Testimony before the
Committee on Agriculture, Nutrition and Forestry
United States Senate
by
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Good morning, Mr. Chairman, Senator Chambliss and members of the Committee. Thank you for this opportunity to testify before you today on investing in our Nation's future through agricultural research.
The American Association for the Advancement of Science (AAAS) is the world's largest multidisciplinary scientific society and publisher of the journal, Science. AAAS was founded in 1848, and includes some 262 affiliated societies and academies of science, representing 10 million individuals.

A portion of my testimony builds upon data and information from the AAAS R&D Budget and Policy Program, which for more than 30 years has strived to be a comprehensive, reliable, and impartial source of information on the federal investment in research and development (www.aaas.org/spp/rd).

U.S. Research Program
By any measure, the American scientific enterprise is certainly among the best, if not the best in the world. Its eminence derives both from the strong support science receives from many sectors of society and from the breadth of the U.S. research and development (R&D) portfolio. The need for strong support across all scientific fields is the result both of the increasing interdependence of engineering, physical, biological, agricultural, behavioral, and social sciences, and from the importance of all these fields to innovation and the growth of the economy, as well as to the improvement of the health and quality of life of all Americans. America's scientific leadership also is a product of a multi-faceted system for both supporting and conducting research. Substantial research support comes from a broad array of Federal government agencies, private philanthropic foundations, from industry, colleges and universities, and the states. The proportion of support among these sources differs by field and intent of the research, but the participation of all has been essential to our country's scientific successes. Moreover, much research is conducted under grants or contracts at individual laboratories located at colleges, universities, research institutes and industrial settings throughout the United States, whereas other research is conducted intramurally within government agencies, in their dedicated laboratories and contractors. Again, the success of American science has been a result of the diversity within our scientific system.

The keystone of U.S. science has been the awarding of research support on the basis of what is called peer or merit review. The award of research grants through merit review goes back over a hundred years. The Smithsonian Institution created a scientific advisory committee in the

mid-19th Century to review proposals for merit before awarding funds. This practice was later embraced by the U.S. Navy and the predecessor to the National Institutes of Health (NIH) in the early 20th Century. Peer-reviewed, merit evaluation allows the government and other funders to prioritize resources and at the same time ensure that the best ideas with the maximum potential will be funded, based on the judgments of top U.S. scientists.

America's innovative scientific spirit, combined with this unique system for supporting and conducting science, has brought us innovations as diverse as the Internet, magnetic resonance imaging (MRI), and satellite-based weather forecasting. In agricultural research, the return on investment has meant higher productivity and lower prices for consumers, improved land management practices, and enhancements in food safety and quality. Perhaps most importantly, the federal government's role in agricultural research has ensured a critical investment in science education through its historical relationship with our nation's land-grant institutions.

Comparison of Key R&D Agencies

Most of the federal government's R&D is mission-oriented: that is, it is intended to serve the goals and objectives of the agency that provides the funds (e.g., agricultural research in the USDA; health research at NIH). As mentioned before, many of these agencies include in-house research labs and centers (e.g., EPA) in addition to supporting research performed at our nation's universities and colleges, by the private sector, and at Federally Funded Research and Development Centers (FFRDCs).

The National Science Foundation (NSF), however, is unique among the mission-oriented agencies. Its primary mission is to support basic and applied research, research facilities, and education across a wide range of science and engineering disciplines. NSF, without laboratories of its own, supports competitive, merit-evaluated research at extramural institutions. More than 80 percent of NSF's $4.8 billion research budget goes to universities and colleges across the United States (see Chart 1).

The National Institutes of Health (NIH), on the other hand, has a research portfolio that mixes both intramural and extramural research as does the USDA. Of the $28.6 billion in R&D that NIH received in FY 2007, approximately 20 percent went to support intramural research conducted at the NIH institutes (see NIH performer chart). Approximately 80 percent of the NIH budget goes to support extramural research, the majority of which is distributed to external performers through Research Project Grants (RPGs), which are investigator initiated, peer reviewed, and competitively awarded. Universities receive 56 percent of all NIH R&D funds (see Chart 2).

In contrast to NIH, almost 73 percent of USDA's R&D budget goes to support intramural research and 27 percent goes to academic research (see Chart 3).

Agricultural Research in the FY 2008 Budget

Under the proposed FY 2008 budget, USDA's R&D budget would fall 10.8 percent from its 2007 final appropriation to $2.0 billion, mostly from proposed cuts in intramural research. On the extramural side, the National Research Initiative (NRI) of competitively awarded research grants would increase $66 million to $257 million. Although the NRI is authorized at $500 million and the Administration has proposed increases to the USDA's main competitive

program over the years, the requests have not made it through Congress and the NRI has rarely exceeded $180 million a year in final appropriations.

Hatch Act funding would fall from an unexpectedly large $323 million 2007 appropriation down below historical levels to $164 million in the President's FY 2008 request; although funding is traditionally distributed by formula, a quarter of the 2008 funds could be awarded competitively.

USDA's intramural research conducted at the 100 Agricultural Research Service (ARS) labs throughout the country would drop in the proposed FY 2008 budget by 9.3 percent to $1.042 billion.

USDA R&D has declined significantly in recent years. Much of the big boost in the early 2000s (see Chart 4) was due not to increases in the actual conduct of research but to strengthening security requirements at USDA labs that conduct research on dangerous pathogens (e.g., anthrax).

Constraints on the Scientific Enterprise

American scientists have a virtually unlimited pool of creative ideas. The biggest constraint on scientific progress is the lack of sufficient resources needed to support research. Unfortunately, overall federal research funding is decreasing in absolute terms. The competition for federal funding is fierce, regardless of the composition of any given agency's research portfolio. NSF, for example, funded less than 25 percent of the proposals it received in FY 2006. In FY 2005, close to $1.8 billion worth of proposals that rated in the very good to excellent range were declined. NIH, meanwhile, funds approximately 20 percent of the extramural research proposals submitted (in FY 2005, it received over 32,000 proposals). It should be noted, however, that during the doubling years NIH was able to fund one in three grant applications. USDA, on the other hand, received 2,312 applications to NRI in FY 2006, representing almost $895 million worth of proposals. Of the proposals submitted, USDA funded only about 16 percent. As a result, in USDA and throughout the government, a large number of proposals worthy of funding are declined each year. In the aggregate, this represents a rich portfolio of lost research and education opportunities.

There also is some concern in the science and engineering community that the research capacity to compete for R&D dollars is highly concentrated among the top elite academic institutions. While almost 800 universities and colleges receive federal funding for research from one of the many R&D agencies, more than three-quarters of the total R&D funds go to the top 100 institutions. The government has addressed this distributional issue in part by creating a range of programs to help develop research capabilities among institutions in states that receive the least federal dollars, including the Experimental Program to Stimulate Competitive Research (EPSCoR) program in several agencies including USDA and NSF, and the Institutional Development Award (IDEA) program at NIH.

Because USDA laboratories and land-grant universities are located in every state, USDA R&D is somewhat more evenly distributed than that of other R&D agencies and over the department's long history, it has helped to build research capacity throughout the nation to perform research to meet local agricultural needs. The top 10 state recipients of USDA R&D

funding receive 51 percent of the total share; the top 10 for NIH get 72 percent, and for NSF it is 61 percent of the total share.

Conclusion

It is widely recognized that the U.S. economy, now and in the future, will depend on our ability to innovate. Maintaining the U.S. lead in innovation in turn relies on a strong foundation of federal investment in research and education across a broad spectrum of disciplines.

Robust research funding is necessary to gain the data needed to understand and craft solutions to pressing issues, ranging from a greater understanding of how to adapt to a changing climate, to the development of national security tools to protect against emerging biological and agricultural threats to our nation, to ensuring a sustainable agricultural economy for generations to come.

In an increasingly technology-based economy that relies on federally funded research as the seed corn for technology-based innovation, the federal government needs a sustained commitment to a robust and diverse research portfolio that recognizes the interdependence and critical role of all scientific disciplines to a future innovative society.

APPENDIX A

American Association for the Advancement of Science (AAAS)

The American Association for the Advancement of Science (AAAS) is the world's largest multidisciplinary scientific society and publisher of the journal, Science (www.sciencemag.org). AAAS (triple A-S) was founded in 1848, and includes some 262 affiliated societies and academies of science, representing 10 million individuals. Science has the largest paid circulation of any peer-reviewed general science journal in the world, with an estimated total readership of over one million. The non-profit AAAS (www.aaas.org) is open to all and fulfills its mission to "advance science and serve society" through initiatives in science education, science policy, international programs, and an array of activities designed both to increase public understanding and engage the public more with science.

Every year since 1976, AAAS has published an annual report analyzing research and development (R&D) in the proposed federal budget in order to make available to the scientific and engineering communities and to policymakers timely and objective information about the Administration's plans for the coming fiscal year. At the end of each congressional session, AAAS also publishes a report reviewing the impact of appropriations decisions on research and development. AAAS has also established a Web site for R&D data on which we now post regular updates on budget proposals, agency appropriations, and outyear projections for R&D, as well as numerous tables and charts. The address for the site is www.aaas.org/spp/rd.

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Dr. Leshner has been Chief Executive Officer of the American Association for the Advancement of Science and Executive Publisher of the journal Science since December 2001. AAAS was founded in 1848 and is the world's largest, multi-disciplinary scientific and engineering society.

Before coming to AAAS, Dr. Leshner was Director of the National Institute on Drug Abuse (NIDA) from 1994-2001. One of the scientific institutes of the U.S. National Institutes of Health, NIDA supports over 85% of the world's research on the health aspects of drug abuse and addiction.

Before becoming Director of NIDA, Dr. Leshner had been the Deputy Director and Acting Director of the National Institute of Mental Health. He went to NIMH from the National Science Foundation (NSF), where he held a variety of senior positions, focusing on basic research in the biological, behavioral and social sciences, science policy and science education.

Dr. Leshner went to NSF after 10 years at Bucknell University, where he was Professor of Psychology. He has also held long-term appointments at the Postgraduate Medical School in Budapest, Hungary; at the Wisconsin Regional Primate Research Center; and as a Fulbright Scholar at the Weizmann Institute of Science in Israel. Dr. Leshner is the author of a major textbook on the relationship between hormones and behavior, and has published over 150 papers for both the scientific and lay communities on the biology of behavior, science and technology policy, science education, and public engagement with science.

Dr. Leshner received an undergraduate degree in psychology from Franklin and Marshall College, and M.S. and Ph.D. degrees in physiological psychology from Rutgers University. He also holds honorary Doctor of Science degrees from Franklin and Marshall College and the Pavlov Medical University in St. Petersburg, Russia. Dr. Leshner is an elected fellow of AAAS, the National Academy of Public Administration, the American Academy of Arts and Sciences, and many other professional societies. He is a member (and on the governing Council) of the Institute of Medicine of the National Academies of Science. The U.S. President appointed Dr. Leshner to the National Science Board in 2004. He is a member of the Advisory Committee to the Director of NIH, and represents AAAS on the U.S. Commission for UNESCO.