Mathematical Models Show that Modern Humans Left Home Continent in at Least Two Waves

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It is well established [1] that modern humans originated in Africa, before moving out to inhabit rest of the planet. They first spread into Asia and Europe via the Arabian Peninsula, and those in the Far East eventually reached America and the Pacific islands.

However, this simple picture does not explain several groups found across Asia and Oceania. Now, by looking at genetic and archaeological data, researchers think they might have found the answer, confirming theories that humans migrated out of Africa more than once.

Across Asia, people are usually similar in appearance to those around them. However, there are scattered populations on islands [2] and in other isolated areas that look quite distinct. These people are sometimes collectively called Negritos (while this may sound archaic, it is the accepted scientific term [3]). Along with Papuans, Melanesians and aboriginal Australians, they are generally much darker-skinned and curlier-haired than their neighbours.

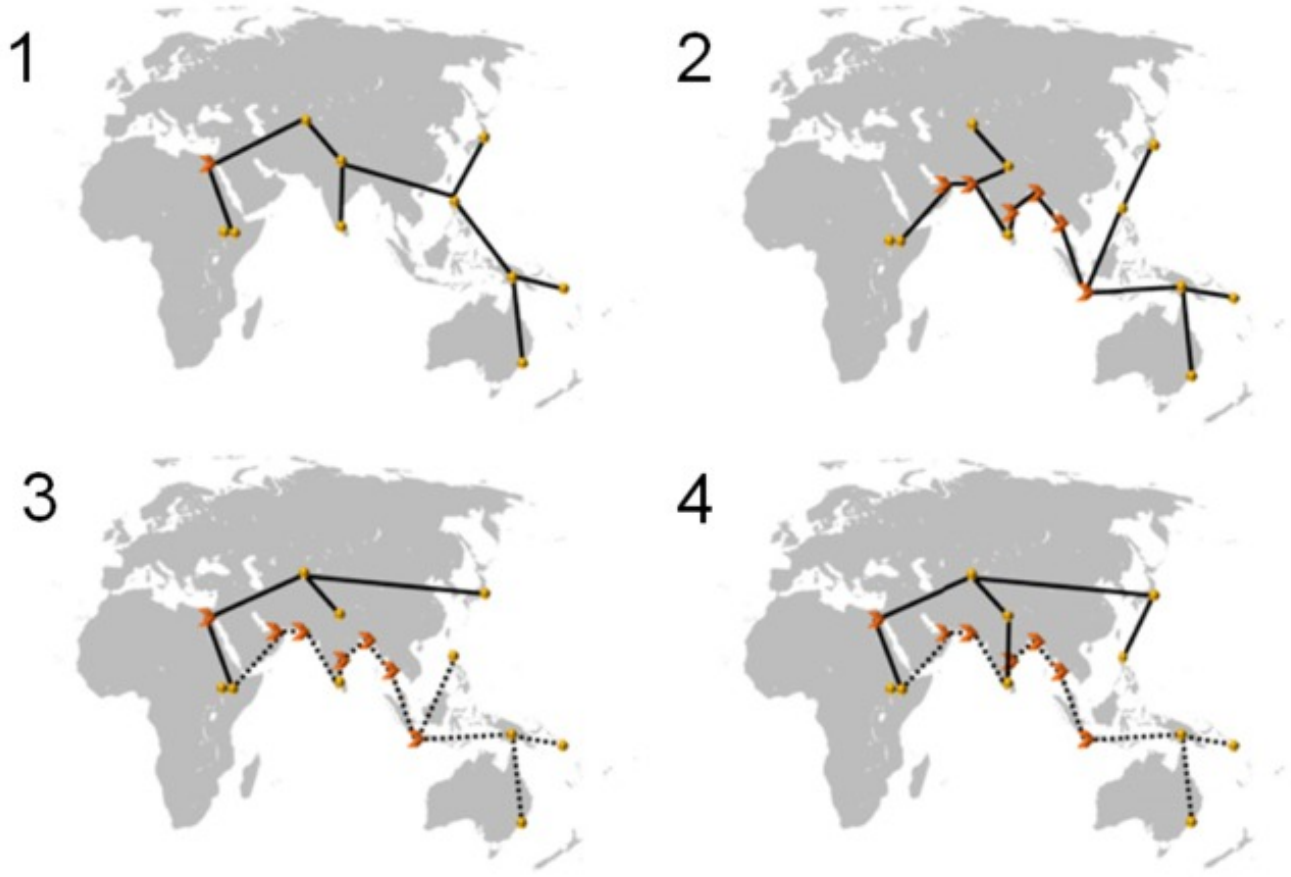
One explanation is offered by the “beachcomber” theory. The first modern humans that settled in Arabia were probably east African fisher-folk who crossed the Red Sea in boats. In this new land they stuck to their coastal lifestyle, rather than head inland for a whole new set of challenges. As their numbers increased, with the sea as a reliable food source and with boats for mobility, they could spread very quickly along the coast of South Asia, crossing inlets and reaching islands, until they eventually found and populated Australia. Later, inland Asian lifestles could become established and support much larger populations, which could spread south, replacing or absorbing our beachcombers in all but the most isolated locations.

This neat hypothesis seemed to have the problem solved until genetic studies were done, which grouped each Negrito population with its neighbours, rather than with other Negritos and Australasians. So why the similar appearance? Could it be that they have each separately evolved the same set of useful traits to live in a similar hot, coastal environment, in which case why have their neighbours not done the same?

A new study published in the Proceedings of the National Academy of Sciences [4], tackled this conflicting evidence. Scientists used mathematical modelling to explain the genetics as well as the skull shapes observed across many Asian and Australasian populations. This involved testing several alternate histories to see which one is best able to explain the modern situation. Each model must be simple enough to understand, and between them, they must cover the likely possibilities.

The models tested could be described as:

1. A population travelled eastwards inland and spread south from there
2. A population travelled along the beachcomber route and then spread north
3. A population took each route without interbreeding
4. A population took each route, they met and interbred



[5]
The reality is, of course, much more complicated, with millions of individuals living, travelling and breeding with no idea of an overall pattern. To this day, people leave Africa (and settle there), or in other words, there have been many, many out-of-Africa migrations. Nevertheless, identifying the model that best explains your observations can give you a good approximation of the most significant truths.

The study found that the fourth model best explained both the genetic data and the skulls for the Negrito population. This means that there were at least two significant out-of-Africa migrations contributing to today's populations – one taking a coastal route and the other an inland route.

Negrito populations appear to have a mixture of beachcomber and inland ancestry. Australians, Melananesians and Papuans seem to descend from beachcombers alone. While other Asian populations – including Dravidian speakers, the majority of south Indians, also sometimes suggested as descendants of beachcombers – appeared to descend predominantly from the inlanders.

The timing, however, was crucial. If the Australasians had no inlander ancestry, they must have passed through Asia before the inlanders appeared. And indeed it appears they did.

A timescale was fitted to the model, using both archaeological evidence and the

accumulation of genetics differences between modern populations. This suggests that, not only did the beachcombers arrive in Australia around 50,000 years ago (when the inland route was just starting out), but that they left Africa around 130,000 years ago.

This is much earlier than most previous estimates, and relatively soon after the first evidence of modern humans [6] (around 200,000 years ago). Intriguingly, from 135,000 years ago, East Africa was struck by a series of “megadroughts”. Perhaps it were these that triggered beachcombers to look for pastures new.

Daniel Zadik does not work for, consult to, own shares in or receive funding from any company or organisation that would benefit from this article, and has no relevant affiliations.

This article was originally published on The Conversation [7]. Read the original article [8].

Links:
[1] https://theconversation.com/albert-and-adam-rewrite-the-story-of-human-origins-15835
[2] http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3487975/
[3] http://www.nature.com/ejhg/journal/v19/n2/abs/ejhg2010162a.html
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