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Fossils in Kenya Challenge Linear Evolution

By JOHN NOBLE WILFORD

Two fossils found in Kenya have shaken the human family tree, possibly rearranging major branches thought to be in a straight ancestral line to Homo sapiens.

Scientists who dated and analyzed the specimens — a 1.44-million-year-old Homo habilis and a 1.55-million-year-old Homo erectus found in 2000 — said their findings challenged the conventional view that these species evolved one after the other. Instead, they apparently lived side by side in eastern Africa for almost half a million years.

If this interpretation is correct, the early evolution of the genus Homo is left even more shrouded in mystery than before. It means that both habilis and erectus must have originated from a common ancestor between two million and three million years ago, a time when fossil hunters had drawn a virtual blank.

Although the findings do not change the relationship of Homo erectus as a direct ancestor of Homo sapiens, scientists said, the surprisingly diminutive erectus skull implies that this species was not as humanlike as once thought.

Other paleontologists and experts in human evolution said the discovery strongly suggested that the early transition from more apelike to more humanlike ancestors was still poorly understood.

The challenge to the idea of a more linear succession of the three Homo species is being reported today in the journal Nature. The lead author is Fred Spoor, an evolutionary anatomist at University College London. Other authors include Meave G. Leakey and her daughter Louise Leakey, the Kenyan paleontologists who are co-directors of the Koobi Fora Research Project that made the discovery. The field work was supported by the National Geographic Society.

The fossils were found east of Lake Turkana in Kenya. It took years to prepare the specimens for study and to be sure of the identification of the species, the scientists said. University of Utah geologists determined the dates of the fossils from volcanic ash deposits.

The most recent fossils of the habilis species known before now were 1.65 million years old or older. Some fragments of fossils with apparent habilis attributes have been dated as early as 2.33 million years old.

In recent years, scientists not involved in the project said, discoveries were hinting at possible overlap between habilis and erectus. But the implications were considered so profound that little was said about these dates, pending more conclusive evidence.

The most recent Homo habilis that had been known was about the same age as the earliest Homo erectus,

said Daniel Lieberman, a professor of biological anthropology at Harvard University. “Now we have extended the duration of the habilis species, and there’s no doubt that it overlaps considerably with erectus.”

In their report, Dr. Spoor and his colleagues wrote, “With the discovery of the new, well dated specimens, H. habilis and H. erectus can now be shown to have co-occurred in eastern Africa for nearly half a million years.” The fact that the two hominid species lived together in the same lake basin for so long and remained separate species, Meave Leakey said in a statement from Nairobi, “suggests that they had their own ecological niche, thus avoiding direct competition.”

In any case, Dr. Leakey said, “Their coexistence makes it unlikely that Homo erectus evolved from Homo habilis.”

Dr. Spoor, speaking by satellite phone from a field site near Lake Turkana, said the evidence clearly contradicted previous ideas of human evolution “as one strong, single line from early to us.” The new findings, he added, support the revised interpretations of “a lot of bushiness and experimentation in the fossil record.”

But Dr. Spoor said the second fossil, the 1.55-million-year-old erectus skull, was probably the more surprising discovery. “What is truly striking about this fossil is its size,” he said. “It is the smallest Homo erectus found thus far anywhere in the world.”

The scientists reported that the individual was a young adult or “a late subadult.” Its size was closer to that of a habilis than previously known erectus fossils. But the distinctive ridge on the cranium, the jaw and teeth and the shape of the neck are all characteristic of erectus.

From the skull’s small size, the scientists concluded that Homo erectus was, in one important respect, less humanlike than had been previously assumed. Other erectus skull and skeletal fossils had seemed to show erectus to be the first human ancestor that was like us in so many ways, except for a smaller brain.

Susan Anton, an anthropologist at New York University and one of the report’s authors, said the small skull pointed up a significant variation in the sizes of erectus specimens, particularly differences between the male and female of the species, or sexual dimorphism. In humans, males are on average about 15 percent larger than females, and the same is true for chimpanzees. Sexual dimorphism is much more striking in gorillas, and apparently also in erectus.

“The new Kenyan fossil suggests that contrary to common belief, this may have been true of Homo erectus,” Dr. Anton said, implying that erectus was not as humanlike as once thought.

Dr. Lieberman of Harvard said, “The small skull has got to be a female, and my guess is that all the previous erectus we have found turned out to be male.”

The new findings, Dr. Lieberman said, highlight the need for obtaining more fossils that are more than two million years old. In addition, he said, they show “just how interesting and complex the human genus was and how poorly we understand the transition from being something much more apelike to something more humanlike.”

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