



National Science Foundation
WHERE DISCOVERIES BEGIN



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NSF AT WORK

Mobile Plant Field Guide Links Researchers and the Public

A new iPhone app turns the public into citizen scientists and helps researchers track the ebb and flow of flora across the United States. **Leafsnap** is a new electronic field guide to trees created by a team of NSF-funded researchers. The team--led by Peter Belhumeur at Columbia University, David Jacobs at the University of Maryland and John Kress at the Smithsonian Institution--incorporated visual recognition software into a free iPhone app that allows anyone to identify tree species just by taking a photograph of the leaf with his/her iPhone camera. Algorithms match the image to a leaf scan database and provide the user with detailed tree species information. The not-for-profit nature photography group, Finding Species, provided high resolution images of leaves, flowers, fruit, seeds, bark and more for the app. The researchers are developing iPad and Android versions as well.

Leafsnap turns the public into citizen scientists, allowing them to not only identify trees in the database but to also add their own scans of new leaves that they identify. The database currently contains tree species found in the Washington, D.C., and New York City metropolitan areas and will soon grow to include species from across the United States as more users upload identified leaf scans into the database. Leafsnap will allow researchers and citizen scientists to study tree biodiversity in cities, suburbs, parks and wilderness areas. Additionally, the app will contribute to the study of invasive plant and insect species, such as the emerald ash borer, an insect causing a loss of ash trees in the Northeast. Leafsnap will help monitor the impact of these invasive species that can be hard to track and costly to communities.

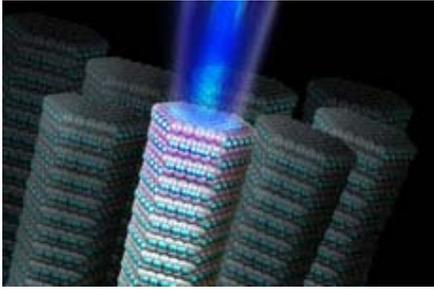
This project was funded in part by NSF (award number **0325867**) and by the Washington Biologists' Field Club.



The flower of the Japanese *Stewartia* viewed in Leafsnap on the iPhone. Credit: Columbia University, the University of Maryland and the Smithsonian.

Foreign-Born Scientists Contribute to U.S. Nanotechnology Innovation

Researchers at the **Center for Nanotechnology in Society at the University of California, Santa Barbara** (CNS-UCSB), a center supported by NSF (award number **0938099**), examined the contributions of foreign-born scientists to nanotechnology innovation. They looked at authorship of the top one percent of the most highly-cited articles on nanotechnology by U.S.



One example of nanotechnology is this nanowire laser, a device in development in the laboratory of 2007 National Science Foundation Waterman awardee Peidong Yang of the University of California, Berkeley. Credit: Nicolle Rager Fuller/NSF

scientists and engineers between 1999-2009. While the role of foreign-born scientists in information technology and biotechnology innovation has been well studied, comparable studies on nanotechnology have been conspicuously absent. The prevalence of the foreign born in the American general population and scientific labor force was used as the benchmark for expected contributions to the nanotechnology industry. Research results concluded that the prevalence of foreign-born authors in nanotechnology publications exceeded that of the general population and the U.S. scientific community. Besides the U.S. (47 scientists), significant contributions came from China (21 scientists), India (eight scientists), and Germany (five scientists), and foreign-born contributions have steadily increased from 38 percent in 1999 to 73 percent in 2009. These findings point to the significance of non-native researchers in promoting U.S. nanotechnology innovation and indicate significant globalization within the American scientific and engineering communities.

Quantifying Cultural Differences Across Nations

For the first time, researchers have assessed cultural restrictiveness and permissiveness of 33 countries and found these qualities to be directly related to the economic dynamics, demographics and resource availability in those countries. Countries are considered either "tight" or "loose" depending on the degree to which societies enforce social norms conformity, and punish socially deviant behavior. Tight countries heavily enforce norms and show little tolerance for deviance, while loose countries have weaker social norm enforcement and much greater tolerance for deviance. Tight countries tend to have histories greatly shaped by war, natural disasters, disease outbreaks, high population density and/or scarcity of natural resources. These countries also tend to have more autocratic government and media institutions. Pakistan, Korea and Japan are all tight countries; loose countries include Israel, Brazil and the United States.



A suburban street in Marne, Germany, one of the tighter countries surveyed by Gelfand and colleagues. Credit: © 2011 Jupiter Images Corporation

Michele Gelfand, professor of psychology at the University of Maryland, led the research effort. She commented, "It is important, within our view, to be mindful that we don't think that either culture is worse or better.

"We believe this knowledge about how tight or loose a country is and why it is that way can foster greater cross-cultural tolerance and understanding," adds Gelfand. "Such understanding is critical in a world where both global interdependence and global threats are increasing."

"Differences Between Tight and Loose Cultures: A 33-Nation Study" was published in the journal *Science*. The research was supported by the NSF Directorate for Social, Behavioral and Economic Sciences (award number **9910760**). View an interview with Gelfand in a **webcast** online.

DID YOU KNOW?

Retirement Patterns Change for Doctoral Scientists and Engineers

Data from the National Center for Science and Engineering Statistics (NCSES) at NSF suggests that the end of mandatory retirement practices changed the retirement patterns of doctoral-level scientists and engineers working in postsecondary educational institutions.

Until 1994, postsecondary educational institutions had mandatory retirement provisions for tenured faculty aged 70 and older. NCSES analyzed retirement data from 1993 to 2003 and found a shift in the age distribution of doctoral-level scientists and engineers. In 2003, a higher percentage of persons aged 56 and older were working in these institutions, with an offsetting reduction among those aged 36–55. Among those aged 56–70, retirement rates have generally

increased, and among those aged 71–75, retirement rates have decreased, with the largest drop occurring between 1993 and 1995 (from 88 percent to 83 percent).

It should be noted that the shift in age distribution is not due solely to changes in the likelihood of older age individuals to retire. Deciding when to retire is likely to be affected by a person's current employment situation, future prospects and the type of institution where he or she is employed.

For more information, the full *InfoBrief* is available online.

FACES OF NSF RESEARCH

Psychology Research Seeks to Improve the Use of Eyewitness Evidence in the Justice System



Psychology professor Steven Clark. Credit: Courtesy of Steven Clark, University of California, Riverside

The 18th century English jurist William Blackstone famously stated, "It is better that 10 guilty men escape than that one innocent suffer." He articulated a problem faced by legal systems everywhere: catching the bad guys without putting innocent people behind bars. But the reverse is a concern as well: making sure not to incarcerate the innocent, without letting too many criminals get away. Data on exonerations suggest that false identification is a primary cause, if not the primary cause, of false convictions in the U.S. For many years, it has been assumed that the false identification rate (the rate of incorrectly identifying an innocent person as a perpetrator) can be decreased without affecting the correct identification rate (the rate at which a real perpetrator is correctly identified). However, a careful analysis of data shows that this assumption does not generally hold.

Eyewitness identification is an integral part of the judicial process, but it sometimes introduces false identification evidence. **Steven Clark**, professor of psychology at the University of California, Riverside, has filled some important gaps in understanding the factors that lead to false identifications. Clark had previously done very basic psychological research on memory acquisition and retrieval. Years later, after focusing his research more specifically on eyewitness identification, he developed a mathematical model to analyze eyewitness identification in experimental data. By looking at data from hundreds of eyewitness identification experiments, Clark found that, in general, procedures that lower the false identification rate also lower the correct identification rate, a finding revealed by his quantitative approach. This means that policy decisions meant to decrease the false identification rate may have unwanted consequences on the correct identification rate.

These research findings can be extremely useful for policy makers, and Clark feels more two-way communication has to occur between researchers and policy makers. "Policy decisions really have to be made by policy makers," says Clark, "and what we do as scientists must be to clearly and fully present the data that they can use to make those decisions."

NSF's Directorate for Social, Behavioral and Economic Sciences has funded Clark's research--both his basic investigations on **how we process and store memory**, as well as his research on **eyewitness memory and identification**.

Economist Named to *TIME* Magazine's 2011 Top 100 List

NSF-funded economist Esther Duflo, founder of the **Poverty Action Lab** at the Massachusetts Institute of Technology, has been named one of ***TIME* magazine's 100 Most Influential People for 2011**. She is the principal investigator for two awards from the Division of Social and Economic Sciences in NSF's Social, Behavioral and Economic Sciences Directorate. "Collaborative Research: Social Networks and the Diffusion of Microfinance" (award number **0752935**) explores microfinance, a rapidly spreading strategy to lift people out of poverty by providing them with access to capital. Her project investigates, both theoretically and empirically, how



Economist Esther Duflo. Credit: Kris Krüg, Wikimedia

social network structure impacts the diffusion of membership in a microfinance organization. "Regulating Industrial Pollution: Experimental Evidence from India" (award number **1066006**) evaluates whether environmental regulations actually reduce pollution in developing countries. *TIME* calls her a "Nobel winner in waiting" who "isn't waiting to make the world a better place."

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NSF IN THE NEWS

Caltech Researchers Scale Up DNA Computing (*Computerworld*) NSF-supported researchers from the California Institute of Technology have built what they claim is the world's largest computational circuit based on deoxyribonucleic acid (DNA), using a technology that they said could easily scale to even greater complexity.

Scientists Strive for Way to Issue Earlier Tornado Warnings (*PBS NewsHour*) Scientists from Colorado, Massachusetts, Oklahoma and Puerto Rico are working to develop new networks of radars under a 10-year grant from NSF.

THE RIPPLE EFFECT

Gutmann Advocates for Funding of Transformative SBE Research



Credit: Royalty free image

On Thursday, June 2, the House Subcommittee on Research and Science Education of the Committee on Science, Space and Technology held a hearing entitled "Social, Behavioral and Economic Science Research: Oversight of the Need for Federal Investments and Priorities for Funding." Subcommittee Chairman Mo Brooks (R-AL) began the hearing with a statement about the need for federal investments in the social science disciplines and the process of evaluating these needs in the context of national priorities. Ranking minority member Dan Lipinski (D-IL)--a former social scientist himself--acknowledged the "difficult times for the [federal] budget," while identifying the immense contributions that social science research has made to society, lending great impetus to its continued funding.

Myron Gutmann, assistant director of the Directorate for Social, Behavioral and Economic Sciences (SBE), testified on the behalf of NSF, highlighting NSF's role as the only federal agency that provides funding for basic research in the social sciences in support of transformative, cross-disciplinary scientific progress. He also emphasized the role of NSF's merit review process in effectively prioritizing SBE research funding.

Cora Marrett Sworn in as NSF Deputy Director

On June 22, Cora Marrett was sworn in as deputy director of NSF. She is the 12th deputy of the agency. Marrett was nominated for the NSF deputy director position by President Obama on August 5, 2010, re-nominated in the new Congress on January 5, and confirmed by the U.S. Senate on May 26.

"Dr. Marrett is a familiar leader at the agency, and her continued commitment to NSF's mission makes her well suited for this role," said NSF Director Subra Suresh. "The agency will truly benefit from her years of experience at both the federal and university levels."



Credit: Photo by Sam Kittner/kittner.com

Read more about Marrett **online**.



A view from the Science360 for iPad application. Credit: NSF

New Science360 Applications Available on iTunes

NSF launched two new multimedia sources for science news and features. The **Science360 Radio** application for the iPhone provides continuous audio programming on a variety of science topics from contributors including Scientific American, Nature, NPR, and more. The **Science360 for iPad** application features high resolution images from NSF-funded institutions for download to the iPad, as well as videos from around the globe, either produced by NSF or gathered from scientists, colleges and universities, and NSF science and engineering centers. The application also allows users to share images and video on Facebook and Twitter or via email. In addition, breaking science news is at a user's fingertips through the application news feed. Within two weeks of its release, the iTunes App Store featured Science360 for iPad in its "New and Noteworthy" section, and the application had over 200,000 downloads. To download these applications for free, visit the Apple iTunes store.



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