# Jawboning Prehistory

One day last month, Hunter College anthropologist Tim Bromage woke up at the site of his team's dig in Malawi in the mood for excitement. "I climbed out of the tent and yelled over to the breakfast table, 'This is going to be a big day,' " recalls Bromage. "It's the only time I ever said it." And he was right. Later that day his team found a fossil jawbone that could help advance one of the hottest and most tangled debates in paleoanthropology. The finding was so spectacular that the team cut short its field work to travel to South Africa to study fossils at the Transvaal Museum and the University of Witwatersrand for comparison. While there, they consulted the university's eminent anthropologist Phillip Tobias, and together tried to figure out what to make of the specimen, UR-501, which came from a hominid living between 2 million and 3 million years ago.

In Bromage's words, the cause of all the excitement is that "this is the first hominid specimen ever recovered from the space between East Africa and South Africa." And because of that geographical origin, it could help shed light on the crucial evolutionary question of how the hominids from those two fossil-rich areas are related to each other.

So far, paleoanthropologists have drawn many possible evolutionary trees based on finds from Eastern and Southern Africa—specimens representing a half-dozen types of hominids, loosely grouped in the genus *Australopithecus.* But the is much disagreement over how they are related to one another—or even whether they represent one species or a half-dozen species or even two genera. One specific question mark in that jigsaw puzzle has been whether a type of hominid found in South Africa—*Australopithecus africanus*—was descended from one living in East Africa: *Australopithecus afarensis*, which is considered the rootstock of modern humans. Since the new jawbone bears a resemblance to both of those gracile hominids and lived in a region between the two, Bromage hopes it may help anthropologists draw in the evolutionary branch that links them.

Bromage and his co-leader, Friedemann Schrenk, a paleontologist at the Hessisches Landesmuseum in Germany, didn't exactly set out to find that branch of the human family tree. But they did set out (funded by the Deutsche Forschungsgemeinschaft) to study the hominid corridor linking southern and eastern Africa. They chose a little-studied site in Malawi known as the Chiwondo Beds, an arid region that is a relatively young and active western branch of the Great African Rift system, where the African continent is splitting apart. Although most of the fossils have been destroyed by earth motion and erosion in the Chiwondo Beds, researchers Christian Betzler, Uwe Ring, and Albrecht Gorthner—working with Bromage and Schrenk—collected flora and fauna and reconstructed the ancient geology, climate, and ecology. That proved a long and painstaking process, and after half a dozen field seasons the team was ready for some faster-paced excitement. And they got their wish: UR-501 surfaced.

Although the team's analysis of the mandible is preliminary, they think it shows features that could tie it to fossils from both East and South Africa. "The question is: Will this specimen look intermediate? Will it look like East African or South African species?" asks Bromage. "We don't know yet because lower jaws are difficult to characterize, and we also have the geographic intermediacy to contend with. One looks at it and says, 'Oh gosh it's a little robust.'" But, on the other hand, says Schrenk, the teeth are not as big as those of the largest gracile *Australopithecines*, so it could be considered gracile.

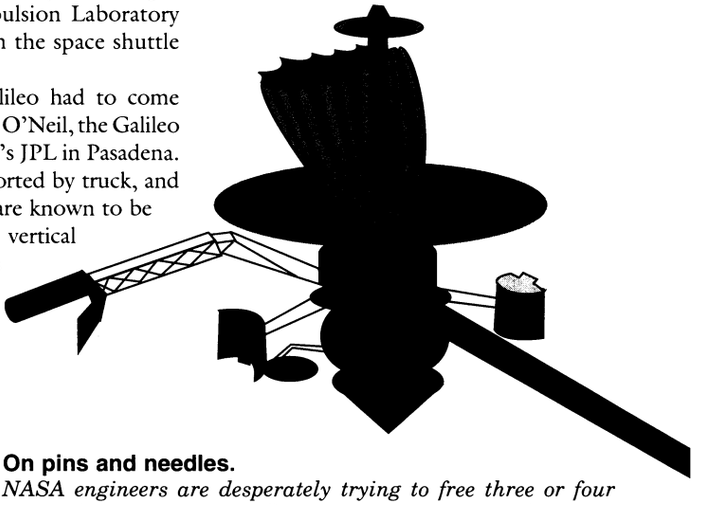
Indeed, the group's preliminary interpretation is that the specimen was from a gracile rather than a robust lineage, which could make it a candidate ancestor for modern human beings. And if it is an intermediate hominid between *A. afarensis* and *A. africanus*, it will have provided a key evolutionary link. But one radical idea goes even further than that—holding that the jaw comes from a species that links *Australopithecines* and *H. habilis*, the first member of the *Homo* line. Ideas like those are going to take time to be tested. Says Schrenk: "This specimen is going to need a hard and long look from a new biogeographical perspective." But at the very least, it will have begun to fill on a large blank area on the map of human origins in Africa. ■ ANN GIBBONS

# Has Challenger Knocked Out Galileo?

When the Challenger space shuttle exploded in January 28, 1986, the immediate impact was obvious: The tragic loss of six astronauts and a schoolteacher, and the derailment of the nation's space program. Now 5 years later it appears the disaster has claimed yet another victim: the $1.3 billion Galileo spacecraft, which is limping toward Jupiter with a broken antenna. At press time, NASA engineers told *Science* that they think they have found the cause for a failure that could essentially scuttle the entire mission: The lubricant used on the antenna's joints was rubbed away as the craft was shipped back and forth between the Kennedy Space Flight Center and the Jet Propulsion Laboratory (JPL) due to the delay in the space shuttle program.

"After Challenger, Galileo had to come back to JPL," says William O'Neil, the Galileo project manager at NASA's JPL in Pasadena. "The antenna was transported by truck, and the (antenna's) ribs that are known to be stuck were lying in the vertical position, where there was rubbing of the pins (that held the antenna in a close position) against the receptacles. So it rubbed away the lubrication."

Unfortunately, that problem was not known to NASA scientists until last April 11 when Galileo was already sailing toward Jupiter. That was when they tried to unfurl its fragile, gold-plated mesh antenna for the first time. "The problem was obvious immediately," recalls Bob Murray, who retired Friday as NASA's Galileo/Ulysses program manager. The deployment should have taken 4 minutes at most, but at the end of 8 minutes no indications had been received at JPL's Deep Space Network that the antenna was unfurled. Subsequent analysis of data from the spacecraft showed that three, or perhaps four, of the graphite ribs in the umbrella-like antenna were jammed in the



**On pins and needles.**
*NASA engineers are desperately trying to free three or four balky pins that have kept Galileo's antenna from unfurling.*