



**Outside Witness Testimony in Support of FY 2022 Funding for the  
National Science Foundation**

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**Submitted by:**

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House Committee on Appropriations  
Subcommittee on Commerce, Justice, Science and Related Agencies

The American Institute of Biological Sciences (AIBS) appreciates the opportunity to provide testimony in support of fiscal year (FY) 2022 appropriations for the National Science Foundation (NSF). We encourage Congress to provide NSF with **at least \$10.2 billion** in FY 2022.

AIBS is a scientific association dedicated to promoting informed decision-making that advances biological research and education for the benefit of science and society. AIBS works to ensure that the public, legislators, funders, and the community of biologists have access to information that can guide informed decision-making.

Biological research is in our national interest. Increasing our knowledge of how genes, cells, tissues, organisms, and ecosystems function is vitally important to efforts to improve the human condition. Food security, medicine and public health, national security, economic growth, and sound environmental management are informed by the biological sciences. The knowledge gained from NSF-funded research contributes to the development of new research tools and industries.

Biological research strengthens our economy. Research funding from NSF powers the expansion of the bioeconomy and has given rise to successful companies, such as Genentech, Ekso Bionics, and Ginkgo BioWorks, as well as new industries that provide more robust food crops or disease detection tools and techniques. The translation of biological knowledge into formal and informal education programs foster the development of the scientifically and technically skilled workforce needed by employers. Data show that employers continue to seek workers with scientific and technical skills. Science and engineering employment in the United States has grown more rapidly than the workforce overall and now represents 5 percent (or about 7 million) of all U.S. jobs.

The cornerstone of NSF excellence is a competitive, merit-based review system that underpins the highest standards of excellence. Through its research programs, NSF invests in the development of new knowledge and tools that solve the most challenging problems facing society.

- **Combating emerging diseases:** NSF-funded research is playing crucial role in our response to the COVID-19 pandemic. Fundamental research supported by NSF led to the development of critical diagnostic tools and medical devices being used to combat the outbreak. NSF supported the discovery of bacteria from thermal pools at Yellowstone National Park that contain thermostable enzymes that allow for the rapid copying of genetic material through a process called Polymerase Chain Reaction (PCR). This process was integral to manufacturing a widely used clinical test for determining whether a patient has been infected with SARS-CoV-2, the virus that causes COVID-19.
- **Mobilizing big data:** Access to and analysis of vast amounts of data are driving innovation. NSF enables integration of big data across scientific disciplines, including applications in the biological sciences. Digitization of biodiversity and natural science collections involves multi-disciplinary teams, which have put more than 125 million specimens and their associated data online for use by researchers, educators, and the public.
- **Enabling synthetic biology:** DNA editing has become more advanced and targeted with techniques such as CRISPR-CAS9 allowing scientists to rewrite genetic code and redesign biological systems. NSF funds research on how these techniques can be used to bio-manufacture new materials, treat diseases, and accelerate growth of the bioeconomy.

Other examples of research that have benefited the public are chronicled in the AIBS report, “Biological Innovation: Benefits of Federal Investments in Biology,” which is available at <https://www.aibs.org/assets/pages/policy/AIBS-Biological-Innovation-Report.pdf>.

The NSF is the primary federal funding source for biological research at our nation’s universities and colleges, providing 67 percent of extramural federal support for non-medical, fundamental biological and environmental research at academic institutions.

The NSF is also an important supporter of biological research infrastructure, such as field stations, natural history museums, and living stock collections. These place-based research centers enable studies that take place over long periods of time and variable spatial scales.

Scientific collections are an important component of our nation’s research infrastructure. Recent reports have highlighted the value of mobilizing biodiversity specimens and data in spurring new scientific discoveries that grow our economy, improve our public health and wellbeing, and increase our national security. In 2019, the Biodiversity Collections Network released their report, [Extending U.S. Biodiversity Collections to Promote Research and Education](#), outlining a national agenda that leverages digital data in biodiversity collections for new uses and calling for building an Extended Specimen Network. A 2020 report by the National Academies of Science, Engineering and Medicine (NASEM), [Biological Collections: Ensuring Critical Research and Education for the 21st Century](#), argued that collections are a critical part of our nation’s science

and innovation infrastructure and a fundamental resource for understanding the natural world. Both reports articulate a common vision of the future of biological collections and define a need to broaden and deepen the collections and associated data to realize the potential for biodiversity collections to inform 21<sup>st</sup> century science. This endeavor requires robust investments in our nation's scientific collections, whether they are owned by a federal or state agency or are part of an educational institution or free-standing natural history museum or another research center. While most federal agencies have a role to play in supporting the development of the Extended Specimen Network, the NSF's leadership through the Advancing Digitization of Biodiversity Collections program has positioned NSF to play a central role in the development of the Extended Specimen Network.

The NSF supports recruitment and training of our next generation of scientists. Support for undergraduate and graduate students is critically important to our research enterprise. Students learn science by doing science, and NSF programs engage students in the research process. NSF awards reached 1,900 colleges, universities, and other public and private institutions across the country in FY 2020. Initiatives such as the Graduate Research Fellowship and the Faculty Early Career Development program are important parts of our national effort to attract and retain the next generation of researchers. Since 1952, the number of students supported by NSF Graduate Research Fellowships has grown to more than 60,000. In FY 2020, nearly 313,000 people, including researchers, postdoctoral fellows, trainees, teachers and students, were supported directly by NSF.

Unfortunately, federal research and development investments are shrinking as a share of the U.S. economy. The U.S. is still the largest performer of research and development globally, but our share of worldwide scientific activity has declined considerably over the past 20 years. Countries in East and Southeast Asia, especially China, have been rapidly increasing their investments in science. In fact, according to the National Science Board and the American Academy of Arts and Sciences, China may have recently surpassed the U.S in research and development spending. To remain at the global forefront of innovation and to fully realize the benefits of NSF-supported research, the government must make new and sustained investments in NSF. Unpredictable swings in funding disrupt research programs, create uncertainty in the research community, and stall the development of the next great idea.

The President's budget request for FY 2022 proposes a 20 percent boost to NSF. If enacted, this increase will allow for critical federal investments in scientific and educational research, as well as support for the development of the scientific workforce. Such an increase will also allow NSF to expand support for important new initiatives, such as the "LEAding cultural change through Professional Societies (LEAPS) of Biology" program, which aims to facilitate cultural changes in the biological sciences to broaden participation and advance diversity, equity, and inclusion.

Providing the NSF with at least \$10.2 billion in FY 2022 is necessary in undoing the recent stagnant funding that slowed American scientific discovery. The requested funding will grow and sustain the U.S. bioeconomy and enable NSF to accelerate work on important initiatives at the frontiers of science and engineering.

In addition to the appropriations process, Congress is currently considering other legislation

relevant to the scientific community, namely proposals to significantly expand the mission and budget of the NSF. Increasing investments in translational research will bolster U.S. global leadership and competitiveness in innovation, however, we urge Congress to also make robust investments in basic and foundational research.

We also urge Congress to pass additional funding for U.S. researchers and science institutions to accelerate recovery from the COVID-19 pandemic. The Research Investment to Spark the Economy (RISE) Act (HR.869 and S.289) will help natural history museums, botanical gardens, field stations, and other research institutions recover from the pandemic. These institutions lost revenue due to reduced, postponed, and canceled public programs, including formal and informal science education programs. Most of these institutions are non-profits and operate with budgets with limited capacity to absorb revenue losses resulting from reduced public visitation. Pandemic related closures and restrictions have also resulted in the loss of a field season for outdoor research, leading to research disruptions and a year's worth of critical data not being collected. Emergency relief funding proposed under the RISE Act, which includes \$3 billion for NSF, would support U.S. researchers, including graduate students and postdoctoral researchers, who have had research interrupted as a result of the pandemic.

We encourage Congress to continue supporting increased investments in our nation's scientific capacity. Thank you for your thoughtful consideration of this request and for your prior efforts on behalf of science and the National Science Foundation.