Unlocking the past with the West Runton Elephant

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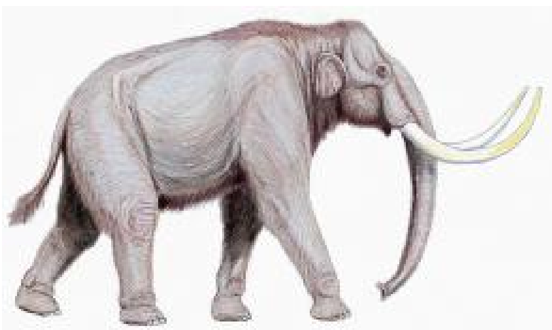

Mammuthus trogontherii, Steppe Mammoth. Image: Dmitry Bogdanov/Wikipedia.

(PhysOrg.com) -- Researchers from the University of York and Manchester have successfully extracted protein from the bones of a 600,000 year old mammoth, paving the way for the identification of ancient fossils.

Using an ultra-high resolution mass spectrometer, bio-archaeologists were able to produce a near complete collagen sequence for the West Runton Elephant, a Steppe Mammoth skeleton which was discovered in cliffs in Norfolk in 1990. The remarkable 85 per cent complete skeleton – the most complete example of its species ever found in the world - is preserved by Norfolk Museums and Archaeology Service in Norwich.

Bio-archaeologist Professor Matthew Collins, from the University of

York's Department of Archaeology, said: "The time depth is absolutely remarkable. Until several years ago we did not believe we would find any collagen in a skeleton of this age, even if it was as well-preserved as the West Runton Elephant.

"We believe protein lasts in a useful form ten times as long as DNA which is normally only useful in discoveries of up to 100,000 years old in Northern Europe. The implications are that we can use collagen sequencing to look at very old extinct animals. It also means we can look through old sites and identify remains from tiny fragments of bone."

Dr. Mike Buckley, from the Faculty of Life Sciences at the University of Manchester, said: "What is truly fascinating is that this fundamentally important protein, which is one of the most abundant proteins in most (vertebrate) animals, is an ideal target for obtaining long lost genetic information."

The collagen sequencing was carried out at the Centre for Excellence in Mass Spectrometry at the University of York and is arguably the oldest protein ever sequenced; short peptides (chains of amino acids) have controversially been reported from dinosaur fossils.

The research formed part of a study into the sequencing of mammoths and mastodons, which is published in the journal *Geochimica et Cosmochimica Acta*. The West Runton Elephant was compared with other mammoths, modern elephants and mastodons. Despite the age of the fossil, sufficient peptides were obtained to identify the West Runton skeleton as elephantid, and there was sufficient sequence variation to discriminate elephantid and mammutid collagen.

Nigel Larkin, co-author and Research Associate with Norfolk Museums and Archaeology Service, said: "The West Runton Elephant is unusual in that it is a nearly complete skeleton. At the time this animal was alive, before the Ice Ages, spotted hyenas much larger than those in Africa today were scavenging most carcases and devouring the bones as well as meat. That means most fossils found from this time period are individual bones or fragments of bone, making them difficult to identify. In the future, collagen sequencing might help us to determine the species represented by even smallest scraps of bone.

“Therefore this research has important implications for bones and bone fragments in all archaeological and palaeontological collections in museums and archaeology units around the world, not just those of Norfolk Museums and Archaeology Service in Norwich.”

More information: The full article of *Mammoth and Mastodon collagen sequences; survival and utility* is available at dx.doi.org/10.1016/j.gca.2011.01.022

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