Pinky DNA Points To Clues About Ancient Humans

by Joe Palca

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A replica of the pinky bone fragment found in a Siberian cave. Researchers used the bone bit to extract and sequence the genome of a girl who lived tens of thousands of years ago.

Scientists in Germany have been able to get enough DNA from a fossilized pinky to produce a high-quality DNA sequence of the pinky's owner.

"It's a really amazing-quality genome," says David Reich of Harvard Medical School in Boston. "It's as good as modern human genome sequences, from a lot of ways of measuring it."

The pinky belonged to a girl who lived tens of thousands of years ago. Scientists aren't sure about the exact age. She is a member of an extinct group of humans called Denisovans. The name comes from Denisova cave in Siberia, where the pinky was found.

Two years ago, scientists at the Max Planck Institute for Evolutionary Anthropology in Leipzig reported that they had been able to get just enough DNA from the fossil to make a rough sequence of her DNA. But Matthias Meyer developed a far more efficient way of recovering ancient DNA, so he went back to the tiny amount of DNA left over from the first effort, and reanalyzed it.

"And from this little leftover, we were able to determine the sequence of the Denisova genome 30-fold over," says Meyer.

What that means is they were able to look at every single location along all of this girl's chromosomes 30 times to be absolutely certain that they had the right DNA letter in the right spot. The new results appear in the online edition of the journal *Science*.

The high-quality sequence gives scientists valuable new data for studying ancient humans. Researchers have begun, for example, to explore which modern human populations may have inherited genes from Denisovans.

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The entrance to the Denisova cave in southern Siberia.

"We still cannot detect a trace of any Denisovan genetic material at all in mainland Eurasia" — places such as China and Japan, says Harvard's Reich. "It's only in Southeast Asia and Australia that we detect it."

Understanding the flow of genes will tell scientists about where and when ancient humans moved around the planet.

Reich says for the moment, nearly all scientists know about the Denisovans comes from a girl's pinky. "One of the amazing things about the Denisovans is we still don't know what kinds of artifacts they left behind, what kinds of archaeology. We really only know them from their DNA," he says. "So it's really a genome in search of an archaeology."

Svante Pääbo, senior author on the new research paper, says it will now be possible to comb through the Denisovan genome to see how it differs from that of modern humans.

"This is perhaps, in the long term, to me, the most fascinating thing about this — what it will tell us in the future about what makes [modern humans] special in the world relative to Denisovans and Neanderthals," says Pääbo.

Now that they've completed a high-quality genome sequence of their Denisovan, the *German scientists have begun work on improving the sequence of another extinct group of humans: the Neanderthals.* They expect that work to be published in a year or so.