

The genetic history of the Indian subcontinent

The human male specific Y-chromosome passes from father to son essentially unchanged, but occasionally a random change, known as a mutation, occurs. These mutations, also called markers, serve as beacons and can be mapped. When geneticists identify a mutation in a DNA test, they try to determine when it first occurred and in which part of the world. Thus, the Y-chromosome haplogroup, which is a population group descended from a common ancestor, can be used to trace the paternal lines of men. The poster describes a research project that aims to identify the ancient geographical origins of key ethnic communities of the Indian subcontinent, based on their Y-DNA haplogroups.



THE GENETIC HISTORY OF THE INDIAN SUBCONTINENT

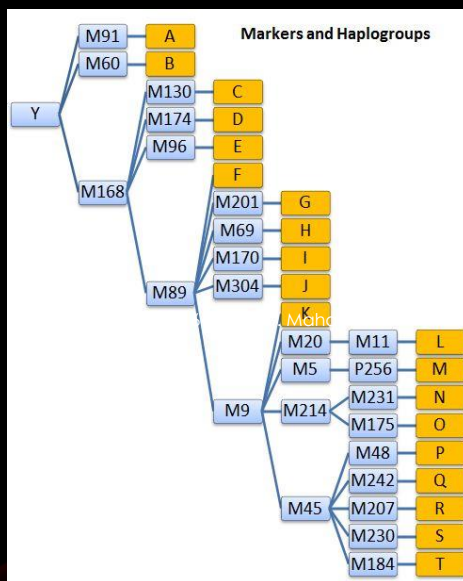
David G. Mahal, Jerome Carson, Ianis G. Matsoukas

INTRODUCTION

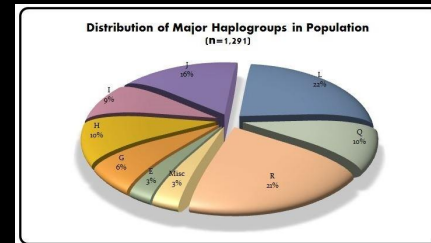
A "haplogroup" is an alphanumeric label that represents a cluster of people who inherited common genetic markers from the same ancestor.

The Y-DNA test generates a set of data, called the "haplotype," that reflects genetic material passed from fathers to sons, essentially unaltered except for occasional mutations. The haplotype is used to identify the "haplogroup."

By using the haplogroup with appropriate databases and markers on the Y-DNA phylogenetic tree -- and making comparisons with populations in different parts of the globe -- the ancient geographic origins of the tested person can be determined.



Y-DNA Phylogenetic Tree



Haplogroups in sample

METHODOLOGY

Eight different haplogroups were identified from a sample of haplotypes of key ethnic communities of the Indian subcontinent. A haplogroup prediction software program was used. The definitions of haplogroups were used to determine their deep ancestries.

RESULTS

By using the haplogroups and their definitions, the geographic origins of the ancestors and the estimated times of their existence were identified, ranging from 10,000 to 35,000 years ago.

SUMMARY OF ANCESTRAL ROOTS			
HAPLOGROUP	MARKER	YEARS OLD	GEOGRAPHIC ORIGINS
E	M96	35,000	Northeast Africa
G	M201	30,000	Eastern edge of the Middle East
H	M69	30,000	Iran, Middle East, Western India
I	M170	25,000	Europe (Balkans, Spain, France, Scandinavia)
J	M304	15,000	Fertile Crescent (Mesopotamia, the land in and around the Tigris and Euphrates rivers)
L	M11	27,500	Pamir Knot region (Hindu Kush, Tian Shah, Himalayas) in Tajikistan
Q	M242	17,500	Siberia (North Asia)
R	M207	10,000	Central Asia (from the Caspian Sea to border of Western China)

Geographic Origins and Age

REFERENCES

- P. A. Underhill et al., "The Phylogeography of Y Chromosome Binary Haplotypes and the Origins of Modern Human Populations," *Annals of Human Genetics* 65 (2001)
- Sanghamitra Sengupta et. al., "Polarity and Temporality of High-Resolution Y-Chromosome Distributions in India Identify Both Indigenous and Exogenous Expansions and Reveal Minor Genetic Influence of Central Asian Pastoralists," *The American Journal of Human Genetics* (Volume 78, February 2006)
- Seema Nair Parvathy et. al., "Haplotype analysis of the polymorphic 17 YSTR markers in Kerala nontribal populations," *Molecular Biology Reports* (November 2011)
- Spencer Wells, *Deep Ancestry* (Washington, DC: National Geographic Society, 2007)
- Tania Gosh et al., "Genetic diversity of 17 Y-short tandem repeats in Indian population," *Forensic Science International: Genetics* 5 (2011) 363-367