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Connecticut Medal of Science

UConn Physicist is 2005 Recipient of State's Highest Science Award

William C. Stwalley, PhD

On September 28, Academy member William C. Stwalley, Board of Trustees Distinguished Professor and head of the University of Connecticut's (UConn) physics department and director of the UConn Laser Facility, will be awarded the Connecticut Medal of Science by Governor M. Jodi Rell at the Alliance for Connecticut Technology Innovation Day and Award Dinner. Stwalley's research has helped to pave the way for some of the most exciting developments in physics today. He has played a seminal role in the creation of a new subfield of physics that bridges atomic and molecular physics, condensed matter physics, and

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Connecticut's Business Incubators Are Critical Links to Innovation

As trade and technology become increasingly global, Connecticut is pinning some of its economic dreams on its ability to become a leading commercial innovation center that can compete in world markets. And every day, that technology marketplace is getting more crowded. As Matthew Nemerson, president and CEO of the Connecticut Technology Council puts it, "Every other state and country is chasing the same rainbow and some are throwing hundreds of millions of dollars into the effort."

What Connecticut has in its favor, said Nemerson, is a long history of innovation and productivity, a size that lets it move quickly and a technology community that's finally on the same wavelength.

One of the mechanisms that is helping Connecticut's innovation culture gain traction is the business incubator. Incubators are entrepreneurial support systems that nurture fledgling companies until they can survive and "fly" on their own. Typically, incubators provide some form of office and laboratory space, business services, and intensive mentoring. What start-up companies are looking for, in addition to facilities, said Academy member Elaine Pullen, Chair of Connecticut Innovations and the Connecticut Technology Council, is a "creative environment with like-minded people."

Nemerson sees this "social networking" as a critical piece of what incubators have to offer. "People want more than space in an office park. They want to be part of a world-class community of innovation and experimentation... yet also work around peers who can help them with intellectual property and business development issues and share things like lab equipment and databases."

In Connecticut, there are currently six business incubators. They come in various models, each with its own approach to raising a high-growth newborn and its own way of fostering those critical linkages. This article will briefly examine three of them.

Technology Incubation Program (TIP)

The University of Connecticut's (UConn) Technology Incubation Program (TIP) was founded in 2002 as part of the Office of Technology Commercialization. Its Advanced Technology Laboratory is located in the impressive high-tech BioScience Complex, with additional space on

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News from the National Academies

The following is excerpted from press releases of the National Academies and from *Infocus Magazine,* a news resource of the National Academies, which can be found online at www.infocusmagazine.org.

◆ Assessing Safety and Security of Spent Nuclear Fuel Storage in US

Responding to concerns that spent nuclear fuel rods could potentially be used to make "dirty bombs" or that the cooling pools in which these rods are stored at US nuclear plants could become targets for terrorists, Congress last year asked the National Academies to convene a group of experts to examine the safety and security of spent nuclear fuel stored at the nation's commercial nuclear power plants. The committee's consensus report was delivered in classified form last year to Congress, the US Nuclear Regulatory Commission (USNRC), and the US Department of Homeland Security. A public version of the report was released in April 2005.

The report found that while the cooling pools at some plants are potentially at risk from a terrorist attack, given existing plant security measures, the likelihood that terrorists could steal enough spent fuel to use in a nuclear dispersal device is small.

The most significant threat from a terrorist attack is the potential for breaching the cooling pools themselves, the report said, noting that an attack that partially or completely drains a cooling pool could have severe consequences, including the initiation of a high-temperature fire in the fuel's zirconium cladding. The report recommends that two immediate steps be taken to reduce the chances and consequences of such fires: repositioning fuel rods in the pools to more evenly distribute heat loads from radioactive decay and installing water-spray systems to cool the fuel in the event of a coolant loss.

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Incubators (continued from page 1)

UConn's Farmington and Avery Point campuses. Because UConn is a public research university, TIP is able to provide] unique access to research faculty and specialized facilities. "There are so many people with expertise," said Executive Director Rita Zangari, "who are willing to help – faculty who are excited to have industry partners, business consultants who provide low cost or no cost services and technology organizations that offer networking support."

Institute of Technology and Business Development (ITBD)

At Central Connecticut State College (CCSU) in New Britain, there's the Institute of Technology and Business Development (ITBD), founded in 1993, where 18 incubator companies occupy 25,000 of the available 35,000 square feet. Managing Director Richard Mullins introduced the highly structured Lifecycle collaboration process that includes mandatory meetings where participating companies report on progress, network with local chambers of commerce and listen to speakers on topics like Internet marketing and branding.

Innovation Center – Connecticut Center for Advanced Technology (CCAT)

"Think Route 128 or Silicon Valley," said Executive Director Guy Hatch about CCAT's Innovation Center, a relatively new incubator in neatly renovated labs and office space, bordering the part of Rentschler Field in East Hartford designated as a campus for science and technology that adjoins Pratt & Whitney and the United Technologies Research Center (UTRC). The vision is to gather companies around certain technologies and create a hothouse atmosphere that will foster growth. After a capabilities study, CCAT identified lasers, photonics, nanotechnology, fuel cells, medical devices and next generation manufacturing as likely growth industries. The Center works with small technology companies but also with industrial research spinoffs, helping more established companies make contact with smaller companies when there is synergy.

A Network of Incubators

"Although there may be some overlap between incubators," said Hatch, "we collaborate more than compete. Growing our economy and technology job sector requires that we all work together." That happens monthly during meetings of the Connecticut Business Incubator Network (CBIN), where the incubators just mentioned and a few others "share best practices." Companies are even referred to another incubator, said Hatch, if it's a better fit.

Because the goals are ambitious, incubators are selective about the companies they admit and insistent on sound business practices. "Companies must have a business plan," said Hatch. "We aren't turnaround artists." He said they look for a great idea and motivated leadership with enough money to cover basic obligations.

In addition to a business plan, ITBD also requires an applicant to provide proof of liability insurance, a balance sheet and a willingness to sign a one-year lease.

After first demonstrating their commercial potential for acceptance into the program, TIP companies have two years to come up with a full business plan. They are encouraged to seek assistance from TIP business specialists. Victor Stancovski, president and chief technical officer of Catelectic, says he has already used two consultants "to help his tiny little company run in the real world."

"But not all companies need that kind of help," said Zangari. For example, MAKScientific has a seasoned CEO who has already started many successful companies. They're here, she explained, because they have UConn intellectual property and it makes sense for them to commercialize it from a campus that offers both human and technical support.

In fact, for a company to be admitted to the TIP, there must be a UConn connection, and while homegrown UConn technology is a common denominator, it's not a requirement. But "there needs to be a reason they're on campus," said Zangari. "The arrangement has to be mutually beneficial. Our companies have access to state-of-the-art research and resources and we have access to student internships and collaboration opportunities for faculty."

Financial Arrangements

Because CCSU is not a research institution, ITBD does not deal with intellectual property nor take equity in any of its companies ITBD manages to be self-supporting, by charging fees for additional services like the Conference or Business Resource Centers.

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Business & Industry

FERTILE GROUND FOR STEM CELL RESEARCH. Connecticut **Governor Jodi Rell** has signed legislation that explicitly endorses and funds the use of human embryonic cells in research. This means that scientists in Connecticut can plan research programs that are illegal in other states. The state's 10-year, $100 million commitment will provide a safe haven to conduct stem cell research and will allow **Yale** to attract a director for its planned research program, said Academy member **Robert Alpern**, dean of the **Yale School of Medicine.**

MONEY FLOWS FOR TECHNOLOGY CENTER. State legislators have approved $1 million for a technology center, the cornerstone of a $2 billion proposal to develop the former **Rentschler Airfield** in East Hartford. The $1 million represents the first funding approved by the legislature for the **Connecticut Center for Advanced Technology (CCAT)**. CCAT, an East Hartford-based organization, wants to build a **National Center for Aerospace Leadership** at Rentschler and is in line to receive a $21 million federal appropriation.

SIKORSKY ONCE AGAIN FLYING HIGH. Stratford-based **Sikorsky Aircraft** recently announced that Offshore Logistics Inc. has bought 35 S-76 helicopters. Offshore Logistics, of Lafayette, LA, the world's leading provider of helicopter transportation to the oil and gas industry, also acquired options to buy 24 additional Sikorsky S-76 helicopters. Terms of the deal, which was announced at the Paris Air Show, were not disclosed. The latest order comes on top of a 2003 purchase of a dozen S-76 helicopters by Offshore Logistics.

UNCONTROLLED SPENDING MAY BE JUST MONKEY BUSINESS. The basic economic theory that people work harder to avoid losing money than they do to make money is shared by monkeys, suggesting this trait has a long evolutionary history, according to a **Yale University** study. This phenomenon, known as "loss aversion," refers to the tendency for people to strongly prefer avoiding losses to acquiring gains. "A large body of studies suggest that losses are more than twice as psychologically powerful as gains," said author **M. Keith Chen**, assistant professor at **Yale School of Management**. In this study, conducted with **Venkat Lakshminaryanan** and **Laurie Santos,** both of Yale's psychology department, tufted capuchin monkeys were given small disks to trade for rewards — apples, grapes or gelatin cubes. "The goal of this work," said Santos, "is to learn whether other animals share some of our basic economic decision processes or whether human economic behavior is unique to our own species."

Communication

POSSIBLE GENETIC BASIS FOR AUTISM. Evidence supporting a controversial theory on the genetic origin of autism — an imprinted gene on the paternal X chromosome in mice — has been uncovered by **Michael J. O'Neill**, assistant professor of molecular and cell biology at the **University of Connecticut.** This basic research may have applications in diagnosing autism. If researchers find that the human X chromosome also has imprinted genes, it may be possible to determine whether a person carries a gene that is predisposed to autism. This could eventually lead to earlier diagnosis and treatment of the developmental disorder.

CELL PHONE LAW MAY NOT HELP MUCH. A new Connecticut law limiting drivers to hands-free cell phones won't make the roads any safer, according to a report issued by the Insurance Institute for Highway Safety. Whether drivers use hands-free or hands-held cell phones, they are still four times more likely to end up with injuries serious enough to warrant hospitalization. **State Rep. Richard Roy**, who was instrumental in implementing the ban, said he was not surprised by the results of the study. "My preference would be to ban all use except for emergencies," said Roy. The new law takes effect October 1, 2005.

MASTER'S DEGREE IN HOMELAND SECURITY. The **University of Connecticut (UConn)**, in partnership with the Naval Postgraduate School in Monterey, California, will offer a new master's degree in homeland security this fall, and expects to accept a class of 25 from a pool of 70 applicants. "Business and industry are looking for a curriculum that prepares students for the same kinds of things government employees are being trained for," said **Krista Rodin**, dean of **UConn's College of Continuing Studies.** The unique program is aimed at working adults in both the public and private sector. Students will learn how to respond to disasters such as outbreaks of diseases or terrorist attacks that endanger food supplies.

TV IS BAD FOR THE ELDERLY TOO. The more seniors watch television, the greater their negative images of aging may be, but maintaining a diary of viewing impressions increased their awareness of the negative stereotyping on television, researchers at **Yale** report in the *Journal of Social Issues*. "These findings suggest that the promotion of awareness could provide a means of helping elders confront ageism," said lead author **Becca Levy,** associate professor in the **Department of Epidemiology and Public Health** at **Yale School of Medicine** and the department of psychology.

Education & Cognition

BUDDING SCIENTISTS IN THE LAB. A group of New Haven teenagers learned how to do serious science at **Yale University** this summer, through the SCHOLAR (Science Collaborative Hands-On Learning and Research) program, an intensive residential summer academy. SCHOLAR exposes 40-50 students from **New Haven's Hill Regional Career High School** to an environment that emphasizes discovery, critical thinking and problem solving. Most students admitted to the program attend for three successive summers, beginning after their freshman year. They live on campus during the week and study in Yale's libraries and laboratories.

LEARNING CAN BE A CRIME. The growing interest in forensic science, sparked by such TV shows as "CSI: Crime Scene Investigation," has led several teachers to participate in a forensic science workshop at the **University of Connecticut (UConn)**. During the four-day program, teachers learn how to use crime scene investigation techniques and exercises they can then take back to their classrooms. The course, funded in part by **Bio-Rad Laboratories** and taught by **Greg Hampikain**, a UConn PhD

Items that appear in the In Brief section are compiled from previously published sources including newspaper accounts and press releases. For more information about any In Brief item, please call the Academy at (860) 527-2161, write the editors at 179 Allyn St., Suite 512, Hartford, CT 06103-1422, or email us at acad@ctcase.org

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graduate, was offered through the **Center for Applied Genetics and Technology** at UConn, reports **Linda Strasbaugh**, director of the center. "We're using the natural attraction to crime scenes to interest students in science and math," said Strasbaugh.

PRESCHOOL SCREENING PROGRAM HIGHLY EFFECTIVE. A pilot program to screen preschool children for vision and hearing problems demonstrated an effective method for early detection of health problems that influence children's development and learning, according to a study by **Yale School of Nursing** faculty. The program was developed in collaboration with the **New Haven Board of Education** to help close the gap between services delivered and program requirements of the **Connecticut State School Readiness Initiative**, which mandates evidence of preschool hearing and vision screening. Assistant professor **Linda Pellico** said the pilot program was a good example of Yale School of Nursing benefiting the New Haven community. "This project represented an opportunity for nursing students to identify unmet health care needs, to plan and implement preventive health care services, and to know their community," she said.

SUMMER BREAK SPENT IN A LAB. For the past three summers, while his classmates enjoy summer break off the campus, **Trinity College** student **Joseph Wzorek** is working away in a chemistry laboratory, doing research usually reserved for graduate students. Studying methods for creating synthetic molecules, Joseph will have completed the equivalent of most master's degrees, according to **Thomas Mitzel,** Joe's advisor. Wzorek is one of about eighty students participating in the summer program in fields including biology, physics and engineering. Over the past decade, academic organizations such as the National Science Foundation and the National Research Council have urged colleges to encourage undergraduates to do basic research.

Energy

A "GREEN" PRODUCE AISLE? UTC Power, a division of **United Technologies Corporation**, announced the official unveiling of the first US supermarket installation of the PureComfort™ 240M combined cooling heating and power system. In a ribbon-cutting ceremony recently at the A&P fresh store in Mount Kisco, NY, government officials celebrated the installation of this 240-kilowatt system designed to provide highly efficient and clean electricity, cooling and heating for the store. The UTC power system uses conventional fuels, but has conversion efficiencies of 80% or more with 40% lower CO_2 and 90% lower NO emissions. It also captures exhaust heat to provide additional heating and cooling. Chuck McCutchan, president of the A&P banner group, said, "We … are proud to serve our community by employing this excellent technology to make more efficient use of energy, and to protect the environment by minimizing emissions."

Environment

WEST NILE VIRUS LINKED TO ROBINS. As West Nile virus makes an appearance for the seventh year, officials have identified the primary carriers of the disease. The American robin and a mosquito found in salt marshes appear to be the main culprits in the transmission of West Nile, not crows as once thought, according to Academy member **Theodore Andreadis,** chief medical entomologist of **The Connecticut Agricultural Experiment Station**. DNA analysis of the stomach blood of 300 mosquitoes indicate that only 1% had fed on the blood of crows, while 40% had fed on robins. Andreadis said that conditions this year are good for the spread of the virus, which usually peaks in late August.

BIOBLITZ HITS EAST HARTFORD. On an early summer day in June, over 170 scientists identified 1,791 species of plants and animals in a 2.5 mile radius surrounding an **East Hartford** school. The annual Connecticut BioBlitz is a spot check of local fauna and flora in a defined area organized by the **Connecticut Museum of Natural History** at the **University of Connecticut**, says **David Wagner**, a professor in the department of ecology and evolutionary biology and an organizer of the event. "It's a lightning strike in terms of coming into a park and finding as many species in 24 hours as possible," comments Wagner. BioBlitz, in its sixth year, helps to highlight the ecological diversity that may be found in a variety of urban habitats.

COURTSHIP SONG. In the courtship dance of a male South American bird, the Club-winged Manakin, *Machaeropterus deliciosus*, rubbing and vibrating specialized wing feathers together creates a courting melody to attract their mates, according to a report in *Science*. **Richard O. Prum,** the **William Robertson Coe Professor of Ecology and Evolutionary Biology** at **Yale**, and his former student, **Kimberly S. Bostwick**, describe a mechanism unique among vertebrates that supports this theory. "We ruled out a lot of hypotheses" said Bostwick, "but when I realized that the wing feathers were twisted in a way that forced them to rub, I knew we had something. The extensive modification of feathers in these unusual structures implies a high degree of selective evolutionary pressure," said Prum.

DEEP SEA ALGAE TELL A STORY. Assistant professor **Mark Pagani** in the department of geology and geophysics at **Yale University** mapped the first detailed history of atmospheric carbon dioxide between 45–25 million years ago based on stable isotopes of carbon in a study sponsored by the National Science Foundation. The findings were based on calibration of carbon-containing compounds produced by ancient sea surface algae that were recently isolated in deep sea drill cores. Intriguing evidence was found that a sharp drop in carbon dioxide level, between 33–25 million years ago, prompted the origin of economically important land plants that are sensitive to atmospheric carbon dioxide levels, such as corn and sugarcane.

RECYCLER SEES THE LIGHT. Raymond Graczyk and **Robert E. Roberts** began crushing used fluorescent light tubes nine years ago and have disposed of nearly 25 million tubes in that time. Partners in **Northeast Lamp Recycling Inc.,** they are responsible for keeping more than 1,700 pounds of mercury out of the environment, as well as other toxic materials found in the lights. It is the only company licensed by the state **Department of Environmental Protection** to recycle the tubes, required by law of all companies and non-profit organizations in the state. The company is also expanding into recycling of other "e-wastes" such as computer equipment and batteries.

STOPPING THE INVASION. The **Scantic Riparian Area**, a wetland in **Somers** surrounding the Scantic River, is infested with the invasive plant purple loosestrife. It is hoped that a beetle known as Galerucella will help to control the species by gorging itself on the leaves and stems of the plant, according to **Jerry Stage**. Stage, a member of the **Northern Connecticut Land Trust**, was one of several volunteers who released the bug in the Riparian Area. "Using a bio-control is the best way to do things, if we have a choice." said Stage.

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THE ENVIRONMENTAL IMPACT OF CONSUMPTION. The connection between consumption and environmental impact is analyzed in new and important ways in a special issue of **Yale's** *Journal of Industrial Ecology*. Articles analyze the environmental impact of consumption and US house size, diet change, work time reduction, time use, product life spans and the quality of life. "This special issue demonstrates the power of industrial ecology," says R**eid Lifset**, editor-in-chief of the publication. Articles consider the strategies advocacy groups use to influence global production and consumption, and explore the role of the "rebound effect" — the possibility that reduced purchase of one set of products can, by saving the consumer money, lead to increased consumption of other goods and services with their attendant environmental effects.

TIGER MOTH, HEAL THYSELF. Research scientists at **Wesleyan University** have found that when the tiger moth caterpillar catches a cold, it develops a taste for toxin-containing plants to kill the infecting organisms. Finding an organism that seeks cures by changing its physiology was a total surprise, according to **Michael Singer,** an assistant professor of biology. The reason for the change in eating habits lies in the caterpillars' taste buds. "Its like if you got sick and penicillin started to taste good," says colleague Elizabeth Bernays, an entomologist at the University of Arizona.

UPWARD MOBILITY FOR FISH. Migratory fish such as herring and salmon are making a comeback in Connecticut, thanks to the help of a simple device, the fish ladder. New England's textile mills blocked the state's rivers to anadromous fish over 175 years ago, as companies dammed the rivers to power their industry. Now, the fish are returning, thanks to the installation of fish ladders on several key waterways around the state. "We are restoring a missing link here," said **Edward Parker**, natural resources bureau chief for the **Department of Environmental Protection**. "The fish supported other forms of life. There are other links that will take place. Everything is interconnected."

Food & Agriculture

PROGRAMMED CELL DEATH PREVENTS INFECTION. Researchers at **Yale** have identified a gene that regulates the major immune response in plants: programmed cell death (PCD). To protect themselves from viruses, plants create a zone of dead cells around an infection site that prevents the infection from spreading. **Savithramma Dinesh-Kumar**, associate professor of molecular, cellular and developmental biology at Yale, discovered how the plants keep from killing themselves after they turn on the cell-suicide PCD process. PCD has been described in virtually all cell types and is an important aspect of many biological processes including immune system function, embryonic development and elimination of defective cells. Failure of PCD can result in devastating diseases such as cancer, Alzheimer's and AIDS.

SHAD RUN. Numbers of American shad migrating up the **Connecticut River** to spawn this past spring plummeted, with the run likely to be the smallest in three decades. The number of shad counted at a fish passageway at the Holyoke Dam totaled only 109,596, the smallest number since at least 1976, when improvements were made at the dam and modern record keeping began. A count of several hundred thousand fish has been more typical over the years. The cause of the decline is not known for certain, and because shad spend much of their lives at sea, many factors could be involved. But some biologists strongly suspect that predation by striped bass is taking a big toll.

THE "COPPERTONE" GENE IN PLANTS. Plants rely on sunlight as the sole source of energy for assimilation of carbon dioxide (photosynthesis) that ultimately drives growth and fruit or grain production. But excess light energy can spillover into the formation of harmful molecules that actively oxidize plant constituents. Agricultural scientist **Richard Peterson** of the **Department of Biochemistry and Genetics** of **The Connecticut Agricultural Experiment Station** in **New Haven** is studying a rapidly switched process that leaves use to shunt excess light energy into production of harmless heat. The psbS gene of the leaf cell nucleus encodes a small, pigment-binding protein that is essential to this photoprotective process, referred to commonly as "nonphotochemical quenching." A futuristic, practical benefit to agriculture might involve genetic engineering of greater resistance to such episodes of environmental stress as drought by increasing the level of the psbS gene. The genetically elevated expression of the gene would provide protection from light when photosynthesis is depressed by stress. Logically, this would limit permanent photooxidative damage and enable a faster resumption of growth once the stress was relieved.

Health

CHANEL #5 FOR MOSQUITOES. A five-year, $8.5-million dollar research project, designed to substantially reduce the spread of malaria by redirecting mosquitoes with odor cues, is being undertaken by an international team of scientists including **John Carlson, Eugene Higgins Professor of Molecular, Cellular, and Developmental Biology** at **Yale**. The specific aim of the project is to reduce the population of malaria transmitting mosquitoes by identifying effective "perfumes" that act as attractants to traps or as mosquito repellents. Scientists at Yale and Vanderbilt University will identify odors that act on mosquito receptors and create the "perfumes," and Dutch researchers will study the mosquito behaviors that the odors elicit.

FLU VACCINE CULTURED IN INSECT CELLS. Meriden-based **Protein Sciences Corp.**, has developed a flu vaccine that shows promising results in preliminary trials. The vaccine, FluB10k, is produced in insect cells and therefore can be manufactured much more quickly than vaccines grown in chicken eggs, which require a live virus. Meetings with officials of the US Food and Drug Administration are planned to discuss the approval of the vaccine for public distribution.

GERBER FOUNDATION AWARDS $1 MILLION. A **Yale School of Medicine** study on necrotizing enterocolitis (NEC) is being funded by a $1 million grant from the Gerber Foundation, established in 1952 by the founder of Gerber Baby Products. NEC is an acute intestinal condition occurring in premature and low birth weight infants. It is the most common surgical emergency in babies and the most common gastrointestinal cause of death in babies. The grant is to the **Elizabeth Glaser Pediatric Research Foundation** to fund creation of a surgical database to look at causes of progression in this disease. Yale pediatric surgeon **R. Lawrence Moss** is surgical director of the foundation and principal investigator of the study. The goal of the database is to determine risk factors for intestinal perforation or death; the relationship between feeding practices and the progression of NEC; current practice patterns of antibiotic therapy and its impact on disease progression; and disease and patient specific factors that predict long term nutritional deficiency and gastroenterological disease.

QUENCHING A HYDRATION RESEARCHER'S THIRST. This past summer saw temperatures blazing near 100°F., putting chills in

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the spine of **University of Connecticut** hydration researcher, **Doug Casa**. Casa has spent the past three summers studying the hydration patterns of teenage athletes attending sports camps. Studies have shown that, despite awareness of the dangers of dehydration and exhortations by coaches to drink frequently, up to 75% of young athletes show signs of serious dehydration. Casa hopes to address this issue by developing methods for precisely determining the rate of water loss for individual athletes, and educating them as to the need for staying adequately hydrated.

SHAKE, RATTLE AND ROLL ON THE HOME PLANET. Oscillations begun by the Sumatra-Andaman earthquake in December 2004 are providing important information about the composition of the Earth as well as the size and duration of the earthquake, according to a report in the journal *Science* by an international group of scientists led by **Jeffrey J. Park** of the **Department of Geology and Geophysics** at **Yale University.** "Just like thumping a watermelon to hear if it is ripe, after a big earthquake thumps our planet we measure the natural tones from seismograms to detect properties of Earth's deep mantle and core," said Park. "The Sumatra-Andaman earthquake produced the best documentation of Earth's free oscillations ever recorded."

SHEDDING THE LASER LIGHT ON PROSTATE DISEASE. A new laser-based procedure may provide an alternative to traditional surgery for those patients suffering from a common male malady of age, an enlarged prostate. "Our goal is to make the patients better, and this definitely has advantages for the patient" says **Michael Flanagan**, a **Waterbury Hospital** urologist who pioneered the use of the KTP laser more than a year ago. Traditional surgical techniques can successfully reduce the size of an enlarged prostate, typically requiring a 2-3 day hospital stay. The laser technique, with its increased precision, allows most patients to go home the same day.

STRATEGY FOR ANTI-SMOKING CAMPAIGN TARGETS WOMEN. The tobacco industry's campaign to attract new generations of smokers, particularly women, provides insight for anti-smoking campaigns, according to a study by researchers at **Yale School of Medicine** and the University of California at San Francisco (UCSF). **Benjamin Toll**, associate research scientist at Yale, said women aged 18 to 24 are exceptionally valuable to the tobacco industry. "The tobacco industry does a lot of research to figure out what young women want to be like. Then they portray this image in their advertisements to encourage women to smoke their cigarettes," Toll said. "A better understanding of this strategy will ideally allow tobacco control efforts to anticipate the tobacco industry, rather than only reacting in response to its activities."

High Technology

INTERNET ON THE RAILS. Metro-North plans to offer wireless Internet service on its **New Haven** line, but not until new rail cars are put into service in early 2008. The Internet service will not be free, however. Under one scenario, Metro-North would charge a wireless company for access to its trains and right-of-ways, and the company would charge the customer directly for ability to log on, in the range of $40-$50 per month. This will not only generate revenue, but improve service by automatically sending data from trains to stations, says Metro-North president **Peter Cannito**.

MICROARRAY CENTER TO BE ESTABLISHED. Yale School of Medicine is the recipient of a $6.5 million grant from the National Institutes of Health (NIH) to establish a microarray center for research on the nervous system. The Yale center is a new addition to the NIH Neuroscience Microarray Consortium supported by the NIH Neuroscience Blueprint Institutes. About 10,000 NIH-funded neuroscientists will be able to further their research through the use of microarray technology that is now sufficiently powerful to simultaneously interrogate the relative level of expression of virtually all of the more than 30,000 genes that are thought to be contained within the human genome.

"BEAM ME UP, SCOTTY"

James Doohan, who played the charming and enigmatic engineer on the original "Star Trek" TV series and movies, and who inspired the catchphrase "Beam me up, Scotty," left behind one final wish when he died — to return to space. Doohan's ashes will join those of buddy and series creator, Gene Roddenberry, later this year when they are placed aboard a rocket to be launched by Space Services Inc., which specializes in space memorials.

SENSORS UNLIKELY TO PROTECT AGAINST SUICIDE BOMBERS. Sensors to detect suicide bombers before they can reach a target and detonate explosives would not substantially reduce deaths and injuries in urban settings, **Yale** researchers report. "Widespread deployment of suicide bomber detectors would at best save a few lives," said Yale professor and Academy member **Edward H. Kaplan**, who co-authored the study with Moshe Kress. "A more promising strategy is to invest available resources in gathering intelligence to intercept suicide bombers before they attack." In a previous study, Kaplan found that the most successful countertactic employed by Israel in combating suicide bombings was intelligence-driven arrests of terror operatives and suspects.

Transportation

PARDON ME BOY, IS THAT THE CHATTANOOGA CHOOCHOO? Commuters on **Metro-North** trains are discovering some changes as the result of a $155 million program to repair and modernize the equipment. According to **David Carrano**, deputy director of the renovation program for the **Connecticut Department of Transportation**, passenger cars rarely need a full-blown overhaul. More often, the work involves locating and replacing worn components, checking the propulsion system, and updating the alternator that provides electric service to the cars. Amenities such as restrooms will be modernized as well.

TEENAGE DRIVERS MORE ACCIDENT-PRONE AT NIGHT. According to a study released by the **University of Connecticut School of Engineering,** teenage drivers are more likely to be in accidents at night. The study shows that automobile operators aged 16 to 20 were 66% more likely to be involved in single-vehicle crashes at night than they were overall. These accidents occur more often on local than state roads and highways, and more often in vehicles with multiple passengers, reports **Lisa Aultman-Hall,** director of the **Connecticut Transportation Institute**. The state is considering additional restrictions on young drivers, including a ban on driving from midnight to 5 am.

— Compiled and edited by Robert Vieth

From the National Academies (from page 1)

The committee noted that the potential risks depend on plant design, and urged the USNRC to promptly undertake plant-by-plant vulnerability analyses to determine which plants are at highest risk. The report also recommends that the USNRC improve the sharing of pertinent information from its analyses with nuclear power plant operators and commercial vendors.

[http://www.nap.edu/books/0309096472/html/]

◆ Report Offers Guidelines for Stem Cell Research

A new report from the National Academies provides guidelines for research involving human embryonic stem cells, and says that a standard set of requirements for obtaining, storing, distributing, and using embryonic stem cell lines — one embraced by the entire US scientific community — is the most responsible means to achieve advances in this area. Previously, the National Academies have recommended that both adult and embryonic stem cell research should go forward, including research using a lab technique called nuclear transfer to derive stem cells, but that human reproductive cloning should not be attempted. In view of current restrictions on federal involvement in human embryonic stem cell research, the scientific community needs guidelines to ensure that the work is conducted responsibly.

The report offers guidelines for procedures to monitor scientific investigations involving human embryonic stem cells at all institutions conducting such work. Practices for obtaining donated eggs, sperm, or blastocysts should meet the highest ethical and scientific standards, the guidelines stress. In addition, the report offers guidelines for use of animal embryonic stem cells, including nonhuman primates. The report also recommends the creation of an independent body to periodically review the guidelines, taking into account advances in stem cell science as well as evolving public attitudes.

[http://www.nap.edu/books/0309096537/html/]

◆ Examining the Science of Oil Spill Dispersants

In 1989, the National Research Council recommended that chemical dispersants be considered as a first response option to oil spills. But continued difficulty in quickly mobilizing oil dispersal prompted the US Coast Guard recently to require that more equipment and personnel be on hand to apply dispersants to spills in a timely manner.

The use of dispersants is generally approved for spills at least five kilometers from shore and in water at least 10 meters deep, where dispersed oil's impact on marine life is likely to be low. But now that dispersal equipment will be more readily available, officials are wondering whether these agents should be used in nearshore, shallow waters, where most oils spills in the United States occur but also where much less is known about how even small droplets of oil affect the sea life and plants living there. The Research Council was again called upon to examine the current state of science surrounding the use of dispersants as a response to oil spills, particularly nearshore ones.

To be effective, dispersants must be used quickly — within 12 to 48 hours after a spill, according to the committee that wrote the new report — before fluctuations in water temperature change the oil's viscosity, possibly turning it into a semi-solid that cannot be dispersed. The decision to use dispersants, the report notes, is a trade-off between decreasing the risk to organisms that thrive on the water's surface and coastline, and possibly increasing the risk to fish populations, sea grasses and coral reefs, and creatures that live on the seafloor. Better information is needed to decide whether to make that trade-off, but with limited funding available for research, the report recommends that federal and state agencies, along with industry and international partners, establish an integrated research plan focused on experiments to support decisions about when and where to use dispersants.

[http://www.nap.edu/books/030909562X/html/]

◆ National Academies Launch Evolution Resource Site

The National Academies have designed a new Web page (http://www.national-academies.org/evolution) to allow easy access to books, position statements, and additional resources on evolution education and research. The National Academies have long supported the position that evolution should be taught as a central element in any science education program. Currently there are challenges to the teaching of evolution in some 40 states or local school districts.

[http://www.nationalacademies.org/morenews/20050613.html]

Medal (from page 1)

Connecticut Medal of Science

the evolving field of nanoscience. His research has focused on the determination of the forces of interaction between two atoms as a function of the distance between the two atoms. Traditionally, rough estimates of such forces determine whether a given substance will be a gas, a liquid or a solid at a given temperature. However, at sufficiently low temperature, some substances behave differently, becoming exotic, nontraditional substances, for example, superfluids, Bose-Einstein condensates (BECs), and degenerate Fermi gases. This exotic behavior can be explained and predicted by the quantum or wave-like behavior of the interacting particles, but only if the forces are precisely, rather than only roughly, known. Such exotic substances represent one of the most important frontiers in physics and nanoscience. In fact, the 2001 Nobel Prize for Physics was awarded for the achievement of BEC.

Forces of interaction between two atoms can be estimated in a variety of ways, but by far the most precise way involves high resolution laser spectroscopy. Stwalley has pioneered the development of precise laser spectroscopic techniques for accurately determining such forces. These determinations allow one to predict, for example, that one isotope of potassium would form a stable BEC (as was subsequently observed) while a second isotope would not.

Stwalley has an extraordinary record of sustained achievement in his own research and in his encouragement and support of fellow scientists. The ultracold-research group at UCONN, which Professor Stwalley leads, is one of the largest anywhere and has an established international reputation for excellence. The study of ultracold matter is one of the frontiers of physics today and its potential impacts range from fundamental science to important new applications such as quantum computing and improved clocks, interferometers and gyroscopes. Professor Stwalley has edited 6 books, published over 300 articles, and holds 6 patents.

He is a Fellow of the American Physical Society and the Optical Society of America, and a member of the Connecticut Academy of Science and Engineering. Among his awards are the William F. Meggers Award of the Optical Society of America for outstanding work in spectroscopy, and the Chancellor's Research Excellence Award at UConn. He has been invited to lecture in over two dozen countries.

Incubators (continued from page 2)

TIP, on the other hand, gets support from UConn, in addition to the monthly fees paid by the companies. When UConn intellectual property becomes the basis of a new company, there's a licensing and revenue sharing arrangement between the company, UConn and the inventor.

At CCAT's Innovation Center, tenants pay the lease. They are all independent entities, said Hatch, and CCAT claims no rights to anything produced. "From a landlord's point of view," he said, "it's the absolute worst value proposition. We bring in tenants who can't pay their bills and as soon as they get successful, we kick them out."

Graduation and Beyond

The right time to kick them out depends on the incubator. ITBD, which has had the most graduates, has settled on a five-year time timeframe. "It works for us," said Mullins, "because we're mixed use," and have multiple kinds of businesses growing at very different rates.

Both UConn and CCAT have opted for a three-year plan. Said Hatch, "In three years a technology start-up should have either outgrown the incubator space or conversely become stagnant or gone into a decline." Said Zangari about TIP, "Of course, the ideal is after three years they don't need us, but the reality is there may be something that happens where they need to renew. If there's a good reason, we'll let them."

After graduation, said Nemerson, we want to have the right atmosphere so the good companies don't leave the state. A lot will depend on the nature of the business and whether it makes sense for them to stay. "Most of the companies that graduate will have global mindsets about their customer base," he said, "but we hope their employees will be homegrown and their supply chain local."

An expanded version of this article is available on our website at www.ctcase.org/bulletin/20_3/incubators.html

Parting Thoughts

Everyone agrees significant progress has been made. "But", said Zangari, "we also have to keep an eye on the competition coming up behind us." Other states, she said, have put a lot of effort and money into attracting new business activity.

What the state needs, said Nemerson, is more participation by government in getting businesses going and better access to capital. He also thinks Connecticut needs a culture of wealthy entrepreneurs (angel funders) who will write big checks.

Hatch agrees. He would like Connecticut to "have a seed fund, like other states, that would help get a small company through the GAP," from a quarter of a million (usually what friends and family can come up with) to about three million, when venture capitalists are willing to invest in it.

In the meantime, government has taken some positive steps. In the last session, the General Assembly passed legislation creating a new opportunities fund [Public Act 05-129}, essentially a financial resource that will provide investment opportunities in seed stage and emerging growth technology-based companies. In addition, new legislation [Public Act 05-165} requires the state's economic agencies to submit a plan by January 2006 for supporting technology transfer efforts. "It would create additional services and programs," said Zangari, "for academics and businesses to support commercialization."

Mullins suggests that Connecticut needs "more marketing as a state that grows businesses" but says the state's incubation process "is healthy and on the rise." ***— Barbara Standke is a freelance writer based in Chester, CT***

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