

How did we get here?

Diversity and Human Evolution
Part II

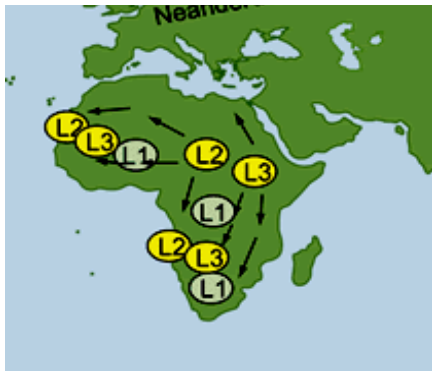
African mtDNA Origins

~120 – 140 kya



mtDNA in Africa

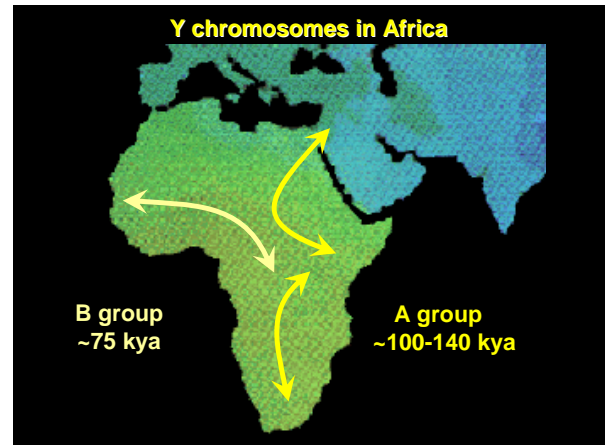
~60 – 80 kya



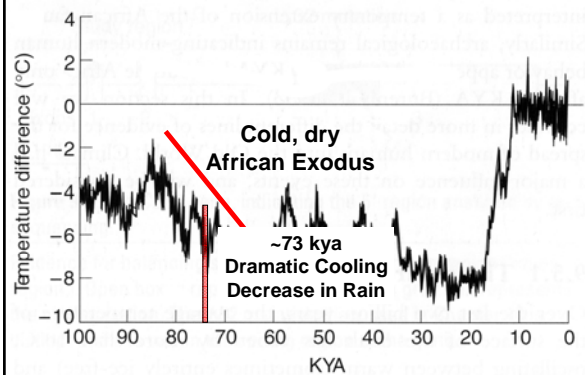
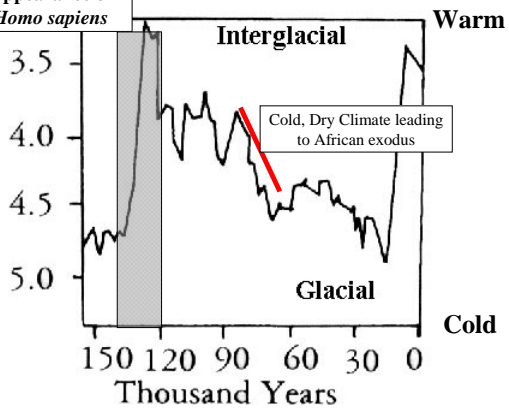
Y chromosomes in Africa

B group
~75 kya

A group
~100-140 kya



Appearance of
Homo sapiens



Genetic Bottleneck

Roughly 73,000 years ago, the population of Modern Humans plummeted, greatly reducing the genetic variation to be found in a relatively young species

Breadth of mtDNA diversity presently detectable

Humans Chimps Gorillas

Time

Genetic Diversity in the three lineages, NOT Population Size!

What Could Cause a Drastic Reduction in the Population of Modern Humans?

The prime suspect for this demographic catastrophe is the **Toba Super Volcanic Eruption** that occurred in Sumatra about 73,000 years ago

Pinatubo Eruption of 1991 produced 4 km³ of ash

Toba eruption of 73,000 years ago produced at least 2,800 km³ of ash

Toba spewed out enough magma to fill 25% of all the currently existing lakes in the world

Location	Volume (cu km DRE)	Time
Fish Canyon, Colorado, USA	3,000	27,800,000 years ago
Toba, Sumatra, Indonesia	2,800	73,000 years ago
Yellowstone, Huckleberry Ridge, USA	2,500	2,200,000 years ago
Yellowstone, Lava Creek Tuff, USA	1,000	600,000 years ago
Krakatoa, Indonesia	21	1883
Mt. St. Helens, Washington, USA	1	1980

DRE = Dense Rock Equivalent

A Volcanic Winter Reduced Human Numbers and Narrowed the Range of Genetic Variability in Our Species

Homeland of Out of Africa migrants was likely located

Would have been seriously affected by the volcanic eruption

