Prehistoric cold case links humans to Tasmanian megafauna extinctions

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A team of Australian and New Zealand researchers have discovered fresh evidence that could finally unravel the mystery of what killed Tasmania's giant marsupials over 40,000 years ago.

Analysis carried out at the Australian Nuclear Science and Technology Organisation (ANSTO) on the skeletal remains of extinct megafauna is providing substantial proof that for about 2,000 years they infact shared the island with early humans before suddenly disappearing some time

before the last ice age.

The findings challenge for the first real time history's version of events and by now placing our ancestors in Tasmania at the same time as large prehistoric animals, like the Protemnodon anak (a giant wallaby), raises the chances we were involved in their extinction.

The climate change debate

Popular belief has centred on three likely scenarios for the mass extinction of the megafauna in the region: environmental causes related to climate change, which was considered the key cause of their extinction. Hyper-disease and human hunting have been a distant second in the debate.

Geological work on sea level change suggests humans could not have crossed Bass Strait until around 43,000 years ago when the island was temporarily connected by a land bridge to Australia. The vanishing of megafauna was thought to have occurred thousands of years preceding human arrival, clearing them from any involvement.

That is, of course, until now.

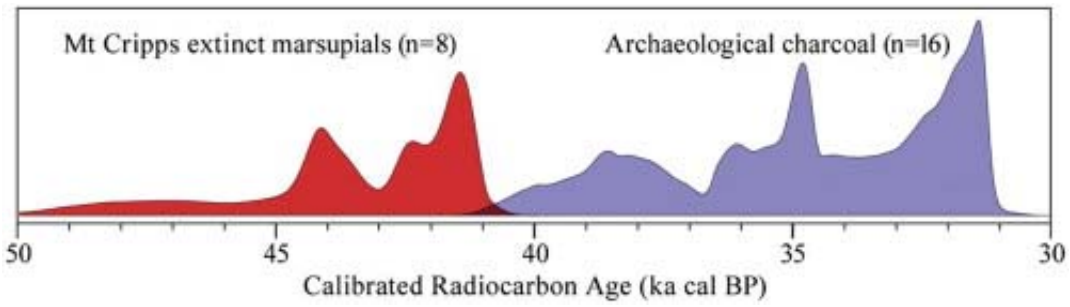
Closing the gap between humans and megafauna

Using a technique called radiocarbon dating and a rethink on what samples are used, scientists carrying out the investigative work at Lucas Heights came up with a new set of theories.

Radiocarbon dating uses the amount of Carbon 14 available in living creatures as a measuring stick. Comparing the amount of C14 in a dead organism to available levels in the atmosphere, produces an estimate of

when that organism died.

For this analysis, the team decided to carbon date protein samples found in the bones of their subjects, which were prehistoric relatives of the kangaroo, wombat and Tasmanian Devil, using the STAR and ANTARES research accelerators located at ANSTO.



Youngest extinct megafauna ages ca. 41 ka overlap with oldest archaeological age. Credit: ScienceDirect.com

The mission was to obtain the most accurate age of the samples and see if they overlapped with the ages of archaeological sites found on the island.

Dr. Vladimir Levchenko from ANSTO is a nuclear scientist in the Institute for Environmental Research.

He is confident the team's results demonstrate megafauna were still living in the 'Apple Island' about 41,000 years ago, at least 2,000 years after first possible human arrival.

"What we've done is review previous unearthed charcoal dates [samples from the oldest known archaeological sites in Tasmania] and compared

them with our youngest dates on extinct fossil material," Dr. Levchenko said.

"Our data clearly shows there are dates in the same period from archaeological sites (charcoal dates] and from fossil sites [bone dates]."

The benefits of obtaining results using nuclear science

What sets these findings apart from earlier research in this area is the purity of the samples they used.

(A) Protemnodon anak juvenile tibia MCP-1 (QVM:2001 GFV: 2), scale bar equals 100 mm; (B) Simosthenurus occidentalis adult skull MCSt-1 (QVM:2006 GFV: 002), scale bar equals 100 mm; (C) decalcified collagen from Zygomaturus trilobus rib MSZ-1 (QVM:1992 GFV:148), note internal brown-black filaments of possible organic contamination, scale bar equals 1 mm. Credit: ScienceDirect.com

Previous radio carbon dating exercises involved using mineral fractions found in bones that tend to be exposed to environmental elements meaning the results were potentially contaminated. In this case, the decision was made to use protein samples.

"A lot of the results that have been recorded in previous research tended

to be unreliable.

“Bones consist of both mineral and protein fractions. Previous measurements have focused on minerals to date fossil remains. Unless you know the bone samples have been well-preserved, the minerals found in bones used to carbon date a fossil tend to interact with the environment.

“For this study, we measured 14C ages, stable C and N isotopes, and C:N ratios on collagen and dentine fractions isolated from the skeletal remains of three extant and four extinct marsupial taxa recovered from the Mt Cripps and Mowbray Swamp fossil sites in North Western Tasmania.” Dr. Levchenko said.

Led by Dr. Richard Gillespie from the Centre for Archaeological Science at the University of Wollongong and Department of Archaeology and Natural History at the Australian National University, the team of scientists assembled from a number of leading universities in Australia and New Zealand, tested the protein samples at ANSTO using the ANTARES and STAR accelerators.

The measurements took only minutes to collate, but to ensure sound results, collagen samples were subjected to different chemical treatments along with a standard bone that was similarly processed to check for reproducibility.

Conclusions

Their results were fascinating revealing giant mammals survived for some time until after the first human arrival.

“We are confident early humans were not only living in Tasmania at the time of the megafauna, but potentially played a hand in their

disappearance," he said.

"The major problem now is we haven't found evidence of any interactions between humans and megafauna to make our findings conclusive."

So who killed Australia's megafauna? The real answer is that scientists are still not sure. This is a very active area of study though for archaeologists and scientists who continue to search for fossil remains. But what these results achieve is to highlight a likely scenario that humans were a major culprit.

More information: www.sciencedirect.com/science/ … ii/S027737911200025X

Provided by ANSTO

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