

Ancient DNA: studies of Late Pleistocene mammal bone from Sixtymile, Yukon, Canada

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Our study focuses on one of the richest ice-age mammal fossil sites in Canada, Locality 3 on Sixtymile River, Yukon. This placer-gold operation has produced hundreds of well-preserved fossils. We review the site's stratigraphy, paleoenvironment, geochronology, Pleistocene fauna, and, above all, results of recent research on DNA from bone radiocarbon-dated to between 21,000 and 48,000 years ago.

The significance of this collection lies in its size (approximately 1,300 specimens), quality (including well-preserved carcasses), and the interesting variety of taxa represented (20 species, most of which have been radiocarbon-dated).

DNA was extracted from 0.5 - 1.0 g samples of cortical bone of several mammalian taxa preserved in frozen ground. Mitochondrial DNA up to 500 bp in length was amplified by PCR, despite the age of the specimens. DNA preservation seemed to reflect the postmortem depositional environment, rather than its absolute age. DNA sequences from the mitochondrial 12S cytochrome b and control region genes were obtained and used to examine systematic and population genetic questions.

The results reveal that such frozen deposits comprise a Late Pleistocene genetic museum, allowing ideas about intercontinental migration, population declines due to climatic change, and hypotheses about the genesis of population subdivisions to be tested.