of North American mammals. Although it is uncertain when black-footed ferrets first entered Eastern Beringia, they certainly died out there sometime during the last 30,000 years. Could the onset of severe cold weather during the last glacial maximum (about 25,000 to 15,000 years ago) have dealt the coup de grace? After all, their long, tube-like bodies provide a maximum of surface exposure with minimal insulation, especially considering their high metabolism and need for food. Although black-footed ferrets prey mainly on prairie dogs in their historic range, they are known to feed on voles and ground squirrels, both of which were common in Eastern Beringia where prairie dogs were completely lacking. Interestingly, the Middle Pleistocene fauna from Cathedral Cave, Nevada does not include prairie dogs, but has abundant evidence of ground squirrels – a likely prey for the black-footed ferrets. Evidence for "olfactory imprinting" in these ferrets shows that food eaten between 60 and 80 days of age influences future taste for prey. So it is easy to see how the species' taste in prey could change rapidly.

Finally, it is worth emphasizing the critical part played by three dogs in this story – finding two of the most important Yukon fossils, and in "rediscovering" the last-known survivors of the species in Meeteetse, Wyoming. Man's best friend? Indeed!

C.R. Harington
February, 2007

Additional Reading

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Yukon
TOURISM AND CULTURE

The Yukon Palaeontology Program's Beringian Research Notes series presents vignettes of life in the Yukon during the last Ice Age.

Beringian Research Notes

2007 No. 16

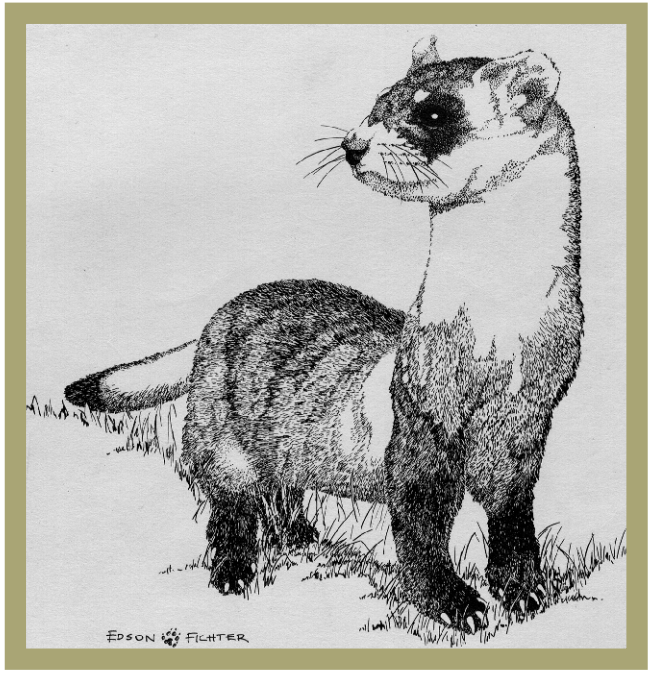

Figure 1: Black-footed ferret sketch by Ed Fichter.

Ancient Black-footed Ferrets and Something the Dog Brought In

Black-footed ferret (*Mustela nigripes*) fossils are rare in Yukon ice age (Pleistocene – about 2 million to 10,000 years ago) deposits and no longer live there now, although they survive (barely) in the heartland of North America. Among the most remarkable of these are two carcasses from Mid-Wisconsinan (about 65,000 to 25,000 years ago) sediments. What makes them so significant and intriguing are their excellent preservation and background stories. Remains of these ferrets, who feed mainly on burrowing rodents, along with American badger (*Taxidea taxus*) fossils and Arctic ground squirrel (*Spermophilus parryii*) middens indicate extensive areas of dry grassland once existed in Eastern Beringia (unglaciated parts of Alaska, Yukon and adjacent Northwest Territories).

Black-footed ferrets (Figure 1) are mink-sized members of the weasel family (Mustelidae). Their skulls are short and broad. Adults males have a body length

(including tail) of about 570 mm and weigh about 1,000 gm compared to about 530 mm and 700 gm for adult females. They are slender, wiry animals with black face-masks, black feet and black-tipped tails. The rest of their short, sleek fur is yellowish-buff, lighter on the belly and nearly white on the forehead, muzzle and throat. They have short legs with large front paws and claws developed for digging. Their large ears and eyes suggest that they possess acute hearing and sight, but smell is their most important sense for hunting prairie dogs (*Cynomys*) underground.

Black-footed ferrets are mostly nocturnal, solitary carnivores. Their breeding populations have only been found in association with the prairie dog (their main prey) colonies, and they live in modified prairie dog burrows. They also eat lagomorphs (hares and rabbits), voles, mice, ground squirrels, pocket gophers, birds and insects. Voles increase in importance for them during winter months when other prey such as ground squirrels are hibernating. Breeding occurs in March – April and gestation is approximately 43 days. Litter sizes range from 1 to 5, averaging 3. Juveniles first appear above ground in late June, and by late August they have reached adult size. Those who secure territory by winter are likely to survive. Modern black-footed ferrets die from predation, disease, as well as human and resource-related causes. Potential predators include badgers, coyotes (*Canis latrans*), bobcats (*Lynx rufus*), Golden Eagles (*Aquila chrysaetos*), Great-horned Owls (*Bubo virginianus*) and hawks.

By 1978 black-footed ferrets were considered extinct. It took a shaggy ranch dog “Shep” to turn things around by “collecting” one in Meeteetse, Wyoming in 1981.

What about the Yukon carcasses? During the summer of 1984 placer miners Chuck and Lynn McDougall working in the Sixtymile area (Loc. 3) took a small carcass from their Border Collie x Dachshund pet “Molly,” and stored it in their freezer, thinking it might be of interest to me. It turned out to be a black-footed ferret – the carcass being complete except for the right hindfoot and tail (Figure 2). Fur is present on the left front of the body and belly as well as on the legs. Even the black mask can be seen on the left side of the head. An x-ray of the specimen revealed that it is a young adult male. Phil Youngman, who studied the specimen, noted that the right fibula (hindlimb bone) showed two fractures. Vole (*Microtus*)-like hair in its intestine was the remainder of its last meal. This carcass, albeit something the dog brought in, is one of the best specimens in Canadian Museum of Nature collections, and has been radiocarbon dated to about 40,000 years ago.

During the summer of 1987, a partial carcass of an adult black-footed ferret was picked up by placer miner Jack Fraser's dog at his mine on Hunker Creek (Loc. 12) near Dawson City – some 80 km east of the Sixtymile locality. Probably the specimen came from “muck” (frozen organic silt) overlying gold-bearing gravel at the site. It consists of the front two-thirds of the skin-covered skull with attached mandible connected by skin and muscle to part of the right leg. Some glossy black fur is present on the foot. The animal had died about 30,000 years ago. Both carcasses seem to have been naturally freeze-dried.

Figure 2: Left side of a black-footed ferret carcass from Sixymile Loc. 3 radiocarbon dated at 39,560 +/-490 years ago.

Since several Pleistocene specimens, apparently representing the closely-related, larger Eurasian steppe ferret (*Mustela eversmanni*) have been reported from Ester Creek near Fairbanks, Alaska; Bluefish Caves (west of Old Crow – one partial skull being dated to about 30,000 years ago); and Old Crow Basin, Yukon both species may have lived in an Eastern Beringian grassland environment during the Mid-Wisconsinan warm phase, about 40,000 to 30,000 years ago. It is worth noting that most mummified mammals from Siberia, Alaska and Yukon were preserved either during the period from 45,000 to 30,000 years ago or from 14,000 to 10,000 years ago. Conditions during these periods have been related to snowy winters, heavy spring runoff and very dry summers.

All living ferrets are derived from Stromer's polecat (*Mustela stromeri*), a small European Middle Pleistocene (about 790,000 to 130,000 years ago) species. Black-footed and steppe ferrets are closely related – a genetic study suggests that they may have separated from a common ancestor sometime between 2 million and 500,000 years ago. Ancestors of the black-footed ferret spread from Eurasia to North America, possibly during the Kansan (first Pleistocene) glaciation when worldwide sea level dropped exposing a broad isthmus linking Siberia and Alaska. The species then moved south into the heartland of North America, perhaps during the following (Yarmouthian) interglacial. The earliest known black-footed ferret fossils are from Porcupine Cave, Colorado (tentatively dated between 850,000 and 750,000 years ago) and from Middle Pleistocene deposits at Cathedral Cave, Nevada. The species is also recorded from Late Illinoian (second last glacial) deposits in Nebraska and Sangamonian interglacial (about 130,000 years ago) deposits in Nebraska and Medicine Hat, Alberta. Black-footed ferrets are recorded from 24 Pleistocene and Holocene (the last 10,000 years) faunas from the historic range of the species except for 10, including Canadian sites at Medicine Hat and January Cave, Alberta; Old Crow River Loc. 65; Sixtymile Loc. 3 and Dawson Loc. 12, Yukon.

Black-footed ferrets, while still surviving in small parts of their historic range (thanks to a recovery program involving reintroductions), are among the rarest