

# Bulletin of the

CONNECTICUT ACADEMY OF SCIENCE AND ENGINEERING



1976

Volume 24,2 / Summer 2009

## Experiment Station in Forefront of Efforts to Monitor, Test for Mosquito-Borne Viruses

The Connecticut Agricultural Experiment Station (Experiment Station) began its thirteenth year of mosquito collection and testing for encephalitis viruses during the first week of June 2009. Over the years, the Experiment Station in New Haven has tested more than 1.7 million mosquitoes for viruses, including West Nile virus and eastern equine encephalitis (EEE) virus, and has also increased our knowledge of arboviruses through intensive research on the mosquito vectors and the viruses they carry.

Until West Nile virus was found in Greenwich in 1999, the primary insect-borne virus of concern in Connecticut was EEE. Although no human cases of EEE have been confirmed to have originated in Connecticut, it has occurred in Rhode Island, Massachusetts, New Hampshire and New York. The latest outbreak in New England occurred in 2005-2006, when seven cases were reported in New Hampshire and six in Massachusetts. In addition, EEE was identified in a flock of penguins at the Mystic Aquarium in 2003, highlighting its ability to infect birds.

Theodore G. Andreadis, chief medical entomologist at the Experiment Station and director of the state Mosquito Trapping and Testing Program, says EEE "is largely unpredictable and it's unclear how this virus overwinters." West Nile virus, on the other hand, appears to overwinter in mosquitoes and is an annual threat to public health in the state.

(Mosquitoes, page 2)

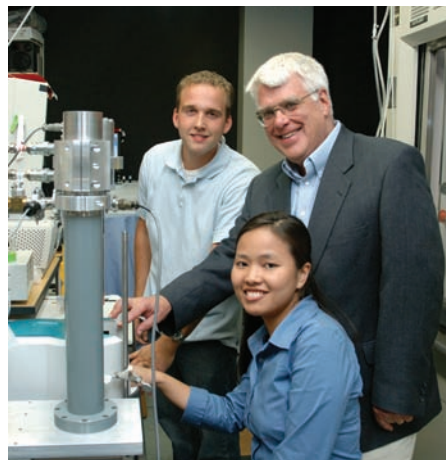
## UConn's Birge Awarded CT Medal of Science

CASE member Robert R. Birge, The Harold S. Schwenk, Sr., Distinguished Chair in Chemistry at the University of Connecticut, was presented with the 2009 Connecticut Medal of Science, the state's highest award for scientists, at the annual meeting of the Connecticut Academy of Science and Engineering in Windsor Locks on May 20.

In presenting the award, Frank W. Ridley, chairman of the Board of Governors for Higher Education, said "Dr. Birge's pioneering work in protein engineering and biomolecular electronics has led to seminal discoveries in the fields of vision, quantum computation, and protein-based data processing. His efforts have boosted the growth and national reputation of UConn's science programs, and have immeasurably strengthened Connecticut's economic position."

Birge is known for his basic research on protein structure and function and in biomolecular electronics. He was the first scientist to propose using proteins to store data; a protein-based disk drive that his research group developed in 1982 was the first such memory device ever produced. His research group in 1978 was the first to apply a new spectroscopic technique to reveal previously unavailable information about a biological molecule, vitamin A. He has written widely about the molecular basis of vision. His research also has far-reaching implications for the development of molecular electronic devices.

He received his bachelor's degree in chemistry from Yale University, his PhD in chemical physics from Wesleyan University and was a postdoctoral fellow at Harvard University.



Dr. Birge in his UConn laboratory with students. (Photo: University of Connecticut)

## News from the National Academies

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

### ◆ More Transparency Urged for US Cyberattack Policy

A new report from the National Research Council finds that the current policy and legal framework regulating use of cyberattack by the United States is ill-formed, undeveloped, and highly uncertain. The United States should establish clear national policy on the use of cyberattack, while continuing to develop its technological capabilities. The report calls for such policy to be informed by open national debate on the technological, policy, legal, and ethical issues of cyberwarfare.

Cyberattacks—actions taken against computer systems or networks—are often complex to plan and execute but relatively inexpensive, and the technology is widely available. The United States could use cyberattacks defensively, in response to a cyberattack from another nation, or offensively, to support military missions or covert actions, the report says. A cyberattack carries with it some implications unlike those associated with traditional physical warfare, the report says, noting that the outcome is likely to be more uncertain, and there may be substantial impact on the private sector, which owns and operates much of the infrastructure through which such a cyberattack would take place.

Clear national policy regarding the use of cyberattack should be developed through open debate within the US government and diplomatic discussion with other nations, the report says. The US policy should make it clear why, when, and how a cyberattack would be authorized, and require a periodic accounting of any attacks that are conducted, to be made available to the executive branch and to Congress.

[http://www.nap.edu/catalog.php?record\\_id=12651](http://www.nap.edu/catalog.php?record_id=12651)

(National Academies, page 7)

There is a strong correlation in time and place where West Nile virus is found in mosquitoes and where subsequent human infections occur, Andreadis said. "We usually get a couple of weeks' lead time between detection of the virus in mosquitoes and the onset of human cases." West Nile virus has been detected by the Experiment Station in 21 species of mosquitoes, not all of which bite humans. In Connecticut, there have been 69 human cases, including three fatalities caused by West Nile virus since 2000.

During 2008, 211,657 mosquitoes were tested. West Nile virus was found in 191 of the 15,108 pools of mosquitoes tested, but no EEE was isolated. From 1996 to 2008, West Nile virus was isolated 767 times and EEE was isolated 239 times. Other viruses known to cause human disease and isolated one or more times over the years include: Cache Valley, Jamestown Canyon, LaCrosse, and Trivittatus. One human case attributed to Jamestown Canyon virus occurred in Simsbury. LaCrosse virus was detected for the first time in Fairfield. Its primary range is in the Midwestern and Appalachian regions of the United States, where it is a leading cause of mosquito-borne encephalitis in children.

### Our Thanks to Academy Sponsors

The Academy wishes to express its sincere thanks to all of its sponsors, whose support makes the important work of the Academy, including this publication, possible.

◆ Leading Patrons ◆

The Connecticut Light and Power Company

### The Connecticut Academy of Science and Engineering

The purpose of the Academy is to "provide guidance to the people and the government of the State of Connecticut ... in the application of science and engineering to the economic and social welfare."

#### OFFICERS OF THE ACADEMY

Myron Genel, President  
Yale University School of Medicine

Gale F. Hoffnagle, Vice President/President Elect  
TRC Environmental Corporation, Inc

Sandra K. Weller, Secretary  
University of Connecticut Health Center

Frederick J. Leonberger, Treasurer  
JDS Uniphase Corporation (ret.)

EXECUTIVE DIRECTOR  
Richard H. Strauss

ASSISTANT DIRECTOR FOR PROGRAMS  
Ann G. Bertini

EDITORS  
George Foyt, Executive Editor - Engineering  
Manager of Electronics Research, UTRC (ret.)

Edward Monahan, Executive Editor - Science  
Director, Connecticut Sea Grant College Program (ret.)  
Professor emeritus, Marine Sciences & Resource Economics  
University of Connecticut

MANAGING EDITOR  
Martha Sherman

The *BULLETIN* of the Connecticut Academy of Science and Engineering is published by the Connecticut Academy of Science and Engineering, Inc., 179 Allyn Street, Suite 512, Hartford, CT 06103-1422. Telephone and fax: (860) 527-2161. E-mail: acad@ctcase.org. Web site: www.ctcase.org. To subscribe to the Bulletin, contact us by phone or email or subscribe on our web site. The Connecticut Academy of Science and Engineering is a private, nonprofit public-service organization established by Special Act No. 76-53 of the Connecticut General Assembly.

COPYING PERMITTED, WITH ATTRIBUTION

It is no coincidence that a timeline in a US General Accounting Office (GAO) review of the key events during the initial West Nile virus outbreak in 1999 starts with the entry: "Connecticut Agricultural Experiment Station begins annual mosquito surveillance." The Experiment Station commenced formal surveillance for encephalitis viruses in mosquitoes in the late summer of 1996 after a large number of mosquitoes infected with EEE were detected in Westerly, RI, just over the border from Connecticut. Immediately upon being told of the discovery by a colleague in Rhode Island, Andreadis and then Station Director and CASE member John F. Anderson put together an emergency program of mosquito collection, identification, and testing. Trapping began on September 5, 1996 and continued until October 18 at 80 locations in 20 towns. The mosquitoes that were caught were brought to the Experiment Station, identified, and sent to the Arbovirus Unit at the Yale University School of Epidemiology and Public Health for testing in their Biosafety Level 3 laboratory. (A Level 3 facility is defined by the Centers for Disease Control and Prevention (CDC) as a facility "in which work is done with indigenous or exotic agents which may cause serious or potentially lethal disease as a result of exposure by the inhalation route. Laboratory personnel have specific training in handling pathogenic and potentially lethal agents, and are supervised by competent scientists who are experienced in working with these agents.")

A paper describing the emergency surveillance published in the *Journal of Medical Entomology* by Andreadis, Anderson, and Shirley J. Tirrell-Peck of Yale, reported that 6,440 female mosquitoes representing 16 species were collected. The authors made 36 EEE virus isolations from eight mosquito species. Upon learning of the discovery of EEE, the governor and officials from the Connecticut Department of Public Health (DPH) notified the public, and some areas were sprayed to suppress mosquitoes. No human cases occurred, which was fortunate since 30% of victims usually die, and many survivors suffer permanent neurological damage. There had been no comprehensive program of surveillance for encephalitis viruses prior to 1996, so the findings revealed both a public health and a research need. Although EEE virus was known to circulate but was infrequently found in mosquitoes in areas in Connecticut with a history of EEE over a 37-year period from 1955 to 1992, there was scant knowledge of the ecology and epidemiology of the virus in the state.

The following year, 1997, the governor requested and the General Assembly funded an arbovirus surveillance program at the Experiment Station under the direction of Andreadis. Trapping took place at 36 locations, "the majority of which were in eastern Connecticut because historically it was the focal area for EEE in horses," Andreadis said. In 1998 the Experiment Station's tick laboratory was upgraded and certified by the DPH and the CDC as a Biosafety Level 3 laboratory where testing for live encephalitis viruses could be done. By then, over 50,000 mosquitoes were being tested annually.

Over the 1999 Labor Day weekend, the CDC Division of Vector-Borne Infectious Diseases announced what it believed to be an encephalitis outbreak in New York City. The potential implications of a dangerous encephalitis virus a short distance from the Connecticut border led Anderson to spend the holiday weekend setting traps and collecting mosquitoes in Greenwich, the town closest to New York City.

The GAO timeline for Saturday, September 4, 1999, notes: "Connecticut Agricultural Experiment Station continues to trap mosquitoes and responds to announcement ... by moving mosquito traps to areas near the NYC outbreak area." By September 8, the GAO said the Experiment Station "is testing mosquitoes

(Mosquitoes, page 7)

# IN BRIEF

## Science and Engineering Notes from Around Connecticut



### Biomedical Research

**DPH AWARDS STEM CELL GRANTS.** The **State of Connecticut Stem Cell Research Advisory Committee** in April directed the allocation of \$9.8 million in stem cell research funds to investigators at the **University of Connecticut, Wesleyan University, Yale University** and the **University of Connecticut Health Center**. This is the third installment of grants from the **Stem Cell Research Fund**, established by the **Connecticut General Assembly** and signed into law by **Governor M. Jodi Rell** in 2005. A 15-member **Connecticut Stem Cell Peer Review Committee** considered 77 applications and provided recommendations in accordance with National Institutes of Health guidelines to the Advisory Committee, which made the final decisions. Between 2005 and 2015, the committee is tasked with allocating approximately \$100 million in order to encourage stem cell research in Connecticut.

**CELLESDSIGN INC. INTRODUCES FIRST LINE OF STEM CELLS.** New Haven-based **CellDesign Inc.** introduced its first set of commercially available human stem cells in March. The cells are likely to be used in diabetes and obesity research at pharmaceutical companies. The company reported that the adult stem cell lines can be used to generate unlimited quantities of human white and brown fat and the tissue sources were obtained with donors' informed consent. Former **Pfizer Inc.** researcher **John Hambor** launched CellDesign in 2008 to conduct the kind of research and development usually done at bigger companies.

**SEARCH FOR BLOOD PRESSURE SECRETS REVEALS NEW SYNDROME.** **Yale** researchers investigating genetic causes of blood pressure variation identified a previously undescribed syndrome associated with seizures, lack of coordination, developmental delay and hearing loss. The findings, published in the *Proceedings of the National Academy of Sciences*, illustrate the way genetic studies can identify a common cause for a seemingly unrelated set of symptoms. "A study like this would have taken years in the past, but was accomplished in a few weeks by a single fellow in the lab," said **Richard Lifton**, chair of the **Department of Genetics** at the **Yale School of Medicine** and senior author of the study. Post-doctoral fellow **Ute Scholle** was conducting a genetic analysis of 600 patients for causes of salt-handling defects of the kidney, which lead to high or low blood pressure. She identified a group of five patients from four families in Afghanistan, Turkey, Great Britain and Canada who had, in addition to a salt-handling defect, diverse neurologic problems. In a matter of weeks Scholle found that all five had inherited mutations in the gene **KCNJ10**, a potassium channel that is expressed in the brain, inner ear and kidney.

**SMOKING CESSATION DRUG MAY HELP REDUCE DRINKING.** A **Yale School of Medicine** study published online in the journal *Biological Psychiatry* found that a popular smoking cessation drug dramatically reduced the amount a heavy drinker will consume. Heavy-drinking smokers in a laboratory setting were much less likely to drink after taking the drug varenicline compared to those taking a placebo, according to the study. The group taking varenicline, sold as a stop-smoking aid under the name **Chantix**, reported feeling fewer cravings for alcohol and were

less intoxicated when they did drink. They were also much more likely to remain abstinent after being offered drinks than those who received a placebo. **Yale School of Medicine Associate Professor of Psychiatry Sherry McKee**, lead author of the study, anticipated that varenicline will likely enter clinical trials as a primary treatment for alcohol abuse.

**PROTEIN SCIENCES MANUFACTURES SWINE FLU VACCINE.** Meriden-based **Protein Sciences Corp.** (PSC) reported it has developed a vaccine for the swine flu (**PanBlok®**). The company expects to begin manufacturing in early June and will be able to produce 20,000 to 30,000 doses of vaccine per week. PSC uses modern technology to create the vaccine from genetic code rather than from the live influenza virus. The highly purified vaccine does not require the use of thimerosal or antibiotics and is low in endotoxins, the company reports.

**MANKIND SEEKS APPROVAL FOR NOVEL INSULIN DRUG.** Danbury and Valecia, CA-based **MannKind Corporation** submitted a New Drug Application to the US Food and Drug Administration for approval of its insulin drug **AFRESA®** and the **AFRESA® Inhaler** for the treatment of adults with type 1 or type 2 diabetes mellitus for the control of hyperglycemia. **AFRESA®** is an ultra-rapid-acting insulin. MannKind reports that the pH-sensitive **AFRESA®** particles immediately dissolve upon contact with the lung surface, releasing insulin monomers that rapidly enter the bloodstream. **AFRESA®** achieves peak insulin levels within 12-14 minutes of administration, effectively mimicking the release of meal-time insulin observed in healthy individuals, but which is absent or impaired in patients with diabetes.



### Business & Industry

**UTC JOB CUTS, THE F-22, THE F-35.** **United Technologies Corp.** announced in March that it would cut 11,600 jobs worldwide in 2009. UTC **Chief Executive Officer Louis Chenevert** followed that announcement with another saying that 3,000 job cuts could occur in Connecticut if the F-22 jet fighter program is canceled. UTC's **Pratt & Whitney** division builds the F-22 engines, as well as engines for the new generation of F-35 Joint Strike Fighter. Most of the engine assembly work is performed in Middletown. In April, Air Force officials announced that they would not recommend including the F-22 in the 2010 budget. In a *Washington Post* Op Ed article, senior Air Force officials wrote: "Analysis showed that overlapping F-22 and F-35 production would not only be expensive, but that while the F-35 may still experience some growing pains, there is little risk of a catastrophic failure in its production line." In May, Pratt & Whitney announced that the F-135 engine, which will go into the F-35s, has proven it can meet diverse aircraft requirements. "The engine demonstrated 41,100 pounds of vertical thrust against our requirement of 40,550 pounds," said **Warren Boley**, vice president, Pratt & Whitney F135/F119 Programs.

**PFIZER SHIFTS FOCUS, ANNOUNCES REORGANIZATION.** In April, **Pfizer Inc.**, announced reorganization plans to follow the completion of its buyout of New Jersey-based rival **Wyeth**. Pfizer, with research and development facilities in **Groton** and **New London**, said it will form two main research units—traditional pharmaceuticals and cutting-edge biotechnology drugs. 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

combined company will have nine businesses, including biotech, primary care and consumer health. Earlier in the year, Pfizer said it would halt development of two medicines in final human testing for fibromyalgia and generalized anxiety disorder, and shift funding to drugs with more market potential. Pfizer's cholesterol drug Lipitor—representing more than a quarter of the company's total revenues—is expected to lose patent protection in November 2011.

**ALEXION SWAPS EQUITY FOR DEBT.** Cheshire-based **Alexion Pharmaceuticals Inc.** announced in April that it issued about 3 million shares of common stock in exchange for \$46.7 million in bonds held by one of its principal debtholders. According to a Securities and Exchange Commission filing, the company will not receive cash proceeds in exchange for its 1.375% convertible senior notes due 2012, beneficially owned by Citadel Equity Fund Ltd. The transaction trimmed the outstanding balance of the notes to \$50.5 million, Alexion said. The company said it may do more debt-equity exchanges if and when favorable opportunities arise.

**ROCKY HILL FIRM GETS \$1M FROM STATE, BANK.** **Harrington Engineering Inc.** in Rocky Hill is to receive \$1 million in financial support from the **Connecticut Development Authority (CDA)** and **People's United Bank**. The CDA and the bank are partners in the loan, which is to be used as working capital for job growth. A private professional engineering and service provider in Connecticut and Rhode Island, Harrington works with affiliate Legnos & Cramer, also of Rocky Hill, to bundle "green" designs with professional service and building offerings.

**EMCOR SUBSIDIARY LANDS USDA CONTRACT.** The **Kilgust Mechanical** subsidiary of Norwalk-based **EMCOR Group Inc.** received a contract to install mechanical systems for the US Department of Agriculture Forest Service in Madison, WI. Kilgust's work is part of the second phase of development of a new multi-use laboratory for the USDA Forest Products Lab, adjacent to the University of Wisconsin-Madison campus.

**COVIDIEN SUES RIVAL IN PATENT FLAP.** North Haven-based healthcare products maker **Covidien Ltd.** sued a competitor for allegedly infringing on one of Covidien's patents. Covidien filed suit in Delaware federal court against Davol Inc., a subsidiary of C.R. Bard, claiming Davol's brand of mesh fixation and applicator device breached Covidien's US Patent No. 6,562,051. Covidien asked the court to ban Davol from continuing to make and sell its Sorbafix device, as well as for compensatory damages.



### Communication

**BROADCASTING CONVERSION DEADLINE IN JUNE.**

Most Connecticut television stations delayed conversion of their broadcast signals to digital from analog to give viewers more time to prepare for the switch. A few stations made the conversion on February 17, according to the **Connecticut Broadcasters Association**. Those stations are: **WEDW Bridgeport (PBS)**, **WUVN-TV 18 Hartford (Univision)** and **WHPX-TV 26 (Independent)**. The remaining stations in Connecticut will make the transition on or before the extended deadline of June 12.



### Education & Cognition

**PROGRAMS TARGET MIDDLE SCHOOL GIRLS.** Several new programs in the state encourage girls to pursue the often male-dominated science, technology, engineering and mathematics

(STEM) fields. **St. Joseph College** in West Hartford launched a program called GO-GIRL, "Gaining Options: Girls Investigate Real Life." In January, the **Connecticut Technology Council** launched **Girls of Innovation** to connect students interested in technology fields with women working in the state's technology community. Connecticut also has recently joined the National Girls Collaborative Project, a clearinghouse for information about STEM programs for girls. Education in STEM subjects has long been considered important to boosting Connecticut's workforce.

**DONATION FOR WATERBURY NURSING SCHOOL LAB**

The nursing program at **Naugatuck Valley Community College** received a \$30,000 donation from the nation's leading dialysis network to equip the college's new nursing simulation lab with state-of-the-art training tools. Fresenius Medical Care North America, based in Waltham, MA, made the donation. Fresenius hires NVCC nursing graduates and provides extensive dialysis treatment training for nurses in the greater Waterbury region.



### Energy

**RESIDENTS CAN SELECT ENERGY SUPPLIER, SAVE MONEY.**

The **Department of Public Utility Control** has an option available via its website, CTenergyinfo.com, whereby customers can select their own energy supplier and save money. The service allows customers to compare Generation Service Charge (GSC) rates.

**Connecticut Light & Power** and **United Illuminating** encourage customers to compare rates and choose a supplier that can help reduce costs. The site also features the CT Power Update Graph, a real-time report showing the amount of electricity in use on Connecticut's electrical power grid, the day's forecasted demand and past seasonal peak demand.

**GENCONN DEAL REACHED.** **GenConn Energy**, a 50-50 joint venture between **NRG Energy, Inc.** and **The United Illuminating Company (UI)**, a subsidiary of **UIL Holdings Corporation**, reached a milestone in the development of its peaking generation projects by closing on \$534 million of project financing. The two 200-megawatt (MW) projects, located at NRG's existing sites in Milford and Middletown, received financing through a bank syndicate of nine major lending institutions. The GenConn project financing includes a seven-year, project-backed term loan and a five-year working capital facility, which together total \$291 million. In addition, UI and NRG have each closed an equity bridge loan of \$121.5 million, which together total \$243 million. The combined financing package, which is supported by 30-year contracts approved by the **Department of Public Utility Control**, will allow for the completion of these important construction projects and benefit Connecticut energy consumers.

**STRATEGY FOR GROWING SOLAR IN CT.** The **Long-Term Sustainable Solar Strategy Workgroup**, a 12-member group led by the **CT Clean Energy Fund** and the **Department of Public Utility Control**, released a report in April entitled "Sustainable Solar Strategy for Connecticut." The report was requested by the legislature and presents a strategy for Connecticut intended to "grow solar" through a set of programs and initiatives designed to reduce existing barriers and provide stable funding for solar energy development. The report recommends that Connecticut set a broad goal of 300 MW of installed solar by 2025. Strategies to meet this goal include continuing existing program offerings, such as solar leases and incentives to enable residents and small commercial customers to purchase solar PV systems. The full report is available at [www.ctcleanenergy.com](http://www.ctcleanenergy.com).

# IN BRIEF

## Science and Engineering Notes from Around Connecticut

**NU EXTENDS CONTRACT WITH QUANTA.** Northeast Utilities announced in February that it added two years and \$200 million to its contract with a Houston engineering-construction firm overseeing the expansion of NU's New England electric transmission network. The original five-year, \$750 million contract with Quanta Services Inc. was to expire in 2013.



### Environment

**PUBLIC LANDS COULD HELP PAY THEIR WAY.** A study by the Yale University School of Forestry & Environmental Studies calculated that the state could sustainably harvest more than twice the amount of timber from public lands than it currently does, doubling revenue from timbering to roughly \$1 million or more each year. The October 2008 report by Aaron Holhl and Chad Oliver of Yale Forestry's Global Institute for Sustainable Forestry concluded that 102,000 acres of public lands could yield at least 6 to 7 million board feet per year indefinitely while continuing to be healthy. That would be more than twice the current annual harvest on that land. The study is available at [www.ct.gov/dep/forestry](http://www.ct.gov/dep/forestry).

**MONEY FROM GE TO RESTORE STREAMS.** The state Department of Environmental Protection with the United States Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration (NOAA) issued the *Housatonic River Basin Draft Natural Resource Restoration Plan, Environmental Assessment and Environmental Impact Evaluation for Connecticut* (the Draft Plan) in early March. The Draft Plan identifies 27 projects for which funding is recommended, including fish passage to restore a state endangered fish, the preservation of floodplain lands, and creation of new canoe and kayak launches, trails and camping areas. The estimated cost of the projects is \$7 million. Funding for the proposed projects comes from a 1999 settlement with General Electric (GE). The river was harmed by the release of PCBs from the GE facility in Pittsfield, MA. The interest-bearing fund has now grown to just over \$9 million. The Natural Resource Trustee SubCouncil for Connecticut is responsible for allocating the funds. Visit [www.housatonicrestoration.org/](http://www.housatonicrestoration.org/) for more information.

**FEWER BATS MEAN MORE MOSQUITOES.** White Nose Syndrome (WNS) was more severe in Connecticut bats this winter than last, the state Department of Environmental Protection (DEP) reported, resulting in expectations of a dramatic reduction in the state's bat population this summer. Visits to two major hibernation areas revealed that 80-90% of the bats have died from the syndrome. The cause of WNS is still unknown. The decreased bat population will result in more mosquitoes and other insects this summer, the DEP said. DEP would like to hear from people about changes in the number of bats they are seeing this summer compared to last year or bat colonies that once existed and do not return to their previous homes (860) 675-8130.

**FEDERAL FUNDS TO HELP REDUCE STATE FLEET EMISSIONS.** The US Environmental Protection Agency awarded \$50,000 to the state Department of Environmental Protection (DEP) to help refit part of the state's fleet of diesel-powered maintenance equipment with advanced pollution control technology. DEP will install diesel oxidation cata-lysts on 13 heavy-duty diesel engines in the maintenance fleet and up to four pieces of construction equipment. DEP has also teamed with the state Department of Transportation to install up to seven diesel particulate filters on air compressors used on highway construction sites around the state. The technology is shown to reduce particulate emissions by 90% and 20%, respectively.

**\$48 MILLION IN STIMULUS FOR WATER, SEWER PROJECTS.** Connecticut is to receive \$48.5 million in federal stimulus funds to help dozens of municipalities repair and update aging water and sewer infrastructure. Governor M. Jodi Rell said projects were selected after an extensive public comment period. The \$48.5 million in stimulus funds from the American Recovery and Reinvestment Act of 2009 (ARRA) provides an additional \$85 million for clean water projects because of the "leveraging" benefit of the Clean Water Fund. Including bonding, the state now has \$270 million available for clean water projects. Communities chosen for clean water projects range from the state's largest—Bridgeport—to smaller towns such as Marlborough and New Hartford. State officials say many of the projects are deemed "shovel-ready," meaning they have obtained all the necessary permits and are ready to go out to bid.



### Food & Agriculture

**BELIEFS ABOUT CAUSES OF OBESITY AFFECT POLICY SUPPORT.** Research led by Yale School of Public Health Assistant Professor Colleen L. Barry found that people who view growing rates of obesity as the result of bad individual choices are less likely to back a range of potential public health responses such as changing school lunch programs and food labeling or imposing taxes on junk food. Conversely, those who see obesity as the consequence of external factors such as public manipulation by the food and beverage industry or the lack of healthy, affordable food in certain neighborhoods are more likely to back government intervention in the form of new health policies and programs.

**BARBERRY PLANTS, CLIMATE AND TICKS.** Scientists Jeffrey Ward and Scott Williams at The Connecticut Agricultural Experiment Station published a paper showing that the invasive barberry plant may increase the tick population. In 2008, a sampling of areas with dense barberry showed an average of 496 ticks infected with the bacterium that causes Lyme Disease, whereas areas with little or no barberry showed an average of 89 ticks. Ward said the higher humidity levels observed in barberry patches may increase tick survival. Ward and Williams are conducting low-impact methods of removing barberry from forested areas. The paper will be published in an upcoming issue of *Environmental Entomology*. The Experiment Station's 2008 Tick Testing Summary is available at [www.ct.gov/caes](http://www.ct.gov/caes). Another study by Yale researchers, in collaboration with those from other institutions, determined that climate impacts the prevalence of Lyme Disease. Deer ticks live for two years and obtain one blood meal during each of their three stages of life. In the moderate climate of the northeastern United States, larval deer ticks feed in the late summer, long after the spring feeding of infected nymphs. This long gap between feeding times correlates to more cases of Lyme Disease reported in the Northeast. The Yale paper appears in the April issue of *Applied and Environmental Microbiology*.

**THE SECRETS OF SALMONELLA'S STEALTH ATTACK.** A single crafty protein allows the deadly bacterium *Salmonella enterica* to both invade cells lining the intestine and hijack cellular functions to avoid destruction, Yale researchers reported recently in the journal *Cell*. Salmonella causes disease when it takes control of cells lining the intestinal track using its own specialized "nano-syringe," called a type III secretion system. Using this structure, Salmonella injects bacterial proteins that mimic proteins of the host cell and help the pathogen avoid destruction. The study, led by senior author Jorge Galan, chair of microbial pathogenesis at Yale, describes the crucial role that a bacterial protein called

# IN BRIEF

## Science and Engineering Notes from Around Connecticut

SopB plays in both Salmonella's forced entry into the cell and its subsequent internal camouflage act.

**NEW NOAA FISHING RESTRICTIONS.** New interim fishing measures from the National Oceanic and Atmospheric Administration (NOAA) took effect May 1. NOAA said that the rules—designed to reduce overfishing and rebuild Northeast groundfish stocks while balancing economic and conservation concerns—are a step toward ending overfishing by 2010, as required by the Magnuson-Stevens Act. The new rules include a reduction in the number of days fishermen can fish, and place tighter restrictions on keeping southern New England winter flounder, and northern windowpane flounder and ocean pout, while allowing healthy haddock populations to be fished more aggressively. Find out more at [www.noaa.gov](http://www.noaa.gov).



### Health

**\$2.5 MILLION IN STIMULUS FUNDS FOR CHILDHOOD IMMUNIZATION.** Governor M. Jodi Rell announced that the state's childhood immunization program would receive over \$2.5 million in federal stimulus funds. The **Department of Public Health** plans to use the federal funds to purchase rotavirus vaccine for children in Connecticut. Rotavirus infection in infants and young children can lead to severe diarrhea and dehydration and is responsible nationwide for 200,000 emergency room visits, 55,000 to 70,000 hospitalizations and as many as 60 deaths. In 2007, Connecticut had the nation's fourth highest rate of childhood immunization, with an 86% coverage rate for the basic immunization series among children 19 to 35 months of age.

**PHARMACY STUDENTS HELP MANAGE MEDS.** Students and faculty in the **University of Connecticut School of Pharmacy** are helping physicians manage their patients' medications to avoid potentially dangerous drug interactions and make sure patients are complying with their medication directives to improve their health. At four locations around the state, pharmacy faculty and final year pharmacy students are working together to manage underserved, uninsured patients suffering from persistent health problems. Individuals with diabetes, high blood pressure, high cholesterol, cardiovascular disease, asthma, chronic pain due to arthritis or osteoporosis, and those participating in smoking cessation programs are just some of the patients ideally suited for this kind of medication therapy management, says **Marie Smith**, head of the pharmacy practice department in the School of Pharmacy. UConn is working with the **Connecticut Pharmacists Association** and other groups to expand the clinical pharmacist model to improve health care in other venues across the state.



### High Technology

**NANOTECHNOLOGY HOLDS PROMISE FOR STD DRUG DELIVERY.** Yale researchers describe a breakthrough in safe and effective administration of potential antiviral drugs—small interfering RNA (siRNA) molecules that silence genes, the first step in development of a new kind of treatment for sexually transmitted diseases (STDs). The work is reported in *Nature Materials*. Using densely-loaded nanoparticles made of a biodegradable polymer known as PLGA, the researchers created a stable "time release" vehicle for delivery of siRNAs to sensitive mucosal tissue like that of the female reproductive system. They found that the particles, loaded with the drug agent, moved effectively in two important

ways, penetrating to reach cells below the surface of the mucosa and distributing throughout the vaginal, cervical, and uterine regions. The siRNAs stayed in the tissues for at least a week and knockdown of gene activity lasted up to 14 days. "RNA interference is a promising approach for prevention and treatment of human disease," said lead author **Kim Woodrow**, Yale postdoctoral fellow in **Yale's School of Engineering & Applied Science**.

**CTC'S 2009 FASTTRACK COMPANIES.** The **Connecticut Technology Council** announced its 2009 class of FastTrack companies—emerging Connecticut technology companies singled out as likely to achieve significant revenue growth in the next year and beyond. These companies are paired with mentors, introduced to investors as appropriate, and assisted in the selection of screened service providers where needed. The selected companies are: **Axxun Inc.** (application development and runtime engine); **Control Station Inc.** (process control solutions for manufacturers); **Core Informatics LLC** (laboratory information management systems software); **Geezeo** (personal finance software website); **PageFad LLC** (sports games for online social networks); **Retail Optimization Inc.** (analytics for retail companies); **RemoTv Inc.** (patent pending technology that can stream any media, in any format, to any device); **SeeClickFix** ([www.seeclickfix.com](http://www.seeclickfix.com)—a website that encourages citizen involvement in local issues and government); and **SyferLock Technology Corporation** (data, networks and identity security).



### Transportation

**CHARGING STATIONS FOR PLUG-INS.** In April, **Northeast Utilities** (NU) said it was in the initial stages of developing a charging infrastructure for plug-in electric vehicles in Connecticut and Massachusetts. In an application for a US Department of Energy (DOE) grant, two NU operating companies, **Connecticut Light & Power** and **Western Massachusetts Electric**, propose to build a network of 575 charging stations over the next two years. Berlin-based NU awaits DOE's decision on whether it will put forward \$693,750 for the estimated \$1.4 million project. The plan calls for a geographically diverse combination of home-based, workplace and publicly-accessible sites in the utilities' existing service territories. The companies are collaborating with New England-based **Environment Northeast**, the town of **West Hartford**, and the **Greater New Haven Clean Cities Coalition**, on key aspects of the project.

**DEPARTMENTS RELEASE JOINT RADIONAVIGATION PLAN.** Earlier this year the US Departments of Transportation, Defense, and Homeland Security released the 2008 Federal Radionavigation Plan (FRP). The plan describes federal policy for operating and regulating common-use radionavigation systems with the goal of improving both national security and the safety and efficiency of the nation's transportation system. The FRP addresses federal radionavigation systems used in positioning, navigation and timing applications and suggests how existing systems may be consolidated and improved. It also aims to strengthen the mix of civil and military systems that will advance the nation's transportation infrastructure by increasing its capacity to move people and products safely and efficiently. Systems addressed in the plan include: GPS and GPS Augmentations; Long Range Navigation; Very High Frequency; Omni-directional Range; Distance Measuring Equipment; Tactical Air Navigation; Instrument Landing System; Microwave Landing System; and Aeronautical Nondirectional Radiobeacons.

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

### ◆ ‘New Paradigm’ Needed for Renewal of US Sustainable Critical Infrastructure Systems

A new report from the National Research Council suggests that a new paradigm is needed for the renewal of the nation’s critical infrastructure systems such as water, wastewater, power, transportation, and telecommunications. The report describes a framework for identifying new approaches, technologies, and financing mechanisms to develop sustainable systems for the 21st century. The United States should develop a broad national vision, focus on providing essential services, and use collaborative, systems-based approaches, according to the report.

[http://www.nap.edu/catalog.php?record\\_id=12638](http://www.nap.edu/catalog.php?record_id=12638)

### ◆ Federal Government Should Give Greater Support to Decision Makers Coping With Climate Change

Many state and local officials and private organizations are basing decisions such as how to build bridges or manage water supplies on the assumption that current climate conditions will continue, but that assumption is no longer valid, according to a new report from the National Research Council. To produce the climate information these decision makers need and to deliver it to them effectively, federal agencies such as the National Oceanic and Atmospheric Administration and the Environmental Protection Agency should expand activities in these areas, the report says.

All federal agencies should follow several key principles in supporting decision makers who are facing the effects of climate change. Among the principles suggested in the report are ensuring that agencies’ efforts are driven by the needs of end users in

## Mosquitoes (from page 2)

trapped near NYC area.” On September 21, the GAO said the Experiment Station “reports isolating virus from brain tissue of a dead crow and from mosquitoes.” By September 24, it was evident through more sophisticated and specific testing that the infectious agent was not St. Louis encephalitis virus. Instead, it was identified as a virus related to Kunjin virus and West Nile virus. The next day, the CDC reported, “West Nile virus confirmed in (bird) specimens obtained from The Connecticut Agricultural Experiment Station.” As a result of these activities, the Experiment Station, using well-practiced testing techniques in a single facility in New Haven, was fully prepared to address encephalitis virus issues.

This first outbreak was reported in a paper entitled “Isolation of West Nile virus from Mosquitoes, Crows, and a Cooper’s Hawk in Connecticut,” co-authored by Anderson, Andreadis, and Charles R. Vossbrinck from the Experiment Station and colleagues at Yale University and the University of Connecticut; the paper, published in the December 17, 1999 issue of *Science*, contained the first peer-reviewed reports on West Nile virus in the United States.

### *Monitoring Procedures*

The state’s mosquito monitoring program begins each year with setting of two types of traps to increase the likelihood of collecting a wide range of species. One type is baited with light (a small incandescent bulb) and carbon dioxide in the form of dry ice, while the other is baited with a hay infusion. Each day, six field assistants set new traps and collect mosquitoes caught during the previous night at some of the 91 trapping locations throughout the state. Trapping generally occurs at a particular site about once each week. Another six workers, including experienced technicians John Shepard and Michael Thomas, visually identify the mosquitoes as they arrive, immobilized by chilling, from the field. Identification is made using stereo dissecting microscopes and diagnostic keys written by Andreadis, Thomas and Shepard and published in an *Identification Guide to Mosquitoes of*

the field, not by scientific research priorities, and creating close ties between the agencies and the scientists who produce climate change information as well as the practitioners who use it. The report urges expansion of federal research to generate the information regional and local decision makers need, as well as a new federal initiative to identify and serve decision makers such as county planners, who may not be served by particular agencies.

[http://www.nap.edu/catalog.php?record\\_id=12626](http://www.nap.edu/catalog.php?record_id=12626)

### ◆ IOM Releases Guide on Pandemic Flu

Cases of the novel influenza strain of swine origin—known as H1N1—that spread rapidly through Mexico in April 2009 are now appearing around the globe, and pandemic response plans are being activated to meet the threat to public health.

In the past several years, the Institute of Medicine has released a number of reports and workshop summaries related to some of the major policy issues that arise when confronting pandemic influenza and other infectious disease threats similar to the current spread of H1N1 influenza. IOM has put together a guide, available online, to highlight information from these reports that could be useful for pandemic planning and response in the following areas:

- Communicating with and engaging the public
- Use of masks and personal protective equipment
- Use of antiviral drugs and vaccines
- Outbreak mitigation (e.g., social distancing, school closures)
- Surveillance, research, and evaluation during a pandemic

<http://www.iom.edu/?id=66154>

*Connecticut (CAES Bulletin 966, 2005).* The mosquitoes are separated according to collection site, trap type, and species, and pooled in groups of 1 to 50 for virus testing.

In 2003, the Experiment Station completed construction and put into operation a new, state-of-the-art Biosafety Level 3 laboratory with expanded capacity to handle mosquitoes and arboviruses. To begin the testing, mosquitoes are placed into flasks containing vero cells—cultured monkey cells—in which viruses grow. These flasks are incubated at 35°C. in the presence of 5% carbon dioxide and examined daily for virus growth for up to seven days. “If there is a virus present, it will typically show up in 3-5 days. The contents of the cell culture appear cloudy and under a microscope, destroyed cells can be seen,” Andreadis said.

Philip Armstrong, the Experiment Station virologist responsible for the virus isolation and identification, has developed an array of molecular techniques using polymerase chain reaction amplification (PCR) to identify nine different viruses that are known to circulate in Connecticut. Depending upon the location and time of year, a sample will be tested successively for the most likely virus until positive identification is made. If EEE or West Nile virus is found, Andreadis immediately reports the results to the state Department of Public Health. In addition, the sampling is stepped up to two to three times per week at the location where the virus was found. Decisions upon whether to initiate mosquito control are made by local officials and the state Mosquito Management Team, which includes scientists from the Experiment Station and officials of the DPH and the Department of Environmental Protection.

In addition to surveillance activities, the Experiment Station maintains an aggressive research program on mosquitoes and mosquito-associated diseases. Goudarz Molaei, a molecular biologist, uses

(Mosquitoes, back page)

## Mosquitoes (continued from page 7)

PCR methods to amplify DNA to identify the source of blood found in engorged mosquitoes. From this information, the potential of a particular species to serve as a transmitter of encephalitis viruses can be further estimated. If a species rarely feeds upon humans or other mammals, it is less likely to be a public health risk. This type of testing determined that the American Robin is the major avian reservoir of West Nile virus in this region, not the crow as originally suspected after deaths of thousands of crows occurred simultaneously with the appearance of West Nile virus in the state. *Discover* magazine in a special issue on the Year in Science recognized this finding by the Experiment Station as one of the top 100 science stories of 2005.

The Experiment Station is always on the watch for exotic mosquitoes which make their way into the state, and ready to assess their potential for spreading viruses. After four adult females of the East Asian mosquito *Ochlerotatus japonicus* were trapped on Long Island and New Jersey in 1999, the Experiment Station conducted a statewide survey to find out if the species had reached Connecticut. Andreadis, Anderson and others found it was established throughout the state, occurring in a variety of natural and artificial containers, including used tire casings, bird baths, plastic milk cartons, vinyl tarpaulins covering swimming pools or woodpiles, tree holes, subterranean catch basins, and similar habitats. The new species was also found to feed upon humans and guinea pigs, and its ability to feed on birds makes it a potential bridge vector of West Nile virus between birds and humans. Ongoing studies have found that this mosquito is a rapid and efficient colonizer and is reducing the abundance of other species in these habitats. Another exotic—the Asian tiger mosquito (*Aedes albopictus*)—was found at a tire recycling plant in northeastern Connecticut in July 2006, but studies by Experiment Station researchers found that it failed to successfully overwinter.

Although the primary goal of the Connecticut mosquito surveillance program is to assess the risk of known threats such as West Nile



*Theodore Andreadis at the electron microscope used to make the first image of the West Nile virus in the United States. (Photo: Paul Gough)*

virus and EEE, Andreadis noted that “In the unlikely event another foreign mosquito-borne pathogen should be accidentally or intentionally introduced to the region, we would be in a very good position to detect it.”

“Everyone agrees that the finding of West Nile virus was a wake-up call for potential future epidemics. Nobody would have predicted its establishment and rapid expansion across North America. There have been nearly 30,000 cases in the United States and to date over 1,000 people have died from an encephalitis virus that was not even known in North America until just 10 years ago,” Andreadis said.

—**Paul Gough, science writer.**

**Information on the mosquito monitoring program, including historical and current data, is available at [www.ct.gov/CAES](http://www.ct.gov/CAES).**

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

DEEP RIVER, CT 06417  
PERMIT 155  
US POSTAGE PAID  
PRESRT STD

CONNECTICUT ACADEMY OF SCIENCE AND ENGINEERING  
179 Allyn Street  
Hartford, Connecticut 06103-1422  
**Bulletin** of the