should organize his work with foreign colleagues, nothing more," says Igor Milovidov.

There is little doubt, however, that unflattering media attention also played a role. In June a presidium official told RAS institute chiefs at a closed meeting that the directive would be scrapped. That decision was made public last month, as most researchers were headed to their summer dachas. A notice in the academy's weekly newsletter, *Poisk*, revealed that the internal directive has been superseded by a seemingly benign measure requiring scientists to inform superiors in writing about their foreign activities.

Although the revision may end the controversy, some observers are discouraged by how few scientists bothered to complain about the original directive. Says microbiologist Garry Abelev of the RAS Center for Oncology in Moscow, "I expected that many more people would have protested."

–ANDREY ALLAKHVERDOV AND VLADIMIR POKROVSKY

Andrey Allakhverdov and Vladimir Pokrovsky are writers in Moscow.

EVOLUTIONARY BIOLOGY

A Molecular Approach To Mushroom Hunting

The oldest land plants just got a lot older. Generally considered to date back 450 million years, land plants may actually have been around 300 million years earlier, says S. Blair Hedges, an evolutionary biologist at Pennsylvania State University, University Park. Moreover, fungi and green algae could have evolved as much as 1 billion years ago, he and his colleagues report on page 1129.

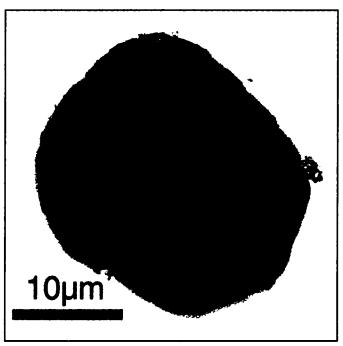
Biologists have long wondered what the first terrestrial pioneers were and when they first drifted to shore. Many suspect that these land-lovers were fungi living in association with either green algae or cyanobacteria—the great, great, great ancestors of modern lichens and organisms called arbuscular mycorrhizae. The exact nature of these first plants, however, as well as when they arose, is unclear because there's scant fossil evidence earlier than 450 million years ago. So to nail down the origins of the first fungi and land plants, Hedges and his colleagues decided to take a molecular approach.

By searching through GenBank, they obtained sequences for 119 proteins from a wide variety of fungi, both aquatic and terrestrial. They compared the same protein from pairs of species; depending on the pairs, each comparison involved between five and 88 proteins. The fewer the sequence differences, the more closely related the species. Based on these calculations, they built a family tree and determined when the various fungal groups split off from one another.

They were astounded. "We had no idea fungi evolved so early," Hedges recalls. "But we were finding these very old divergences." According to their analysis, most of the fungi branches split off between 1.5 billion and 966 million years ago—not 660 million to 370 million years ago, as previously reported. In particular, the Glomales order, which includes terrestrial fungi, took root about 1.3 billion years ago, suggesting that's when the first land plants came into existence.

Because the dates differ so radically from earlier analyses of either the fossil record or other DNA, "I expected [the paper] wouldn't get accepted," says Hedges. So the team members checked—and double-checked. They analyzed new species—a green alga, a moss, several higher plants, as well as a pathogenic and nonpathogenic yeast—to see where they landed along this new evolutionary timeline. These new data enabled them to place their fungal tree into a broader context and calculate divergence times for plants as well. The data confirmed their initial findings.

These new results "are surprising," agrees Linda Graham, a plant evolutionary biologist at the University of Wisconsin, Madison. Analyses of a ribosomal subunit gene from modern fungi had placed their origin just 600 million years ago. Furthermore, the oldest lichen fossils are a mere 400 million years old, while the most primitive mycorrhizae have been found in fossil fungi dating from 460 million years ago. As for higher land plants, the first fossils—represented by spores—are 520 million years old, although some biologists question whether the spores actually came from higher plants.



Late bloomers. Fossilized spores, possibly from higher plants living 500 million years ago, are still much younger than the first terrestrial fungi.

But Graham is nonetheless supportive. "This is probably the most complete study that I know of. They used several [proteins] and as many organisms as they could find data for," she explains.

This early origin is impressive, concurs Paul Strother, a paleobotanist at Boston College, who says that Hedges's results bolster a recent trend. "There's a 25-year history of people

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ScienceScope

Women Wave Two years after admitting that its female researchers lacked administrative power, the Massachusetts Institute of Technology's top management is taking on a different look. This week the renowned Whitehead Institute announced that molecular biologist Susan Lindquist of the University of Chicago will take over as director when Gerald Fink steps down in October.

Lindquist, a member of the National Academy of Sciences who is known for her work in heat shock proteins and fruit flies, joins a growing coterie of women in senior administrative positions at MIT. In the past year alone, the institution has promoted or plans to promote women as associate chiefs of the cancer center, electrical engineering, and computer science; associate head of chemical engineering; director of the nuclear science lab; and associate provost. "This is an astounding amount of progress in a single year in terms of diversity in the leadership—particularly of science and engineering," says MIT biologist Nancy Hopkins, a key player in the 1999 report that focused on inequities among tenured women faculty members.

Stationary Target? In Washington, when things get tough, the tough assemble a blue-ribbon panel—ideally with Nobel Prize winners. That's what NASA hopes will smooth over White House and congressional concerns about the direction of the agency's financially troubled space station effort.

NASA and the White House sparred for months over the scope and membership of the panel, which was finally announced last week. Among the members are two Nobel laureates: physiologist Richard Roberts of New England Biolabs in Beverly, Massachusetts, and Robert Richardson, research vice provost at Cornell University. The 19-member team—the latest of a half-dozen to review the program over the past 15 years—will report by 1 November on how to fix management problems and a nearly $5 billion overrun.

According to sources close to the panel, NASA hopes the chair, retired aerospace executive Thomas Young, will bless the agency's current plans, while the White House trusts that the vice chair, Admiral Thomas Betterton, will press for more radical ways to control the spiraling costs.

to retain Irish talent and lure big fish to its shores. "This is the largest investment in scientific research in our history," gushes Mary Harney, Ireland's deputy prime minister.

Ireland's economy is booming, thanks in part to generous aid from the European Union over the last 15 years. But although high-tech companies spreading across the Irish landscape have fueled a 7.5% average rise in annual gross domestic product over the past 5 years, that prosperity hasn't extended to academia. "Ireland has not been seen as a location to carry out world-class research in the past, and traditionally the best of Irish researchers went overseas to complete their doctorates," says SFI spokesperson Martin Hynes. Even worse, few returned. Attracted by higher salaries and better grant support, many talented scientists set up shop elsewhere in Europe and in the United States.

SFI would like to counter this disturbing trend. The government set up the foundation in July 2000, handing it $600 million to spend on peer-reviewed research over the next 5 years. Seeking to model the agency partly after European bodies like the Wellcome Trust and partly on the U.S. National Science Foundation (NSF), SFI imported as its new director-general William C. Harris, a chemist and former vice president of the University of South Carolina. Harris also spent nearly 20 years at NSF, including a stint as head of the agency's math and physical sciences directorate. A key part of Harris's remit is to keep the SFI's sights trained on basic research.

SFI's first move was to put up major funds for 10 world-class labs to beef up basic research connected to its high-tech industry. The agency advertised a global competition last year, inviting applications from anyone working in biotechnology or information technology—areas deemed vital to the country's economic development. The so-called SFI Principal Investigators, selected by international panels, each will get about $6 million over 5 years, including unpublicized premium salaries said to be more in line with industry than academia. Six are relocating to Ireland or within the country, while the other four are Trinity College researchers enticed to stay put (see table). The SFI has placed no restrictions on how the scientists spend their money, although foundation officials expect the researchers to use the funds to recruit top-notch team members, refurbish aging labs, and purchase major equipment.

"The winning candidates are key people in their fields," says biochemist Brian Heap, foreign secretary of the U.K.'s Royal Society, which last year launched a similar initiative to retain top scientific talent. "In terms of brain gain," he says, "Ireland will benefit substantially."

And there's more to come. SFI will continue a rolling call for proposals from candidates for principal investigatorships. It will also create an award for outstanding young scientists, again following an NSF model, with grants of about $300,000 a year for 5 years. Although such programs should empty SFI's coffers by 2006, the government has pledged to continue funding the agency at an annual level of $120 million. **–JOHN PICKRELL**

John Pickrell writes from Hertfordshire, U.K.

Movers and Stayers

Trinity College Dublin	
Michael Coey (IT)	—
Seamus Martin (biotech)	—
Kingston Mills (biotech)	from NUI* Maynooth
John Pethica (IT)	from University of Oxford, U.K.
Igor Shvets (IT)	—
Ken Wolfe (biotech)	—
NUI Cork	
Eoin O'Reilly (IT)	from University of Surrey, U.K.
Eugene Freuder (IT)	from University of New Hampshire, U.S.
NUI Maynooth	
Douglas Leith (IT)	from University of Strathclyde, U.K.
Dublin Institute of Technology	
John Lewis (IT)	from Dublin Institute of Advanced Studies

* National University of Ireland.

Rainbow's end. The Science Foundation Ireland has showered its new Principal Investigators (eight of whom are shown here) with generous 5-year grants.

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ScienceScope

Up in Arms Two federal legislators want to help bail out U.S. researchers sinking under new rules that restrict their use of foreign graduate students to help design and build science satellites.

Scientists have been complaining in vain about the regulations, which require researchers to get State Department licensing in some cases. They were put in place last year following a congressional outcry over satellite technology transfers to countries like China (*Science*, 24 March 2000, p. 2138). So far, the scientific fallout has won little attention from politicians.

Part of Gravity Probe B.

But last month two House members urged President George W. Bush to exempt scientific satellites from the regulations and remove "the cloud of confusion and uncertainty that currently overhangs our nation's space science." The 20 July letter from Representatives Sherwood Boehlert (R–NY) and Ralph Hall (D–TX)—respectively the chair and ranking minority member of the House Science Committee—cites a government decision 15 years ago that kept such satellites off the so-called munitions list.

Administration officials, however, say that the highly charged debate over technology controls will make that plea a hard sell.

Well-Oiled Academy The African Academy of Sciences (AAS) kicked off its $20 million endowment drive last week with a $5 million gift from Nigeria. The donation, three times the academy's annual budget, is the latest sign that science is riding high in the oil-rich nation. President Olusegun Obasanjo also recently established a science council to advise him on issues such as bridging the digital divide and improving the country's biotech industry.

The AAS gift will help fund peer-reviewed scientific grants across all of Africa. "We think this is quite visionary," says AAS president Mohamed Hassan, who hails from Sudan. Founded in 1985 and headquartered in Nairobi, the AAS has 112 fellows from more than 24 countries.

Contributors: Andrew Lawler and Richard Stone