Early hominid first walked on two legs in the woods

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Ambrose analyzed the teeth of two dozen mammal species found in the same ancient soil layer as *Ardipithecus* in order to help reconstruct its environment. A modern hippopotamus tooth is pictured. Credit: Photo by L. Brian Stauffer, U. of I. News Bureau

Among the many surprises associated with the discovery of the oldest known, nearly complete skeleton of a hominid is the finding that this species took its first steps toward bipedalism not on the open, grassy savanna, as generations of scientists - going back to Charles Darwin - hypothesized, but in a wooded landscape.

"This species was not a savanna species like Darwin proposed," said University of Illinois anthropology professor Stanley Ambrose, a co-author of two of 11 studies published this week in *Science* on the hominid, *Ardipithecus ramidus*. This creature, believed to be an early

ancestor of the human lineage, lived in Ethiopia some 4.4 million years ago.

One of the crucial pieces of evidence to show that Darwin didn't get it right, Ambrose said, was the analysis of carbon isotopes in the soil and in the teeth of *Ardipithecus* and other animals that lived at roughly the same time and in the same location.

The mass of carbon atoms in the atmosphere varies, and during photosynthesis, trees and tropical grasses absorb different proportions of carbon-12, the most common carbon isotope, and carbon-13, which is rare. These isotopes pass into the soil and into the bodies of animals that eat the plants, making it possible to accurately reconstruct the proportions of grass to trees on the landscape and in the diets of the animals that lived there.

Ambrose analyzed stable carbon isotope ratios in the soil in which the bones of 36 *Ardipithecus* individuals were found. He also analyzed the teeth of five *Ardipithecus* individuals and 172 teeth of two-dozen mammal species found in the same ancient soil layer.

The fossil-bearing layer, in the Afar Rift region of northeastern Ethiopia, spans a broad arc about 9 kilometers long. Sandwiched between two layers of volcanic ash that both date to about the same age, it provides a well-focused snapshot of an ancient African ecosystem.

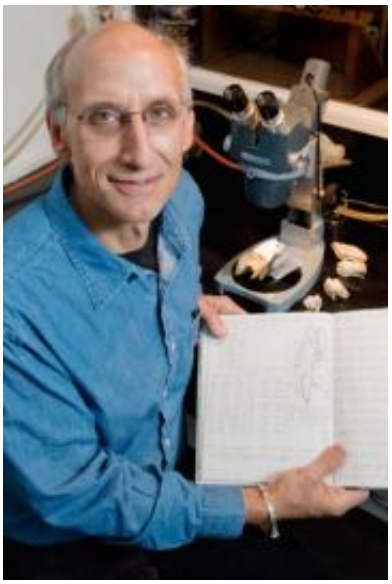
The carbon isotope ratios of the soils indicated that in the time of *Ardipithecus* the landscape varied from woodland in the western part of the study zone to wooded grassland in the east. None of the *Ardipithecus* specimens were found in the grassy eastern part of the arc.

"Fossils of many species are common all the way across the landscape," Ambrose said. "But this species is missing in action from the east side of

the distribution."

Isotopic analysis of teeth found on the site gave a more complete picture of the habitat of the animals that lived and died there, Ambrose said.

"The distribution of plant carbon isotope ratios conveniently separates out grasslands from forests," he said. "And it also separates out grazing animals, like zebras, from browsing animals that eat the leaves off of trees, like giraffes."



Carbon isotope analyses conducted by University of Illinois anthropology professor Stanley Ambrose indicated that *Ardipithecus ramidus* was a woodland creature whose diet resembled those of modern baboons and chimpanzees. Credit: Photo by L. Brian Stauffer, U. of I. News Bureau

The distribution of the fossil browsers and grazers echoed that of the habitat, he said.

"On the west we find lots of *Ardipithecus* fossils and they're associated with a lot of woodland and forest animals," he said. "And then there's a break; *Ardipithecus* and most of the monkeys that live in trees disappear, and grass-eating animals become more abundant."

The carbon isotope ratios of the *Ardipithecus* teeth also tell the story of a woodland creature, he said.

"The diet of the *Ardipithecus* is much more on the woodland and forest side," he said. "It's got a little bit more of the grassland ecosystem carbon in its diet than that of a chimpanzee but much less than its fully bipedal savanna-dwelling descendents, the australopithecines."

This evidence, along with the anatomical studies indicating that *Ardipithecus* could walk upright but also grasped tree limbs with its feet, suggests that this early hominid took its first steps on two legs in the forest long before it ventured very far into the open grassland, Ambrose said.

"Multiple lines of evidence now suggest that they were beginning to leave the trees before they left the forest," he said.

Source: University of Illinois at Urbana-Champaign (news : web)