

Humans and Neanderthals 'didn't breed'



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Anthropologists have dealt a blow to theories that Homo sapiens and Neanderthals interbred, bequeathing humans today with some of the genetic legacy of their mysterious cousins.

Over the last two years, several studies have suggested that H. sapiens got it on with Neanderthals, an enigmatic hominid who lived in parts of Europe, Central Asia and the Middle East for up to 300,000 years but vanished some 30-40,000 years ago.

The evidence for this comes from fossil DNA, which shows that on average Eurasians and Asians share between one and four percent of their DNA with Neanderthals, but Africans almost none.

But a new study by scientists at Britain's University of Cambridge says the shared DNA came from a shared ancestor, not from "hybridisation" or reproduction between the two hominid species.

Reporting on Monday in the US journal *Proceedings of the National Academy of Sciences (PNAS)*, Andrea Manica and Anders Eriksson at the university's Evolutionary Ecology Group devised a computer model to simulate a genetic odyssey.

It begins with a common ancestors of Neanderthals and H. sapiens who lived around half a million years ago in parts of Africa and Europe.

Around 300,000-350,000 years ago, the European population and the African population of this hominid became separated.

Living in genetic isolation, the European range evolved bit by bit into Neanderthals, while the African range eventually became H. sapiens, which expanded in waves out of Africa from around 60,000-70,000 years ago.

Communities of H. sapiens that were geographically closer to Europe -- possibly in North Africa -- retained a relatively larger share of the ancestral genes, according to the theory.

They also became the first colonisers of Eurasia during the progressive "Out of Africa" migration.

This could explain why modern-day Europeans and Asians but not Africans have the tiny bit of genetic similarity with Neanderthals.

"Our work shows clearly that the patterns currently seen in the Neanderthal genome are not exceptional, and are in line with our expectations of what we would see without hybridisation," Manica said in a press release.

"So, if any hybridisation occurred -- it's difficult to conclusively prove it never happened -- then it would have been minimal and much less than what people are claiming now."

One of the great questions of anthropology is what happened to the Neanderthals.

Hybridisation would have answered that, at least partly. By interbreeding with humans, the Neanderthals were not wiped out by H. sapiens or by climate change as some contest. Instead, Neanderthal genes were merged into the genome of the dominant strain of Homo.

In a separate study published in *PNAS*, scientists led by Svante Paabo at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, found that Neanderthals and H. sapiens split between 400,000 and 800,000 years ago, an earlier date than thought.

The team also calculate that humans split from chimpanzees -- our closest primate relative -- around seven to eight million years ago, earlier than the six-to-seven million years ago that is a common estimate.

Neanderthals overrun by early humans

Neanderthals in Europe died out because they were overrun by hordes of modern humans from Africa who flooded into the region 40,000 years ago, scientists have claimed.

Neanderthals were unable to compete with modern humans Photo: BBC

By Nick Collins, Science Correspondent

7:00PM BST 28 Jul 2011

The Homo sapiens arrived in swarms that outnumbered the Neanderthals by at least ten to one, putting the natives at a massive disadvantage in competition for food, fuel and shelter.

Modern humans would also have been likely to triumph in any conflicts between the two species because of their larger and more coordinated social groups, researchers said.

The explanation could solve the mystery of why Neanderthals were unable to compete with modern humans despite having flourished in the icy landscape of central and western Europe for the previous 300,000 years.

A study of archaeological evidence from a large concentration of Neanderthal and early modern human sites in the south-west of France showed for the first time that the earliest modern human populations must have arrived in far greater numbers than native groups.

Scientists from Cambridge University noticed a sudden increase in the number and size of occupied sites, as well as relics like tools and animal food remains, which suggested modern humans lived in much larger and more integrated social groups.

Writing in the Science journal, the researchers said humans also had more sophisticated hunting equipment, better means of storing and preserving food through the long, freezing winters, and better trade links with neighbouring communities.

Experts are divided over whether modern humans had more developed brains than Neanderthals, but it is thought they had more sophisticated forms of language.

Professor Sir Paul Mellars, who led the study, said: "It was clearly this range of new technological and behavioural innovations which allowed the modern human populations to invade and survive in much larger population numbers than those of the preceding Neanderthals across the whole of the European continent.

"Faced with this kind of competition, the Neanderthals seem to have retreated initially into more marginal and less attractive regions of the continent and eventually – within a space of at most a few thousand years – for their populations to have declined to extinction – perhaps accelerated further by sudden climatic deterioration across the continent around 40,000 years ago."

Modern man outlived Neanderthals due to 'live slow and grow old' strategy

Modern man developed a better brain than Neanderthals because of our "live slow and grow old" strategy, a study claimed.

Young Neanderthals' teeth growth was significantly faster than in our own species Photo: HULTON ARCHIVE

7:30AM GMT 16 Nov 2010

Humans became more sophisticated than other species because of our uniquely slow physical development and long childhood, it was claimed.

Other primates have shorter gestation, mature faster in childhood, reproduce at a younger age and have shorter lifespans, even when compared with early humans.

It had been unclear at what point in the six to seven million years since our evolutionary split from non-human primates the life course shifted.

But a new examination of teeth from 11 Neanderthal and early human fossils has suggested that our move from a "live fast and die young" to a "live slow and grow old" strategy occurred fairly recently.

The research was led by scientists at Harvard University in the United States, the Max Planck Institute for Evolutionary Biology (MPI-EVA), and the European Synchrotron Radiation Facility (ESRF).

Tanya Smith, assistant professor of human evolutionary biology at Harvard, said: "Teeth are remarkable time recorders, capturing each day of growth much like rings in trees reveal yearly progress.

"Even more impressive is the fact that our first molars contain a tiny 'birth certificate', and finding this birth line allows scientists to calculate exactly how old a juvenile was when it died."

Dr Smith and her colleagues found that young Neanderthals' teeth growth was significantly faster than in our own species, including some of the earliest groups of modern humans to leave Africa some 90,000 to 100,000 years ago.

This indicates that the elongation of childhood has been a relatively recent development.

The research was published in the Proceedings of the National Academy of Sciences.

Neanderthals were too smart for their own good

Neanderthals died out because they were too clever for their own good, research suggests.

Neanderthals died out because they were too clever for their own good, research suggests Photo: BBC

7:30AM GMT 18 Nov 2011

Rather than being outwitted by the more numerous early humans, Neanderthals were just as sophisticated - but so impressed the humans they were seen as potential mates, say scientists.

The interbreeding meant that their own line died out, said Professor Julien Riel-Salvatore, of the University of Colorado, adding: "In many ways they were simply victims of their own success."

Researchers studied computer models of how hominin groups evolved in response to climate change in the last Ice Age, looking at culture and biology amongst hunter gatherers between 11,500 and 128,000 years ago, reports journal Human Ecology.

Professor Michael Barton, of Arizona State University, the lead author of the study, said: "We designed theoretical and methodological frameworks that incorporated feedback across three evolutionary systems: biological, cultural and environmental.

"One scientifically interesting result of this research, which studied culturally and environmentally driven changes in land-use behaviors, is that it shows how Neanderthals could have disappeared not because they were somehow less fit than all other hominins who existed during the last glaciation, but because they were as behaviorally sophisticated as modern humans."

Prof Riel Salvatore, who co-authored the research, added: "It's been long believed that Neanderthals were outcompeted by fitter modern humans and they could not adapt.

"We are changing the main narrative. Neanderthals were just as adaptable and in many ways, simply victims of their own success."

The team used archeological data to track behavioral changes in Western Eurasia and found that human mobility increased over time, probably in response to environmental change.

By the Ice Age both Neanderthals and the ancestors of modern humans were ranging more widely across Eurasia in the search for food.

This led them to interact - and interbreed - more often.

The researchers ran a computer program for the equivalent of 1,500 generations showing that as Neanderthals and modern humans expanded their yearly ranges, the Neanderthals were slowly absorbed by more numerous modern humans until they had disappeared as a recognizable population.

Prof Riel-Salvatore said: "Neanderthals had proven that they could roll with the punches and when they met the more numerous modern humans, they adapted again.

"But modern humans probably saw the Neanderthals as possible mates. As a result, over time, the Neanderthals died out as a physically recognizable population."

Prof Barton added: "We tested the modeling results against the empirical archaeological record and found that there is evidence that Neanderthals, and moderns, did adapt their behaviors in the way in which we modeled.

"Moreover, the modeling predicts the kind of low-level genetic admixture of Neanderthal genes that are being found in the newest genetic studies just now being published.

"In other words, successful behavioral adaptations to severe environmental conditions made Neanderthals, and other non-moderns about whom we know little, vulnerable to biological extinction, but at the same time, ensured they made a genetic contribution to modern populations."

He added: "The kind of modeling we did in this research is very new in paleoanthropology, as is the continental scope of the archaeological analysis we used to test the model results.

"However, such computational modeling can refine our understanding of long-term human impact on the environment that can help inform land-use decisions for our future."

Dogs 'helped man out-compete with Neanderthals'

Dogs could have been the deciding factor which enabled modern humans to out-compete with Neanderthals and colonise Europe, researchers claim.

Man's relationship with his best friend has lasted 32,000 years, with cave-dwelling hunter-gatherers using dogs to carry supplies so that they could save their energy for hunting.

The bond between man and dog arose at around the time Neanderthals began to surrender their dominance over Europe, which had lasted for the previous 250,000 years.

Now experts have suggested the domestication of dogs, and the benefit it gave to their masters, could have played a key role in the demise of the Neanderthals and supremacy of humans.

Excavations of early human dwellings suggest the animals were revered by our ancestors, with their teeth adorning jewellery and their images occasionally painted on walls, the Daily Mail reported.

Dogs, which at the time would have been at least the size of German Shepherds, could have helped humans by transporting meat and other supplies from one place to another, removing an energy burden from their masters which would have given them an advantage when hunting.

The relationship would have been mutually beneficial because in return for becoming a 'tool' for humans, the animals would have received food, warmth from fires and companionship.

Pat Shipman, an anthropologist at Penn State university, said: "Animals were not incidental to our evolution into Homo sapiens – They were essential to it. They are what made us human."

Neanderthals' macho image may be wrong

Neanderthals have traditionally been seen as a race of macho hunters but in reality they spent much of their time carrying out domestic chores, a study has found.

The primitive men, who became extinct about 30,000 years ago after human ancestors arrived in Europe from Africa, were presumed to have spent most of their time hunting prey.

But a new study suggests that their daily lives were in fact much more mundane, with tedious tasks like processing animal skins to make clothing accounting for several hours of each day.

Researchers from Cambridge University came to their conclusion after studying possible causes for the overdevelopment of the right arm bones which is common among Neanderthal skeletons.

While humans typically have a right arm which is between five and 15 per cent stronger than their left, some Neanderthals had upper arm bones which were 50 per cent stronger on the right side.

Previously, it had been assumed this was caused by right-handed Neanderthals spending an excessive amount of time hunting large animals with spears, which built up their arm strength.

The new paper, published in the PLOS One journal suggests the imbalance more likely developed as a result of spending hours scraping animal hides with stones – a stage in the production of clothes.

Such a task would have required them to make a forceful and repetitive scraping motion for several hours at a time, making it a much more likely cause of the distinctive trait, researchers said.

Dr Colin Shaw, who led the study, said: "The asymmetry we see in the arms of Neanderthals is far more profound than anything we encounter in modern humans except some sportspeople, such as cricketers and tennis players.

"The skeletal remains suggest that Neanderthals were doing something intense or repetitive, or both, that had a significant role in their lives. If it was hunting, it was taking up a great deal of their time. Not surprisingly, that theory has coloured our view of Neanderthal 'the hunter'.

"Our research moves away from that perspective. Hunting was an important part of the lives of Neanderthals. However, for much of their time Neanderthals might have been performing other tasks, such as preparing skins. If we are right, it changes our picture of the daily activities of Neanderthals."

The researchers tested their theory by asking groups of right-handed men to perform actions replicating the repeated scraping of a hide and a two-handed spear thrust to kill large prey.

By measuring the electrical potential produced by shoulder and chest muscles during each activity, the scientists could calculate the approximate load being placed on the upper arm.

They found that using a spear against a target produced more muscle activity in the left arm than the right, because the left hand was closer to the point of impact.

In contrast, the scraping task caused muscle activity on the right side in exactly the areas which would over time cause the right arm to become overdeveloped, the researchers reported.

Studies of the preparation of animal hides by traditional populations in Ethiopia, Alaska and Canada today show that it can take eight hours to scrape a single hide.

Scraping hides would likely have been an activity that Neanderthals had to carry out because they would have needed warm clothing to survive, researchers added.

A stone tool known as a *racloir*, or "side-scraper", used to remove soft tissue from animal hides, is often found alongside Neanderthal remains.