

Study reveals lactose tolerance happened quickly in Europe

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Various bones at a Bronze Age battle excavation site, some of which were genetically tested to determine the presence of the lactase-persistent gene. Credit: Stefan Sauer / Tollense Valley Project

The ability for humans to digest milk as adults has altered our dietary

habits and societies for centuries. But when and how that ability—known as lactase persistence or lactose tolerance—occurred and became established is up for debate. By testing the genetic material from the bones of people who died during a Bronze Age battle around 1,200 BC, an international team of scientists including Krishna Veeramah, Ph.D., of Stony Brook University, suggest that lactase persistence spread throughout Central Europe in only a few thousand years, an extremely fast transformation compared to most evolutionary changes seen in humans. Their findings are published in *Current Biology*.

Despite the prominence of [milk](#) drinking in Europe and North American today, approximately two-thirds of the world's population remains lactose intolerant. Generally, no mammal digests milk as an adult, which is why for example people should not give adult cat or dog pets milk. However, a subset of humans have a genetic mutation that enables the enzyme lactase to digest the lactose sugar found in milk throughout an individual's lifetime. Many of these people are from Central or Northern Europe.

The battle occurred on the banks of the Tollense, a river in present day Germany, and is the most significant that we know about from Bronze Age Europe, probably consisting of about 4,000 warriors, almost a quarter of which died during the fighting. Despite being more than three thousand years old, the researchers were able to sequence DNA from some of the bone fragments recovered from the battle site.

Veeramah, Associate Professor in the Department of Ecology and Evolution in the College of Arts and Sciences, led part of the research that involved analyzing how the overall genetic ancestry of the battlefield population compared to other modern and ancient populations, and then compared the frequency of the lactase-persistent allele to other modern and ancient populations, particularly medieval European populations.



Bronze Age skull in situ in the Tollense valley. Credit: © Stefan Sauer/Tollense Valley Project

The research team, led by Joachim Burger and colleagues at Johannes Gutenberg University Mainz (JGU), found that despite the battle occurring more than 4,000 years after the introduction of agriculture in Europe—which in part would have involved the consumption of dairy from early cattle, goats and sheep domesticates—only one in eight of the warriors had a genetic variant that enabled them to break down lactose.

"When we look at other European genetic data from the early Medieval period less than 2,000 years later, we find that more than 60 percent of

individuals had the ability to drink milk as adults, close to what we observe in modern Central European countries, which ranges from 70 to 90 percent" said Veeramah. "This is actually an incredibly fast rate of change for the gene that controls milk digestion. It appears that by simply possessing this one genetic change, past European individuals with the ability to digest lactose had a six percent greater chance of producing children than those who could not. This is the strongest evidence we have for positive natural selection in humans."

Joachim Burger of JGU, lead author on the study, added that there still is not definitive answer to the question: Why did being able to digest the sugar in milk after infancy provide such a big evolutionary advantage?

"With milk being a high-energy, relatively uncontaminated drink, its ingestion may have provided greater chances of survival during food shortages or when supplies of drinking water may have been contaminated," explained Burger.

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