



# Career Cornerstone News

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### Inside this issue:

<i>Earliest Vision Genes Discovered</i>	1
<i>Nanotech Dental Implants</i>	1
<i>Device Sees Damage in Concrete Structures</i>	2
<i>Degree Profile: Software Engineering</i>	2
<i>L'Oréal USA Fellowships for Women in Science</i>	3
<i>Seeing Spinning Stars</i>	4
<i>Golden Gate Bridge Seismic Retrofit</i>	4

## Earliest Vision Genes Discovered

By peering deep into evolutionary history, scientists have discovered the origins of photosensitivity in animals: vision genes called opsins that first appeared in the aquatic animal species Hydra magnipapillata.

The hydras have no eyes or light-receptive organs, but they have the genetic pathways to be able to sense light.

The biologists -- David Plachetzki and Todd Oakley of the University of California at Santa Barbara -- are the first to look at light receptive genes in cnidarians (corals, jellyfish and sea anemones), of which hydras are members.

Hydras are found in most freshwater ponds, lakes and streams in temperate and tropical regions, and are predatory animals that feed on small aquatic invertebrates.

The scientists speculate that hydras use light sensitivity in order to find prey. The hydras have opsin proteins all over their bodies, but the proteins are concentrated in the mouth area.

"Because we don't find opsins in earlier branching animals like sponges, we can put a date on the evolution of light sensitivity



Opsin genes are present in the cnidarian Hydra, the first evidence of sight in animals.  
Credit: David Plachetzki/UCSB

in animals," said Plachetzki. "We now have a time frame for the evolution of animal light sensitivity. We know its precursors existed roughly 600 million years ago."

Find out more at [www.lifesci.ucsb.edu/eemb](http://www.lifesci.ucsb.edu/eemb).

## Nanotech Dental Implants

Millennium Research Group conducted a detailed analysis of the U.S. dental implant market that revealed that nanotechnology is creating a new buzz in the dental implant market. More specifically, many prominent dental implant manufacturers are incorporating nanotechnology into their dental implant surface designs because the technology is purported to cut healing time in half.

Nanotechnology describes a wide range of new technologies utilizing the

unique physical properties of materials and devices with structures on the order of a hundred nanometers or less. Engineering of materials at these small sizes began in force as new imaging techniques including electron and atomic force microscopy finally allowed scientists to observe and



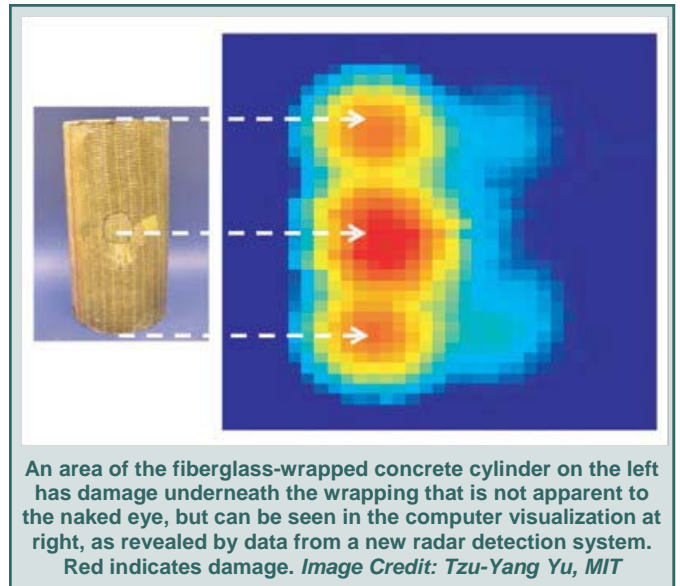
measure material structures on this scale.

Find out more about careers in dentistry and bioengineering at [www.careercornerstone.org](http://www.careercornerstone.org).

## Device Sees Damage in Concrete Structures

Engineers at MIT have developed a new technique for detecting damage in concrete bridges and piers that could increase the safety of aging infrastructure by allowing easier, more frequent, onsite inspections that don't interfere with traffic or service. The technique involves use of a hand-held radar device that can "see" through the fiberglass-polymer wrapping often used to strengthen aging concrete columns to detect damage behind the wrapping not visible to the naked eye. Such damage can occur on the concrete itself, or to areas where layers of the wrapping have come loose from one another or even debonded

from the concrete. The new noninvasive technique can be used onsite from a distance of more than 10 meters (30 feet) and requires no dismantling or obstruction of the infrastructure. It provides immediate, onsite feedback. Called FAR-NDT (far-field airborne radar nondestructive testing), the technique could prove especially advantageous for bridges that span rivers or highways, which



can prove inaccessible for other inspection techniques. Find out more at <http://cee.mit.edu>.

## Degree Profile: Software Engineering

The explosive impact of computers and information technology on our everyday lives has generated a need to design and develop new computer software systems and to incorporate new technologies into a rapidly growing range of applications. The tasks performed by computer software engineers evolve quickly, reflecting new areas of specialization and changes in technology.

To prepare for a career in software engineering, students complete a four-year undergraduate engineering program. Computer



software engineers apply the principles and techniques of computer science, engineering, and mathematical analysis to the design, development, testing, and evaluation of the software and systems that enable computers to perform their many applications.

Software engineers working in applications or systems

development analyze users' needs and design, construct, test, and maintain computer applications software or systems. Software engineers can be involved in the design and development of many types of software, including software for operating systems and network distribution, and compilers, which convert programs for



execution on a computer. In programming, or coding, software engineers instruct a computer, line by line, how to perform a function. They also solve technical problems that arise. Software engineers must possess strong programming skills, but are more concerned with developing algorithms and analyzing and solving programming problems than with actually writing code. Find out more about software engineering at [www.careercornerstone.org](http://www.careercornerstone.org).

## L'Oréal Fellowships for Women in Science

Five postdoctoral researchers working in the fields of geochemistry, neuroscience, oceanography, physical chemistry and bioengineering have been awarded the 2007 L'Oréal USA Fellowships For Women in Science, administered by AAAS's Education and Human Resources Program and sponsored by L'Oréal USA.

According to new survey results released by L'Oréal USA at the award ceremony, 65 percent of adults picture a typical scientist as a man over the age of 40, and 73 percent say there are too few female role models in the sciences.

Only 15 percent of teen girls surveyed said they would definitely pursue a scientific career; only 22 percent of those surveyed thought of scientists as "cool" or "popular" people.

AAAS and L'Oréal USA hope the five new winners of the Fellowships can help change the public image of women researchers.

The winners each received a \$40,000 research award, double the amount given in the past three years of the Fellowships.

This year's winners are:

- ◆ Jaime D. Barnes, University of New Mexico, Albuquerque; studying the geochemistry of volcanic eruptions
- ◆ Sarah Clinton, University of Michigan, Ann Arbor; studying the roles of nature and nurture in emotional behavior in rats
- ◆ Julie Huber, Marine Biological Laboratory, Woods Hole, Massachusetts; studying the microbial ecology of deep-sea vents
- ◆ Maria Kirsch, University of California, Irvine; studying how liquids and vapors interact at the molecular level
- ◆ Kim Woodrow, Yale University, New Haven, Connecticut; studying biodegradable nanoparticles for drug delivery



Dr. Sally Ride, the first American woman in space; CEO Sally Ride Science, was also honored with the L'Oréal USA For Women in Science Role Model Award for her role in helping to shape the image of women in science. Find out more at [www.lorealusa.com](http://www.lorealusa.com).

Find out more about careers in science and other fields at [www.careercornerstone.org](http://www.careercornerstone.org).

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Find out more at [www.careercornerstone.org](http://www.careercornerstone.org)

## Seeing Spinning Stars

Using a suite of four telescopes, astronomers have captured an image of Altair, one of the closest stars to our own and a fixture in the summer sky.

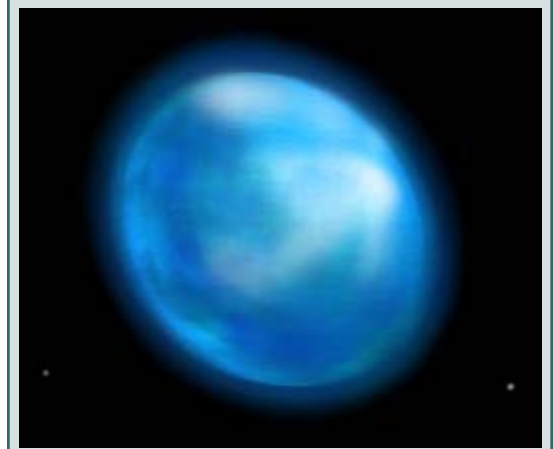
While astronomers have recently imaged a few of the enormous, dying, red-giant stars, this is the first time anyone has seen the surface of a relatively tiny hydrogen-burning star like our own sun.

An international team of astronomers captured the image using four of the six telescopes at a facility on Mt. Wilson, CA, operated by the Center for High Angular Resolution Astronomy (CHARA) at Georgia State University in Atlanta with partial support from the National Science Foundation. The CHARA telescopes were able to make the breakthrough observation because

they were outfitted with a novel system to clean up some of the distortions from Earth's atmosphere, a technology called the Michigan Infrared Combiner, developed at the University of Michigan in Ann Arbor. Recent advances in fiber optic telecommunication technology made this new combiner possible.

Until now, astronomers could gather tremendous amounts of data from stars, but could not capture images of what the stars looked like. Even to the largest telescopes, stars looked like the points of light we all see when we peer up into the night sky.

Using the telescopes as an interferometer--a multi-telescope system that combines information from small, distantly spaced



An artist's rendition of Altair, a star that spins so quickly it stretches at its equator.  
Credit: Zina Deretsky, National Science Foundation

telescopes to create a picture as if taken from one large telescope--the researchers captured infrared lightwaves as if from a giant telescope 265 meters by 195 meters in dimension.

Altair is one of the closest stars, only about 15 light years away. It spins quickly, (300 kilometers per second at its equator) that it's shape is distorted.

## Golden Gate Bridge Seismic Retrofit

The Golden Gate Bridge has long been considered vulnerable to significant earthquake damage -- with a 65 percent probability of an earthquake with a magnitude of at least 6.7 striking the San Francisco region before the year 2030. To protect this international icon, five structures of the bridge were retrofitted to withstand an 8.3 Richter scale-magnitude earthquake occurring seven miles west of the bridge. In recognition of the project's success, the Golden Gate Bridge Seismic Retrofit Phase II, South Approach Structures Project has been honored with the American Society of Civil Engineers' 2007 Outstanding Civil Engineering Achievement award. The OCEA award recognizes the project's significant contribution to the civil engineering profession and its local community. Currently the second longest suspension bridge in the United States, the Golden Gate Bridge



is visited by millions each year and crossed by 40 million vehicles annually. Since opening to traffic in 1937, more than 1.7 billion have crossed the span. 2007 marks the 70th anniversary of the Golden Gate Bridge. Find out more about careers in civil engineering at [www.careercornerstone.org](http://www.careercornerstone.org).