ing it from binding. Some researchers think this disruption could cause the microtubules to collapse. The destabilized axons would lose contact with their target neurons—and neurons die when they lose their connections.

The Spillantini group's mutation may also affect tau binding to microtubules, she says, although the mutation is more subtle. It is not in the gene's protein-coding regions but in one of its introns—regions that are spliced out of the messenger RNA made from a gene before the mRNA is translated into the actual protein. In humans, the tau protein occurs in six different forms of varying lengths, depending on where the splices are made and which exons are included in the finished protein. The mutation seems to encourage the cell's protein-making machinery to grind out abnormal amounts of three of the longer forms.

In fact, the brains of MSTD sufferers have several times as much of the longer tau versions as do normal brains, the Spillantini team reports. This imbalance, says Spillantini, may prevent proper binding to the microtubules, which could then destabilize the axons. She notes, however, that the disrupted-axon scenario faces a serious challenge, posed by the genetically engineered mice that make no tau protein yet seem healthy. She favors another possibility: that a disruption in binding leads to an excess of tau floating loose in the cell. Like out-of-work loiterers, the unbound proteins might aggregate and disrupt cell function.

Although Alzheimer's patients don't seem to have any tau mutations, the protein may get more respect from Alzheimer's researchers now that there's more direct proof that tau defects can lead to nerve cell death. Indeed, John Hardy of the Mayo Clinic, whose team discovered the first mutation in the gene that encodes β amyloid, thinks that β amyloid may somehow work through disruption of tau function. That could explain the correlation between the degree of dementia in patients and the abundance of tangles in their brains, he notes. "The pathway from amyloid to dementia is likely to go through tangles," he predicts. The big question now is how the two might interact to make tau into a killer.

Understanding how tau turns deadly could have benefits beyond Alzheimer's and the tau diseases. Hardy and others have noted that a familial form of Parkinson's disease described last year (*Science*, 27 June 1997, p. 1973) is also caused by a mutated protein that accumulates in brain cells. Indeed, Goedert thinks the tau diseases could be a model for understanding how abnormal protein filaments might kill cells in a whole range of diseases, including sporadic dementias, Parkinson's disease, and Huntington's disease. "I would argue that cells die because they have these filaments," he says. Just months ago, tau was a marginal suspect in brain diseases, but now it might help close several other unsolved cases.

**–Gretchen Vogel**

HUMAN ORIGINS

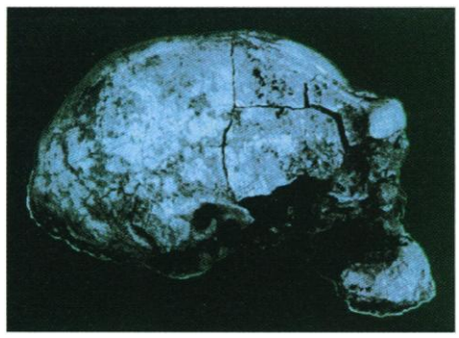
# Old, Old Skull Has a New Look

The origins of our species, *Homo sapiens*, are lost in a gaping hole in the fossil record. Between 1.4 million and 600,000 years ago, traces of human ancestors more or less vanish in Africa, where many researchers believe *H. sapiens* originated. Now a well-preserved skull of an early human found in the northeast African country of Eritrea has landed right in the middle of that gap.

Dated to 1 million years ago, the skull shows a tantalizing mix of ancient and modern features, says Ernesto Abbate, a geologist at the University of Florence in Italy and head of the multinational team—including members from Italy, South Africa, and Switzerland—that reported the discovery in this week's issue of *Nature*. Although it has yet to be studied in detail, the skull "could be evidence of the emergence of *H. sapiens* characters earlier than previously thought," says Lorenzo Rook, a paleontologist at the University of Florence. It also underscores earlier hints that northeastern Africa was a focal point of human evolution, says Tim White, a paleoanthropologist at the University of California, Berkeley: "This discovery is another significant step in establishing the Horn of Africa as the key to understanding human origins and evolution."

The skull was found in the remote, arid lands of the Northern Danakil Depression of Eritrea, about 50 kilometers from the Red Sea and 400 kilometers north of the famed Awash Valley in Ethiopia, which has yielded the remains of several other human ancestors. Rook was walking along a hilly slope in December 1995 when he noticed the right side of the skull, ear-side up, poking out of the sand and rock. "I called to my colleagues, and we immediately realized it was a *Homo* skull," says Rook.

When they had dug it out of the rock, their first impression was that the nearly complete brain case resembles that of *H. erectus*, a human ancestor that appeared in Africa 1.7 million years ago and persisted until at least 1.4 million years ago in Africa and much later in Asia. Like *H. erectus*, it has a pronounced brow ridge and elongated brain case, among other features, says Rook.



E. ABBATE / UNIVERSITY OF FLORENCE

**Filling a gap.** The Eritrean skull dates from the dawn of *Homo sapiens*.

The new skull would be the youngest African *erectus*. To date the stratum where it was found, the team looked in the rocks for the signature of known reversals in Earth's magnetic field and identified fossils from mammals that went extinct at known times. The resulting age of 1 million years puts the fossil right between the youngest *H. erectus* found in Africa—a 1.4-million-year-old fossil from Olduvai, Tanzania—and the oldest archaic form of *H. sapiens*, a 600,000-year-old specimen from Bodo, Ethiopia.

A closer look at the fossil revealed modern-looking features mixed with the old. The skull is remarkably narrow, reaching its greatest width near the top, as in *H. sapiens*, rather than at the base, as in *erectus*. This suggests that some traits typical of *H. sapiens* had begun to develop 200,000 to 300,000 years earlier than expected, says Rook. "It contributes to the perception that *H. erectus* and *H. sapiens* have no distinct boundary between them," adds paleoanthropologist Milford Wolpoff of the University of Michigan, Ann Arbor, who has seen photos of the skull.

But others say such conclusions are preliminary because half the skull is still embedded in rock. Further hampering study, the skull, along with two incisors and pelvic fragments, has been kept under wraps at the Eritrea National Museum in Asmara. Eritrea, a nation just 5 years old, has yet to write regulations governing the study of such antiquities. The Italian team is working with Eritrean scientists and officials to arrange for the skull to be restored and studied.

Ultimately, the fossil could help anthropologists make sense of other fossils found outside Africa that fall in the critical time gap, such as 800,000-year-old remains at Atapuerca, Spain, and *H. erectus* in Asia. No one knows whether these creatures are evolutionary dead ends or transitional players on the path to *H. sapiens*, but the new skull may help to sort out where they fit on the family tree. "This is clearly going to be a major player in future scenarios, but it has to be studied," says Ian Tattersall, a paleoanthropologist at the American Museum of Natural History in New York.

**–Ann Gibbons**