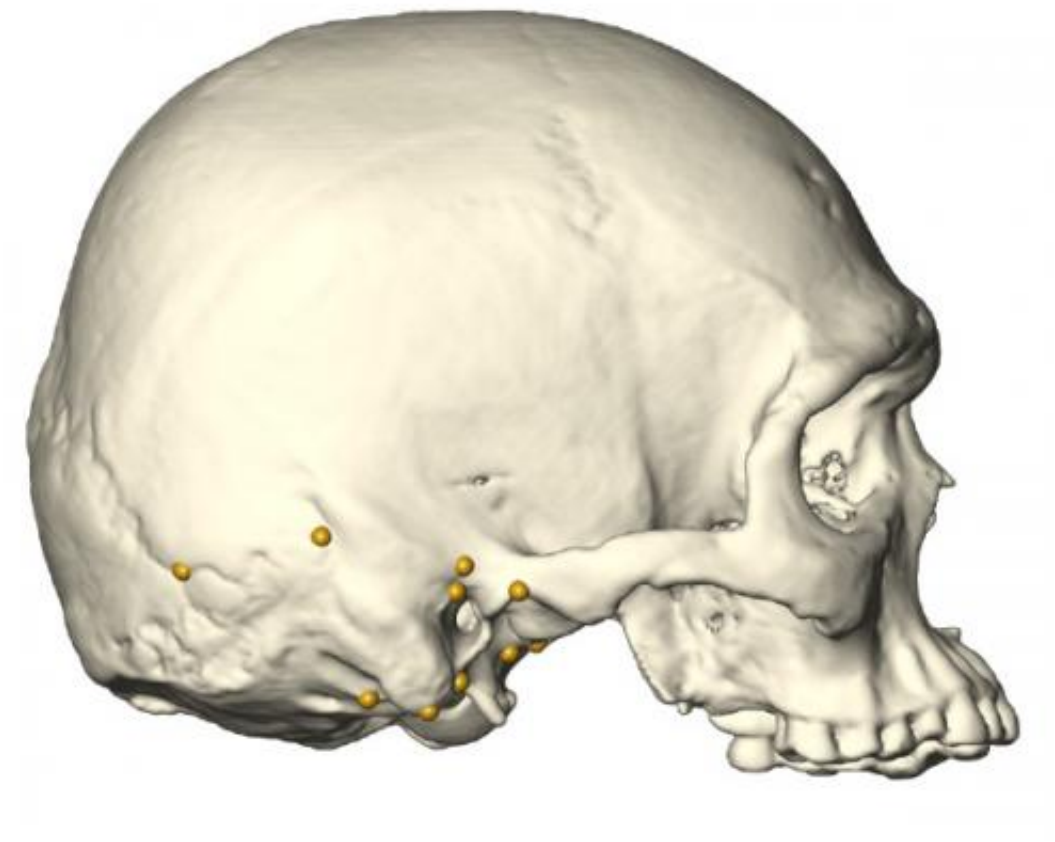
# Paleoanthropologists use models to show humans may have left Africa earlier than thought

April 22 2014, by Bob Yirka



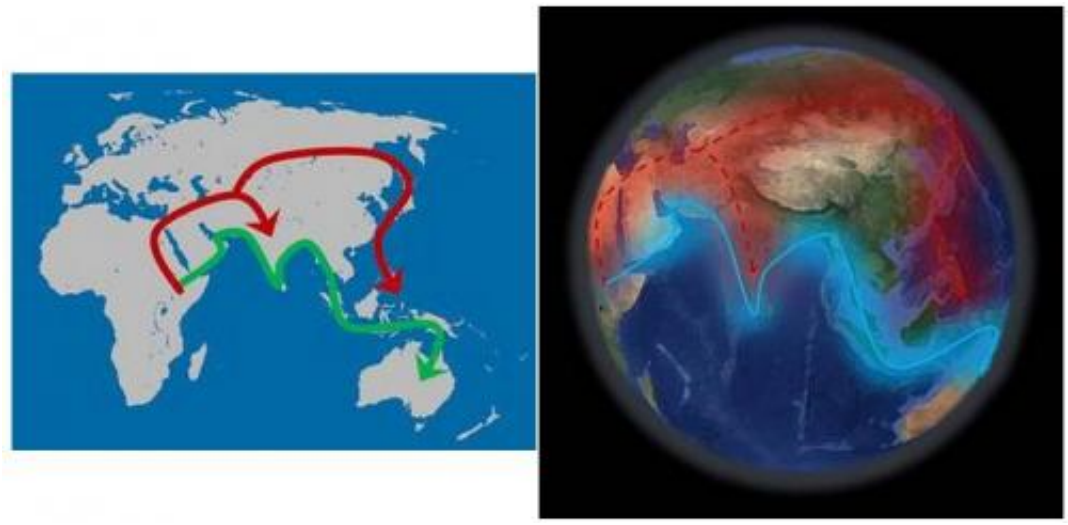
Landmarks shown in one individual cranium. Credit: Katerina Harvati/University of Tübingen and Senckenberg Center for Human Evolution and Palaeoenvironment

(Phys.org) —A team of European researchers is suggesting that humans dispersed out of Africa in multiple waves, rather than in just one, and that it occurred much earlier than has been previously thought. In their paper published in *Proceedings of the National Academy of Sciences*, the group describes how they built migration models based on gene flow and skull characteristics to predict human migration out of Africa.

Scientists have generally agreed that humans first migrated out of Africa 40,000 to 70,000 years ago, culminating in settlements that span the globe. That estimate has been rocked in recent years however, by discoveries of stone artifacts in the Arabian Desert that date back at least 100,000 years (close to the time that modern humans were thought to have arisen). In this new effort, the researchers have expanded on the idea that humans may have left Africa sooner than most had thought, and that it likely happened via multiple routes, rather than just one.

The models the team built took into account genetic dispersal and human skull shape—they created four possible model scenarios of migration—two that showed a single path out of Africa and two that showed multiple paths. The first of the single migration paths involved people traveling north along the Nile valley then turning right when they hit the Mediterranean Sea. The second involved people meandering along the Arabian Peninsula until making their way to Asia. The multi-path migration models involved people marching out of Africa along several paths, both north and south of the Arabian Peninsula.

After completing their models, the team compared them with actual population data regarding people now living in Africa, Australia and Asia. They report that the models they built showing multi-path dispersal most closely aligned with modern genetic histories and skull shapes. Their models also showed people leaving Africa as early as 130,000 years ago for Asia and Australia and then again in another wave approximately 50,000 years ago taking a more northerly route.



The Out-of-Africa model that best fits both the genetic and cranial shape data. A first migration along the Indian Ocean rim occurred as early as 130 thousand years ago (green or blue arrow) and was followed by a second, more recent migration wave into Eurasia (red arrow). Credit: University of Tübingen

The models can't prove when modern humans first left Africa, how they did so, or even why, but they do seem to correspond with common sense. Why, after all, would people choose one path up and out of Africa at one point in time when there were so many to others to choose from, especially if there were a compelling reason to do so, such as drought turning lush lands to desert.

The researchers suggest more field work is necessary to add more credence to their models but are confident that their claims will be borne out as more data becomes available.

**More information:** Genomic and cranial phenotype data support multiple modern human dispersals from Africa and a southern route into Asia, Hugo Reyes-Centeno, *PNAS*, 2014. DOI:

10.1073/pnas.1323666111

**Abstract**

Despite broad consensus on Africa as the main place of origin for anatomically modern humans, their dispersal pattern out of the continent continues to be intensely debated. In extant human populations, the observation of decreasing genetic and phenotypic diversity at increasing distances from sub-Saharan Africa has been interpreted as evidence for a single dispersal, accompanied by a series of founder effects. In such a scenario, modern human genetic and phenotypic variation was primarily generated through successive population bottlenecks and drift during a rapid worldwide expansion out of Africa in the Late Pleistocene. However, recent genetic studies, as well as accumulating archaeological and paleoanthropological evidence, challenge this parsimonious model. They suggest instead a "southern route" dispersal into Asia as early as the late Middle Pleistocene, followed by a separate dispersal into northern Eurasia. Here we test these competing out-of-Africa scenarios by modeling hypothetical geographical migration routes and assessing their correlation with neutral population differentiation, as measured by genetic polymorphisms and cranial shape variables of modern human populations from Africa and Asia. We show that both lines of evidence support a multiple-dispersals model in which Australo-Melanesian populations are relatively isolated descendants of an early dispersal, whereas other Asian populations are descended from, or highly admixed with, members of a subsequent migration event.