Species of Near-Humans

Evolutionary History of the "Robust" Australopithecines. FREDERICK E. GRINE, Ed. Aldine de Gruyter, Hawthorne, NY, 1989. xxii, 527 pp., illus. $99.95. Foundations of Human Behavior. From a workshop, Stony Brook, NY, March 1987.

Australopithecus came to light in 1924, with the discovery of the famous child skull at Taung in South Africa. More bones of this extinct hominid were found later at Sterkfontein, and in 1938 the first fragments of a new ape-man, different from the Sterkfontein creature, appeared in eroded cave breccias at Kromdraai. Robert Broom called the fossils from Kromdraai *Paranthropus robustus*. After World War II, the search continued, and important discoveries were made at Swartkrans, also in the Sterkfontein valley. By 1959, after Louis and Mary Leakey had uncovered a cranium with very large teeth at Olduvai Gorge in Tanzania, it was clear that these early hominids had lived in East Africa as well as in the south. At first the Olduvai cranium was named *Zinjanthropus*, but it was soon evident that the specimen resembled those already recovered at Swartkrans and Kromdraai. During the next decade, most paleoanthropologists agreed that the Olduvai material, and fossils newly discovered at other sites in Kenya and Ethiopia, should be referred along with the South African collections to the genus *Australopithecus*. The larger hominids from Kromdraai, Swartkrans, and the East African localities then came to be known informally as the "robust" australopithecines.

These intriguing near-humans, grouped into several species, evolved more than 2.5 million years ago. Their anatomy can now be reconstructed from hundreds of fossils, representing parts of the postcranial skeleton as well as skulls and teeth. Body weight for an average individual is estimated as just under 50 kilograms. This is only a few kilograms more than *Australopithecus africanus* at Sterkfontein, so in fact the difference in size between so-called "robust" and "gracile" species is not very large. Pieces of the backbone, pelvis, lower limb, and foot indicate that the "robust" australopithecines were capable bipeds. Brain volume is not much greater than that of an ape, but the early hominids seem to be more encephalized (that is, their brains are larger relative to body size), and they may show cortical reorganization suggestive of the human condition. Faces are long and flattened (concave or "dished" in the East African forms), and the larger crania exhibit impressive crests providing added area for muscle attachment. These features are related to chewing, and the facial skeleton is designed to enhance powerful use of the jaws. The mandible itself is thickened in its lateral branch and heavily buttressed at the front. Premolars and molars are large relative to the anterior teeth and are clearly outsized in comparison to body weight. These cheek teeth have exceptionally thick coatings of enamel. A reasonable assumption, based on biomechanical considerations as well as direct microscopic examination of tooth surfaces, is that the "robust" australopithecines ate substantial quantities of hard foods, such as seeds and nuts. Their diet probably differed from that of *A. africanus*, which may have included more leaves and softer fruits.

These are just a few of the new findings or confirmations of earlier ideas that are packed into this volume, which provides a thorough appraisal of what is known or can be surmised about the evolutionary biology of an important branch (or branches) of the human phylogenetic tree. In all, 34 contributors have prepared 29 chapters, along with a foreword (Clark Howell) and a final summary (Grine). Specialist studies of anatomy are well represented, and there is attention to limb proportions as well as body size. One author describing hand bones from South Africa claims that the Swartkrans hominid possessed a precision grip and was able to fashion simple tools. Worked stones occur in the same deposits, as do pieces of long bone and horncores that may be digging tools. However, remains of *Homo* are also present at the site, so the identity of the tool-maker is not obvious. The mandible is analyzed in relation to bending and twisting movements that apply during powerful mastication. Tooth morphology and wear patterns are treated in detail, and tooth size variation is used as one basis for discussing sexual dimorphism. Other chapters contain current evidence concerning dating of the sites, reconstruction of the environment, and the influence of climatic change on evolution of the hominids.

Exploration of these topics does lead to controversy, but there is a measure of agreement on many points. Herein lies the strength of the volume, and a number of the papers will stand for some time as useful reviews. An example of matters on which the participants could reach no consensus is the question of how many species are actually present in the fossil record. Answers range from just one to as many as five. Disagreement centers on the East African material but is also apparent with respect to the South African assemblages, where several of the contributors see distinct taxa at Swartkrans and at Kromdraai.

If paleontological species are to be viewed as real entities with separate evolutionary histories, then recognizing and diagnosing them is crucial. Since this primary issue has not been resolved, it is not surprising that there is so much confusion about the relationships of the "robust" australopithecines to one another and to other hominids. Different cladograms, trees, a "phylogenetic plant," and some plain speculation are advanced in at least half a dozen chapters. Though some of these scenarios are certainly more plausible than others, choosing among them is difficult. A particular sticking point, here and also in the case of species identification, is the status of the skull known as KNM-ER 17000. Discovered in 1985 in deposits to the west of Lake Turkana, this important specimen is discussed by Alan Walker and Richard Leakey, who regard it as an early representative of *Australopithecus boisei*. Other authors argue that KNM-ER 17000 belongs to a different species that may or may not be linked directly to *A. boisei* as documented in later deposits elsewhere in the Turkana basin and at Olduvai. A major question is the role played by KMN-ER 17000 in relation to the "robust" australopithecines of South Africa.

Such questions will not be settled right away. It is likely that the principal viewpoints have been developed about as fully as the present evidence allows. KNM-ER 17000 is after all a single, incomplete specimen, and nothing is known about variation within the population from which this individual is drawn. New fossils are required. Even without more bones, however, the biology and behavior of some "robust" australopithecine species can be documented in impressive detail. As this book makes clear, our close evolutionary cousins are well worth studying.

G. PHILIP RIGHTMIRE
Department of Anthropology, State University of New York, Binghamton, NY 13901