PALEOANTHROPOLOGY

Oldest Members of *Homo sapiens* Discovered in Africa

For more than a century, scientists have wondered when and where modern humans arose—and what they looked like. Genetic evidence has pointed firmly to Africa in the past 200,000 years, but there have been few fossils from the right time and place to back that up.

Now three partial skulls from Ethiopia are putting a face on the earliest modern humans. These ancestors were African, with big brains, robust features, and a taste for hippopotamus and buffalo meat. Dated to 154,000 to 160,000 years ago, the skulls are the first strong fossil evidence that modern humans originated in Africa. "This is the oldest clear example of an early modern human we have found," says paleoanthropologist Chris Stringer of the Natural History Museum in London.

The skulls belonged to two men and a child, and they are being introduced on the cover of this week's issue of *Nature* as the immediate ancestors of modern humans. A team of American and Ethiopian researchers says that the face of the most complete skull already has a "modern gestalt." "It is so similar to ours that there is little doubt it is the face of a direct ancestor," says co-author and paleoanthropologist Tim White of the University of California, Berkeley. The skulls also have cut marks, suggesting that they were defleshed and handled after death, perhaps in rituals for the dead.

Until now, the oldest undisputed modern human remains were skulls dated to 90,000 to 120,000 years ago. They were found not in Africa but in the caves of Skhul and Qafzeh in Israel. The oldest anatomically modern Africans are skull fragments from South Africa dated to 100,000 years ago. Another half-dozen African fossils thought to be 130,000 to 300,000 years old are poorly dated or fragmentary, and they are not enough to prove the leading model that modern humans arose in Africa, says Stringer.

The best evidence for this Out of Africa model has come instead from DNA. Geneticists have consistently traced the oldest types of modern human DNA to ancestors who lived in Africa in the past 200,000 years. Most recently, population geneticist Sarah Tishkoff of the University of Maryland, College Park, reported at a meeting in April that the oldest versions of maternally inherited DNA arose 170,000 years ago and are found in the Sandawe people of Tanzania and the !Kung San of the Kalahari desert, who both may have roots in northeastern Africa.

Now, for the first time, fossils fit the genetic data. The new skulls were discovered on a quick stop in November 1997, when White spotted a butchered fossil hippopotamus skull on the ground near the village of Herto, about 230 kilometers south of Addis Ababa. When the team returned to explore, White sent graduate student David DeGusta and Turkish paleontologist Cesur Pehlevan to survey while he set up a tarp for shade. Both found skulls before lunch. A week later, Berhane Asfaw of the Rift Valley Research Service in Addis Ababa found a child's cranium, shattered into 200 pieces.

It took the team 3 years to clean, prepare, and reassemble the fossils. Then White and Asfaw compared the skulls with 6000 others from around the world. They concluded that the most complete adult skull was clearly a *Homo sapiens*, with a pentagonal shaped vault, wide upper face, and moderately domed forehead. It also had divided brow ridges and a flat midface like modern humans. But the skull's huge vault (1450 cubic centimeters) was slightly above the modern human average. And a few primitive features, such as a flexed bone at the rear of the braincase and protruding brows, link it with more ancient African fossils. The team concluded it was a near-modern and named it *H. sapiens idaltu*, using the word for elder in the local Afar language.

Modern look. This skull of an adult male from Ethiopia is about 160,000 years old, but it already looks like a modern human's.

The site also yielded a surprising mix of stone tool technologies. The team found crude stone hand axes as well as stone flakes produced by a more efficient and sophisticated toolmaking technique. Another puzzle is that the child's skull, in addition to cut marks, had polish on its side and back. "This is some kind of mortuary practice extending well beyond the death of the individual," says White, who adds that the marks most resemble those seen on skulls handled in rituals in New Guinea.

The team next faced the problem of dating the skulls, which was difficult because two were on the surface and all were beyond the range of carbon dating. However, the most complete skull was found embedded in ancient cemented sands. Geochronologist Paul Renne of the Berkeley Geochronology Center used isotopes of argon to date volcanic material in the same layer as the fossil to 160,000 years ago. But the ash in the layer above the fossil, which would give the upper bounds on its age, was contaminated with crystals from older eruptions. So other team geologists traced the volcanic layer to a site dated reliably to 154,000 years ago.

Although a few colleagues are grumbling about whether the subspecies designation is needed, no one disputes that the new fossils are early *H. sapiens*. "This is a great discovery because there is no doubt these fossils are the forerunners of the early modern people at Skhul and Qafzeh," says Harvard University archaeologist Ofer Bar-Yosef, co-discoverer of the Qafzeh fossils.

Researchers also agree that the new fossils do not resemble Neandertals, whose lineage evolved in Europe from 400,000 years ago to about 30,000 years ago. That's important because a minority view of modern human origins holds that living people inherited their DNA primarily from modern humans coming out of Africa but also from Neandertals they met in Europe and other archaic humans in Asia. "It does confirm that Neandertals were not part of the direct ancestry of early modern humans," says Erik Trinkaus of Washington University in St. Louis, Missouri. He adds that it is still possible that these modern Africans interbred later with Neandertals or other archaic people.

The new skulls come from a site where the Middle Awash team has found a remarkable sequence of early human fossils, dating to 1 million years, 600,000 years, and now 160,000 years ago. The sequence shows that species of *Homo* were living in this corner of Africa off and on for a million years, and that they were evolving more modern features over time. "Now we have a great sequence of fossils showing our species evolved in Africa, not all over the globe," says White.

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