

# Fossils Put New Face on Lucy's Species

Investigators have recovered and pieced together the first nearly complete skull of the earliest known species in the human evolutionary family, *Australopithecus afarensis*. Fragments of the 3-million-year-old skull, as well as of a number of limbs and jawbones, turned up at the Hadar site in Ethiopia.

Fieldwork at Hadar in the 1970s yielded the first *A. afarensis* remains, including the partial female skeleton known as Lucy.

William H. Kimbel and Donald C. Johanson, both anthropologists at the Institute of Human Origins in Berkeley, Calif., and Yoel Rak, an anatomist at Tel Aviv University describe the new finds in the March 31 NATURE.

"There is no obvious sign of evolution in this prehuman species for about 1 million years," Kimbel says. "Yet later, in only a fraction of that time, [*A. afarensis*] gave

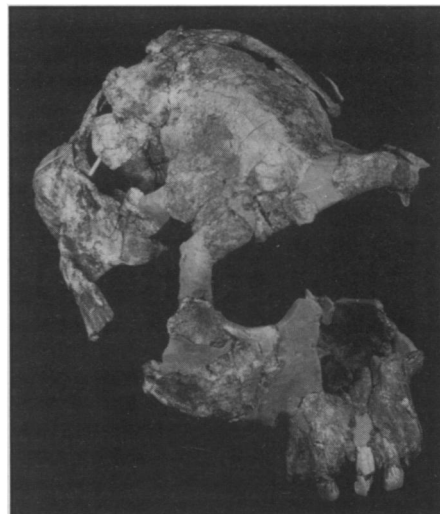
rise to a great branching of the family tree."

The age estimate for the new skull, assembled from more than 200 fragments found in a sandy gully in March 1992, makes it the youngest known example of Lucy's kind. Analysis of two forms of argon in crystals of volcanic rock just above and below where the skull lay established its age. The fossil's anatomy confirms that a 3.9-million-year-old cranial fragment previously found at another Ethiopian site also belonged to *A. afarensis*, the scientists argue.

Lucy herself lived about 3.2 million years ago.

Since 1990, annual fieldwork at Hadar conducted by Kimbel and his coworkers has yielded 53 *A. afarensis* specimens.

Kimbel attributes the Hadar skull to a male much larger than the diminutive Lucy, who stood about 3½ feet tall. The



Institute of Human Origins

*A. afarensis* skull found in Ethiopia

skull and other new Hadar material indicate that *A. afarensis* males were considerably larger than females, although average size differences between the sexes remain unclear, Kimbel notes.

A minority of researchers places smaller and larger *A. afarensis* in separate species. However, later australopithecines — including a lineage that died out 1 million years ago — also featured large size differences between sexes of the same species, writes Leslie C. Aiello, an anthropologist at University College in London in a comment accompanying the new report.

Reconstruction of the three-quarters complete Hadar cranium will yield an estimate of brain size, Kimbel notes.

A virtually complete ulna, or forearm bone, and a partial upper-arm bone found at Hadar also came from *A. afarensis*, the scientists say.

The ulna curves and is long relative to the upper arm, a pattern observed in chimpanzees. But the *A. afarensis* ulna lacks elbow features that allow chimps to support their body weight with the forelimbs while walking, Aiello says.

The thick upper-arm bone contains deep grooves where muscles attached, much like a corresponding *A. afarensis* fossil found at a nearby site (SN: 11/20/93, p.324), Kimbel points out.

Aiello calls the arm bones "ideally suited to a creature which climbed in the trees but also walked on two legs when on the ground."

Some researchers argue that female *A. afarensis* favored tree climbing, as indicated by their curving toe bones.

Kimbel suspects debate about how Lucy's kind moved about will continue. *A. afarensis* clearly could walk efficiently on two legs, "but I don't know if we can say whether they spent time in the trees," he adds.

— B. Bower

## Acid soil blamed for thinning eggshells

DDT became infamous in the 1960s and 1970s for causing birds to produce eggs with dangerously thin shells. The United States and many European countries have since banned the pesticide. Now, calcium deficiency due to acid soil appears to have similar effects on birds, according to a new study of a common European species of passerine known as the great tit.

An increasing number of great tits and other passerines living in forests with nutrient-poor, acidified soils in the Netherlands are producing eggs with thin and porous shells, researchers reported in 1989. A new team has unraveled the series of mishaps responsible for those defects, it reports in the March 31 NATURE.

After ruling out poisoning as the culprit, the scientists concluded that the birds suffer from lack of calcium in their diet because of the scarcity of snail shells on which they normally dine, writes Jaap Graveland of the Institute for Forestry and Nature Research in Wageningen and his colleagues.

"Snails have all but disappeared on acid, sandy soils," says coauthor Arie J. van Noordwijk of the Netherlands Institute of Ecology in Heteren.

The researchers blame the declining snail population on the decreased amount of calcium in the soil, which results from acid rain. The soil's calcium content is 0.3 gram per kilogram of dry matter; 5 to 10 grams is normal, Noordwijk says.

Adding lime to acidified forest soil boosts the snail population to levels comparable to those found in areas with rich soil, other studies find. And when Graveland's team provided the birds in

nutrient-poor localities with shells from snails and chicken eggs, the proportion of nests with at least one defective shell dropped from about 65 percent to about 20 percent, the researchers report. Another source of calcium — spiders — provides only 10 percent of a laying bird's daily requirement, even in areas with rich soil, they find.

"To our knowledge, this is the first experimental evidence for calcium limitation in wild birds," they contend. It also reveals a previously overlooked mechanism by which acidification harms species' nutritional status, they write.

Studies of North American birds that eat snail shells also suggest that fledglings may suffer from deficiencies, says David Winkler of Cornell University, who praises the Dutch study. The researchers from the Netherlands did not look at fledgling health, but they report that they found few shell fragments in the nests for the fledglings to eat.

The study "illustrates what to most people would be an unexpected link between acid rain and bird populations," says Kenneth V. Rosenberg, also of Cornell. "It's something that could go completely unnoticed." Europeans monitor their bird populations much more closely than Americans do, he added.

Though a poor substitute to any snail lover, chicken eggshells provide nourishment for birds from the impoverished forests. They raid local farms and picnic sites for these eggshells to try to make up for their lack of snails, the researchers report.

"They may fly up to a mile or more to get extra calcium," says Noordwijk. — T. Adler