Book Reviews

Evolution in Pleistocene Africa

Earliest Man and Environments in the Lake Rudolf Basin. Stratigraphy, Palaeoecology, and Evolution. Proceedings of a symposium, Nairobi, Kenya, Sept. 1973. YVES COPPENS, F. CLARK HOWELL, GLYNN LL. ISAAC, and RICHARD E. F. LEAKEY, Eds. University of Chicago Press, Chicago, 1976. xxii, 616 pp., illus. Cloth, $17.50 (library edition); paper, $8.50. Prehistoric Archeology and Ecology.

During much of the present century, the study of mammalian and human evolution in Africa proceeded at a relatively slow pace, with only a few workers contributing the major effort. Since the mid-1960's, a large international group of scientists has joined the effort, stimulated by exciting new fossil discoveries as well as by advances in geophysical methods of dating and correlating fossil-bearing sediments. The result has been so rapid an accumulation of geological, archeological, and paleontological data that much has remained unpublished and generally unavailable. This book attempts to bring together in summary fashion the vast quantity of data collected from Pliocene-Pleistocene deposits of the Lake Rudolf basin in northern Kenya and southern Ethiopia, where much of the research has been conducted. Some 51 workers from nine countries have contributed 50 chapters that represent an impressive array of approaches to common research problems. Together, they pay tribute to the kind of interspecialty, international cooperation that alone can bring about significant progress in so formidable an undertaking.

The book is organized into three parts. The first part, edited by Glynn Isaac, is concerned with geology and geochronology. Much of this section consists of description of sedimentary units, correlation of geological and paleontological dating techniques, and discussion of climatic versus tectonic influences in determining the observed wide variations in sedimentation around the lake during the past 4 million years. Although opinion remains divided, many contributors hold that differences in subsidence and deformity zones within the basin contributed significantly to the differences in sediment accumulation between East Rudolf and the Omo valley.

Of particular interest is the chapter by Jean de Heinzelin, Paul Haesaerts, and F. Clark Howell on depositional environments and taphocenoses of the Omo River basin. These authors present an interesting profile of the stratigraphic and geophysical history of the area, identifying 17 sedimentary periods on the basis of land surface and paleoecological criteria.

Another important chapter, by Frank Brown and Ralph Shuey, gives for the lowermost section in the Omo basin the most comprehensive analysis that has been made of paleomagnetic events in Africa. Their scheme agrees well with absolute potassium-argon dates and correlations based on faunal interpretations. It provides an independent method of age determination and should eventually allow more confident correlation with other major localities. Andrew Brock and Glynn Isaac discuss a similar though less extensive succession of magnetic fluctuations for East Rudolf.

Part 2 of the book, edited by Yves Coppens and F. Clark Howell, concerns paleontology and paleoecology. Many of the chapters present descriptions of fossil material from various localities around the lake, but in general they lack interpretative conclusions on evolution or on the paleoecological significance of the finds. There are several notable exceptions, particularly the chapter by Shirley Coryndon on the hippopotamids of the entire Rudolf basin. Coryndon traces the fossil history of the family for more than 12 million years and gives an excellent discussion of its evolution and paleoecology. One perplexing problem is the great species diversity seen in this small lake during the Pleistocene, when as many as five species may have coexisted. The author suggests that some as yet unknown geological or ecological factors influenced hippo speciation during this period.

In a chapter on the Suidae, H. B. S. Cooke traces evolutionary trends for several lineages in an attempt to correlate established potassium-argon dates with morphological sequences at East Rudolf and the Omo. He gives a brief, interesting discussion of ecological inferences to be drawn from the fossil material, suggesting a complex interplay of bush, savanna, and grassland environments around the lake during Pleistocene times.

An important collection of micromammals from the Shungura formation is discussed by J.-J. Jaeger and H. B. Wesselman. Jaeger and Wesselman suggest that an essentially modern assemblage was established in Africa more than 3 million years ago. Paleoecological inferences indicate a change from wooded savanna to a more open landscape just over 2 million years ago. A similar climatic shift is supported by the palynological studies of Raymonde Bonnefille, which show that the humid wooded savanna of the upper Omo valley from 2.5 million years ago gave way to drier conditions with extensive grasslands about 2.0 million years ago.

The final part of the book is edited by F. Clark Howell and Glynn Isaac and is devoted to paleoanthropology. Many of the basic data presented here have been published previously, at least in brief form. B. A. Wood summarizes the evidence for the presence of *Homo* at East Rudolf, and supports the view that the famous E.R. 1470 cranium, dated at about 3 million years ago, represents the earliest member of the genus known. However, in a short discussion of taxonomic procedure, Alan Walker points out the many australopithecine features of this skull and argues for caution in such interpretations.

Michael Day reviews the 74 postcranial specimens from East Rudolf. He concludes that two distinct species were present—*Australopithecus* and a *Homo* similar to *H. erectus*. This is in full agreement with the dental evidence reported previously.

The Omo valley hominids are discussed by F. Clark Howell in a chapter that is destined to stir some controversy. Here Howell recognizes at least four taxa. According to his interpretation of the fossils a small species of *Australopithecus* similiar to *A. africanus* occurs from the lower Omo section between 3.0 and 2.5 million years ago, and may have survived until 1.9 million years ago. A second species of *Australopithecus* resembles the Olduvai species *A. boisei*, and is known from the middle Omo section 2.1 to about 1.0 million years ago. Howell also recognizes two species of

Homo, a small form different from both *A. africanus* and *H. erectus* occurring about 1.8 million years ago and a large form close to *H. erectus* occurring in the uppermost beds dated at about 1.0 million years ago.

The exciting archeological data from East Rudolf are summarized by Glynn Isaac, J. W. K. Harris, and D. Crader. The oldest known human cultural evidence, dated at about 2.4 million years ago, suggests that some hominids had already developed behavioral patterns that were of fundamental importance for the evolutionary differentiation of modern *Homo sapiens* from other primates. These included tool manufacture and use, meat eating, operation out of a home base, and possibly some form of cooperative division of labor. This evidence is entirely consistent with the fossil data indicating that some early hominids were bipedal, with hands free for tool use.

In summary, this is a valuable volume that brings together more than a decade of research not previously available in such comprehensive form. It will prove extremely useful to anyone interested in geological, paleontological, or archeological problems in Pleistocene Africa, and will certainly be the starting point for all further research in this area.

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Stratigraphy of a Famous Site

Geology of the Olduvai Gorge. A Study of Sedimentation in a Semiarid Basin. RICHARD L. HAY. University of California Press, Berkeley, 1976. xvi, 204 pp., illus. + plates. $22.50.

The Olduvai Gorge, in Tanzania, is probably the world's best-known site in connection with early man, largely through the work of the late L. S. B. Leakey and his wife, Mary, who have received both financial support and publicity through the National Geographic Society. Mammal fossils were first found there by Kattwinkel in 1911, and in 1913 a preliminary geological survey was made by Hans Reck, who recognized five stratigraphic units and numbered them from the base upward. Leakey began his work in the gorge in 1931 and persisted with scanty funds until the discovery in 1959 of the australopithecine skull popularly known as "Zinj," after which money became available for large-scale excavations and detailed study. A turning point in the reconstruction of the history of early man was the 1961 dating by Evernden and Curtis of tuffs in bed I as 1.75 million years old, which gave for the first time a real indication of the antiquity of the human family.

Richard Hay began in 1962 a systematic study of the stratigraphy and sedimentological characters of the deposits, and this volume is the report of some 12 years of investigation. It is a most impressive document and must surely be one of the most detailed and thorough studies of a single small area ever published. Each of the component beds is discussed in detail, including lateral variations and facies changes, and the characteristics are used for environmental interpretations and paleogeographic reconstructions. The Olduvai basin is bordered on the south and east sides by volcanoes that have contributed detrital sediment and pyroclastic debris. Hay has shown that Ngorongoro furnished the volcanic floor but Olmoti supplied much of the tuff material in beds I and II. Within bed II, an eolian tuff known as the Lemuta member forms a striking and useful marker horizon. Widespread faulting caused erosion of bed II so that beds III and IV were deposited in a different setting and are themselves separable only in the eastern part of the basin. The former upper part of bed IV is now separated as the Masek beds, which rest unconformably on the earlier deposits, and the former bed V constitutes two units, the Ndutu beds and the Naisiusiu beds, deposited under conditions of tectonic instability. The unraveling of the complex of lithofacies into half a dozen different types of depositional environments has resulted in a very complete history of events in the gorge, well summarized in chapter 11, and there is evidence for a close association of hominid activities with particular lithofacies that indicate a perennial supply of fresh water.

The volume is very well illustrated, both by clear figures and relevant photographic plates, and there is a glossary that will be useful to the many anthropologists and archeologists who will need to read it; appendixes provide radiocarbon dates and a list of all archeological sites. The size and format match those of the Cambridge University Press volumes *Olduvai Gorge, 1951–1961*, to which Hay's book is an essential companion.

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A New World Culture

The Hohokam: Desert Farmers and Craftsmen. Excavations at Snaketown, 1964–1965. EMIL W. HAURY. Published in collaboration with Southwest Parks and Monuments Association by University of Arizona Press, Tucson, 1976. xii, 412 pp., illus. $19.50.

Quibblers will perhaps object to the principal title of this book, which is primarily a report of the results of a year's excavations carried out at one site in southern Arizona. But in reality these excavations together with the excavations Haury carried out at the same site in 1934–35 do indeed constitute the major study of the Hohokam culture.

Rarely does an archeologist have the opportunity that Haury had of returning after 30 years to reexcavate a major site employing an array of new methods and techniques. He and his colleagues have made excellent use of this opportunity. The importance of the Snaketown excavation—and the Hohokam—is well illustrated by the storm of contention regarding chronology, internal development, and extent of Mesoamerican affiliations that followed publication of the original Snaketown report in 1937. For example, in the present report Haury charts (fig. 16.1) no fewer than six greatly differing chronologies for the Hohokam—the one he and his colleagues advanced in 1937, two others by one of the original authors, and three proposed by other outstanding Southwestern archeologists.

The stated objectives of the new research included clarification of chronology (using new dating techniques and methods); expansion of knowledge regarding the earliest Hohokam periods and their presumed origin in the preceding Cochise culture; evaluation of the nature, extent, and time of Mesoamerican influence on the Hohokam; and finally, concentration on the history of irrigation agriculture as developed at Snaketown.

The various chapters and appendixes of the book demonstrate the thoroughness, skill, and craftsmanship of the field and the laboratory studies and the soundness of Haury's conceptualization and interpretation of the data, both new and old. The "new archeology" dedicated to processual studies notwithstanding, Haury states without apology that he has utilized the "historico-cultural approach," noting that processual studies will come in due time—following, as they must, studies such as this.

The new excavations at Snaketown verified the phase sequence established