

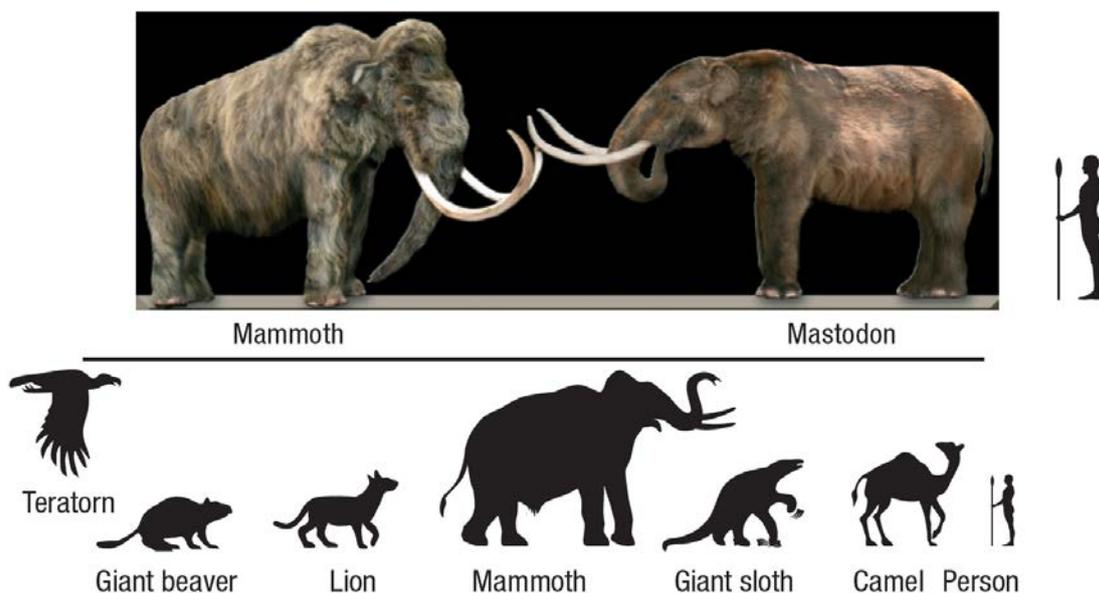
The first humans in America

Update #3 to *Human Origins: How diet, climate and landscape shaped us*

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A recent study presents evidence that members of our human (*Homo*) lineage were in North America around 130 thousand years ago (Holen and others, 2017; Wade, 2017a). This is a shocking claim because it is more than 100 thousand years before the previously established timing of 14 thousand years ago for when humans first entered the Americas. This latest report is not the first to argue for a much earlier presence of humans in the Americas, but it provides by far the most compelling and best dated evidence yet.

The evidence consists of scattered mastodon bones lying immediately adjacent to several large stones. The bed in which the bones and stones occur were recovered from a 12-m-thick succession of river deposits discovered at a construction site near San Diego, California. The mastodon is a distant relative of elephants and was common in North America (along with the woolly mammoth and other large animals) up until people hunted them to extinction by around 12 thousand years ago. The authors of the study argue that the physical damage of some mastodon bones and associated stones indicate that the stones were used as hammerstones and anvils to break open the large mastodon bones. Breaking of the bones was done most likely to access the oozing, nutrient-rich marrow inside. The large stones were locally sourced but, oddly, none was modified or shaped in any way by removal of smaller stone flakes. Although no human bones were found at the site, it is assumed that humans were responsible because no other animal capable of smashing large mastodon bones with large stones is known to have lived at this time in the Americas.

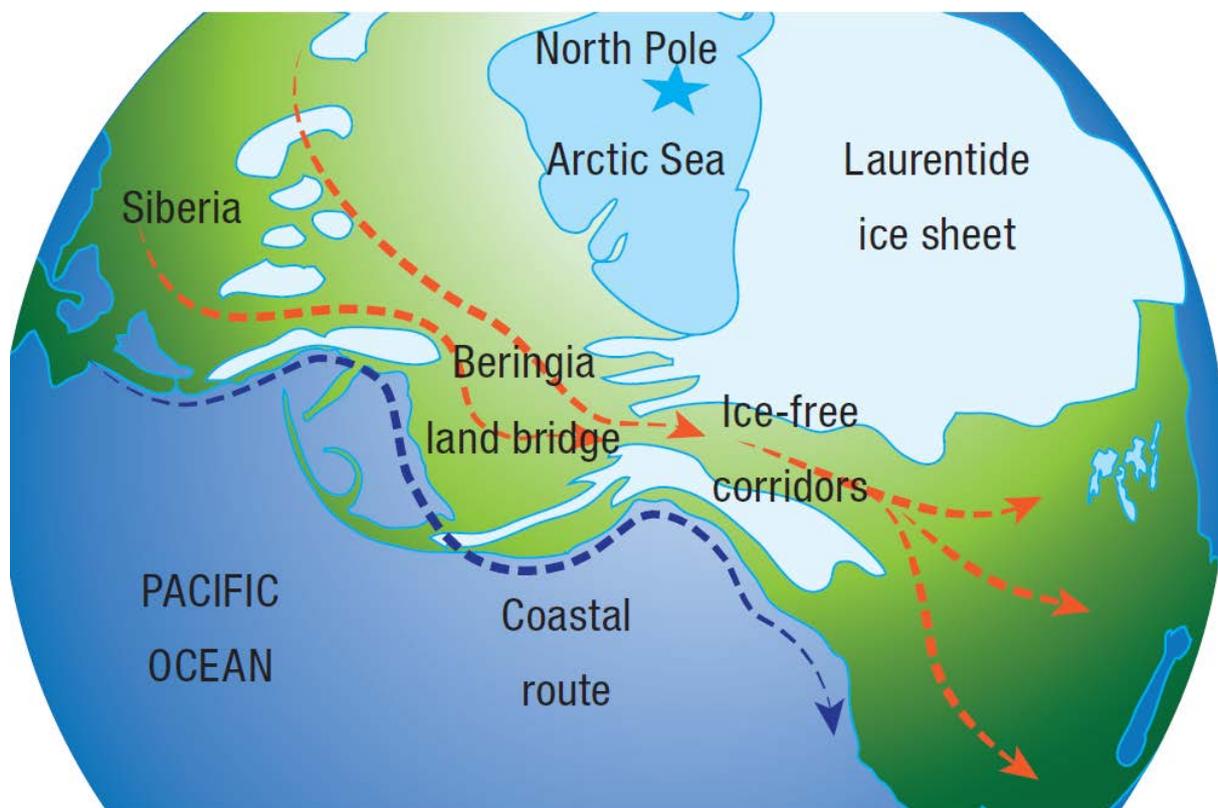


Many of the large animals shown here (including the mastodon, upper right) became extinct soon after people arrived in North America 14 thousand years ago (human with spear for scale).

The site was determined to be 130.7 ± 9.4 thousand years old based on the decay of the radioactive element uranium contained within the bones. There was no organic carbon left in the bones to date using radiocarbon methods and the application of optically stimulated luminescence (OSL) indicated

that the sediment at the site was deposited at least 60 thousand years ago. The age uncertainty of plus/minus nearly ten thousand years reflects, in part, the model assumptions made in using the uranium-series disequilibrium method. However, the uranium-derived ages appear to be robust and indicate that the deposit most likely formed sometime between 140 and 120 thousand years ago.

The lack of human bones, as well as any other stone tools or cultural artefacts besides the hammerstones and anvils, make it difficult to say which member of our human lineage was active at the site. It is certainly conceivable that members of our lineage living in Eurasia may have crossed over to North America when the Beringia land bridge was exposed. The Beringia land bridge today is flooded by the Bering Sea, but the lowering of sea level at times in the past was sufficient to expose the Bering Sea as a land bridge connecting Eurasia and North America. For example, the Beringia land bridge could have been crossed roughly 134 to 131 thousand years ago, within the age window of the mastodon site. Any humans living in eastern Siberia at that time may have made the journey across on foot without necessarily making use of boats.

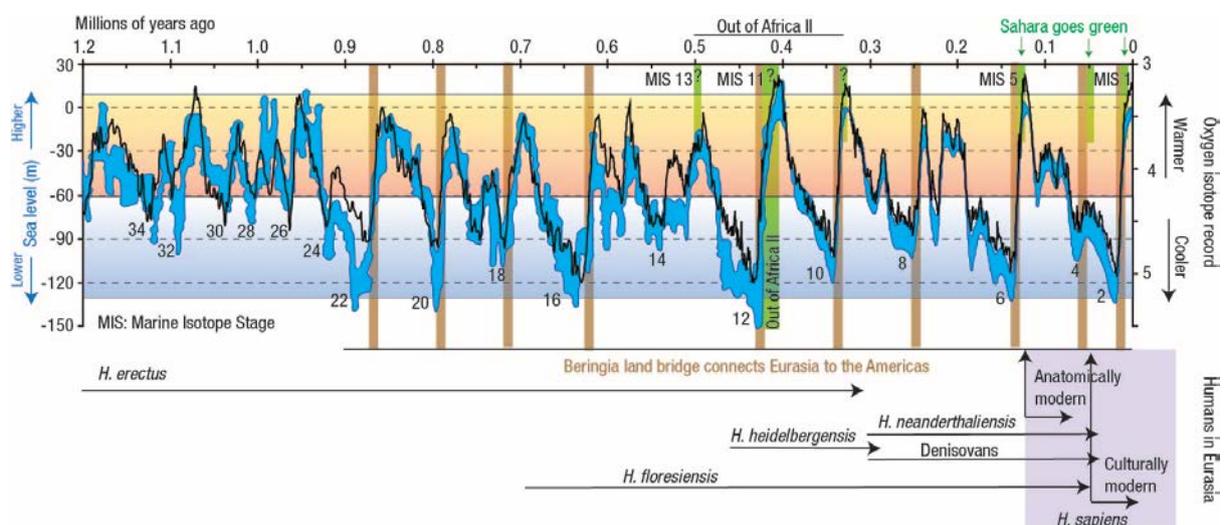


Siberia was connected to North America periodically when sea level was lowered by major ice build up. Humans living in Siberia could have crossed over to North America either by boat along a coastal route or on foot overland through ice-free corridors.

The highly successful crossing 14 thousand years ago was part of the Great Expansion of behaviourally modern people who left Africa around 60 to 50 thousand years ago. There are numerous archaeological sites that show modern people had entered and become widespread throughout the Americas, reaching the southern coast of Chile by around 14 thousand years ago. The timing of initial entry into the Americas is thought to be mostly determined by when people living in the Far East and eastern Siberia could cross over the Beringia land bridge connecting Eurasia and North America during the Last Glacial Maximum when sea level was lowered in response to the

build-up of major ice sheets. Passage into North America from Beringia was delayed until the large ice sheet blocking the way had started to melt back with the onset of warmer climates 18 to 14 thousand years ago. There was a relatively brief window to pass over the land bridge before it was flooded by the rising sea as the ice sheets quickly melted. Most are sceptical that humans had crossed over before 14 thousand years ago, with the current debate centred on when people crossed over, where they came from and whether they travelled by canoe along a coastal route or overland on foot through ice-free corridors that opened as the large Laurentide ice sheet melted back (Wade, 2017b).

It is not too far-fetched that some of our ancestors living in Eurasia might have crossed over to the Americas much earlier than the well-documented crossing of people by 14 thousand years ago. This is because the Beringia land bridge was repeatedly exposed as Earth cycled through glacial and interglacial periods over the last million years. Any of our ancestors adapted to living at relatively high latitudes may have inadvertently crossed over Beringia in pursuit of game and, once across, they could expand and fill the virgin American landscapes.



Sea-level cycles over the last million years and the periodic exposure of the Beringia land bridge in the transition from glacial to interglacial periods when animals (including humans) may have crossed over to North America (brown columns). The mastodon archaeological site reported from southern California implies humans crossed over sometime prior to 134 to 131 thousand years ago during the MIS 6 glacial to MIS 5 interglacial transition (third brown column on the right) when Neanderthals and Denisovans, but probably not our species (*Homo sapiens*) or the 'hobbit' (*H. floresiensis*), were living at high latitudes in Eurasia.

Could it have been our species, *Homo sapiens*, who crossed over? This seems unlikely because, although our species had appeared in Africa by around 200 to 160 thousand years ago, the earliest evidence of when we left Africa is 131 to 113 thousand years ago (MIS 5). After crossing over, our species appears to have largely been confined to the Middle East region. There is, as yet, no evidence that they had expanded into Siberia as early as when the Beringia land bridge to the Americas was exposed 134 to 131 thousand years ago. So, if not our species, then what other member of our lineage may have crossed over prior to 140 to 120 thousand years ago?

We know that Neanderthals, Denisovans and the 'hobbit' (*Homo floresiensis*) were all living in Eurasia at this time. *Homo erectus* was widespread throughout Eurasia even earlier, but does not

appear to have lived at high enough latitudes, above 40°N, to have crossed over the Beringia land bridge located at latitudes above 55°N. The 'hobbit' is only known from the Indonesian island of Flores where it lived from 700 up until 50 thousand years ago, whereas Neanderthals and Denisovans are known to have lived at high latitudes, including Siberia. However, it is unclear which of the two crossed over the Beringia land bridge because the only stone tools (hammerstones and anvils) yet to be recovered from the site are not shaped in any way. Almost all contemporaneous stone tools documented in Eurasia (and Africa) were intentionally shaped by the removal of stone flakes. The lack of shaped stone tools is an unusual, and difficult to comprehend, aspect of the mastodon site.

Another surprising aspect about the mastodon site besides its lack of shaped stone tools, is that there has been so little convincing evidence of an earlier human presence in the Americas before now. If humans did managed to cross over, then it is predicted that they would have rapidly spread into the virgin landscapes, landscapes never before occupied by humans and full of large animals relatively easy to hunt. The Americas are two enormous continents no more difficult for humans to thrive in than Eurasia. So why are traces of humans living there so difficult to see in comparison to the record in Eurasia? Has the abundance of archaeological sites younger than 14 thousand years old obscured older, less abundant evidence? Perhaps if people dig a bit deeper and consciously look for it, an older record of humans in the Americas will be revealed. Now that the first compelling site has been discovered, perhaps more will follow.

Further reading

Holen, S. R., and others, 2017. A 130,000-year-old archaeological site in southern California, USA. *Nature* 544, 479–483. doi:10.1038/nature22065

Wade, L., 2017a. Claim of very early humans in Americas shocks researchers. *Science* 356, 361. doi: 10.1126/science.356.6336.361

Wade, L., 2017b. On the trail of ancient mariners. *Science* 357, 542-545. doi: 10.1126/science.357.6351.542

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