

## NSF AT WORK

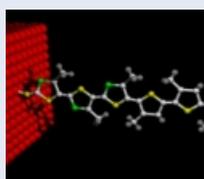
### NSF's "Hit Parade:" Readers' Picks for 2006

This is it! The hits have been tabulated and we have a list of NSF's most popular news stories as picked by you. Based on NSF Web statistics, here are a "dazzling dozen" of the 2006 stories most frequently viewed on the NSF Web site.



**NSF Awards First Partnership for International Research and Education Grants** -- NSF's Partnership for International Research and Education program awarded its first grant. The program is designed to enable U.S. scientists and engineers to build strong, long-lasting international research collaborations and to help the nation develop a new cadre of globally engaged U.S. scientists and engineers. -- January 30, 2006 -- [Full story](#)

**Accelerating Loss of Ocean Species Threatens Human Well-Being** -- An international group of ecologists and economists showed that the loss of biodiversity is profoundly reducing the ocean's ability to produce seafood, resist diseases, filter pollutants and rebound from stresses such as overfishing and climate change. -- November 2, 2006 -- [Full Story](#)



**Device Only Atoms Across May Allow Infinitesimal But Powerful Computers** -- Using the power of modern computing combined with innovative theoretical tools, an international team of researchers determined how a one-way electrical valve, or diode, made of only a single molecule does its job. -- April 3, 2006 -- [Full story](#)

**NSF Report Reveals Century of Doctoral Education Trends in the United States** -- A report released by NSF documented rapid growth and changing demographics of doctoral education during the 20th century, especially over the last 25 years. "U.S. Doctorates in the 20th Century" highlighted many factors about who is educated and where. The report also describes the complex changes taking place in the pursuit of doctoral degrees, many of which are in new interdisciplinary fields. -- October 10, 2006 -- [Full Story](#)



**Top Researcher-Educators Receive the Presidential Early Career Award for Scientists and Engineers** -- The White House honored 20 NSF-supported researchers with the Presidential Early Career Award for Scientists and Engineers, one of the most prestigious awards given to investigators in the early stages of promising research and education careers. -- July 26, 2006 -- [Full story](#)

**Self-Cooling Soda Bottles?** -- Every day, the sun bathes the planet in energy--free of charge--yet few systems can take advantage of that source for both heating and cooling. Now, researchers are making progress on a thin-film technology that sticks both solar cells and heat pumps onto surfaces, ultimately turning walls, windows and maybe even soda bottles into climate-control systems. -- July 11, 2006 -- [Full story](#)



**Easy Up, Not-So-Easy Down** -- Using new fiberglass-polymer materials, contractors in Springfield, Mo., subjected a decaying, 70-year-old bridge to a makeover that was as quick as it was dramatic. Instead of snarling traffic for two to three weeks while they repaired the crumbling deck, girders and guardrails by conventional methods, the workers used prefabricated plates and cages developed by an NSF-supported university-industry partnership to finish the job in a mere five days. -- March 2, 2006 -- [Full Story](#)

**Closer to Home** -- Using a relatively new planet-hunting technique that can spot worlds one-tenth the mass of our own, researchers have discovered a potentially rocky, icy body that may be the smallest planet yet found orbiting a star outside our solar system. -- January 25, 2006 -- [Full Story](#)



**'LouseBuster' Instrument Shown to Kill Head Lice** -- Biologists invented a chemical-free, hairdryer-like device--the LouseBuster--and conducted a study showing it eradicates head lice infestations on children by exterminating the eggs, or "nits," and killing enough lice to prevent them from reproducing. -- November 6, 2006 -- [Full Story](#)

**Global Warming Can Trigger Extreme Ocean, Climate Changes** -- Newly published research provided evidence that global climate change may have quickly disrupted ocean processes and may lead to drastic shifts in environments around the world. Although the events described unfolded millions of years ago and spanned thousands of years, the researchers, affiliated with the Scripps Institution of Oceanography, say they provide one of the few historical analogs for warming-induced changes in the large-scale sea circulation, and thus may help to illuminate the potential long-term impacts of today's climate warming. -- January 4, 2006 -- [Full Story](#)



**Real-Time Traffic Routing from the Comfort of Your Car** -- Engineers developed a system for turning anonymous cell-phone location information into an illuminated traffic map that identifies congestion in real time. The system takes advantage of the steady stream of positioning cues--signals all cell phones produce, whether in use or not, as they seek towers with the strongest signals. It is the first traffic-solution technology that monitors patterns on rural roads and city streets as easily as on highways. -- August 30, 2006 -- [Full Story](#)

**A Link Between Rainfall and Magnetism** -- Scientists gained a deeper insight into rainfall patterns and atmospheric dynamics by using techniques originally developed for magnetic materials. Physicist Ole Peters, of the Santa Fe Institute and UCLA, and climatologist J. David Neelin of UCLA argue that the onset of intense tropical rain can be described by the same mathematics as a piece of iron that is making the transition from unmagnetized to magnetized. -- June 29, 2006 -- [Full story](#)

## DID YOU KNOW?

Science and engineering (S&E) really is for everyone. NSF Statistics show that "scientists" and "engineers" may end up in occupations near or far afield.

- In 2003, there were over 19 million people with a science, engineering or related degree in the U.S.--that's 47% of ALL college graduates.
- Of the top 10 companies in the Fortune 500, eight are headed by CEOs with S&E degrees.
- 48% of all top-level managers, executives and administrators with college degrees have science, engineering or related degrees.
- 55% of farmers, foresters and fisherman have S&E or related degrees.
- 22% of artists, editors, entertainers, writers, etc. have science, engineering or related degrees.



*"Scientists" are not just limited to jobs involving experiments in a laboratory. People with S&E degrees are found in diverse occupations. Credit: © 2007 JupiterImages Corporation (top L and R); Gary Meek, courtesy of Georgia Tech (center); Art Explosion (bottom L and R).*

Note: These data were pulled from NSF's Division of Science Resources Statistics, *National Survey of College Graduates: 2003*. For more survey information, visit the [Web site](#).

### Something to "WOW" About: Come See NSF's Science at Work!



An EarthScope worker welds a GPS station on the flanks of Mount St. Helens. Such stations will precisely monitor deformation associated with magma movement within the volcano. Credit: EarthScope.



Researchers from Lehman College at CUNY will be on hand for their exhibit on visualization in evolutionary anthropology. Credit: © 2007 JupiterImages Corporation.

If you are curious about science and technology, come to NSF to charge your scientific imagination.

#### National Science Foundation Open House & Exhibition

Monday, February 5, 2007  
11 a.m. - 5 p.m.  
4201 Wilson Blvd.  
Arlington, VA 22230

More than 30 NSF-supported scientists, engineers and educators from across the Nation will showcase some 16 exhibits at NSF's open house. Visitors can see robots used in disaster areas; learn about earthquake ground motion sensors; witness superconductivity and magnetic levitation; see technological advances in particle detection for homeland security; and don 3-D glasses to see high-definition stereo visualizations!

- Watch robots search and rescue.
- Find out if your dollar has a criminal past.
- See how ice sheets move and change.
- Learn when to get out of the way.
- Experiment with plant technologies.
- Learn how nations are linked at the poles.

For more information, visit [NSF's site](#).



Research staff install a weather station and sensors as part of Hawaii EPSCoR Limahuli Mountain-to-Sea Research. Credit: Courtesy of the National Tropical Botanical Gardens and the Center for Conservation Research & Training, University of Hawaii.



Children watch a robot climb a wall. Credit: Anthony Gibson, NSF.

## NSF IN THE NEWS

[Scientists Create Unique Filtration System](#) -- *United Press International (01/18/07)* -- U.S. scientists have developed a filtration system that kills 100 percent of dangerous microbes in water. Researchers from Dowling College in Long Island, Cornell University, and Polytechnic University in Brooklyn have developed a filtration system that kills all dangerous microbes in water using a simple and cheap water purification method. The research was funded by the National Science Foundation.

[Modesto Students to Use 'Eyes in the Sky' to Study Space](#) -- *News10 (CA) (01/18/07)* -- Eighteen teachers nationwide have been selected by the National Science Foundation to take part in the National Optical Astronomy Observatory Project. They will be trained in the use of satellites and telescopes so they can pass on their knowledge to students.

[Invest More Now](#) -- *Washington Times (01/17/07)* -- Former speaker of the House Newt Gingrich and U.S. Rep. Bart Gordon, chairman of the House Committee on Science and Technology, note in this article how President Bush last year took the important step of setting in motion the eventual doubling of funding for basic research in the physical sciences and engineering at three federal agencies, including the National Science Foundation.



Excerpts from  
**"Transformative Research:  
 The Artistry and Alchemy  
 of the 21st Century"**

by  
**NSF Director Arden L. Bement, Jr.**  
 as delivered at  
**Texas Academy of Medicine,  
 Engineering and Science  
 Fourth Annual Conference**

January 4, 2007

The practice of "looking forward" has recently been the focus of a great deal of discussion by the National Science Board, NSF's policy and oversight arm, and the staff at NSF. The topic I want to explore with you tonight is "transformative research."

We use this term to describe a range of endeavors, which promise extraordinary outcomes; such as, revolutionizing entire disciplines, creating entirely new fields, or disrupting accepted theories and perspectives. In other words, these endeavors have the potential to change the way we address challenges in science and engineering and also provide grist for the innovation mill. Supporting transformative research is of critical importance in the fast-paced, science and technology-intensive world of the 21st Century.

Let me begin by putting transformational research within the larger context of NSF's mission. As part of the larger Federal research and development effort, NSF has a comprehensive, over-arching mandate and horizon. Part of our job is to keep all the fields and disciplines of science and engineering research healthy and strong. But strong is not enough because the flip side of what we know in medicine, science and engineering is everything we don't know.

To learn more about Dr. Bement's take on "Trans Research," read the [entire speech](#). Or, visit [NSF's Office of the Director](#) to read other speeches by Dr. Bement.

**Research!America  
 Research Partners Forum  
 "Bridging the Sciences:  
 Investment and Innovation"**

Keynote Speaker:	Arden L. Bement, Jr. Director, National Science Foundation
Date & Time:	Thursday, February 1, 2007 9:30 a.m. -- 1:30 p.m.
Location:	National Press Club, Holeman Lounge 529 14th St. NW, Washington, DC
More Details:	See Research!America's <a href="#">Web site</a>

**2006 IN REVIEW:  
 NSF STORIES RANK TOPS  
 BY BEST SCIENCE SOURCES**

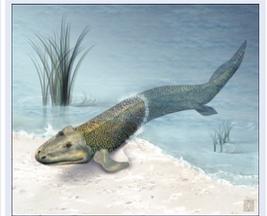
Discoveries resulting from NSF investments in research and education enable the U.S. to remain at the forefront of science and engineering and enhance the nation's economic strength in the face of global competition. Here are just a few of the many NSF-supported activities from 2006 that were cited in top science sources.

**Discovery of a Planet Close to Earth's Mass Shows the Promise of Gravitational Microlensing**

Using a relatively new technique that can spot planets one-tenth the mass of the Earth, researchers announced the discovery of a potentially rocky, icy body--OGLE-2005-BLG-390Lb--that may be the smallest planet yet found orbiting a star outside our solar system. The discovery suggests gravitational microlensing may be exceptionally useful in finding distant planets with traits that could support life. *Discover* magazine included the discovery in its list of the Top 100 science stories for 2006. -- January 25, 2006 -- [Full story](#)

**This Fish Was Made for Walking?**

Working in rocks more than 375 million years old, NSF-supported paleontologists unearthed a remarkable new fossil species that could fill in the evolutionary gap between fish and early limbed animals.



The new species, named *Tiktaalik*, has a skull, neck, ribs and parts of a fin that resemble the earliest limbed animals, called tetrapods. But *Tiktaalik* also has fins and scales like a fish. Scientists collected the fossils during four summer explorations on Ellesmere Island in Canada's Nunavut Territory, far above the Arctic Circle. The journal *Science* has named the discovery a runner-up for Breakthrough of the Year, and *Scientific American* called it one of the most important science stories of 2006 -- April 5, 2006 -- [Full story](#)

**Astronomers Announce First Direct Observation of 'Dark Matter'**

By observing a rare smash-up of galaxies traveling at 10 million miles per hour, astronomers have made the first direct detection of "dark matter"-- the mysterious, invisible stuff that comprises at least one-quarter of the universe. Because dark matter neither emits nor reflects light and only interacts with ordinary matter through gravity, its existence had been inferred but never observed directly before researchers studied a remarkable cosmic structure called the bullet cluster-- actually two clusters of galaxies passing through one another. *Discover* magazine listed the discovery as the third most important science story of 2006 -- August 21, 2006 -- [Full story](#)

See NSF's [2006: Year in Review](#) for more highlights from last year.



The National Science Foundation (NSF) is an independent federal agency that supports fundamental research and education across all fields of science with an annual budget of nearly \$5.58 billion. NSF funding reaches all 50 states through grants to roughly 1,700 universities and institutions. Each year, NSF receives about 40,000 competitive requests for funding and makes about 10,000 new funding awards. The NSF also awards over \$400 million in professional and service contracts yearly. Contact [NSF's Office of Legislative and Public Affairs](#) for more information, to unsubscribe, or for permission to reuse newsletter images.