmussen 1974; FAUNMAP 1994). In the surrounding region, the species has been recovered from the Late Wisconsinan deposits at Rainbow Beach and the Dam Local Fauna in Idaho and Horned Owl Cave in Wyoming (FAUNMAP 1994).

Family Sciuridae (squirrels, etc.)
Spermophilus sp. (ground squirrels)

Referred specimen: MOR LI94.5.256, partial edentulous right dentary with alveoli for the m2 and m3 present.

Remarks: Species identification is not possible due to the lack of dentition. In general, all ground squirrels are burrowers, most hibernate, and many are colonial. Habitat of ground squirrels living in the area today is predominantly sagebrush and bunchgrass rangeland. However, species such as *Spermophilus lateralis* typically inhabit moist coniferous forests (Zelovoff 1988). Recent ground squirrel burrowing has resulted in considerable bioturbation at the Merrell Locality.

Spermophilus lateralis is a common ground squirrel found in the area today. *Spermophilus richardsonii* may also be a local resident at the present time. There is a possibility that a population of *Spermophilus townsendii* could reach as far north as the Centennial Valley as well. In Montana, *Spermophilus lateralis* is known from the Late Wisconsinan at False Cougar Cave, while *Spermophilus richardsonii* has been recovered from False Cougar Cave and Warm Springs #1. Other species of *Spermophilus* are also known from False Cougar Cave (FAUNMAP 1994).

Family Castoridae (beavers)
Genus *Castor* (beaver)
Castor canadensis (beaver)

Referred specimen: UMT 10035, a right p4.

Remarks: The size and morphology of the p4 from Merrell is indistinguishable from modern specimens of *Castor canadensis* in the collections of the University of Montana Zoology Museum.

Beaver live in the region today. In general, they are found wherever permanent water and enough woody vegetation is present. They have a great capacity for modifying their environment. Whenever moving into an area where water depth is not sufficient, they build dams across streams, where possible, using logs, sticks, and mud. The deep water serves a number of functions. Deep water protects lodges and bank dens, facilitates movement of food and building materials, and provides a greater area for swimming during winter when the water surface may become ice-covered. Also, flooding caused by damming saturates a large area of surrounding soil, a condition conducive to growth of favorite food items such as willow, aspen, alder, and cottonwood. Many other plant species are also eaten, such as grasses in summer. Beaver ponds attract a wide range of wildlife, including waterfowl, fish, muskrats, and others (Zelovoff 1988).

In the fossil record of the region, *Castor canadensis* is known from Late Wisconsinan sites at Rainbow Beach and the Dam Local Fauna in Idaho and the Little Box Elder Cave and Little Canyon Creek Cave in Wyoming (FAUNMAP 1994).

Order Carnivora (carnivores)
Family Canidae (canids, i.e., dogs)
Genus *Canis* (wolves, jackals, coyotes, domestic dog)
Canis latrans (coyote)

Figure 86

Referred specimen: MOR LI95.2.309, a right p4.

Remarks: MOR LI95.2.309 has a well-developed second cusplet, a third cusplet present, and a posteromedial cingulum. The specimen is 13.5 mm in length and 6.1 mm wide. It was compared with modern specimens of *Canis latrans* and *Canis lupus*. In general size, the specimen falls within the range of variation of nine specimens of *Canis latrans* in the UMZM; size range of the nine UMZM specimens, length 8.2-13.8 mm, width 4.7-6.7 mm. It is smaller than five specimens of *Canis lupus* in the UMZM; size range of the five UMZM specimens, length 15.8-17.6 mm,

width 7.4-8.7 mm. In a comparison between *Canis latrans* and *Canis lupus*, the p4 of *Canis lupus* has more reduced cusplets, more often lacking a well-developed third cusplet and posteromedial cingulum. The p4 of *Canis latrans* has a second cusplet, usually a pronounced third cusplet, and a posteromedial cingulum extending behind the third cusplet (Nowak 1979). Based on these characters, the Merrell p4 compares best with *Canis latrans*.

In general, Pleistocene coyotes are larger than modern specimens, although by Late Wisconsinan time they approach the size of the Recent forms (Kurtén and Anderson 1980). The species is one of the most common carnivores in the North American Late Pleistocene, recovered from around 100 localities, about a dozen of which are nearby in Idaho and Wyoming (Figure 86) (Nowak 1979). Late Wisconsinan occurrences are Jaguar Cave, Rainbow Beach, and the Dam Local Fauna in Idaho and Little Box Elder Cave in Wyoming (FAUNMAP 1994).

Today, the coyote continues to be a wide-ranging species, occupying most of North America and living in a variety of habitats (Jones and Birney 1988). They most often occupy open grasslands, brush country, and broken forest (Bekoff 1977; Nowak 1991). Coyotes are considered an opportunistic predator with a broad range of food items in the diet. Diet varies seasonally and according to geographic location, although 90 percent of food items are

mammals, particularly rodents and rabbits. Large animals can be important in the winter diet and plant material may be an important dietary component. Scavenging is not uncommon (Bekoff 1977).

Canis lupus (gray or timber wolf)

Figure 87

Referred specimen: MOR LI94.5.130, proximal half of a right metatarsal 3.

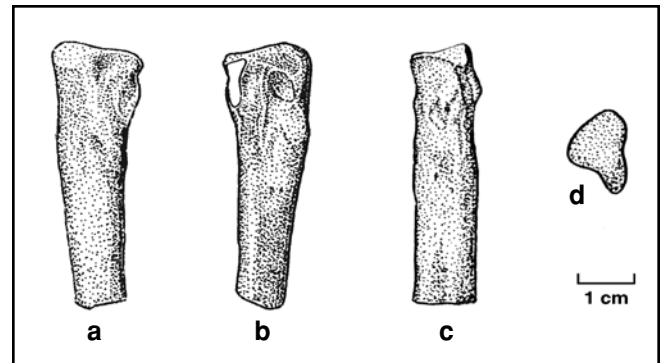


Figure 87. Gray or timber wolf (*Canis lupus*) (MOR LI 94.5.130) proximal half of a rt. metatarsal 3: a, medial; b, lateral; c, posterior; and d, proximal views.

Remarks: MOR LI94.5.130 compares very well in size to *Canis lupus* specimen UMZM 17652. The metapodials of *Canis lupus* are considerably larger than *Canis latrans*. The specimen does not generally compare well to *Canis dirus* in size. *Canis dirus* postcranial elements are more robust than *Canis lupus*. MOR LI94.5.130 is not out of the size range for known *Canis dirus*, but would be on the small end of the size range (e.g., Kisko 1967). The small end of the size range for dire wolf skeletal elements is represented mainly by specimens from southern dire wolf populations. Given that the MOR metatarsal compares extremely well in size to local gray wolf specimens, and in areas where *Canis dirus* and *Canis lupus* co-occur the dire wolf specimens are more robust, it seems highly unlikely that MOR LI94.5.130 could represent a specimen of *Canis dirus*. However, *Canis lupus* and *Canis dirus* likely co-occurred in the area, because a specimen of dire wolf is known from nearby Orr Cave in Beaverhead County, Montana (Kurtén 1984). *Canis lupus* is geographically widespread and occurs at over 50 localities of Late Pleistocene age in North America (Figure 88) (Nowak 1979). Late Wisconsinan occurrences in the region are Little Box Elder Cave and Prospects Shelter in Wyoming. Regional "Late-Glacial" records include Jaguar Cave, Idaho, and Agate Basin and Natural Trap Cave, Wyoming (FAUNMAP 1994). The species occupies a broad range of habitats, most commonly arctic tundra, steppe, savannah,

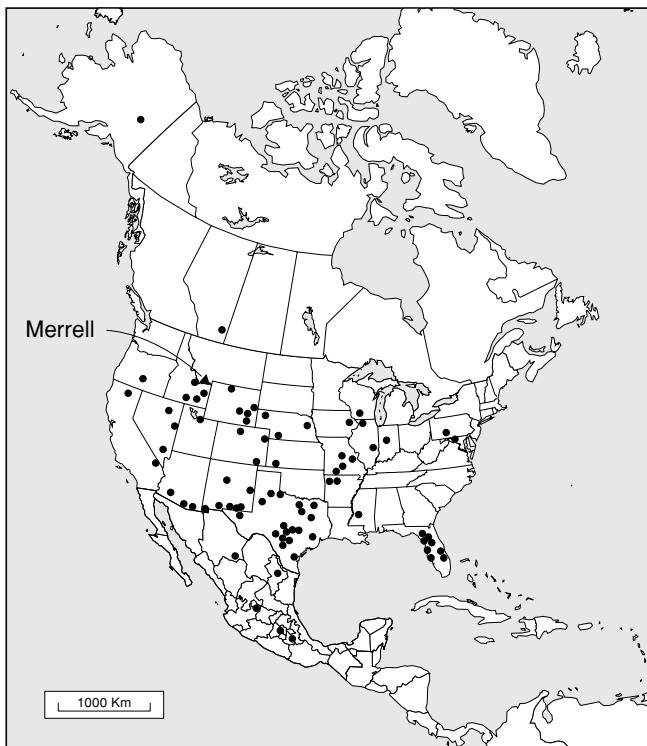


Figure 86. Late Pleistocene occurrences of coyote (after FAUNMAP).



Figure 88. Late Pleistocene occurrences of gray or timber wolf (after FAUNMAP).

and forests (Nowak 1991). Today, the gray wolf is one of North America's top predators, feeding primarily on deer, elk, caribou, moose, and bison (Zevloff 1988).

Family Felidae (cats)
 Genus *Homotherium* (Scimitar cats)
Homotherium serum (Scimitar cat)

Figures (89-90)

Referred specimens: UMT 10001, proximal left ulna; UMT 10002, left metacarpal 4.

Remarks: These two specimens of *Homotherium serum*, recovered from unprovenienced beach collections by the University of Montana field crew in 1989, were described by Dundas (1992). A sample of UMT 10001, a proximal left ulna, was submitted to Beta Analytic for radiocarbon dating; however, the specimen lacked datable protein (Les Davis, pers. comm., 1997).

One of the most significant discoveries among the faunal remains, this species is rare in the Pleistocene of North America, and this represents its first record in Montana. *Homotherium serum* is known from 18 Rancholabrean-age sites (Figure 90), the closest occurrences being at the Duck Point and American Falls localities in Idaho (Jefferson and

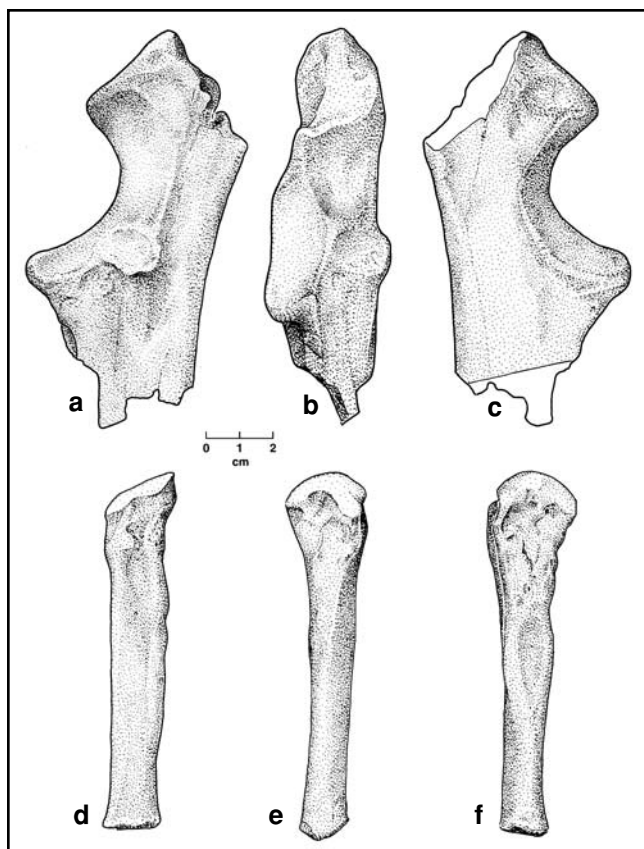


Figure 89. Scimitar cat (*Homotherium serum*) (UMT 100002): (a-c) proximal left ulna; and (d-f) left metacarpal



Figure 90. Late Pleistocene occurrences of Scimitar cat (after FAUNMAP).

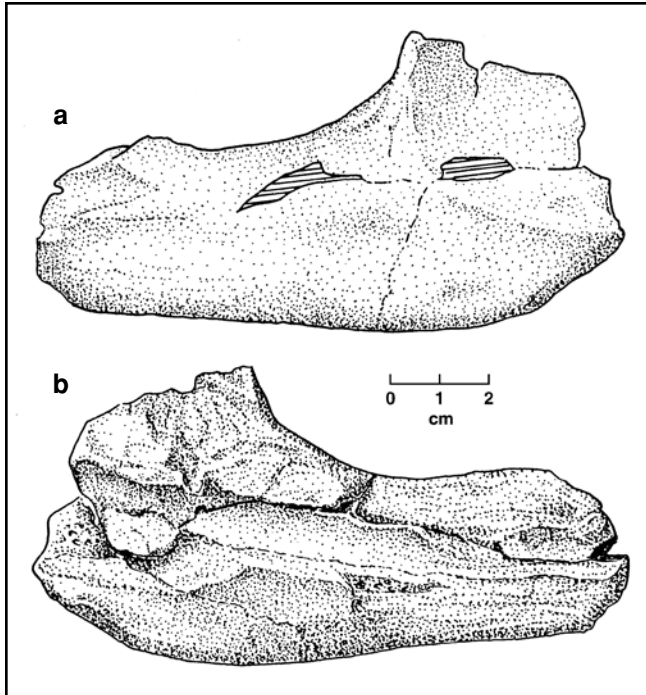


Figure 91. Bear (*Ursus* sp.) (UMT 10050) lft. dentary fragment: a, lateral and b, medial views.

Tejada-Flores 1993). Consistent with most records of *Homo*therium (Jefferson and Tejada-Flores 1993), the Merrell specimens represent one individual.

Family Ursidae (bears)

Ursus sp.

Figure 91

Referred specimen: UMT 10050, left dentary fragment.

Remarks: An earlier referral of the dentary fragment to *Ursus americanus* (Dundas 1992; Dundas, Hill, and Batten 1996) was based on a comparison of only a couple of specimens. Examination of over two dozen mandibles of *Ursus arctos* (Grizzly bear) and *Ursus americanus* (American black bear) in the collections of the University of Montana Museum of Zoology indicates that diagnostic characters necessary to identify the specimen to species are lacking. The specimen is, therefore, referred to *Ursus* sp.

Order Artiodactyla (artiodactyls)

Family Antilocapridae (pronghorns)

cf. *Antilocapra americana* (American pronghorn)

Referred specimens: UMT 10049, pelvic fragment; MOR LI94.5.456, proximal end of a proximal phalange; MOR LI95.2.537, proximal phalange.

Remarks: MOR LI95.2.537, a proximal phalange, compares well with *Antilocapra americana* specimen UMZM 4027, although the Merrell specimen is slightly larger. Pronghorn occupy grassland habitat (Jones and Birney 1988). The species occurs in the area today (Zaveloff 1988). Not surprisingly, considering the species distribution, it is found at several late Wisconsinan sites in the region, including Rainbow Beach, Owl Cave, and the Dam Local Fauna in Idaho and Horned Owl Cave, Little Box Elder Cave, Prospects Shelter, and Natural Trap Cave in Wyoming. Other “Late-Glacial” sites in Wyoming include Agate Basin, Colby, and Sheaman (FAUNMAP 1994).

Family Cervidae (deer)

Genus and Species indeterminate (large cervid)

Referred specimens: MOR LI94.5.455, left i1 or i2; MOR LI94.5.457, deciduous lower left molariform tooth.

Remarks: MOR LI94.5.455, a lower incisor, compares well with *Cervus elaphus*, but is rather small for elk. The specimen also compares well with some specimens of *Odocoileus*, but is large for this genus of cervid. MOR LI94.5.457, a deciduous lower molariform tooth, was compared with the deciduous dentitions of specimens of *Cervus elaphus* (elk) and *Alces alces* (moose). The variation in the deciduous dentition of both of these large cervids is great enough to preclude assignment of the Merrell specimen to a genus. Both specimens are best identified as being referred to as Cervidae, albeit from large cervids.

cf. *Odocoileus* sp. (white-tail or mule deer)

Referred specimen: MOR uncat. (MS-685, EN-2), proximal phalange.

Remarks: The proximal phalange compares well with UMZM 4945, a proximal phalange of *Odocoileus hemionus* (mule deer). Deer occupy a variety of habitats from brushy, wooded areas to open plains. Both species of *Odocoileus* occur in the area today (Zaveloff 1988). *Odocoileus hemionus* is known from several Late Wisconsinan sites in Wyoming, including Horned Owl Cave, Little Box Elder Cave, and Little Canyon Creek Cave. The known Wisconsinan-age fossil record of the two species of *Odocoileus* is poor for the region (FAUNMAP 1994).

Family Bovidae (bovids)

Bison sp. (bison)

Figures 92-94

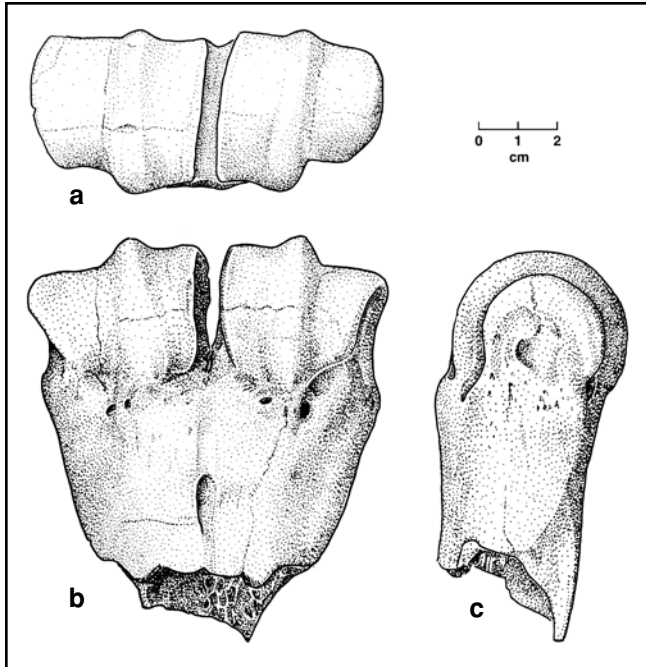


Figure 92. Bison (*Bison* sp.) (UMT 10071) distal end of metapodial: a, distal; b, anterior; and c, side views.

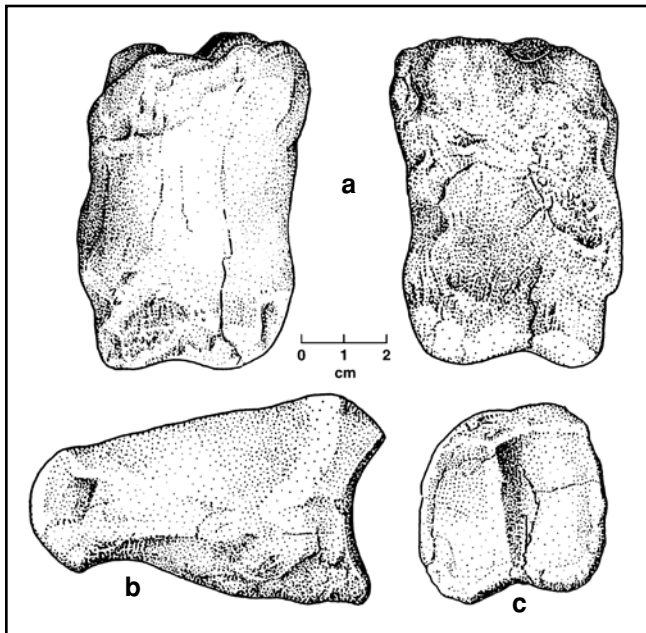


Figure 93. Bison (*Bison* sp.) (UMT 10032) proximal phalange: a, anterior and posterior views; b, side; and c, proximal views.

Referred specimens: UMT 10013, partial lower right m3; UMT 10032, proximal phalange; UMT 10064, partial left radius/ulna diaphysis; UMT 10071, distal end of a metapodial; MOR LI91.1.3, naviculocuboid; MOR LI91.1.5, partial proximal end of a metacarpal 3/4; MOR LI93.2.1,

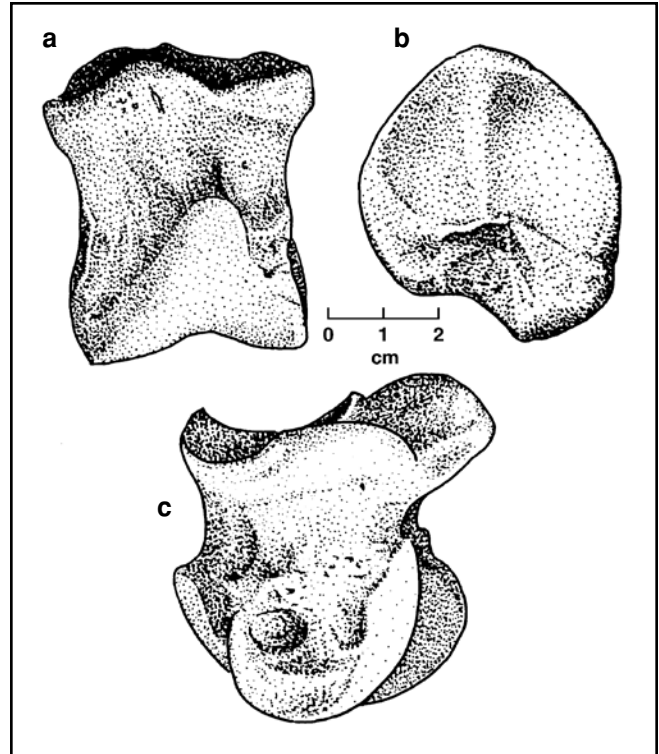


Figure 94. Bison (*Bison* sp.) (MOR LI 94.5.460) medial phalange: a, posterior; b, left proximal; and c, side

partial left innominate; MOR LI94.5.458, tooth fragment; MOR LI94.5.460, left medial phalange; MOR LI94.5.462, proximal end of a right ulna; MOR LI95.2.535, proximal phalange; MOR LI91.1.3 (MS-562, BLM#27), right scaphoid.

Remarks: UMT 10032 is a proximal phalange missing the proximal epiphysis. The specimen is clearly from a juvenile. The remainder of the material is from adult animals.

Bison are grazers that occupy mainly open, grassland habitat in North America. They occasionally use forested areas, particularly for shade and feeding when the snow is too deep (Zaveloff 1988). Bison occurred in the area up into historic time before populations were reduced dramatically and the species nearly became extinct in the late 1800s (Zaveloff 1988). In the fossil record, bison are known from many Wisconsinan sites in the region (FAUNMAP 1994).

Family Camelidae (camels)

Camelops sp. (large camel)

Figure 95

Referred specimens: UMT 10020, left partial dentary with m3; MOR LI94.5.86, tooth fragment consisting of

the buccal side of an M2 or M3; MOR LI94.5.459, distal end of a proximal phalange; MOR LI94.5.461, proximal epiphysis of a proximal phalange.

Remarks: Morphologically, UMT 10020, a left dentary fragment with m3, compares well with Rancho La Brea specimens of *Camelops hesternus* in the collections of the University of California Museum of Paleontology (Berkeley). *Camelops* was also reported from the Late Wisconsinan

left half of a medial phalange; MOR LI95.2.134, medial phalange; MOR LI95.2.155, unerupted partial upper left molariform tooth, not the P2 or M3; MOR LI95.2.162, mandibular symphysis with alveoli for right i1, i2, i3, and left i1; MOR LI96.4.96, right upper molariform tooth, not the P2 or M3; MOR LI96.4.191, distal half of a radius.

Remarks: Both adult and juvenile horse material is represented. No attempt is made here to assign this material to a species, for two reasons. First, the material is of limited value taxonomically, not possessing diagnostic characters necessary for species identification. Second, given the current state of confusion concerning the species level taxonomy of the genus *Equus*, little value exists in assigning the material to species.

Equus material is not uncommon in the Late Pleistocene of Montana, although most records are unpublished. In comparison to other Montana sites containing horse, which typically have few specimens, a considerable collection of *Equus* material was recovered from the Flint Creek site (Dundas 1991).

Order Proboscidea (proboscideans)

Family Elephantidae (elephants)

Genus *Mammuthus* (mammoths)

Mammuthus columbi (Columbian mammoth)

Figures 96-97

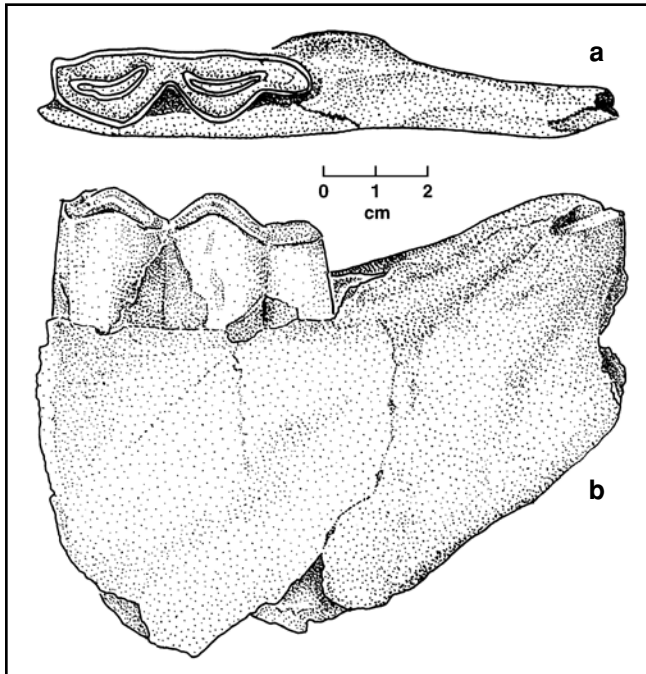


Figure 95. *Camelops hesternus* partial lft. dentary with m3: a, occlusal; and b, buccal views.

Flint Creek site, Montana (Dundas 1991). Nearby Late Wisconsinan occurrences in Idaho include Jaguar Cave, Dam Local Fauna, and Rainbow Beach (FAUNMAP 1994).

Order Perissodactyla (perissodactyls)

Family Equidae (horses)

Equus sp. (horse)

Referred specimens: UMT 10023, lower molariform tooth, not the p2 or m3; UMT 10039, lower right molariform tooth, not the p2 or m3; UMT 10043, partially erupted lower right molariform tooth; UMT 10048, left cuneiform; UMT 10051, partial distal phalanx; UMT 10062, lower right molariform tooth, not the p2 or m3; MOR LI91.1.4, partial right navicular; MOR LI91.1.6, partial medial phalange; MOR LI93.2.2, partial left innominate; MOR LI94.5.119, left trapezium; MOR LI94.5.185, proximal sesamoid of pes; MOR LI95.2.23, distal end of a proximal phalange; MOR LI95.2.106,

Referred specimens: UMT 10019, left metatarsal 3; UMT 10027, fibula; UMT 10028, patella; UMT 10029, right metatarsal 3; UMT 10038, partial lower right m3; UMT 10052, proximal end of a left scapula; UMT 10054, right tibia; UMT 10055, left metacarpal 5; UMT 10056, right magnum; UMT 10057, right metacarpal (4?); UMT 10059, right cuboid; UMT 10060, proximal phalange; UMT 10061, right metacarpal 1; UMT 10065, left cuneiform; UMT 10066, proximal phalange of digit 3; UMT 10067, proximal phalange; UMT 10068, proximal phalange of digit 5; UMT 10069, proximal phalange; UMT 10070, right lunar; UMT 10072, left metacarpal 2; UMT 10075, partial left magnum; UMT 10076, partial right magnum; UMT 10077, right ectocuneiform; UMT 10078, partial right navicular; UMT 10079, partial left unciform; UMT 10080, partial right calcaneum; UMT 10083, atlas; UMT 10085, medial phalange; MOR LI94.5.98, phalange; MOR LI94.5.100, tooth; MOR LI94.5.114, metapodial missing the proximal end; MOR LI94.5.115, ?left metacarpal 5; MOR LI94.5.120, proximal phalange; MOR LI94.5.134, basicranial fragment with one occipital condyle; MOR LI94.5.363, proximal phalange; MOR LI94.450, partial tooth; MOR LI94.5.451, partial tooth; MOR LI94.5.541, partial tooth; MOR LI95.2.118, proximal end of a left ulna;

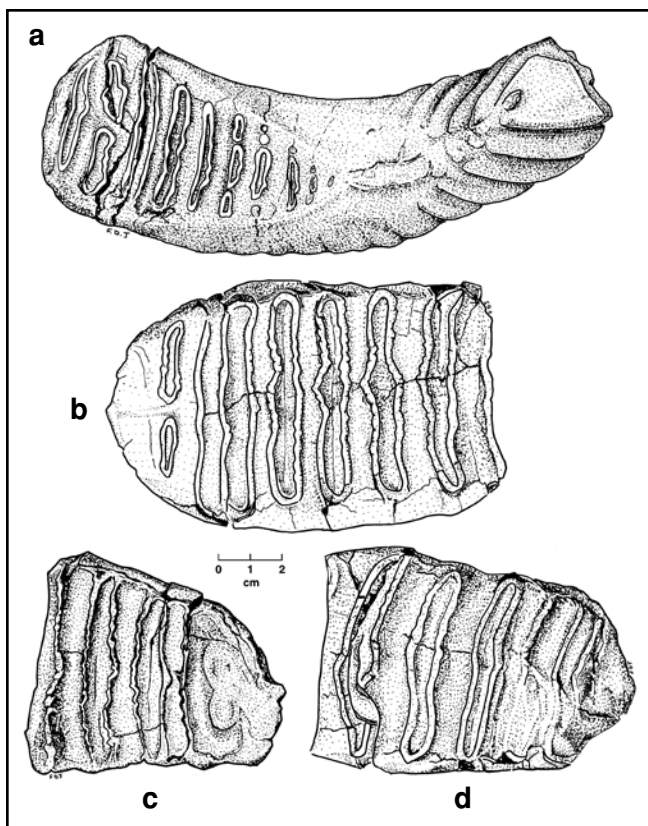


Figure 96. Occlusal surfaces of Columbian mammoth (*Mammuthus columbi*): a, MOR LI 94.5.100; (b-c), MOR LI 94.5.450-452.

MOR LI95.2.140, partial innominate, mostly the ilium; MOR LI95.2.156, distal phalange; MOR LI96.4.63, right navicular; MOR LI96.4.90, proximal end of a left scapula; MOR LI96.4.91, metapodial; MOR LI96.4.95, phalange; MOR LI96.4.99, left astragalus; MOR LI96.4.182, right calcaneum; MOR LI96.4.183, right astragalus; MOR LI96.4.184, left metatarsal 5; MOR LI96.4.185, right metatarsal 3; MOR LI96.4.186, left metatarsal 4; MOR LI96.4.187, sesamoid; MOR LI96.4.188, right metatarsal 1; MOR LI96.4.189, distal phalange; MOR LI96.4.192, right metatarsal 4; MOR LI96.4.193, left calcaneum.

Remarks: UMT 10029 is a right metatarsal 3 with an unfused distal epiphysis, suggesting a subadult. Nearly all of the identifiable mammoth remains appears to be from adults. UMT 10027, a fibula, was radiocarbon dated.

There is some disagreement regarding North American mammoth taxonomy (Maglio 1973; Kurtén and Anderson 1980; Graham 1986; Agenbroad and Barton 1991) and, until a comprehensive revision is undertaken and a general consensus reached, it is particularly important to cite which taxonomy is being used. Here, the taxonomy follows Maglio (1973). Dental measurements were taken using procedures outlined by Maglio (1973).

Several partial teeth from Merrell allow some consideration to be given to species identification. Plate count, enamel thickness, and lamellar frequency are reported for the following specimens, where possible:

UMT 10038 - The anterior part of the lower right m3 is broken off. The remainder of UMT 10038 consists of 15 total plates, 11 of which are in wear. The enamel thickness is 2-2.8 mm, and the lamellar frequency is seven.

MOR LI94.5.100- 20 plates, 11 of which are in wear; enamel thickness of 2 mm; lamellar frequency of 6.

MOR LI94.5.450- a molar fragment with 5.5 plates. Enamel thickness is 2 mm.

MOR LI94.5.451- a molar fragment with 4 plates. Enamel thickness is 1.5 mm.

MOR LI94.5.452- a molar fragment with 7 plates. Enamel thickness is 2 mm.

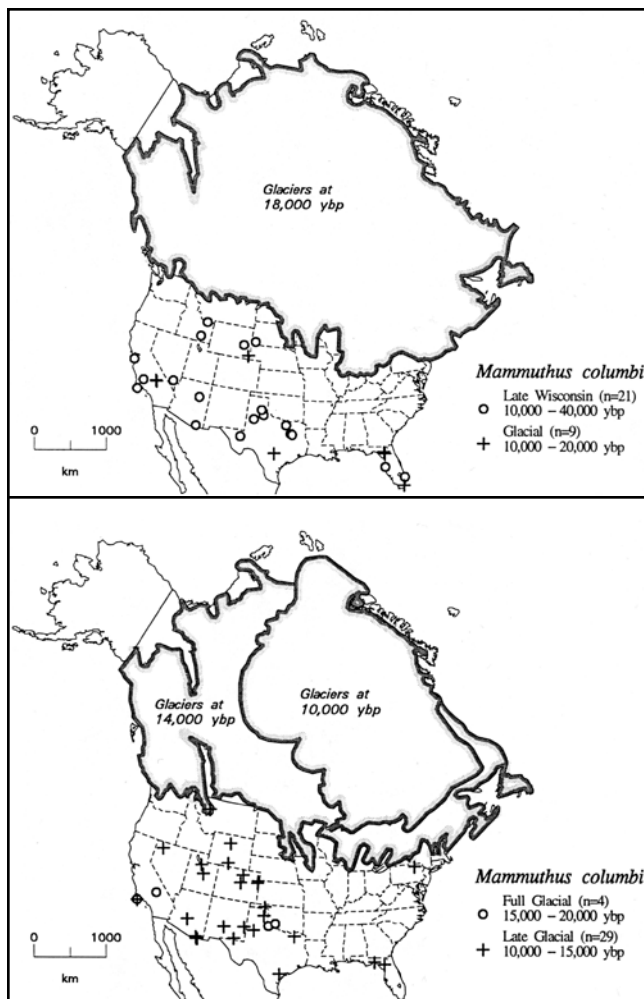


Figure 97. Columbian mammoth (*Mammuthus columbi*) distribution relative to Pleistocene glaciation.

Table 9. Comparison of Lamellar Frequency, Enamel Thickness, and Plates Per Tooth Between *M. columbi* Variants.

Characteristics	<i>M. columbi</i> (typical form)	<i>M. columbi</i> (derived form)	<i>M. primigenius</i>
lamellar frequency (lophs per 100 mm)	5-7	7-9	7-12
enamel thickness	2.0-3.0 mm	1.5-2.0 mm	1.0-2.0 mm

Unfortunately, most of the Merrell mammoth teeth are incomplete. As a result, the characteristic of plates per tooth is of little value here. Maglio (1973) recognized two Late Pleistocene species of mammoth in North America: *Mammuthus columbi* (Columbian mammoth) and *Mammuthus primigenius* (Woolly mammoth). Maglio further recognized what he termed a “typical form” and a “derived form” of Columbian mammoth. The characteristics used to distinguish the species listed below are based on the 3rd molar.

Considering the Merrell material, the lamellar frequency of 6-7 and enamel thickness ranging from 1.5-2.8 mm support the assignment of these specimens to *Mammuthus columbi* (Table 9).

Discussion

The Merrell fauna is comprised of 21 taxa, of which 15 are mammals. Although many members of the fauna currently live in the area, several became extinct in North America near the end of the Pleistocene, including *Homotherium serum*, *Camelops*, *Equus*, and *Mammuthus columbi*. In regard to minimum number of individuals, all vertebrate species at the Merrell Site are represented by a minimum of one individual, except for *Bison* sp., *Equus* sp., and *Mammuthus columbi*. At least two *Bison* are represented; a juvenile is present while the remainder of the material is adult. Likewise, *Equus* is represented by a minimum of two individuals, based on partially erupted dentition indicating a young animal, while most of the material is adult. Probably more than two individuals are represented based on stratigraphic location of the juvenile dentitions. Mammoth is the most abundant material at Merrell. However, determining a minimum number of individuals based on the fragmentary nature of many of the specimens probably underestimates the actual number of individuals. Nevertheless, at least three individuals of mammoth are present, two adults and one subadult (or juvenile).

In general, discussion of faunules at the Merrell Site is not possible, in part, due to the considerable bioturbation

present at the site. However, considering the five stratigraphic units at Merrell, the faunal remains were recovered from deposits of at least two ages. Specimens from the debris flow (stratum D), on the north end of the site, date to ca. 27,000 BP and 22,000 BP. Remains from stratum B (and upper stratum A) are dated to ca. 40,000 BP (Hill, this report: Table 9).

Several members of the fauna are indicative of a perennial, slow-moving water body in the area. The swan, duck, muskrat, and beaver all suggest a stream, marsh, or lake setting.

The sedimentary sequence contains a variety of fossil remains (cf. Dundas 1992). A list of the vertebrate fauna recovered from the Merrell Locality is presented as Table 8. The materials studied by Dundas were collected by a team directed by Foor in 1989 and were initially conserved in the University of Montana Museum of Paleontology vertebrate collections (Dundas 1992:9). Mammoth remains are present in both the stratum B (LL2) and stratum D deposits (Albanese, this report and Hill, this report). Bones were also observed in the uppermost part of and on the top of stratum A (along its boundary with stratum B). Other vertebrate remains that are biostratigraphic time markers include a Pleistocene variant of horse, Yesterday’s camel, and Scimitar cat.

Invertebrates

Christopher L. Hill

Invertebrate fossils include molluscs and ostracods. Fragments of gastropods and bivalves were recovered from the uppermost part of stratum B (LL2e, Figure 6). Intact gastropods and ostracods were recovered from LL3a (Figure 6). Fragments of molluscs and ostracods occur throughout the upper sections of strata C and D. Bump (1989) reports the presence of four genera of gastropods and a bivalve genus from the sediments containing and overlying the vertebrate remains. All are associated with aquatic habitats, including stream settings or ponds.