Inside the AMS

Joint Testimony by Society Presidents

On April 12, 2000, AMS president Felix E. Browder, together with three other scientific organization officials, gave testimony before the subcommittee of the House Appropriations Committee that oversees the budget of the National Science Foundation (NSF). The testimony discussed the fiscal year 2001 appropriation for the NSF and called for increased funding for the NSF across all disciplines.

The testimony was presented before the House Subcommittee on Veterans Affairs, Housing and Urban Development, and Independent Agencies. Joining Browder in the presentation were Daryle Busch, president of the American Chemical Society; David G. Kaufman, president of the Federation of American Societies for Experimental Biology, and Robert C. Richardson, chair of the Physics Policy Committee of the American Physical Society.

Busch introduced the group to the committee and emphasized the importance of science to economic growth. Kaufman highlighted the interdependence of the sciences and mathematics, citing magnetic resonance imaging as an example of a development that depended on advances in a variety of areas. Richardson stressed the need for an appropriate balance between funding for focused research initiatives and funding for core research.

Browder's portion of the testimony, which concluded the presentation, was as follows.

"[A]s my colleagues have stressed, our nation benefits tremendously from research supported by the National Science Foundation. Fundamental knowledge gained from this research often forms the basis for the development of new technologies: in medicine, the environment, telecommunications, defense and agriculture, to name just a few areas. I will cite a few specific examples.

"Let us look at medicine first. The NSF currently supports researchers who are developing methods that will facilitate real-time magnetic resonance imaging (MRI) data processing so that three-dimensional brain images can be produced in minutes. Currently, because of the massive amounts of data generated from MRI brain scans, hours, even days, are needed to process the data.

"Another NSF-supported research group has developed a method to detect precancerous cells. This method, based on fluorescence spectroscopy, applied in clinical trials, has demonstrated significantly improved efficacy in detection of early-stage cervical cancer, as compared to existing technologies.

"In the environmental arena, discovering cheaper and more benign solvents to replace toxic volatile organic solvents for polymer synthesis is a critical problem. NSF-supported research has led to an environmentally benign method of polymer synthesis using liquid carbon dioxide. Several chemical companies are supporting the development of products for commercial use based on this research.

"As a mathematician, I would be remiss if I didn't point out that scientific discoveries often depend on complex mathematical modeling and computational algorithms. NSF supports research in mathematics that is related to many scientific problem areas. For example, enormous data sets are being generated in all scientific areas and must be displayed and analyzed. This poses difficult mathematical problems since all data sets do not have similar characteristics, nor are they always used in the same way. Data sets needing real-time analysis, as in the control of aircraft, pose even more difficult mathematical challenges.

"These are just a few of the areas where NSF-supported research is making significant contributions to society. Let me conclude with just a few other observations about the nature of NSF's operation.

"The NSF is widely regarded as a sound steward of the taxpayer's investment. The NSF is one of the most efficient of all federal agencies by almost any measure. It spends only about 5 percent of its budget on administration and management. Moreover, NSF awards funds to researchers only after a rigorous merit-review process using expert peers. Although NSF funds about 20,000 grants in any given year, it is forced to turn down approximately two-thirds of all new proposals each year.

"Not only will increased funding allow NSF to fund more outstanding proposals, it will allow NSF to increase the size and duration of its grants—a long-standing goal of the foundation—without limiting the number of new awards. Reducing the time researchers spend writing proposals will free up more time for research and increase

the overall return per dollar invested. Longer grants should also encourage more high-risk, and potentially high-payoff, research.

"Mr. Chairman, it's hard to overstate how central NSF is to basic scientific and engineering discoveries. NSF provides the cornerstone of new knowledge across scientific disciplines and, as such, plays a key role in maintaining the nation's scientific and economic leadership. Put most simply, NSF is a true investment in our nation's future."

—Allyn Jackson

AMS Participates in Project on Professional Master's Degrees

As mathematics becomes increasingly important in a wide variety of professions, many mathematics departments have launched professional master's degree programs. The AMS and the Mathematicians and Education Reform (MER) Forum, in cooperation with the Society for Industrial and Applied Mathematics (SIAM), have for the past two years collaborated on a project designed to promote the development of these programs. With funding from the National Science Foundation (NSF), two workshops were held and a survey was conducted. Information from the survey will soon be available on the Web.

The purpose of professional master's degrees in mathematics is to provide mathematical education deeper than that at the bachelor's level, together with preparation for a profession in which mathematical training is an asset. These are stand-alone degrees in the sense that they are not intended as steppingstones to the Ph.D. Indeed, some who already have mathematics doctorates have enrolled in professional master's programs as a way of gaining the specific background they needed to enter certain professions.

There is a wide range in the character of professional master's programs, from those with a strong academic flavor to those emphasizing practicalities of career preparation. Some are interdisciplinary programs, in which the degrees are given jointly by a mathematics department and a department in another field. Among the areas of emphasis are actuarial mathematics, applied mathematics, bioinformatics, financial mathematics, industrial mathematics, scientific computing, and teaching. Internships are often part of these programs, and sometimes professionals from outside academia are brought in to teach courses.

The first workshop on professional master's degree programs was held in November 1998 at the Courant Institute of Mathematical Sciences, New York University. With twenty-six universities represented among the sixty-five participants, the workshop included a panel of finance professionals, as well as discussions with graduates of financial mathematics programs. The second workshop, held a year later at Arizona State University, drew seventy-five participants from thirty-three institutions. That workshop included a panel of professionals from the high technology and pharmaceutical industries.

As part of the project, the AMS solicited information about existing professional master's degree programs from all U.S. mathematics departments that grant graduate degrees. In addition to contact information, departments with professional master's degree programs were asked to provide such information as the date when the program started, the number of graduates, and the degree requirements. The AMS plans to make this information accessible by the end of August 2000 through the AMS Web page, `http://www.ams.org/education/`.

—Allyn Jackson

AMS Science and Technology Town Meeting in Cambridge

The AMS held a Science and Technology Town Meeting in Cambridge, Massachusetts, on April 24, 2000, with Congressman Michael Capuano, representing Massachusetts's eighth congressional district. This is the fourth town meeting that the AMS has organized over the past two years. These meetings provide forums for discussions between mathematicians, scientists, engineers, and members of Congress.

Congressman Capuano responded candidly to questions from an audience of around seventy-five constituents, explaining how he must balance the many issues and needs of his district. Science is very seldom a high priority for him, even though his district has one of the highest concentrations of scientists in the country. However, Capuano thoroughly enjoyed the give-and-take with this group of science constituents and—with continued followup by the group—science should be able to move up in his consciousness.

The town meeting was organized locally by Arthur Jaffe of Harvard University and Dan Stroock and Jerry Friedman of the Massachusetts Institute of Technology, with support from the AMS Washington Office. The AMS Washington Office enlisted the help of several other scientific societies, including the American Physical Society and the American Chemical Society, in publicizing the town meeting and cosponsoring the event.

The AMS Washington Office hopes to facilitate the organization of several science and technology town meetings later this year. These meetings provide an advantageous and relatively easy way to begin to develop relationships with members of Congress, and I encourage those interested in hosting similar events on their campuses to contact me by e-mail at `smr@ams.org` or by telephone at 202-588-1100.

—Samuel M. Rankin III
AMS Washington Office