

Cleveland research team uncovers early human ancestors

by John Mangels

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A Cleveland Museum of Natural History-led research team scouring the sun-baked badlands of central Ethiopia has unearthed jaws and teeth of early human ancestors that lived 3.5 million to 3.8 million years ago.

The specimens, whose discovery was announced today at a briefing in the Ethiopian capital of Addis Ababa, are from a crucial period in human evolution that had been sorely lacking in fossils for study.



The Cleveland team found a partial skeleton of comparable age in 2005.

Time-wise, the skeleton, jaws and teeth collectively fill a void between an older hominid group called *Australopithecus anamensis* that lived in Africa 3.9 million to 4.2 million years ago, and the younger *Australopithecus afarensis* species of 3 million to 3.6 million years old represented by the famous "Lucy" fossil.

The newly uncovered fossils should help scientists sort out the relationship between those two species - whether there was a direct line of descent, or a branching of the family tree.

"The current hypothesis, which so many people seem to accept, is that they were ancestral descendents -- that anamensis gave rise to afarensis," Yohannes Haile-Selassie, the expedition's co-leader and anthropology curator at the Cleveland museum, said in a telephone interview from Addis Ababa. "To test that, we need fossils. That's why we think these specimens are really, really important."

The partial skeleton's discovery two years ago was a major find, since its pelvis and leg bones, once cleaned and reassembled, should help researchers judge how well the creature walked upright. Anthropologists consider a two-legged gait a defining evolutionary feature that distinguishes early humans from their more primitive, tree-dwelling ape ancestors.

But a complete lower jaw and teeth the team found in February about a mile from the skeleton site and in the same geological layer of time has the potential to be even more significant. It is more than 3.6 million years old, Haile-Selassie said. (Two other jaw pieces the team found in the same area are slightly younger and probably represent *A. afarensis*, he said).

A view to the southeast at Nefuraytu, a locality within the Woranso-Mille project study area, where researchers found bones of early human ancestors. *Cleveland Museum of Natural History*

The previously discovered skeleton lacked a skull and jaw. Scientists rely on cranial and dental features, especially the jaw contour and the size, shape and thickness of the teeth, to pin down the evolutionary group to which a hominid belongs.

Both *A. anamensis* and *A. afarensis* walked upright. But the jaws and teeth of the two species were markedly different.

A. anamensis' jaw was narrow, its sharply pointed canine teeth were quite large, and the crowns atop its molars were short. *A. afarensis*, which lived as much as 1 million years later and considerably farther north, under presumably different living conditions, had a wider-spread lower jaw, less prominent canines, and molars with taller crowns suited for tougher chewing and grinding. Fossil jaws slightly younger than those found by the Cleveland-led team and classified as *afarensis* show a mixture of those features.



A complete lower jaw (mandible) of Australopithecus from a locality called Nefuraytu located in the Woranso-Mille study area. This specimen is one of the most complete jaws from sites older than 3.0 million years ago.

Cleveland Museum of Natural History

"We don't have enough evidence to show this, but one hypothesis would be that this is one continuously evolving population and *anamensis* evolved gradually into *afarensis*," said Pennsylvania State University anthropologist Alan Walker, the co-discoverer of the *anamensis* species in 1995. "With more specimens from that time period, we're going to be able to look at that and follow it in more detail."

Rather than a single line of hominid descent from 4 million to 3 million years ago, some researchers contend evolution produced a "bushy" family tree, with more than one species splitting away and existing at the same time. By some accounts, *A. afarensis* - whose most celebrated specimen is the stubby partial skeleton nicknamed "Lucy" -- is on a side branch, not the one leading to anatomically modern humans in the *Homo* family.

The newly found jaw and teeth could help clarify Lucy's lineage and address the "bushy versus straight" debate.

"The real question people have right now for the Lucy species, *afarensis*, is what position does it occupy on the human family tree," said University of California, Berkeley, anthropologist Tim White, who co-discovered the species along with Donald Johanson, Haile-Selassie's predecessor at the Cleveland museum in the 1970s.

If *A. anamensis* directly evolved into *afarensis*, fossils from the time period between the two species should "bridge the anatomical distance," White said. "Those are the characters that Yohannes will focus on - the teeth and jaws. It's really important to get a jaw."

Haile-Selassie will spend the next several weeks cleaning the specimens, and months after that comparing them to known *anamensis* and *afarensis* samples. He may not publish his findings for several years.

The fossils will remain in Haile-Selassie's native Ethiopia, but replicas eventually will be displayed in Cleveland. The natural history museum is planning a major expansion that will highlight Lucy and the institution's other significant contributions to early human fossil discoveries. In 2004, for example, Haile-Selassie, White and colleagues identified a hominid species, *Ardipithecus kadabba*, that lived in Ethiopian forests between 5.2 million and 5.8 million years ago.

"Cleveland is kind of the center of human evolutionary studies, along with Berkeley," said museum director Bruce Latimer. "We've got the best fossil finder alive in Yohannes. We have the fossils, the field teams. We will have the world's best hall of human history, bar none."