

POPULATION GENETICS

Bursts of male-lineage expansions

“Y-chromosome lineage expansions seem to have followed technological innovations”



Edward Kinsman/Oxford Scientific/Getty

A large demographic study of 1,244 human Y-chromosome sequences reveals several independent, extreme bursts in male population numbers over the past 55,000 years. The research, published in *Nature Genetics*, indicates that these male-specific population expansions occurred during known migrations and periods of technological innovation.

Owing to its patrilineal inheritance pattern and the absence of recombination with the X chromosome over most of its length, variation in Y-chromosomal DNA can be used to build robust phylogenies, and thereby inform the study of male human evolution and demographic patterns.

The researchers analysed over 65,000 Y-DNA variants in more than 1,200 sequenced individuals from 26 global populations that were ascertained in phase 3 of the 1000 Genomes Project. After identifying

the Y-chromosome haplogroup of each individual, the authors built a maximum-likelihood phylogenetic tree using 60,555 biallelic single-nucleotide variants (SNVs). The tree maps how the individuals relate to one another, with the most recent common male-line ancestor reported to have lived ~190,000 years ago.

Strikingly, the branching pattern suggested the existence of several rapid increases — within just a few generations — in the number of men carrying certain Y-chromosome haplogroups, beginning about 50,000–55,000 years ago, when an increase in the number of male lineages outside of Africa could be observed. The authors posit that this burst may reflect the settling of the Eurasian continent around this time period. The phylogeny also supports the theory that the predominant African haplogroup originated

outside of Africa and migrated back before 58,000 years ago.

Although the links between male-specific population expansions and historical data are mostly unsubstantiated, the researchers note that their theories could be confirmed using ancient DNA (aDNA). Notably, the findings in this paper demonstrate the very different demographic histories of men and women, and several of the Y-chromosome lineage expansions seem to have followed technological innovations (such as metallurgy, wheeled transport and organized warfare), which could have put small groups of men at a reproductive advantage. The data produced from this study are now publicly available, and further demographic and aDNA studies might build upon them to increase our understanding of the history of the human population.

Bryony Jones

ORIGINAL ARTICLE Poznik, G. D. *et al.* Punctuated bursts in human male demography inferred from 1,244 worldwide Y-chromosome sequences. *Nat. Genet.* <http://dx.doi.org/10.1038/nrg.3559> (2016)