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September 8, 2011

# New Fossils May Redraw Human Ancestry

By **NICHOLAS WADE**

An apelike creature with human features, whose fossil bones were discovered recently in a South African cave, is being greeted by paleoanthropologists as a likely watershed in the understanding of human evolution.

The discoverer of the fossils, Lee Berger of the University of Witwatersrand in Johannesburg, says the new species, known as *Australopithecus sediba*, is the most plausible known ancestor of archaic and modern humans. Several other paleoanthropologists, while disagreeing with that interpretation, say the fossils are of great importance anyway, because they elucidate the mix-and-match process by which human evolution was shaped.

Dr. Berger's claim, if accepted, would radically redraw the present version of the human family tree, placing the new fossils in the center. The new species, in his view, should dislodge *Homo habilis*, the famous tool-making fossil found by Louis and Mary Leakey, as the most likely bridge between the australopithecenes and the human lineage. Australopithecenes were apelike creatures that walked upright, like people, but had still not forsaken the trees.

Dr. Berger and his colleagues present this claim in five articles in the current issue of *Science* that describe various aspects of the new fossils. As is common in the field of paleoanthropology, the discoverer of a new fossil is seeking to place it as close as possible to the direct line of human descent, while others are resisting that interpretation.

In this particular case, there are many uncertainties regarding the fossil record from that time, including when the human lineage first emerged and how *Homo habilis* fits in the picture.

The principal significance of the new fossils is not that *Australopithecus sediba* is

necessarily the direct ancestor of the human genus, other scientists said, but rather that the fossils emphasize the richness of evolutionary experimentation within the australopithecine group.

“This is really exciting new material,” said Ian Tattersall, a paleoanthropologist at the American Museum of Natural History in New York. “I think it holds the possibility of flinging wide open the question of what Homo is.”

Besides two skulls reported last year, researchers led by Dr. Berger have since retrieved an almost complete right hand, a foot and a pelvis. The bones are especially well preserved because their owners apparently fell into a deep cave and a few weeks later were swept into a sediment that quickly fossilized their bones. The rocks above the cave have gradually eroded away, bringing the fossils to the surface, where **one was found by Dr. Berger’s 9-year-old son, Matthew, in 2008, while chasing his dog.**

That fall into the cave happened 1.977 million years ago, according to dating based on the rate of decay of uranium in the rock layer that holds the fossils.

In the articles in Science, Dr. Berger’s team describes novel combinations of apelike and humanlike features in the hand, foot and pelvis of the new species. The hand, for instance, is apelike because it has long, strong fingers suitable for climbing trees, yet is also humanlike in having a long thumb that in combination with the fingers could have held tools in a precision grip. A cast of the inside of the skull shows an apelike brain, but one that had taken the first step toward being reorganized on human lines.

This mixture of apelike and humanlike features suggests that the new species was transitional between the australopithecines and humans, the researchers said at a news conference on Wednesday. Given its age, Australopithecus sediba is just old enough to be the ancestor of Homo erectus, the first species that paleoanthropologists agree belonged to the human ancestry and which existed 1.9 million years ago.

But the fossils are significant even if sediba is not a direct human ancestor. They are evidence that a ferment of evolutionary experimentation was going on at the time, out of which the human lineage somehow emerged. “If you take sediba as a metaphor for evolutionary change, it is a whole lot more powerful than the claim for direct ancestry,” Dr. Tattersall said.

A similar view was taken by Bernard Wood, a paleoanthropologist at George Washington University. “I think these are some of the most interesting papers that have been published

in recent years,” Dr. Wood said. “But these are probably not the reasons the authors think they are interesting.”

Dr. Wood gave little credence to Dr. Berger’s arguments that *Australopithecus* is a direct ancestor of the human group, saying there was too little time for the small-brained, tree-climbing ape to evolve into the large-brained *Homo erectus*. More interesting, in his view, are the strange combinations of apelike and humanlike features that Dr. Berger’s team has described. The new fossils display the modular way in which evolution operates: they have mostly known features but in novel combinations that have never been seen before.

“It’s clear that though the hand has to be an integrated whole, the parts of the hand evolve as separate modules,” Dr. Wood said. “You can pick a No. 3 thumb from five possible options, say, and pair it with a No. 2 medial wrist and a No. 4 lateral wrist.”

Dr. Wood said that although he had read the five papers quickly “late at night over a glass of whisky,” he believed they would prove to be “a watershed in our understanding of human evolution, even if only to demonstrate that things are pretty complex, and because of this it will be very difficult to link different fossils in an evolutionary sequence.”

In arguing that *Australopithecus* is the ancestor of the human lineage, Dr. Berger dismisses all earlier fossils held to be human, including a jawbone 2.33 million years old discovered in 1994 in Hadar, Ethiopia, by the paleoanthropologist Donald Johanson. The jawbone has some human-like features, Dr. Berger and colleagues write, yet that does not mean the owner of the jawbone was necessarily human. But Dr. Johanson said in an e-mail that the Hadar jawbone “possesses all the hallmarks of *Homo*,” the human lineage, and “places the origins of *Homo* firmly in eastern Africa, at least 400,000 years prior to the dating of *A. sediba*.”

Both Dr. Wood and Dr. Tattersall see Dr. Berger’s discovery as pointing to the great variety of australopithecine apes, from which it will be very difficult to select the particular species that gave rise to humans. Dr. Tattersall believes the leap to humans may have been brought about very suddenly, perhaps by a few critical genetic changes, which is why the transition is so hard to trace in the fossil record.

Dr. Wood praised Dr. Berger for describing the new fossils so quickly. Dr. Tattersall said that Dr. Berger had been “incredibly forthcoming” in giving other researchers access to his fossils instead of hoarding them for his private use, as other paleoanthropologists have been known to do.

“Unlike anything else I can remember in 40 years, they have already sent us full casts of the material they have described, and they will be available to any researchers who want to see them,” Dr. Tattersall said.