

# Back to the future: Mastodon extends the time limit on DNA sequencing

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In a new paper in the open access journal PLoS Biology, Michael Hofreiter from the Max Planck Institute for Evolutionary Anthropology in Germany, and colleagues from Switzerland and the United States, announce the sequencing of the complete mitochondrial genome of the mastodon (*Mammuthus americanus*), a recently extinct relative of the living elephants that diverged about 26 million years ago.

The sequence was obtained from a tooth dated to 50,000–130,000 years ago, increasing the specimen age for which such palaeogenomic analyses have been done by almost a complete glacial cycle.

The mastodon becomes only the third extinct taxon for which the complete mitochondrial genome is known, joining the superficially similar looking woolly mammoth, and several species of Moa, the giant flightless Australasian bird.

Using the mitochondrial genome sequence, together with sequences from two African elephants, two Asian elephants, and two woolly mammoths (obtained from previous work), it was shown that mammoths are more closely related to Asian than to African elephants. This shows the power of genetic data to clarify interrelationships, even in the case of well studied taxa.

Moreover, the researchers used the mastodon data as a calibration point, lying outside the Elephantidae radiation (elephants and mammoths), which enabled them to estimate accurately the time of divergence of

African elephants from Asian elephants and mammoths (about 7.6 million years ago) and the time of divergence between mammoths and Asian elephants (about 6.7 million years ago).

These dates are strikingly similar to the divergence time for humans, chimpanzees, and gorillas, and raise the possibility that the speciation of mammoths and elephants and of humans and African great apes had a common cause. Despite the similarity in divergence times, the substitution rate within primates is more than twice as high as in proboscideans, showing that the molecular clock ticks differently for different taxa.

Citation: Rohland N, Malaspinas AS, Pollack JL, Slatkin M, Matheus P, et al. (2007) Proboscidean mitogenomics: Chronology and mode of elephant evolution using mastodon as outgroup. *PLoS Biol* 5(8): e207. doi:10.1371/journal.pbio.0050207.

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