

Neanderthals, humans co-existed in Europe for over 2,000 years: Study

October 13 2022, by Daniel Lawler



Distinctive stone knives thought to have been produced by the last Neanderthals in France and northern Spain. This specific and standardized technology is unknown in the preceding Neanderthal record, and may indicate a diffusion of technological behaviors between Homo sapiens and Neanderthals immediately prior to their disappearance from the region. Credit: Igor Djakovic

Neanderthals and humans lived alongside each other in France and northern Spain for up to 2,900 years, modeling research suggested Thursday, giving them plenty of time to potentially learn from or even

breed with each other.

While the study, published in the journal *Scientific Reports*, did not provide evidence that humans directly interacted with Neanderthals around 42,000 years ago, previous genetic research has shown that they must have at some point.

Research by Swedish paleogeneticist Svante Paabo, who won the medicine Nobel prize last week, helped reveal that people of European descent—and almost everyone worldwide—have a small percentage of Neanderthal DNA.

Igor Djakovic, a Ph.D. student at Leiden University in the Netherlands and lead author of the new study, said we know that humans and Neanderthals "met and integrated in Europe, but we have no idea in which specific regions this actually happened."

Exactly when this happened has also proved elusive, though previous fossil evidence has suggested that modern humans and Neanderthals walked the Earth at the same time for thousands of years.

To find out more, the Leiden-led team looked at radiocarbon dating for 56 artifacts—28 each for Neanderthals and humans—from 17 sites across France and northern Spain.

The artifacts included bones as well as distinctive stone knives thought to have been made by some of the last Neanderthals in the region.

The researchers then used Bayesian modeling to narrow down the potential date ranges.

'Never really went extinct'

Then they used optimal linear estimation, a new modeling technique they adapted from biological conservation sciences, to get the best estimate for when the region's last Neanderthals lived.

Humans, neanderthals, Denisovan and mystery hominins

Main research probing the link between us and our extinct "cousins"

1 Early human and eastern Neanderthal

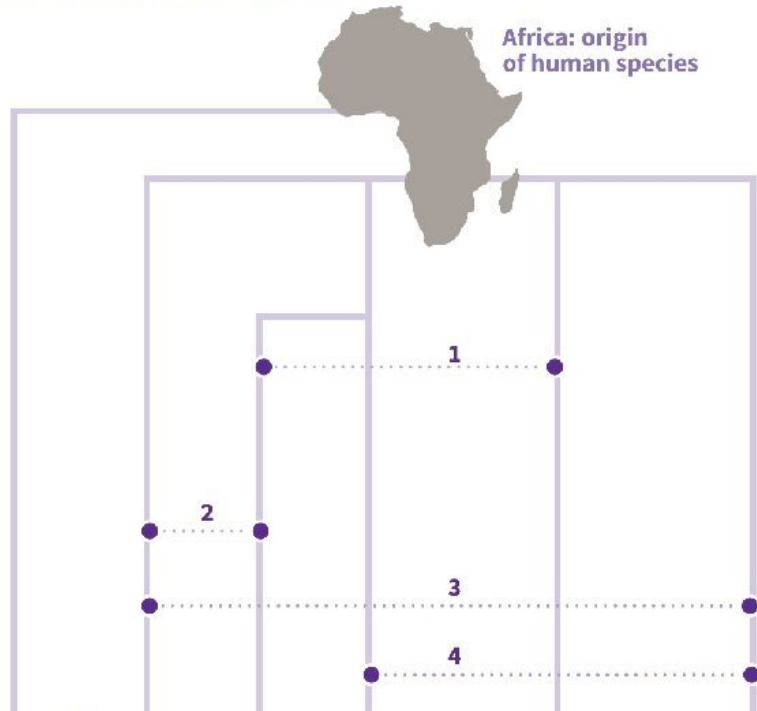
Around 100,000 years ago
Genome of a female Neanderthal showed up in sections of human DNA

2 Eastern Neanderthal and Denisovan

50,000 years ago
New DNA research finds remains of a 13-year-old girl from the Denisova cave in Siberia who was half Neanderthal and half Denisovan

3 Human and Denisovan

45,000 years ago
Humans reached Papua New Guinea bringing Denisovan genes with them



Humans, neanderthals, Denisovan and mystery hominins.

Djakovic said the "underlying assumption" of this technique is that we are unlikely to ever discover the first or last members of an extinct species.

"For example, we'll never find the last woolly rhino," he told AFP, adding that "our understanding is always broken up into fragments."

The modeling found that Neanderthals in the region went extinct between 40,870 and 40,457 years ago, while modern humans first appeared around 42,500 years ago.

This means the two species lived alongside each other in the region for between 1,400 and 2,900 years, the study said.

During this time there are indications of a great "diffusion of ideas" by both humans and Neanderthals, Djakovic said.

The period is "associated with substantial transformations in the way that people are producing material culture," such as tools and ornaments, he said.

There was also a "quite severe" change in the artifacts produced by Neanderthals, which started to look much more like those made by humans, he added.

Given the changes in culture and the evidence in our own genes, the new timeline could further bolster a leading theory for the end of the Neanderthals: mating with humans.

Breeding with the larger human population could have meant that, over time, Neanderthals were "effectively swallowed into our gene pool," Djakovic said.

"When you combine that with what we know now—that most people living on Earth have Neanderthal DNA—you could make the argument that they never really went extinct, in a certain sense."

More information: Igor Djakovic et al, Optimal linear estimation models predict 1400–2900 years of overlap between Homo sapiens and Neandertals prior to their disappearance from France and northern

Spain, *Scientific Reports* (2022). DOI: 10.1038/s41598-022-19162-z

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Citation: Neanderthals, humans co-existed in Europe for over 2,000 years: Study (2022, October 13) retrieved 10 June 2024 from <https://phys.org/news/2022-10-ancient-humans-co-existence-modern-neanderthals.html>

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