

January/February 2010

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NSF AT WORK

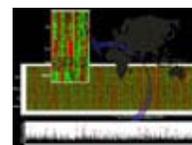
Our Readers' Favorites in 2009



The National Science Foundation (NSF) was founded in 1950 to support the scientific enterprise in the United States. As we begin the celebration of 60 years of scientific discovery, we take a look back at the previous year's highlights. Our readers' favorite news and discovery stories, based on Web statistics, are summarized below.

New Computer Software Reveals Ancestry

NSF-funded researchers have developed a new algorithm that can be used to reveal the genetic ancestry of thousands of individuals in minutes. The new software looks for specific DNA markers known as single nucleotide polymorphisms, or SNPs (pronounced snips), and needs nothing more than a DNA sample in the form of a simple cheek swab.



New Data Challenge Theory That Asteroid Caused Dinosaur Extinction

A study of the sediments associated with the mass extinction event that led to the demise of the earth's dinosaur population and the crater formed when a massive asteroid collided with the earth show that the two events are separated by as much as 300,000 years. The findings cast doubt on the popular theory that the asteroid collision caused the extinction of dinosaurs.

NSF Receives \$3 Billion in ARRA Funding

This fact sheet, summarizing remarks by NSF Director Arden L. Bement, Jr., describes how NSF intends to implement the American Recovery and Reinvestment Act (ARRA), which included a 50 percent boost in 2009 funding for the agency. ARRA funds were used to support the nation's best researchers and to fund new instrumentation programs.



President Announces "Energy for America" Plan

In a speech to the National Academies of Science, President Obama announced a collaboration between NSF and the U.S. Department of Energy (DOE) that addresses the need to "spark a sense of wonder and excitement" in the nation's youth and encourage the pursuit of careers in science and engineering. This fact

sheet includes information about the President's plan to develop new energy technologies.

NSF Launches New Video Series

In June, NSF announced the launch of *Science Nation*, a series of video reports produced by NSF that examine breakthroughs and the possibilities for new discoveries about ourselves, our planet and our universe. Jeff Nesbit, director of NSF's Office of Legislative and Public Affairs, said, "We are pleased to be able to educate and engage the American public about the diverse range of NSF-funded cutting-edge research that is going on every day."



Learning From Disasters



Earthquake damage in Turkey, 2003. Credit: William A. Mitchell

Experts say that Haiti's recent earthquake was anything but a "natural" disaster. While the root cause was a geological event, a magnitude 7.0 earthquake, this natural occurrence would not have produced the near-catastrophic results it has, according to several NSF-funded researchers, were it not for Haiti's enormous social and economic problems, including a lack of modern building standards and practices.

NSF supports a wide variety of research into the causes and management of disasters, including several that focus on the social aspects of these tragic events. The **Natural Hazards Center**, located at the University of Colorado–Boulder, is funded by a consortium of federal agencies including NSF. The Center administers a "**Quick Response Grant Program**" to rapidly collect data during and after earthquakes.

NSF has also supported the **Earthquake Engineering Research Institute** (ERRI) to deploy fast reconnaissance teams whenever a significant earthquake happens anywhere in the world. The teams gather relevant data and draw lessons that might be applied to safer building and infrastructure construction. EERI has already assembled a research group to study the Haiti earthquake; as we were going to press, the team had already begun to arrive in Haiti. **Other NSF-funded teams** have also deployed to the area to assess the possibilities for future quakes. Information gathered from past disasters is available from EERI's NSF-funded "Learning from Earthquakes" project, available **here**.

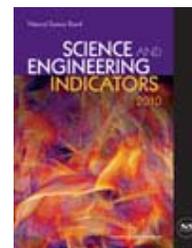
These and other NSF-sponsored research projects have revealed that social vulnerabilities are key to understanding how serious a natural disaster will be and can also provide guidance to those seeking to rebuild after a disaster. **Susan Cutter**, director of South Carolina's **Hazards and Vulnerability Research Institute**, partially funded by NSF, maps out social vulnerabilities to disaster across the United States. Her work shows that it is the vulnerability of a population as much as the severity of the natural event that determines how catastrophic a disaster will really be. Cutter has provided expert testimony to Congress on hazards and vulnerabilities and served on a team that investigated the societal impacts on the severity of the Katrina disaster.

Software Saves Energy Costs

A Virginia Tech professor has developed novel software that promises to increase the efficiency of computers. According to Kirk Cameron, his **MiserWare** application has helped some users save as much as 35 percent on energy costs. The software is an intelligent power management system that automatically balances the energy demands on a computer system by adjusting power consumption when the system is not being heavily used. The software is available for both Linux and Windows-based computers. NSF **supported the development** of MiserWare through its Small Business Innovation Research grants program. Cameron has also been supported by **other NSF funding** for his research on high-power, high-efficiency computing.

DID YOU KNOW?

The 2010 issue of *Science and Engineering Indicators* was released on January 15 and is available to the public [here](#). The report, prepared biennially by the National Science Board and delivered to the President and Congress in even-numbered years, tracks the progress of the country by measuring a variety of statistics related to the research and development (R&D) enterprise. Among the data included in the 2010 report are those showing annual R&D growth in the U.S. lagging behind that of several Asian countries, including South Korea and Japan. While the U.S. continues to lead the world in scientific publications, other countries are catching up. China, for example, now produces 8 percent of the world's research publications, up from just 2 percent of the world's share in 1995.



FACES OF NSF RESEARCH

The Science of Hockey Helmets



Katharine Flores.
Credit: G. Hulse, Ohio State University

Katharine Flores is bringing the highly technical methods of materials science to bear on a problem of great interest to sports enthusiasts: the strength of the protective helmet worn by bicyclists, hockey players and other athletes. If these helmets shatter or fail to absorb the impact of a blow to the head, serious injury or even death can result.

Flores' **NSF-funded research** in the Department of Materials Science and Engineering at Ohio State University (OSU) is focused on the development of a class of materials known as bulk metallic glasses, or BMGs, that are ideal for use in applications ranging from surgical tools to protective sports equipment. The materials have attractive properties for these applications, including extraordinary tensile strength and the ability to undergo large deformations upon impact without fracturing. BMGs are a type of metallic alloy that don't crystallize when cooled below their melting point but, rather, settle into a liquid-like disordered structure. Although the resulting materials are, technically, a type of glass, they can be formed into shapes the way plastics are molded but produce a finished product with the hardness and strength of a metal.

The BMG materials that Flores is currently studying are composed largely of zirconium combined with smaller amounts of copper, nickel, aluminum and other metals. Small samples of these alloys are studied in Flores' lab using a variety of highly sophisticated techniques to investigate the molecular events that occur when the materials are deformed by impact or pressure. Flores believes that it is a lack of understanding of these materials at the molecular level that limits more general application of them in society, and that further uses will be discovered when the materials are more thoroughly understood. Read more about her research [here](#).

Prior to joining the faculty at OSU, Flores was the director of the Sports Materials Laboratory at Stanford University where she established an industry-funded research program on the development of materials for sports application. In addition to her research and teaching duties at OSU, Flores serves as the director of education and outreach for NSF's **Center for Emergent Materials**.

More recently, Flores has expanded her outreach and education activities by participating in a joint project between NSF and NBC News. Just in time for the winter games, scheduled for February, 2010, the **NSF/NBC partnership** has produced a 16-part video series on "The Science of the Winter Olympics" that will be broadcast during the games. View the **NSF Special Report** to read more about this partnership and to watch Flores and other scientists explain the science behind the winter games.

NSF IN THE NEWS

New Mollusk With Load-Bearing Armor Discovered (*R&D Magazine*) NSF-supported researchers have discovered a gastropod mollusk whose armor could improve the load-bearing and protective materials in everything from aircraft hulls to sports equipment.

Biologists Find Darwin's Finches Respond Quickly to New Pathogens (*The Salt Lake Tribune*) Studies of finches on the Galapagos Islands have shown that the birds can rapidly mount an immunological response to parasites that were only recently introduced to the isolated island environment.

Use of Brain-Controlled Devices Not Science Fiction (*CNN*) The hit movie "Avatar" features a paraplegic soldier using brain signals to control sophisticated equipment. Research supported by NSF shows that this science-fiction scenario is quickly becoming reality.

Discovery of Water on Planet Orbiting Nearby Star (*The New York Times*) Astronomers reported the discovery of water on a planet orbiting a nearby red-dwarf star. The planet has an atmosphere of superheated steam and other gases. The work, supported by NSF, was the subject of an NSF Webcast.

THE RIPPLE EFFECT

NSF Begins Celebration of its 60th Year

On May 10, 1950, President Harry S. Truman signed a bill establishing the National Science Foundation. The President announced the creation of the new federal agency, dedicated to advancing the scientific enterprise of the United States, from the rear platform of a train in Pocatello, Idaho. Alan T. Waterman, chief scientist at the Office of Naval Research, was nominated by President Truman as NSF's first director and provided with a budget of \$225,000. From that initial allocation, the National Science Board, established along with NSF and given oversight over its operations, made 97 grants, including one to physical chemist Max Delbruck, who went on to win the 1969 Nobel Prize in Medicine. Additional historical details are available [here](#).



The National Science Board, July, 1951. Alan T. Waterman, NSF's first director, is seated third from the right in the front row. Credit: NSF Collection

Award-Winning Science Journalism



A scene from "Diamond Factory," one of the award-winning programs, is shown [here](#). This episode of WGBH's NOVA ScienceNow features host Neil deGrasse Tyson learning about new techniques for producing artificial diamonds. Credit: WGBH

recognized at the 2010 AAAS annual meeting.

To What Degree?

NSF's special report on climate change has been recently updated to include the latest scientific results. Please visit our [Web site](#) to explore this interactive presentation from leading climate change



Open Government Activities

In response to the Obama Administration's **Open Government Directive**, NSF will be developing an Open Government Plan that describes how we will improve transparency, better integrate public participation and collaboration, and become more innovative and efficient. As we begin to consider these topics, we'd like to hear your ideas and suggestions. Please visit our **Open Government site** between February 6 and March 19 to give us your input and learn more about NSF's open government activities.

Visit Us at AAAS



ADVANCING SCIENCE. SERVING SOCIETY

The 2010 **annual meeting** of the American Association for the Advancement of Science will be held February 18-22 in San Diego. The theme of this year's meeting is "Bridging Science and Society." NSF will have a booth at the meeting--if you are in attendance, please plan on

experts discussing a complex scientific and societal issue. stopping by!



*The National Science Foundation (NSF) is an independent federal agency that supports fundamental research and education across all fields of science and engineering. In fiscal year 2010, its budget is \$6.9 billion. NSF funds reach all 50 states through grants to over 1,900 universities and institutions. Each year, NSF receives about 48,000 competitive requests for funding, and makes over 11,300 new funding awards. NSF also awards over \$400 million in professional and service contracts yearly. Contact **NSF's Office of Legislative and Public Affairs** for more information or for permission to reuse newsletter images.*



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