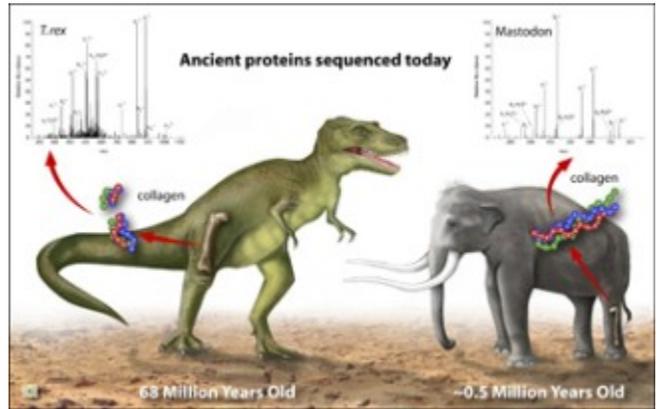


NSF AT WORK

Dinosaur DNA

Scientists have confirmed the existence of protein in soft tissue recovered from the fossil bones of a 68-million-year-old *Tyrannosaurus rex* (*T. rex*) and a half-million-year-old mastodon. Their results may change the way people think about fossil preservation and present a new method for studying diseases in which identification of proteins is important, such as cancer.

When an animal dies, protein immediately begins to degrade and, in the case of fossils, is slowly replaced by mineral. This substitution process was thought to be complete by 1 million years. Researchers at North Carolina State University and Harvard Medical School now know otherwise. The team successfully sequenced portions of the dinosaur and mastodon proteins, identifying the amino acids and confirming that the material was collagen.



*Ancient proteins have been found in bones like those of a 68-million-year-old dinosaur *T. rex* fossil. Credit: Zina Deretsky, NSF.*

For more on this breakthrough that says genetic sequences are possible to attain from 68-million-year-old fossils, see NSF's press release, "[Ancient *T. rex* and Mastodon Protein Fragments Discovered, Sequenced.](#)"

Researchers Find Way to Use Microbial Fuel Cells for Large-Sale Electricity Production



Carbon brush anode, tubular cathode and fuel cell. Credit: Bruce Logan, Penn State.

Generating electricity from renewable sources could soon become as easy as putting a brush and a tube in a tub of wastewater. A carbon fiber, bottle-brush anode developed by Penn State researchers will provide more than enough surface for bacteria to colonize. For the first time, it will be possible to use microbial fuel cells for large scale electricity production, according to the research team. In addition, a membrane-tube air cathode, adapted from existing wastewater treatment equipment, will complete the circuit.

Microbial fuel cells work through the action of bacteria, which can pass electrons to an anode of a fuel cell. The electrons flow from the anode through a wire to the cathode, producing an electric current. In the process, the bacteria consume organic matter in the wastewater. This novel approach uses the bacteria that naturally occur in wastewater, requiring no special bacterial strains or unusual environmental demands.

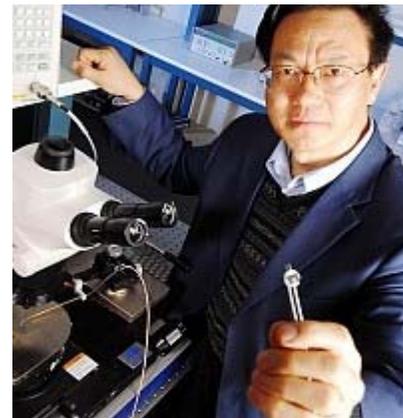
An additional benefit to the microbial fuel cell is that while it generates electricity, it cleans up the wastewater, something that usually requires the consumption of energy. Read [Penn State's news release](#) for more information. NSF and the U.S. Department of Agriculture supported this work.

Novel Nanogenerator Converts Motion Into Electricity

In a breakthrough that could free nanomachines from the bulk of batteries, researchers have developed a novel nanogenerator--an array of tiny filaments that converts the smallest motions into electrical current.

The nanowires are crafted from zinc oxide, a safe material that would allow the generator to be used in biomedical applications, and may eventually power nanomotors, tiny sensors, and if in large enough arrays, macroscale devices.

The researchers developed the generators with the support of the NSF, the Defense Advanced Research Projects Agency and the Emory-Georgia Tech Nanotechnology Center for Personalized and Predictive Oncology. For more information on this research, see NSF's [press release](#), or visit [Georgia Tech's Web site](#) for additional details.



Georgia Tech researcher Zhong Lin Wang holds a prototype nanogenerator that was fabricated using an array of zinc oxide nanowires. Credit: Gary Meek.

Solar Vehicles for Environmental Monitoring



The new solar-powered autonomous underwater vehicle (SAUV-II) will be used for a variety of environmental monitoring tasks. Credit: Arthur C. Sanderson, Rensselaer Polytechnic Institute; Richard Blidberg, Autonomous Undersea Systems Institute.

The SAUV was one of the features at NSF's Robots Exhibit. See [exhibit descriptions](#) for more information, or watch the [SAUV video](#).

The RiverNet Project is designing sensor networks and systems to monitor complex or geographically large regions. One such development is the Solar Autonomous Underwater Vehicle (SAUV). The SAUV can submerge for up to 12 hours and dive to 500 meters. It features a unique solar panel that allows deployment of the vehicle for weeks at a time, an on-board computer system to enable real-time mission adaptations and networked communications to support multi-vehicle cooperation.

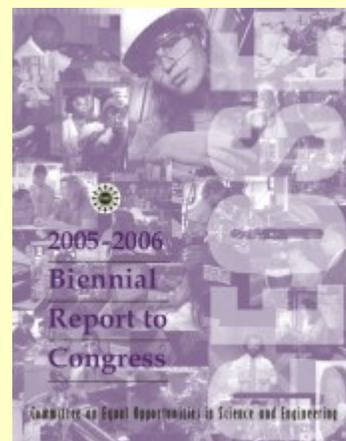
The SAUV can be used in a variety of environmental monitoring tasks including the detection and monitoring of hazardous events such as red tides, contaminant spills, or in assessing the impact of natural events such as earthquakes and volcanoes.

A team of SAUV vehicles will be used for long-term observation of coastal and harbor regions in order to detect threats or introduction of hazardous substances. The SAUVs may also serve as an integral part of logistics for large-scale military operations with several vehicles facilitating land, sea and air coordination.

DID YOU KNOW?

NSF provides financial support to Historically Black Colleges and Universities (HBCU), Hispanic-Serving Institutions (HSI), and Tribal Colleges and Universities (TCU) to enhance the instructional and research infrastructure of these minority-serving institutions, and to offer educational opportunities in science, technology, engineering and mathematics (STEM) for underrepresented minorities who attend these institutions of higher education.

The level of dedicated NSF funding to minority-serving institutions has grown over the last six years by 58%, from \$119 million in FY 2001 to \$188 million in FY 2006. Visit the [2005-2006 Biennial Report to Congress by the Committee on Equal Opportunities in Science and Engineering](#) for more information on NSF's efforts to broaden participation in STEM.



Every two years, the Committee on Equal Opportunities in Science and Engineering prepares a report for Congress on NSF's activities.

Celebrating Excellence in Science and Engineering!

Vannevar Bush Award: This annual award recognizes an individual who, through public service activities in science and technology, has made an outstanding "contribution toward the welfare of mankind and the Nation."



Shirley Ann Jackson, who has led a national movement to respond to what she calls a "quiet crisis" in the science and engineering work force, will receive the Vannevar Bush Award for a lifetime of achievements in scientific research, education and senior statesman-like contributions to public policy. [Read more.](#)

Shirley Ann Jackson, pictured at left, will be honored for her work in theoretical physics, her leadership in workforce and global energy security issues and for revamping the nation's oldest civilian technology university. Credit: Rensselaer Polytechnic Institute.

Public Service Award: Each year, individuals and/or groups (company, corporation or organization) are recognized for increasing the public understanding of science or engineering.



Bassam Z. Shakhshiri, a chemistry professor who pioneered new ways to encourage public understanding of science through his enthusiastic communications and visually exciting chemical demonstrations, will receive the individual 2007 National Science Board Public Service Award. [Read more.](#)

Bassam Shakhshiri, pictured at left, won praise for communicating science and as advocate for NSF education programs. Credit: Stephanie Judge, University of Wisconsin-Madison.



The popular television drama series "Numb3rs," about an FBI agent whose brother, a genius mathematician, helps solve crimes in the Los Angeles area by using mathematical problem-solving techniques, will receive a National Science Board group Public Service Award for 2007, along with the program's co-creators, Nick Falacci and Cheryl Heuton. [Read more.](#)

The TV drama, "Numb3rs" (cast members shown at left) and its two collaborators will be honored for their contributions toward increasing scientific and mathematical literacy on a broad scale. Credit: Cliff Lipson, CBS Photo.

NSF IN THE NEWS

[H-1Bs and Students](#) -- *Computerworld* (04/09/07) -- The National Science Foundation reports that the number of undergraduate computer science degrees awarded annually in the United States peaked at 57,400 in 2004 but has since dropped by about 30 percent.

[Microsoft Funds New Mapping Research Programs](#) -- *Washington Post* (04/07/07) -- CitySense, partly funded by the National Science Foundation and led by Harvard University, is a 100-node sensor network hanging from streetlights that is tracking pollution, temperature, winds, rainfall and traffic in Cambridge, Mass.

[Scientists: Genes Determine Dogs' Sizes](#) -- *Boston Globe* (04/05/07) -- Researchers from the National Human Genome Research Institute have conducted a study examining the vast scope of size differences in canines. Elaine A. Ostrander led her team in discovering a set of genes linked to the size of dogs. The National Science Foundation partly funded the project.



Excerpts from
testimony before the

**Research and Science Education
Subcommittee
House Science and Technology Committee**
by
Arden L. Bement, Jr.
March 20, 2007

Encouraging new investigators to become effective contributors to the science and engineering workforce is a critical goal for the National Science Foundation. Supporting young investigators is something that NSF takes seriously and it is an issue that we are addressing in a variety of ways...

The effectiveness of these efforts is shown by the fact that we've maintained the funding rates of young investigators. The current NSF success rate is 21% for research grants--a decline from the 30% success rate of the late 1990s--however, the percentage of awards made to new investigators as a share of the NSF portfolio has remained stable at 27% in 1997 and 28% in 2006.

Also, the length of time between the year of an investigator's last degree and the year of an investigator's first research grant from NSF in 1997 and 2006 has remained stable. In 1997, 73% of new Principal Investigators receiving their first NSF award were within seven years of their last degree and in 2007 the comparable figure was 74%...

Still, we continually strive for improvement, and we believe that the variety of programs in place to foster young investigators will continue to increase the pool of successful young investigators involved in the U.S. science and engineering enterprise.

See the full version of [Dr. Bement's written testimony](#), which addresses NSF's specific efforts to nurture young investigators, the appropriate balance between interdisciplinary and disciplinary research, and how NSF focuses attention on research issues of national importance.

Science & Engineering Visualization Challenge

The competition recognizes scientists, engineers, visualization specialists and artists for producing or commissioning innovative work in visual communication.

The deadline is quickly approaching for this exciting competition, so get your entries in right away. Submissions must be postmarked no later than May 31, 2007. For more information on the challenge, important dates, and how to enter, see [NSF's site](#).



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 \$5.91 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.

NSF's Bill Watch



H.R. 363	<i>Sowing the Seeds Through Science and Engineering Research Act</i>
Sponsor	Rep. Bart Gordon [TN-6] (introduced 5/11/2006)
Latest Action	4/24/2007: Scheduled for House consideration.
Authorizes appropriations for basic research and research infrastructure in science and engineering. Establishes Early Career Research awards for science and engineering and a Presidential Innovation Award. (more information)	
S.761	<i>America COMPETES Act</i>
Sponsor	Sen. Harry Reid [NV] (introduced 3/5/2007)
Latest Action	4/23/2007: Considered by Senate.
Provides authorizations for NSF, NIST, NOAA, Department of Energy, and a variety of educational programs. The bill authorizes NSF's budget to grow to \$11.2 billion by 2011, with proportional increases in EHR and EPSCoR. The Noyce, GRF and IGERT programs would grow to \$200 million, \$60 million and \$55 million, respectively, by 2011. (more information)	
H.R. 263	<i>The Cybersecurity Education Enhancement Act of 2007</i>
Sponsor	Rep. Sheila Jackson-Lee [TX-18] (introduced 1/5/2007)
Latest Action	1/31/2007: Referred to House subcommittee on Technology and Innovation.
Authorizes the Secretary of Homeland Security to transfer funds to NSF to make grants to institutions of higher education for the establishment or expansion of cybersecurity professional development programs. (more information)	