Hominid Evolution: A Search for Models

The Evolution of Human Behavior. Primate Models. WARREN G. KINZEY, Ed. State University of New York Press, Albany, 1987. xvi, 299 pp., illus. $39.50; paper, $14.95. Williams Press, Inc., Series. SUNY Series in Primatology. Based on a symposium, Chicago, Nov. 1983.

In trying to account for the evolutionary origin of the human family, anthropologists have often turned to studies of the nonhuman primates in order to put behavioral flesh on the bones found in the fossil record. This book, containing nine papers from an American Anthropological Association symposium and one invited commentary, reports on the current state of this art.

Fifteen years ago, it was common practice to use an extant primate species as a model for the common ancestor of humans and today's African apes, and for this purpose there were two major candidates: the baboon, for the ecologically minded, and the chimpanzee, indisputably our closest living relative. This book makes it quite clear that such a simplistic approach is no longer possible. Neither the baboon, an early favorite of the male chauvinists, nor the chimpanzee, adopted by the feminist revisionists, is likely to represent our earliest ancestor adequately. Several contributors emphasize that it is a mistake to regard the trajectory of human evolution as a continuum, with a chimpanzee-like creature at one end, a hunter-gatherer at the other, and all the intervening forms strung neatly like beads in between. Humans are unique in many ways, they believe, and any theory that seeks to account for our origins must also account for this uniqueness.

Many of the chapters present ideas that have been developed more fully by their authors elsewhere. Tanner continues to regard chimpanzees as an appropriate model for early hominids and reminds us that selection can be expected to operate on both sexes. Potts makes a plea for human uniqueness and restates his hypothesis that many Plio-Pleistocene sites previously touted as hominid home bases may actually have been stone caches. Continuing to build on his seminal paper (1980) on primate social organization, Wrangham suggests that a comparison of all African apes might identify phylogenetically conservative traits that were present in our common ancestor, although he ends on a note echoed by other contributors: "We are thrown back again on behavioral ecology and other evolutionary principles."

R. L. Susman believes that the pygmy chimpanzee is the most forest-adapted of the African apes and thus is important for understanding *Australopithecus afarensis*. The extent to which this early hominid made use of trees is controversial, but Susman makes an important point: the idea that hominization involved our ancestors' leaving the trees and moving "out onto the savannah" is not supported by the paleoenvironmental data.

Disavowing baboons as direct models for early humans, Strum and Mitchell draw attention to some characteristics of baboon society that could be useful in considering early hominid behavior. Kinzey's essay on monogamy in primates places this mating system, whose role in human evolution is by no means certain, in a wider perspective. Though howler monkeys have neither a close phylogenetic nor a close ecological affinity with early humans, Crockett uses this longest-observed of all primate species to make some telling points about the role of evolutionary biology in human paleontology.

Marks and R. W. Sussman discuss new approaches to behavioral reconstruction, Marks seeking to correlate primate socioecology with cytogenetic variability and Sussman exploring how the dietary patterns, tooth morphology, and intestinal physiology of all primates, including humans, might combine to provide a picture of early hominid subsistence.

If it is no longer feasible to use particular primate species as referential models in reconstructing the behavior of our ancestors, what is the alternative? In an invited essay that spans one-quarter of the book, Tooby and DeVore take up suggestions made by several of the other authors: the best prospects for a solution lie in a rigorous application of the principles of behavioral ecology. These are set forth in great detail, and it is proposed that a strategic modeling approach be applied to all the data available. Their emphasis is on methods, and Tooby and DeVore do not produce yet another version of the transition from hominoid to hominid; nonetheless it is clear that, in contrast to the other contributors, they would assign a major role to hunting were they to devise such a scenario.

Research on human evolution is studded with "creation myths" of varying sophistication and plausibility. Abandoning the pretext that the early hominids were either baboonlike or chimpanzeelike should remove yet another possible source of error, and treating their behavior as a problem in behavioral ecology is a promising avenue of research. Behavioral ecologists are just as capable of creating adaptationist "Just-So Stories" as naïve physical anthropologists, however, and so it is vital that hypotheses generated through this approach be testable if there is to be progress in this most speculative of fields.

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Phosphorite Sedimentation

Phosphate Deposits of the World. Vol. 1, Proterozoic and Cambrian Phosphorites. P. J. COOK and J. H. SHERGOLD, Eds. Cambridge University Press, New York, 1986. xviii, 386 pp., illus. $99.50. International Geological Correlation Programme Project 156, Phosphorites.

This massive volume is a model of productive international cooperation on a project of global scientific and humanitarian importance: developing a better understanding of the world's irreplaceable and dwindling mineral phosphate resources. The first of a projected series of four such volumes, it is the English-language product of 46 authors, more than half having other first languages.

Despite predictable unevenness among its 26 chapters, the production has been skillfully orchestrated by editors Peter Cook and John Shergold, who also provide an orientational introduction and an illuminating summary chapter that deals with the nature and origin of the nearly 350 known deposits reviewed in the book. A general chapter by A. G. J. Notholt and R. P. Sheldon summarizes the distribution of the 14×10^9 tons of identifiable phosphorite ores known to have formed between approximately 2.2 and 0.5×10^9 years ago (about 10% of the known global resource). The remaining 23 chapters consist of regional reviews, accounts of particular deposits, and interpretative studies that provide much of the database from which the three summary chapters are distilled.

Readers primarily interested in origins or exploration will find the meat of the book in the summary chapter by Cook and Shergold and the immediately preceding chapter on phosphogenesis by S. R. Riggs. All support the classic view of A. V. Kazakov that upwelling is and probably was the primary source of mineral-bearing waters and that warming shallow shelves and platforms at low to intermediate latitudes are favored sites of phosphorite sedimentation.

Cook and Shergold see climatic change and plate tectonism as the primary driving mechanisms, operating at a range of scales