Treasure trove of ancient genomes helps recalibrate the human evolutionary clock

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Just like adjusting a watch, the key to accurately telling evolutionary time is based upon periodically calibrating against a gold standard.

Scientists have long used DNA data to develop molecular clocks that measure the rate at which DNA changes, i.e., accumulates mutations, as a premiere tool to peer into the past evolutionary timelines for the lineage of a given species. In human evolution, for example, molecular clocks, when combined with fossil evidence, have helped trace the time of the last common ancestor of chimpanzees and humans to 5-7 million years ago, and contributed to the recent 'out of Africa' theory for a great human migration event 100,000 years ago.

To improve the modeling and reading of the branches on the human tree of life, authors Francois Balloux et al, compiled the most comprehensive DNA set to date, a new treasure trove of 146 ancient (including Neanderthal and Denisovian) and modern human full mitochondrial genomes (amongst a set of 320 available worldwide). Mitochondrial DNA (mtDNA) is a precious resource for evolutionary scientists, because they have a high mutation rate, and unlike genomic DNA, are only maternally inherited.

Now, by using a variety of sophisticated calibration techniques, the authors have improved the accuracy of using mtDNA as a molecular clock by recalibrating the human evolutionary tree. They showed that a molecular clock calibrated with ancient sequences was far more accurate than the traditional ones based on archaeological evidence. With this

new recalibration, scientists can now trace back, with greater accuracy than ever before, the first 'Eves' of the many migrations leading to the colonization of the earth by anatomically modern humans.

"The recent possibility to generate high-quality genome sequences from ancient remains represents an amazing progress in our ability to accurately reconstruct the past history of many species, including our own," said author Adrien Rieux.

Provided by Oxford University Press

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