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Yale's Thomas Steitz Awarded Nobel Prize in Chemistry for Ribosome Research

Most people would probably agree that when the phone rings in the middle of the night, it is rarely good news. For Thomas A. Steitz; however, it was the call of a lifetime. On the other end of the telephone was the secretary of the Nobel committee of the Royal Swedish Academy of Sciences in Stockholm, Sweden. His message? Steitz was one of three winners of the 2009 Nobel Prize in Chemistry. In December, he traveled to Sweden for two weeks of ceremonies that included lectures and the formal presentation of the medal. "It was a wonderful experience," he said, noting that he was amazed by the level of notoriety afforded the recipients. "People were waiting outside the hotel to get my autograph—that's never happened before."

Steitz, the Sterling Professor of Molecular Biophysics and Biochemistry and a Howard Hughes Medical Institute Investigator at Yale University, shares the Nobel Prize with two other chemists who have carried out similar research: Venkatraman Ramakrishnan of MRC Laboratory of Molecular Biology in the United Kingdom and Ada E. Yonath of the Weizmann Institute of Science in Israel. A member of the Connecticut Academy of Science & Engineering (CASE), Steitz will share his research and his Nobel experience at the 2010 CASE Annual Meeting in May.

Working separately, the three Nobel Laureates mapped the structure of ribosomes at the atomic level and documented their role in translating DNA information into life. Using a method called X-ray crystallography, they mapped the position of each of the hundreds of thousands of atoms that comprise the ribosome.

(Steitz, page 2)



"Some of the key team players in the ribosome project are shown enjoying a reception given by the Nobel Foundation at the Nordic Museum, Stockholm, on December 9, 2009. Left to right: Poul Nissen, Thomas Steitz, Peggy Eatherton, Peter Moore, Nenad Ban, Martin Schmeing and Jeff Hansen. Peter is my long time faculty colleague, friend and collaborator on the ribosome project. Poul and Nenad are former postdocs in the lab who were the ones primarily responsible for determining the structure of the 50S subunit. Jeff is a former postdoc whose major contributions included the structure of antibiotic and substrate intermediate analogue complexes with the 50S subunit. Martin is a former graduate student whose many structures of substrate analogue complexes that were captured in the various steps of catalysis allowed him to make a movie of peptide bond formation on the 50S subunit. Peggy has been my administrative assistant for 25 years and has been an enabling facilitator, memory chip and coordinator of lab personnel."

[Photo and caption courtesy of Thomas Steitz]

News from the National Academies

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

◆ Protecting a Critical Resource

The US Environmental Protection Agency estimates more than 60,000 chemicals are in use throughout the United States that could affect drinking water quality. Many of these chemicals have not yet been studied for possible effects in humans and are not regulated by the Safe Drinking Water Act. Even regulated chemicals need to be reassessed periodically. In addition, nature presents its own set of contaminants that can get into drinking water supplies—microbial pathogens such as *Giardia*, *Cryptosporidium*, and *Legionella*.

The National Academy of Sciences has several resources designed to help the general public understand some of the concerns related to the nation's drinking water treatment and distribution system. Reports and an overview of related information have been collected on the Water Information Page at <http://water.national-academies.org/basics.shtml>. Several reports from the National Academies' Water Science and Technology Board address the issue of drinking water quality, including *Desalination: A National Perspective*, *Drinking Water Distribution Systems: Assessing and Reducing Risks*, and *Classifying Drinking Water Contaminants for Regulatory Consideration*.

<http://dels.nas.edu/wstb/index.shtml>

◆ Actions Needed to Reduce Threats from Hepatitis B and C

Stepped-up vaccination requirements, a boost in resources for prevention and treatment, and a public awareness campaign similar to the effort that dispelled the stigma of HIV/AIDS are needed to curb the health threats posed by hepatitis B and hepatitis C, says a new report from the Institute of Medicine. These diseases

(National Academies, page 7)

DNA molecules reside inside every cell in all organisms. The DNA molecules contain the blueprints for how the living organism will look and function. DNA molecules aren't the whole story; however, because they need the ribosome to translate their information delivered by messenger RNA into living matter.

"Ribosomes make proteins based on the information in DNA," Steitz said. "There are tens of thousands of proteins in the body (including hemoglobin, antibodies of the immune system, hormones and enzymes); they all have different forms and functions and they all build and control life at the chemical level."

According to the Royal Swedish Academy of Sciences, "An understanding of the ribosome's innermost workings is important for a scientific understanding of life. This knowledge can be put to immediate use; many of today's antibiotics cure various diseases by blocking the function of bacterial ribosomes. Without functional ribosomes, bacteria cannot survive. This is why ribosomes are such an important target for new antibiotics."

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The three Nobel Laureates generated three-dimensional models that show how different antibiotics bind to the ribosome. Pharmaceutical companies, like Rib-X in New Haven, which Steitz co-founded, are using these models to develop new antibiotics that target the ribosome. "These new drugs will target drug-resistant infections," he said. "This was never the goal of our research, but it is a valuable practical application that stands to benefit the population at large." Steitz continues his involvement with Rib-X as chair of its scientific advisory board. The company has a number of novel antibiotics in late-stage development.

"The most exciting thing for me about the ribosome research was seeing its large macromolecular assembly structure for the first time," Steitz said. "I had no idea what it would look like and I have to say it was the most exciting time in science that I've had by a lot. It was like getting to the top of Mount Everest and seeing the view. It was terrific."

Because of his experience in both basic and applied research, Steitz has a unique perspective on what Connecticut can do to position itself for biotech success: find ways to support basic research in the state and help facilitate startup companies. "It's not easy to get funding," Steitz said. "We saw this first-hand during our ribosome research. We carried out the first stage, but the actual development of a new drug is so complex and expensive and it requires such technical expertise that it is too much for a university. We spun off Rib-X to handle the development, but even finding a facility was tough. As a state, we need to do a better job of transferring technology from universities into industry, so that we can solve problems and create jobs. Drug companies want to have effective drugs and the public wants that too. The problem right now is that the landscape to get through development is very expensive and complicated. If we make this investment, overcome the hurdles and do it well, everyone wins."

What's next? "I'm not done," Steitz said. "I continue to work on projects. The reason I got involved in this research is because I wanted to know how molecules do their work in cells. I continue to be fascinated by this work and its implications."

About the Nobel Laureates

Thomas A. Steitz, US citizen. Born in 1940 in Milwaukee, WI, USA. PhD in Molecular Biology and Biochemistry in 1966 from Harvard University. Sterling Professor of Molecular Biophysics and Biochemistry and Howard Hughes Medical Institute Investigator, both at Yale University. He was elected to the National Academy of Sciences in 1990. His research in the field of protein and nucleic acid X-ray crystallography, including his recent work with CASE member Peter Moore on the 50S ribosome structure has had wide-ranging impact in the global scientific community. In 2001, Steitz together with Moore and Harry Noller received the Rosenstiel Award for Distinguished Work in Basic Medical Sciences for their research on the ribosome. He has been a member of the Connecticut Academy of Science & Engineering since 1991. In 2007, Steitz served on the committee for the CASE study to develop strategic plan guidelines for Connecticut's Stem Cell Research Program. www.mbb.yale.edu/faculty/pages/steitzt.html

Venkatraman Ramakrishnan, US citizen. Born in 1952 in Chidambaram, Tamil Nadu, India. PhD in Physics in 1976 from Ohio University. Senior Scientist and Group Leader at Structural Studies Division, MRC Laboratory of Molecular Biology in Cambridge, UK. He was a postdoc at Yale University in Moore's lab in the early 1980s. www.mrc-lmb.cam.ac.uk/ribo/homepage/ramak/index.html

Ada E. Yonath, Israeli citizen. Born in 1939 in Jerusalem, Israel. PhD in X-ray Crystallography in 1968 from the Weizmann Institute of

(Steitz, page 7)

IN BRIEF

Science and Engineering Notes from Around Connecticut



Biomedical Research

CT COMPANIES CITED IN SURVEY OF ORPHAN DRUG DEVELOPMENT. A survey by Tufts University, which cited Connecticut companies, suggests that applications for orphan drug approvals doubled in the last decade, from 208 to over 400. Orphan drugs are those developed specifically to treat rare medical conditions. **Pfizer**, with R&D headquarters in Groton, **Alexion Pharmaceuticals** in Cheshire, and **Bristol-Myers Squibb**, with operations in Wallingford, were among those cited as applying for orphan-drug status for various treatments.

SCIENTISTS ISOLATE SPECIFIC CANCER-CAUSING CELLS. Researchers from the **Yale Cancer Center** and other institutions demonstrated how distinct groups of cells from the same tumor are capable of forming new tumors (*Cancer Research*, Jan. 1, 2010). Using stem cell markers in mouse melanoma models, researchers were able to divide tumor cells into three distinct groups. One group of cells always formed tumors after injection of a single cell, a second sometimes formed tumors, and the third group rarely formed tumors. **Marcus Bosenberg**, lead author and associate professor of dermatology and pathology at the **Yale School of Medicine**, says the analysis will help in developing effective treatments and may explain why some patients have a partial response to treatment.

UCONN TEAM DEVELOPING IMPLANTABLE BIOSENSOR. The **University of Connecticut** (UConn) reports that at the laboratory of Board of Trustees Distinguished Professor of Pharmaceutics **Diane Burgess**, CASE members **Fotios Papadimitrakopoulos**, professor of polymer and physical chemistry, and **Faquir Jain**, professor of electrical and computer engineering, are working with graduate students and postdoctoral fellows to help develop a miniaturized wireless device to monitor blood glucose levels for three months or more after being inserted under a patient's skin. Prototypes smaller than a grain of rice are embedded with an array of highly sensitive, microscopic electronic chips, sensors, and transmitters. Researchers hope to adapt the device so that Type 1 diabetics can wirelessly connect the monitor to a portable insulin pump that would automatically infuse their body as needed. Type 2 diabetics would use the device for monitoring. The aim is to begin clinical testing in two to three years.

NANOSENSORS TO MEASURE CANCER BIOMARKERS IN BLOOD. A **Yale** team led by CASE member **Mark Reed**, Harold Hodgkinson Professor of Engineering & Applied Science, and **Tarek Fahmy**, an associate professor of biomedical and chemical engineering, used nanowire sensors to detect and measure concentrations of biomarkers for prostate and breast cancer. Their findings could dramatically simplify the way physicians test for biomarkers of cancer and other diseases (*Nature Nanotechnology*). Researchers developed a novel device that acts as a filter, catching the biomarkers—in this case, antigens specific to prostate and breast cancer—on a chip while washing away the rest of the blood. Creating a buildup of the antigens on the chip allows for detection down to extremely small concentrations, on the order of picograms per milliliter, equivalent to detecting the concentration of a grain of salt dissolved in a swimming pool. Current tests take several days, while the new device is able to read out biomarker concentrations in a just a few minutes.

NEW TECHNOLOGY COULD BOOST SPEED, SENSITIVITY OF TESTS. **Yale University** scientists have developed a way to rapidly manipulate and sort different cells in the blood using magnetizable liquids (*Proceedings of the National Academy of Sciences* online). Ferrofluids are composed of magnetic nanoparticles suspended throughout a liquid carrier and have been used in industrial applications for years. Now a team led by **Hur Koser**, associate professor at the **Yale School of Engineering & Applied Science**, has developed a biocompatible ferrofluid and created a device with integrated electrodes that generate a magnetic field pattern, allowing researchers to manipulate and separate red blood cells, sickle cells and bacteria contained in this unique solution. This new method does not require labor-intensive preparation or post-processing and could improve the speed and sensitivity of tests for cancer biomarkers, blood disorders, viruses and other diseases.

BEACON MARKS 10TH ANNIVERSARY WITH SPECIAL EVENTS. The **Biomedical Engineering Alliance and Consortium** (BEACON) is hosting or sponsoring several events in 2010, including a celebration marking the Consortium's 10th anniversary in November. Upcoming events include an April 14 "Tri-State Get Together" at the UMASS Medical Center in Worcester, MA, for networking and review of new technologies; and an April 28 seminar on "Regenerative Medicine" by Koudy Williams of Wake Forest University School of Medicine, to be held at the **Hospital of Special Care in New Britain**. For further details on these events and others, visit BEACON's website at www.beaconalliance.org and click on 10th Anniversary Events at left.



Business & Industry

AMARIN RELOCATES OPERATIONS FROM IRELAND TO CT. In connection with its recent \$70 million private equity infusion, **Amarin Corporation** has relocated operational headquarters from Ireland to **Mystic**. Amarin is in Phase 3 clinical testing of a compound with properties akin to the healthy omega-3 fatty acids found in fish that the company plans to offer one day in the multi-billion-dollar market for preventing and treating heart disease. The company was named one of last year's top 250 best-performing international stocks listed on US exchanges.

NUFERN WINS KEY NAVY CONTRACT. **East Granby**-based **Nuferm** was selected in late 2009 as the lead optical fiber supplier for the modernization and life extension of the US Navy's Trident missile guidance system. Nuferm worked with the primary contractors Honeywell and Draper Labs to develop cost-effective and high-performance optical fibers for the gyroscopes and associated fibers used in other components of the inertial measurement unit and overall guidance system. The contract marks a turnaround for Nuferm, which had been lacking telecommunications customers in the last decade. The company received investments from **Connecticut Innovations** totaling \$901,000 and a \$1 million state loan, enabling its research and development for the Navy project. German laser maker Rofin Group acquired Nuferm in 2007.

CLEAN DIESEL GETS \$961K EMISSIONS GRANT. **Bridgeport**-based **Clean Diesel Technologies Inc.** received a \$961,000 grant from a Texas research center to craft new emissions technology that could widen its exposure to markets in the West and Southwest. The Houston Advanced Research Center issued the grant from the

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 CASE Bulletin, 179 Allyn St., Suite 512, Hartford, CT 06103-1422, or email us at acad@ctcase.org

IN BRIEF

Science and Engineering Notes from Around Connecticut

Texas Commission on Environmental Quality to devise and test a device that, when fitted on on- and off-road diesel engines, reduces their nitrogen oxide and particulate emissions. The United States and Europe recently stiffened emissions requirements for new vehicles equipped with diesel engines, the company said. Existing diesel vehicles are expected to eventually fall under the new guidelines.



Communication

CT EMERGENCY ALERT SYSTEM. The **Connecticut Department of Public Safety (DPS)** said that staff at the majority of the state's public 911 answering centers have been trained on Everbridge, the state's new web-based emergency notification system, implemented last fall. The system allows state agencies like DPS and the **Department of Emergency Management and Homeland Security** to communicate with employees en masse about developing emergencies. Currently, the system can communicate with members of the public that have land-line service. However, according to Public Safety Planning Specialist **Mike Guerrero**, a Citizen Alert signup web page will be available this spring and will allow members of the public to sign up for emergency notifications on any device or e-mail account they specify.

CT INVESTS \$750K IN STAMFORD TECH FIRM. **Connecticut Innovations (CI)**, the state's technology investment arm, awarded \$750,000 in a \$1.5 million financing package for Stamford-based **LegiTime Technologies Inc.**, to help the firm refine and expand marketing of its mobile-phone messaging and device management software. CI also obtains a board seat at LegiTime. Venture capital firm **iNovia Capital** also invested \$750,000. In addition to its products currently available for Windows Mobile and Blackberry devices, LegiTime is due to deliver Android and iPhone versions of its products in the first half of 2010.

COMCAST CONTINUES ROLLOUT OF DOCSIS 3.0. Comcast recently launched DOCSIS 3.0 in the **Seymour** and **Waterbury** areas of the state. DOCSIS 3.0 is an international telecommunications standard that permits the addition of high-speed data transfer to an existing cable TV system. Comcast already launched DOCSIS 3.0 in the **Hartford, New Haven, Plainville, Vernon, Norwich,** and **Old Lyme** areas and expects additional rollouts in 2010. The changes allow customers to select different tiers of service. Comcast's Extreme 50 tier has download speeds of up to 50 Mbps, and Ultra tier delivers download speeds up to 22 Mbps. Wideband has also enabled Comcast to double speeds for the majority of its existing high-speed Internet customers.

CT RECEIVES BROADBAND MAPPING GRANT. The **Connecticut Department of Public Utility Control (DPUC)** is being awarded \$1.8 million in the federal stimulus funding for statewide broadband mapping, which includes approximately \$500,000 for planning. The purpose of the grant, administered through the National Telecommunications and Information Administration, is to identify served and underserved areas of CT in terms of broadband infrastructure.



Education & Cognition

QUINNIPIAC PLANS TO OPEN MED SCHOOL. **Quinnipiac University** has announced plans to open a medical school by 2014 at its **North Haven** campus. The school, which would emphasize primary care and global health, would be the third medical school

in Connecticut, in addition to the **Yale School of Medicine** and the **University of Connecticut School of Medicine**.

UConn AND INTERNATIONAL PARTNERSHIPS. The **University of Connecticut (UConn)** was selected by the Al-Bayan Foundation to establish a Saudi Arabian university adhering to UConn curriculum and administration standards. The Prince Migrin University (PMU), named after Prince Migrin bin Abdul Aziz, will be located between Medina and Jeddah. The project began in January 2009, when CASE member **Reda Ammar**, head of the department of computer science & engineering and UConn's director of International Academic Partnerships, traveled to King Abdul Aziz University (KAU) in Saudi Arabia to build relations with the institution. Ammar said that PMU is scheduled to open in fall 2010. Ammar is also passionate about bringing engineering graduate students to the United States, especially those with scholarships from their governments. Since the summer of 2009, Ammar says he has recruited 28 graduate students funded by their home countries, generating approximately \$7 million in revenue for UConn.

YALE STUDY "UNCOUPLES" DYSLEXIA FROM IQ. Researchers at **Yale School of Medicine** and University of California, Davis, presented new data that explain how otherwise bright and intelligent people struggle to read (*Psychological Science*, Jan. 1, 2010). Using data from the Connecticut Longitudinal Study, an ongoing 12-year study of cognitive and behavioral development in a representative sample of 445 Connecticut schoolchildren, **Sally E. Shaywitz**, the Audrey G. Ratner Professor in Learning Development in the **Department of Pediatrics**, and her team tested each child in reading every year and tested for IQ every other year. Researchers found that in typical readers, IQ and reading not only track together, but also influence each other over time. But in children with dyslexia, IQ and reading are not linked over time and do not influence one another.

NU SPONSORING ROBOTICS CONTEST, CCAT SPONSORS ALL GIRLS TEAM. Hartford-based **Northeast Utilities Inc. (NU)** is the newest three-year sponsor of **Connecticut FIRST**, the state's annual robotics competition. NU obtained the title sponsorship in exchange for the **Northeast Utilities Foundation** pledging \$300,000 to fund the event through 2012. The previous sponsor, **United Technologies Corp.**, will sponsor the national FIRST competition in Atlanta, and will continue to support the regional event and student teams nationwide. The Connecticut FIRST competition will be held April 1-3 in Hartford at the Connecticut Convention Center. The **Connecticut Center for Advanced Technology** is sponsoring the first all-female robotics team—dubbed Athena's Warriors—with students from Bloomfield, Hartford, West Hartford and Wethersfield. The team is one of four participating in the **Connecticut Technology Council's Girls of Innovation** program.

DOWNTOWN HARTFORD SITE FOR PHARMACY SCHOOL. **Saint Joseph College** announced that its new pharmacy school will be housed in 35,000 square feet of downtown's **Hartford 21** commercial-residential complex. The three-year pharmacy school opens in the fall of 2010 with 65 students and will be Saint Joseph's first school established beyond its West Hartford campus.

UConn AMONG KIPLINGER'S 100 BEST COLLEGE VALUES. The **University of Connecticut (UConn)** ranked 34th out of 100 nationally and 1st among New England's public colleges and universities in the February issue of *Kiplinger's Personal Finance* list of best value public colleges. Kiplinger's bases its rankings on a combination of academics and affordability. In February, UConn proposed a 7% tuition hike citing weakening economic conditions

IN BRIEF

Science and Engineering Notes from Around Connecticut

and less government aid. **Governor M. Jodi Rell** asked the university to find other savings and UConn president **Michael J. Hogan** has formed several committees to look at ways to cut the budget without affecting students or academic programs.



Energy

FEDERAL FUNDING FOR ENERGY RESEARCH TO CCAT. The US Department of Defense (DoD) has provided more than \$18M in funding to the **Connecticut Center for Advanced Technology (CCAT)** to provide expertise in assisting the federal government in making efficient use of domestic energy sources. The DoD is investigating the potential to increase its utilization of alternative energy sources to produce liquid fuel. CCAT's three-year contract has been awarded to assess research efforts and implement demonstration projects to mitigate CO₂ emissions. CCAT will perform assessments of existing and developing technologies and will select promising technologies as pilot feasibility projects at key DoD facilities.

CT RECEIVES \$3M FOR GREEN JOB TRAINING. The **Connecticut Employment and Training Commission** received \$3.3 million in federal stimulus funding to help train workers for "green" energy jobs. The grants, awarded through the US Department of Labor, are intended to teach workers skills for emerging industries in energy efficiency and renewable energy.

UTC INVESTING IN WIND TURBINES. **United Technologies Corp.** (UTC) is investing \$271 million in Clipper Windpower, Inc., of Carpinteria, CA. The wind turbine company said the deal would enable it to enhance its operations and pursue its strategic goals, while UTC will expand its power generation portfolio and enter the wind power market. Clipper has a manufacturing plant in Iowa as well as operations in the United Kingdom.

GE WIND TURBINES IN BRAZIL, OREGON. **General Electric Co.** made commitments to supply turbines for wind farms in Brazil, marking the debut of GE's wind turbine technology in that country. Two Brazilian power companies planning to supply more than 400 megawatts of electricity selected GE's 1.5 megawatt class wind turbines for use at the projects. GE also announced a \$1.4 billion contract to supply wind turbines and related services for Caithness Energy's 845-megawatt Shepherds Flat wind farm, located in Oregon. GE said that the order from Caithness for 338 of its 2.5xl wind turbines is the largest yet for that turbine.



Environment

CT COLLEGES SUBMIT CLIMATE ACTION PLANS TO AUCPCC. Four Connecticut colleges—**Eastern, Southern, and Central Connecticut State Universities** and **Trinity College**—have submitted their Comprehensive Climate Action Plans to the American College and University Presidents' Climate Commitment (AUCPCC), according to the AUCPCC web site. Other Connecticut schools that signed on to the AUCPCC are **Western Connecticut State University, Connecticut College, Fairfield University, Manchester and Norwalk Community Colleges, and Wesleyan University.** Both Wesleyan and Connecticut College have filed for extensions on the Action Plan, which was due in January. Participating institutions have agreed to incorporate climate change and sustainability into the educational experience of all students and to achieve climate neutrality at the earliest pos-

sible date. The Association for the Advancement of Sustainability in Higher Education notes that each plan should include goals; target dates; actions to make climate change part of the curriculum; actions to expand research on climate change and potential solutions; actions to reduce the institution's GHG emissions and mechanisms for tracking progress on goals and actions. Visit www.presidentsclimatecommitment.org for more information.

HONEY BEES REFLECT PESTICIDE USE IN THE NEIGHBORHOOD. Honeybees, for a still unknown reason, are declining. The causes may be poor nutrition, migratory stress, varroa mites, colony collapse disorder, or pesticides. To determine the exposure of bees to pesticides, **Brian Eitzer** and **Kimberly Stoner** at **The Connecticut Agricultural Experiment Station** in New Haven analyzed pollen that bees had foraged in urban, suburban and rural locations. During three years the bees collected pollen containing approximately 45 different pesticides that varied with location and season and that changed rapidly depending on local pesticide use.



Food & Agriculture

SCHOOL NUTRITION IMPROVEMENTS HAVE POSITIVE INFLUENCE. When schools serve healthier, more nutritious food, students do not compensate by eating more unhealthy food at home, a new **Yale University** study has found (*Health, Education & Behavior*, December 2009). The study by the **Rudd Center for Food Policy and Obesity** also showed that this type of school-based obesity prevention does not lead to weight concerns or body dissatisfaction among students. The study, which involved six Connecticut middle schools, found that students in schools that removed unhealthy foods and beverages did not increase their consumption of those foods at home.

PEOPLE EAT LESS WHEN THEY KNOW MORE. A new study from **Yale University** measures the impact of regulations such as mandatory menu labeling in restaurants (*The American Journal of Public Health* online). Researchers from the **Rudd Center for Food Policy and Obesity at Yale** studied 303 adults in the New Haven community, dividing them into groups that saw a menu with no calorie labels, a menu with calorie labels, or a menu with calorie labels plus information on the recommended daily caloric intake for an average adult. Participants in the two groups that saw calorie labels ate 14% fewer calories than the group that did not see calorie labels. When after-dinner eating was factored in, the group that saw menu labels as well as recommended calorie guidelines consumed an average of 250 fewer calories than those in the other groups.



Health

BIRDS PLAY ROLE IN SPREAD OF LYME DISEASE. The range of Lyme disease is spreading in North America and it appears that birds play a significant role by transporting the Lyme disease bacterium over long distances, according to a study by the **Yale School of Public Health** (*Frontiers in Ecology and the Environment* online). Researchers analyzed published records and concluded that at least 70 species of North American birds are susceptible to infection by black-legged ticks (*Ixodes scapularis*), the principal vector of the Lyme disease bacterium (*Borrelia burgdorferi*). The evidence also suggests that these bird species are dispersing infected ticks into areas that had previously been free of the disease, such as Canada. Lyme disease bacterium is usually associated with

IN BRIEF

Science and Engineering Notes from Around Connecticut

small mammals such as mice and squirrels. The researchers found that *I. scapularis* most consistently parasitizes bird species such as thrushes, brown thrashers, wrens and wood warblers.

TWO CT HEALTH CENTERS TO RECEIVE STIMULUS FUNDING.

Two **Hartford** community health centers are to receive more than \$16 million in construction grants as part of the federal stimulus package to upgrade their facilities. **Sen. Christopher Dodd** announced in late 2009 that the US Department of Health and Human Services is awarding \$10 million to **Charter Oak Health Center**, while **Community Health Centers Inc.** will receive \$6.2 million.

PROTEIN MARKERS CAN PREDICT RISK OF MELANOMA

RECURRENCE. **Yale Cancer Center** researchers have developed a new prognostic tool that can determine the risk of recurrence in melanoma patients (*Journal of Clinical Oncology*, Dec. 1, 2009). The technology, based on five proteins expressed in melanoma tissue, can classify patients into a low-risk group, with 10% chance of recurrence at eight years, or a high-risk group that has a 40% probability of recurrence within that time.

PREDICTING, DIAGNOSING PREECLAMPSIA.

Researchers at **Yale School of Medicine** have developed a simple urine test to rapidly predict and diagnose preeclampsia, a common, but serious hypertensive complication of pregnancy. Dubbed the "Congo Red Dot Test" by the research team, the test accurately predicted preeclampsia in a study of 347 pregnant women, allowing health care providers to offer better preventive care to pregnant women. The research was presented in February at the Annual Scientific Meeting of the Society for Maternal Fetal Medicine.



High Technology

PRATT TO ESTABLISH CENTER OF EXCELLENCE AT UCONN.

Pratt & Whitney has established a **Center of Excellence** in the **University of Connecticut (UConn) School of Engineering** for research in the field of aviation propulsion systems. Pratt & Whitney will work with the university on fundamental and applied research initiatives that support the design and development of more efficient gas turbine engines. The university's primary focus will be research in the field of advanced sensors, diagnostics, and controls for use in commercial and military aircraft propulsion systems. The partnership was announced Feb. 17 and Pratt officials said they selected UConn for the center because it is renowned for its world-class engineering education and research capabilities.

CCAT ESTABLISHING NANOTECH CONSORTIUM, UNIVERSITY OF HARTFORD RESEARCHING NEXT-GEN DRONES.

The **Connecticut Center for Advanced Technology, Inc.** (CCAT) was awarded a five-year contract from the US Army Joint Munitions and Lethality Center at Picatinny Arsenal, NJ, for the establishment of The Applied Nanotechnology Consortium (TANC). The total award CCAT will administer has the potential of providing \$20 million to TANC members for research and development of advanced munitions. TANC is a multi-state consortium with the following members: **Ensign-Bickford Aerospace & Defense Company** (Simsbury); **GKN Aerospace Services Structures Corporation** (Cromwell); **Kaman Precision Product** (Middletown); **Imperial Machine & Tool Company** (Columbia, NJ); **University of Bridgeport**; **University of Connecticut**; and **University of Hartford**. The **University of Hartford** recently announced it was awarded \$2.4 million through this new program to lead efforts in the development of new unmanned aerial vehicles (drones).

NATIONAL SBIR CONFERENCE THIS APRIL IN HARTFORD.

The National Small Business Innovation Research (SBIR) Conference will be held April 21 - 23, 2010 at the **Connecticut Convention Center** in Hartford, with pre-conference workshops on April 20. Planned speakers include CASE members **Henry Lee**, professor of forensic science, University of New Haven, and **J. Michael McQuade**, UTC's senior vice president for science and technology, as well as **Kristina Johnson**, under secretary for the US Department of Energy. Visit www.sbirnational.com to learn more or to register.

WORLD'S FIRST MOLECULAR TRANSISTOR.

Researchers from **Yale** and the Gwangju Institute of Science and Technology in South Korea succeeded in creating the first transistor made from a single molecule (*Nature*, Dec. 24, 2009). The team includes CASE member **Mark Reed**, the Harold Hodgkinson Professor of Engineering & Applied Science at Yale and **Takhee Lee**, a former Yale postdoctoral associate and now a professor at the Gwangju Institute of Science and Technology. Reed and Lee showed that a benzene molecule attached to gold contacts could behave just like a silicon transistor. By controlling the voltage they applied to the molecule through the contacts, they were able to manipulate the molecule's different energy states, allowing them to control the current passing through the molecule. Reed stressed that the breakthrough is strictly scientific and that practical applications such as smaller and faster "molecular computers"—if possible at all—are many decades away.



Transportation

UTC POWER, FUEL CELL MILESTONE.

South Windsor-based **UTC Power** said one of its fuel cells mounted aboard a California transit bus has surpassed 5,000 hours of maintenance-free service. UTC Power's PureMotion fuel cell powers three hybrid-electric buses serving the Alameda-Contra Costa Transit District in the Oakland, CA, area. A similar bus serves downtown Hartford riders daily. The fuel cell has its original cell stacks. **Ken Stewart**, UTC Power vice president-transportation, said stack durability is a key challenge in commercializing fuel cell vehicles worldwide.

CT TRANSIT TO ADD 35 LFS ARTIC BUSES.

CT Transit selected Nova Bus to provide 35 LFS (Low Floor Series) Artic buses, with options on an additional 35 articulated vehicles over a four-year period. CT Transit, whose divisions serve seven metropolitan areas throughout the state, including Hartford, New Haven and Stamford, selected a mix of clean-diesel and hybrid drives for its articulated vehicles, with deliveries starting in late 2010. Valued at approximately \$60 million, the order will be assembled at Nova Bus' Plattsburgh, NY, plant.

SHORE LINE EAST SERVICE EXPANDED.

Expanded commuter rail service to **New London** on **Shore Line East** began in mid-February, with a second round trip **New London-New Haven** train added to the daily schedule. Amtrak and **Governor Rell** announced the service expansion, which was cited as a major step forward in providing a mass transit alternative to driving on Interstate 95, supporting the goals of reducing congestion, improving air quality and reducing energy consumption.

—Compiled and edited by **Ann G. Bertini**, Asst. Dir. for Programs

cause thousands of cases of liver cancer, liver disease, and death each year, and account for nearly half of the liver transplantations that must be performed annually. Resources and efforts to contain the viruses that cause hepatitis B and C lag behind those directed at other infectious diseases of similar impact to public health, notes the report.

The report calls for educational programs and materials that outline risk factors for viral hepatitis and provide information on immunization, prevention, and proper monitoring of infected individuals to be developed and made available to all health professionals and social service providers. It recommends measures to create a more coordinated approach, including improved identification of infected individuals, social and peer support to reduce the stigma of infection, and medical management of those with chronic hepatitis B or C.

http://www.nap.edu/catalog.php?record_id=12793

◆ 'America's Energy Future' Issues Final Report

Beginning with a summit held in March 2008 and culminating with a 650-page report released this past summer, America's Energy Future—a National Academies-wide initiative—brought together 65 experts to provide detailed, technical assessments of energy technologies available to the United States. Panels were convened to study such issues as potential new energy supplies from coal and biomass, renewable resources, nuclear energy, and the potential for energy efficiency savings.

Changing the way that the nation uses energy will involve energy efficiency measures such as those adopted in the 1970s, formulation of consistent government policies to drive these changes, and new technologies that can improve the way energy is produced, distributed, and consumed. Before these changes can occur, decision makers need a realistic picture of the options that exist. The America's Energy Future project was launched to provide all the technical information required for an informed debate on the issue of energy in the United States. Its final report, *America's Energy Future: Technology and Transformation*, brings together the findings from all of the panels and also includes information on fossil fuels, nuclear energy, and the electric grid. The report concludes that with a sustained national commitment, the United States could make substantial improvements to the way it produces and uses energy.

http://sites.nationalacademies.org/Energy/index.htm?infocus_9.2

◆ Air Pollutants Know No National Borders

A recent National Research Council report finds that air pollutants can be transported aloft across the Northern Hemisphere to continents that lie downwind. Although air quality is nearly always dominated by local or regional emissions, air pollutants from abroad are becoming a growing concern as emissions from developing countries increase and environmental protection standards tighten in industrialized nations.

Distinguishing between domestic and foreign components of air pollution and quantifying how global sources affect air quality and ecosystems is constrained by current modeling and observational capabilities. In the coming decades the concern over pollutants will grow, particularly as man-made emissions are expected to rise in East Asia. These increases could potentially be mitigated by progressively more stringent pollution control efforts and international cooperation in developing and deploying pollution control technology. Projected climate change will also likely affect the emissions and travel of pollutants, but predicting the net impact is extremely difficult with present knowledge. To improve understanding of long-range transport of pollution, the report urges research initiatives such as "fingerprinting" techniques to better identify source-specific pollutant characteristics, atmospheric modeling, ground-based and remote sensing observations, and focused field studies.

http://www.nap.edu/catalog.php?record_id=12743

◆ Reassessing Sale of Nation's Helium Reserve

Helium, used in applications ranging from medical devices such as MRIs to surveillance balloons, has long been the subject of public policy deliberation and management, largely because of its many strategic uses and its unusual source—it is a derived product of natural gas. Shortly after sources of helium were discovered at the beginning of the last century, the US government recognized helium's potential importance to the nation's interests and placed its production and availability under strict governmental control. In the 1960s, helium's strategic value was reflected in policies that resulted in the accumulation of a large reserve of helium owned by the federal government. The Helium Privatization Act of 1996 (1996 12 Act) directed that substantially all of the helium accumulated be sold off by 2015 at prices sufficient to repay the federal government for outlays associated with the helium program. A new report from the National Research Council finds that selling off the reserves has had an adverse affect on the nation's scientific, technical, biomedical, and national security users of helium and recommends that the federal government reconsider whether selling the reserves is still in the nation's best interest.

<http://www.nationalacademies.org/morenews/20100122b.html>

◆ Mapped Genome Shows Corn's Adaptability

After four years of collaboration, researchers have nearly completed sequencing the B73 corn genome, cataloging over 32,000 genes (more genes than are in human DNA) and 2.3 billion base nucleotides. Corn is one of the most widely grown grains in the world, and the B73 strain—one of the most common—has the largest genetic blueprint discovered for any plant species mapped to date. The mapping has implications for developing higher yield, disease resistant, drought resistant, and more nutritious crop strains.

Study of the corn genome has given scientists a broader understanding of genetic behavior in more than just plants. With the discovery of "jumping genes" or transposons, new possibilities in the study of genetic evolutionary mechanisms opened up. Found in both animals and plants, transposons allow rapid adaptation from generation to generation.

Funding for this undertaking was provided through the National Plant Genome Initiative (NPGI), a multi-agency collaborative research program with the goal of understanding the structure and function of genes in plant species that are important to agriculture, environment, energy, and health. In 2008, the Interagency Working Group on Plant Genomes asked the National Research Council to assess NPGI's achievements and recommend its future direction. The conclusions can be found in *Achievements of the National Plant Genome Initiative and New Horizons in Plant Biology*.

<http://www.nationalacademies.org/headlines/20091204.html>

Steitz (continued from page 2)

Science, Israel. Martin S. and Helen Kimmel Professor of Structural Biology and Director of Helen & Milton A. Kimmelman Center for Biomolecular Structure & Assembly, both at Weizmann Institute of Science. www.weizmann.ac.il/sb/faculty_pages/Yonath/home.html

About the Nobel Prize for Chemistry

On 27 November 1895, Alfred Nobel signed his last will and testament, giving the largest share of his fortune to a series of prizes, the Nobel Prizes. As described in Nobel's will one part was dedicated to "the person who shall have made the most important chemical discovery or improvement." Learn more about the Nobel Prize in Chemistry from 1901-2009 at www.nobelprize.org.

(Steitz, back page)

Visit our web site at www.ctcase.org

Steitz (continued from page 7)

About the Royal Swedish Academy of Sciences

The Royal Swedish Academy of Sciences, founded in 1739, is an independent organization whose overall objective is to promote the sciences and strengthen their influence in society. The Academy takes special responsibility for the natural sciences and mathematics, but endeavours to promote the exchange of ideas between various disciplines.

Who selects Nobel Laureates?

In his last will and testament, Alfred Nobel specifically designated the institutions responsible for the prizes he wished to be established: The Royal Swedish Academy of Sciences for the Nobel Prizes in Physics and Chemistry, Karolinska Institute for the Nobel Prize in Physiology or Medicine, the Swedish Academy for the Nobel Prize in Literature, and a Committee of five persons to be elected by the Norwegian Parliament (Storting) for the Nobel Peace Prize. In 1968, the Sveriges Riksbank established the Sveriges Riksbank Prize in Economics in Memory of Alfred Nobel. The Royal Swedish Academy of Sciences was given the task to select the Economics Prize Laureates starting in 1969.—**Karen Breckbill Cohen, The Write Stuff, LLC.**

[Editor's Note: This article includes information posted on the official web site of the Nobel Foundation (www.nobelprize.org).]



for Children Celebrates Ten Years, Upcoming Expansion

The mission of Stepping Stones Museum for Children, named one of America's Top 50 Children's Museums and

located in Norwalk, CT, is to broaden and enrich the educational opportunities for children ages ten and under and to enhance their understanding of the world. The museum opened to the public in March 2000 and will celebrate its 10th birthday this year with a variety of activities starting with a birthday party on March 13 and special events each month throughout the year.

The Museum's interactive exhibits include *Healthyville*, which teaches children about their bodies, health and the food choices they make and *Rainforest Adventure*, which illustrates the essential elements of tropical rainforests and the challenges and opportunities of conservation. Like children outgrowing their clothes, Stepping Stones is bursting at the seams. The museum broke ground on a facility expansion in March 2009.

The future facility, grounds and educational offerings will support the evolving needs of museum visitors, community, staff and volunteers while promoting environmental stewardship. The expanded facility will qualify for the US Green Building Council's LEED Gold Certification. New educational exhibits and programs on energy and conservation will further extend these important concepts and introduce environmentally healthy choices to museum visitors. Stepping Stones will celebrate the opening of its 22,000 square foot green expansion in November 2010. For more information, visit steppingstonesmuseum.org.