**Context articles for “N Words” story**

**Article #1** from ***Nature* magazine site**

Published online 25 October 2007 | Nature | doi:10.1038/news.2007.197

# Some Neanderthals were red-heads

Ancient DNA contains clues about complexion.

By Heidi Ledford

Pale complexions may have evolved many times over.Digital Vision

An analysis of 50,000-year-old Neanderthal DNA suggests that at least some of the ancient hominids probably had pale skin and red hair.

The findings, published this week in Science[1](http://www.nature.com/news/2007/071025/full/news.2007.197.html#B1), are based on the sequence of a single gene, called mc1r. Humans with a less functional form of the MC1R protein are more likely to be fair skinned — an adaptation that may have helped inhabitants of high latitudes synthesize vitamin D more efficiently in limited sunlight.

Analyses of Neanderthal DNA are always subject to the problem of fossil samples being contaminated with modern human DNA in the lab or the field. But Carles Lalueza-Fox of the University of Barcelona, Spain, with Holger Römpler of the University of Leipzig in Germany and colleagues, found that the mc1r gene in two European Neanderthal fossils they studied contained a single base-pair change that seems to be unique to Neanderthals.

“We were lucky we found a variant that had not been described in modern humans,” says co-author Michael Hofreiter of the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany. “That made it unlikely to be human contamination.”

The researchers re-sequenced the applicable region of the gene multiple times, then asked two additional labs to repeat the experiments using fresh extracts. They also sequenced fragments of the mc1r gene from the researchers in each lab, as well as the archaeologists and palaeontologists who had handled the fossils. And they searched databases containing mc1r sequence from 2,800 humans and tested several hundred additional samples.

In the end, they had surveyed more than 3,700 humans, and none contained the Neanderthal sequence. “If it is in the modern human population, it’s at an extremely low frequency,” says Hofreiter.

## Fair test

The researchers inserted the Neanderthal mc1r gene into human cells grown in the lab, and found that it had roughly the same low functionality as seen in mc1r genes from fair-skinned people with red hair.

It’s impossible to determine the precise frequency of pallid, red-haired Neanderthals that once populated Europe. But the researchers estimate that at least 1% of the population would have carried two copies of this less-active gene, giving them roughly the same pigmentation seen in modern red-heads.

Scientists have estimated that there should be at least a million nucleotides (single letters in the genome) that differ between humans and Neanderthals, says Lalueza-Fox. But little research has been done as yet to identify these. Recent work shows that Neanderthals have the same version of a speech gene as modern humans (see [Modern speech gene found in Neanderthals](http://www.nature.com/uidfinder/10.1038/news.2007.177)). “This is the first functional difference in the genome between Neanderthals and modern humans,” says Lalueza-Fox.

## Independent evolution

Lalueza-Fox and Hofreiter note that the absence of the Neanderthal-specific mc1r sequence in modern humans suggests that pale skin evolved independently in Neanderthals and humans, rather than from interbreeding between the two.

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That's interesting but not entirely unexpected, says Rachel Caspari, an anthropologist at Central Michigan University in Mount Pleasant. The regulation of skin colour in humans is very complex, she notes; so she would expect evolution to have come up with many different ways to generate lighter skin.

Caspari cautions against ruling out genetic exchange between the two populations just yet. It is still possible that the allele was present in humans 50,000 years ago, but was later replaced by a different mutation, she says. “It certainly doesn’t support gene flow between Neanderthals and humans,” says Caspari, “but it doesn’t refute the idea either.”

## References

* 1. Lalueza-Fox, C. *et al*. Science doi:10.1126/science.1147417 (2007).

<http://www.nature.com/news/2007/071025/full/news.2007.197.html>

# About the site (modern mission statement from 2000)

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<http://www.nature.com/nature/about/index.html>

**Article #2** from **Answers in Genesis site**

[Answers in Depth](https://answersingenesis.org/answers/in-depth/) [Browse Volume](https://answersingenesis.org/answers/in-depth/v2/)



Image from [*Answers* magazine](https://answersingenesis.org/answers/magazine/v7-n2/)

* [*Answers in Genesis*](https://answersingenesis.org/)
* [Answers](https://answersingenesis.org/answers/)
* [Evolution](https://answersingenesis.org/evolution/)
* [Human Evolution](https://answersingenesis.org/human-evolution/)
* [Neanderthal](https://answersingenesis.org/human-evolution/neanderthal/)
* [Red-Haired, Fast-Talking Neanderthals](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/)

Red-Haired, Fast-Talking Neanderthals

by [Dr. Georgia Purdom](https://answersingenesis.org/bios/georgia-purdom/) on November 21, 2007

**Abstract:** Recent research publications indicate that some Neanderthals may have had red-hair, fair complexions, and the capacity for speech and language.

**Keywords**: Neanderthals, DNA, genetics, speech, language, mutations, Homo sapiens, sub-species, radiometric dating, presuppositions, humans.

Recent research publications indicate that some [Neanderthals](https://answersingenesis.org/home/area/faq/Anthropology.asp#neandertals) may have had red-hair, fair complexions,[1](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_1) and the capacity for speech and language.[2](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_2) This is not surprising to creationists who have long held that Neanderthals are fully human, descendants of Adam and Eve, and therefore would be expected to share many modern human characteristics. These findings are contrary to evolutionary-based predictions of Neanderthals as knuckle dragging, dark-haired, grunting savages.

A portion of the FOXP2 gene that has been linked to speech and language and a portion of the MC1R gene important in melanin production have been recovered and sequenced from Neanderthal DNA. This is the first time genes from nuclear DNA have been recovered from Neanderthal fossils.

**Neanderthals and Language**

Mutations in the [FOXP2](https://answersingenesis.org/docs2006/0503human-language.asp) gene have been found to lead to speech and language disorders in humans and vocalization abnormalities in mice.[3](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_3) The FOXP2 gene is very similar between humans and mice with only three amino acid differences in the protein.[3](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_3) The difference between human and chimp FOXP2 protein is two amino acids,[3](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/" \l "fn_3" \o "Footnote 3) which, according to evolutionary ideas, is the result of [mutations](https://answersingenesis.org/home/area/faq/mutations.asp) in the DNA allowing humans to have the capacity for speech and language. (Note: FOXP2 is not the only gene involved in speech and language). These variations in the human FOXP2 gene are believed to have arisen in the past 120,000 years[4](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_4) after Neanderthals and modern humans split (250,000 or more years ago).[5](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_5) The expectation was that Neanderthals would not possess the mutations leading to the two amino acid differences (when compared to chimps) that modern humans possess. However, it was found that the Neanderthal and modern human DNA both have these *mutations*.[2](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_2) It is now believed that these mutations in FOXP2 must have been present before the split with modern humans and that Neanderthals had the capacity for speech and language.[2](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_2) Thus they may not be “mutations” at all and instead reflect created differences between humans and chimpanzees.

There is very little actual evidence to support the idea that Neanderthals and modern humans could not have interbred.

Another possibility, but one that scientists think is unlikely, is that Neanderthals and modern humans interbred, allowing both populations to have the same version of the FOXP2 gene.[6](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_6) There is very little actual evidence to support the idea that Neanderthals and modern humans could *not* have interbred. The evolutionary basis for this idea seems to be that Neanderthals are not fully human or diverged so long ago from modern humans that interbreeding would not have been physically or genetically possible.

For biblical creationists these findings are not surprising. Neanderthals are fully human and descendants from Adam and Eve.[7](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_7) They are either the same species (*Homo sapiens*) or, at the most, a sub-species (*Homo sapiens neanderthalensis*) of human.[7](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_7) Obviously, we do not accept the dates of hundreds of thousands of years ago, and most likely Neanderthals were a post-Flood population of individuals that possibly isolated themselves from other humans leading to characteristics unique to Neanderthals (such as facial and skull morphologies).[8](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_8) Only those forcing evolutionary ideas on the evidence have problems with Neanderthals having the capacity for speech and language and need to constantly alter their ideas to make the evidence fit.

**Redheaded Neanderthals**

The same group of scientists that studied the FOXP2 gene also studied the MC1R gene in Neanderthals. The MC1R gene codes for the melanocortin 1 receptor, which regulates the type of melanin melanocytes (pigment producing cells) produce.[9](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_9) Mutations in the MC1R gene cause the resulting protein to function poorly, and so, the melanocytes make mostly pheomelanin (leading to red/blond hair, fair complexion, freckles) instead of eumelanin.[9](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_9)

Scientists found that the MC1R gene (the portion they studied) was identical in Neanderthals and modern humans in all Neanderthal samples but one.[1](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_1) They attribute the identical cases to modern human contamination (see more on this issue below) and the one that was different as being genuine Neanderthal DNA.[1](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_1) The gene was found to have a mutation that has not been reported in modern humans. Further testing of the Neanderthal version of the MC1R gene showed it might give the same phenotype (red hair, etc.) as mutations in the MC1R gene in modern humans.[1](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_1) Since Neanderthals are believed to have resided in Europe where sunlight levels are diminished, this phenotype would be expected, as lighter skin increases absorption of available sunlight necessary for Vitamin D production.

Biblical creationists would agree with these conclusions, although clearly *not* as an example of evolution (as the articles suggest). Rather this would be an example of a [mutation](https://answersingenesis.org/genetics/mutations/are-mutations-part-of-the-engine-of-evolution/) (in the [MC1R gene](https://answersingenesis.org/natural-selection/adaptation/evolution-or-adaptation/)) that is favored or selected for ([natural selection](https://answersingenesis.org/natural-selection/adaptation/evolution-of-finch-beaks-again/)) in an environment where sunlight is diminished and having a fair complexion is an advantage. Adaptation (change within a [kind](https://answersingenesis.org/home/area/faq/kinds.asp)) is occurring—not evolution (change between kinds). Both mutation and natural selection have led to a decrease and/or corruption of [genetic information](https://answersingenesis.org/home/area/faq/infotheory.asp) resulting in a defective melanocortin 1 receptor that is present in the Neanderthal population. Neanderthals remain Neanderthals.

Dr. Clive Finlayson, director of the Gibraltar Museum states, “If the Neanderthal and modern variants [of the MC1R gene] are different, it may be a good example of parallel, or convergent evolution—a similar evolutionary response to the same situation.”[10](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_10) The differences in the MC1R gene are clearly not an example of an “evolutionary response,” but rather an adaptive response as described above. Neanderthal populations may have isolated themselves from other human populations such that the variations in the MC1R gene between Neanderthals and modern humans are dissimilar.

**The Monkey Wrench**

Another article recently published in *PLOS Genetics* brings these results and others published on the Neanderthal genome into question.[5](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_5) The authors of the article reevaluated work done on sequencing of the Neanderthal genome last year published in the journals *Nature*[11](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_11) and *Science*[12](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_12) and suggest that contamination with modern human DNA may have been a factor for the work published in *Nature*.

Their evaluation of the sequence differences between Neanderthal and modern human DNA from the *Nature* paper gave a split in the two populations of 35,000 years ago and for the *Science* paper of 325,000 years ago.[5](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_5) The *PLOS Genetics* article suggests that, since the *Nature* paper data does not correlate with the fossil record (which suggests a split of 250,000+ years ago) and indicates that Neanderthals and modern humans interbred, the Neanderthal DNA used in the *Nature* paper was contaminated with modern human DNA.[5](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_5)

Unfortunately, this is another example of evolutionary ideas inhibiting science. Fossil dates are typically determined by [radiometric dating](https://answersingenesis.org/geology/carbon-14/doesnt-carbon-14-dating-disprove-the-bible/) and [index fossils](https://answersingenesis.org/creation/v22/i2/geology.asp). These methods are based on evolutionary assumptions that do not use God’s Word as a source of truth and, so, discount the catastrophic effects of the Flood. There is also no evidence that interbreeding is impossible. In addition, it is not known if differences in DNA between organisms can serve as accurate chronometers especially since these “clocks” are typically based on the idea that one kind evolved into another kind (versus variation within a kind).[13](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_13) The evidence, in this case Neanderthal DNA, doesn’t speak for itself; [presuppositions](https://answersingenesis.org/creation/v25/i2/bullet.asp) play a significant role. The authors of the *PLOS Genetics* article, on deciding what data is correct, based their conclusions on erroneous presuppositions from evolutionary timescales!

As biblical creationists, we also would not rule out the possibility that contamination with modern human DNA has occurred. The MC1R paper made it clear that this was a possibility in their research.[1](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_1) The FOXP2 paper stated that they performed several controls to assure their DNA was not contaminated,[2](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/" \l "fn_2" \o "Footnote 2) but some of their methods are questionable.[7](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_7) However, we believe that Neanderthals are fully human and descended from Adam and Eve, and so, we would expect their DNA to be similar to that of modern humans. The differences that are observed may be due to the Neanderthal population isolating itself from modern humans at some point in the past.

One news article stated, “It’s a great example [referring to the *PLOS Genetics* article] of how science can self-correct.”[14](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/#fn_14) Or is it? It can only be self-correcting if the presuppositions used for interpreting the evidence are correct. If the Word of God is the basis for our presuppositions it can only lead us to the right answers. Conversely, if the Word of God—a consistent basis of Truth from the Creator, who is eternal, omniscient, and omnipresent—is the basis for our presuppositions, then we can only be led to the right conclusions.

[Previous Paper A Tale of Two Chromosomes](https://answersingenesis.org/genetics/dna-similarities/a-tale-of-two-chromosomes/) [Next Paper Selling Science to the Public](https://answersingenesis.org/what-is-science/selling-science-to-the-public/)

**Answers in Depth**

**2007 Volume 2**

[**https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/**](https://answersingenesis.org/human-evolution/neanderthal/red-haired-fast-talking-neanderthals/)

## Footnotes

1. Carles Lalueza-Fox et al., “[A Melanocortin 1 Receptor Allele Suggests Varying Pigmentation Among Neanderthals](http://www.sciencemag.org/cgi/content/abstract/1147417),” Sciencexpress, October 25, 2007: 1–3.
2. Johannes Krause et al., “[The Derived FOXP2 Variant of Modern Humans Was Shared with Neanderthals](http://www.current-biology.com/content/article/abstract?uid=PIIS0960982207020659),” *Current Biology* 17 (2007):1–5.
3. Online Mendelian Inheritance in Man, “[Forkhead Box P2; FOXP2](http://www.ncbi.nlm.nih.gov/entrez/dispomim.cgi?id=605317&rn=1" \t "_blank).”
4. Wolfgang Enard et al., “[Molecular Evolution of FOXP2, a Gene Involved in Speech and Language](http://www.nature.com/nature/journal/v418/n6900/pdf/nature01025.pdf),” *Nature* 418 (2002): 869–872.
5. Jeffrey D. Wall and Sung K. Kim, “[Inconsistencies in Neanderthal Genomic DNA Sequences](http://genetics.plosjournals.org/perlserv/?request=get-document&doi=10.1371%2Fjournal.pgen.0030175&ct=1),” *PLoS Genetics*, 3 (2007): 1862–1866.
6. Elizabeth Culotta, “[Talk Like a Man](http://sciencenow.sciencemag.org/cgi/content/full/2007/1018/3),” *Science*, October 18, 2007.
7. Marvin Lubenow, “[The Neandertals: Our Worthy Ancestors](https://answersingenesis.org/human-evolution/neanderthal/the-neandertals-our-worthy-ancestors/),” Answers in Genesis.
8. Marvin Lubenow, “[The Neandertals: Our Worthy Ancestors, Part II](https://answersingenesis.org/human-evolution/neanderthal/the-neandertals-our-worthy-ancestors-part-ii/),” Answers in Genesis.
9. U.S. National Library of Medicine, “[MC1R](http://ghr.nlm.nih.gov/gene=mc1r).”
10. Paul Rincon, “[Neanderthals ‘Were Flame-Haired’](http://news.bbc.co.uk/2/hi/science/nature/7062415.stm),” BBC News, 2007.
11. Richard Green et al., “[Analysis of One Million Base Pairs of Neanderthal DNA](http://www.nature.com/nature/journal/v444/n7117/pdf/nature05336.pdf)” [PDF] *Nature* 444 (2006): 330–336.
12. James Noonan et al., “[Sequencing and Analysis of Neanderthal Genomic DNA](http://www.sciencemag.org/cgi/content/abstract/314/5802/1113),” *Science* 314 (2006): 1113–1118.
13. Marvin Lubenow, [*Bones of Contention*](https://answersingenesis.org/store/10-2-173) (Grand Rapids, Michigan: Baker Books, 2001), pp. 65–74.
14. John Timmer, “[Human Sequences Cropping Up in Neanderthal Genome](http://arstechnica.com/journals/science.ars/2007/10/15/human-sequences-cropping-up-in-neanderthal-genome),” ars technica, October 15, 2007.

About the forum: (from the “about us” page on the site <https://answersingenesis.org/about/> )

## Our Message

Answers in Genesis is an apologetics (i.e., Christianity-defending) ministry, dedicated to enabling Christians to defend their faith and to proclaim the [gospel](https://answersingenesis.org/about/good-news/) of Jesus Christ effectively. We [focus](https://answersingenesis.org/about/mission/) particularly on providing answers to questions surrounding the book of Genesis, as it is the most-attacked book of the Bible. We also desire to train others to develop a biblical worldview, and seek to expose the bankruptcy of evolutionary ideas, and its bedfellow, a “millions of years old” earth (and even older universe).

AiG teaches that “facts” don’t speak for themselves, but must be interpreted. That is, there aren’t separate sets of “evidences” for evolution and creation—we all deal with the same evidence (we all live on the same earth, have the same fossils, observe the same animals, etc.). The difference lies in how we interpret what we study. The Bible—the “history book of the universe”—provides a reliable, eye-witness account of the beginning of all things, and can be trusted to tell the truth in all areas it touches on. Therefore, we are able to use it to help us make sense of this present world. When properly understood, the “evidence” confirms the biblical account.

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Please visit our [ministry news](https://answersingenesis.org/ministry-news/) page for the latest updates about the Creation Museum, the Ark Encounter, and our overall ministry.

**Article #3** from the ***Discovery*** website

[Evolution](http://news.discovery.com/human/evolution)

Neanderthals, Humans Interbred, DNA Proves

May 6, 2010 // by [Jennifer Viegas](http://news.discovery.com/jennifer-viegas.htm)

[[](http://news.discovery.com/videos/did-we-eat-all-the-neanderthals.htm)](http://news.discovery.com/videos/did-we-eat-all-the-neanderthals.htm)

A reconstructed head based on a Neanderthal skull found in France is shown.

Sven Traenkner (c), "Safari zum Urmenschen" ("Safari to Human Ancestors") exhibition, Senckenberg Research Institute and Natural History Museum, Frankfurt, Germany

**THE GIST**

- A newly mapped Neanderthal genome provides strong evidence that humans and Neanderthals interbred.

- Between 1-4 percent of the DNA of many humans living today likely came from Neanderthals.

- People of European and Asian heritage are most likely to carry the Neanderthal genes.

It's official: Most of us are part Neanderthal. The first draft sequence of the Neanderthal genome has provided the strongest evidence yet that modern humans and Neanderthals interbred and that all non-Africans today have Neanderthal gene fragments in their genetic codes.

Although the Neanderthal contribution to the DNA of these individuals is estimated at being just one to four percent of the total, the finding, published in the latest issue of the journal *Science,* helps to resolve the long-standing controversy over whether or not humans mated with Neanderthals when the two groups encountered each other outside of Africa.

It also gives new life to Neanderthals that, as a species, went extinct 30,000 years ago.

"Neanderthals live on in non-Africans," co-author David Reich told Discovery News. "At least some Neanderthals were absorbed into the modern human population."

Reich is an associate professor of genetics at Harvard University who also serves as a population geneticist at the Broad Institute of MIT and Harvard.

He and his colleagues analyzed over one billion DNA fragments taken from Neanderthal bones -- dating to approximately 38,000 years ago -- found in Croatia, Germany, Russia and Spain.

Although 95 percent of the fragments consisted of bacteria and microorganisms that colonized the Neanderthal remains, special DNA isolation and anti-contamination measures enabled the scientists to piece together over 60 percent of the entire Neanderthal genome.

The researchers next compared the Neanderthal DNA to samples taken from present-day humans in southern Africa, western Africa, China, France and Papua New Guinea.

One of the first determinations concerned the point at which humans diverged from their common ancestor with Neanderthals, who lived in much of Europe and western Asia before they went extinct.

"According to our results, the ancestors of Neanderthals and modern humans went their separate ways about 400,000 years ago," said co-author Jim Mullikin, a computational geneticist at the National Human Genome Research Institute.

The new data, however, also supports that Neanderthals and humans encountered each other again around 45,000 to 80,000 years ago in the Middle East, when humans migrating out of Africa likely met Neanderthals who were already living there.

The meeting must not have been too unpleasant, since the researchers believe the interbreeding happened at this place and estimated time.

Supporting that conclusion is the fact that the Neanderthal DNA more closely matched that of the China, France and Papua New Guinea individuals in their study. All had the one to four percent Neanderthal contribution to their DNA, so the interbreeding must have first occurred before the humans migrating out of Africa colonized other, more distant regions in Europe, Asia and elsewhere.

Reich said humans and Neanderthals might have continued to mate with each other later, "because their populations overlapped in Europe and remains have been found for human individuals with Neanderthal-type features," but the genetic data cannot pinpoint when and where these later couplings might have taken place.

In addition to the interbreeding revelations, the study illuminates what makes modern humans unique.

The researchers found Neanderthal DNA is 99.7 percent identical to present-day human DNA, but Homo sapiens evolved distinct genes related to cognitive functions, metabolism and the development of cranial features, the collarbone and the rib cage.

Reich said three of the human-specific genes suggest that "skin and hair must have been particularly relevant to the evolution of modern humans," but additional analysis is needed.

In a second related Science study, Gregory Hannon of Cold Spring Harbor Laboratory and his colleagues explain a new process, called "array capture re-sequencing," that allows scientists to better study Neanderthal and other ancient DNA. Hannon said that the new process "enables us to extract from genomes important information, on a very selective basis, rapidly, very accurately, and at low cost."

Hannon described the sequencing of the Neanderthal genome as "a watershed event, a major historical achievement."

<http://news.discovery.com/human/evolution/neanderthal-human-interbreed-dna.htm>

**About the site** (from their webpage <http://impact.discovery.com/our-business/our-networks/> )

# Our Networks

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High-quality, mission-driven programming has been synonymous with Discovery since John Hendricks launched the company’s first network, Discovery Channel, in 1985 with a mission to satisfy curiosity and make a difference in people’s lives. Today, that mission remains the driving force behind the programming strategies across Discovery’s networks as they strive to provide viewers with the highest quality content that not only entertains and engages, but also enlightens, educates and inspires positive action.

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**Context Op-Ed Piece #1**

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# Why Not Bring a Neanderthal to Life?

By [John Tierney February 13, 2009 11:30](http://tierneylab.blogs.nytimes.com/author/john-tierney/" \o "More Posts by John Tierney)

Now that [the Neanderthal genome has been reconstructed](http://www.nytimes.com/2009/02/13/science/13neanderthal.html?ref=science), my colleague Nicholas Wade reports, a leading genome researcher at Harvard says that a Neanderthal could be brought to life with present technology for about $30 million.

So why not do it? Why not give Harvard’s George Church the money he says could be used to resurrect a Neanderthal from DNA?

I’m bracing for a long list of objections from the world’s self-appointed keepers of bioethics, who must see this new Neanderthal issue as a research bonanza. Think of the conferences to plan, the books to publish, the donors to alarm! I can imagine an anti-Neanderthal alliance between the religious right and the religious left, like James Dobson and Jeremy Rifkin — what I like to call the holier-than-thou coalition opposed to new biological technologies.

But I’m afraid I can’t see the problem. If we discovered a small band of Neanderthals hidden somewhere, we’d do everything to keep them alive, just as we try to keep alive so many other endangered populations of humans and animals — including man-biting mosquitoes and man-eating polar bears. We’ve also spent lots of money reintroducing animals into ecosystems from which they had vanished. Shouldn’t be at least as solicitous to our fellow hominids?

(Credit: Michael Sohn/Associated Press) A man walking his dog is seen through a cutout silhouette of a Neanderthal at the site of a monument in Mettmann, Germany.

Granted, it would be disorienting and lonely for the first few Neanderthals, but it would be pretty interesting for them as well as us. (What would a Neanderthal make of Disneyland, or of World of Warcraft?) If our species disappeared and a smarter species took over the planet, I’d take the offer to be resurrected just on the theory that being alive beats being dead.

What do you think? Should we try to resurrect a Neanderthal? And if so, what kind of precautions should we take, and what kind of lives should we help them lead? I welcome all answers, but I hope that we won’t distracted by talk of genocide or slavery. Yes, previous encounters between advanced and primitive civilizations did end badly for the primitives, but I think it’s a stretch to imagine today’s humans trying to exterminate or enslave Neanderthals. Let’s assume we’d do our best to treat them well. How much would they enjoy living today? How much would we learn from one another?

<http://tierneylab.blogs.nytimes.com/2009/02/13/why-not-bring-a-neanderthal-to-life/comment-page-19/>

**Context Op-Ed Piece #2**

# [Should We Clone Neanderthals?](http://www.neatorama.com/2013/01/19/Should-We-Clone-Neanderthals-2/)

[Alex Santoso](http://www.neatorama.com/whois/alex/) • Saturday, January 19, 2013 at 7:00 PM • [1](http://www.neatorama.com/2013/01/19/Should-We-Clone-Neanderthals-2/)

Given the advances in biotechnology, it's just a matter of time before humanity can bring the Neanderthals back from the dead. Whether we should is a completely different story, according to genomics and synthetic biology pioneer [George Church](http://arep.med.harvard.edu/gmc/) of Harvard University.

In this intriguing interview with Der Spiegel, Church explained that using synthetic biology to bring the Neanderthals back from extinction may actually benefit society:

SPIEGEL: Wouldn't it be ethically problematic to create a Neanderthal just for the sake of scientific curiosity?

Church: Well, curiosity may be part of it, but it's not the most important driving force. The main goal is to increase diversity. The one thing that is bad for society is low diversity. This is true for culture or evolution, for species and also for whole societies. If you become a monoculture, you are at great risk of perishing. Therefore the recreation of Neanderthals would be mainly a question of societal risk avoidance.

But first, you'd need an "extremely adventurous female human" to serve as a surrogate mother:

SPIEGEL: Setting aside all ethical doubts, do you believe it is technically possible to reproduce the Neanderthal?

Church: The first thing you have to do is to sequence the Neanderthal genome, and that has actually been done. The next step would be to chop this genome up into, say, 10,000 chunks and then synthesize these. Finally, you would introduce these chunks into a human stem cell. If we do that often enough, then we would generate a stem cell line that would get closer and closer to the corresponding sequence of the Neanderthal. We developed the semi-automated procedure required to do that in my lab. Finally, we assemble all the chunks in a human stem cell, which would enable you to finally create a Neanderthal clone.

SPIEGEL: And the surrogates would be human, right? In your book you write that an "extremely adventurous female human" could serve as the surrogate mother.

Church: Yes. However, the prerequisite would, of course, be that human cloning is acceptable to society. Read the full interview over at Der Spiegel: [Link](http://www.spiegel.de/international/zeitgeist/george-church-explains-how-dna-will-be-construction-material-of-the-future-a-877634.html)