



Career Cornerstone News

Volume V, Issue VIII

August, 2009



Career Cornerstone News is a Publication of the Sloan Career Cornerstone Center, the Premier Online Resource for Exploring Career Paths in Science, Technology, Engineering, Mathematics, Computing, and Healthcare.

Inside this issue:

<i>Tornado Research Blog</i>	1
<i>Engineering Flu Vaccines</i>	1
<i>Sea Animals Adapt to Volcano Living</i>	2
<i>Degree Profile: Actuarial Science</i>	2
<i>Electronic Patient Records and Education</i>	3
<i>Catnip: A Natural Insect Repellent?</i>	4
<i>Powered by Chocolate, Steered by Carrots</i>	4

Tornado Research Blog

VORTEX2, or Verification of Rotation in Tornadoes Experiment 2, is the largest attempt in history to study the origin, structure and evolution of tornadoes. Now, members of the public can follow live reports from scientists involved in the project, funded by the National Science Foundation and the National Oceanic and Atmospheric Administration. Atmospheric scientist Josh Wurman of the Center for Severe Weather Research in Boulder, CO, a participant in Vortex 2, has now started a blog, allowing members of the public an inside glimpse

of the action. Some of the questions the teams hope to answer include: How, when and why do tornadoes form? Why are some tornadoes violent and long-lasting, while others are weak and short-lived? What is the structure of tornadoes? How strong are the winds near the ground and how exactly do they do damage? How can we learn to better forecast tornadoes? For daily updates on progress on VORTEX2, including photos and video from the field, follow the blog at <http://tornadoscientists.blogspot.com/>. Atmospheric scientists, commonly called meteorologists,



Credit: NOAA

study the atmosphere's physical characteristics, motions, and processes, and the way in which these factors affect the rest of our environment. Explore careers in atmospheric science at www.careercornerstone.org.

Engineering Flu Vaccines

A new computerized method of testing could help world health officials better identify flu vaccines that are effective against multiple strains of the disease. Rice University scientists who created the method say tests of data from bird flu and seasonal flu outbreaks suggest their method can better gauge the efficacy of proposed vaccines than can tests used today. Scientists and world health authorities are always trying to prepare for a potential flu outbreak.

Because the flu virus mutates continually, creating a vaccine in advance is problematic. World health authorities currently test the efficacy of proposed flu vaccines using either ferrets, which can contract the same forms of flu as people, or genetic assays. Rice's new computerized method could be a cheaper and faster alternative. With the new method, flu virus mutations are assigned numerical scores. The researchers then assign a number that captures the amount of difference or

similarity between strains. The method can be used to test how effective a vaccine will be against divergent strains. Influenza viruses are like chameleons. They constantly change the patterns on their outer surface to avoid being targeted by antibodies. Find out more at www.rice.edu and explore careers in science and engineering at www.careercornerstone.org.



Sea Animals Adapt to Volcano Living

Scientists who recently returned from an expedition to an erupting undersea volcano near the Island of Guam report that the volcano appears to be continuously active, has grown considerably in size during the past three years, and its activity supports a unique biological community thriving despite the eruptions. An international science team on the expedition captured dramatic new information about the eruptive activity of NW Rota-1, the only place on Earth where a deep submarine volcano has ever been directly observed while erupting. Bill Chadwick, an Oregon State University (OSU) volcanologist and

chief investigator on the expedition, says that they discovered that the volcano had built a new cone 40 meters high and 300 meters wide. Chadwick notes that "as the cone has grown, we've seen a significant increase in the population of animals that lives atop the volcano. We're trying to determine if there is a direct connection between the increase in the volcanic activity and that population increase." Animals in this unusual ecosystem include shrimp, crab, limpets and barnacles, some of which are new species. "They're specially adapted to their



Lava erupts onto the seafloor at NW Rota-1, creating a cloudy, extremely acidic plume.
Credit: WHOI

environment," said Chadwick, "and are thriving in harsh chemical conditions that would be toxic to normal marine life.

Find out more about careers in science and biology at www.careercornerstone.org.

Degree Profile: Actuarial Science

One of the main functions of actuaries is to help businesses assess the risk of certain events occurring and to formulate policies that minimize the cost of that risk. For this reason, actuaries are essential to the insurance industry. Actuaries assemble and analyze data to estimate the probability and likely cost of the occurrence of an event such as death, sickness, injury, disability, or loss of property. Actuaries also address financial questions, including those involving the level of pension contributions required to produce a certain retirement



income and the way in which a company should invest resources to maximize its return on investments in light of potential risk.

Using their broad knowledge of statistics, finance, and business, actuaries help design insurance policies, pension plans, and other financial strategies in a manner which will help ensure that the plans are maintained on a sound financial basis.

Actuaries hold about 18,000 jobs in the U.S., and most actuaries are employed in the insurance industry, specializing in life and health insurance or property and casualty insurance. Actuaries in other financial services industries manage credit and



price corporate security offerings.

Applicants for beginning actuarial jobs usually have a bachelor's degree in mathematics, actuarial science, statistics, or a business-related discipline such as economics, finance, or accounting.

The median annual earnings of actuaries is \$82,800.

More information about careers in actuarial science is at www.careercornerstone.org.

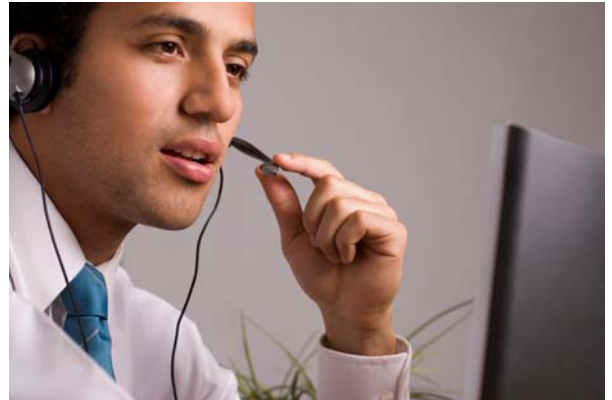
Electronic Patient Records and Education

Brigham & Women's Hospital recently partnered with Krames, a health information solutions company, to institute a new electronic plan for patient education. "Our medical surgical floors deal with so many diagnoses making it virtually impossible to store printed materials," explained Ann Furey, RN MBA, patient education program manager at the Boston Hospital. "The database of materials at our nurses' fingertips is a great benefit for our team and ultimately, our patients."

The "On-Demand" system features a library of over 3,000 information sheets spanning 38 medical specialty areas, plus over 2,000 medication information sheets. All the content is available in English and Spanish with subsets of content available in several other languages. The resource has helped improve staff efficiency as well, according to Furey, "More and more of the nursing documentation is occurring online, be it medication administration, nursing assessments or flow sheets. The

fact that we can easily access patient education online fits into our workflow. And, with the ability to edit the Krames content, it reduces the amount of education materials that have to be created from scratch."

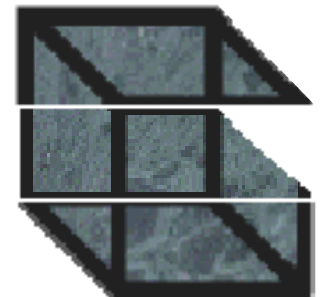
But patient education is not the only aspect of healthcare that is becoming more automated in the U.S. Currently, only about 8% of the nation's 5,000 hospitals and 17% of its 800,000 physicians have modernized their systems by making their health records standardized and electronic. The trend toward electronic medical records is likely to expand with a boost from stimulus funds in the United States. As technology becomes more and more critical to the healthcare industry, many careers are expanding to help meet the need for technologically savvy staff to support hospitals, private practices, and nursing homes. Medical records and health



information technicians, for example, organize and evaluate medical records for completeness and accuracy. They are increasingly using computer programs to tabulate and analyze data to improve patient care, better control cost, provide documentation for use in legal actions, or use in research studies. In addition software engineers are developing specialized and customized software designed to streamline all aspects of the healthcare industry. Find out more about careers in healthcare and engineering at www.careercornerstone.org.

Our Partner Organizations Include:

- American Association for the Advancement of Science (AAAS)
- American Board of Medical Specialties
- American Chemical Society
- American Geological Institute
- American Institute of Biological Sciences
- American Institute of Chemical Engineers
- American Institute of Physics
- American Mathematical Society
- American Nuclear Society
- American Society of Civil Engineers
- American Statistical Association
- American Society of Mechanical Engineers
- Casualty Actuarial Society
- Institute of Electrical and Electronics Engineers
- Mathematical Association of America
- NASA
- Society for Industrial and Applied Mathematics
- Society of Actuaries
- The Minerals, Metals, and Materials Society
- Whitaker Foundation



Find out how your organization can be a partner at www.careercornerstone.org

Catnip: A Natural Insect Repellent?

DuPont recently received registration from the U.S. Environmental Protection Agency (EPA) for an insect repellent ingredient derived from the catmint plant, a sustainable resource more commonly known and loved by felines worldwide as catnip. The new ingredient, Refined Oil of *Nepeta cataria*, is the first new insect repellent biopesticide to be registered by the EPA in eight years.

"This new, natural ingredient is particularly exciting because it repels a broad range of biting insects with effectiveness similar to synthetic ingredients such as DEET. Unlike other repellants on the market today, natural refined catmint oil can be



Nepeta cataria, or catmint.
Image Source: DuPont

reapplied often in contrast to other common repellents," said Henry Bryndza, director of chemical science and engineering for DuPont Central Research & Development. Potential markets for the new insect repellent include

topical personal care products such as sun block lotions, sprays, wipes and insect repellent candles. It could also potentially be formulated into sunscreen because of its ability to be reapplied.

The catmint oil is harvested from catmint plants selected for their abilities to produce higher amounts of the active ingredient. Many homeowners



DuPont plant biologist David Hallahan and chemical engineer Yamaira Gonzalez in the labs developing a new insect repellent made from a mint plant. Image Source: DuPont

use catmint as an ornamental in their outdoor landscaping; however, producing insect repellent from the plants is not straightforward. Unrefined, the oil is a skin sensitizer. The refining innovation developed by DuPont makes it possible to apply directly.

Find out more about careers in biology and chemical engineering at www.careercornerstone.org.

Powered by Chocolate, Steered by Carrots

Researchers at the University of Warwick have unveiled a Formula 3 racing car powered by chocolate, steered by carrots, with a body made from potatoes that can do 125mph around corners. The researchers decided to build a competitive racing made from sustainable and renewable materials. The car meets all the Formula 3 racing standards except for its biodiesel engine which is configured to run on fuel derived from waste chocolate and vegetable oil. Formula 3 cars currently cannot use biodiesel.

Components made from plants form the mainstay of the car's make up, including a race specification steering wheel derived from carrots and other root vegetables, a flax fibre and soybean oil foam racing seat, a woven flax fibre bib, plant oil based lubricants and a biodiesel engine configured to run on fuel derived from waste chocolate and vegetable oil. Find out more about careers in science and engineering at www.careercornerstone.org.



Credit: University of Warwick