# A mammoth task -- sorting out mammoth evolution

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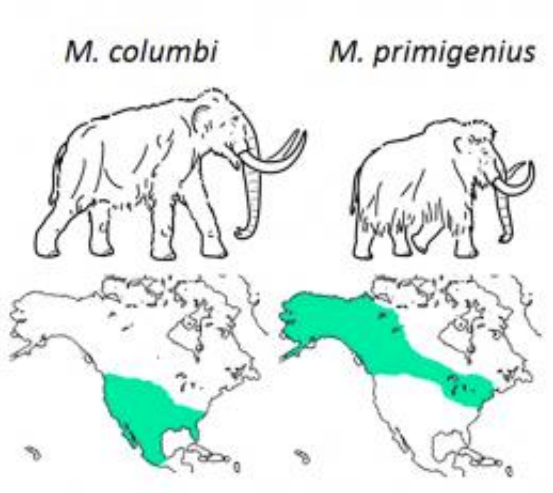


An illustrated figure of the Columbian mammoth and the woolly mammoth

Mammoths were a diverse genus that roamed across Eurasia and North America during the Pleistocene era. In continental North America, at least two highly divergent species have long been recognized – woolly mammoths (*Mammuthus primigenius*) and Columbian mammoths (*M. columbi*). But new genetic evidence published in BioMed Central's open access journal *Genome Biology* suggests that these species may have been closely related enough to mate when they had the chance.

Remains of woolly mammoths have been found across the glacial tundra-steppe of Eurasia and northern North America, while the much

physically larger Columbian mammoths inhabited the savannah environments of temperate southern and central North America. The differences between the species have long been considered as unique adaptations to the environments where they evolved. But by piecing together trace fragments of DNA from an 11 thousand year-old Columbian mammoth from Fairview, Utah, a team of Canadian, American and French researchers found that surprisingly the mitochondrial genome from this mammoth was nearly indiscernible from that of its northern woolly counterparts.

But the group does not suspect that this requires a re-write of North American mammoth evolution. "We think this individual may have been a woolly-Columbian hybrid," says Jacob Enk of the McMaster Ancient DNA Centre, the group that led the research. "Living African elephant species interbreed where their ranges adjoin, with males of the bigger species out-competing the smaller for mates. This results in mitochondrial genomes from the smaller species showing up in populations of the larger. Since woolly and Columbian ranges periodically overlapped in time and space, it's likely that they engaged in similar behaviour and left a similar genetic signal." The team goes on to suggest that interbreeding may explain some mammoth fossils that have intermediate physical characteristics, between woollies and Columbians, sometimes assigned to the species *M. jeffersonii*.

They do not rule out other explanations however, and note that the only way to know for sure whether their mammoth was a hybrid is to sequence nuclear DNA from it and other mammoths. For poorly-preserved remains like those of southern-ranging Columbians, this will be a challenge. But they expect that by exploiting new cutting-edge sequencing technologies, the nuclear genomes of these amazing animals are within reach.

**More information:** The Complete Columbian mammoth mitogenome

suggests interbreeding with woolly mammoths, Jacob Enk, Regis Debruyne, Alison Devault, Christine E King, Todd Treangen, Dennis O'Rourke, Steven L Salzberg, Daniel Fisher, Ross MacPhee and Hendrik Poinar, *Genome Biology* (in press)

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