Statement by
David Eisenbud, President of the American Mathematical Society
on
FY 2004 Appropriations for the National Science Foundation
before the
Subcommittee on VA, HUD and Independent Agencies
Committee on Appropriations
United States House of Representatives

April 9, 2003

Mr. Chairman and members of the committee, I am David Eisenbud, President of the American Mathematical Society, representing more than 27,000 mathematical scientists in academia, industry and the national laboratories. I am here today to testify on behalf of the National Science Foundation (NSF).

Let me begin by expressing my thanks for the strong commitment this committee has made to the NSF. I believe that this support is very much in the public interest and that your vision will pay extraordinary dividends in the years to come. I am also grateful to the 107th Congress for passing the NSF Authorization Act, which suggests an FY 2004 budget of $6.39 billion for the NSF, as part of a program of substantially increasing NSF support. This is a direction we wholeheartedly support.

The NSF is crucial in maintaining the nation's scientific leadership and in continuing our nation's fantastic technological progress. Dividends from past investments in the NSF are manifest in the development of individual scientific disciplines and the development of interdisciplinary research needed to meet today's and tomorrow's scientific challenges. Research supported through the NSF has led to profound advancement in science, mathematics, and engineering, and has time and again underpinned new products, methods, technologies–even new industries.

Work the NSF supports in cellular biology has the potential of shedding light on Alzheimer's disease, Lou Gehrig's disease, and cancer. NSF support of computing research may lead to collision warning, smart lane merging, and rear impact avoidance systems for automobiles. An effort in engineering has led to a "pharmacy-on-a-chip" implant that monitors a patient's blood chemistry and will deliver accurate and timely doses of medicine. Materials research has derived techniques for making composite materials that can potentially be used for constructing artificial bone and repairing nerve fibers.

Today, when national security and pressing needs are of great concern to America, we should not forget that our progress in these areas rests squarely on fundamental research. For example, the cryptography that makes it possible for banks to transact their business on the internet or for our military commanders to have secure communications in the field depends on fundamental advances in number theory that, just a few years ago, were touted as the sort of pure science that would never be applied. Future progress in this seemingly abstract area, by us or by hostile forces, could threaten the security of all these communications, and would require fundamental new science to repair the damage. If the past is any guide, the applications of science that we already see will be dwarfed in importance by those of which we still have no idea. Thus it is critical to our nation that US fundamental science and mathematics remain at the highest level, and the NSF is the leading agency promoting such fundamental research.

A strength of the NSF is that it supports the best research, regardless of its potential use, and good research often finds its way into innovations. The NSF peer review system has an excellent track record of choosing the best science and the best investigators to perform the research. The number of Nobel Prize winners who were supported by the NSF is one measure of this.

As a mathematician and as Director of the NSF supported Mathematical Sciences Research Institute in Berkeley, CA, I have intimate knowledge of how the health of the NSF affects a discipline. Approximately 68 percent of federal support for academic mathematics research comes from the NSF. Continued advancement in the subfields of the mathematical sciences depends critically on healthy NSF budgets. Unfortunately, many grant proposals that are deemed of very high quality are underfunded or not funded at all. This funding situation has a very negative affect on US students when they consider mathematical research as a career path. The pipeline issue, getting enough young people into the discipline, is one of the main thrusts in the use of new funding at the NSF, and one on which we have a long way to go. Adequate support, also for midcareer scientists, is a crucial part of this. Other science and engineering fields experience many of the same tensions exhibited in the mathematical sciences.

This state of affairs is serious because the need for mathematics in scientific discovery is accelerating. I have already mentioned how theoretical advances in number theory affect our most sensitive communications networks. Mathematical theory and modeling will contribute to a better understanding of the spread of epidemics, of DNA, of brain function, and of three-dimensional interactions of proteins—an enormous, complex problem of biology. The understanding of uncertainty, of large data sets and their uses, will need new mathematical theories. The modeling, simulation, control, and manufacturing of nano and quantum molecular devices will require advances in mathematics.

The US leads the world in science and in its many technological applications; our economy and our culture depend on this leadership. All disciplines of science and engineering depend on a strong NSF.

Again, Mr. Chairman, thank you for your leadership and thank you and the committee for your efforts on behalf of the National Science Foundation. I encourage you to continue your generous support of the NSF in your FY 2004 appropriations.