

**Testimony by
Dr. Ford W. Bell,
President of the American Association of Museums,
to the House Appropriations Subcommittee on Commerce, Justice, Science,
and Related Agencies
March 22, 2012**

Thank you for inviting me to testify today. I'm Ford Bell, I'm a veterinary oncologist by training, and President of the American Association of Museums.

AAM represents museums of all kinds, including the AAM-accredited Manassas National Battlefield Park in **Chairman Wolf's** district, the AAM-accredited Academy of Natural Sciences in **Ranking Member Fattah's** district, and the AAM-accredited Houston Museum of Natural Science in **Rep. Culberson's** district.

Many museums are very involved in STEM Education, and I am here on behalf of the larger museum community – including the Association of Zoos and Aquariums, the Association of Children's Museums, the Association of Science Museum Directors, and the Association of Science-Technology Centers – to request that the Subcommittee continue making the critical investment in the National Science Foundation's Informal Science Education (ISE) program, which is proposed to be renamed the Advancing Informal STEM Learning (AISL) program.

This important program received \$61.4 million in FY12, and the president has proposed a 22% reduction for FY13, which would turn the clock back on the urgent need to get our kids hooked on science.

Our public education system is undergoing massive change. And the growing consensus is that the future of education will be about helping kids develop a core set of skills: critical thinking, the ability to synthesize information, creativity, collaboration, and the ability to innovate.

Visiting a museum offers the perfect opportunity to develop these skills.

And what better way to bring science to life than visiting a science center, public garden, zoo, or aquarium.

In 2009, the National Research Council of the National Academies explored whether people learn science in nonschool settings.

The answer was a clear yes.

They found that museums, science centers, zoos, aquariums, and environmental centers are places where people can pursue and develop science interests and engage in science inquiry.

The study also found that informal learning in museums can have a significant impact on science learning outcomes for those who are historically underrepresented in science.

My testimony details a few examples of how NSF Informal Science Education grants have allowed museums to bring STEM education to their communities:

- A \$3 million ISE grant supports “Urban Advantage” – a 5-year collaboration that brings the Denver Museum of Nature and Science, the Denver Botanic Gardens, and the Denver Zoo – all accredited institutions – together with 3 local school districts to improve science literacy among middle-school students. It provides hands-on experiences, makes expert scientists available to teachers, students, and parents, and gets families involved in the learning process.
- In Philadelphia, the AAM-accredited Franklin Institute Science Museum and the Free Library of Philadelphia got a \$1 million ISE grant to develop an innovative afterschool program that engages children and families in science and literacy. This program – called “LEAP into Science” – uses hands-on activities to introduce science to a whole new generation, and makes it fun. The program reaches diverse audiences and underserved families, and makes science accessible to thousands of Philadelphians.
- In California, a \$1.2 million ISE grant allows the Exploratorium in San Francisco to work with UC-Santa Cruz and King’s College London on a 5-year project to shape the future of informal science education and prepare science educators to maximize the link between formal and informal science learning.

Once again, I appreciate the opportunity to testify. I encourage you to support NSF's Informal Science Education, and I encourage you to do some field research in your districts by visiting some of the wonderful museums you represent, and I'm more than happy to help you arrange any of these visits. I am also happy to answer any questions.

[The following written testimony – submitted in advance – will be included in the Subcommittee's official public record of the hearing.]

The American Association of Museums (AAM) appreciates the opportunity to testify today in support of the programs of interest to museums that are funded by the Commerce, Justice, and Science Subcommittee on Appropriations, and in particular, the **Informal Science Education (ISE)/Advancing Informal STEM Learning (AISL) program at the National Science Foundation (NSF)**. We urge the Subcommittee to provide \$61.4 million, equal to the FY 2012 funding level, and reject the President's budget request which called for only \$47.82 million for FY13, a significant, 22% decrease from the FY 2012 level.

The American Association of Museums represents the full range of our nation's museums – including aquariums, arboretums, archaeological museums, art museums, botanical gardens, children's museums, culturally specific museums, historic sites, history museums, maritime museums, military museums, natural history museums, nature centers, planetariums, presidential libraries, science and technology centers, zoological parks, and other specialty museums – along with professional staff and volunteers who work for and with museums. AAM is proud to work on behalf of the 17,500 museums that employ 400,000 people, spend more than \$2 billion on educational programming, and contribute more than \$20 billion to local economies.

One of society's greatest challenges is determining how to engage the next generation in the sciences. Museums offer the perfect learning environment – where science, technology, engineering, and mathematics (STEM) education is brought to life through activities and experiences that build a lifetime of interest and enthusiasm for the sciences.

There is a growing consensus that whatever the new educational era looks like, it will focus on the development of a core set of skills: critical thinking, synthesizing information, ability to innovate and think creatively, and collaboration. And museums are uniquely situated to help learners develop these core skills. Millions of Americans of all ages and backgrounds already learn about STEM each year by visiting museums, science centers, public gardens, zoos, and aquariums.

In 2009, the National Research Council of the National Academies released a report entitled *Learning Science in Informal Environments: People, Places, and Pursuits*, which found:

- “Each year, tens of millions of Americans, young and old, explore and learn about science by visiting informal learning institutions, participating in programs, and using media to pursue their interests.”
- “Do people learn science in nonschool settings? This is a critical question for policy makers, practitioners, and researchers alike – and the answer is yes.”

- “Designed spaces – including museums, science centers, zoos, aquariums, and environmental centers – can support science learning. Rich with real-world phenomena, these are places where people can pursue and develop science interests, engage in science inquiry, and reflect on their experiences through sense-making conversations.”
- “Virtually all people of all ages and backgrounds engage in informal science learning in the course of daily life. Informal environments can stimulate science interest, build learners’ scientific knowledge and skill, and – perhaps most importantly – help people learn to be more comfortable and confident in their relationship with science.”
- **“Informal environments can have a significant impact on science learning outcomes for those who are historically underrepresented in science.”**

NSF is providing crucial funding to support museums’ educational missions and efforts to improve STEM education.

The mission of NSF’s Directorate for Education and Human Resources (EHR) is to achieve excellence in U.S. STEM education at all levels and in both formal and informal settings in order to support the development of a diverse and well-prepared workforce of scientists, technicians, engineers, mathematicians and educators and a well-informed citizenry that have access to the ideas and tools of science and engineering. The purpose of these activities is to enhance the quality of life of all citizens and the health, prosperity, welfare and security of the nation.

EHR’s Informal Science Education (ISE) program – funded at \$61.4 million in FY12 – supports innovation and lifelong learning through investments in research, development, infrastructure, and capacity-building for STEM learning outside formal school settings. Like all NSF programs, ISE invests in conferences, symposia, workshops, and five types of projects: Research; Connecting Researchers and Public Audiences; Pathways; Full-Scale Development; and Broad Implementation. Museums are among those institutions who have been awarded highly-competitive NSF funds.

In addition to Informal Science Education, the Directorates for Biological Sciences; Education and Human Resources; Geosciences; and Social, Behavioral & Economic Sciences have all supported museums in the areas of field and collections-based research, collections improvements and digitization, database development, and educational programming. Museum exhibitions and educational programs and resources are built on a firm foundation of research, and museum researchers are making major original contributions to the understanding of important issues such as changes in climate, environments, biodiversity, and human culture. I urge the Subcommittee to fully fund these important directorates.

Following are three examples of how NSF-ISE is helping museums provide increased access to their unique resources and fulfill their potential in educational improvement.

Example #1: Denver Museum of Nature and Science/Denver Botanic Gardens/Denver Zoo

Museums across the country have been and are continuing to forge long-term partnerships between cultural institutions and local school districts. One such innovative program is the “Urban Advantage” program (see www.urbandantagedenver.org), a collaboration between the AAM-accredited Denver Museum of Nature and Science, the AAM-accredited Denver Botanic Gardens, the AZA-accredited Denver Zoo, and three local school districts. Supported by a \$3.27 million ISE grant, this five-year collaboration is modeled after a partnership between the AAM-accredited American Museum of Natural History and the New York City Department of Education.

The goal of the Denver collaboration is to improve science literacy among middle-school students in urban environments. School groups and families are encouraged to visit each partner institution to inspire long-term class experiments. For example, a recent project examined saber-tooth tigers using research from the Denver Museum of Nature and Science. This project and many others were displayed at a 2011 Science Day. The museum engages the entire family in hands-on demonstrations such as learning about bird bones by building models of hollow bones and testing their strength. The project has also aggressively promoted communications between the partners, with the museum, zoo and gardens maintaining a help line that links teachers, students and parents directly to staff scientists. E-mail questions are routed directly to the scientist and researcher whose work is most closely aligned with a given project, whether it is horticulture or public health.

The NSF grant also enables educators to work with evaluators to study the long-term impact of this collaboration between formal and informal institutions. Focus groups, teacher observations and links to state testing will provide data to help evaluate how projects such as this can contribute to the learning landscape.

Example #2: The Franklin Institute Science Museum/Free Library of Philadelphia

LEAP into Science is a partnership between AAM-accredited The Franklin Institute Science Museum and the Free Library of Philadelphia that engages children and families in science and literacy by integrating hands-on science activities with children's literature. This effort is supported by a \$1.2 million 5-year ISE grant which was awarded to build a model museum/library partnership to promote science and literacy.

The Franklin Institute's strength in science programming and the Library's expertise in children's literature result in an innovative afterschool program connecting books and science. The library environment is an ideal setting for informal science programs. With ready access to books and the Internet, and a desire to support kids' scientific exploration, libraries can provide educational science opportunities for children and families during afterschool hours and on evenings or weekends. *LEAP into Science* aims to inspire exploration and questioning, providing opportunities for children and families to think like scientists and investigate scientific phenomena with familiar materials and relevant children's fiction and nonfiction books.

LEAP into Science aims to achieve the following impacts:

- Increase science interest, understanding, and engagement by involving underserved families in cross-generational science and literacy experiences;
- Make science accessible to a diverse audience by bringing science activities into community settings; and
- Build community capacity and provide training and experience in informal science and literacy connections to library afterschool staff and children's librarians.

LEAP into Science curriculum resources consist of afterschool workshops designed for children grades K-4 which integrate hands-on science activities and children's books, family workshops which engage children and adults in tabletop science activities linked with related children's books, as well as science bookmarks and exploration cards which extend learning in the home environment.

Another central goal of *LEAP into Science* is to demonstrate how museums, libraries, and other educational institutions can work together to enhance the capacity of urban communities to engage children and families in science. In 2011, *LEAP into Science* expanded to 10 new sites nationwide in efforts to better understand issues of sustainability and institutional partnerships in supporting science and literacy learning in informal environments.

Example #3: Exploratorium/UC-Santa Cruz/King's College London

The Center for Informal Learning and Schools (CILS) is a five-year collaborative effort, funded with the help of a \$1.2 million grant from ISE, between the Exploratorium in San Francisco, the University of California at Santa Cruz, and King's College London. The purpose of the Center is to study the intersection of informal science learning that takes place in museums and science centers and formal learning that takes place in schools, and to prepare leaders in informal science education.

Through the efforts of the center, new doctoral level leaders will be prepared who understand how informal science learning takes place and how informal institutions can contribute to science education reform. A Ph.D. program will be offered to 16 individuals at King's College London (two cohorts of eight) and a post-doctoral program to six scientists interested in issues of learning and teaching in informal settings. A doctoral program is planned at the University of California at Santa Cruz for 24 students, 12 whose interests are primarily in education and 12 who come from the sciences. In addition to doctoral level training, there will be a certification program for existing informal science professionals to better enable them to support teachers, students and the general public. That program will provide 160 informal science educators 120 hours of professional development experiences, and an additional 24 informal science educators with a master's degree in informal science education at UC Santa Cruz.

A Bay Area Institute will be developed to serve as a central focus for all CILS activities. It will bring together researchers and practitioners; it will offer courses and workshops for graduate students; and it will provide a central location for reporting research findings and methodologies that focus on how informal learning institutions can best contribute to science education reform.

Conclusion

We appreciate this opportunity to present these views to the Subcommittee, and urge the Subcommittee to fund the NSF-ISE program at \$61.4 million, equal to the FY 2012 funding level, so we can continue to inspire young and old about science, technology, engineering, and mathematics and fulfill our potential of improving the educational landscape.