

New 'molecular clock' aids dating of human migration history

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Researchers at the University of Leeds have devised a more accurate method of dating ancient human migration - even when no corroborating archaeological evidence exists.

Estimating the chronology of population migrations throughout mankind's early history has always been problematic. The most widely used genetic method works back to find the last common ancestor of any particular set of lineages using samples of [mitochondrial DNA](#) ([mtDNA](#)), but this method has recently been shown to be unreliable, throwing 20 years of research into doubt.

The new method refines the mtDNA calculation by taking into account the process of [natural selection](#) - which researchers realised was skewing their results - and has been tested successfully against known colonisation dates confirmed by [archaeological evidence](#), such as in Polynesia in the Pacific (approximately 3,000 years ago), and the Canary Islands (approximately 2,500 years ago).

Says PhD student Pedro Soares who devised the new method: "Natural selection's very gradual removal of harmful gene mutations in the mtDNA produces a time-dependent effect on how many mutations you see in the family tree. What we've done is work out a formula that corrects this effect so that we now have a reliable way of dating genetic lineages.

"This means that we can put a timescale on any part of the particular

family tree, right back to humanity's last common maternal ancestor, known as 'Mitochondrial Eve', who lived some 200,000 years ago. In fact we can date any migration for which we have available data," he says.

Moreover, working with a published database of more than 2,000 fully sequenced mtDNA samples, Soares' calculation, for the first time, uses data from the whole of the mtDNA molecule. This means that the results are not only more accurate, but also more precise, giving narrower date ranges.

The new method has already yielded some surprising findings. Says archaeogeneticist Professor Martin Richards, who supervised Soares: "We can settle the debate regarding mankind's expansion through the Americas. Researchers have been estimating dates from mtDNA that are too old for the archaeological evidence, but our calculations confirm the date to be some 15,000 years ago, around the time of the first unequivocal archaeological remains.

"Furthermore, we can say with some confidence that the estimate of humanity's 'out of Africa' migration was around 60-70,000 years ago - some 10-20,000 years earlier than previously thought."

The team has devised a simple calculator into which researchers can feed their data and this is being made freely available on the University of Leeds website.

More information: The paper is published in the current edition of the *American Journal of Human Genetics*.

Source: University of Leeds ([news](#) : [web](#))

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