NSF Revamps Graduate Training Grants

It has become a truism that science is increasingly multidisciplinary and that job opportunities for new Ph.D.s are brightest for those entering industry. So, why, officials at the National Science Foundation (NSF) wonder, are most U.S. universities still training students to follow in the narrow footsteps of a single academic mentor?

A new NSF program is intended to help break that pattern by encouraging universities to broaden the training of graduate students. The program, known as Integrating Graduate Education and Research Training (IGERT), is part of NSF's 1998 budget proposal unveiled last week (see main text). Combined with an expansion of its CAREER program for young academic faculty members, the activities are part of a continuing effort to help the scientific infrastructure adapt to a changing world. "It's a response to what a graduate education should be like," says acting deputy NSF director Joe Bordogna, who played a lead role in getting IGERT off the ground. "The idea is to enable graduates to pursue a broader range of options. Nobody has the answer, but we think this will help."

Most of NSF's support for graduate students currently comes through its prestigious fellowship program, which gives stipends to 800 students a year to work with a single faculty researcher, or by funding a student slot on an individual research grant. IGERT will expand NSF's role in traineeships, in which the grants go instead to universities. IGERT will merge and augment two existing traineeship programs, one within the biology directorate and the second a foundationwide program run by the education directorate, that together fund nearly a thousand students, most of them in graduate school, at 183 universities. The agency hopes to spend $20 million on IGERT in 1998, about $5 million more than it spends on the two programs it will replace.

A committee is still hashing out details of the new program, to be presented next month to NSF's oversight body, the National Science Board. But officials say that IGERT will emphasize interdisciplinary training and promote opportunities for students to work with industry, as well as providing money for research equipment.

As a model for what they hope to achieve, NSF officials point to a traineeship program at Arizona State University that focuses on biological diversity. John Lundberg, an evolutionary biologist who directs the program, says it draws on faculty from nine academic units for a truly interdisciplinary approach. A graduate student in ecology, for example, applied family trees of organisms—phylogenies—for a project in neurobiology, providing that faculty with "a different way to look at their world." But Lundberg offers a note of caution: "Most of our graduates want a postdoc and then a university position—I haven't seen too many break the mold."

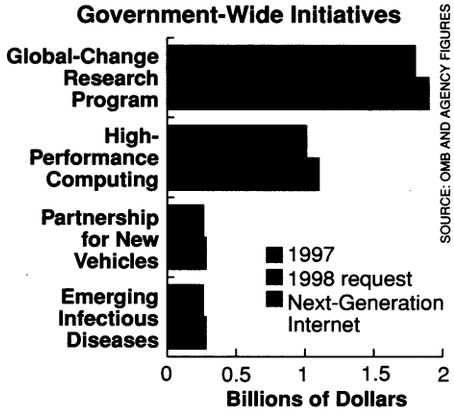
NSF is also expanding its CAREER program, itself a 1995 merger of several programs for young faculty members. CAREER is an attempt to strike a better balance between teaching and research. Applicants must demonstrate their interest and involvement in improving undergraduate instruction, along with their plans for cutting-edge research. NSF has budgeted a 17% increase in the $70 million program, which provides grantees with up to $200,000 over 5 years.

The agency is still feeling its way with all these programs, and it is hoping that an internal review of how different support mechanisms shape the career paths of graduate students will help determine the proper mix of programs. But the results won't be ready for at least a year. In the meantime, says Bennett Bertenthal, assistant director for social and behavioral sciences, who is overseeing the review, the search for answers continues.

"Everybody recognizes that what we have now is not sufficient—it's too narrow," says Bertenthal, who is on leave from the psychology department at the University of Virginia, which 4 years ago cut its graduate enrollment by 30% in an effort to ease demand on a saturated job market. "IGERT jives with people's intuition of what's needed. But nobody really knows what to do." **–Jeffrey Mervis**

■ **NSF:** A 3.4% increase in NSF's research account, to $2.5 billion, is seen by agency officials as a presidential vote of confidence in NSF's basic mission—support for basic academic research. But it doesn't hurt to have something with a bit of pizzazz in the portfolio, too. The biggest single new activity in the proposed 1998 budget is a $58 million program—Knowledge and Distributed Intelligence—that uses a phrase coined by Vice President Al Gore in describing how new technologies are changing the way people collect information and learn (*Science*, 12 April 1996, p. 177). "We want to take what we already have one level higher," says director Neal Lane about NSF's plan to build on existing programs in computer science and other disciplines to improve software and hardware for manipulating databases and communicating with other users.

NSF has also requested a $9 million down payment for a $180 million array of 40 millimeter-wavelength telescopes to explore the early universe and star formation, and $25 million for a radar observatory in Canada's Northwest Territory to study the aurora and other phenomena in the upper atmosphere. Although its $620 million education directorate would grow by only 1%, NSF hopes to combine research and training money in a new approach to supporting graduate education (see http://www.nsf.gov/bfa/bud/fy1998).



Holding on. Clinton seeks modest increases in four ongoing multiagency programs.

■ **Energy:** The big-ticket item in DOE's request is more than $900 million in upfront funding to build the National Ignition Facility at Lawrence Livermore National Laboratory. The laser complex is part of the stockpile-stewardship effort that could prove a boon to fusion researchers and astrophysicists as well. The one-time request for construction would push the budget for nuclear weapons to $5 billion.

Civilian energy research will remain flat at $2.5 billion, but "that's fundamentally a good-news budget," says Martha Krebs, DOE energy research chief. The Administration wants $35 million in 1998—$20 million more than this year's level—as the U.S. share in building the Large Hadron Collider at CERN in Switzerland, part of a $394 million request to support construction through 2004. DOE and CERN recently settled on the U.S. role in building the accelerator and its detectors.

DOE also wants $23 million to study a new spallation neutron source and to upgrade an existing neutron source at Los Alamos National Laboratory. The cost of the