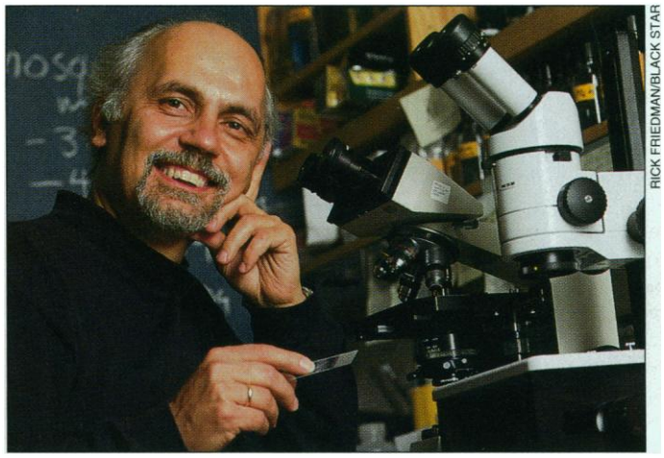
MOLECULAR BIOLOGY

New EMBL Director Reaches Out to Southern Europe

HEIDELBERG—Few centers have done more to reverse the transatlantic brain drain of Europe's biologists than the European Molecular Biology Laboratory (EMBL). So when the Heidelberg-based lab was looking for a new director-general earlier this year, Greek developmental geneticist Fotis Kafatos, who has spent much of his career in the United States, seemed a natural choice. Kafatos, who shot through the ranks at Harvard to become a professor in 1969 before he turned 30, is bringing some distinctly American ideas to the running of EMBL. A priority, he says, is to adopt U.S.-style affirmative action to bring in more talented researchers from the less scientifically developed countries of southern Europe.



RICK FRIEDMAN/BLACK STAR

Politics of inclusion. Fotis Kafatos.

Europe's only truly multinational molecular biology center has just come through a decade of aggressive expansion under Swedish molecular biologist Lennart Philipson, which saw the lab double in size to its present complement of more than 300 researchers and emerge as one of the world's top five centers for molecular biology. In comparison, Kafatos' vision of EMBL as a paragon of equal opportunities may seem to lack ambition. But this policy of "inclusiveness" is the key to Kafatos' overall plans, which include shifting more resources into developmental biology and establishing new links with research labs across Europe.

The need to include a broader diversity of nationalities in EMBL's scientific ranks became glaringly apparent at the 9 March meeting of the lab's governing council that confirmed Kafatos as director-general. Gerardo Carante, the Italian delegate, declared that Italy is not getting enough from EMBL—only two of EMBL's 58 scientific group leaders are Italian, he noted—and announced that his country intends to pull out of the lab. And although no other EMBL nation has gone that far, the Italians aren't alone in questioning whether EMBL gives value for the money that their countries put into the lab. "We pay a lot and we get back very little," says Margarita Salas, director of the Center for Molecular Biology in Madrid.

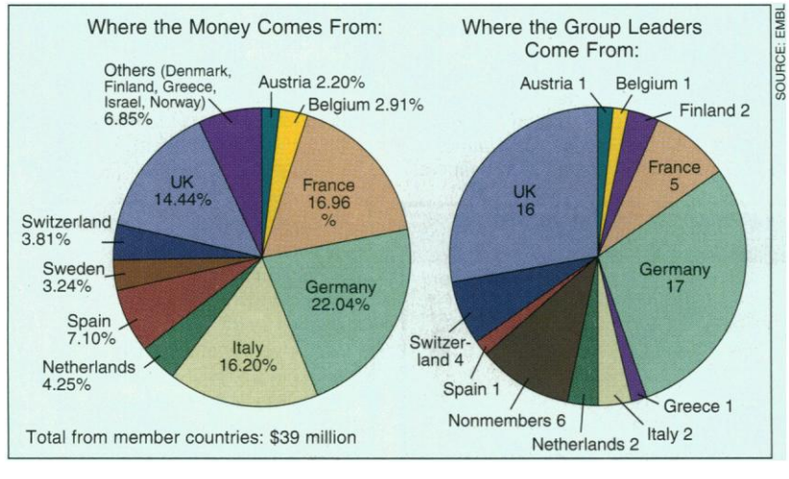
Carante's statement is widely seen as the opening gambit in an effort to negotiate a better return on Italy's $6.44 million annual EMBL subscription, and since that sum represents 16.2% of EMBL's income from its 15 member states, the threat cannot be taken lightly. Moreover, most of the EMBL nations apart from Germany and Britain can claim to be underrepresented to some extent, as those two heavyweights together account for more than half of EMBL's group leaders. So ensuring wider participation in the lab is not just a matter of political correctness: It could be essential to ensure that the standard bearer of European unity in biology does not itself become a victim of nationalistic politics.

For Kai Simons, a Finn who directs EMBL's cell biology program, the squabbling over EMBL's value demonstrates "the myopic vision of the [European] molecular biology establishment." But, like most of his colleagues in Heidelberg, Simons backs Kafatos' call for inclusiveness. EMBL must look beyond candidates recommended by the heads of leading labs in Europe and the United States and consider young scientists from places where it's harder to produce "flashy papers," agrees German national Thomas Graf, director of EMBL's differentiation program.

But while most European biologists think that a less elitist hiring policy is fine at the graduate student and postdoc level, some are concerned that it could undermine EMBL's reputation for excellence if applied to the hiring of group leaders. These thirtysomething scientists on the threshold of an independent career are hired for up to 9 years and are EMBL's driving force. "The idea is wonderful," says Fritz Melchers, director of the Basel Institute for Immunology. But the sad reality, he says, is that suitably qualified people are in short supply outside the major scientific nations.

Kafatos argues, however, that supply is not the main problem: The underrepresentation of southern Europeans could also be due to a reluctance to apply for positions at the lab. Many fear that, by coming to Heidelberg for a few years, they'll cut themselves off from the powerful professors whose patronage is often essential to secure a permanent job back home. Member nations must do more to provide their EMBL returnees with jobs, says Kafatos. EMBL will do its part he promises, by twinning its groups with "deserving" labs elsewhere in Europe to work on joint projects and exchange scientists on sabbaticals.

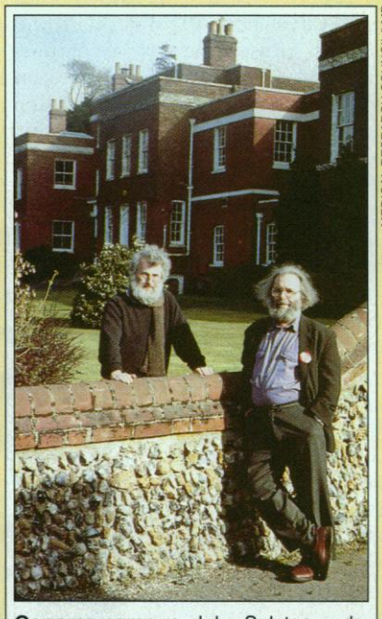
Although it may happen to coincide with political expediency, there is no doubting Kafatos' commitment to the principle of inclusiveness, for he's equally keen to address an imbalance at EMBL that, unlike the shortage of southern Europeans, does not directly threaten the lab's financial future: a dearth of women scientists. That will take some doing, because pitifully few women apply for EMBL positions. Developmental biologist Anne Ephrussi, a French national and one of only four women group leaders at EMBL, says, "I've experienced no discrimination." But most EMBL scientists believe the lab's policy of bringing in researchers from other countries to work on temporary contracts discourages women applicants. "Unfortunately, it's much



Europe's Genomes Come Home to Roost

CAMBRIDGE, UK—It is hard to imagine the pastoral grounds of Hinxton Hall, a picturesque 18th-century manor house 8 miles out of Cambridge, playing host to a genome center that will be the envy of Europe. Yet in 2 years' time, the hall will be neighbor to a brand new complex housing a human chromosome sequencing effort on a scale unprecedented anywhere in the world, together with Europe's main repository for DNA and protein sequence data.

The sequencing initiative—named after Fred Sanger, the double Nobel Prize–winning British biochemist—is being bankrolled by Britain's Wellcome Trust to the tune of $75 million over the next 5 years. It is the brainchild of John Sulston, a senior scientist at the Laboratory of Molecular Biology in Cambridge, who is well known for his success in applying automated sequencing technology to the genome of the nematode *Caenorhabditis elegans*. Alongside the Sanger Center at Hinxton, the European Bioinformatics Institute (EBI) will be Europe's answer to the U.S. National Center for Biotechnology Information. An outstation of the European Molecular Biology Laboratory (EMBL), it will provide fast and easy access to the latest sequence data for biologists across the continent.



MEDICAL RESEARCH COUNCIL/LMB

Genome campus. John Sulston and Michael Ashburner at Hinxton Hall.

Sulston, who's already directing an embryonic version of the Sanger Center, based in an abandoned engineering company lab on the Hinxton site, will not say exactly how much data he expects to churn out: The human genome may yet contain some nasty surprises for anyone rash enough to make ambitious predictions. (Already, it is known that human chromosomes are full of repeated sequences, which can make it difficult to determine how a series of overlapping sequenced fragments should be fitted together.) But the plan Sulston submitted to the Wellcome Trust envisions a sequencing operation that, within 4 years, will consist of 17 teams of 10 people, each team capable of sequencing a million bases a year. That would make the center "unquestionably the largest facility doing actual chromosome sequencing," says Craig Venter, whose own venture—The Institute for Genomic Research (TIGR) in Maryland—is taking the alternative route of sequencing clones of complementary DNA, to identify expressed genes.

Although most of the Sanger Center's effort will be focused on the human genome, Sulston says that just under one-third of its sequencing workforce will continue the *C. elegans* project, expanding his existing collaboration with Robert Waterston of Washington University in St. Louis. And in the short term, the Sanger Center will also help out with the international yeast genome sequencing project. It will tackle four of the yeast's total of 16 chromosomes over the next 2 years—which should help ensure that the entire project is completed before the end of 1995.

Sulston is quick to note that the point of his operation is not just to produce as much sequence data as quickly as possible. "We're not starting on a forced march through the genome with our minds out of gear," he says. Gene mapper David Bentley has been brought in from Guy's Hospital in London to help identify which regions of the human genome are richest in genes and so would make the best candidates for sequencing. His 30-person team will also have the task of improving the resolution of current human physical genome maps. Completing the picture is a computing team under Richard Durbin that will run databases and design software to analyze the raw DNA sequence data.

Durbin is looking forward to fruitful conversations over coffee with his counterparts from the EBI, once that outfit starts operating in 1995. By then, EMBL's DNA data library should have been transferred to Hinxton from its existing cramped quarters in Heidelberg, and its staff will have almost doubled to some 70 people. This expansion is necessary, explains EMBL data library chief Graham Cameron, to cope with the growing avalanche of new sequence data and to keep improving database technology.

There's one remaining hurdle for the EBI: Plans assume that the European Community will roughly match the $3.1 million a year that EMBL plans to contribute toward the center's running costs. No decision has yet been made, but EMBL staff are quietly confident that their new director-general, Fotis Kafatos, will manage to close the deal.

The addition of the EBI to what is now being called the Cambridge genome campus may not be the end of the story. There is a good chance that the UK Medical Research Council's (MRC) human genome resource center will also be relocated to Hinxton. The 30-person center—which coordinates several large projects and maintains clone libraries and databases for the British genome community—may soon be looking for a new home. At present, it is based at the Northwick Park Hospital in London. But many researchers argue that the closure 18 months from now of the MRC's Clinical Research Center, also at Northwick Park, will leave the genome resource center isolated from the research community. And if the resource center could, indeed, be lured to Hinxton, Cambridge's emergence as the genome capital of Europe would be hard to deny. "You'd then have an extraordinary concentration of people with different, but complementary interests," observes Cambridge University geneticist Michael Ashburner.

–P.A.

easier for men to persuade their spouses to move," observes Angus Lamond, a British group leader in the gene expression program.

Kafatos is also taking a close look at EMBL's internal research portfolio. He says he wants to make room for more developmental biology, perhaps creating a new program to sit alongside the lab's existing efforts in cell biology, differentiation, gene expression, structural biology, and instrumentation. And as further rapid growth in Heidelberg is not on his agenda, that will mean cutting back some other areas. The most likely candidate? The structures program, which has expanded some four-fold over the past 6 years. Structural biologists should be pleased to note, however, that Kafatos is planning to expand EMBL's facility at Grenoble, to take advantage of the powerful x-rays provided by the new European Synchrotron Radiation Facility in the city. Indeed, any future growth of EMBL is likely to take place away from Heidelberg—and with EMBL's DNA data library soon to move to Cambridge (see box), Kafatos is promoting

the idea of EMBL as a "family" of labs.

Political pressures may soon raise the issue of additions to the lab family. With Italy's future EMBL membership hanging in the balance, Italian biologists see an opportunity to press for their own EMBL facility. "The time is right to consider a serious proposal to have a southern European lab," says Riccardo Cortese, who heads the Institute for Research in Molecular Biology in Pomezia. And John Tooze, executive secretary of the European Molecular Biology Organization, EMBL's sister body, believes that, to secure EMBL's long-term future, "each of the four major states has to have a stake of real estate."

The lab's other main paymasters—Germany, France, and Britain—are all now hosting EMBL facilities, so Italy does seem to have drawn the short straw. But what would an Italian lab do? "Molecular neurobiology is scattered and could do with a boost," says Tooze. And if that doesn't appeal, he says, what about a center working on the biotech applications of bacterial molecular biology? Beyond that, Tooze believes it will be necessary to build from Kafatos' lab twinning program to create formal affiliations with leading centers in the member states, so that most countries feel they have a slice of the EMBL action.

The problem, of course, is that all this will cost money. Kafatos says that he needs a "dowry" from the EMBL member states, just to open up some new positions to kick-start his inclusiveness drive. But this may not be enough: EMBL insiders say that the lab's future may depend heavily on whether Kafatos is able to win major funding from the European Community (EC). At first glance, the prospects don't look good: Philipson resigned over the failure of the EMBL nations to back his spending plans, and he also alienated Brussels officials over the past few years by publicly attacking EC science policy.

But Stephen Fuller, an American who heads EMBL's structural biology program, thinks that Philipson's actions will actually work in Kafatos' favor. By resigning, says Fuller, Philipson transformed the discussion of EMBL's budget from a squabble over next year's funding into a serious debate about the lab's long-term future. And many at EMBL believe that the stark contrast between Philipson's deliberate abrasiveness and Kafatos' consummately diplomatic style may be just what is needed, both to get the EMBL member states to cough up more money, and to build a closer relationship with Brussels.

With Italy threatening to jump ship, and with the EC needing to be wooed, Kafatos' diplomatic skills will be tested to the limit. But if he proves up to the challenge, EMBL may yet emerge as the organization to lead Europe's biologists toward that elusive goal: true European unity.

–Peter Aldhous

OCEANOGRAPHY

ERS-1 Gives Europeans New Views of the Oceans

SOUTHAMPTON, UK—Once, the only way to study the mighty oceans was from the pitching deck of a research ship, gathering a smattering of data along the ship's narrow track while criss-crossing the sea at about the speed of a cyclist. The past 20 years have seen the situation slowly change, however. Remote sensing satellites are now providing data that can be as good as, or even better than, on-the-spot measurements—with added benefits of regular supply and global coverage.

At the moment the brightest star in this orbiting firmament is ERS-1, a satellite funded by the 13-nation European Space Agency (ESA) at a cost of $1.2 billion, including its operation and ground facilities. Launched in July 1991, ERS-1 rains down floods of data and stunning images of Earth's surface every day. "Technically, it's quite outstanding. There is no question, it has exceeded all our expectations," says Chris Rapley of the Mullard Space Science Laboratory, part of University College London. "It's the only game in town," adds Tony Hollingsworth, head of research at the European Centre for Medium-Range Weather Forecasting (ECMWF) in Reading, United Kingdom. "It gives Europe a significant lead." The reason for the enthusiasm: ERS-1's unique combination of instruments. Three radar sensors give researchers the unparalleled ability to see through clouds and the darkness of night to monitor wave heights, wind speeds, and the thickness of the polar ice sheets. ERS-1 also carries a sensor that measures ocean surface temperatures with a precision unmatched by any other satellite.

ESA

Piercing eye. ERS-1's radar can see at night and through clouds.

But while the satellite itself shines brightly, there are rumblings of dissent back on Earth. In one sense, the satellite is a victim of its own success: Although the agency constructed receiving stations around the world, a coordinating center in Italy, and processing and archiving facilities in four European countries, it has been overwhelmed by the complexity of processing some types of data that researchers need. "We've been hampered to quite a large extent by the inability of ESA to supply data," complains Trevor Guymer of the James Rennell Centre for Ocean Circulation in Southampton.

Guymer and his colleagues' appetite for ERS-1 data was whetted in the late 1970s when the National Aeronautics and Space Administration (NASA) lofted Seasat, the first remote sensing satellite to focus on the oceans. Unfortunately, Seasat's power system failed after just 106 days, leaving oceanographers with a tantalizing glimpse of what the technology was capable of. NASA's plans for a successor never got off the drawing board, although the U.S. Navy launched the first of its Geosat satellites in 1985 with one radar instrument that has provided some data for researchers. So European oceanographers and climatologists began to lobby for a satellite of their own. They got what they wanted when ESA announced plans in 1981 to build ERS-1. Later ESA decided also to build a follow-on, ERS-2, scheduled for launch in 1994, and other space agencies have been quick to follow. Japan launched its JERS satellite in early 1992, NASA and the French space agency took to the air with Topex/Poseidon last summer, and the Canadians will loft Radarsat in 1994 or 1995.

ERS-1's three radar instruments have lived up to the expectations raised by Seasat. Its synthetic aperture radar, or SAR, produces images of Earth's surface. It achieves a very detailed resolution of 25 meters by using a long exposure as it flies along, rather than a snapshot, and electronically sorting the reflected radar signals to form an image. Oceanographers use the images to study the distribution of sea ice, coastal erosion, and ocean features such as currents and temperature fronts. The scatterometer uses three radar antennas to look at the roughness of the sea surface from three angles, ahead, behind, and below the satellite. Combining the data from all three antennas produces maps of wind speed and direction, potentially of great value to weather forecasters. The third radar instrument, the altimeter, bounces radar pulses off the surface directly below the satellite. The round trip time of the pulses gives a measure of the height of the sea surface to an accuracy of just a few centimeters. By looking at how the return signal is smeared, oceanographers can also assess the height of waves, and the signal's amplitude indicates surface