

Our Readers Favorites in 2007

The number of people seeking science news from the NSF Web site increased throughout 2007. Here are a few of our readers' favorite news stories from last year, based on [Web visitor statistics](#).



[Laser Blasts Viruses in Blood](#)

(8/29/07) — A father-son research team has discovered a new use for lasers--zapping viruses out of blood. The technique, which holds promise for disinfecting blood for transfusions, uses a low-power laser beam with pulses lasting just fractions of a second.

[World's Smallest Radio Fits in the Palm of the Hand . . . of an Ant](#)

(10/31/07) — Harnessing the electrical and mechanical properties of the carbon nanotube, a team of researchers has crafted a working radio from a single carbon fiber. The tiny device could have applications far beyond novelty, from radio-controlled devices that could flow in the human bloodstream to highly efficient, miniscule, cell phone devices.



[Microbes Churn Out Hydrogen at Record Rate](#)

(11/12/07) — Researchers have coaxed common bacteria to produce hydrogen in a new, efficient way. The team had already shown success at using microbes to produce electricity. By adding a few modifications to their successful wastewater fuel cell, they increased the hydrogen yield to a new record for this type of system.

[Laser-Induced Shocks in Diamond-Anvil Cell Can Achieve Pressures of Supergiant Planets](#)

(5/2/07) — Diamond-anvil cells and laser-induced shocks can separately achieve pressures higher than those at the core of the Earth, but in combination they may achieve pressures 100 to 1,000 times greater than possible today, reproducing the pressures predicted in the cores of supergiant planets.



[Diamonds From Outer Space](#)

(1/8/07) — Geologists have traced the origin of the Earth's mysterious black diamonds, also called carbonado diamonds, to interstellar space. The scientists used infrared synchrotron radiation at Brookhaven National Laboratory to discover the diamonds' source.

[Laser-Cooling Brings Large Object Near Absolute Zero](#)

(4/5/07) — Researchers are building an \$8.7 million hybrid magnet for neutron scattering experiments. When finished in 2011, the new magnet will produce a magnetic field between 25 and 30 tesla--more than half a million times stronger than the Earth's magnetic field.



[Jeannette Wing Chosen to Head NSF's Computer & Information Science & Engineering Directorate](#)

(1/31/07) — NSF has chosen Jeannette Wing, President's Professor and head of the Computer Science Department in Carnegie Mellon University's School of Computer Science, as assistant director for Computer & Information Science and Engineering (CISE) at NSF.



NSF Researchers Honored in *Scientific American's* SCIAM 50 Awards

Every year since 2002, *Scientific American* has chosen 50 innovators — individuals, organizations or companies — who made exciting contributions to new technologies the previous year. Multiple former and current NSF-funded researchers made the list in 2007. Below are highlights from their visionary work. See the [full article online](#) for the complete list.

Business Leader of the Year Amyris Creates Living Chemical Factories

Jay Keasling puts microbes to work — producing everything from biofuels to life-saving pharmaceuticals. Keasling and two postdoctoral researchers from his lab founded Amyris, a company that is taking a revolutionary approach to chemical manufacturing by harnessing metabolic processes in microorganisms. Keasling is a professor of chemical engineering and the head of the NSF-sponsored Synthetic Biology Engineering Research Center at the Univ. of California at Berkeley. Through genetic engineering, the researchers coax microbes to churn out useful chemicals, bypassing traditional, more expensive methods. Amyris has engineered a strain of yeast that can produce large quantities of artemisinic acid, a precursor to a drug that fights malaria but is currently in short supply. Amyris is now close to its goal of supplying industrial amounts of the drug to developing countries. Amyris is also developing a fermentation process to deliver a biofuel gasoline substitute.

For more information on this synthetic biology research, visit his [research group Web site](#), and [Amyris Biotechnologies](#).

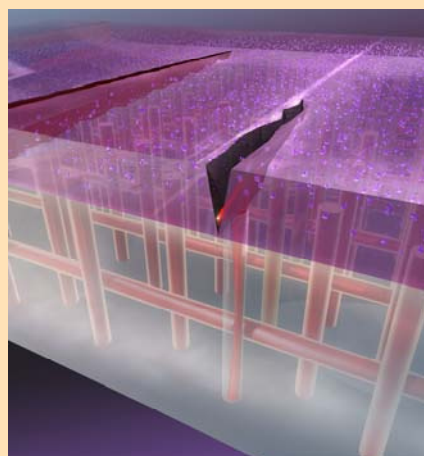


UC Berkeley professor Jay Keasling holds a sprig of *Artemisia*, a plant from which he extracted genes that he inserted into microbes to produce an antimalaria drug. Credit: Peg Skorpinski

Filling in the Gaps in Sensor Networks

Wireless sensors enable us to keep track of everything from soil moisture to the power grid, yet deploying and managing these networks presents a daunting task. *Scientific American* put NSF grantee Robert Ghrist and his colleague Vin de Silva, both of the University of Illinois, at number five on the list for work applying mathematics to eliminate coverage gaps in sensor networks. NSF selected Ghrist to be a 2005 recipient of the Presidential Early Career Award in Science and Engineering, the highest honor the nation gives to young investigators.

See the [UIUC press release](#) for more information.



A healing agent contained in a microvascular network helps a polymer repair its own cracks. Credit: Janet Sinn-Hanlon, Univ. Ill.

Plastic, Heal Thyself

Plastics are prone to cracking, often deep within the material where damage is difficult to detect and repair. Current NSF awardees Scott R. White, Nancy R. Sottos and their colleagues at the University of Illinois at Urbana-Champaign earned spot number 18 for their work on developing a “self-healing” plastic. The plastic hosts a microvascular network containing a healing agent. Cracks that form in the material release the healing agent which oozes in to repair the crack.

For more information, visit the [autonomic research Web site](#) at UIUC.

Light Comes In and Doesn't Come Back Out

E. Frank Schubert and colleagues at Rensselaer Polytechnic Institute earned spot 28 on the list for creating a coating that reflects almost no light. By controlling the way titanium dioxide and silicon oxide nano-sized rods are layered on a surface, the researchers can drastically reduce the amount of light that escapes the surface. Non-reflective surfaces could make solid-state lighting devices more energy-efficient, and could boost the sunlight-harvesting capabilities of solar cells.

See NSF's [press release](#) and visit [Prof. Schubert's Web site](#) for more information on this research.



A coating of "nanorods" prevents light from reflecting off surfaces. Credit: Fred Schubert and Jong Kyu Kim



A prototype of the original "active building envelope" system on the roof of Rensselaer's Student Union building. Credit: S. Van Dessel

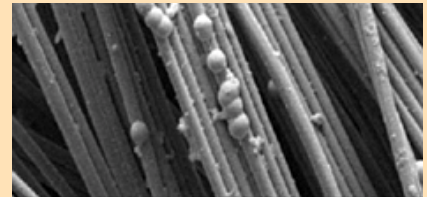
Solar Power to Heat and Cool Buildings

Imagine wrapping a building in thin-film materials that capture the power of the sun to either heat or cool the interior. At number 33 on the list, Steven Van Dessel of the Rensselaer Polytechnic Institute and colleagues have developed a prototype system comprised of solar panels and solid-state thermoelectric heat pumps. The active building envelope system accomplishes the jobs of both cooling and heating, yet operates silently with no moving parts.

For more information on this research, see the [NSF press release](#) or the [RPI press release](#).

A Scaffold for Tissue Regeneration

Work by bioengineer and surgeon Cato Laurencin of the University of Virginia earned spot number 42 the list for polymers that serve as scaffolding for the regrowth of knee ligaments. Laurencin's research focuses on "biologics" or bio-degradable plastics that can be left in the body, eliminating the need for follow-up surgery.



An up-close view of the fibers of the anterior cruciate ligament, the most commonly injured ligament of the knee. Credit: C. Laurencin

But wait! There's More!

Other past and present NSF awardees on the list include Peter Sutter, Eli Sutter, James Dumesic, Peidong Yang, Desmond Smith, Marcelo Jacobs-Lorena, Lawrence Rome, Gregory Engel, Adoslav Adzik and Shelley Minter.

DID YOU KNOW?



Genomic sequencing of important crops such as corn can help scientists develop tools for safeguarding plants against disease and genetic disorders. Credit: USDA

Plant Genome Research: National Academies Tout Achievements of NSF's *Arabidopsis* 2010 Project

Plants provide us with the materials we need for food, clothing, furniture, shelter and alternatives for fossil fuels. Sequencing the genomes of major plant crops can help us to ensure a secure crop supply in the future while enabling us to improve human nutrition and ecological stewardship. The National Research Council has recently produced a report heralding the achievements of the National Plant Genome Initiative and NSF's *Arabidopsis* 2010 project. The report lists some of the many results of these programs, which have led to practical applications in crop species. The report concludes with recommendations for future research directions in plant genome sciences and plant biology. Visit the National Academies [news release](#) to download the full report.

FACES OF NSF RESEARCH

Facing a Crisis: Preserving the Biodiversity of Madagascar



Highly endangered Greater Bamboo lemur feeding on Giant Bamboo in Ranomafana National Park, Madagascar. Credit: Steven Lonker

Madagascar is an island nation rich in biodiversity and famous for its unique wildlife, including lemurs, one of the most endangered primates in the world. Lemurs are characterized by a small body, long nose and large eyes. What makes Madagascar's lemurs unique is that they evolved in isolation without competition or predation. Lemurs were once widespread throughout Madagascar but now reside in a few patches of the eastern rainforest. Human activities such as illegal logging, slash and burn agriculture and hunting have destroyed eighty percent of their rainforest habitat.

[Patricia Wright](#), an NSF grantee and primatologist at the State University of New York at Stony Brook, has been working in Madagascar for more than twenty years. During an exploratory expedition in 1986, Wright and her colleagues discovered a new species of lemur, the golden bamboo lemur. When logging practices threatened the lemur's survival, Wright piloted conservation efforts that led to the development of Ranomafana National Park.



Patricia Wright, Ranomafana National Park, Madagascar. Credit: Linda Benson



Red bellied lemur, Ranomafana National Park, Madagascar. Credit: Linda Benson

Ranomafana National Park has not only served as a hub for research and conservation, it has also generated economic opportunities for local communities. "I think the success of the program has something to do with the egalitarian nature of the Malagasy," says Wright. "Everyone wants to be sure the system is fair because everyone has a vested interest in the park."

Wright has also been instrumental in the success of [Centre ValBio](#), which is an International Training Center for the Study of Biodiversity, built with funding from NSF and other organizations. Centre ValBio promotes research and training for the Malagasy and visiting international scientists and students. The park also provides better education, improved healthcare and economic benefits through tourism to the communities surrounding the park.



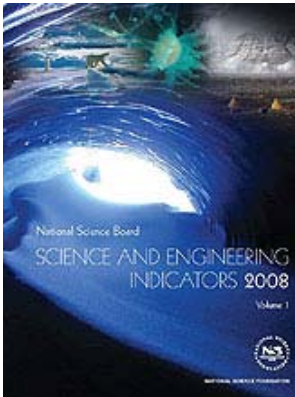
International research station (Centre ValBio), Ranomafana National Park, Madagascar. Credit: Linda Benson

NSF IN THE NEWS

[U.S. losing economic war, Rendell tells teachers](#) (*The Patriot-News, Harrisburg, PA 1/17/2008*) — The reason is the decline of American students' science and math skills, the failure of the nation's education and training system, and a lack of political will, Rendell said in a speech at a National Science Foundation conference.

[Global Advances Challenge U.S. Dominance in Science](#) (*The New York Times 1/16/2008*) — The United States remains the world leader in scientific and technological innovation, but its dominance is threatened by economic development elsewhere, particularly in Asia, the National Science Board said Tuesday in its biennial report on science and engineering.

THE RIPPLE EFFECT



Science and Engineering Indicators 2008

On January 15, 2008, the National Science Board gave Congress and the President its biennial *Science and Engineering Indicators*, (SEI) a compendium of science and engineering (S&E) data and statistics. SEI is recognized around the world as the premier source of information and trends on all areas concerning the S&E enterprise including science, engineering and mathematics education at all levels; the S&E workforce; U.S. and international research and development performance; and public attitudes about science and engineering.

Visit the [SEI homepage](#) to learn more about its contents and to download an electronic copy of the report.

Notable NSF Advances of 2007

[Scientists at NSF-sponsored Facility Win Nobel Prize \(10/11/2007\)](#) — More than three dozen scientists and support staff at the National Center for Atmospheric Research were involved in reports by the U.N. Intergovernmental Panel on Climate Change (IPCC), with several playing leadership roles. The IPCC was awarded the 2007 Nobel Peace Prize along with former Vice President Al Gore.



[Method Shows Promise for Early Detection of Pancreatic Cancer \(8/1/07\)](#) — An optical technology developed for detecting colon cancer holds promise for detecting pancreatic cancer and could lead to the first screening method for people who have no symptoms of the illness.

[NSF's Math and Science Partnerships Demonstrate Increases in Student Proficiency \(1/24/07\)](#) — An analysis of 123 schools participating in NSF's Math and Science Partnership (MSP) program showed improvements in student proficiency in mathematics and science at the elementary-, middle- and high-school levels over a 3-year period.

[Origami Electronics? \(8/14/07\)](#) — By weaving black carbon nanotubes into paper, engineers have created printable, flexible batteries that are more resilient than many existing batteries, yet can be cut and folded just like paper.



[Evolutionary Comparison Yields New Human Genes \(11/15/07\)](#) — Using supercomputers to compare the human genome with those of other mammals, researchers have discovered some 300 previously unidentified human genes.



[Ancient *T. rex* and Mastodon Protein Fragments Discovered, Sequenced \(4/12/07\)](#) — Researchers confirmed the existence of protein in soft tissue recovered from the fossil bones of a 68 million-year-old *Tyrannosaurus rex* and a half-million-year-old mastodon. The scientists successfully sequenced portions of the dinosaur and mastodon proteins, identifying the amino acids and confirming that the material was collagen.



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