

Fossilized teeth provide new insight into human ancestor

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A dental study of fossilized remains found in South Africa in 2008 provides new support that this species is one of the closest relatives to early humans.

The teeth of this species – called *Australopithecus sediba* – indicate that it is also a close relative to the previously identified *Australopithecus africanus*. Both of these species are clearly more closely related to humans than other australopiths from east Africa, according to the new research.

The study, published in the journal *Science*, revealed that both *africanus* and *sediba* shared about the same number of dental traits with the first undeniably human species.

"Our study provides further evidence that *sediba* is indeed a very close relative of early humans, but we can't definitively determine its position relative to *africanus*, said Debbie Guatelli-Steinberg, co-author of the study and professor of anthropology at The Ohio State University.

The research was led by Joel D. Irish, professor of natural sciences at Liverpool John Moores University.

The *sediba* fossils were found in South Africa in 2008 and first described in a series of articles published in *Science* in 2010. That study was led by Lee Berger of the University of Witwatersrand in South Africa, who is also a co-author of this new study.

In this study, Irish, Guatelli-Steinberg and their colleagues extended that work by examining the teeth from *sediba* and comparing them to eight other African hominin species, which include modern humans from Africa, and [extinct species](#) of *Homo*, *Australopithecus*, and *Paranthropus*. In all, the researchers examined more than 340 fossils and 4,571 recent specimens. They also examined teeth from 44 [gorillas](#) for comparison.

The focus was on 22 separate traits of tooth crowns and roots that can give clues as to the relationship between the different species studied.

For example, they measured how much one of the incisors was shovel-shaped. Depending on the species in this study, the incisor may have no depression in the back of the tooth, a faint shovel shape, or a trace of that shape.

Researchers use standardized measurements from the Arizona State University Dental Anthropology System to compare the teeth on these 22 traits.

The researchers found that on 15 of these traits, *sediba* and *africanus* scored the same. *Sediba* shared 13 traits with *Homo erectus*, an early [human species](#), which was comparable to how *africanus* scored.

Sediba and *africanus* shared five dental traits that weren't found in earlier australopiths, further showing their close relationship. Both also share five traits with early humans – *Homo habilis/rudolfensis* and *Homo erectus*—which weren't shared with earlier ancestors, demonstrating the close relationship between these two australopiths and the first humans.

Teeth are an excellent way to study relationships between different species, Guatelli-Steinberg said. They are well preserved in the [fossil](#) record, and researchers can compare large samples, at least for many ancient species.

In addition, most of the dental traits the researchers used in this analysis don't have a selective advantage that could help one species survive over another. That means if researchers see a similar trait in two species, they can be more confident that they shared a common ancestor and that the trait didn't evolve independently.

In many ways, these new dental data support the earlier research on *sediba*, which included analysis of the inside of the skull, hand, spine, pelvis, foot and ankle, Guatelli-Steinberg said.

"All of the research so far shows that *sediba* had a mosaic of primitive traits and newer traits that suggest it was a bridge between earlier australopiths and the first humans," she said.

Guatelli-Steinberg said their dental analysis showed that both *africanus* and *sediba* are more closely related to humans than the famous "Lucy" skeleton fossil found in [East Africa](#) in 1974. This fossil represented a species, *Australopithecus afarensis*, that was at one time was thought to be the closest relative of humans.

Lucy is estimated to have lived 3.2 million years ago. *Sediba* lived 1.977 million years ago, while *africanus* lived between 3.03 and 2.04 million years ago.

"Our research on teeth can't definitively settle if either *sediba* or *africanus* is more closely related to humans than the other [species](#)," Guatelli-Steinberg said. "But our findings do suggest that both are closely related to each other and are more closely related to humans than *afarensis*.

"We need to find more *sediba* remains to help fill in the missing pieces of this evolutionary puzzle."

Provided by The Ohio State University

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