



National Science Foundation
WHERE DISCOVERIES BEGIN



January/February 2012

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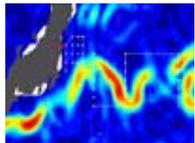
NSF AT WORK

NSF's "Hit Parade" From 2011

Below are highlights of the year's top news and discoveries from NSF-supported research, as measured by NSF web visitor statistics.

Vision Scientists Demonstrate Innovative Learning Method

New research suggests it may be possible to use brain technology to learn to play a piano, reduce mental stress or hit a curve ball with little or no conscious effort. It's the kind of thing seen in Hollywood's "Matrix" franchise.



Scientists Assess Radioactivity in the Ocean From Japan Nuclear Facility

U.S. and Japanese researchers analyzing the levels of radioactivity discharged in the first four months after the 2011 Japan earthquake and tsunami found that the levels, while high, are not a direct threat to humans or marine life.

Earth's Sixth Mass Extinction: Is It Almost Here?

With the steep decline in populations of many animal species, scientists have warned that Earth is on the brink of a mass extinction like those that have occurred just five times during the past 540 million years.



Sleeping Giants: Largest Black Holes Ever Measured Found in Nearby Galaxies

Astronomers discovered the most massive black holes to date in two separate nearby galaxies. Each black hole has a mass equivalent to 10 billion suns.

North American Human Remains Provide Insights Into Ice Age Culture

Newly excavated remains in central Alaska may belong to one of the earliest inhabitants of North America and may provide rare insights into the burial practices of Ice Age people.



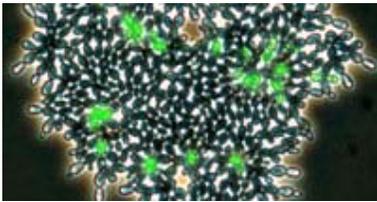


Foiling the Plan of a Cyberbully

Highly publicized cases of online bullying, or cyberbullying, are getting attention from parents, teachers, school administrators and academic experts. But some experts ask: Is "cyberbullying" a real culprit? The answer depends on who's asked. Watch a **video** of psychologist Sheri Bauman on strategies to prevent cyberbullying.

Photo credits: Nicolle Rager Fuller, NSF; Woods Hole Oceanographic Institution; Nicolle Rager Fuller, NSF; Gemini Observatory/AURA/Lynette Cook; Lisa Raffensperger, NSF; Nicolle Rager Fuller, NSF

Biologists Replicate Key Step Leading to Life on Earth



The green cells are undergoing cell death, a cellular division of labor fostering new life. *Credit: Will Ratcliff and Mike Travisano*

More than 500 million years ago, single-celled organisms on Earth's surface began forming multi-cellular clusters that ultimately became plants and animals. But how that happened is a question that has long eluded evolutionary biologists.

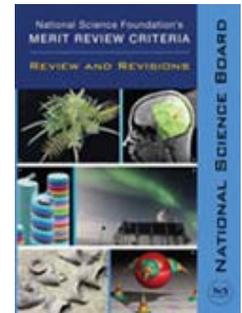
NSF-supported scientists at the University of Minnesota have replicated that step in the laboratory using common Brewer's yeast, a single-celled organism. In 60 days, the yeast developed multi-cellular clusters that work together cooperatively, reproduce and adapt to their environment. In essence, they developed into precursors of the types of life that exist on Earth today. The research was supported by NSF grants **0918897** and **1051115**.

Read more and view a **video** about the results, published January 17, 2012, by *Proceedings of the National Academy of Sciences*.

National Science Board Releases Report on NSF Merit Review Criteria

A National Science Board task force conducted an examination of the two merit review criteria--**intellectual merit** and **broader impacts**--that NSF uses to evaluate every proposal it receives. Several thousand individuals from stakeholder groups provided input. **The report**, released in January, concluded that the criteria are appropriate for evaluating proposals but recommended revising the descriptions to give the NSF community a better understanding of the criteria and how they relate to each other. In addition, the report identified three principles that apply to NSF's use of the criteria:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals.
- Assessment and evaluation of NSF-funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects.



Credit: National Science Board

Read more in the NSF **press release**.

DID YOU KNOW?

Asian Investments Gaining on U.S., Says New Report

According to **Science and Engineering Indicators 2012**, a biennial report on the U.S. and international science and engineering enterprises, the United States conducts more science and technology research and development (R&D) than any other nation. But the Asian region is rapidly increasing its R&D investment and overtaking the United States. In China alone, R&D growth increased a stunning 28 percent in 2008-2009, with another 20 percent increase reported for 2009-2010, propelling China past Japan and into second place behind the United States.

For more information, see the **NSF press release** or **Chapter 4** of the report, published in

FACES OF NSF RESEARCH

Indigenous People Provide Valuable Assistance in Amazon Field Survey



A Makushi man opening a transect trail in the Amazon basin region of Guyana.
Credit: Sean Giery and Jeffrey Luzar

No one is in a better position to monitor environmental conditions in remote areas of the natural world than the people living there.

Stanford University ecologist José Fragoso demonstrated the value of enlisting local, non-scientist residents in efforts to collect field data over large areas. He successfully completed a five-year study of a 48,000-square-kilometer tract in the Amazon Basin with the help of 340 villagers trained in scientific survey techniques, such as walking a transect, recording sightings of plants and animals, and marking observations on a map.

Younger villagers with formal education were often paired with older villagers, many of whom could not read, write or do arithmetic but were expert bushmen. In all, the technicians logged 48,000 sightings of 267 animal species. They also recorded

more than 33,000 locations of plants on which the animals feed. The partnership allowed the researchers to gather far more data than otherwise would have been possible.

Learn more from this [video](#) and [Stanford press release](#). Fragoso's research is supported by NSF grant **0837531**.



Makushi indigenous people learn to use maps of their region.
Credit: Sean Giery and Jeffrey Luzar

NSF IN THE NEWS

In Eureka Park, Start-ups Get a Slice of CES (*The Washington Post*) The International Consumer Electronics Show isn't just for "big-wigs" like Google and Qualcomm. This year, CES featured a special area for start-ups. NSF has given grants to 28 of the exhibitors.

NBC Brings 'Science of NHL Hockey' to TVs, Classrooms (*The New York Times*) A series of educational segments on the "Science of NHL Hockey" made their debut during the NBC Sports Network's coverage of the All-Star festivities. In each video, an NSF-supported scientist explains a science principle.

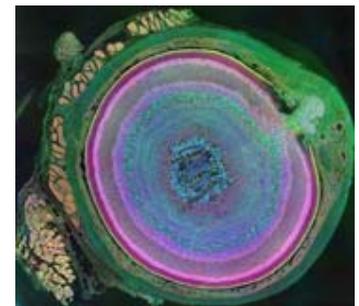
Commentary: Science Rediscovered Entrepreneurship (*CNBC*) Over the last two months, the U.S. government has been running one of the most "audacious" experiments in entrepreneurship since World War II--the Innovation Corps, set up by NSF as an incubator for scientists.

THE RIPPLE EFFECT

Winners of 2011 International Science & Engineering Visualization Challenge Announced



How many people would have heard of fractal geometry, double helix, or solar flares if it weren't for the spectacular images? Illustrations can encourage popular interest in science and engineering and help in understanding complex research developments. NSF and the journal *Science* created the **International Science & Engineering Visualization Challenge** to celebrate and encourage the visual communication of science for educational



Microscopic image of trichomes on the skin of an immature cucumber, Honorable Mention, Photography. *Credit: Robert Rock Belliveau*

and journalistic purposes.

Winners were announced in five categories: Photography, Illustrations, Informational Posters and Graphics, Interactive Games and Videos. The winning entries are featured in the February 3 **Science** and on the **NSF website**. For the first time in the history of the

Metabolomic eye of a mouse, First Place, Photography. *Credit: Bryan William Jones*

competition, participants were able to submit entries online, and viewers participated in the voting process, selecting People's Choice winners. Viewers submitted more than 3,200 votes and 100 comments by the time the competition was completed.

For more information on the 2011 winners, read the NSF **press release**.

Visit the winners' **webpage** to explore the elegance of structures, the beauty of fine detail, the mystery of hidden patterns and the insight of novel perspectives among past years' winners.

NSF Plans Hands-on Exhibits for AAAS Meeting Visitors



NSF exhibit at 2011 AAAS meeting. *Credit: NSF*

NSF will highlight several of its investments at the **annual meeting** of the **American Association for the Advancement of Science (AAAS)** in Vancouver, British Columbia, February 17-19. In keeping with the theme of "Flattening the World: Building a Global Knowledge Society," the interactive exhibits will feature NSF-supported researchers whose collaborative work addresses global challenges, from ocean acidification to solar power to catalysis-enabled technologies. NSF-hosted workshops will emphasize opportunities for collaborating internationally and teaming researchers with K-12 teachers to boost educational impact.

Join NSF at Booth 501 in the **Exhibit Hall**.



*The National Science Foundation (NSF) is an independent federal agency that supports fundamental research and education across all fields of science and engineering. Its Fiscal Year 2012 budget is \$7.0 billion. NSF funds reach all 50 states through grants to nearly 2,000 colleges, universities and other institutions. Each year, NSF receives more than 50,000 competitive requests for funding and makes about 11,000 new funding awards. NSF also awards nearly \$420 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. Editor: Amber Jones. Contributors: Neysa Call, Lee Herring, David Capriccioso, Steve Lonker, Zach Miller, Tarri Joyner.*



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