

papers in this section range from the historically interesting work of John Graunt (1662) on the London Bills of Mortality through the population models of Lotka and Volterra. An anticipation of Leslie matrices by E. G. Lewis concludes the section.

The second and largest part of the book is divided into several subsections dealing with sex ratio, age-structured populations, population density and selection, and some empirical applications. This rather heterogeneous group begins with papers by Darwin, Fisher, and Bodmer and Edwards on natural selection and the sex ratio. Here, a demographic feature (sex ratio) is viewed as being subject to natural selection. The next set of papers (by Haldane, Fisher, and Norton) treat a demographic characteristic (age structure) and its influence on the course of selection. Included is Fisher's important concept of reproductive value. Next in the sequence comes modern work (1970-72) on age- and density-dependent selection. In these papers the interaction between demographic factors and selection emerges more clearly. Indeed, according to the editors, the synthesis marking the birth of demographic genetics occurred only after 1970. From the recent large literature they have chosen papers by Roughgarden on density-dependent selection, Christian on social factors, population density and evolution, Anderson and King on age-specific selection, and one of the Charlesworth and Geisel papers on selection in populations with overlapping generations. The final two papers in this part concern the use of demographic indices to measure selection, potential selection in the case of Crow's Index and actual fitness in the paper by Bodmer.

Part Three takes up the topics of population subdivision, migration and isolation. It begins with a translation of Wahlund's (1928) classic paper on the effects of population subdivision, continues with Wright's paper, "Isolation by Distance," and Bateman's discussion of pollen "migration" in seed crops. Numerous recent papers on population structure are omitted but are cited in the editors' comments. The final section includes three more empirically oriented studies of human populations along with a relatively early (1964) discussion of the application of Monte Carlo simulation techniques by Schull and Levin. Papers by Sutter and Tran-Ngoc-Toan and by Cavalli-Sforza deal with the structure of human populations and Hajnal's paper covers random mating and the frequency of consanguineous marriages.

The editors provide brief but effective

comments on each subsection of the book stating the problem area, summarizing the papers, and directing the reader to further literature.

The diversity of the topics considered in this book shows that demographic factors may be relevant to numerous areas of population genetics. Much of classical population genetics theory tended to sacrifice realism for the advantages of generality and mathematical tractability. The current trend is toward greater realism. Demographic, ecological, and social parameters are being incorporated into evolutionary models. Weiss and Ballonoff have identified some of the historical roots of this "newer" evolutionary synthesis and have thus provided perspective for current researchers. Anthropologists in particular are in an excellent position to contribute to this synthesis since more demographic information exists (and is potentially available) for human populations than for any other organism. Thus, the book is not only useful to those interested in the history of genetics but may also be read with profit by those pursuing or contemplating research in this area.

Earliest Man and Environments in the Lake Rudolf Basin: Stratigraphy, Paleocology, and Evolution. *Yves Coppens, F. Clark Howell, Glynn L. Isaac, and Richard E. F. Leakey*, eds. Chicago: University of Chicago Press, 1976. xxi + 615 pp. \$17.50 (cloth), \$8.50 (paper).

Milford H. Wolpoff
University of Michigan

Combining the content of this book and its price easily makes it the best bargain in paleoanthropology. A book published in 1976 reporting the proceedings of a late 1973 conference is not completely up-to-date, but this reflects the rapid recent growth of knowledge in this field. In the intervening three years a *Homo erectus* cranium (as well as numerous other new specimens) has been recovered from the sub-Okote tuff unit. The name of the tuff unit is new (comprising the former Koobi Fora and BBS tuffs at Koobi Fora and the lower and middle tuffs at Ileret) and the specimens are without parallel. Numerous new hominid remains have been recovered in deposits dating to about three million years from the Afar region of Ethiopia, and Laetolil in Tanzania has yielded a 3.75 million year old hominid sample with the most primitive dental characteristics yet found in a hominid. New data have sug-

gested that what was once considered to be a single wide ranging tuff dated to 2.6 million years (KBS) is actually a number of different distinct tuffs; two of these are dated to 1.6 and 1.8 million years radiometrically, and while there is continued disagreement over the dating it appears that a 2.6 million year date can no longer be sustained. Finally, the name of the lake whose basin is the subject of this conference has been changed to Turkana.

In spite of these more recent developments, the book covers an amazingly wide range of topics in some depth, and no presentation of this magnitude can be easily put out of date. The three major parts cover geology and chronology, paleontology and paleoecology, and paleoanthropology. While no review could hope to do justice to the contributions of all 50 contributors, some of the papers of specific interest to anthropologists are discussed below.

The first section includes basic presentations of the geology, stratigraphy, and dates of Omo and East Turkana sites, along with discussions of several radiometric dating techniques and their specific applications. Papers by Brown and Nash, and Brown and Shuey present radiometric and paleomagnetic interpretations of the Omo sequence, while Fitch and Miller, and Brock and Isaac, present parallel discussions for the Turkana sequence. A brief perusal of the many excellent stratigraphic columns suggests that both sites are well dated throughout, although a more careful reading of the texts reveals that few actual dates have been determined, and that multiple dates from single sites tend to be widely dispersed with many individual dates falling outside the probable error range of others. The more recent reanalysis and redating of the KBS tuff at Turkana has made some of this work obsolete. Moreover, the increasing resolution of the paleomagnetic sequence and the continuing discovery of additional polarity reversals reduces the usefulness of paleomagnetism in providing additional accuracy for age determination, and for relating sites in different areas.

The second section consists of papers reviewing faunal and floral evolution at Omo and Turkana and presents much of Behrens-meyer's important taphonomic work. While the main focus is on the evolutionary and adaptive trends in particular taxa, some of the papers are particularly helpful in environmental reconstruction. Presentations generally parallel each other, with information concerning the same taxa presented for Omo and Turkana by different authors. There are limited cross-comparisons between the two

regions, and it takes a careful reading of papers by Harris on the *Bovidae*, Cooke on the *Suidae*, and Benden on the Proboscideans to discover what was actually one of the most widely discussed issues at the conference: the lack of correspondence between the Omo/Turkana radiometric date relations and faunal relations. These problems have been resolved with the redating and reanalysis of the KBS tuff. Papers by Bonnefille and Carr document a shift from a wooded savanna environment characterizing the earlier Omo deposits to a more open grasslands regime by 2 million years ago. Interestingly, this corresponds to the first appearance of the hyper-robust australopithecines. Behrens-meyer's analysis of the Turkana taphonomy distinguishes several different sedimentary environments, all of which have yielded the various australopithecine "types." At both Turkana and Omo the hominid-yielding environment appears to have been mosaic and no direct evidence associates hominids with any particular habitat.

The third section deals with the fossil hominids and their archaeology. Papers by Leakey (for Turkana) and Howell and Copen (for Omo) provide lists of the up-to-date recovered hominids. A brief description of the more complete remains is supplemented by an excellent series of plates. While this cannot substitute for a more complete series of descriptions such as the *American Journal of Physical Anthropology* presentations of the Turkana material, it does provide some basic information relating time and morphology. A more in-depth analysis of the Turkana remains is presented in papers by Walker, Wood, and Day. Walker presents a thoughtful discussion of the problems underlying early hominid systematics, and outlines the *Australopithecus* adaptive complex with some specificity. Wood presents a largely metric-based evaluation of specimens he believes can be attributed to the genus *Homo*, and Day provides a reasonably detailed discussion of the Turkana postcranial remains. The papers by Walker and Wood, in particular, provide an interesting contrast and demonstrate how greatly differences in approach can alter conclusions drawn from the same data set (see especially, the parallel discussions of ER 1470). It is difficult to compare these papers, largely because of the tendency to substitute taxonomy for description, to sort specimens into taxa without defining them, and to name and attribute specimens to genera without naming or defining the species they are comprised of. In sum, while these presentations are helpful in understanding how the

various authors have sorted the specimens, excepting Walker there is little discussion of the evolutionary processes underlying the variation described, and of the phylogeny of the Pliocene and early Pleistocene hominids.

Analysis of the archaeological evidence from both regions is also presented in this section. One site from Turkana seems to represent a hippopotamus butchering while others may represent home bases or camps. The technology at these early sites is crude, and Isaac suggests that tool manufacture was in part opportunistic, with flakes being struck until one of the appropriate size and shape was formed. (He distinguishes tools which are objects showing retouch or trimming from the far more common artifacts which are the primary result of fracturing stone or bone.) In neither area can the industries be characterized as utilizing any specific design elements (although the possibility remains that this may result from the raw material available for fracture), and with the redating of the KBS tuff and possibly also of the site where an artifact was thought to be associated with Omo member C (discussed by Merrick and Merrick), it seems increasingly likely that recognizable stone artifacts in the basin do not substantially predate 2 million years or about half the span of known hominid occurrences in East Africa. No associations between specific hominids and tool sites can be demonstrated.

Bishop provides a thoughtful summary of the conference in a final paper which subsequent events have proved to be insightful. In all, this volume should be considered "required reading" for serious students of human paleontology. The frankness and detail of many of the presentations prevent easy answers to many of the problems raised. This is not a reflection of the participants, but rather of the state-of-the-art, and of the fact that the problems themselves are difficult.

Monkeys Without Tails: The Story of Man's Evolution. *John Napier.* New York: Taplinger, 1976. 120 pp. \$16.95 (cloth).

Matt Cartmill
Duke University

This brief and breezy primer of human evolution is based on the televised talks which the author gave in 1973 as part of the Royal Institution's series of Christmas lectures for young people. It begins with a general survey of primate adaptations, arranged into the familiar tupaiid-lemur-tarsier-and-so-on *scala Naturae*; this is followed by a sketch of intraspecific variation and evolutionary mechanisms, a skeletal outline of historical geology and primate evolution, a résumé of hominoid behavior and morphology, and a concluding chapter on "The Hallmarks of Mankind," with special emphasis on features of the limbs (the major focus of Napier's own work). Despite the book's brevity and unflinchingly jocular tone, which may put off its more hard-nosed readers, it is surprisingly meaty. Every paragraph has something important or interesting (usually both) to say, and Napier says it in an amusing and frequently witty way which gives the reader the feeling of being in contact with a human mind, rather than the usual committee of editors hired by some publisher to provide English translations of textbook copy handed in by semi-illiterate Ph.D.s. There are of course many places in the text where one might pick a quarrel with some overconfident or oversimplified statement, but the only one that I found really annoying was the assertion on page 32 that "DNA synthesises amino-acids which in turn combine to form the proteins from which the body is built up." Several major problems, ranging from dinosaur extinction to the affinities of KNM ER 1470, are posed without pointing to any "correct" answer, so that the young reader will not be left with the usual misconception of science as a system of established facts. The illustrations are large, clear, numerous, and striking. If you teach a short survey course in general anthropology, and want to dispose of physical anthropology in two weeks or less, this little book might do nicely as a text.

Archaeology

Irrigation's Impact on Society. *Theodore E. Downing and McGuire Gibson,* eds. Anthropological Papers of the University of Arizona, No. 25. Tucson: University of Arizona Press, 1974. xi + 181 pp. \$5.95 (paper).

H. David Tuggle
University of Hawaii, Manoa

Irrigation is one of those topics which anthropologists have talked about more than they have studied. This volume contains