PALEOANTHROPOLOGY

A New Body of Evidence Fleshes Out *Homo erectus*

The long-legged human ancestor *Homo erectus* is known for breaking records: It has been seen as the first globetrotter, the first inventor of stone hand axes, and the first human to dramatically expand its brain and to reach the height of people today. But such views of the body of *H. erectus* rely heavily on a single partial skeleton of a strapping youth from Nariokotome, Kenya. Now the discovery of incredibly rare trunk and limb bones of early *H. erectus* shows that the species wasn't always so tall and brainy—and, according to some interpretations, suggests that it may have emerged in Asia, not Africa.

In this week's issue of *Nature*, researchers unveiled 32 postcranial bones from three adults and a teenager who lived 1.77 million years ago at Dmanisi, Georgia. The hominids resembled the Nariokotome Boy but would have stood only as high as his shoulders. "All of the individuals are small—they are not NBA players," says team leader David Lordkipanidze of the Georgian National Museum in Tbilisi. Although their feet and body proportions are modern, the Dmanisi skeletons had more primitive shoulders and arms and are considered the most primitive members of *H. erectus* yet found.

But not everyone agrees. The bones are so primitive that a few researchers aren't even sure they are members of *Homo*. "They are truly transitional forms that are neither archaic hominins nor unambiguous members of our own genus," says paleoanthropologist Bernard Wood of George Washington University in Washington, D.C.

The debate reflects how little is known about the murky period at the dawn of our genus, partly because there are so few fossils of postcranial bones. The famous partial skeleton of Lucy offers a view of *Australopithecus afarensis*, which lived 3.6 million to 3 million years ago. But the next good window into body anatomy doesn't appear until 1.55 million years ago, with the 12-year-old Nariokotome Boy from Kenya. He had a dramatically bigger brain and would have stood about 180 centimeters tall had he survived to adulthood. "We've got Lucy's body and then Nariokotome, and this gap in the middle with a lot of scrappy stuff in between," says paleoanthropologist Susan Antón of New York University. The earliest of those in-between fossils have been called *H. habilis*, which is something of a grab bag species for specimens too small or primitive to be considered *H. erectus*.

The remarkably well-preserved Dmanisi fossils, among the earliest members of *H. erectus* found anywhere, fall into that gap. The postcranial bones, some of them articulated with each other, fit nicely with four previously published small skulls. The skeletons suggest that the Dmanisi people ranged from 145 to 166 centimeters tall and weighed between 40 and 50 kilograms—bigger than an australopithecine but on the very low end of the range for modern humans. These small specimens also fit with a tiny *H. erectus* skull from Kenya published last month (*Science*, 10 August, p. 733). But another African *H. erectus* skull is both 225,000 years older and larger, so the species now encompasses a wide size range, perhaps because of sexual dimorphism between males and females or adaptations to varied habitats.

Short people. Skeletons from Dmanisi, Georgia, shown on a forested landscape are surprisingly short-statured.

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The Dmanisi skeletal bones also have other primitive traits: The bone of the upper arm is straight rather than twisted, and the shoulder blades might have been closer to the sides rather than the back. Those traits are seen in australopithecines and also in the tiny 18,000-year-old *H. floresiensis* from Indonesia (*Science*, 19 May 2006, p. 983). Nariokotome Boy's upper arm bone is incomplete but looks relatively straight. In any case, the Dmanisi bones suggest that a dramatic reorganization of the orientation of the upper arm and shoulder, which allows overhead throwing (and piano playing), came relatively late in the evolution of humans. Yet the small-brained Dmanisi people were adept at using their archaic arms to butcher meat with stone tools, says co-author Christoph Zollikofer, a neurobiologist at the University of Zurich, Switzerland.

The fossils' small size might suggest they belong to *H. habilis* or a new species, but their more modern traits, such as long legs and modern body proportions, place them in *H. erectus* and show they were adapted for long-distance locomotion, says Zollikofer. Their feet are also quite modern, including a big toe that was not grasping, as in apes and australopithecines.

Lordkipanidze thinks the fossils were either very early *H. erectus* or "the best candidates to be the ancestors of *H. erectus*." He suggests that they arose in Asia from an early *Homo* that was part of a very early radiation out of Africa. Some of the Dmanisi fossils' descendents returned to Africa while others spread out later into Asia as full-fledged *H. erectus*. Paleoanthropologist Alan Walker of Pennsylvania State University in State College doesn't buy that scenario. He and Antón prefer a model in which the species arose in Africa and continued to evolve separately on different continents—including at Dmanisi—giving rise to variation as it adapted to different habitats. Either way, "the real story here is variation, variation, variation," says co-author Philip Rightmire of Harvard University. **–ANN GIBBONS**

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