

# Bulletin of the

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## The State of Innovation in Connecticut

With innovation being touted as a solution to the current economic crisis, what's being done to put young minds to work creatively solving problems for tomorrow's world? From elementary education through advanced studies, programs exist in Connecticut to stimulate the brain and promote the art of inspiration.

### *An early start*

For younger students, schools (including magnet schools focusing on science, technology, engineering and mathematics, or "STEM") and nonprofit organizations like the Connecticut Invention Convention (CIC), the Connecticut Science Fair (CSF) and the Junior Science and Humanities Symposium, provide hands-on opportunities to put math, science and engineering principles to work.

More than 100 schools participate in the CIC, a nonprofit organization that's been active in the state since 1983. "Our ultimate goal is for all kids to have at least one hands-on invention experience during their elementary school career," said Honora Kenney, president of CIC. "Not all will become scientists and engineers, but all can become better, smarter citi-

zens. We introduce productive thinking, brainstorming and other tools to help identify and solve problems. These inquiry-based science and engineering principles will stay with them for life as they solve problems for the greater good."

For nearly 70 years, the CSF has encouraged middle- and high-school students to explore self-inquiry through science, engineering and mathematics projects. The program stresses innovative problem solving and looking at things in a new light. Kelly Benoit-Bird, a 2010 MacArthur Fellow and an assistant professor of biological oceanography at Oregon State University, sees a direct tie from her CSF experience to her life's work, which is an extension of her CSF research. "It opened my eyes; I realized for the first time that I could explore my scientific interest as a profession," she said. "It gave me mentors along the path and opportunities for hands-on learning."

The Junior Science and Humanities Symposia program promotes original research and experimentation and publicly recognizes high school students for outstanding achievement.

### *Transitioning to real life*

At the University of Connecticut (UConn) and Yale University, creative study opportunities abound for students to fine-tune their technical and business savvy.

Through programs such as Senior Design and the Entrepreneurial Senior Design Project (ESDP), UConn students identify marketplace needs and solve real-life problems for industry sponsors. The ESDP provides undergraduate engineering students with an atypical opportunity to take two MBA-level entrepreneurship courses and team with students from the School of Business.

"The ESDP takes the traditional senior design course experience to the next level," said John Bennett. Bennett is professor emeritus of mechanical engineering and co-director of the ESDP with Richard Dino, associate professor of management, in the School of Business.

(See *Innovation*, page 2)

## News from the National Academies

The following is excerpted from press releases and other news reports from the National Academies ([www.national-academies.org](http://www.national-academies.org)).

### ◆ Health Information Technology Needs Better Oversight, Accountability

To protect Americans from potential medical errors associated with the use of information technology in patient care, a new report by the Institute of Medicine calls for greater oversight by the public and private sectors. The report examines a broad range of health information technologies, including electronic health records, secure patient portals, and health information exchanges, but not software for medical devices. It calls on the secretary of the US Department of Health and Human Services to publish a plan within 12 months to minimize patient safety risks associated with health IT and report annually on the progress being made. Such a plan should include a schedule for working with the private sector to assess the impact of health IT on patient safety. If the secretary determines that progress toward improving safety is insufficient within a year, the US Food and Drug Administration should exercise its authority to regulate these technologies. Concurrently, FDA should begin planning the framework needed for potential regulation so that the agency is ready to act if necessary.

The report calls for HHS to establish a mechanism for both technology vendors and users to report health IT-related deaths, injuries, or unsafe conditions. A new Health IT Safety Council should be funded by HHS to evaluate criteria and develop methods for assessing and monitoring safety and measuring impacts of health IT on safety, the report says. Additionally, HHS should establish quality management principles and risk management processes in designing and implementing health IT products.

[http://books.nap.edu/catalog.php?record\\_id=13269](http://books.nap.edu/catalog.php?record_id=13269)

### ◆ Effects of Vaccines: Evidence, Causality

In 1900, for every 1000 babies born in the United States, 100 would die before their first birthday, often due to infectious diseases. Today, vaccines exist for many viral and bacterial diseases. The cornerstone of the vaccine safety system in the United States is the National Childhood Vaccine

(See *NAS*, page 7)



Competitors face a rigorous judging process at the CT Science Fair. [Photo: CT Science Fair]

"In ESDP, business and engineering students have a mutually beneficial learning opportunity that exposes them to the technical and business sides of the entrepreneurship equation," he said.

Both programs are among UConn's "crown jewels" according to CASE member Mun Choi, dean of the UConn School of Engineering. "These programs allow students to work with industry experts on relevant topics and bring together fundamental knowledge to improve a product or design," he says. "Working together for months, the students gain a good understanding of the marketplace and the technical challenges."

The School of Engineering hosts monthly "Innovation Connection" meetings, providing networking opportunities for 75 to 100 industry partners, faculty and students. "This is a prime example of what I call 'serendipity by design,'" Choi said. "It's a forum for information exchange."

The UConn Research & Development Corporation was re-activated in 2002 to foster more interest in commercializing technology and

building businesses around it. "It's an important and useful aspect of research," said Mark Van Allen, president of the UConn R&D Corp. "This activity provides a solid return on investment to taxpayers and directly contributes to the economy."

Yale University also is working to nurture an "innovative spirit." Vincent Wilczynski, deputy dean of its School of Engineering & Applied Science (SEAS), believes the innovative ability of the US education system, society, government and industry is one competitive attribute that other countries don't have. "Maintaining and advancing our innovative status is possible," he said. "We need to figure out a way to bring innovators together and give them support. Innovation thrives in a culture surrounded by others. Innovation is our competitive advantage."

Undergraduate research projects at Yale have led to the creation of new businesses in the state, including a company that designs liquid cooling systems to increase the efficiency of microprocessors in computer data centers and one that sells furniture made of recyclable cardboard. "We've seen firsthand the importance and effectiveness of increasing people's motivation and their awareness of how to make their ideas a reality," he said.

In that vein, Yale offers a 10-week summer program that trains students to develop ideas into viable private companies, providing resources and the opportunity to pitch ideas to potential investors. The university also sponsors annual regional conferences and hosts an annual competition for startup office space, as well as professional legal and financial advice.

In 2012, Yale will open its Center for Engineering Innovation & Design, an 8,500-square-foot facility featuring areas for instruction, team meetings, computer-aided design, fabrication and assembly.

Wilczynski says the university is listening to its students, faculty and the community and responding to the need to foster innovation. "It is an exciting time at Yale," he said. "We have opportunities to identify high-flying ideas and the ability to hook into funding and bring these ideas to the marketplace," he said.

### *What's the payoff?*

Young entrepreneurs are changing the world.

Alex Mittal, a Connecticut native, earned top honors at the 2002 CSF and was an Intel International Science and Engineering Fair winner. He is chief executive officer of Innova Dynamics, a company that developed a low-cost technology to address urgent water quality problems in the developing world, and transitioned the technology to diverse high-tech applications including medical device and touch screen display technology. A 2003 graduate of Greenwich High School, he also previously co-founded Credery, a web-based credential verification company that is currently one of the fastest growing companies in India.

Featured by BusinessWeek as both one of 'America's Best Young Entrepreneurs' and 'America's Most Promising Social Entrepreneurs,' Mittal attended public and private schools in the state and credits much of his success to his family, teachers and outside organizations that nurtured his interests. "Having hands-on and open-ended experiences at a young age led me to approach life differently," he said. "When I see a problem in the world, I try to think of a solution. I don't just accept things the way they are, I know that each of us has the power to change the world if we take action to solve problems."

Many agree that making Connecticut more "innovation friendly" will require a change in culture and the ability to ignite the passion for science and technology at a young age and foster it.

*(See Innovation, back page)*

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# IN BRIEF

## Science and Engineering Notes from Around Connecticut



### Biomedical Research

#### STEM CELL FUNDING AIDS LIVER DAMAGE RESEARCH.

Antibiotics, antivirals and other drugs have helped countless people, but for some, they can also cause liver damage. There is no way to tell who's susceptible until after it happens, and until recently, scientists trying to develop ways to find out sooner faced significant obstacles, including obtaining appropriate liver cells for experimentation. Now three professors at the **University of Connecticut School of Pharmacy** are working to find ways around those obstacles using stem cells that can be turned into liver cells. Researchers **Urs A. Boelsterli, Theodore Rasmussen, and Winfried Krueger** hope to learn why drugs cause liver damage in some people, which could in turn lead to a way to tell who is at risk from certain drugs. Their work is one of 20 stem cell research projects awarded a total of \$9.8 million in state funding in the most recent round of funding in the state's 10-year, \$100 million commitment. The 20 projects were selected from seventy-nine applications accepted for consideration in January 2011. The **Connecticut Stem Cell Research Peer Review Committee** reviewed these applications in accordance with National Institutes of Health guidelines and provided the Connecticut Stem Cell Research Advisory Committee with recommendations with respect to the scientific merits of each application.

**BRAIN CELL INTERRUPTION MAKES MICE ANTI-SOCIAL.** Mice become profoundly anti-social when the creation of new brain cells is interrupted in adolescence, a surprising finding that may help researchers understand schizophrenia and other mental disorders, according to a new **Yale** study. When the same process is interrupted in adults, no such behavioral changes were noted, according to research recently published in the journal *Neuroscience*. Scientists have known for quite some time that new brain cells are continually generated in specific brain regions after birth. This process, called neurogenesis, occurs at a significantly greater rate during childhood and adolescence than in adulthood, yet most research has focused upon the function of these neurons in older brains. The Yale team decided to explore the function of these new brain cells in mice of different ages. They found that while normal adult mice tend to spend a lot of time exploring and interacting with unfamiliar mice, adult mice that had neurogenesis blocked during adolescence showed no interest in exploring other adult mice and even evaded attempts made by other mice to engage in social behavior. The findings have "important implications in understanding social development at the molecular level," said **Arie Kaffman**, assistant professor of psychiatry and senior author of the study.

**FAT CELL MYSTERY EXPLORED.** **Yale University** researchers have found one of the mechanisms that cause fat cells to lose their ability to efficiently store and use energy—a scientific mystery and a phenomenon that contributes to obesity, a major public health problem. The Yale team, headed by **Tobias Walther**, associate professor of cell biology and senior author of the study, discovered a mechanism that allows cellular fat droplets to expand when excess metabolic energy is present, i.e., when the body has taken in more food than it can burn off. Researchers in Walther's lab and collaborators at the Gladstone Institutes in San Francisco found that an enzyme within cells senses tension at the surface of the expanding fat droplets. This triggers the production of more surface components of fat droplets, enabling them to expand and accommodate

more fatty acids without adverse consequences. The study was reported in a recent issue of the journal *Cell Metabolism*.

**PARASITES LINKED TO MAMMALIAN REPRODUCTION.** Genetic parasites invaded the mammalian genome more than 100 million years ago and dramatically changed the way mammals reproduce—transforming the function of the uterus in the ancestors of humans and other mammals from the production of eggs to a nurturing home for developing young, according to a new study by **Yale** researchers. The findings, published online in the Sept. 25 journal *Nature Genetics*, describe in unprecedented detail the molecular changes that allowed mammals to carry their developing young within the safety of the womb rather than laying them in nests or carrying them around in pouches. "In the last two decades there have been dramatic changes in our understanding of how evolution works," said **Gunter Wagner**, the Alison Richard Professor of Ecology and Evolutionary Biology at Yale, and senior author of the paper. "We used to believe that changes only took place through small mutations in our DNA that accumulated over time. But in this case we found a huge cut-and-paste operation that altered wide areas of the genome to create large-scale morphological change."



### Business & Industry

**DRONE HELICOPTER TO SUPPLY TROOPS.** **Kaman Corp.**'s drone cargo-lifting helicopter will see its first combat action in Afghanistan starting this month, authorities say. The US Marine Corps announced this fall that it will deploy two pilotless K-Max drones to one of the world's most active combat zones following a speedy but rigorous tryout that amazed officials from the military and Kaman's project partner, Lockheed Corp., according to Kaman officials. Lockheed and Kaman teamed in 2007 to transform Kaman's manned power-lift helicopter into a drone capable of autonomous or remote-controlled cargo delivery, with Kaman designing the airframe and Lockheed the helicopter's mission management and control systems. The helicopters are part of an initial \$46 million contract the Navy awarded Lockheed as prime contractor. The drone K-Max is essentially the same size as the original aircraft, but is flown via remote control by military technicians in the battlefield. Using hooks and lines, it can ferry a maximum three-ton payload of ammunition, food, medicine and other supplies to US and allied forces in the war zone, officials said. It is not designed as a troop carrier, Kaman said.

**XEROX LANDS \$14 MILLION CONTRACT.** ACS, the Dallas-based information-technology division of Norwalk's **Xerox Corporation**, won a six-year, \$14 million contract with the state of Connecticut to install a secure portal for law enforcement officials' paperless access to the state's criminal justice database. ACS will design and build the portal, called the Connecticut Information Sharing System (CISS), that will allow police, judges and others to electronically access and exchange criminal and court records using a centralized statewide system. It will be one of the most advanced tools of its kind in the country, making data available from hundreds of sources in the state to thousands of authorized users, ACS said. Initially, the system will enable 50,000 users to share text, analytics, business intelligence, dashboards, video, graphics and audio, and improve access to reports. Over time, it is expected to expand to 75,000 users, according to company officials. "This system will

*Items that appear in the In Brief section are compiled from previously published sources including newspaper accounts and press releases.*

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incorporate many trusted and time-tested solutions to improve public safety in Connecticut, and give agencies comprehensive and secure access to the information they need to make decisions and protect citizens," said Under Secretary **Mike Lawlor** of the state's **Office of Policy and Management**.

**FASTEST GROWING TECH COMPANIES NAMED.** Six winners representing key areas of technology have been announced as the fastest growing technology companies in Connecticut at the 2011 Marcum Tech Top 40 awards ceremony at the Oakdale Theater in Wallingford. Marcum LLP, one of the nation's leading accounting and advisory firms, and **The Connecticut Technology Council** recognized the 40 fastest growing technology companies in Connecticut based on revenue growth over the past four years. The overall winner of this year's Marcum Tech Top 40 is Tolland-based **OpenSky Corporation**. The IT services company, which provides professional services in IT consulting, infrastructure, risk management, security and virtualization, has achieved revenue growth of 18,221% over the past four years. Five other category winners include: **RSL Fiber Systems, LLC**, East Hartford (Advanced Manufacturing); **STR Holdings Incorporated**, Enfield (Energy/Environmental Technologies); **Alexion Pharmaceuticals**, Cheshire (Life Sciences); **HealthPlanOne, LLC**, Shelton (New Media/Internet/Telecom); and **Higher One Holdings, Inc.**, New Haven (Software).

**PRATT ENGINES FUEL BIOFUEL DEMONSTRATION FLIGHT IN CHINA.** A 747 jetliner powered with **Pratt & Whitney** engines running on sustainable biofuel has successfully made a demonstration flight in China, authorities say. Air China, partnering with Pratt, Boeing Co. and others, completed the flight using sustainable biofuel derived from biomass grown in China, Pratt said. The PW4000 94-inch diameter engines kept the plane aloft for the approximately hour-long flight, officials said. No modifications to the aircraft or engine were required for the biofuel, which is a "drop-in" replacement for petroleum-based fuel. Chinese air officials called the test a "milestone" for both biofuels and for China, one of the world's largest and fastest-growing aviation markets. Pratt and Whitney hailed the flight as an important step in developing new, cleaner fuels that can help it expand its business around the world.



### Communication

**ER WAITS START AT HOME.** Sick of standing in line to be seen in the emergency room? Well, how about waiting to be seen by an ER doctor in the comfort of your own home instead? That's the goal of a new web-based service launched in October by **St. Francis Hospital and Medical Center** in Hartford. The new service, called InQuicker, allows patients with non-emergency conditions to request a visit for up to two hours in advance. Not an appointment or reservation-setting program, the new option instead is a check-in service that estimates treatment times based on patient traffic conditions and allows its users to wait from home instead of in the waiting room. Nationwide, nine out of 10 InQuicker users are seen by a healthcare professional within 15 minutes of their projected treatment times, officials said. To cut down on wait times, the service has users provide all requested information during the online check-in, including such things as medical history and symptoms. That eliminates paperwork in the hospital and allows nurses and physicians to know what to expect before the patient arrives, which further reduces wait times, according to **Steven Wolf**, chairman of St. Francis's Department of Emergency Medicine.

**STATE BUSINESSES USE SOCIAL MEDIA TO BOOST SALES.** The revolution in communications technology has seen Connecticut

companies—after a slow start, according to some observers—tapping into social media websites to connect directly with customers and their wallets while leveraging online networking tools to market events, fill jobs and generate sales. "Businesses are starting to really understand the benefits of social media and how to use it as a sales tool," said **Jeffrey Cohen**, vice president of ImageWorks LLC, a web design, hosting and e-commerce firm in Vernon, in a recent interview with the *Hartford Business Journal Online*. "It's a great way to connect with customers, market products and promote specials," he said, noting that Facebook pages, Twitter accounts, YouTube videos and LinkedIn networks allow customers, clients and even job candidates to start an online conversation with companies.



### Education & Cognition

**MAGNET SCHOOL RECEIVES 'LEAD THE WAY' CERTIFICATION.** New London's **Science and Technology Magnet High School** has received national certification for its Project Lead The Way (PLTW) program that it has been offering since 2007. PLTW, a nonprofit organization and the nation's leading provider of science, technology, engineering, and math (STEM) education programs, offers a rigorous curriculum that allows students to apply what they are learning in math and science class to real-life biomedical sciences projects. The PLTW certification program recognizes schools for successfully demonstrating a commitment to PLTW's national standards and provides students with the opportunity to apply for college credit when they successfully complete select PLTW courses in high school and receive other college-level recognition at PLTW affiliate universities. Students who enroll in PLTW courses also benefit from the organization's strong university and industry relationships that allow students to begin working toward their college degrees and gain valuable experience through internships and through their association with local biomedical sciences professionals who serve as mentors, provide in-classroom visits and tours of their facilities.

**ENGINEERING AMBASSADORS.** In early September, ten **University of Connecticut** engineering students kicked off the new school year with science and technology classes at **CREC Two Rivers Magnet Middle School** in East Hartford. The UConn students are Engineering Ambassadors, members of an outreach program that presents engineering concepts to school age students in the form of interactive demonstrations. The Engineering Ambassadors program was started in fall 2009 with a \$50,000 grant from **United Technologies Corporation** and aims to introduce K-12 students to engineering and problem solving and to foster an interest in the science and technology fields as a career.



### Energy

**NEW HAVEN BIOFUEL PLANT TO OPEN NEXT YEAR.** New Haven alternative fuel provider **Greenleaf Biofuels** closed project funding on a 10-million-gallon per year biodiesel plant set to open in the second quarter of 2012. The facility, which will be located at the **Port of New Haven**, will become the largest biofuel facility in New England and the first with deepwater and rail access, according to Greenleaf officials. With the opening of the production plant, Greenleaf will shift from a biofuel delivery company of three employees to a production company with 23 employees initially. Financial terms with **Sovereign Bank** and the **Connecticut Community Investment Corp.** were not disclosed.

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**YALE TO ESTABLISH NEW ENERGY SCIENCES INSTITUTE.** Yale University will establish an **Energy Sciences Institute** on its West Campus with the help of a \$25 million gift from Yale alumnus **Thomas F. Stever** ('79) and his wife, **Kathryn A. Taylor**. The institute will bring together physicists, chemists, geologists, biologists, and engineers to develop solutions to the world's energy challenges. Yale President **Richard C. Levin** said the new institute will draw on the scientific resources of the university to find new and better ways to convert the sun's energy into fuel and, in the near term, to reduce atmospheric carbon by other means. During the institute's start-up phase, the university will recruit several new faculty members, including a director, and establish 40,000 square feet of dedicated laboratory space. The institute will divide its research into two major areas: the development of solar fuels, with a goal of converting sunlight into storable chemical energy; and the explorations of near-term "transitional technologies" such as clean fuels, refined combustion technologies, and carbon capture and sequestration.



### Environment

**TREES, ICE STORMS AND POWER OUTAGES.** At the request of the **Department of Energy and Environmental Protection**, **Jeff Ward** at **The Connecticut Agricultural Experiment Station** measured the risk posed statewide from large street trees as the state seeks ways to prevent prolonged power outages and damage such as that resulting from toppled trees during Tropical Storm Irene in August and the Oct. 29 nor'easter. Of the estimated 1.1 million trees along Connecticut streets and highways, as many as 620,000 are large enough to pose potential hazards during future storms. Of these, more than half are maples, whose growth habit tends to result in defects such as hollow cavities and split trunks with weak forks that make them vulnerable in winds and snows. Removing the shade of maples would be too drastic, but planting only varieties with mature heights of less than 30 feet and keeping trees eight feet from power lines are logical responses to Ward's survey, which was extrapolated from 11 cities and towns that had recently inventoried tree damage during extreme weather. His survey was furnished to **Governor Dannel P. Malloy's** Two Storm Panel.

**INTERSTATE POLLUTION CONTROL EFFORT LAUNCHED.** Connecticut, joined by five other Eastern states and the District of Columbia, is seeking to intervene in support of a federal rule to control interstate air pollution, which is currently under challenge in a lawsuit before the US Court of Appeals for the DC Circuit. The federal Environmental Protection Agency rule requires significant reductions in nitrogen oxides and sulfur dioxide, the precursor pollutants of ozone and fine particulate matter, beginning January 1, 2012, in states that contribute to high or unacceptable air pollution levels in downwind states, such as Connecticut. "While Connecticut has stringent laws controlling sources of air pollution emissions, the same cannot be said of other states," said **Attorney General George Jepsen**.

**ARTIFICIAL DIET DEVELOPED TO EASE HEMLOCK THREAT.** Ever try to improve the diet of a beetle so they breed much faster? Well, testing such substances is a task being undertaken by **Carole Cheah**, a research entomologist with **The Connecticut Agricultural Experiment Station**. The insect in question is adelgid-feeding lady beetle, which is a natural predator of the hemlock woolly adelgid that is threatening hemlock trees all over the eastern part of the country. "The hemlock woolly [adelgid] feeds on hemlock tissue, causing tree decline and mortality," Cheah said. In a recent interview, she explained that at first—working on an annual grant from the US Department of Agriculture Forest Service—she and

other scientists had to collect the adelgid-infested hemlock foliage and raise the beetles on them in the laboratory—a painstaking and tedious process. "Dr. Allen Cohen, a professor at North Carolina State University, did the basic work on creating an artificial diet for the beetles and my job is to test it," said Cheah, adding that if the diet works as planned, it will make the beetles breed much faster so they can be released in great numbers in forests. This will in turn allow them to sharply reduce the hemlock woolly adelgid population much more efficiently than is possible with current controls.



### Food & Agriculture

**FLY HURTS RASPBERRY GROWER.** As if wet and blustery Irene weren't enough, a pesky fly never before seen in Connecticut has taken an exasperating toll on a Guilford pick-your-own orchard. **Bishop's Orchards** had to prematurely shut down its raspberry patches in early September for the rest of the 2011 harvest due to the damaging effects of the recent tropical storm and an insect pest, *Drosophila suzukii*, or "vinegar fly," a close relative to the common fruit fly, the farm's CEO says. This is the first appearance of this pest in Connecticut, authorities say. It is the first time in a decade that the orchard's raspberry harvest was virtually nonexistent. The orchard is working closely with the **University of Connecticut's Cooperative Extension Service** and **The Connecticut Agricultural Experiment Station**, studying resource material from other states where the fly has already become a major pest, to craft a solution.

**STINK BUG DETECTION TRAP UNDER DEVELOPMENT.** A **Connecticut Agricultural Experiment Station** scientist is working to develop traps that will tell farmers and property owners when the brown marmorated stink bug is threatening to invade their fields and properties. According to Station entomologist **Chris Maier**, the stink bug—which gets its name from a foul odor it gives off as a defense mechanism against predators—is a voracious eater of virtually anything not made of wood. "They eat flowers, stems, fruits, vegetables—almost anything," Maier said. "There are effective pesticides that can kill them but too often they are not detected in a field until it's too late and the damage is done." While there has been no crop damage in Connecticut so far, damage has been heavy in a number of states and is expected to become a threat here as well.



### Health

**BACTERIA KILLER DISCOVERED IN IMMUNE SYSTEM.** Yale scientists using bits of material from the human immune system have developed a compound that can neutralize or kill several varieties of drug-resistant and other dangerous bacteria. Drug-resistant bacteria are an increasing risk to the health of the world's population. The new compound's ability to kill bacteria in the lab also is promising as a new treatment for infectious diseases. "The compound is effective in concentrations currently used in drugs and hopefully can be used to combat infectious diseases as well as drug-resistant organisms," said Nobel Laureate **Sidney Altman**, Sterling Professor of Molecular, Cellular and Developmental Biology and professor of chemistry, and senior author of the study, which was published in the Sept. 26 *Proceedings of the National Academy of Sciences*.

**CHEAPER, LESS TAXING CHEMO TREATMENT SOUGHT.** Approximately 1.5 million people in the United States were diagnosed with cancer in 2010, including 21,000 in Connecticut. But a dramatic increase in cancer survival rate—now 68%, compared

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to 50% in the late 1970s—reflects substantial progress. Some of the main factors in the increase in survival rate are dramatic advances in the field of chemotherapy drugs. Although chemotherapy has become the most common cancer treatment, the costs and side effects typically associated with it are often a deterrent for patients. If these treatments could be less expensive and taxing on their bodies, patients would feel less stress, which would aid their recovery. This goal is the driving force behind a multidisciplinary research program at the **University of Connecticut**. The research team, led by **Mu-Ping Nieh**, an associate professor of chemical, materials and biomolecular engineering (CMBE), was awarded approximately \$387,000 by the National Science Foundation to conduct research that will enable them to design new self-assembled targeting nanodisc carriers that will incorporate hydrophobic (fat soluble) drugs. Nieh is partnering with **Tai-Hsi Fan** of mechanical engineering, and **Yong Wang** of CMBE. The three-year study will focus on leukemia as its disease model.

**STATION WORKING ON BED BUG KILLER.** Bed bugs. Those two words strike fear and disgust whenever they are uttered. The blood sucking parasites—brown and flat and no bigger than an apple seed—are infesting cities and towns all over the country, and Connecticut is no exception. For the past four years, **Gale Ridge**, an entomologist and head of the Insect Inquiry Office of **The Connecticut Agricultural Experiment Station** and the chairman of the **Connecticut Coalition Against Bed Bugs**, has been working to find an effective means of killing these voracious insects. “There are some insecticides that do the job,” Ridge said in a recent interview, “but only if used by trained professionals. Those available to the public are generally ineffective.” Ridge has identified a fungus which has proven “highly effective in killing bed bugs in the laboratory. Their spores enter the bed bugs’ bodies and, acting like a virus, kill them.” But she said a lot of work has to be done before the fungus can be field tested in homes and apartments, which she said she hoped would take about a year.

**CONSUMERS WARNED ABOUT COUNTERFEIT MEDICINES.** Pharmaceutical giant **Pfizer Inc.**, with research operations in Groton, is teaming up with a pharmacy standards group to warn consumers about the risks of counterfeit prescription medicines, which endanger the public and take money from both pharmacies and legitimate drugmakers. Pfizer, whose impotence drug Viagra is widely counterfeited, and the National Association of Boards of Pharmacy has announced the start of an educational campaign to explain the dangers of counterfeit drugs and help people find legitimate pharmacies online. The effort includes a website at [www.awarerx.com](http://www.awarerx.com) and a video series on a new YouTube channel called [www.youtube.com/spotfakemeds](http://www.youtube.com/spotfakemeds). Counterfeit drugs can be very dangerous, often containing toxic substances such as rat poison or lead, or they can have the wrong amount of the real drug’s active ingredient. In addition, people who buy medicines from illegal online pharmacies risk financial fraud and identity theft if they provide credit card or other personal information.

### High Technology

**CITIZEN PLANET HUNTERS DISCOVER ‘EXOPLANETS’.** Since the online citizen science project Planet Hunters launched in December 2010, 40,000 web users from around the world have been helping professional astronomers analyze the light from 150,000 stars in the hopes of discovering Earth-like planets orbiting around them. Users analyze real scientific data collected by NASA’s Kepler mission, which has been searching for planets beyond our own solar system—called “exoplanets”—since its launch in March 2009.

In a new study to be published in the *Monthly Notices of the Royal Astronomical Society*, astronomers at **Yale University** have announced the discovery of the first two potential exoplanets discovered by Planet Hunters users. “This is the first time that the public has used data from a NASA space mission to detect possible planets orbiting other stars,” said CASE member **Debra Fischer**, a Yale astronomer and exoplanet expert who helped launch Planet Hunters.

**NEW ‘EYES’ WOULD MEASURE MICROCHIP PATHWAYS.** One of the nation’s leading nanotechnology research labs will pay Middlefield technology maker **Zygo Corp.** more than \$9 million to design the next-generation of “eyes” that can measure ever-shrinking microchip pathways down to the atomic level. Zygo said its contract is with the State University of New York-Albany’s College of Nanoscale Science and Engineering, which is partnering with a nonprofit consortium of some of the world’s leading chipmakers based in the same city to come up with new extreme ultraviolet (EUV) lithography optics. Zygo is a world leader in designing and building very expensive and technical equipment used to precisely measure lengths on object surfaces or the distance between points in a spatial plane. This optics platform is to be the basis, according to Zygo officials, for a fifth-generation micro-exposure tool (MET-5) for the college’s NanoTech Complex. The MET-5, according to Zygo and industry experts, would be capable of “reading” lines smaller than 16 nanometers wide, the extremely pint-sized equivalent to a molecular string of 160 hydrogen atoms.

**RESTAURANT DINING GOES HIGH TECH.** Innovation in the restaurant industry usually involves creative new methods of food preparation. At **Treva Restaurant and Bar** in West Hartford Center, it’s the menus themselves that are breaking new ground by going high tech—an idea that could well become a national trend. It has become the first restaurant, according to proprietor and executive chef **Dorjan Puka**, to start using tablet computers (similar to iPads®) as menus for its selection of food, wine and signature cocktails. Customers can, with just the tap of a finger, see a picture of what they might order, along with information about ingredients and other details like preparation. The tablet menus are being sold and maintained by **MaxxMenus** of Stamford. Company president **Stephen Drew** says the firm has 15 restaurant groups as clients, with eight in Connecticut.



### Transportation

**AMTRAK UPGRADE GETS FEDERAL FUNDING.** Connecticut’s transportation agency says an upgrade of a six-mile stretch of Amtrak rail between Hartford and Windsor is ready to get underway now that federal authorities have formally released \$30 million for the project. The governor’s office and the **Connecticut Department of Transportation** announced in September that the funding represents the state’s share of the \$2 billion in federal transportation funding that the state of Florida rejected last spring. The funding will be used to double-track 5.8 miles of the corridor beginning just north of the **Hartford Station** and extending to the **Windsor Station**, transportation officials said. The work will also include improvements to a freight siding in the **Hartford Yard** and safety improvements at-grade crossings as far north as **Windsor Locks**. These funds will also allow for a project, planned for the spring of 2012, to install Amtrak signal cable between New Haven and Hartford, to be extended to Springfield.

— Compiled and edited by **Robert C. Pollack**



## From the National Academies *(from page 1)*

Injury Act. This legislation was intended to bolster vaccine research and development through federal coordination of vaccine initiatives, and by providing relief to vaccine manufacturers facing financial burdens. A key component of the legislation required the Department of Health and Human Services to collaborate with the Institute of Medicine to assess concerns about the safety of vaccines and potential adverse effects, especially in children.

*The Adverse Effects of Vaccines* reviews the epidemiological, clinical, and biological evidence regarding adverse health effects associated with specific vaccines covered by the Vaccine Injury Compensation Program including varicella zoster vaccine, influenza vaccines, hepatitis B vaccine, and the human papillomavirus vaccine, among others. The report reviews prior studies, summarizes their findings, and evaluates the epidemiological evidence. It finds that while no vaccine is 100% safe, very few adverse events are shown to be caused by vaccines. In addition, the evidence shows that vaccines do not cause several conditions of recent concern.

[http://www.nap.edu/catalog.php?record\\_id=13164](http://www.nap.edu/catalog.php?record_id=13164)

### ◆ 'Front of Package' Nutrition Rating Systems Studied

Over the past decade, tremendous growth has occurred in the use of symbols and rating systems designed to summarize key nutritional aspects and characteristics of food products. These symbols and the systems that underlie them have become known as front-of-package (FOP) nutrition rating systems and symbols. Though not regulated and inconsistent in format, content, and criteria, FOP systems and symbols have the potential to provide useful guidance to consumers. As a result, Congress directed the Centers for Disease Control and Prevention (CDC) to undertake a study with the Institute of Medicine (IOM) to examine and provide recommendations regarding FOP nutrition rating systems and symbols.

The study was completed in two phases. Phase I focused primarily on the nutritional criteria underlying FOP systems. Phase II builds on the results of Phase I while focusing on aspects related to consumer understanding and behavior related to the development of a standardized FOP system. This report, *Front-of-Package Nutrition Rating Systems and Symbols*, focuses on Phase II of the study and addresses the potential benefits of a single, standardized front-label food guidance system regulated by the Food and Drug Administration, assesses which icons are most effective with consumer audiences, and considers the systems/icons that best promote health and how to maximize their use.

[http://www.nap.edu/catalog.php?record\\_id=13221](http://www.nap.edu/catalog.php?record_id=13221)

### ◆ GameDesk Awarded \$225,000 Grant To Develop Science-Based Interactive Game For Classrooms

As part of its Science & Entertainment Exchange, the National Academy of Sciences will award the GameDesk Institute \$225,000 to develop its Science in Motion project, an "embodied" game that provides a learning experience that actively engages students physically and mentally in difficult science topics. Science in Motion, which its developers bill as a "textbook of the future," merges high-quality characterization, storytelling, and game design from LucasArts Entertainment with assessment-driven game-learning methodology from GameDesk to create educational geoscience games that involve students' senses, perceptions, and mind-body actions and reactions.

Since 2008, the Academy's Science & Entertainment Exchange program has connected top scientists with screenwriters, directors, and producers to craft engaging storylines rooted in sound science and more accurately portray scientists in film and television. Seeking to expand the program to similarly benefit classroom education, the Exchange held a summit on science, entertainment, and education earlier this year in Beverly Hills, CA, where leading scientists and



*Apatosaurus is popular with visitors. [Photo: Peabody Museum]*

## Yale's Peabody Museum offers world-renowned collections and interactive exhibitions

The Yale Peabody Museum collections today comprise over 12 million specimens and artifacts. Rare gems, minerals and meteorites are on view in the Hall of Minerals, Earth & Space. The Great Hall of Dinosaurs features dramatic fossil skeletons of Apatosaurus ("Brontosaurus"), Stegosaurus, and Triceratops, as well as Rudolph Zallinger's famed mural *The Age of Reptiles*. The largest dinosaur painting in the world, it documents 300 million years of Earth history.

Also on view are Egyptian mummies, prehistoric mammals, Native American artifacts and 11 stunning animal habitat dioramas. Leafcutter ants in the Discovery Room carry up to 10 times their body weight through 32 feet of tunnel! From February 11 through November 2012, the Peabody hosts *Big Food: Health, Culture and the Evolution of Eating*, an interactive exhibition addressing the neuroscience of appetite, genetics of obesity, and behavioral and cultural issues related to nutrition and exercise.

The museum was founded in 1866 by philanthropist George Peabody at the urging of his nephew O.C. Marsh, one of the great 19th century scientists and the first professor of paleontology in North America. Opened to the public in 1926, the current Museum building was designed to house the massive dinosaur skeletons collected in the American West by O.C. Marsh.

Hours are Monday through Saturday 10 to 5, Sunday noon to 5 with admission \$5-\$9. The museum is located at 170 Whitney Avenue, New Haven, CT. For more information, visit [www.peabody.yale.edu](http://www.peabody.yale.edu).

### *From the National Academies (continued)*

engineers met with creative individuals from the movie, television, and gaming industry, as well as dozens of teachers and students, to discuss new ways to use entertainment as a science learning tool. The Gordon and Betty Moore Foundation sponsored the summit and also provided funding for the new grant, intended to support projects that leverage entertainment media to improve science learning.

<http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=11012011>

Visit our web site at [www.ctcase.org](http://www.ctcase.org)

## Innovation *(from page 2)*

"If you can spark self-inquiry and 'outside-the-box thinking' through middle school and keep it ignited through high school, students will have it for life," says CASE member George "Bob" Wisner, CSF fair director and board chairman. "Some of our most innovative students continue the theme of their early science project work throughout their career."

According to UConn's Choi, there's a growing need for cost-effective technology-based education in the region. "Connecticut has seen a 25% increase in students applying to engineering schools in recent years," he said. "The need for high quality, affordable technical education is growing."

As to the change in culture, for some it involves the way we think about risk taking.

"I tell my students that I always want 'Murphy' [of Murphy's Law fame] on their team," said UConn's Bennett. "For innovation to flourish, we need to take risks. Things will go wrong and the most important skill we can teach is the ability to analyze why it happened and what it means. There is no blueprint for guaranteed success; but if we encourage curiosity and creativity, success will likely follow."

For Oregon State's Benoit-Bird, it begins with asking the right question and being flexible. "I tell my students to forget about

the limitations imposed by the tools at hand and ask them what they want to do," she said. "Sometimes people are so focused on the end goal that they don't explore a side path that might yield an innovative solution. Flexibility and process-based research are very important."

Connecticut Technology Council President & CEO Matthew Nemerson says reinvention is a key to future economic success. "Throughout our state's history, people have reinvented our economy by developing new industries," he said. "This current period of reinvention provides an opportunity to shape our identity. With a little work, Connecticut could be the Finland of North America; a place people visit to see best practices."

Rather than just touting Connecticut as the midpoint between Boston and New York, Nemerson suggests making the state relevant to these two economic hubs. "I think state leaders are on the right track," he said. "The Jackson Labs facility planned for Connecticut is a positive step. There is no reason why we can't compete with economic powerhouses like Miami, Charlotte or Atlanta. We can actively influence our state's identity."

Nerac, a company headed by UConn graduate Kevin Bouley, hosts an incubator of sorts for startup companies. "Our environment invites conversations, stimulates ideas and

mentors young talent with the expectation of creating a sustainable economic ecosystem for our state based on intellectual capital," he said.

One business in the Nerac incubator is OpenSky, a consulting company that ensures the security and availability of business IT systems. This fall, OpenSky was named Connecticut's top workplace and fastest-growing technology company by Marcum Tech Top 40 awards and the Connecticut Technology Council. "Companies like this begin with a conversation," Bouley said. "With enough conversations, we build a critical mass of intelligent, curious people who want to solve problems or create opportunities. An environment that is intellectually attractive, stimulating and challenging generates its own specific gravity and will draw people here from Berkeley, MIT and elsewhere."

It's clear that there are opportunities in this new economy. As President Barack Obama said in his State of Union address, "The future is ours to win. But to get there, we can't just stand still... Sustaining the American dream has never been about standing pat. It has required each generation to sacrifice, and struggle, and meet the demands of a new age. And now, it's our turn." — **Karen Cohen, freelance science writer and owner, The Write Stuff.**