releasing proteins when they die that spark an immune reaction. The drug currently used to fight river blindness kills larvae, which slows the course of the disease but doesn't cure it because the adults remain.

*Wolbachia*, by contrast, garnered little attention, although researchers have known for some 30 years that they live inside the worms. In the late 1990s, parasitologists demonstrated that the nematodes need these bacteria to reproduce, and researchers began to wonder what would happen if they killed the bacteria. Last year, Achim Hoerauf, a research physician at the Bernhard Nocht Institute for Tropical Medicine in Hamburg, Germany, found that in infected people, antibiotics kill the bacteria and interrupt the parasites' life cycle.

"The question then was what role might the bacteria be playing" in river blindness, says Eric Pearlman, an immunologist at Case Western Reserve University in Cleveland, Ohio. To find out, his group teamed up with Hoerauf and Mark Taylor, a parasitologist at the University of Liverpool, U.K.

In one experiment, the German team sent Pearlman extracts of worms taken from either untreated patients or those who had received antibiotics. In the latter group, the antibiotic had killed most of the *Wolbachia*, leaving a solution of worm proteins devoid of bacterial ones. When Case Western's Amélie v. Saint André injected the extracts into the eyes of mice, she and her colleagues found that the worm-plus-*Wolbachia* extract caused much more damage, judging by how hazy the mice's eyes became, than worm proteins alone.

Pearlman and his colleagues tested additional extracts, this time supplied by the Liverpool team. These came from two other filarial nematodes, one that doesn't carry *Wolbachia* and one that does. Only the latter clouded the mice's eyes. "It looks like *Wolbachia* is really causing a lot of the problem," comments Barton Slatko, a molecular parasitologist at New England Biolabs in Beverly, Massachusetts.

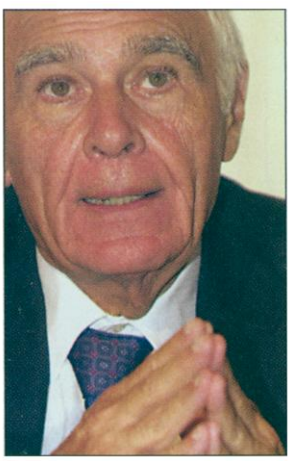
Thus it seems that "if one were to treat [patients] with antibiotics, potentially these microfilaria would no longer be able to incite an inflammatory response," notes Thomas Nutman, a parasitologist at the National Institute of Allergy and Infectious Diseases in Bethesda, Maryland.

But as Nutman and others point out, it's not yet clear how practical or effective these antibiotics might be. Microfilaria proteins may also play a role in the disease. And Eric Otteson, a clinical parasitologist at Emory University in Atlanta, notes that the extracts came from dead or dying adult worms and not from the juvenile microfilaria that colonize the eye. Thus, he says, the researchers have made "a leap of faith" in assuming that extracts of larval proteins would have the same effect. Nonetheless, many parasitologists view the international team's effort as an important step in understanding a disease that deprives hundreds of thousands of people of their vision. **–ELIZABETH PENNISI**

AIDS RESEARCH

## Delays Jeopardize Italian Program

With a queasy sense of déjà vu, Italian AIDS researchers are bracing for severe funding cuts for the second time in less than 2 years. Only this time, their plight is even more dire: As *Science* went to press, Prime Minister Silvio Berlusconi's government had yet to allot any funds for the national AIDS program in its 2002 budget. To make matters worse, a series of freezes and delays has prevented most researchers from receiving grants awarded for 2001.



**Where's the beef?** Girolamo Sirchia had promised to fund AIDS program.

CREDIT: PIER PAOLO CITO/AP

Annual funding for the AIDS program, which peaked at nearly $14 million 6 years ago, now stands at about $11 million. But extracting that money from the government, which has changed hands once a year on average since World War II, is another matter. "It has taken a little miracle to get this funding each year," says Stefano Vella, chief of clinical AIDS research at the National Institute of Health in Rome and president of the International AIDS Society. In 1997, then–health minister Rosy Bindi froze the funds for several months. Then in 2000, she proposed slashing the AIDS research budget by 36% (*Science*, 7 July 2000, p. 28). Although the government of former Prime Minister Giuliano Amato reversed that cut, the money is again on the chopping block.

Italian scientists have been lobbying current health minister Girolamo Sirchia—who has overall responsibility for the program—and Berlusconi's deputy prime minister, Gianfranco Fini, for a budget at least at the 2001 level. Speaking last December in Milan on World AIDS Day, Sirchia promised that the money would be forthcoming. But since then, Vella says, "we have not seen anything." Nor have Sirchia and Fini replied

## ScienceScope

**Thou Shalt Share** The National Institutes of Health (NIH) has released long-awaited draft guidelines on data sharing.

Worried that taxpayer-funded researchers might hoard data to the detriment of science, NIH officials are asking potential grantees to propose how they plan to share the fruits of their labor. NIH says it may provide extra cash to researchers who need help assembling publicly accessible databases or creating other distribution tools. But the policy draft (grants2.nih.gov/grants/policy/data_sharing/index.htm) emphasizes that the government has no wish to stand in the way of patenting potentially valuable discoveries, giving scientists up to 60 days to keep secrets while legal papers are finished. NIH is asking for comment by 1 June, with implementation by 1 January 2003.

**Plugging Holes** NASA finally has a chief of biological and physical research—and soon may have a chief financial officer too.

NASA Administrator Sean O'Keefe named Mary Kicza to the research job 4 March after a nearly 2-year, unsuccessful hunt for a prominent outside researcher (*Science*, 12 May 2000, p. 938). Kicza, an electrical engineer with a master's in business administration, was associate center director at Goddard Space Flight Center in Greenbelt, Maryland, and was responsible for coordinating earth and space science efforts. Kicza's lack of a biological or physical research background, however, is sure to raise eyebrows in the life and microgravity sciences community. O'Keefe's statement tries to parry that anticipated criticism by noting that Kicza has managed a diverse portfolio of research agendas for 2 decades. She will work closely with Shannon Lucid, a shuttle veteran recently named NASA's chief scientist.

O'Keefe also is likely to soon name Steve Isakowitz to the space agency's top budget slot. Isakowitz is currently an influential civil servant at the White House Office of Management and Budget, where he oversees science and space programs. He has been quietly skeptical of NASA's outer planets exploration program and space station research efforts—two issues he will now tackle from the inside.

O'Keefe also named Frederick Gregory as the agency's chief of space flight. The longtime astronaut will oversee the troubled space station program.

to a letter last month signed by 200 researchers, including most of the 15 members of Italy's National AIDS Commission, asking the government to commit the funds. Sirchia and Fini did not respond to repeated requests from *Science* for comment.

The government's foot-dragging could cripple a program in which key discoveries in HIV research have been made, say scientists, including insights into how the virus interacts with the immune system. "Italian researchers have made substantial contributions to basic and clinical research on HIV/AIDS," says Anthony Fauci, director of the U.S. National Institute of Allergy and Infectious Diseases in Bethesda, Maryland. Italian researchers have published about 9600 papers on AIDS in international journals since the national program began 15 years ago. If the funds are not forthcoming, those contributions could begin to dry up.

"My laboratory, as well as many others, is already in a very critical condition," says immunovirologist Guido Poli of the San Raffaele Scientific Institute in Milan, who's still waiting for money he was awarded for 2001. If the Italian AIDS community were to starve for lack of funds, says Fauci, it "would be a significant loss to the global HIV research effort." –MICHAEL BALTER

PALEONTOLOGY

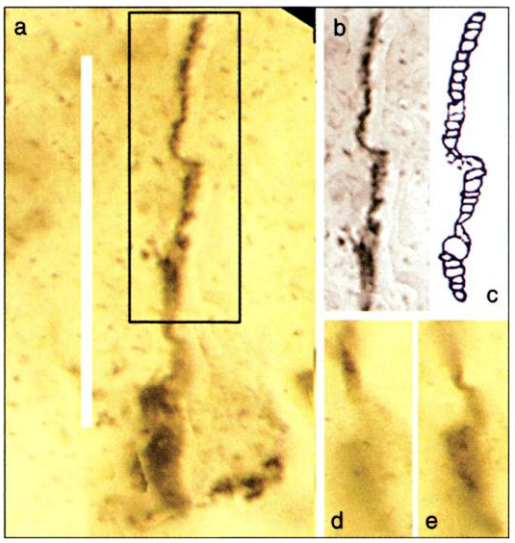
## Earliest Signs of Life Just Oddly Shaped Crud?

The search for fossils in rocks formed before the Cambrian explosion of life 540 million years ago "has been plagued by misinterpretation and questionable results," leading paleontologist William Schopf of the University of California, Los Angeles (UCLA), once noted. Now Schopf's own claim for the oldest known fossils—fossils that have entered textbooks as the oldest ever found—is under attack as a misinterpretation of intriguingly shaped but purely lifeless minerals.

A paper in this week's issue of *Nature* argues that the microscopic squiggles in a 3.5-billion-year-old Australian chert are not fossilized bacteria, as Schopf claimed in a 1993 *Science* paper (30 April 1993, p. 640), but the curiously formed dregs of ancient hot-spring chemistry. "There's a continuum [of putative microfossils] from the almost plausible to the completely ridiculous," says lead author Martin Brasier, a micropaleontologist at the University of Oxford, U.K. "Our explanation is that they are all abiogenic artifacts."

If true, the analysis calls into question the fossil record of life's first billion years. It would also raise doubts about the judgment of Schopf, the man chosen by NASA to set the standard for distinguishing signs of life from nonlife at the press conference unveiling martian meteorite ALH84001 (*Science*, 16 August 1996, p. 864). But Schopf says that such speculation is unwarranted. "I would beg to differ" with Brasier's interpretation, he says. "They're certainly good fossils."

The absence of simpler, smaller predecessors to the complex Cambrian biological record was a problem that bothered Charles Darwin. But paleontologists have since found uncontestable fossils in rocks as old as 2 billion years. They include multicellular algae and cyanobacteria, which could produce oxygen through photosynthesis. But the earlier record is sparser and far messier. Of the half-dozen groups of microfossils claimed to come from the Archean eon (before 2.5 billion years ago), Schopf's group was the star. It was not only the most diverse, with 11 distinct taxa of organisms, but Schopf also thought it contained some fossils that were probably cyanobacteria. At 3.465 billion years, it was also the oldest, coming just 400 million years after the last lethal bombardment of the young planet (*Science*, 25 June 1999, p. 2111).




**A new view.** By compositing in-focus views from a range of depths, a putative microfossil described by William Schopf (b, c) extends and balloons into (a).

Brasier's paper, the first serious reanalysis of Schopf's 1993 paper, rejects the suggestion of photosynthetic bacteria. From both chemical analyses and geological mapping near Marble Bar in northwestern Australia, Brasier and seven colleagues conclude that the so-called Apex chert containing the putative fossils was deposited not on the floor of a shallow sea but below the sea floor in the throat of a hot spring. Both lines of evidence, the group says, show that Schopf's samples came from a conduit that eventually clogged with chert and other minerals deposited from the hot brine it carried toward the sea floor. Photosynthesis below the sea floor seems unlikely, Brasier notes.

Examining Schopf's sections of chert, which had been archived at the National Museum of Natural History in London, Brasier saw the same segmented, wormlike threads of dark organic matter pictured in the paper. But he saw a great deal more when he raised or lowered the microscope's focal plane to bring rock above and below into focus. A long, stringy "microfossil" with supposedly sharp terminations at either end in Schopf's image instead continued downward from one end, ballooning to many times its original width (see figure). Some strands seemed to branch, unlike chains of bacterial cells. Other structures ranged from vaguely suggestive of life to inscrutable jumbles of dark organic matter. "We found so many intermediate, chaotic forms," says Brasier. "Parts that would look like a bacterium [at one focal depth] took on weird shapes" at other depths.

Brasier and the team suspect that they were seeing organic matter shaped into sometimes provocative but meaningless forms by hot-spring minerals as they grew and transformed on cooling. The organic matter might be the remnants of heat-loving bacteria that lived in the vents but went unpreserved, the group concludes. Or it might have been synthesized under high temperature from volcanic gases under the catalytic prodding of the metals found in the chert.

Schopf accepts the reinterpretation of the site as the root of a hot spring and concedes that none of his fossils are cyanobacteria. Schopf had always relied on early, far less detailed geologic mapping by others that assumed the Apex chert was a sea-floor deposit, and he hadn't done any chemical or mineralogical analysis. But he says that Brasier's interpretation of the dark shapes "is just a mistake; they haven't the experience looking at Precambrian microfossils, or such a depth of focus confuses them." The very unbacterial branching of chains of bacterial cells, for example, is actually folding of chains, says Schopf.

Schopf has some support in the Precambrian community. "There's always a process of sorting out signal from noise," says Malcolm Walter of Macquarie University in Sydney, who has published with Schopf. "You illustrate only the well-preserved things," he says, and leave the messier structures found by Brasier unillustrated.

Other Precambrian paleontologists side with Brasier. "I thought it was a very persuasive paper," says Andrew Knoll of Harvard University. The structures illustrated by Schopf as microfossils, he says, are "part of a

CREDIT: M. BRASIER *ET AL.*, *NATURE*