BBC NEWS

DNA identifies new ancient human

By Paul Rincon
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The finger bone was unearthed in 2008 at Denisova Cave

Scientists have identified a previously unknown type of ancient human through analysis of DNA from a finger bone unearthed in a Siberian cave.

The extinct "hominin" (human like creature) lived in Central Asia between 48,000 and 30,000 years ago.

An international team has sequenced genetic material from the fossil showing that it is distinct from that of Neanderthals and modern humans.

Details of the find, dubbed "X-woman", have been published in Nature journal.

Ornaments were found in the same ground layer as the finger bone, including a bracelet.

Professor Chris Stringer, human origins researcher at London's Natural History Museum, called the discovery "a very exciting development".

" **Whoever carried this mitochondrial genome out of Africa about a million years ago is some new creature that has not been on our radar screens so far** "

Svante Paabo Max Planck Institute for Evolutionary Anthropology
"This new DNA work provides an entirely new way of looking at the still poorly-understood evolution of humans in central and eastern Asia."

The discovery raises the intriguing possibility that three forms of human - *Homo sapiens* , Neanderthals and the species represented by X-woman - could have met each other and interacted in southern Siberia.

The tiny fragment of bone from a fifth finger was uncovered by archaeologists working at Denisova Cave in Siberia's Altai Mountains in 2008.

An international team of researchers extracted mitochondrial DNA from the bone and compared the genetic code with those from modern humans and Neanderthals.

Origin unknown

Mitochondrial DNA comes from the cell's powerhouses and is passed down the maternal line only.

The analysis carried out by Johannes Krause from the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, and colleagues revealed the human from Denisova last shared a common ancestor with modern humans and Neanderthals about one million years ago.

This is known as the divergence date; essentially, when this human's ancestors split away from the line that eventually led to Neanderthals and ourselves.

The Neanderthal and modern human evolutionary lines diverged much later, around 500,000 years ago. This shows that the individual from Denisova is the representative of a previously unknown human lineage that derives from a hitherto unrecognised migration out of Africa.

"Whoever carried this mitochondrial genome out of Africa about a million years ago is some new creature that has not been on our radar screens so far," said co-author Professor Svante Paabo, also from the Max Planck Institute for Evolutionary Anthropology.

The divergence date of one million years is too young for the Denisova hominin to have been a descendent of *Homo erectus* , which moved out of Africa into Asia some two million years ago.

And it is too old to be a descendent of *Homo heidelbergensis* , another ancient human thought to have originated around 650,000 years ago.

Dr Krause said the ground layer in which the Denisova hominin fragment was found contain tools which are similar to those made by modern humans in Europe.

Slice of time

"We have ornaments, there is a bracelet, so there are several elements in the layers that are usually associated with modern human archaeology," he told BBC News.

"That's quite interesting, but of course, it is hard to prove that the bone is strongly associated to this archaeology, because it is possible that bones could have moved within the site.

"We are also not sure how exactly the excavation was done. It could have come from a deeper layer, so that's hard to say."

The research contributes to a more complex emerging picture of humankind during the Late Pleistocene, the period when modern humans left Africa and started to colonise the rest of the world.

Professor Clive Finlayson, director of the Gibraltar Museum, has previously argued: "A time slice at a point in the late Pleistocene would reveal a range of human populations spread across parts of Africa, Eurasia and Oceania.

"Some would have been genetically linked to each other, behaving as sub-species, while the more extreme populations may well have behaved as good species with minimal or no interbreeding."

It was long known that modern humans overlapped with Neanderthals in Europe, apparently for more than 10,000 years.

But in 2004, researchers discovered that a dwarf species of human, dubbed "The Hobbit", was living on the Indonesian island of Flores until 12,000 years ago - long after modern humans had colonised the region.

Difficult classification

Neanderthals appear to have been living at Okladnikov Cave in the Altai Mountains some 40,000 years ago. And a team led by Professor Anatoli Derevianko, from the Russian Academy of Sciences, has also found evidence of a modern human presence in the region at around the same time.

Prof Stringer commented: "Another intriguing question is whether there might have been overlap and interaction between not only Neanderthals and early moderns in Asia, but also, now, between either of those lineages and this newly-recognised one.

"The distinctiveness of the mitochondrial DNA patterns so far suggests that there was little or no interbreeding, but more extensive data will be needed from other parts of the genome, or from the fossils, for definitive conclusions to be reached."

Experts have been wondering whether X-woman might have links with known fossil humans from Asia, which have controversial classifications.

"Certain enigmatic Asian fossils dated between 250,000-650,000 years ago such as Narmada (in India), and Yunxian, Dali and Jinniushan (in China) have been considered as possible Asian derivatives of *Homo heidelbergensis* , so they are also potential candidates for this mystery non- *erectus* lineage," said Prof Stringer.

"However, there are other and younger fragmentary fossils such as the Denisova ones themselves, and partial skulls from Salkhit in Mongolia and Maba in China, which have been difficult to classify, and perhaps they do signal a greater complexity than we have appreciated up to now."

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