

The Strapping Young Ancestor

The Nariokotome *Homo erectus* Skeleton. Alan Walker and Richard Leakey, eds. 457 pp. Harvard University Press, 1993. \$125.

Book-length monographs are a rare species in human paleontology. Most longer analyses of individual collections or overviews of taxa are published as lengthy book chapters (such as F. C. Howell, "Hominidae," in *Evolution of African Mammals*, V. J. Maglio and H. B. S. Cooke, eds., 154–248. Harvard University Press, 1978) or in an academic series that has low circulation (such as A. P. Santa Luca, "The Ngandong Fossil Hominids." *Yale University Publications in Anthropology* 78, 1980, 1–175). For reasons not least related to the vagaries of publisher marketing and historical precedence, it is far more likely for archaeological paleoanthropologists to publish their work in such books than it is for their counterparts in human paleontology. Yet the past five years have been a time of bonanza in this field, especially for those published in English.

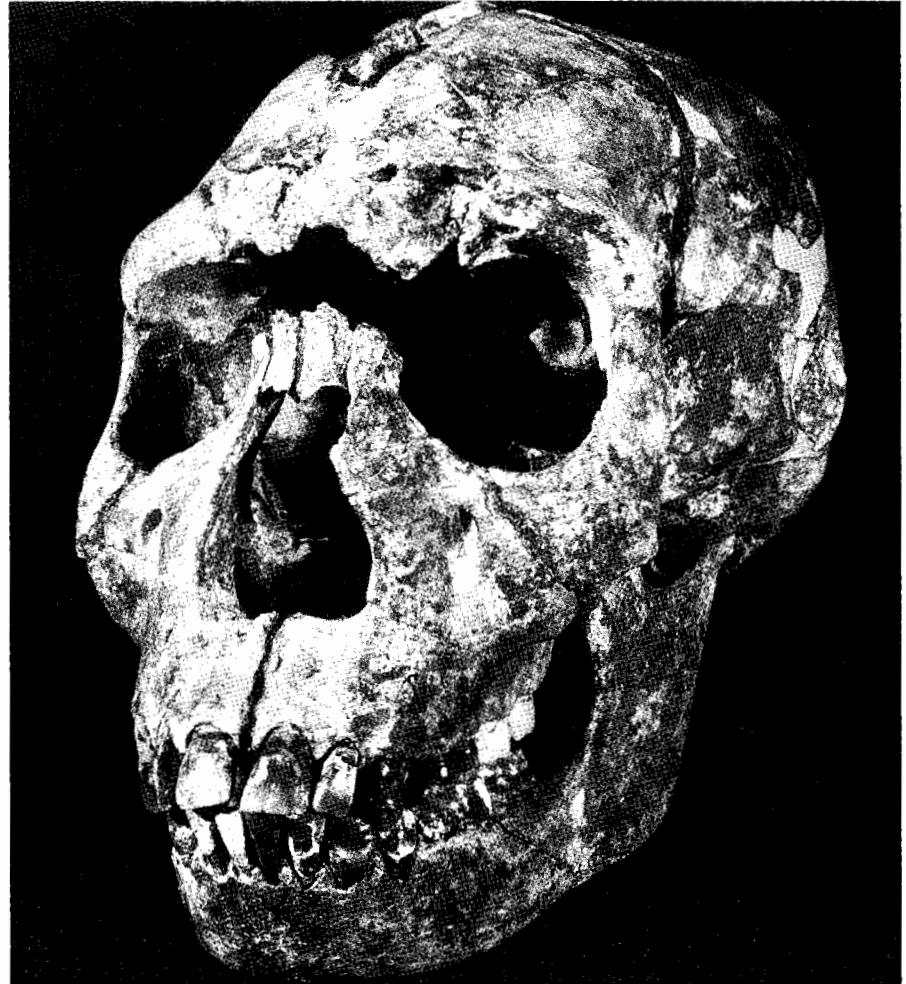
In 1990, Philip Rightmire published his slim but extensive survey of the morphology of *Homo erectus*, the last extinct species preceding our own (*The Evolution of Homo erectus*, Cambridge University Press). The following year saw the long-awaited appearance of Phillip Tobias's two-volume assessment of a still-earlier form (*Olduvai Gorge, Volume 4. The Skulls, Endocasts and Teeth of Homo habilis*. Cambridge University Press). Then in 1992, there was Bernard Wood's exemplary volume on the range of fossils from east of Lake Turkana (*Koobi Fora Research Project, Volume 4, Hominid Cranial Remains*. Oxford University Press).

Now the decade has a fourth *magnum opus*, but one with a rather different approach and focus. Although the three preceding books were authored singly and examined numerous fossils spanning up to 1.5 million years of time, in this tome Alan Walker (with Richard Leakey) has drawn on the varied expertise of 14 other researchers—five of whom have present or past connections with his department of anatomy at Johns Hopkins—to elucidate the biology of a single individual, whose remains were recovered in a gully on the western side of Lake

Turkana, in northern Kenya. The specimen is formally known as KNM WT 15000 (its Kenya National Museum catalogue number), but it has been aptly termed the "strapping youth."

A brief digression on human evolution may help to bring more distant colleagues closer to ringside. Modern humans belong to *Homo sapiens*, a species that originated either around 100,000 years ago—for those who define it strictly to include only anatomically modern people—or over 0.5 million years ago—for those, such as myself, who accept a broader definition that includes the Neanderthals, for example. *H. sapiens* was preceded in most views by *Homo erectus*, a species that first

appeared in Africa and perhaps eastern Asia 1.8 million years ago, and remained extant until around 0.25 million years ago in China and around 0.9–0.6 million years ago in Africa (again depending in part on the definition one accepts). There is a view held among a small but growing minority of paleoanthropologists, which includes Wood but not Rightmire, Walker or this reviewer, that the earlier African populations usually included in *H. erectus* should perhaps be set off as a distinct species, *H. ergaster*, because its members lack some of the "specializations" of eastern Asian *H. erectus* and, therefore, may have been more directly ancestral to *H. sapiens*. Generally, older fossils from such sites as



The cranium and mandible of KNM-WT 15000 in three-quarter view. From *The Nariokotome Homo erectus Skeleton*. (Courtesy of Harvard University Press.)

Olduvai Gorge and Koobi Fora have often been included in *Homo habilis*—see Tobias's treatment. But others, including Wood, support the view that the variation observed in this sample is greater than acceptable for a single species, and they recognize the larger individuals (otherwise males of a strongly dimorphic species) as *H. rudolfensis*. Based on present evidence, these earliest members of *Homo* first appeared after 2.5 million years ago and continued until 1.7 million years ago or later.

The majority of the human fossils that belong to all of these species are fragmentary remains: parts of a skull, jaw or limb bone, or even a single tooth. The specimen treated in this volume preserves more of the skeleton than any other such fossil before the far younger Neanderthals, a few of whom are about equally represented. The famous "Lucy" skeleton of the much older *Australopithecus afarensis*, by comparison, lacks not only hands and feet, as does the Nariokotome individual, but also most of the cranium, rib cage and backbone, which are well preserved here.

The volume is divided into three major sections, following a refreshingly brief editors' introduction. Part I, "The Site," includes four chapters on geological and paleontological topics. Between 1968, when work began in the Koobi Fora region, and the early 1980s, a succession of geologists and stratigraphers attempted, to no avail, to clarify the sequence and age of fossiliferous deposits. But in Frank Brown and his colleagues from the University of Utah, these complex rocks met their match. In this volume, Brown and others date the fossil to 1.53 ± 0.05 million years ago, and they interpret its burial site (NK3) as a marshy grassland, which was probably seasonally flooded. Few other mammalian fossils were recovered at NK3, but studies by John Harris and Meave Leakey, of similar-age fauna taken from neighboring sites, support the idea of a marshy region at a lake's edge, albeit with woodlands and thickets on nearby hills and in patches within the grassland. Walker reviews the taphonomy, the term used for site-formation patterns, of NK3, and he seeks to reconstruct both the cause of the youth's death and the details of that event's aftermath. The only abnormality he can find is a minor periodontal lesion in the lower jaw that might have led to death by septicemia. After falling or being washed into the swamp, the corpse floated face down in one place where many of the front teeth fell out, and then it drifted back and forth, decomposing, being trampled by large herbivores and partially eaten by turtles and catfish, before it eventually fossilized.

Part II, "The Specimen," presents brief descriptions, illustrations and comparisons of all the preserved elements in three chapters written by the editors and

by Barbara Brown, who collaborated on the analysis of fossilized teeth. A separate catalogue number was given to every one of the 80 parts of the cranium and mandible that were recovered. Each individual bony element is illustrated in several standard views, usually at its natural size. These figures make it possible for the reader to reproduce many of the observations of the authors, although the mottled coloration and variable albedo of the bones make one wish for photographs of sharp casts for comparison.

The skull and teeth demonstrate both the juvenile age at death of the NK3 individual and its archaic morphology, which seems to be most comparable to that of *Homo erectus*. Detailed comparisons are provided with specimens from other Turkana sites and with the extensive sample of *Homo erectus* teeth from Zhoukoudian, China. Although the matter is not discussed directly, WT 15000 is clearly distinct in that it has smaller teeth and jaws than those of the smallest Olduvai example of *Homo habilis* (OH 13). But they are of similar geological age, which suggests that a species that disappeared in the Turkana Basin may have lived on for several hundred thousand years at Olduvai.

Part III, "Analytical Studies," includes eight technical chapters and a survey of the importance of the NK3 find. There is not space to review the many significant findings of the detailed but somewhat *ad hoc* investigations. Separate chapters treat the vertebral canal, the thoracic and lumbar vertebrae, the pelvis and the rib cage, but no further attention is paid to the long bones (in terms, for example, of locomotion and agility), except where the chapter on body size interprets their length. Nor are the teeth examined other than to help in determining the age of the strapping youth at the time of his death. Among the topics covered here in detail, the discussion of age and body size are among those of greatest interest. Holly Smith provides a detailed interpretation of dental development in WT 15000, concluding—with some uncertainty—that his growth pattern was intermediate between those of modern humans and of chimpanzees. This conclusion provided the basis on which the specimen's age of 9 to 10 years was calculated, as well as the notion that *Homo erectus* individuals probably did not undergo the adolescent growth spurt characteristic of modern 12- to 14-year-olds.

In contrast, Christopher Ruff and Alan Walker evaluate body size and shape mainly from analyses of limb-bone dimensions, beginning with the idea that the NK3 youth was 11 to 12 years old at his death and that he would have experienced an adolescent growth spurt before attaining full adult size. It is not completely clear why they ignored the results

of Smith, their colleague who had been invited to examine these questions, but they apparently opted for her less-preferred hypothesis that modern humans beings are the best—if not sole—referent for understanding growth in *Homo erectus*. From these assumptions, Ruff and Walker arrive at the widely publicized conclusion that the specimen was approximately 185 centimeters tall (less a bit due to lower skull height) and 68 kilograms for the extrapolated size of an adult. They further proposed that the specimen had an elongated body build as seen in modern Africans living in similar environments. (That morphology was attained as a result of analogous ecological adaptation, rather than direct ancestor-descendant links.)

The final chapter by Walker surveys many of the preceding findings and places them in a broader perspective, although most points would have been better placed in the relevant chapters. For example, he notes that not only are other early African *Homo erectus* tall and rather weighty, but the femora from Zhoukoudian yield weight estimates that are only slightly less, suggesting a rather constant body form over an interval of one million years. Other features such as dental size and shape, as well as cranial contours, are similarly stable over the life-span of this taxon. Walker reiterates the view that *Homo erectus* is a single long-lived species found in both Africa and Asia. But here he considers alternatives, such as those proposed by Wood and others. He agrees with the latter group that the mandible of ER 992 (the holotype of *H. ergaster*) is an excellent match for that of WT 15000, and he further places ER 820 and ER 730 as still younger and older examples, respectively, of the lower jaw of this African population. A brief discussion of the ancestry of *H. erectus* adds only the idea that if *H. habilis*, (broadly defined) is the ancestor, a punctuational event would be required. But this need not be the case, however, if the larger late Pliocene fossils are removed to *H. rudolfensis*, which became extinct without issue.

Few errors can be found among the details. In an otherwise excellent study of the pelvis, Walker and Ruff argue for a humanlike secondary altriciality (continued rapid brain growth after birth), but the brain-size calculations are questionable. They note that modern human brains grow by a factor of 2.5 from birth to the first birthday and then add an amount equal to the birth value by adulthood; in other words, the brain weight at birth is two-sevenths, and at one year five-sevenths, of the adult value. Estimating the brain size of a neonatal *Homo erectus* at 200 grams from the WT 15000 pelvic canal, they arrive at a size of 700 grams after one year, plus 200 more for the predicted adult

value of 900. This is, however, an increase factor of 3.5, not 2.5; only by using the formula of a neonatal brain value of 260 grams, which is significantly higher than their maximal estimate of 240 grams, would the human equation work.

The volume is expensive, but it has been extremely well produced, with care

given to technical details, including paper quality, binding and illustration reproduction, usually found only in art or "coffee table" books. Although the range of comparative data provided may not be as broad as those in Franz Weidenreich's monographs on the Zhoukoudian sample, and some aspects of the analysis are

still incomplete, this is nonetheless a work of which the editors and authors may be justifiably proud. It surely belongs in the library of any practicing or prospective paleoanthropologist, as well as in university collections.—*Eric Delson, Anthropology, Lehman College, City University of New York*