

# Reflections of Our Past: How Human History Is Revealed in Our Genes

**John H. Relethford**

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Recently there has been a raft of popular books covering the use of genetic and genealogical information to inform us about the relationships and history of human groups. Leading the list are Spencer Wells's *Journey of Man*, Steve Olson's *Mapping Human History*, Martin Jones's *The Molecule Hunt*, *The Seven Daughters of Eve*, by Brian Sykes, and the slightly older *Genes, Peoples, and Languages*, by Luca Cavalli-Sforza. Several of these books I have assigned to graduate and undergraduate classes. Each book provides an overview of several of the kinds of historic and prehistoric problems genetic information might reasonably address, and although each glosses over the essential details of hypothesis testing using population genetic methods, each may nevertheless provide interesting points of departure for lectures and discussions. By subject matter, John Relethford's *Reflections of Our Past* fits snugly into this group. Like Olson's and Wells's contributions, Relethford runs through the usual set of potential ancient migrations, beginning with the possible origin of modern humans in a single out-of-Africa migration, through the migrations leading to the habitation of the New World, Europe, and Polynesia respectively. Other recent genetic topics that might be found elsewhere, such as the Jewish Diaspora and the fate of the Neandertals, garner a section each. The most original contributions of subject matter here include an extended overview of the population history of Ireland, drawing from Relethford's own research, as well as discussions of admixture among contemporary American ethnic groups. As a constellation of broadly historical topics, all centered on the common link of genetic evidence, the book could serve as the type specimen of the genre.

But by early in the third chapter, it is clear that this book stands apart. Most books present a series of vignettes of ancient species and their characteristics, sometimes making useful review sheets for undergraduates but rarely giving any impression of the underlying ambiguities of fossil interpretation or assumptions of evolutionary process. Instead of the usual list of species, Relethford presents a concise metadiscussion of the advantages and disadvantages of different taxonomic approaches in a section titled "How many species?" Like other geneticists, Relethford lacks a nuanced appreciation of the fossil record, but unlike most he takes the time to illuminate the assumptions underlying different interpretations and their potential flaws.

More substantially, Relethford's approach to genetics is remarkably unpretentious. On population genetics, the book makes full use of a good teacher's clear visualizations of topics--often complete with visual aids--and encouraging readers to take logical steps themselves while carefully confirming the correctness of the logic. For most topics, these secure stepping stones lead quickly to deeper waters, as once-simple truths are subjected to logical probing. The result is a sort of studied naiveté, where no assumption is really safe from innocent-seeming examination, and some of the most important insights come from recognizing and accepting deep ambiguities.

The centerpiece of the book is the clear examination of the dispute whether modern humans are the products of a recent African replacement or a multiregional ancestry. On this subject Relethford covers every essential genetic angle. Unlike most accounts, the book does a superb job of explaining not only why the initial mtDNA analyses of Cann and others seemed so important in the late 1980s but also why their conclusions were so misleading in many ways--as Relethford puts it, "they were right, but for the wrong reasons" (p. 71). Here, we are privileged to hear an insider's account of the growing awareness of the importance of population size to shaping genetic variation during the early 1990s, and the later suspicion that even this apparent link to ancient prehistory might not be as conclusive as it initially seemed. Ultimately, the message is one about compatibility and consistency--evidence that initially appears to favor one model generally can be found to fit the other as well. Many witnesses of the disagreement over the interpretation of genetic data might well have wondered at the time why it was so difficult to get conclusive results. This narrative explains most of the difficulties, including those that remain.

The other essential genetic evidence relating to modern human origins is the recovery of ancient DNA from Neandertal fossils, and to this subject Relethford devotes a full chapter. The clarity of this chapter is excellent; it briefly introduces the methods and problems of ancient DNA analysis, and then discusses in detail the particular interpretation of the known Neandertal sequences. Here the points are much like those in the modern human origins chapter: although the evidence appeared at first to favor total Neandertal extinction, in fact it is consistent with either that hypothesis or the hypothesis that they survived as ancestors of living people.

Where things genuinely are simple, Relethford has the wisdom to leave them that way. The discussion of hominoid relationships in Chapter 2 is up to date, and refreshingly free of second-guessing about either the order of hominoid branching or chronology. Two paragraphs are enough to both summarize Thor Heyerdahl and discredit his "Kon-Tiki" hypothesis for Polynesian origins. The story of the Irish Travellers is well-presented and simple, providing a good appetizer course to the later, more detailed accounts of Relethford's own Irish work. Indeed, these sections manage to pull off a remarkable trick: the reader will scarcely notice just how much Relethford was able to determine about the genetics of this population without the mention of a single gene.

There are weak points. The three chapters on European, New World, and Polynesian origins, where Relethford has little direct experience, tend to read more as a literature review than as a critical inquiry. While his journalism in this regard is good, the chapters lack the dramatic sparkle of those where Relethford has been directly involved with research. As an example, the text stops well short of the most interesting questions concerning New World origins. The dichotomy between the advocates of a single migration and those advocating multiple migrations--and between short and long chronologies--to account for different aspects of linguistic and genetic information is quite clear, as the book explains in detail the rationale for each position. But such stark contrasts, with each side claiming support from genetic data, begs the question: are the existing data really compatible with both views? This is just the kind of analysis that Relethford has made his signature in the area of human origins. It is, or course, an approach that takes substantially more analytical work than the simplistic interpretations that it evaluates, and Relethford cannot be faulted for failing to solve single-handedly all the questions of human ancestry. Nevertheless, having seen the potential of Relethford's approach in the earlier chapters, the text seems incomplete without it.

In my view, the most important chapter is the fifth, called "The Palimpsest of the Past." This chapter introduces the concept of genetic distance and its relationship to geography, really the culmination of

early anthropological genetics applied through example to recent genetic data. Simple graphs show the relationship of geographic distance and genetic differences in humans, as well as illustrating the great genetic similarities between populations globally. But the simplicity of this chapter, and the striking illustrations it contains, raise conceptual problems in later chapters, especially those relating to European and Polynesian origins. If isolation-by-distance is really so explanatory for human genetic differences, then why should we accept--as Cavalli-Sforza does for Europe and the spread of agriculture--that a cline is evidence of demic diffusion associated with a particular prehistoric event? If human populations normally mix, why should we assume--as do both the "slow boat" and "fast train" models--that mixing between Melanesians and Polynesians could occur only in one direction as the boats left the Solomon Islands? And if the genetic record is really a palimpsest written over by the entire history of genetic changes in our species, then how can we know that particular patterns of genes can be evidence for particular ancient events--especially when the numerical models of genetics that we use to test such relationships assume a complete lack of any such distortions?

Relethford comes closest to answering such questions at the end of the eighth chapter. After a discussion of the settlement of Polynesia, a question on which Relethford himself has not published before, he notes the "close correspondence" between the questions about ancient migrations in different parts of the world. The modern human origins question, the spread of the European Neolithic, the origins of New World populations, and the settlement of Polynesia all share common issues; particularly the expansion of some populations at the expense of others and the possibility of interbreeding among those populations during the expansion. Relethford concludes with a synthetic vision, that "the history of a species, particularly the human species, can be understood . . . by examining the genetic impact of population expansions" (p. 184). In his view, human populations are typically connected by a web of gene flow, a background upon which occasional expansions of particular populations may cause large genetic effects, tempered by continued gene flow both at the time of expansion and subsequent to it. This pattern results in a "mosaic pattern of genetic variation." This description outlines a powerful model of genetic evolution, but one that remains to be developed. As such, it may raise more questions than it answers--for example, if all these problems in human evolution really involve the same basic phenomena, then why do geneticists persist in using entirely different, and incommensurable, methods to examine them? Relethford's account stands out at this moment in the history of analyses of human variation as a call to develop a single methodology to attack the basic problems of migration and population expansion in the past. The contradictions presented by the use of different methods and assumptions to examine such issues cannot survive much longer, as the descriptions of them in this book serve--quite unintentionally--to make clear.

The style of much science writing is to lead the reader, through many twists and turns--and no shortage of blind alleys--at last to the right answer. But, although professing eagerness to obtain answers about the past, Relethford emphasizes again and again that the easy answers are generally wrong. Instead, at his best, Relethford doggedly leads the reader to the right questions. This incisive approach is most evident in his own work, which at one point he calls "frustrating," because he "would like to find the one piece of evidence that supports one model to the exclusion of the other," but "Much evidence that at first appears to support the African replacement model winds up also being easily explained under a multiregional model" (p. 72). It is the relentless process of uncovering hidden assumptions that has driven Relethford's work--it would seem that leaving questions unasked is simply not in his nature. It is this nature that makes *Reflections of Our Past* so much better than other books about genetics and human history.