Kenyan fossils unveil new hominid species

Excavations in northern Kenya have yielded the remains of a new species in the human evolutionary family that lived between 4.2 million and 3.9 million years ago, according to a new report. These hominids, named *Australopithecus anamensis* by their discoverers, display the earliest evidence of consistent two-legged walking and may have been the ancestors of *A. afarensis,* the species that includes the 3.2-million-year-old partial skeleton known as Lucy.

"We conclude that [a two-legged gait] had evolved at least half a million years before the previous earliest evidence, the footprints at Laetoli, suggests," contend Meave G. Leakey of the National Museums of Kenya in Nairobi and her colleagues. Footprints preserved in volcanic ash at Tanzania's Laetoli site date to about 3.6 million years ago.

Leakey and Alan Walker of Pennsylvania State University in University Park directed excavations at Kanapoi and Allia Bay, two sites near Kenya's Lake Turkana. Craig S. Feibel of Rutgers University in New Brunswick, N.J., and Ian McDougall of Australian National University in Canberra dated volcanic ash above and below fossil-bearing soil by measuring the decay of a radioactive form of the element argon in single crystals of the ash.

A total of 21 *A. anamensis* fossils has been recovered so far at the Lake Turkana sites, Leakey and her coworkers report in the Aug. 17 NATURE.

A. anamensis combines humanlike limbs with relatively apelike jaws and teeth, the researchers assert. Both a partial shin bone and an upper-arm bone, the latter unearthed 30 years ago at Kanapoi by other investigators, closely resemble corresponding bones in living humans.

The mix of features in *A. anamensis* suggests it may have evolved into *A. afarensis,* according to Leakey's group. *A. afarensis* lived from about 4 million to 3 million years ago. Its fossils have been found at two East African sites separated by 900 miles. *A. anamensis,* the researchers contend, has more in common with *A. afarensis* finds from the older site, which lies closer to Lake Turkana.

The new jaws and teeth differ in important ways from those of the earliest known hominid, which lived in East Africa 4.4 million years ago (SN: 10/1/94, p.212). That creature, now considered part of the new genus *Ardipithecus,* may have been a "sister species" to *A. anamensis* and later hominids directly ancestral to modern humans, Leakey and her associates suggest.

However, anatomical variations on the adaptation for two-legged walking may have caused several hominid species to arise around 4 million years ago, they add. Any of those species, not just *A. anamensis,* could have served as the evolutionary root of *Homo sapiens.*

Many questions remain about the evolutionary identity of the Kenyan finds, notes Peter Andrews of the Natural History Museum in London in an accompanying editorial. Two species may have lived at Kanapoi, he maintains. Humanlike limbs found there may be as many as 500,000 years younger than apelike jaws and teeth from deeper sediment, in the British researcher's opinion.

Or, Andrews proposes, the unusual combination of ape and human features in *A. anamensis* may render it distinct from australopithecines such as Lucy. Instead, the Kenyan hominid could have belonged to a lineage that directly linked ancient apes to *Homo,* which arose about 2 million years ago.

Whatever the case, other evidence indicates that early hominids apparently retained a capacity for tree climbing along with upright walking, Andrews holds (SN: 7/29/95, p.71). Evidence of considerable forest and smaller wooded regions at Kanapoi and other ancient hominid sites suggests that creatures such as *A. anamensis* lived much as modern apes do, he contends. — *B. Bower*

Backup digestive enzyme rescues insects

Many plants, after insects have munched on them for a day or so, produce a protein that can weaken or kill their predators by interfering with digestive enzymes called proteases. Exploiting this ability, scientists have genetically engineered experimental crops to churn out these proteins full-time. That way, insects get a dose with their first bite.

But the bugs found a way to turn the tables. Many insects survive the transgenic and normal plants' protein defenses, known as protease inhibitors.

U.S. Department of Agriculture

Can tobacco plants outwit their insect foes' digestive juices?

A team of Dutch researchers say they know the survivors' secret. In response to the protease inhibitors, these insects produce a second type of enzyme that can withstand the inhibitors, assert Maarten A. Jongsma and his colleagues at the Agricultural Research Department–Center for Plant Breeding and Reproduction Research in Wageningen.

"With our transgene, we gave plants more of what they already have, but that turned out in the end not to be too clever," says coauthor Dirk Bosch.

The researchers inserted a gene from potatoes into tobacco plants, they report in the Aug. 15 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES. The potato gene caused the tobacco to produce protease inhibitor II (PI2) continuously. PI2 closely resembles the protease inhibitor that the tobacco plant produces when under attack.

The team then fed leaves from the transgenic plant, a normal plant, and a damaged one that was producing natural protease inhibitors to beet army worms, a foe of tobacco.

To find out how well the different protease inhibitors worked, the researchers extracted enzymes from the insects' guts and tested the enzymes' ability to break down a protein outside the plants. Overall, the enzymes from all the insects acted similarly, says Bosch, no matter which leaf diet they had fed on. Although the protease inhibitors curtailed the activity of one type of enzyme, the insects produced over twice as much of a second class and largely made up their losses.

The scientists also found that Colorado potato beetles reared on potato plants that produce large amounts of a protease inhibitor make enzymes that are insensitive to the inhibitor.

The findings suggest that genetically engineering plants for insect resistance may prove more difficult than originally thought, the authors and others assert. Researchers will need to take a closer look at what chemicals the insects, not just the plants, produce, notes Bosch. Other scientists have found that factors such as temperature can boost insects' resistance to plant toxins (SN: 4/9/94, p.230).

"We are naive newcomers to this game that plants and insects have been playing for a millennium," says Matthew P. Ayres of Dartmouth College in Hanover, N.H.

The inhibitor-induced enzyme may enable the insects to break down the plant protein to use as a nutrient, speculates Frank Slansky of the University of Florida in Gainesville. — *T. Adler*