Change in early human ancestor diet came earlier than thought

September 15 2015, by Bob Yirka

Credit: University of California Museum of Paleontology

(Phys.org)—A team of researchers in the U.S. has found that our early human ancestors expanded their diet to include savannah grasses and other food sources approximately a quarter of a million years earlier than had been previously thought. In their paper published in *Proceedings of the National Academy of Sciences*, the team explains how they tested a variety of fossilized teeth, what they found and the impact the change in diet likely had on the ability of our ancestors to thrive.

Scientists have known for quite some time that the diet of our earliest

ancestors changed, from eating mostly leaves and berries, to grasses, tubers and eventually meat. But the timing of that changeover has been up for speculation, though many have believed it was approximately three and a half million years ago. To pin down the time frame, the researches with this new effort gained access to 152 fossilized teeth found in sites in Africa, from a variety of primates and other ancient animals and carbon tested them to collect evidence of the types of food that the creatures that used them ate.

In looking at the results, the team found that most of the primates had been eating C3 type plants (so named because they have three-carbon atoms) which generally meant tree leaves and berries and some cool weather grasses. In contrast, they found that some species of primates (our early ancestors) had added C4 type plants to their diet as far back as 3.76 million years ago, which included savannah grasses, tubers and sedges. This is an important point in human history, the team notes, because adding such foods to the diet allowed our ancestors to broaden their range because they could survive under more variable conditions—not only were more foods available to them, but the new kinds of food offered more energy. And that, the researchers suggest, set them apart, and led eventually to mass migrations and even greater adaptations.

A field worker shows a fragment of a hominin tooth from Woranso-Mille, Afar, Ethiopia, one of 152 tooth fragments sampled for isotope analysis to find evidence of diet change. Credit: Yohannes Haile-Selassie, Cleveland Museum of Natural History

The researchers note that the changes in diet only came about after changes in teeth and jaws evolved in a way that allowed for chewing the new types of food—and of course, changes in the digestive tract to allow for gaining nutrients and energy from them.

More information: Dietary change among hominins and cercopithecids in Ethiopia during the early Pliocene, Naomi E. Levin, *PNAS*, DOI: 10.1073/pnas.1424982112

Abstract

The incorporation of C4 resources into hominin diet signifies increased dietary breadth within hominins and divergence from the dietary patterns of other great apes. Morphological evidence indicates that hominin diet became increasingly diverse by 4.2 million years ago but may not have included large proportions of C4 foods until 800 thousand years later, given the available isotopic evidence. Here we use carbon isotope data from early to mid Pliocene hominin and cercopithecid fossils from Woranso-Mille (central Afar, Ethiopia) to constrain the timing of this dietary change and its ecological context. We show that both hominins and some papionins expanded their diets to include C4 resources as early as 3.76 Ma. Among hominins, this dietary expansion postdates the major dentognathic morphological changes that distinguish Australopithecus from Ardipithecus, but it occurs amid a continuum of adaptations to diets of tougher, harder foods and to committed terrestrial bipedality. In contrast, carbon isotope data from cercopithecids indicate that C4-dominated diets of the earliest members of the Theropithecus oswaldi lineage preceded the dental specialization for grazing but occurred after they were fully terrestrial. The combined data indicate that the inclusion of C4 foods in hominin diet occurred as part of broader ecological changes in African primate communities.

Press release