

Genetics reveals the impact of lifestyle on evolution

April 4 2016



The Khoisan, ethnic groups in Southern Africa, traditionally live as a hunters and gatherers.

Scientists have long thought that the rate with which mutations occur in the genome does not depend on cultural factors. The results of a current study suggest this may not be the case. A team of researchers from France and Germany analysed more than 500 sequences of the male Y-chromosome in southern African ethnic groups living as farmers and in population groups engaged in traditional hunter-gatherer activities. The study found that the agriculturalists had a comparatively higher rate of change than the hunter-gatherers did. The researchers explain this by the significantly older average age of paternity among the agriculturalists. Furthermore, the study finds a much older age for the most recent common ancestor of the human Y-chromosome than was previously assumed.

By sequencing stretches of the Y-chromosome of 500 African males, scientists have been able to show for the first time that the chromosome, which is inherited only in the paternal line, changes at different speeds in different [population groups](#). The researchers compared, on the one hand, members of the Khoisan ethnic groups who traditionally live as hunter-gatherers and, on the other hand, speakers of a Bantu language living in Botswana, Namibia and Zambia who have long worked as farmers.

Interestingly, the different mutation rates can be explained by cultural differences between the two population groups: men from farming societies tend to have children for a longer period of time, leading to an older average [age](#) of fathers and a higher mutation rate than is typical for men from foraging societies.

"On average, paternal age in southern African foraging societies is 36 years, and 46 years in southern African agriculturalist societies", explains Chiara Barbieri, scientist at the Max Planck Institute for the Science of Human History and one of the lead authors of the study. "A 15-year increase in age of paternity results in a 50% increase of mutations – so these differences in lifestyle can have a huge impact on

the rate of change of the Y-chromosome."

Farmers often marry twice

Brigitte Pakendorf, scientist at the laboratoire Dynamique Du Langage in Lyon who coordinated the study added: "Farming societies often allow men to marry more than one wife, so that men often have children at a relatively advanced age with a younger woman. This is one of the factors behind this difference in paternal age and the resulting difference in mutation rate."

The study also reveals a much older age than was previously thought for the most recent common ancestor of the human Y-chromosome. Whereas previous studies estimated an age of approximately 140,000 years, the current investigation estimates an age of 180,000 to 200,000 years. "Previous analyses studied mainly Eurasian individuals in their dating efforts and so missed much of the genetic variation found in southern African populations", said co-author Mark Stoneking, professor at the Max Planck Institute for Evolutionary Anthropology. "Overall, our results demonstrate the importance of expanding genetic studies to non-Eurasian populations."

More information: Refining the Y chromosome phylogeny with southern African sequences *Human Genetics* (April 2016) doi: [dx.doi.org/10.1101/034983](https://doi.org/10.1101/034983)

Provided by Max Planck Society

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