Out of Africa date brought forward

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Ötzi the Iceman, a well-preserved natural mummy of a Chalcolithic (Copper Age), who was found in 1991 in the Schnalstal glacier in the Ötztal Alps. Credit: South Tyrol Museum of Archaeology

(Phys.org) —A study on human mitochondrial DNA has led to a new estimate of the time at which humans first began to migrate out of Africa, which was much later than previously thought.

The new study by an International group of evolutionary geneticists used mitochondrial DNA from the remains of ancient modern humans to estimate the rate of genetic mutations. Three of the skeletons were from

the Czech Republic and dated at 31,000 years old, two were 14,000 years old, from Oberkassel, Germany. Another sample used was the natural mummy Ötzi the Iceman, who lived some time between 3350 and 3100 BC. The most recent skeleton was that of a man who lived in medieval France 700 years ago, while the oldest was dated at 40,000 years ago, and came from Tianyuan in China.

The results suggest that the genetic divergence between African and non-African humans began between 62 and 95 thousand years ago, which tallies with other studies estimating the time through dating of stone tools and fossils, but they disagree with the results of recent genetic studies that estimated the migration began much earlier, up to 130 thousand years ago or even before.

The previous studies sequenced the entire genome of living humans to count the number of genetic mutations (around 50) in newborn babies compared to the parents to determine the generational mutation rate. This then provided the a molecular "clock," which could be extrapolated backwards to date important events in human evolution.

Triple burial from Dolni Vestonice in the Czech Republic. Credit: J. Svoboda

The new study sequenced mitochondrial DNA from fossils of ancient modern humans rather than living humans. The fossils were dated using radiocarbon dating methods. Since the samples were from humans who lived up to 40,000 years ago, mutations that have occurred in the genome since they died would be missing, and the samples provided a range of calibration points for their estimation of the start of the migration.

The disagreement in dating the migration between the new study and previous genetic research could be due to underestimating the number of new mutations in a generation of living humans because of the difficulty of discriminating between true mutations and mistaken ones and because of a desire to avoid false positives. Under-counting would lead to an older estimate for the migration from Africa and other important events.

The new date, which agrees with the archaeological evidence, shows that modern humans were in Europe and Asia before and after the most recent glaciation, and they were therefore able to survive and adapt to a dramatically changing climate.

The paper was published in the journal *Current Biology* on 21st March.

More information: A Revised Timescale for Human Evolution Based on Ancient Mitochondrial Genomes, *Current Biology*, 21 March 2013, DOI: 10.1016/j.cub.2013.02.044 www.cell.com/current-biology/r … ii/S0960982213002157