

Bones, teeth and molecular clocks

Bernard Wood

New Interpretations of Ape and Human Ancestry.

Edited by Russell L. Ciochon and Robert S Corruccini.

Plenum: 1983. Pp.888. \$95, £66.50.

PALAEoANTHROPOLOGICAL research over the last decade or so has been rather like an iceberg. Above the metaphorical waterline has been the varitable flurry of new discoveries and fresh interpretations of hominid remains from the Plio-Pleistocene, but beneath the surface, literally and metaphorically, lies the Miocene, which, in the same period, has been the focus of much fossil collecting, field research and careful laboratory study and analysis. The editors of this weighty book quite rightly recognized the need for a summary of the progress and the problems associated with research into this crucial phase of hominoid evolution and this volume is the result. Any doubts about its adequacy can be immediately dispelled. The standard is high and the editors have obviously worked hard to produce a volume which is every bit as good as Washburn's *Classification and Human Evolution* (Aldine) which, in 1963, covered similar, but obviously not identical, ground. Although the majority of the papers in this volume (some 30 in all) concentrate on fossil evidence and its interpretation, the scope of the book is wider, and its real theme is any evidence, be it molecular, chromosomal, palaeontological or palaeoenvironmental, pertinent to an understanding of the emergence of higher primates.

At the beginning of the 1970s, the majority of palaeontologists considered that the lineages leading to man, and the African and Asian apes, had been

established by the middle of the Miocene epoch (25–5 million years BP), if not before. *Ramapithecus* was a hominid ancestor, and all was well with the world. However, the middle and late 1960s saw the beginning of the collaboration between Vincent Sarich and Allan Wilson at Berkeley. Starting with immunological techniques, they embarked on a research programme which aimed to assess the strength of what can best be termed the biochemical or molecular relationships between extant primates. Sarich was convinced from the onset that "the essential variable governing the retention of antigenic similarity and appearance of antigenic diversity is time". They developed the notion of the 'molecular clock' and the time it told for the divergence of the higher primates was not 20 or 15, but 5 million years. What progress at reconciling these two scenarios, if any, has been made in the past decade or so?

The practitioners of molecular evolution would claim, I suspect, that it has taken the palaeontologists that long to see the light and that they are merely using new fossil evidence and the fruits of more rigorous morphological analysis as a metaphorical smokescreen to cover their unseemly and ragged retreat. This view is both unfair and untrue. Palaeontologists were indeed defensive of their position, but they were also rightly sceptical of the more extreme claims, or alleged claims, which were being made for the molecular evidence.

Although molecular evidence was closer to the genome, it was nonetheless still phenotypic evidence. However, some workers treated it as something akin to absolute truth, whereas it was clearly no such thing. Molecular evolution is a branch of comparative anatomy — admittedly the anatomy of molecules, but nonetheless still susceptible to the same class of errors as more traditional comparative studies. However, whatever ones caveats about the molecular evidence, its advent most certainly made palaeontologists examine the fossil record more closely than they

might otherwise have done, but more importantly it prompted them to embrace more rigorous methods of analysis.

What followed, in the field of molecular evolution, but particularly in palaeontology, is well represented in this book. The pre-Miocene evidence from the Fayum is reassessed in one chapter and it is claimed that *Aegyptopithecus* and *Propliopithecus* are suitable "phyletic ancestors for all later catarrhines". The hominoidea are regarded as the primitive catarrhines from which the cercopithecoids evolved as a derived group. *Ramapithecus* and *Sivapithecus* are treated by many contributors as synonymous, and linked phyletically with modern and sub-fossil *Pongo*. Two authors conduct a spirited rearguard action on behalf of the hominid affinities of *Ramapithecus* and there is now clearly a need for a detailed examination of the evidence cited by Kay and Simons in the light of the well documented counter-evidence put forward in this volume and elsewhere by Andrews, Tekkaya, Ward and Pilbeam. Wolpoff contributes a thoughtful review in which he postulates that the *Ramapithecus/Sivapithecus* 'radiation' may include the common ancestors of all the living hominoid forms. Contributions by Mai on chromosomes, Kluge on cladistic analysis and Kortlandt on the palaeoenvironmental evidence were papers which particularly caught my interest. Some authors are guilty of using cladistics more as a prop than a tool, but the majority were rigorous and comprehensive in their treatment of their elected or allotted topics.

I have a few 'niggles' for the editors, but many more plaudits. I would have appreciated more maps and timecharts at the front or the back of the book and a summary of each paper would have been helpful in a book of nearly 900 pages. This must be one of the first books on hominoid palaeontology in which new words and new meanings, outnumber new taxa. Diagram is now a verb, so I can now spend my time 'diagramming' if I tire of writing. 'Meld' is a new and subtle combination of weld and mould, and if I get bored with 'diagramming', I can always spend my time 'reconceptualizing'! More seriously, though, the editors can be heartily congratulated on their efforts. Mistakes are few and minor. There are comprehensive indexes to both authors and subjects and one of the editors has provided an excellent concluding summary chapter.

This book is edited by two students who graduated from the Department of Anthropology at Berkeley. They dedicate it to two of their teachers, Sherry Washburn and Clark Howell whose ideas and influence permeate much of what is good in palaeoanthropology today. I would urge anyone seriously interested in human origins to read this excellent book. □



The orang-utan — a close but disputed relative of human beings. The picture is taken from *A Complete Guide to Monkeys, Apes and other Primates* by Michael Kavanah, (Johnathan Cape), which will be reviewed in *Nature*.

Bernard Wood is Professor of Anatomy at The Middlesex Hospital Medical School, University of London.