New evidence on the role of climate in Neanderthal extinction

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The mystery of what killed the Neanderthals has moved a step closer to resolution after an international study led by the University of Leeds has ruled out one of the competing theories – catastrophic climate change – as the most likely cause.

The bones of more than 400 Neanderthals have been found since the first discoveries were made in the early 19th century. The finds suggest the Neanderthals, named after the Neander Valley near Düsseldorf, where they were first recognized as an extinct kind of archaic humans, inhabited Europe and parts of western Asia for more than 100,000 years.

The causes of their extinction have puzzled scientists for years – with some believing it was due to competition with modern humans, while others blamed deteriorating climatic conditions. But a new study published today in *Nature* has shown that the Neanderthal extinction did not coincide with any of the extreme climate events that punctuated the last glacial period.

The research was led by Professor Chronis Tzedakis, a palaeoecologist at the University of Leeds, who explained: “Until now, there have been three limitations to understanding the role of climate in the Neanderthal extinction: uncertainty over the exact timing of their disappearance; uncertainties in converting radiocarbon dates to actual calendar years; and the chronological imprecision of the ancient climate record.”

The team’s novel method – mapping radiocarbon dates of interest

directly onto a well-dated palaeoclimate archive – circumvented the last two problems, providing a much more detailed picture of the climate at the possible times of the Neanderthal disappearance.

The researchers applied the new method to three alternative sets of dates for the timing of the Neanderthal extinction from Gorham's Cave, Gibraltar, a site which is thought to have been occupied by some of the latest surviving Neanderthals:

-- a set of generally accepted but older dates (around 30-32,000 radiocarbon years ago)
-- newly-suggested younger dates (around 28,000 radiocarbon years ago)
-- more contentious dates (around 24,000 radiocarbon years ago).

The team showed that during the first two sets of dates, Europe was experiencing conditions similar to the general climatic instability of the last glacial period – conditions the Neanderthals had already proved able to survive.

The much more controversial date of around 24,000 radiocarbon years ago placed the last Neanderthals just before a large expansion of ice sheets and the onset of cold conditions in northern Europe. "But at that time, Gibraltar's climate remained relatively unaffected, perhaps as a result of warm water from the subtropical Atlantic entering the western Mediterranean," explained palaeoceanographer Isabel Cacho of the University of Barcelona.

"Our findings suggest that there was no single climatic event that caused the extinction of the Neanderthals," concludes palaeonthropologist Katerina Harvati of the Max Planck Institute for Evolutionary Anthropology. "Only the controversial date of 24,000 radiocarbon years for their disappearance, if proven correct, coincides with a major environmental shift. Even in this case, however, the role of climate

would have been indirect, by promoting competition with other human groups."

The work also has wider implications for other studies, as paleoclimatologist Konrad Hughen of the Woods Hole Oceanographic Institution explained: "Our approach offers the huge potential to unravel the role of climate in critical events of the recent fossil record as it can be applied to any radiocarbon date from any deposit."

Source: University of Leeds