"the courage to recognize diversity in the hominid fossil record."

Experts are unanimous in the opinion that *Kenyanthropus* will complicate efforts to trace the convoluted course of human evolution. This task is especially mind-bending because, beginning about 3 million years ago, hominid species began sprouting like wildflowers across Africa. But for the period between 3 million and 4 million years ago, things had seemed relatively simple. After decades of searching, most researchers had concluded that *A. afarensis* was the only clearly identified hominid in Africa at that time. Winding the clock back farther, a 4-million-year-old australopithecine, *A. anamensis*, seemed a likely ancestor to Lucy. But the new discovery, dated smack in the middle of this critical million years, could put a kink into any straight-lined phylogeny, because it doesn't share key features with either *A. afarensis* or *A. anamensis*. "It certainly puts a big question mark over the status of *A. afarensis* as the sole ancestor" of all later hominids, says Chris Stringer of London's Natural History Museum.

Indeed, just last month, a Paris-based team led by Martin Pickford and Brigitte Senut described a 6-million-year-old candidate hominid from Kenya's Tugen Hills, named *Orrorin tugenensis*, which had small, humanlike molars (*Science*, 23 February, p. 1460). Pickford and Senut argued that Lucy and her large molars could not have given rise to humans. In the *Nature* paper, Leakey's team says that *Kenyanthropus*'s small molars might also sideline *A. afarensis* as a human ancestor. "If the hominid status of *Orrorin* is confirmed, it would support the suggestion that small molar size is the primitive condition," says Leakey's co-author Fred Spoor of University College London. And Lucy co-discoverer Donald Johanson, director of the Institute of Human Origins in Tempe, Arizona, says he isn't surprised that Lucy has a rival in *Kenyanthropus*. "The presence of a single [species] between 3 and 4 million years ago," he says, "just didn't make any sense."

On the other hand, few researchers, Leakey's group included, are suggesting that *Kenyanthropus* necessarily lay on the path to *Homo*. Rather, experts say, the importance of the new discovery lies in its demonstration that the roots of the human evolutionary tree are pretty tangled. "Those of us who have been suggesting that human evolution is more like a bush than a ladder," says Wood, "may not have been far off the mark."

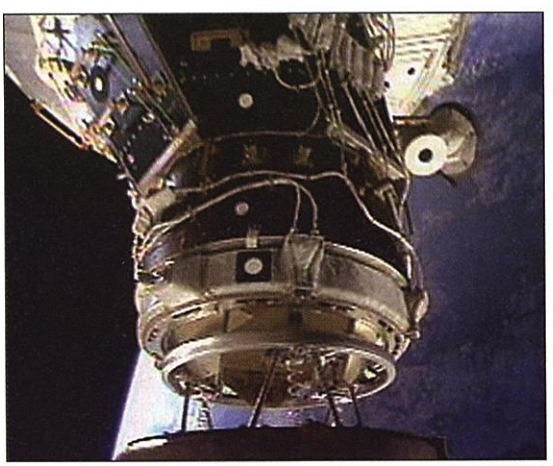
–MICHAEL BALTER

SPACE BIOLOGY

New Cuts in Station Could Spark Walkout

U.S. researchers eager to use the international space station are threatening mutiny if NASA carries out plans to trim facilities and crew in the wake of exploding costs. A biological sciences advisory group has called the proposed cuts a "betrayal of the public trust" that undermines the scientific rationale for the station. Although critics have long questioned the station's likely scientific payoff, what's new about the latest attack is that it's coming from the station's staunchest scientific supporters.

Last month, NASA announced that the station, now under construction, faces a $4 billion overrun. In response, agency managers plan to cancel a habitat module and a rescue vehicle, and reduce the size of the crew and the amount of power available. Further cuts, such as delaying or canceling a centrifuge module critical for nonhuman biological research, are pending. Even so, administration officials insist that the $60 billion station will meet NASA's promise to the science community and its international partners to operate a world-class research facility with a sustained human presence. "We can continue to maximize research," says Joe Rothenberg, NASA's space flight chief.



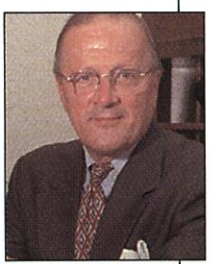
Destiny diminished. Cutting back on crew size could hamper research aboard the space station's laboratory, Destiny.

Not true, say members of NASA's space station biological research project science working group, made up of a half-dozen outside advisers. "We were [already] at the extreme edge of maintaining a credible science endeavor," writes Martin Fettman, a veterinarian at Colorado State University in Fort Collins and chair of the working group, in a 9 March letter to Rothenberg. If NASA goes ahead with the proposed cuts, the panel adds, "we might as well completely discon-

CREDITS: (LEFT TO RIGHT) NASA TV/AP; CHARLES TASNADI/AP

ScienceScope

Role Reversal Maybe science is bipartisan after all. Last week the Republican and Democratic leaders of the House Science Committee made an unexpected departure from politics as usual on a front-page environmental issue.



During a hearing on climate change science, panel chair Representative Sherwood Boehlert (R–NY, right) took fellow Republican George W. Bush to task for a "misguided and unjustified" decision to drop a campaign promise to regulate emissions of carbon dioxide and other greenhouse gases. "I wish the Administration would have waited to hear from experts" before reversing course, Boehlert said.

But the president's reversal won support from an equally surprising source, Democrat Representative Ralph Hall. A Texan with close ties to the Bush family, Hall said he was skeptical of the global warming threat and pleased that Bush had "clarified his position."

What to make of the exchange? Joked one House aide, "[The panel] is either boldly independent—or just confused."

Energetic Defense California legislators have pulled a new and heavily publicized state research initiative off the chopping block after pleas from the governor and university scientists.

Last week a state budget panel restored $75 million that Governor Gray Davis (D) has requested for the three California Institutes for Science and Innovation, 2 days after removing the money to bolster an emergency fund to deal with the energy crisis. The new institutes (*Science*, 15 December 2000, p. 2052), which involve scientists at seven University of California (UC) campuses, cover biotechnology and quantitative biomedical research, nanosystems, and information technology and telecommunications. But legislators failed to restore a $33 million request from the governor to create a fourth institute that would apply information technology to critical societal problems.

"We hope that they will continue to fund this investment," says UC administrator Susanne Huttner, noting that the money must still survive votes later this spring. With the return this week of rolling blackouts, however, it's not clear whether legislators will continue to see the light.

tinue" science funding for the space station.

Fettman, who also serves as chair of the NASA-funded National Space Biomedical Research Institute's external advisory panel, says the working group is prepared to quit in protest. The letter also warns that "the entire life sciences community would turn its support away" from a scaled-back station "and in fact become active campaigners against the station if the program continues to divert resources from science to solve construction problems." Members of the National Academy of Sciences' Space Studies Board raised similar concerns last week during a briefing by Administration and congressional aides on NASA's proposed budget for 2002. "It's the old fear of putting up a tin can that isn't capable of doing good science," says John McElroy, chair of the board and a former engineering dean at the University of Texas, Arlington.

Rothenberg says the list of cuts won't be finalized until June, and only after consultation with researchers. He adds that other partners, such as Europe, might contribute elements NASA can no longer afford. "We honestly believe the science community is our customer," says Rothenberg. That position is seconded by Steve Isakowitz of the Office of Management and Budget, who cautioned researchers "to wait for the agency to complete its review before taking any premature action." Speaking to the academy panel, he said that "whatever happens, we'll still have a station that's better [for research] than anything we've had before."

But Fettman and others are skeptical. Part of the problem, they say, is that scientists lack clout at Houston's Johnson Space Center, which until last month was in charge of the effort, and at headquarters, which now oversees the program. "Decisions are made by people who don't understand the science" or the equipment that it requires, Fettman complained in an interview. "The engineers don't seem to connect with what we want." For example, he says that it took much effort to convince industry contractors and NASA to abandon plans for an expensive lead-lined locker to hold film, at a time when "everyone is going digital." And NASA has just discovered a 60% cost overrun on the racks that will house nonhuman biological experiments, he adds: "This is no way to run a business." Fettman urges NASA to assign a scientist to a "critical management slot" before making any further cuts in the research program.

Rothenberg was still mulling a response to the challenge last week, but he makes a plea for patience. "Give us a chance," he says. "The community should be concerned, but it shouldn't panic."

–ANDREW LAWLER

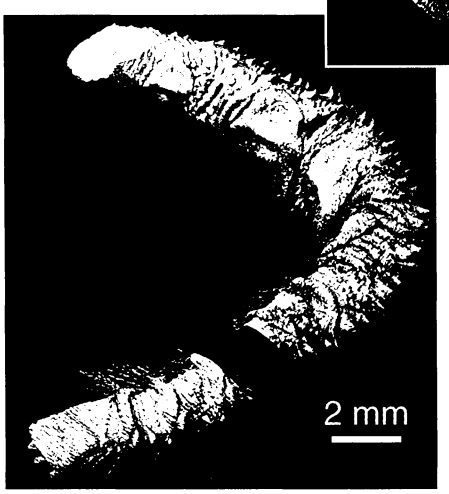
With reporting by Jeffrey Mervis.

PALEONTOLOGY

New Fossil May Change Idea of First Mollusk

Some 425 million years ago, a heavily armored, wormlike mollusk died on the deep sea floor and was buried in volcanic ash. Now, using a novel technique, a team of paleontologists has created a virtual reconstruction of its perfectly preserved shape. The fossil has a strange mix of traits that, although not conclusive, supports a controversial idea about the identity of the earliest mollusks. "This is really a major discovery," says paleontologist Bruce Runnegar of the University of California, Los Angeles.

Mollusks include snails and bivalve clams and also several groups of more puzzling and obscure organisms. Tidepoolers known as the chitons, for example, have segmented shells and superficially resemble arthropods. Deep on the ocean bottom, feeding on foraminifera, live the aplacophorans—shell-less mollusks that look like odd worms. Because they lack some key traits, not just a shell but also sometimes the muscular foot, many malacologists think the aplacophorans resemble the first mollusks. Yet none had been found in the fossil record of mollusks, which stretches back more than 500 million years to the early Cambrian—until now.



Ancient armor. Shell plates like *Acaenoplax*'s may have girded the earliest mollusks.

CREDIT: M. SUTTON *ET AL.*, *NATURE* **410**, 461 (2001)

The new fossil, described in this week's issue of *Nature*, comes from an ash bed of Silurian age in Herefordshire, United Kingdom, a deposit noted for preserving an extraordinary record of soft tissue in three dimensions. After creatures were entombed in ash, their bodies rotted away, and the cavities filled with calcite. This process also made the fossils frustratingly tough to study. The only way to reveal them was to laboriously pick away the surrounding rock. So the collection sat relatively unstudied until Mark Sutton, a postdoc at the University of Oxford, tried a better way—but one that is still a bit of a grind.

Sutton chose specimens that were numerous enough that a few could be destroyed. Then he ground down the rock 30 micrometers at a time. At each step, he polished the end of the rock and took a digital photograph. A computer outlined the fossil, which was darker than the rock matrix, on each picture. "We didn't have a clue what it was," Sutton says. But after the computer had stacked up several hundred slices into a 3D replica, "everything fell into place."

The fossil, named *Acaenoplax hayae*, has several aplacophoran traits, such as a posterior cavity with features that may have been gills and lack of a typical molluscan foot. With its rows of spiny ridges, however, *Acaenoplax* is more strongly serialized, or repetitively structured, than any known mollusk, Sutton says. That is consistent with the widely held idea that the common ancestor to all mollusks had a serial structure, even though most modern mollusks (chitons excepted) have at most faint serial patterns.

A more significant feature, in terms of molluscan evolution, is that *Acaenoplax* had dorsal shell plates. Chitons have always had this armor, but modern-day aplacophorans don't. This has led most malacologists to believe that the shell-less aplacophorans were the first to split from the early mollusk lineage, followed by chitons. *Acaenoplax* may support a more contentious view: that the ancestor of chitons and aplacophorans formed the first branch of the molluscan family tree. Sutton and his colleagues—Derek Briggs of the University of Bristol, David Siveter of the University of Leicester, and Derek Siveter of the University of Oxford—say that *Acaenoplax* suggests that shell plates were originally a common feature of both aplacophorans and chitons, and that the two form a natural group. It's not an exact match, because chitons have eight dorsal plates, whereas *Acaenoplax* has only seven. Nevertheless, "our creature seems to be the missing link" between chitons and aplacophorans, Sutton says.

Mollusk fans are happier than a clam. "This is a most amazing beast," says aplacophoran expert Amélie Scheltema of the