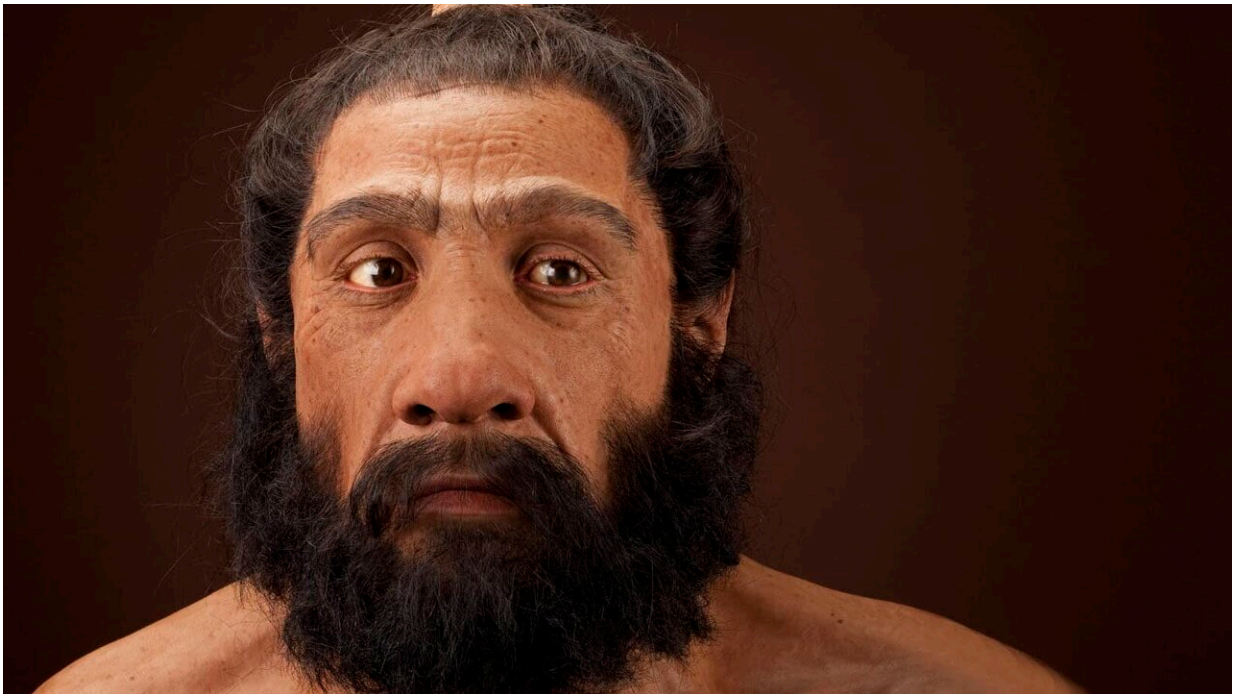


Study of ancient skulls sheds light on human interbreeding with Neandertals

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Homo neanderthalensis adult male. Reconstruction based on Shanidar 1 by John Gurche for the Human Origins Program, NMNH. Credit: Chip Clark.

Research has established that there are traces of Neandertal DNA in the genome of modern humans. Now an exploratory study that assessed the facial structure of prehistoric skulls is offering new insights, and supports the hypothesis that much of this interbreeding took place in the Near East—the region ranging from North Africa to Iraq.

"Ancient DNA caused a revolution in how we think about [human evolution](#)," says Steven Churchill, co-author of the study and a professor of evolutionary anthropology at Duke University. "We often think of evolution as branches on a tree, and researchers have spent a lot of time trying to trace back the path that led to us, Homo sapiens. But we're now beginning to understand that it isn't a tree—it's more like a series of streams that converge and diverge at multiple points."

"Our work here gives us a deeper understanding of where those streams came together," says Ann Ross, corresponding author of the study and a professor of biological sciences at North Carolina State University.

"The picture is really complicated," Churchill says. "We know there was interbreeding. Modern Asian populations seem to have more Neandertal DNA than modern European populations, which is weird—because Neandertals lived in what is now Europe. That has suggested that Neandertals interbred with what are now modern humans as our prehistoric ancestors left Africa, but before spreading to Asia. Our goal with this study was to see what additional light we could shed on this by assessing the facial structure of prehistoric humans and Neandertals."

"By evaluating facial morphology, we can trace how populations moved and interacted over time," Ross explains. "And the evidence shows us that the Near East was an important crossroads, both geographically and in the context of human evolution."

For this study, the researchers collected data on craniofacial morphology from the published literature. This ultimately resulted in a data set including 13 Neandertals, 233 prehistoric Homo sapiens, and 83 [modern humans](#).

The researchers focused on standard craniofacial measurements, which are reproducible, and used those measurements to assess the size and

shape of key facial structures. This then allowed the researchers to do an in-depth analysis to determine whether a given human [population](#) was likely to have interbred with Neandertal populations, as well as the extent of that likely interbreeding.

"Neandertals had big faces," Churchill says. "But size alone doesn't establish any genetic link between a [human population](#) and Neandertal populations. Our work here involved a more robust analysis of the facial structures."

The researchers also accounted for environmental variables that are associated with changes in human facial characteristics, to determine the likelihood that connections they established between Neandertal and human populations were the result of interbreeding rather than other factors.

"We found that the facial characteristics we focused on were not strongly influenced by climate, which made it easier to identify likely genetic influences," Ross says. "We also found that facial shape was a more useful variable for tracking the influence of Neandertal interbreeding in human populations over time. Neandertals were just bigger than humans. Over time, the size of human faces became smaller, generations after they had bred with Neandertals. But the actual shape of some facial features retained evidence of interbreeding with Neandertals."

"This was an exploratory study," Churchill says. "And, honestly, I wasn't sure this approach would actually work—we have a relatively small sample size, and we didn't have as much data on facial structures as we would have liked. But, ultimately, the results we got are really compelling.

"To build on this, we'd like to incorporate measurements from more

human populations, such as the Natufians, who lived more than 11,000 years ago on the Mediterranean in what is now Israel, Jordan and Syria."

The paper is published in *Biology*.

More information: Steven E. Churchill et al, Midfacial Morphology and Neandertal–Modern Human Interbreeding, *Biology* (2022). [DOI: 10.3390/biology11081163](https://doi.org/10.3390/biology11081163)

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