# Fossil jaw offers clues to human ancestry

Investigators have uncovered a lower jaw in Africa that represents one of the earliest known fossils of a direct human ancestor, or member of the genus *Homo.* The specimen, assigned a preliminary age of about 2.4 million years by its discoverers, turned up in fossil-poor sediments near Lake Malawi, roughly halfway between sites in eastern and southern Africa that have yielded the bulk of ancestral human remains.

Another *Homo* fossil may also date to 2.4 million years ago (SN: 2/29/92, p.134).

The *Homo* lineage apparently originated in the tropics of eastern Africa around 2.5 million years ago, following a gradual shrinkage of habitable land to the south and north caused by global cooling, assert Friedemann Schrenk, a paleontologist at Hessisches Landesmuseum in Darmstadt, Germany, and his colleagues. The species they assign to the new find, *H. rudolfensis,* eventually migrated as far south as Lake Malawi, they state. Another species, *H. habilis,* traveled even farther south between 1.8 million and 1.5 million years ago as temperatures climbed, they argue in the Oct. 28 NATURE.

"Many scenarios of human evolution are still possible," contends Timothy G. Bromage, an anthropologist at Hunter College in New York City who participated in the Malawi excavations. "But this new fossil looks like the large-toothed, large-jawed specimens from eastern Africa that some researchers call *Homo rudolfensis.*"

Microscopic study of tooth enamel shows a pattern of dental development in the jaw similar to that of proposed *H. rudolfensis* fossils, Bromage adds.

The leading proponent of *H. rudolfensis* as a bona fide species, anthropologist Bernard Wood of the University of Liverpool in England, supports Bromage's classification of the fossil jaw. Given the small number of early *Homo* fossils and disagreements over how to group them (SN: 6/20/92, p.408), other scientists decline to assign the jaw to a specific species.

Schrenk has directed the Hominid Corridor Research Project at sites in southeastern Africa since 1983. These excavations have attempted to clarify how animals and hominids, or members of the human evolutionary family, evolved and moved through that part of the continent.

The Lake Malawi site does not contain an abundant trove of fossils. Beach sand propelled by powerful waves on the lake has scoured out much fossil-bearing sediment, Bromage notes. In the past decade, field workers have unearthed about 600 animal bones, mainly from pigs and antelopes. Last year, two joining parts of the hominid's lower jaw appeared. Many teeth remained in their sockets.

For now, Bromage considers the age estimate of 2.4 million years, based on previously known ages of animal bones found near the jaw, to be a best guess. Investigators have not found any datable volcanic ash in the hominid-bearing sediment, but measurements of magnetic orientations in the deposits may eventually produce a more accurate estimate, he says.

The jaw indicates that *H. rudolfensis* evolved a face specialized for chewing, much like that of *Paranthropus,* a smaller-brained hominid lineage that lived at the same time, Wood argues. The find also supports the view that hominids and other mammals at the Malawi site maintained stronger links to eastern, rather than southern, Africa, he asserts.

Tim D. White, an anthropologist at the University of California, Berkeley, says the jaw may represent either a large male *H. habilis* or a *H. rudolfensis* of undetermined sex. Early *Homo* species may have experienced large fluctuations in body size over time, making it difficult to identify them from fossil remains, White contends.

He calls the age assigned to the new specimen "speculative." Still, the jaw shows that early *Homo* species extended south about 1,000 miles from eastern Africa and bore "striking similarities" in anatomy, White holds. *— B. Bower*

# Fighting bugs with bugs to save cassava

"The enemy of my enemy is my friend."

South American farmers are making this Arab proverb a strategy in their fight against insect pests ravaging their cassava crops. Mustering an arsenal of natural enemies, farmers are deploying predatory wasps, a lethal virus, and cannibalistic mites against cassava pests, says Anthony Bellotti, an entomologist at the International Center for Tropical Agriculture in Cali, Colombia (CIAT). The starchy roots of the cassava plant feed 500 million people in South America, Africa, and Asia.

CIAT

*Predatory mite (right) feasts on green spider mite (left), an insect that devastates cassava crops around the world.*

Initial results of an ongoing, four-year field project in southern Brazil and Colombia have shown the potential of biological pest control to reduce the amount of chemical insecticides used and to increase yields at the same time, Bellotti announced at a press conference held last week in Washington, D.C. The briefing was arranged by the Consultative Group on International Agricultural Research, an intergovernmental umbrella organization for 18 agricultural research centers around the world, including CIAT.

Cassava plants are under constant attack from the cassava hornworm and the green spider mite. Both insects defoliate thousands of hectares of cassava fields, killing the plants and reducing yields.

The hornworm "is a voracious feeding machine" that grows up to 5 inches long. "One hornworm consumes about 1,100 square centimeters of cassava leaves" before spinning its cocoon and later hatching as an adult moth, states Bellotti.

Farmers are fighting the hornworms with a predatory wasp that stings and paralyzes the caterpillar, then chops it up and carries the slices home to feed its young. Wasps from one nest can consume 100 hornworms a day, Bellotti notes.

Another weapon developed by Bellotti's group exploits a viral disease. The virus kills the caterpillar but, Bellotti claims, is harmless to other, beneficial insects and to humans. Farmers collect infected hornworms, which exude a milky, virus-containing sap; add water; and grind them up in a blender. When sprayed on cassava fields, this viral pesticide kills 100 percent of young hornworm larvae in two days and older ones in four days, he reports. "In a 75,000-acre trial area, chemical pesticide use went down by 60 percent," Bellotti says, adding that the biological approach cost one dollar for every 14 dollars previously spent on chemical pesticides.

The green spider mite causes even more damage than the hornworm. In Africa, where the mite migrated from its origins in South America, it is largely undisturbed by natural enemies. Surveying South America for such enemies, Bellotti's group found a fungus, a virus, and predatory mites that suck the contents out of the spider mite's body or eggs, leaving behind a dry shell.

Though this project is still in an experimental stage, "field trials in Colombia showed that mite predators can increase cassava yields by 25 percent," says Bellotti. Part of the CIAT pest control regimen is on the way to large-scale implementation, he reported. "The Brazilian and the Colombian governments have approved [the hornworm virus for wide application]. We are also expanding our strategies to Africa." *— G. Strobel*