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Integrative Paths to the Past: *Paleoanthropological* Advances in *H*onor of F. Clark Howell, edited by Robert S. Corruccini and Russell L. Ciochon, Englewood Cliffs, New Jersey: Prentice-Hall, 1994.

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F. Clark Howell retired from the faculty of the University of California at Berkeley in 1991. At Berkeley, and earlier while at the University of Chicago, he was responsible for training a number of specialists in human biocultural evolution, or palaeoanthropology. In fact, Howell is credited with developing the concept of palaeoanthropology (and defining the term itself); he certainly created the framework for this integrated, multi-disciplinary approach to human evolution. For his retirement, former students and colleagues collaborated to produce this volume. Some of the papers were presented at a one day symposium reviewing the highlights of Howell's career along with current research directions in palaeoanthropology. It took place during the annual meeting of the American Anthropological Association held in San Francisco in 1992. Howell's long time colleague J. Desmond Clark gave the distinguished lecture at the same meeting. During his career, Howell directed excavations at Isimila in Tanzania, as well as Torralba and Ambrona in Spain (all extensive Acheulean localities), but is best known for his work west of the Omo River in southern Ethiopia. It was there during the 1960s and 1970s that he developed the methods and approaches which would come to characterize the best of palaeoanthropological research.

In the Omo deposits, there are hundreds of metres of fossil-bearing sediments spanning the last four million years (for example, the Plio-Pleistocene Shungura Formation is over 700 m thick). When he began to work here, Howell chose to focus on understanding the palaeoenvironmental and geological history of the region, rather than just prospecting for hominid fossils. The combination of a sequence of datable volcanic tuffs and rich fossil-bearing sediments made the Omo the most important area in East Africa for understanding the framework in which early hominid evolution occurred.

Given this, it is true that the Omo project never got the public attention in the way that work on the east side of Lake Turkana ("Koobi Fora") or the Afar triangle received. Here, numerous, often spectacular, hominid discoveries made the names and careers of their discoverers-Richard Leakey at East Turkana and Donald Johanson at Hadar. A number of people (including several authors in this collection) have suggested that Clark Howell never became "famous" because he failed to discover as many fossil hominid remains, or did not publicize them in the way that others did. This may be true, but there are a surprising number of hominid bits and pieces here, albeit fragmentary, along with tremendous quantities of fossil animal remains. Geologists and palaeontologists were able to create a sequence of depositional units and fossil species which provide the basis for correlating sites elsewhere in the Lake Turkana basin, and even further north into the Hadar and Middle Awash regions where the earliest hominid remains (Australopithecus afarensis, and most recently, A. ramidus) have been recovered. The exercise in correlation was not always appreciated by geochronologists or palaeontologists working elsewhere, as can be seen in the acrimonious debate about the age of the KBS tuff at East Turkana. This tuff lay well above the layer containing the skull of ER-1470, a large brained hominid now assigned to Homo habilis (or to another coeval species, Homo rudolfensis). This debate has been well described by Roger Lewin in his book Bones of Contention (1987), and is only briefly mentioned here.

This is not to say that the Omo failed to provide data of special importance to palaeoanthropologists. Among the discoveries here may be the world's earliest stone artifacts, a rather unprepossessing assemblage of small quartz fragments struck from microscopic cores which Glynn Isaac (1978:142) once described as the "first example of hominid frustration" due to their diminutive size. They could be as much as 2.3 or 2.4 million years old (mya).

Some of the significance of the Omo work, and the research Howell did at other sites, comes out in this volume. But most of it is concerned with the hard data of palaeoanthropology (bones, stones, geological sequences) and its interpretation. As a result, it is invaluable for people trying to keep up with the bewildering range of new species, methodologies and discoveries being presented in the published literature. John Fleagle quotes Howell in this volume (p. 32) as saying that the more you know, the harder it is to understand. Anyone who teaches human palaeontology would have to agree; interpretations change quicker than the facts, and the facts themselves change rapidly. It sometime seems that researchers have to come up with new ideas or new fossils in order to make their careers, so they tend to disagree on almost everything. I teach this subject to third year students with some background in physical anthropology and zoology. I outline the facts for each species in turn (the fossils, their position in time and space, their anatomical characteristics), then focus on the debate about the significance of this information. Only in this way can we deal with the ever expanding literature, and learn to evaluate if new discoveries totally change our views on everything, as is often proposed.
In the light of current debate in palaeoanthropology, where does this book lie? It is a mixture of material on primate and hominid evolution, geology, geochronology, taphonomy, palynology and archaeology; in other words, all of the fields involved in the discipline that Howell created. It begins with a review of Howell's background and influence written by Geoffrey Pope. He stresses that Howell was always concerned with the hard evidence, not over-riding theory, something which is a refreshing change. Some papers deal with early primate evolution. John Fleagle discusses anthropoid origins, Russell Ciochon and Dennis Etler primate biogeography and Walter Hartwig the intriguing question of where the ancestors of the South American monkeys came from.

One of the most interesting articles is by Andrew Hill. In 1988, he and Steven Ward wrote an article for the Yearbook of Physical *Anthropology* reviewing discoveries of African hominoids dated between 14 and 3.7 mya (when A. afaresis remains become abundant). It is surprising how limited a sample compared to the abundance of earlier and later periods. In this volume he tries to review the same material, totals up new finds, and addresses the big question of why and how hominid origins took place. Hill's fieldwork has been around Lake Baringo in central Kenya, where fossil-bearing deposits spanning this entire period are found. He has shown that no great environmental change happened here, throwing into question scenarios of hominoids becoming bipedal hominids as a result of expansion of savannas (compare this to Vrba's argument below).

A number of papers review the Plio-Pleistocene hominid evidence (Bernard Wood, Robert Corruccini, Phillip Tobias, Ron Clarke, Yoel Rak, and P. Kyuaka). Henry McHenry examines the postcranial remains and reviews their significance for understanding the development of upright posture and bipedal locomotion. With the abundant remains of A. afarensis, a debate has sprung up over how bipedal they were. Some authors (Owen Lovejoy, Tim White and Donald Johanson) feel that they were completely bipedal, in fact better than modern humans as they did not have to balance the requirements of upright posture with having a big enough birth canal for a large brained infant to pass through at birth. (This presumably became a factor in the evolution of the genus Homo). Others (Jack Stern and R.L. Susman), noticing the long curved hand and foot bones as well as ape-like limb proportions, believe that the earliest hominids retained a great deal of grasping and climbing abilities. Therefore, they may have spent considerable time in trees, only using bipedal locomotion when on open ground. McHenry takes an intermediate position, but states unequivocably that "Lucy" and like forms were clearly bipedal.

Other papers concentrate on the geology or palaeoenvironmental data. Frank Brown reviews the geochronology of the Omo and its relationships to other regions in East Africa. Noel Boaz describes work he has done in the Western Rift along the Semliki River. He suggests that the process of uplift which created the rift system (which began during the Miocene) led to increasing savanna conditions in East Africa, as it was cut-off from circulation, and thus to hominid origins. A similar scenario has been outlined by Yves Coppens in Scientific American (1994). Dorothy Dechant Boaz looks at site formation processes at the Omo using taphonomic methods, and Raymonde Bonnefille at environmental reconstruction in East Africa using palynology.

Elisabeth Vrba is a specialist in the evolution of African bovids (antelopes), a group which undergoes adaptive radiation during the Pliocene and Pleistocene, splitting and diversifying at the same time as hominids. It is these changes which allowed her to suggest dates for the South African australopithecine sites, localities where chronometric dating methods cannot be applied. In a number of influential papers, Vrba has argued that global climatic changes could create the conditions for hominid origins at the end of the Miocene around 5 mya, when growth of glaciers in Antarctica led to world-wide cooling, sea level drop, and loss of tropical forest habitats in which apes lived in Eurasia as well as Africa, not to mention the evaporation of the Mediterranean Sea. It may also explain the diversification of hominids around 2.5 mya into 2 to 3 genera and anywhere from 3 to 7 species (depending on who is talking), when savannas greatly expanded. It was at this time that the first members of the genus Homo appeared, as well as the earliest stone tools. In this volume, she expands this climatic forcing or "pulse" theory to see if the rates and patterns of hominid evolution can be explained in the same way. It is one of the few original articles in the collection, and is extremely sophisticated in its range of data examined and the questions being addressed (the role of neoteny in human evolution, identifying and assessing changes in timing of maturation, as well as rates of change of body shape and size).

A number of papers deal with archaeological problems. Kathy Schick and Nick Toth examine the role of spheroids in East African Early Stone Age sites. Desmond Clark looks at the Acheulean from a general perspective. Richard Klein reviews the

geological and stone age archaeological history of South Africa. Geoffrey Pope and Kathy Schick separately describe the archaeological evidence from the earliest sites in the Far East, and Dennis Etler and Li Tianyuan the hominid data from the same region. Leslie Freeman examines archaeological work at the Acheulean sites of Torralba and Ambrona in Spain, which began in the 1960s and was resumed in the 1980s.

Naomi Porat and Henry Schwarcz review information about electron spin resonance (ESR), a dating technique which has given chronometric dates for sites beyond the range of radiocarbon. It is ESR, along with thermoluminescence of burned flint artifacts, which has led to substantial revision of ages for key Upper Pleistocene hominid sites, and to the recognition that anatomically modern humans probably preceded neandertals in the Middle East, well before moderns appear in Europe. This aligns quite nicely with the mitochondrial Eve scenario for an African origin of modern humans. But if this is a resonable conclusion, where do neanderthals fit into the picture? Their anatomy is reviewed by Susan Anton, and Robert Corruccini concludes with an unusual assessment of ideas relating to the rise and fall of neanderthals as modern ancestors; these seem to change paralleling periods of increasing and decreasing conservatism in scholarly and political circles.

In conclusion, I can recommend this book to anyone who wishes to get up to date with palaeoanthropological data and its interpretation. It is not an exhaustive survey of current information and issues, but gives a good picture of what we know. It is largely due to the fundamental work of F. Clark Howell in creating a general science of palaeoanthropology that understanding of our own past has come this far.

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