

Reanalysis of Iceman's genome reveals dark skin, baldness and Anatolian ancestry

August 16 2023



Since 2012, which is when Ötzi's genome was sequenced for the first time, DNA sequencing technologies have advanced enormously. This new study reveals that compared to other contemporary Europeans, Ötzi's genome had an unusually high proportion of genes in common with those of early farmers from Anatolia, that his skin was darker than previously thought, and that he was likely bald or had little hair on his head when he died. Credit: © South Tyrol Museum of Archaeology/Eurac/Marco Samadelli-Gregor Staschitz

The genetic makeup of most present-day Europeans has resulted mainly from the admixture of three ancestral groups: western hunter-gatherers gradually merged with early farmers who migrated from Anatolia about 8,000 years ago and who were later on joined by Steppe Herders from Eastern Europe, approximately 4,900 years ago.

The initial analysis of the Iceman's [genome](#) revealed genetic traces of these Steppe Herders. However, the refined new results no longer support this finding. The reason for the inaccuracy: the original sample had been contaminated with modern DNA.

Since that first study, not only have sequencing technologies advanced enormously, but many more genomes of other prehistoric Europeans have been fully decoded, often from skeletal finds. This has made it possible to compare the Neolithic Tyrolean Iceman Ötzi's genetic code with his contemporaries. The result: among the hundreds of early European people who lived at the same time as Ötzi and whose genomes are now available, Ötzi's genome has more ancestry in common with early Anatolian farmers than any of his European counterparts. The research is published in the journal *Cell Genomics*.

Ötzi's ancestry and appearance

The research team concludes that the Iceman came from a relatively isolated population that had very little contact with other European groups.

"We were very surprised to find no traces of Eastern European Steppe Herders in the most recent analysis of the Iceman genome; the proportion of hunter-gatherer genes in Ötzi's genome is also very low. Genetically, his ancestors seem to have arrived directly from Anatolia without mixing with hunter gatherer groups," explains Johannes Krause, head of the Department of Archaeogenetics at the Max Planck Institute

for Evolutionary Anthropology in Leipzig, and co-author of the study.

The study also yielded new results about Ötzi's appearance. His skin type, already determined in the first genome analysis to be Mediterranean-European, was even darker than previously thought. "It's the darkest skin tone that has been recorded in contemporary European individuals," explains anthropologist Albert Zink, study co-author and head of the Eurac Research Institute for Mummy Studies in Bolzano.

"It was previously thought that the mummy's skin had darkened during its preservation in the ice, but presumably what we see now is actually largely Ötzi's original skin color. Knowing this, of course, is also important for the proper conservation of the mummy."

Our previous image of Ötzi is also incorrect regarding his hair: as a mature man, he most likely no longer had long, thick hair on his head, but at most a sparse crown of hair. His genes, in fact, show a predisposition to baldness. "This is a relatively clear result and could also explain why almost no hair was found on the mummy," says Zink.

Genes presenting an increased risk of obesity and type 2 diabetes were also found in Ötzi's genome, however, these factors probably did not come into play thanks to his healthy lifestyle.

More information: Johannes Krause, High coverage genome of the Tyrolean Iceman reveals unusually high Anatolian Farmer ancestry, *Cell Genomics* (2023). [DOI: 10.1016/j.xgen.2023.100377](https://doi.org/10.1016/j.xgen.2023.100377). [www.cell.com/cell-genomics/ful...2666-979X\(23\)00174-X](https://www.cell.com/cell-genomics/ful...2666-979X(23)00174-X)

Provided by Max Planck Society

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