

Human breeding practices found to be likely reason for lack of paternal DNA diversity in modern horses

April 19 2018, by Bob Yirka



Credit: CC0 Public Domain

A team of researchers from across Europe has found that human breeding practices, particularly during the Iron Age, are likely the cause

of a lack of variability in paternally inherited DNA in modern horses. In their paper published on the open access site *Science Advances*, the group describes the DNA study they undertook to better understand the genetic history of the modern horse and what they found.

It has been known for some time that modern horses are genetically diverse, maternally speaking, but have a distinct lack of variability on the paternal side. The prevailing theory regarding this state of affairs is that during the time when horses were first being domesticated there were many more mares than stallions. In this new effort, the researchers suggest a different reason—they believe it is due to selective breeding, particularly during the Iron Age. The group came to this conclusion after conducting an extensive DNA analysis of both modern and ancient horses.

The study consisted of gathering DNA samples from 350 horses covering the past 5,000 years and attempting to genotype them—in the end they were able to genotype just 86 of the samples, but that was enough to provide the team with a means for creating a timeline for four major haplotypes: Y-HT-1 through 4. Y-HT-1, the team notes, is dominant in modern horses. To create the timeline, the team divided the DNA samples into four time periods: earlier than 2,200 BC, between 2,200 BC and 900 BC, between 900 BC to 400 AD and from 400 AD till today. In looking at the haplotypes, the researchers found all but Y-HT-1 were heavily represented in the first period, but over time Y-HT-1 became increasingly prominent as the other three became less so.

The researchers note that Y-HT-1 began its progression to dominance during the Bronze Age, a time during which humans were migrating across Eurasia. But the Iron Age was when Y-HT-1 really began to assert itself, a period during which the Roman Empire was reaching across Europe and changing ideas about how horses should be bred by focusing on males instead of females. This, the researchers claim, suggests that

the lack of paternal diversity is very likely due to human breeding practices.

More information: Saskia Wutke et al. Decline of genetic diversity in ancient domestic stallions in Europe, *Science Advances* (2018). [DOI: 10.1126/sciadv.aap9691](https://doi.org/10.1126/sciadv.aap9691)

Abstract

Present-day domestic horses are immensely diverse in their maternally inherited mitochondrial DNA, yet they show very little variation on their paternally inherited Y chromosome. Although it has recently been shown that Y chromosomal diversity in domestic horses was higher at least until the Iron Age, when and why this diversity disappeared remain controversial questions. We genotyped 16 recently discovered Y chromosomal single-nucleotide polymorphisms in 96 ancient Eurasian stallions spanning the early domestication stages (Copper and Bronze Age) to the Middle Ages. Using this Y chromosomal time series, which covers nearly the entire history of horse domestication, we reveal how Y chromosomal diversity changed over time. Our results also show that the lack of multiple stallion lineages in the extant domestic population is caused by neither a founder effect nor random demographic effects but instead is the result of artificial selection—initially during the Iron Age by nomadic people from the Eurasian steppes and later during the Roman period. Moreover, the modern domestic haplotype probably derived from another, already advantageous, haplotype, most likely after the beginning of the domestication. In line with recent findings indicating that the Przewalski and domestic horse lineages remained connected by gene flow after they diverged about 45,000 years ago, we present evidence for Y chromosomal introgression of Przewalski horses into the gene pool of European domestic horses at least until medieval times.

© 2018 Phys.org

Citation: Human breeding practices found to be likely reason for lack of paternal DNA diversity in modern horses (2018, April 19) retrieved 24 April 2024 from <https://phys.org/news/2018-04-human-lack-paternal-dna-diversity.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.