

## Causes and Consequences of Human Migration: An Evolutionary Perspective

Michael H. Crawford and Benjamin C. Campbell (eds.)

Cambridge, UK: Cambridge University Press, 2012, 550 pp. (hardback), \$119.99.

ISBN-13: 978-1-107-01286-8.

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In both contemporary world affairs and the study of hominin evolution, migration is a central topic. *Homo sapiens* may be 'wise man,' but 'dispersing person' may be a better description of our species. Humans are migrators *par excellence*. Not content with our African homeland, we colonized most of the earth. Recently, we have begun to extend beyond our own planet. Do the modern and ancient ends of the spectrum of human spatial movement feature underlying similarities? Can we bring an evolutionary perspective to recent episodes of population migration? These are the kind of themes which underpin the 26 chapters of Crawford and Campbell's edited compilation.

In-between an introduction by the editors and an overview by O'Rourke, the book is divided into two sections, firstly 'theory' (six chapters) and secondly 'Geography and Migration' (18 chapters). The bulk of the book therefore consists of a series of geographically specific case studies which attempt to bring an 'evolutionary' perspective to the study of human migration. The book follows from a conference at the University of Kansas in 2010. In the following, I will generally focus on particular threads and chapters I found interesting, rather than outlining exactly what each chapter says.

The importance of population movement is generally accepted in paleoanthropology, but it is arguably the case that it remains under-theorized. We can improve our understanding by either looking 'backwards' from historical and related information on human populations, or by looking 'forwards' (more accurately 'sideways'...) from wider patterns of dispersal in biological contexts. In general, Crawford and Campbell's book very much represents a focus on the former, rather than the latter (on which see, e.g., Clobert et al. 2012). This difference in perspective has important implications, as whether one uses the spread of organisms into an available niche or recent examples of human migration such as the European colonization of the Americas as a benchmark for understanding migration leads to very different outlooks and expectations.

The 'evolutionary' theme of the book primarily takes the form of combining genetic information with data from sources such as archaeology and linguistics. It is a shame that there is not a strong primatological contribution to this book, as this would very much bring a pertinent evolutionary perspective. Instead, the focus is on primarily single locus genetic systems (e.g., mitochondrial DNA and the Y-chromosome). A repeated thread in the book is the dif-

ferent narratives suggested by these different sources of genetic data, in no small part because of the frequently sex-biased nature of dispersals which has a strong effect on uniparental genetic systems. And if processes over the last few hundred years have left such a confusing genetic legacy, then it is surely reasonable to suppose that we are missing much of the complexity of the processes which occurred tens of thousands of years ago. Now that ancient DNA and whole genome sequencing are becoming both much more widely used, and much cheaper, many of the ambiguities of the genetic systems traditionally focused on can hopefully be overcome.

In general, I found the 'theory' section of the book more useful than the 'geography and migration' case studies, although I am sure the latter would be highly useful to someone studying migration in the recent part of the Holocene. Stoneking's chapter provides a brief and useful summary of genetic evidence. There may be nothing particularly earthshattering here, but the chapter does a nice job at describing major recent findings, such as the confirmation of the recent African origin of our species along with the evidence for subsequent admixture with other hominin species. The chapter by Wells and Stock, 'the biology of human migration: the ape that won't commit' is one of the high-points of the book for me. They argue that human plasticity is key, and that the flexible expression of the genome allows us to live in varied settings rather than over-adapting to particular niches. It is also a reminder of the complex relationship between genotypes, phenotypes, and behavior. For instance, they discuss the example of stature, with which approximately 180 genes have been associated. In each case, the effect of the gene is relatively small, and the key factor in variation is the interaction between the genes rather than primarily in terms of natural selection on novel mutations. Humans, they discuss, are likewise flexible in their behavior. Niche construction and behavioral flexibility together buffer the environmental variability associated with population dispersal into new regions.

Campbell and Barone's chapter likewise emphasizes the evolutionary setting of migration. For example, they discuss DRD dopamine receptor genes, the frequency of which had been found to co-vary with the distance a population had moved from its original location. The notion is that this gene acts in the prefrontal context where it has the behavioral effect of encouraging novelty seeking, which Campbell and Barone suggest leads to increased levels of

migration (while recognizing that it is probably a lot more complicated in reality). They review a number of other examples of features which plausibly relate to migration, and emphasize that these often have both biological bases but also relate to social aspects such as dominance and hierarchy. Factors such as risk taking and ambition which can reasonably be seen as important aspects of migration, have their basis in variations in genes in the brain, but the way these are expressed as neuropsychological traits, of course, reflects the complex social lives of hominins.

While many of the individual geographical case studies express rather conventional approaches to genetics (such as comparing small samples of mitochondrial DNA), the 'theory section' chapters by Crawford and West, Fix, and Mosher all provide important discussions and examples of the complexity of genetic variation and its relationship to other factors. This is all very interesting reading for any paleoanthropologist. Fix's chapter focuses on the importance of kin structure to human migration. He also emphasizes the importance of demographic factors such as population structure, without which scholars are often just telling "good stories" (p. 88). Mosher's chapter on diet and epigenetics also makes for fascinating reading. While genotypes establish parameters and constraints, Mosher is correct to emphasize that phenotypes are shaped by the interaction of genes and environmental factors, such as the sort of nutrients an organism consumes. While there has been much interest in the study of human evolution on the consumption of meat, and more recently on seafood, Mosher emphasizes our capacity as omnivores.

Moving on to the specific case studies of Chapters 8 through 25, Hirbo and colleagues' chapter offers another emphasis on the importance of population structure. In this case they focus on Africa, and the correlations between archaeological, linguistic, and genetic data. While their motivation and essential thrust are eminently supportable, I am somewhat dubious on some of the specifics of their argument. They try to summarize African climate, but it is debatable how accurate their summary is. I am sure that specialists on North Africa would be surprised to learn that North Africa was apparently wet between 60 ka and the Last Glacial Maximum. Likewise, with the archaeology they offer a rather simplistic perspective which they see as evidence for population structure. For example, they emphasize the difference between the 'Lower Nile Valley Complex' and the 'Nubian Complex,' if we accept either as useful heuristics. These were originally differentiated because it was (wrongly) thought that assemblages assigned to them were the same age, but it is now known that the former is much younger than the latter. This is not to argue that population structure is not important in Pleistocene Africa, indeed I am an author on a paper saying that it is (Scerri et al. 2014), but it is dubious whether the 'industries' dreamed up by archaeologists correlate with much in the way of the reality of Pleistocene demography. The linguistic side of Hirbo et al's paper is interesting, but it is dubious how much the modern linguistic structure says about ancient Africa. Despite these criticisms, their focus on the

importance of population structure and the need for multi-disciplinary are pertinent.

I was pleased to see that the numerous contributions to the 'geography and migration' section are broadly balanced across the globe, with four chapters on Africa, four on Europe, three on Asia, and four on the Americas, while the remaining three cover Oceania and the Caribbean. In this regard, the editors should be congratulated for producing a balanced volume. Some of these chapters may not be particularly stimulating to someone not specialized in their particular area, but they all seem useful enough. While many chapters discuss push and pull factors, I found their lack of quantification of these factors rather frustrating.

The examples of migration explored vary considerably, from the genetic legacy of African slaves in modern South American populations, to the origin of the Basques, to Scottish ancestry in Americans. There is much in the way of detail here, but few commonalities emerge. Aldenderfer's chapter on the peopling of the Tibetan Plateau is a nice example of the work in this book, well written and highly interdisciplinary, while some chapters can be a bit dense if you are not a specialist on a particular aspect. The Tibetan Plateau is a good case study for migration and subsequent adaptation, both biological and cultural. Living at such high altitudes poses various problems, such as chronic mountain sickness and issues with pregnancy. Tibet was first populated in the Late Pleistocene. Aldenderfer argues that the uniformity of modern Tibetan genetic adaptations to high altitude reflects the contribution of a small, but permanent, pre-Holocene population, which he argues played a more important role than previously considered. Likewise, Matisoo-Smith provides an effective summary of a classic example of migration, the colonization of the Pacific. This forms another example of the need to consider the context of genetic variation, with considerable migration between some islands and depopulation of others over the last few hundred years making genetic analyses unreliable unless these factors are considered.

O'Rourke's short overview chapter provides a neat summary paper, emphasizing the multiple scales of dispersals and the need for interdisciplinary research. He is right to emphasize that "migration as a process links the natural and social sciences" (p. 528), and this is why it is such an important topic.

Aside from small quibbles here and there, I found one of the biggest problems with the book to be the unresolved tension in terms of defining what 'migration' actually means, and how it relates to other conceptions such as dispersal and range expansion. In just seven pages of the introduction, the authors state three times that the book is about migration from the origin of our species. But why this start point? This is where I think looking at non-human primates could provide useful information on dispersal in the hominin lineage. I found Wells and Stock's 'typology of migration' useful, which suggests that there is not a typical form of migration and outlines the different forms of human population movement (e.g., home range change, seasonal migration, exogamy, slavery, etc.). To me,

an evolutionary perspective on migration precisely has to transcend an individual hominin species, and this is where I think disciplines such as primatology and archaeology have much to offer.

In a sense, my initial impression was that the modern examples of migration discussed in this book had limited relevance for understanding the deep past. However, on further consideration it seems that the extreme complexity of recent processes and population interactions, even in the contexts which have traditionally been regarded as 'simple' using archaeological or linguistic data, suggests that more ancient processes, operating over much longer time scales, were also surely extremely complicated. The drivers of migration are often described as either push (e.g., aridity, disease) and pull (e.g., milder climates, freedom from persecution) factors, as described in Crawford and West's chapter for example. While a lot of data is presented in the book, it remains to really be drawn together. It may well be that different push and pull factors are involved in all examples of human migration, but it would be interesting to understand even in broad terms if push is more important than pull, for instance, and how this varies through time. The same goes for sex biased dispersals, it would be very interesting to compare the character of this bias across human groups and with other species. While there are some

excellent archaeological publications on migration/dispersal in human prehistory (e.g., Gamble 2013), there is generally a gap between this sort of literature and that on dispersal more widely in animals and other taxa. While much therefore remains to be understood, Crawford and Campbell's book makes useful reading for anyone interested in human population movements. As is generally the case with Cambridge University Press publications, the book is attractively presented and well-edited. With the ongoing revolution in genetics, it is imperative that scholars of other disciplines develop new perspectives and techniques to understand the prehistory of human population movement which in many ways made us who we are today.

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