March 25, 2015
Contact: Meghan McCabe
Legislative Affairs Analyst
mmccabe@faseb.org

Testimony of the
Federation of American Societies for Experimental Biology

On
FY 2016 Appropriations for the National Science Foundation

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

Representative John Culberson, Chairman
Representative Chaka Fattah, Ranking Member

The Federation of American Societies for Experimental Biology (FASEB) respectfully requests a fiscal year (FY) 2016 appropriation of a minimum of $7.72 billion for the National Science Foundation. This sustainable increase is an important first step in ensuring a competitive basic research enterprise.
FASEB, a federation of 27 scientific societies, represents more than 120,000 life scientists and engineers, making it the largest coalition of biomedical research associations in the United States. Our mission is to advance health and welfare by promoting progress and education in biological and biomedical sciences.

The National Science Foundation (NSF) is the only federal agency supporting all fields of fundamental science and engineering. NSF’s mission is “to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense...”¹ The agency has supported revolutionary research in every field of science and engineering and funded over 200 Nobel Laureates. Its fellowship programs support the education and training of thousands of graduate students pursuing advanced degrees in science, technology, engineering, and mathematics, ensuring a robust and competitive workforce.

The vast majority of NSF funding is distributed, through merit-based reviews, to 200,000 scientists, engineers, educators, and pre- and post-doctoral students across all 50 states. NSF funds approximately 24 percent of all federally-supported basic research through an average of 11,000 new competitive awards per year.²

Recent highlights from NSF-funded research include:

- **Understanding the Brain**: Researchers at the University of Arizona have demonstrated that brain structures responsible for learning and memory are nearly identical across a wide variety of animal species, including insects, crustaceans, mollusks, and worms. This similarity indicates a common evolutionary pathway, and the neuroanatomy and chemical composition of the structures mirror areas in the human brain that are implicated in neurological disorders involving learning and memory, such as Alzheimer’s disease and Down syndrome.³

- **Developing Wearable Medical Monitors**: A team of engineers at the University of California at Berkeley, funded by NSF, have developed an organic, fabric-like pulse oximeter, which measures pulse and blood oxygenation levels. Traditional oximeters, used in every hospital in America, are rigid and expensive to produce. The new model will be “as cheap as a Band-Aid” and is as accurate as the product currently in use. This revolutionary technology has the potential to catalyze a new industry to develop affordable, wearable medical sensors.⁴

¹ [http://www.nsf.gov/about/glance.jsp](http://www.nsf.gov/about/glance.jsp)
² [http://www.nsf.gov/about/glance.jsp](http://www.nsf.gov/about/glance.jsp)
• **Fighting Antibiotic Resistance:** NSF-funded researchers found that a member of *Archaea*, a group of single-celled organisms best known for living in extreme environments like hydrothermal vents, produces compounds that kill a group of bacteria that includes drug-resistant pathogens like *Staphylococcus aureus*, *Bacillus anthracis* (which causes anthrax), and *Clostridium difficile* (which causes gut infections). This discovery could lead to the identification of new antimicrobial drugs that will help combat the serious problem of antibiotic resistance.\(^5\)

• **Reducing Sleep Disorders:** The NSF funds a collaborative project between mathematicians and neuroscientists to study sleep-wake cycles using mathematical models. These models, which are tested with data from rodent studies and human patients, are revealing how the structure of the massive neuronal network in the brain affects the timing of sleep-wake cycles. Successful models could potentially be used to develop insomnia treatments, effective remedies for medical condition-induced sleep disorders, or strategies to reduce jet lag more quickly.\(^6\)

• **New Methods of Producing Biofuels:** NSF-funded research led to the discovery that certain symbiotic bacteria that live in the gills of marine clams provide the animals with the enzymes they need to digest the cellulose in wood, thereby yielding energy for the clams to survive. These enzymes have potential economic value because they convert wood into soluble sugars that can be fermented into renewable biofuels, such as ethanol. They can also be used in production or processing of paper, textiles, detergents, food, animal feed, and waste materials.\(^7\)

**Maintaining Global Leadership In Innovation**

Progress in science and technology is becoming increasingly interdisciplinary, as discoveries in one field fuel advancement in another. The broad research portfolio of discovery science at NSF is especially critical for our nation’s capacity for generating new knowledge that benefits society, improves quality of life, and strengthens the economy. In a recent speech at the United Nations Educational, Scientific and Cultural Organization, NSF Director France Córdova, PhD, said, “…that is the key to innovation—it is to invest in discovery based-research.”\(^8\)

---

Steady, sustainable funding increases are the best way to ensure that the next period of transformative discovery takes place in America. NSF should be granted the resources it needs to enhance innovation and train the next generation of leaders in science and engineering. According to our estimate, providing NSF with $7.72 billion ($380 million above the FY 2015 level) would enable NSF to support approximately 400 more research grants at current funding levels.

In FY 2016, FASEB recommends a minimum of $7.72 billion for NSF. This sustainable increase is an important first step in ensuring a competitive basic research enterprise.

Thank you for the opportunity to offer FASEB’s support and recommendations for the NSF.