

Early human populations evolved separately for 100,000 years

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A team of Genographic researchers and their collaborators have published the most extensive survey to date of African mitochondrial DNA (mtDNA). Over 600 complete mtDNA genomes from indigenous populations across the continent were analyzed by the scientists, led by Doron Behar, Genographic Associate Researcher, based at Rambam Medical Center, Haifa, and Saharon Rosset of IBM T.J. Watson Research Center, NY and Tel Aviv University.

Analyses of the extensive data presented in this study provide surprising insights into the early demographic history of human populations before they moved out of Africa, illustrating that these early human populations were small and isolated from each other for many tens of thousands of years.

MtDNA, inherited down the maternal line, was used to discover the age of the famous 'mitochondrial Eve' in 1987. This work has since been extended to show unequivocally that the most recent common female ancestor of everyone alive today was an African woman who lived in the past 200,000 years. Paleontology provides corroborating evidence that our species originated on this continent approximately 200,000 years ago.

The migrations after 60,000 years ago that led modern humans on their epic journeys to populate the world have been the primary focus of anthropological genetic research, but relatively little is known about the demographic history of our species over the previous 140,000 years in

Africa. The current study returns the focus to Africa and in doing so refines our understanding of early modern Homo sapiens history.

Doron Behar, Rambam Medical Center, Haifa, said: “We see strong evidence of ancient population splits beginning as early as 150,000 years ago, probably giving rise to separate populations localized to Eastern and Southern Africa. It was only around 40,000 years ago that they became part of a single pan-African population, reunited after as much as 100,000 years apart.”

Recent paleoclimatological data suggests that Eastern Africa went through a series of massive droughts between 135,000-90,000 years ago. It is possible that this climatological shift contributed to the population splits. What is surprising is the length of time the populations were separate - as much as half of our entire history as a species.

Saharon Rosset, IBM T.J. Watson Research Center, NY and Tel Aviv University, said: “The analysis of such a massive dataset presents statistical and computational challenges as well as great opportunities for discovery of the events that shaped our history and genetic landscape. For example, we can see evidence of a population expansion period starting around 70,000 years ago, perhaps leading to the out of Africa dispersal shortly afterward.”

The timing of these events coincides with the onset of the Late Stone Age in Africa, a change in material culture that many archaeologists believe heralds the beginning of fully modern human behavior, including abstract thought and complex spoken language.

Previous studies have shown that while human populations had been quite small prior to the Late Stone Age, perhaps numbering fewer than 2,000 around 70,000 years ago, the expansion after this time led to the occupation of many previously uninhabited areas, including the world

beyond Africa.

Dr. Spencer Wells, National Geographic Explorer-in-Residence and Director of the Genographic Project, said: “This new study released today illustrates the extraordinary power of genetics to reveal insights into some of the key events in our species' history. Tiny bands of early humans, forced apart by harsh environmental conditions, coming back from the brink to reunite and populate the world. Truly an epic drama, written in our DNA.”

Paleontologist Meave Leakey, Genographic Advisory Board member, National Geographic Explorer in Residence and Research Professor, Stony Brook University, added: “Who would have thought that as recently as 70,000 years ago, extremes of climate had reduced our population to such small numbers that we were on the very edge of extinction.”

To view the publication in full:

[www.ajhg.org/AJHG/fulltext/S0002-9297\(08\)00255-3](http://www.ajhg.org/AJHG/fulltext/S0002-9297(08)00255-3)

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