



Book review

Dead Men Telling Tales: *Homo* Fossils and What to Do With Them

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A review of Robert Eckhardt, *Human Paleobiology*, Cambridge University Press, Cambridge, 2000, 349 pp., ISBN 0-521-45160-4 (HB).

“Human Paleobiology” is about the use of fossils to determine the adaptations and evolutionary trajectories of human ancestors. At least part of this book’s purpose may be summed up in its title; this is *Paleobiology*, the study of long dead organisms via their fossils, as opposed to *Paleoanthropology*, the physical anthropology of dead people. Consequently, this book draws attention to the changes in studying the human past that are emerging within human evolution studies.

Paleoanthropology has a history of being focused upon human ancestors, rather than the forces that shaped them. Arguments about phylogeny have tended to overshadow arguments about the causes and circumstances of evolutionary events. In fact, where evolution has figured at all, it has typically been about mechanisms that provide coherence to phylogenetic positions. Punctuated equilibrium provides support for multiple species of hominids. Post-synthesis population genetics can be viewed as providing support for a single genetically contiguous lineage. Various positions have held sway at various times. Loosely we can categorise these positions as the “lumpers”, those that folded various fossil finds into a single species, and the “splitters”, who were prepared to be a bit more generous with their taxonomic labels.

Arguments about hominid phylogeny become particularly vigorous the closer to humans we get. The taxonomic status of Neandertals – ancestors or dead end – and the Modern Human Origins debate (MHO) provided some of the most spectacular fireworks. The lumpers see *Homo erectus* through to *Homo sapiens* as being “a single polytypic species” (Clark and Willermet 1997: 4). Currently in the ascendant are the splitters, or those that back

a “replacement” model. The current picture within the discipline is that Neandertals are not the direct ancestors of anatomically modern humans.

This debate has its roots in the birth of human evolution studies. It retains its current interest for various reasons. Partly it's due to the media's love of “missing link” and human origin stories. Mitochondrial Eve sells magazines. More relevantly, the debates also impact upon the claims of evolutionary psychologists and related disciplines. It matters if the human species is old and stable, as opposed to young and from a speciose family. For if *Homo Sapiens* is a young species, then its niche is recent and particular. If however *Homo sapiens* really does stretch back over one million years, then it includes those specimens designated *Homo neanderthalensis*, *heidelbergensis*, *erectus*, *ergaster*, to mention but a few (Foley 1991, 2002). Consequently according to the “lumpers” *Homo Sapiens* as a species encompasses much more variation, and is potentially much more developmentally pliable, than we typically think. In such a situation, the claims of evolutionary psychology will be under pressure, for they tacitly rely upon the relatively intractable development of a “Pleistocene brain.” The lumpers' picture is of a developmentally flexible and varied organism that grows to fit its environment. If human minds grow around corners and through tight spaces in the manner of some creeping vines (Lewontin 2000), then evolutionary psychology and related projects are in difficulty. We are too developmentally plastic for such projects to succeed, and to understand a mind we must look to the development of the individual, rather than the past of the species.

The debates about human phylogenies and lumping versus splitting have for a long time revolved around the anatomical details of fossils, and the morphological reconstruction of past ancestors. The reason for this is twofold. Partly it reflects the history of studying human ancestors. The history of human evolution as a science is the history of fossil finds and their interpretation. It is bound to the disciplines of anatomy and those sciences connected with the study of bones. People trained in anatomy rather than biology have dominated the science of the human past.

The second and main reason for the concentration on fossils is that for long time the fossils were the only real evidence that anybody has had. Dating fossils has always been a bit sketchy until recent times. It has relied on best guesses and has tended to be relative rather than absolute. This fossil is later than that fossil. Normally prominent local events provide a localised set of reference points for the relative dating of fossils; volcanic eruptions and the subsequent ash layers are good in this regard. Cross dating fossils from different regions without absolute dates was consequently difficult. More often than not it was dependent upon the interpretation of morphological features and presumed phylogenetic relations. The upshot was that within

Paleoanthropology dates have not been reliable data. Sequences of fossils have been constructed based upon interpretations of morphological features and presumed evolutionary trajectories, rather than known dates.

Importantly too, the sample size of human fossils has not been big enough to estimate ranges or bio-geographical spread. Hypotheses involving populations have not really been testable as such. For there is the very real risk that the particular individual represented in a fossil find is unrepresentative of a population. Estimating range sizes and populations has been a tenuous exercise. Testing bio-geographical hypotheses has been a bit out of the question.

What these limitations reinforce is a bias towards anatomy, taxonomy and the slotting in of specimens into an acceptable sequence. Something chimp-like at one end, and something human at the other;

Traditional paleoanthropologists concentrate on bones and teeth. Collect all the relevant fossil skulls, teeth and bones. Observe, measure, compare and construct a lineage or phylogenetic tree of presumed morphological characteristics to show their evolutionary relationships. . . . The ideal result is, rather like Othniel Marsh's famous lineage of increasingly larger horses for New York's American Museum of Natural History, a compelling sequence showing the clear trend toward the modern (Maienschein 1997: 414).

Eckhardt's "Human Paleobiology" is recognisable as part of the shift in attitude away from these concerns in those studying human evolution. To a certain extent the broad outline – that "clear trend" – is known, though not the precise detail that we would like. Nevertheless, we know that bipedalism preceded any substantial brain increase above that of chimps by a good million odd years. We know hominid origins were in Africa, and there is a broad consensus on issues such as timing and spread of earlier hominids. These big picture issues were for a long time the meat of paleoanthropological debates. Now the data is broadly in place, so it is time to both fill in the details of the pattern and explain it.

Eckhardt advocates early that the study of fossils, so long a source of taxonomic information, be used for insights into adaptation. Fossils are to be used for something more than slotting in the ancestors.

A more positive view of the prospects for anatomical or morphological study is that, freed from its role as a principal anchor for phylogenetic inference, this line of research concentrate on that to which it is better suited by far – the investigation of relationships between form and function (Eckhardt 2000: 150).

So, Eckhardt's intentions initially look good. The idea is that the increasing sophistication of physical anthropology and the increasingly fine grained

resolution of modern studies of remains should begin to provide information pertinent to a richer understanding of hominids and their life ways. For example, modern techniques of fossil analysis are capable of detecting how many offspring a female has given birth to due to rings of mineral depletion in a fossil bone, a testament to the expensive nature of hominid reproduction. Such information in conjunction with hypotheses about changing life patterns and birth intervals early in the homo clade provide statistical support for an enhanced understanding of our ancestors (O'Connell, Hawkes et al. 1999; Alvarez 2000; Shanley and Kirkwood 2001). The fact that such information can be extracted from fossils means that insights into life history can be gained.

The change that Eckhardt is advocating should be seen as a shift from data gathering to hypothesis testing. That collecting and cataloguing that Maienschein alluded to as Paleanthropology's past is to be replaced by the formation of hypotheses about adaptations and about past evolutionary trends. Fossils can be something more than phylogenetic markers. This approach Eckhardt labels as Paleobiology. According to Eckhardt's introduction, Paleobiology is the study of populations in changing environments. Paleobiologists are in the business of reconstructing past behaviours of organisms based upon fossil evidence. *Human* Paleobiology is then the study of past human populations and the reconstruction of past human behaviours.

The first few chapters of the book survey the history of the study of human ancestors. The underlying theme is that certain historical contingencies shape our current understanding of the human past. As fossils have become known at different times, they have been interpreted within the understanding of the past current at the time. This contingency has shaped our understanding of the fossils. So the early chapters are really a review of how fossils have been used in the past and some of the theories that have been used to interpret them.

It is not until Chapter 5 that Eckhardt starts laying out his positive project. This chapter deals with what Eckhardt describes as the Human Adaptability Framework. This framework is more an ideal than an existent tool. The framework suggests that we can detect in fossils three different adaptive levels of acclimatisation, developmental plasticity and genetic change.

The first level, acclimatisation, suggests that behaviours and environments shape skeletons and the hard-parts of which fossils are the remains. Eckhardt suggests that some of the forms that a hominid had will be the result of acclimatisation to a local physical environment. Someone living at high altitude will have a chest cavity that is larger to accommodate much-exercised lungs. Some acclimatisation will also be to activities of the individual. Blacksmiths do not swing hammers because they have large arms, but have large arms because they have swung hammers.

The second level is developmental plasticity. Diet, lifestyle etc. all impact upon a growing organism. Things like the calcium content of early diets make a difference. Physical anthropological studies and anthropometric surveys consistently demonstrate diet and other factors impinge on the development of the organism.

It is the third adaptive level – genetic change – that is adaptation in the evolutionary sense. Genetic change in populations of organisms is only one factor that affects an organism's final form. Given that evolution works upon changes in gene frequencies, then to understand the past the other adaptive levels have to be eliminated before we can claim that there has been some kind of evolution taking place.

In order to make sense of a fossil's evolutionary, phylogenetic and biological significance and reconstruct behaviour, these adaptive levels need disentangling. So the Human Adaptability Framework is designed to distinguish reliably between the different data that fossil remains can provide.

To do this Eckhardt suggests a reliance on measurements of existing populations, be they *Homo sapiens* or related species. The interspecies variation of modern populations should be used as a guide to understanding the variation within the fossil record. Where modern populations show predictable anatomical structures resulting from consistent pressures – environmental or behavioural – then we are in a position to reverse engineer past populations of hominids and their behaviour.

So, put simply, Eckhardt's plan is to use modern populations to provide the understanding of what forces have shaped extinct organisms. Robert Foley used this approach to make broad and plausible inferences about hominids in "Another Unique Species" (Foley 1987). By analysing the range sizes of extant savannah predators and integrating this with studies of fossils and paleoecological information, Foley was able to provide good and reasonably robust indications of range sizes for hominids that were reliant on hunting. Robin Dunbar also used a comparative approach to bolster his hypothesis about language (Dunbar 1996). Comparative techniques can work well and can provide some reliable insights into past populations.

What Eckhardt takes from his Human Adaptability Framework is the idea that fossils can be reliable indicators of past behaviours. Now if Eckhardt had stuck with this project and had demonstrated how this was so, things would have been fine. Eckhardt instead starts trying to show why morphology may not be any good for resolving taxonomic issues. In fact, it is from Chapter 5 onwards that the book starts to look like an extended argument about why not to use fossils for phylogenetic information. While he provides glimpses of the increasingly rich data fossils can provide about adaptations and lifeways, he never touches on any theories of evolutionary pressures or evolutionary

circumstances. Instead, the book meanders around the problem of identifying hominid species through time and why morphology might not be of any use in this endeavour.

For example, Chapter 6 seems to take a comparative approach to providing information about species and speciation across clades. This chapter looks at the *Papionines*, the baboons and relatives. Baboons have always retained something of an interest to Paleoanthropology for the reason that their habitat and geographical spread are somewhat closer to that of early hominids than *Pan*. The Baboons are our closest relatives that live in a similar savannah environment that probably typified that of the *Australopithecines* and early *Homo*.

However, rather than using this clade as an example of Paleobiology and looking at how different habitats and behaviours can shape the morphology of the *Papionines*, the chapter seems devoted to the complex and less than straightforward taxonomy of this group. Eckhardt relies on the work of primate systematists to suggest that baboons are a good example of potential gene flow across species, and the possibilities of hybrid zones between species. Eckhardt suggests that the baboon species of Africa may represent population clines, with gene flow possible across recognised species.

The importance of what is said in this and other chapters for the Modern Human Origins debate is never stated. Nevertheless, one cannot help feeling that this chapter and the following ones contribute covertly to the Modern Human Origins debate, rather than to our understanding of the evolution of hominids and *Homo Sapiens*. For if the variation found in fossil morphology represents not species, but intra species variation and localised responses to environments, then the multi-regional argument looks more plausible.

This over-concentration on species and species issues continues through the rest of the book. So in the end, Eckhardt never convinces us of how useful his approach could be for he never uses it. He never addresses directly any of the debates about different adaptive pressures or evolutionary scenarios that are still current. Instead, the whole book ends up confusing the issues surrounding hominid speciation and species. One could almost take this as an extended covert argument for lumping and the multi-regional evolution model of Wolpoff and others. Far from demonstrating that human Paleobiology has a future, he demonstrates that the problems of human taxonomy won't go away. The problem is that he never provides us with any examples that demonstrate Paleobiology's potential contribution to understanding the past.

This failure to deliver on the original promise is aggravated by the book's other major problem of bad editing. The level of detail is inconsistent, as is the level of explanation of technical vocabulary. The book's intended audience

is not clear. The result is a book that lacks focus and sends mixed messages as to its purpose.

It has to be said that there are some fascinating insights tucked away in this book. My favourite being the fact that the use of toothpicks may go back two million years (p. 198). But all in all, a frustrating book. Eckhardt provides us with a framework for studying the adaptations of hominids, but failed to apply it. Paleobiology may offer us ways to test dietary, adaptation and lifeway hypotheses about human ancestors. But one won't see Paleobiology in action in this book. Instead, we get confused messages about hominid speciation, interesting tidbits and a tantalising glimpse of Paleobiology's promise in studying Human Evolution.

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