The Science of Human Origins by Claudio Tuniz, Giorgio Manzi and David Caramelli

2014. Walnut Creek, Left Coast Press, 186 pp.
ISBN 978 1 61132 972 8 (pbk).

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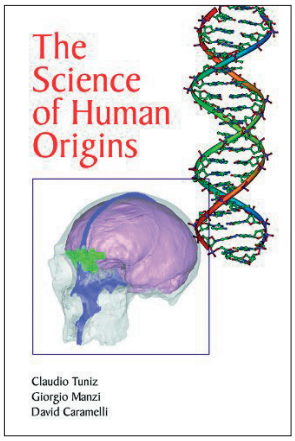

This is a very strange book. Written by three Italian scientists working on different aspects of the science of human origins, and translated from the original Italian, it is not clear who is the intended audience. In six short chapters, the authors offer a primer on human origins as the essential background for telling a story: a review of dating methods and their applications; a summary of evidence on climate change in the Pleistocene; a description of the power of CT scanning of fossils; a brief account of the methods of palaeogenomics and some of the ethical problems they have encountered; and a very brief set of stories of the results of such analysis. The plan and size of the book, and the qualifications of the authors should have produced a much better book.

It is not a bad book, and avoids the problems that beset a previous one by the first author. That one was mired in personal animosity that obscured the quality of the argument—perhaps because it was co-written with a journalist, and journalists demand conflict. No, this is a book that seems to want to explicate scientific techniques to a lay audience. But the authors do not seem to have worked together consistently and have limited grasp of the issues beyond their undoubted expertise in particular techniques: some are explained in a little detail, others are mentioned in passing. This inconsistency is one of the things that makes it difficult to understand which audience the book is addressing.

The background information, mostly about hominin classifications, introduces the major species, but does not assess the quality of evidence about them consistently. Unless you actually know about them already, you might be confused. Two studies have called the standard classification into question much too recently to be included (Antón et al. 2014; Balter 2014), but the authors show no sign that the well known problems of classification might be an issue. It would have helped to have a graphic or a time chart here. Likewise, the section on climate changes seems to me to be confused, and quite confusing. It probably should have been a second background chapter. As with the first, it screamed for the readers to be offered a climate curve, only to find that there was one tucked away inexplicably at the end of the chapter rather than near the beginning. For what it is worth, the general air that the authors are out of their depths outside their specialities is well illustrated in this chapter. They state (p.68) that 'The common ancestor of *H. sapiens* and *H. neanderthalensis* probably came from Africa during the Middle Pleistocene, when global climate changes, including surges and drops in temperature, were much more intense'. Of course, the climate curve (p.81) shows what we all know: that there were seven glacials and seven interglacials in the Middle Pleistocene, and, while two of the glacials (MIS 16 and 10) were colder than MIS 2, others were not (MIS 18, 14, 12 and 6), and none of the interstadials was as warm as MIS 5 or the Holocene. Moreover, the length of the Stages was greater in the Middle than the Upper Pleistocene. What do the authors mean and how did they arrive at their conclusion about surges and drops and about intensity? Lacking references in the book, we cannot go to the original papers and find out.

On dating methods, the treatment is not systematic. It claims to start with more recent times and then proceed to a deeper past, but actually changes chronological direction three times. The result is that there is no thread running through this narrative. Nowhere is there a consideration of the concepts involved in the recognition of any of the categories being dated—a fundamental of good science. The book gives the impression that the categories are given; they are just the 'facts' that the scientific techniques can be applied to. The problem can be illustrated by the example of the site of Florisbad (p.54). The site has been known since the 1930s and the fossil skeletal remains have been classified in various ways based on their anatomy, but the dating has always been uncertain. Here, mention is made of radiocarbon dating (of which some explanation has been given), then amino-acid racemisation dating (without a mention that it is extremely problematic) which confirmed the radiocarbon result. But then the authors refer to a result by ESR dating (without mention of the assumptions of the method or its intrinsic weaknesses) which gave a date eight times older than the other methods. The authors write 'Hence, the Florisbad cranium belonged to one of the last archaic humans' (p.54), as if this date somehow trumped the others and permitted a classification that was independent of the anatomical examination of the fossil. This is an almost perfect example of how science does NOT operate and will only serve to make understanding difficult for inexperienced readers.

Some of the most straightforward description of the new work in sciences applied to archaeological materials comes in Chapter 4 'New Microscopes and Quantitative Paleontology'. The methods are described succinctly but adequately, and some case studies are well described: new understandings of issues surrounding birth for early hominins and the broader evolution of life history (pp.92–98). Likewise, anatomical issues surrounding the production and reception of aural communication are well described (pp.98–102), but it would be unreasonable, given the authors' failings elsewhere, to expect a reasoned discussions about the relations between such communication and language. And then, inexplicably, the chapter ends with a section on analysis of carbon isotopes to reveal diet—completely unrelated to all of the rest of the chapter.

The best section is at the end of the book, where one chapter gives a little introduction to the methods of genographic analysis with some of the (sad) history of such studies, and a second chapter discusses some of the conclusions of the work. Some will object that the history is kind to the ethically challenged Human Genome Diversity Project (HGDP), and unfair in singling out Aboriginal Australians

among the many Indigenous peoples who found the HGDP approach unethical. It is clear to most that the problems lay with the researchers and not with the Indigenous peoples. Alas, the section does not address the fundamental assumptions that make the phylogeographic story work—and more importantly, not work.

So who is the audience? For the novice there is insufficient reference to authoritative literature and far too many examples of bad practice. Another example is 'we can confidently assume that the Palestine region was alternately occupied' by two species of hominins (p.56). Quite to the contrary, that knowledge claim is a result of empirical research—'confident assumptions' are not science. Anyone experienced in the study of human origins will know more than is revealed in this book, and they will know the sources of the unattributed graphics. There are two good books of this length to be written, one for the novice and one for the more experienced scholar, but this version of those is not a book I would recommend to anyone.

References

Antón, S.C., R. Potts and L.C. Aiello 2014 Evolution of early *Homo*: An integrated biological perspective. *Science* 345(6192):1–15.

Balter, M. 2014 RIP for a key *Homo* species? *Science* 345(6193):129.