Human evolution and migrations

Human migration and sea food *(May 2000)*

One way in which fully modern humans might have migrated from Africa to colonise the rest of the Old World is by following shorelines. The Kenyan ecologist and anthropologist Jonathan Kingdon coined the term 'strandloping' for such a lifestyle. By concentrating on abundant marine life at the waters edge, the strandlopers would be able to bypass the great deserts of North Africa and the Middle East that today bar the way east to anyone foolish enough to walk - water is only available from deep wells, a recent bit of technology. At the time when we know that migration did begin - before the 60 thousand year first occupation of Australasia by modern humans - much drier tropical conditions associated with global cooling would have enlarged these desert barriers enormously.

The problem is that, apart from evidence for early humans pursuing a coastal life near to Cape Town in South Africa, it was widely held to be a strategy only adopted at the depth of the last Ice Age. Most sites would have been drowned by sea-level rise, following ice-sheet melting about 10 thousand years back, to become inaccessible. A multinational team has discovered a rich haul of stone tools and food remains in an uplifted coral reef on the Red Sea shoreline in Eritrea, NE Africa (R.C. Walter and 11 others, 2000. Early human occupation of the Red Sea coast of Eritrea during the last interglacial. *Nature*, vol 405, pp. 65-68; DOI: 10.1038/35011048). This turns out to be 125 thousand years old, from the time when climate conditions were similar to those today.

The find shows that modern humans were well adapted to life by the seaside much earlier than previously thought. Since the occupation was at a time of warm, wet climate, strandloping may have been by choice rather than necessity. Quite likely it was adopted by earlier Africans when times were far harder in the previous ice age. When conditions cooled and dried again, well-established strandloping opened the coastal routes to the east along the newly exposed coastal strands, perhaps explaining colonization of New Guinea and Australia 20 to 30 thousand years earlier than much closer Europe. But that had to be by boat or raft, for even maximum fall in sea level because of the build up of land ice would not have bared the sea bed between Australasia and modern Indonesia.

How Africans got to Europe is not so easy to explain. Following the Red Sea would have taken them to Suez, a short distance from the Mediterranean but even today an area that is inhospitable. But what inducement or pressure would have diverted them from simply continuing around Arabia?

Eve never met Adam *(October 2000)*

A bit of molecular biology never did Earth scientists any harm, and new research on connectedness in DNA between people now living in different parts of the world sheds new light on the origin of fully modern humans.

All humans are, at most, one tenth of a percent different in their genetic make up; we are ten times more closely related than are chimps from different bands in the forests of West Africa. This low variance almost certainly results from the origin of anatomically modern

humans in very recent times. The well-known comparison between DNA in mitochondria (mtDNA) of people across the world points to a divergence in our "bush" of descent about 140 000 years ago. Because mtDNA passes through the female line, this aspect of modern human origins has been said to stem from a mitochondrial "Eve" living in Africa at the time. This does not mean that only one fully-modern woman was alive at the time, but that lines of descent from others died out subsequently.

The other side of the evolutionary coin is descent worked out through the male line. Molecular biologists have focussed on DNA in Y-chromosomes that only men possess and pass on to their sons. A team at Stanford University in California used cell material from over a thousand men from 24 widely separated regions to investigate relatedness and divergence with the highest precision yet. Their results point to a time of divergence between 50 and 70 000 years ago; half that for female inheritance. While the mismatch certainly knocks creationism and its literal reading of the Old Testament still further out of the park, how the mismatch arose is hard to fathom. One possibility is that a mutation affecting Y-chromosome DNA only imparted such an advantage to the males who carried it that their descendants survived, while those not so favoured had their lines snuffed out. Alternatively, it may simply have been that some important technological discovery, or maybe even a cultural change, such as art that seems to first appear in Africa around 70 000 years ago, gave a very small family group the potential for only their descendants to survive through 3 to 4 000 generations. Whatever, the "bottleneck" through which all our genes passed at the time was in Africa.

Source: Cohen, P. 2000, Eve came first. *New Scientist*, 4 November 2000, p. 16.

More molecular evidence for Cro-Magnon migration into Europe *(December 2000)*

For two weeks in December both adults and infants in Britain have been plagued by nightmares figuring the superb prosthetic and dramatic reconstruction of a Neanderthal family in Channel 4's *Neanderthal*. As London University human geneticist, Steve Jones, has observed, "If you met an unwashed Cro Magnon dressed in a business suit on the Underground, you would probably change seats. If you met a similarly garbed Neanderthal, you would undoubtedly change trains". Of course, the big issue is not that Neanderthals were muscled hulks with gigantic noses, beetling brows and little in the way of chins, but who were the interlopers that drove them to oblivion? Apart from the fact that *Neanderthals* portrayed Cro Magnons as being pretty cool, with a trendy line in face paint, there is little doubt that their only advantage over the chinless ones was one of lifestyle. Being migrants from Africa via the Middle East, Cro Magnons had to have been nomadic hunter gatherers. Neanderthals had survived at least two full ice ages in Europe, and subsisted from fixed ranges around their homes. Game husbandry in a severe climate meant two things: small Neanderthal bands supported by large ranges, and little communication with neighbouring bands. Entry of nomadic hunters into ranges inevitably depleted resources for the territorial first occupants, without the two groups even coming into direct conflict. Nomads can move to fresh hunting grounds, thereby avoiding starvation.

Recent molecular studies of modern men's' Y chromosomes (see also *Eve never met Adam* above) confirms archaeological evidence that the sad drama of Neanderthal decline and eventual extinction began with the entry of fully modern humans about 40 000 years ago

(Semino, O. *et al*., 2000. The genetic legacy of Paleolithic *Homo sapiens sapiens* in extant Europeans: a Y chromosome perspective. *Science*, v. **290**, p. 1155-1159; DOI: 10.1126/science.290.5494.1155). Eighty percent of modern European mens' Y chromosomes stem from two ancient haplotypes. The divergence can be calculated to have occurred around 40 ka from one now vanished, apart from its trace in molecular relatedness. That trace itself is related to another, older one, found in modern Siberian and native peoples of the Americas. It looks as if migrants from Africa remained fixed for a long time in the near East, then to move west and east as the climate cooled. It was the carriers of the now dominant European male Y chromosome that interacted ecologically with the Neanderthals, to the extent that the latter died out.

The molecular statistics suggests that these early "Aurignacian" people - named after their stone-tool culture recovered from archaeological sites - dominated northern Europe. Deepening glacial climate forced them into refuges in the Ukraine and Iberia during the last glacial maximum around 24 to 16 ka ago. At this climatic low point, a further migration into southern Europe emerges from the genetic analyses; that of a population which probably brought in the more advanced "Gravettian" culture. They too survived in a refuge, but in the Balkans. The fact that the Aurignacian genetic trace is so dominant among European men today probably signifies that its population moved rapidly out of its refuge areas, growing numbers re-stocking much of the continent left empty by the demise of the Neanderthals.

Considering the explosive influence of an entirely different culture on the history of Europe during the last 10 thousand years - that of agriculture - it comes as a great surprise that genetic evidence of its likely source is restricted to at most 20 % of modern Europeans. Four new mutations can be dated to have appeared around 9 000 years ago, at the beginning of the Neolithic explosion from which all modern economies date. They almost certainly arose in the "fertile crescent" of the Middle East where farming first shows in the record around that time.

In the same way that Channel 4's *Neanderthals* came to be made, the evidence needs imagination to enliven it. One thing does seem likely; the earliest modern Europeans probably learned their farming, and possibly much else besides, from a trickle of new immigrants, once climate had finally improved to a near-modern state. More intriguing is to wonder why the earliest Cro Magnons were moved to walk into an increasingly frigid Europe in the first place. Were they pariahs in what became the "fertile crescent"? Did they get sick of oppressive "Big Men" who ruled the roost there? Incidentally, that seems to have spurred much of the historical movement of peoples in Africa. Or, did drying at low-latitudes, which accompanied more northerly cooling, mean that worsening conditions in the Middle East demanded urgent migration in any direction that presented itself? Perhaps we shall see a drama relating this story, and the sudden explosion of art at the depth of an ice age. An expression of relief and celebration of good luck?

See also: Gibbons, A. 2000. Europeans trace ancestry to Paleolithic people. *Science*, v. **290**, p. 1080-181; DOI: 10.1126/science.290.5494.1080

Discovery of huge primate buttock print *(December 2000)*

The search for the *Sasquatch* is a story that runs and runs; well, it does in North America. Generally it has been stoked up by dubious evidence, such as plaster casts of gigantic footprints and a film of a rather portly and somewhat camp being striding through the woods of Washington State. Scorn poured on "Bigfoot" research by zoologists and anthropologists may have to be retracted after the latest revelation (Kleiner, K. 2000. Bigfoot's buttocks. *New Scientist*, 23/30 December 200 issue, p. 8).

The Bigfoot Field Researchers Organization set out in September to lure a *Sasquatch* with a mixture of pheromones (whose, I wonder!), supposed cries of wandering, pedally challenged anthropoids, and … apples. The trap was laid in a muddy clearing in the Gifford Pinchot National Forest of southern Washington State. The following day, researchers found an impression interpreted as that made by forearm, hip, thigh heel and a gigantic, hairy bottom, as if some naked… thing… had sat down to munch the bait.

Now this is exactly what I would have needed to sustain my early belief in Santa Claus; something going beyond the drained sherry glass and crumbs of cake on the hearthstone. Using comparative anatomy, the prints suggest a being more than 2.5 metres tall, in keeping with the well-known size 24 feet. Personally, I get the whiff of smoked fish, because the heel print bore markings remarkably like those of human fingerprints. As they say, the jury is still out... probably having a stiff drink.