

# Bulletin *of the* CONNECTICUT ACADEMY OF SCIENCE AND ENGINEERING



Volume 30,1 / Spring 2015

## The Jackson Laboratory for Genomic Medicine: Changing the Landscape of Bioscience in Connecticut

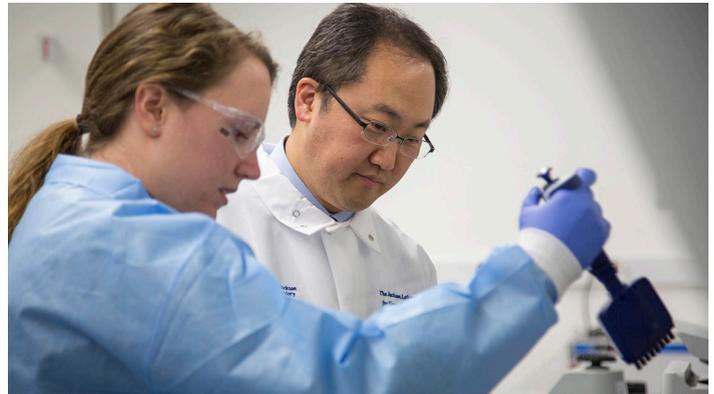
While it's easy to see how The Jackson (JAX) Laboratory for Genomic Medicine has physically changed the landscape of the UConn Health Center campus in Farmington, of greater significance is how JAX Genomic Medicine is changing Connecticut's expanding bioscience landscape.

JAX Genomic Medicine opened the doors of its new facility in October, 2014. The building's biology and computational lab space is configured to encourage collaboration among scientists and technicians and can be easily rearranged to accommodate new research program space requirements. There is enough space for 330 employees to collaboratively work together; part of JAX's deal with the state is to hire at least 300 researchers and staff by 2020.

Charles Lee, JAX scientific director and professor, sees several advantages to JAX's physical and collaborative proximity to the UConn Health Center. "We are bringing in the human, clinical component and medical focus to JAX Genomic Medicine in Connecticut. Our clinically certified diagnostic lab is a place where new technologies and assays (analytic procedures) are run on-site, on patient samples, to better inform physicians how to treat patients. When we develop a new assay, we don't have the bureaucratic barriers that exist elsewhere. JAX Genomic Medicine can implement [an assay] in months rather than years on human samples, then send the test results directly to the patient's physician," he said.

JAX Genomic Medicine's financial incentive to locate in Connecticut was the direct result of Bioscience Connecticut, spearheaded by Governor Dannel P. Malloy and approved by the General Assembly in 2011. JAX received \$192 million for construction, and another \$99 million to subsidize its research operating costs for the first decade.

But it wasn't just the money that prompted JAX to come to Connecticut. Another powerful incentive was the opportunity to form a powerful alliance of scientific, medical and economic partnerships with the state, UConn, the UConn Health Center and Connecticut hospitals.



*Eliza Cerveira, research assistant in Dr. Lee's lab, shows Dr. Lee the BioRad Digital PCR system and how to generate droplets from a test DNA sample. [Graphic: The Jackson Laboratory for Genomic Medicine]*

This alliance was further enhanced when new legislation created the \$200 million Connecticut Bioscience Innovation Fund (CBIF) in 2013. CBIF's purpose is to speed up commercialization of Connecticut's bioscience breakthroughs in translational research, emerging technologies and new companies. Ripple effects of this funding are expected to expand educational opportunities and innovation in science, technology, engineering and math (STEM) disciplines throughout the state's education system.

Although JAX Genomic Medicine is new to Connecticut, it is actually an expansion of The JAX Laboratory, an independent, nonprofit biomedical research center. Founded in 1929, and located in Bar Harbor, Maine, The JAX Laboratory is an award-winning, internationally respected, mammalian genetics research institute and a National Institute for Health (NIH) designated Cancer Center with NIH centers of excellence in systems genetics and aging.

*(See Jackson, page 2)*

## Keynote Address at CASE Annual Meeting and Dinner - May 19



### *A Conversation: Edison Liu, President and CEO, The Jackson Laboratory Talks with Dan Haar, Columnist, The Hartford Courant*

It was considered a coup in 2012 when The Jackson Laboratory (JAX) convinced Edison Liu, an international leader in cancer biology, genomics, human genetics and molecular epidemiology, to lead their world-renowned organization and establish a new research facility dedicated to the emerging field of genomic medicine.

Out of the 90 candidates interviewed, Liu had the distinction of being the first. His interviews with JAX's search team took place via teleconferences from Singapore, where he is the founding executive director of Singapore's Genome Institute, with an impressive track record of building it in less than 10 years from a staff of three into a major research institute of 27 laboratory groups and a staff of 270.

*(See Liu, page 7)*

Rapid advancements in genome sequencing technology are advancing the understanding of our “code of life.” As JAX Genomic Medicine’s Site Director, Yu Hui Rogers, explains, “The genome can be likened to a book that is encoded with your life and written using four letters A, C, T, and G. These four letters form words (codons), and the words form sentences (genes). The entire book is decoded using sequencing technology to read the entire genome in short sentences, one base at a time; a computer [is used] to reassemble them. Since there are three billion bases to read for each genome, it is a rather daunting task. But the task is getting easier, faster and less costly. I was part of the team in 2001 that sequenced and assembled the first human genome. Back then it cost \$300 million and took 14 months to sequence one genome. Since then, human genome sequencing has dropped to below \$10,000, or approaching \$1,000 per genome.”

Anticipating collaborations with JAX Genomic Medicine, UConn created the Institute for Systems Genomics, bringing together the intellectual power of nine of its schools, colleges and JAX. The Institute is a vehicle for fostering collaboration between UConn and JAX in genomics research and education, as well as advancing the mission of Bioscience Connecticut. In 2013, the Institute awarded \$1 million in grants for four interdisciplinary genomics studies, named the Affinity Research Collaboratives (ARC). JAX Laboratory investigators are on each of the research teams. Each team receives \$50,000 per year for five years of studies on chemotherapy toxicity, autism-spectrum disorders, drug interactions and premature infant health.



*The Jackson Laboratory for Genomic Medicine in Farmington.  
[Graphic: The Jackson Laboratory for Genomic Medicine]*

JAX Genomic Medicine also entered into a Collaborative Research Agreement with Connecticut’s Children’s Medical Center to find new approaches to cancer treatment. On a broader scale, Connecticut’s Medical Center, JAX Genomic Medicine and Hartford Hospital are participating in the cancer avatar lab trial—growing tumors in mice from human patients to find the best therapies for each patient’s disease.

JAX Genomic Medicine’s educational outreach efforts are already impacting Connecticut’s educational landscape. In July, JAX Genomic Medicine will offer its “Teaching the Genome Generation” in Connecticut to the state’s STEM teachers. Offered for the first time last year at JAX Laboratory in Maine, this one-week, professional development course combines hands-on advanced laboratory techniques with approaches to genetic analysis.

At the precollege level, genetics has been taught for years, but genomics is such a new field, it has yet to make it into most curricula. JAX Genomic Medicine is working to change that. Among their efforts is their partnership with Farmington High School (FHS), formed late last year. “Right now we are beginning to supplement a genetics unit FHS currently teaches with genomic underpinnings,” says JAX Associate Program Director for Genomic Education Walter Nakonechny. The JAX 10-week Summer Student Program for high school and undergraduates, a fixture at the Bar Harbor site, will be offered this summer by JAX Genomic Medicine in Farmington.

Currently, students interested in genomics and microbial systems have the opportunity to pursue a career in research through UConn’s Professional Science Masters (PSM) program. The PSM program draws from JAX Genomic Medicine’s expertise to develop the curriculum and provides research opportunities to PSM students. Students experience what it would be like to be part of a cutting edge genomic research laboratory.

JAX Genomic Medicine comes to Connecticut at a time when genomic-based personal medicine is one of the most rapidly growing fields in the bioscience industry. JAX is counting on that growth to secure additional funding sources for expanding in Farmington to a \$1.1 billion research facility. So far, their presence in Connecticut has ignited dozens of collaborations, partnerships, education programs and research initiatives, among them a collaborative effort on a “next-generation humanized mouse model” involving researchers at Yale and JAX. The project received \$500,000 in funding from the Connecticut Bioscience Innovation Fund, managed by Connecticut Innovations, last November.

Clearly, JAX’s mission “to discover precise genomic solutions for disease and empower the global biomedical community in our shared quest to improve human health” will contribute to better health for all people, while growing Connecticut’s bioscience economy. —  
**Deborah Mearman, freelance science writer**

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# IN BRIEF

## Science and Engineering Notes from Around Connecticut



### Biomedical Research

**MINNESOTA FIRM BUYS WALLINGFORD BIOTECH.** **Bio-Techne Corp**, a life sciences company located in Minnesota, announced in November that it will purchase Wallingford-based biochemical test maker **CyVek** for \$195 million in cash and incentives. **Connecticut Innovations** invested more than \$1.7 million in CyVek over the past five years and is expected to benefit from this sale. CyVek manufactures immunoassays, permitting researchers to measure molecules in blood and other biological materials. Bio-Techne, with more than 1,000 employees and \$358 million in net sales, manufactures purified proteins for researchers and laboratories.

**JACKSON LAB TEAM STUDIES LUNG REGENERATION.** On November 12, the journal *Nature* published an article by **The Jackson Laboratory** professors **Frank McKeon** and **Wa Xian** on lung regeneration, examining potential therapeutic strategies that harness lung stem cells. Focusing on mice infected with the H1N1 influenza virus, researchers noted progressive inflammation in the lung, followed by loss of important lung cell types. However, after several weeks, the lungs recovered, revealing no signs of the previous lung injury. The researchers found that when individual lung stem cells are isolated and then transplanted into a damaged lung, they contribute to the formation of new alveoli, demonstrating capacity for regeneration.

**CT BIOSCIENCE FUND ANNOUNCES AWARDS.** In November 2014, the **Connecticut Bioscience Innovation Fund**, a \$200 million fund established by legislation in 2013 and managed by **Connecticut Innovations**, announced awards of almost \$2 million for four projects. Awards of \$500,000 each went to two projects by **Yale** researchers, one focusing on bone marrow cancer and the other a collaboration between Yale and **The Jackson Laboratory for Genomic Medicine** in Farmington on a “next-generation humanized mouse model” that could revolutionize drug development. Another \$500,000 went to **Tangen Biosciences** in Guilford for research into a mobile, point-of-care molecular diagnostic test for tuberculosis, while the final \$458,000 went to Tolland-based **Loon Medical** for a flexible, Bluetooth-integrated system technology to monitor patients at home.

**NEW BIOSCIENCE ADVOCACY GROUP FORMS.** **The Connecticut Business & Industry Association** (CBIA) has announced formation of a new agency, the **Connecticut Bioscience Growth Council**, to represent biotech and biopharma companies. The Council will offer advocacy support, resources and plans for enhancing the companies’ position with Connecticut and nationally. The council is led by CBIA’s **Paul Pescatello**, a longtime advocate for the biotech industry. “Biotechnology and related industries are a keystone for Connecticut’s future,” Pescatello said in a statement.

**STUDY SUGGESTS ALZHEIMERS, ANXIETY LINK.** On January 28 in the online edition of *JAMA Psychiatry*, **Yale** neuropsychologist **Robert Pietrzak** and his colleagues from the Australian Imaging, Biomarkers, and Lifestyle Flagship Study of Ageing research group published findings indicating that older persons with an increased risk of Alzheimer’s disease due to accumulated amyloid-beta plaques experience more rapid cognitive decline if they also have elevated anxiety symptoms. They assessed levels of amyloid- $\beta$  and several other risk factors for Alzheimer’s disease in more than 300

healthy older adults over 54 months, and found much more rapid cognitive decline over time in subjects with elevated amyloid- $\beta$  plaques who also experienced anxiety, suggesting treatment of anxiety symptoms might mitigate risk for cognitive decline.



### Business & Industry

**CTC NAMES TWO TECH FIRMS ‘COMPANIES TO WATCH.’** **Body Biolytics** of Stonington and **Nature’s Fingerprint** of East Lyme were selected by the **Connecticut Technology Council** (CTC) as two “Tech Companies to Watch” in the coming year. The two firms were the only two companies from southeastern Connecticut chosen for CTC’s eighth annual Innovations Summit. **Body Biolytics** creates software for the wearable technology market that uses body monitors to help determine how people respond to exercise. **Nature’s Fingerprint**, founded by former **Pfizer** scientist **John Jasper**, developed an isotopic technology that helps pharmaceutical companies trace the source of material used in medicines.

**CT FIRM UNVEILS SMALLER FOUR-STROKE ENGINE.** This fall, Bloomfield-based **LiquidPiston** introduced a prototype of its 70cc four-stroke gasoline engine at a conference in Italy. The X Mini is 30% smaller and lighter than comparable four-stroke piston engines. The company says it is now talking with outdoor power equipment manufacturers about potential applications. **Alexander Shkolnik**, president and co-founder of **LiquidPiston**, stated, “Given that this is a brand new engine—and is smaller, lighter and more efficient—it could enable brand new applications that don’t even exist today.”

**TESLA CASE TO PROMPT LEGISLATIVE CHANGE.** On January 13, Representative **Tony Guerrero**, chair of the **Connecticut General Assembly’s Transportation Committee**, reported that his committee will raise a bill to allow Tesla Motors to sell its electric cars directly to consumers, rather than using independent, often family-owned, franchise dealerships. State law in Connecticut prevents a vehicle manufacturer from also being a retailer. Tesla was denied a dealership license in Connecticut, but was allowed to open a repair facility in Milford. The company hopes to receive a Connecticut dealership license to operate its own store.

**UTC DROPS PAS DIVISION.** **United Technologies Corp** announced in January the elimination of its **Propulsion & Aerospace Systems** (PAS) division as part of its efforts to streamline its aerospace operations. **Pratt & Whitney** and **UTC Aerospace Systems** (UTAS) will continue as stand-alone business units. CASE member and Pratt & Whitney President **Paul Adams** will report directly to President & Chief Executive Officer **Gregory Hayes** of UTC, as will **David Gitlin**, who was promoted to president of UTC Aerospace Systems, from his former position as leader of that company’s Aircraft Systems segment.



### Communication

**SEEKING A SUPER-FAST INTERNET.** Forty-six Connecticut municipalities have invited telecommunications and other businesses for ideas to build and finance Internet service at rates of 1 gigabit per second. This is more than 100 times faster than current home speed delivery. Comptroller **Kevin Lembo** and Consumer

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) 571-7143, or contact us at [acad@ctcase.org](mailto:acad@ctcase.org).

# IN BRIEF

## Science and Engineering Notes from Around Connecticut

Counsel **Elin Swanson Katz** are helping lead this effort to attract and keep businesses in Connecticut. Costs have not yet been estimated as officials investigate what is needed to establish a super-fast Internet.

**INCREASED INTEREST IN DMV MOBILE APP.** In December, the **Connecticut Department of Motor Vehicles (DMV)** reported increased downloads of a mobile app introduced in mid-September. The app provides real-time information about waits at DMV offices and for DMV services, and offers practice tests, including a parent quiz on teen driver safety.

**STATE LEADS IN INTERNET SPEED.** An Akamai Technologies report released in January finds **Connecticut** a leader both nationally and globally in Internet speed, with average peak connection speeds of 15.3 Mbps during the third quarter of 2014, putting it in the top three states in the nation. In addition, the state's Internet speeds were faster than every country except Hong Kong, Singapore and South Korea. "This is yet another measure in which Connecticut doesn't just compete with our fellow states when it comes to Internet speed—it blows away the competition," said State Senator **Bob Duff**, former chair of the **Energy & Technology Committee** and current Majority Leader.

**OLDER RESIDENTS KEEPING LANDLINES, WANT OVERSIGHT.** A recent AARP survey of Connecticut adults age 50 and older found that nearly all maintain landline telephone service in their homes, with overwhelming support for consumer protections for all landline customers, regardless of who provides the service. Half of the respondents believe Connecticut's **Public Utilities Regulatory Authority (PURA)** should play a key role in determining how the state's telecommunications market moves from traditional copper-wire networks to new technologies. A large majority of surveyed adults want PURA to oversee the areas of protection it now does, such as emergency preparedness and public safety, including 911 services and ensuring phone service access and reliability.



### Education & Cognition

**SIKORSKY HONORED BY UNH.** Last fall, **Sikorsky Aircraft** received the Exemplary Partner Award from the Professional Advisory Board of the **Tagliatela College of Engineering** at the **University of New Haven** for Sikorsky's extraordinary support of Tagliatela's Engineering program during a five-year partnership. Sikorsky has supported the University of New Haven through programs such as the Engineering and Manufacturing (TEAM) Summer Camp, where high school students are introduced to engineering product development through hands-on engineering projects.

**SCHOOL 'ADOPTS' ROBOT.** **Voluntown Elementary School** adopted a robot to bring the classroom experience to students too ill to attend class. Using telepresence technology, a tablet weighing 1.5 pounds and standing about 12 inches tall is turned into a portable eye. The device, a \$399 Kubi designed by San Francisco-based Revolve Robotics, was set up in the classroom by technology director **Jim Ward** and students. The robot can pan 300 degrees and set sights 45 degrees up or down while being accessed from any computer, tablet or smartphone.

**QUINNIPIAC NURSING STUDENTS WIN GRANT FOR MEDICAL 'GAME'.** Last fall, **Quinnipiac University** announced that Quinnipiac nursing students had won a \$10,000 Robert Wood Johnson Foundation Innovation in Accelerated Nursing Education grant to design an education game about arterial blood

gas analysis. The **School of Nursing** and **Department of Visual and Performing Arts** will partner with **Southern Connecticut State University** for the project. The game will be presented to the Foundation in September 2015.

**DANBURY ROBOTICS TEAM COMPETES.** **Danbury High School Robotics Team E** finished in third place in preliminary match play at a robotics competition held at **Masuk High School** in Monroe in December. Working within the VEX robotics platform, the Danbury team, which qualified for the VEX World Championship for four consecutive years, is competing for a fifth year in Connecticut and New England. The Honors Robotics course at the high school engages students in science, technology, engineering and math.

**'COLLABORATIVE MODEL' GOAL OF KELLOGG GRANT.** CASE member and **Comer School Development Program (SDP)** founder **James P. Comer**, professor at the **Yale Child Study Center**, has been awarded a \$600,000 grant from the W. K. Kellogg Foundation of Battle Creek, Michigan, to advance child-centered efforts in education. Comer's goal is to put into place a collaborative model including a school system (**New Haven Public Schools**), a state university (**Southern Connecticut State**), and SDP, allowing educators to create school environments that integrate student development and academic learning for academic and life success. Comer founded the SDP in 1968. His concept of teamwork has improved the educational environment in more than 500 US schools.



### Energy

**ANCIENT TECHNOLOGY HOLDS PROMISE FOR MERIDEN DAM.** On November 19, Massachusetts-based New England Hydropower Co. announced that it plans to use an ancient Greek technique called "screw generator technology" for Meriden's **Hanover Pond Dam**, saving nearly \$20,000 a year in power costs and property taxes over 20 years. The technology, attributed to the ancient Greek scientist Archimedes, uses a large screw, which will be installed underground next to the dam. Water is diverted into the screw at the top of the dam, forcing the screw to slowly spin, creating electricity. Fish can safely pass through the "large pockets of water" taken in by the screw. The project is the first of its kind in the state, and one of the first in the country, said Christian Conover, chief marketing officer for the company. Before proceeding with the project, New England Hydropower must obtain a permit from the Federal Energy Regulatory Commission. The company hopes to begin construction in the summer of 2015.

**REPORT ASSESSES FUTURE ELECTRIC NEEDS.** A draft assessment of Connecticut's future electric needs released by the **Connecticut Department of Energy and Environmental Protection (DEEP)** on December 11 projects that the amount customers pay for electricity will increase by 63%, from the current 9.8 cents per kilowatt hour to 16 cents per kilowatt hour in 2024. The report calls for increased focus on using distributed generation in the state using methods such as solar energy, fuel cells and combined heat and power systems. "The grid has already changed," DEEP Commissioner **Robert Klee** said. "It's no longer electrons traveling a long distance from a power plant to your home." The integrated resource plan suggests offering **Eversource Energy** (formerly Northeast Utilities and its subsidiary companies) the opportunity to purchase electricity produced through distributed generation.

**CT A 'TOP FIVE FUEL CELL STATE.'** Governor **Dannel P. Malloy** announced in December that Connecticut has been recognized as a "top five" fuel cell state by the US Department of Energy

# IN BRIEF

## Science and Engineering Notes from Around Connecticut

(DOE) along with California, New York, Ohio and South Carolina. The report highlights efforts by **Connecticut Center for Advanced Technology, Inc.**, **Connecticut Hydrogen-Fuel Cell Coalition** and the Northeast region to improve power grid resiliency as well as multi-state fuel cell efforts. The largest fuel cell power plant in the nation (14.9 megawatts) is located in **Bridgeport**.

**NU BECOMES EVERSOURCE ENERGY.** **Northeast Utilities** changed its name to **Eversource Energy** as of February 2 for all subsidiaries including **CL&P** and **Yankee Gas Services** in Connecticut, and other subsidiaries in Massachusetts and New Hampshire. "Energy is what brings us all together, and Eversource reflects the one-company focus we have been driving [forward] the last few years," said CEO **Tom May** in announcing the change.

**MICROGRID FUNDING APPROVED.** The **State Bond Commission** has approved \$5.1 million for the creation of two microgrid projects in **Bridgeport** and **Milford**; the projects will help keep critical buildings and facilities powered when the electric grid goes down. The microgrids provide power for government services and businesses such as police, fire, state and town emergency response centers, shelters, dining facilities, grocery stores, and gas stations necessary during extreme weather events.



### Environment

**COMMON CT SPIDER DEEMED VENOMOUS.** Scientists have determined a common New England spider, the broad-faced sac spider (*Trachelas tranquillus*), appears to be venomous after a woman in Connecticut was bitten. **Charles Vossbrinck**, a scientist at the **Connecticut Agricultural Experiment Station** in New Haven who co-authored a report for the September issue of the *Journal of Medical Entomology*, noted that the bite victim did not suffer serious side effects. This case is only the second confirmed case of envenomation by *T. tranquillus*, with the first one occurring in 1969.

**GREENWICH SCHOOL GOES GREEN.** The **Parkway Elementary School** in Greenwich has been named a **Connecticut Green Leaf School** for promoting environmental sciences, energy conservation and wellness programs for the school community. Parkway is the 66th school in Connecticut to be included in the Green LEAF program, a collaborative effort by the **Connecticut Departments of Education, Energy and Environmental Protection, Administrative Services, and Public Health**, as well as many environmental and educational organizations to support schools in "growing greener." Parkway is also pursuing a US Department of Education Green Ribbon, given to schools that reduce environmental impact and costs; improve the health and wellness of schools, students and staff, and provide environmental education, especially by incorporating STEM, civic skills and green career pathways.

**MATTRESS RECYCLING PLAN OKAYED.** The **Connecticut Department of Energy & Environmental Protection** in January gave permission for the **Mattress Recycling Council** (MRC), a Virginia-based nonprofit, to initiate a statewide mattress recycling plan. The plan will begin May 1 and adds a \$9 recycling fee to each new or renovated mattress and box spring sold in the state. The fees will be given to MRC to be used to pay contractors who collect and recycle mattresses. Connecticut's recycling program will divert that waste from landfills to recycling plants.

**PLUM ISLAND SALE THREATENED.** In January, the environmental group Save the Sound announced it had notified

the US General Services Administration and the US Department of Homeland Security of its plans to block the federal sale of **Plum Island**, claiming the property in Long Island Sound is critical to the welfare of endangered and threatened species. The two federal agencies have 60 days to correct alleged failures to protect the environment or face a lawsuit to block the sale. Save the Sound officials claim the procedures were "fundamentally flawed" because there were no restrictions on what the island could be used for after its sale.



### Food & Agriculture

**FIGHTING BACTERIAL INFECTIONS FROM OYSTERS.** Scientists from the **Connecticut Department of Agriculture** (DOA) announced major progress in preventing bacterial infections linked to oysters in **Long Island Sound**. A specific, virulent form of *Vibrio vulnificus*, a bacteria formerly limited to the Pacific Northwest, recently appeared in the Sound. *Vibrio* infections, associated with raw or undercooked shellfish, can be fatal in individuals with compromised immune systems. The DOA's new plan requires oysters taken from the outbreak area be cooled to an internal temperature of 50°F on board the boat within one hour of harvest. Throughout 2014, there have been no confirmed cases of *Vibrio* illness attributed to Connecticut shellfish, with the overall number of reported cases across the Northeast low compared to recent years. Scientists believe this may be because water temperatures were significantly lower than normal early in the summer.

**STATE CHOSEN FOR USDA PILOT PROJECT.** State officials announced late last year that Connecticut has been selected by the United States Department of Agriculture (USDA) to participate in the Pilot Project for Procurement of Unprocessed Fruits and Vegetables. The program is provided under the federal Agricultural Act of 2014—the Farm Bill. Participating in the program will allow the state to increase its purchases of locally-grown fruits and vegetables for its state-assisted school meal program. The program will be administered by the **Department of Administrative Services' (DAS) Federal Foods** program, whose staff have worked with local school districts and local food producers for many years to provide quality food items as a part of school meals.

**AGRIVOLUTION WINS USDA GRANT.** On December 24, New Haven's **Agrivolution LLC**, announced receipt of a \$73,000 grant from the US Department of Agriculture to work with Connecticut farmers to determine the feasibility of year-round, indoor production. **Richard Fu**, who started Agrivolution while a graduate student at the **UConn** plans to use the grant to research hydroponic techniques with the goal of expanding Connecticut's share of the local produce market beyond berry farming. Part of his project will include work with Connecticut's fuel cell industry to reduce energy costs.

**YALE, LAWMAKERS JOIN FORCES TO SEEK FUNDING.** **Yale School of Public Health** and state and federal lawmakers joined together in December to secure funding for the **Commodity Supplemental Food Program**, designed to provide 3,000 low-income Connecticut seniors with a monthly box of healthy, non-perishable food and nutritional education. The **New Haven Food Policy Council**, a group of residents appointed by the city, and supported by CARE—the **Community Alliance for Research and Engagement**, a Yale research group focusing on social, environmental and behavioral health risk factors—played a large role in arranging funding.

# IN BRIEF

## Science and Engineering Notes from Around Connecticut



### Health

**GATES FOUNDATION TO FUND VACCINE STUDY.** The Bill & Melinda Gates Foundation announced recently that it will provide a \$1.5 million grant to a team of **Yale School of Public Health** researchers headed by **Daniel Weinberger**, assistant professor in the **Department of Epidemiology of Microbial Diseases**, to analyze the effectiveness of a pneumococcal vaccine on different socioeconomic groups. Using data from Latin America, where the vaccine has been tried, the researchers will develop models of the vaccine's potential impact in similar low and middle income communities where the vaccine has yet to be introduced and where there is a lack of high-quality data.

**E-CIGARETTE USE RISING AMONG YOUTH.** A **Yale School of Medicine** study published December 9, 2014, in the journal *Nicotine and Tobacco Research* found that 25% of Connecticut high school students and 3.5% of middle school students have tried an electronic cigarette, with 8.8% of high school students and 1.1% of middle school students in the six-school sample reporting having smoked e-cigarettes within a month of the study. Lead author **Suchitra Krishnan-Sarin**, associate professor of psychiatry at the Yale School of Medicine, noted that e-cigarette use is high and appears to be rising among middle and high school students.

**STATE RANKED FOURTH HEALTHIEST.** According to the 2014 "America's Health Rankings" index published by United Health Foundation, **Connecticut** is the nation's fourth healthiest state. The annual survey ranks states based on categories of behaviors, community and environment, public and health policies and clinical care. The state was ranked low in prevalence of smoking and occupational fatalities rate, and high for immunization of children; challenges include binge drinking, a high rate of preventable hospitalizations and a large disparity in health status by educational level.

**STATE TO GET \$45M FOR HEALTHCARE IMPLEMENTATION.** Connecticut will receive \$45 million from the US Department of Health and Human Services to support the State Innovation Model (SIM) to change the way healthcare is delivered, tracked, and paid for in the state.



### High Technology

**ROTARY CLUB HELPS FUND WEBCAM FOR NICUS.** Last fall, **Connecticut Children's Medical Center** announced it had received a \$10,000 donation from the **Rotary Club of Farmington** to help bring "Angel Eye" webcam technology to Neonatal Intensive Care Units (NICUs) in Hartford and Farmington. The webcams will provide parents of critically ill or premature newborns with a way to bond with their babies during their baby's stay in the NICU, even when parents are not physically present. Farmington is one of six Rotary Clubs that partnered to support this project. The Internet-based Angel Eye NICU Camera system allows parents to see and talk to their babies 24 hours a day, seven days a week from a computer, laptop or mobile device. The secure transmission is HIPAA compliant and the streaming video can be viewed by family members anywhere in the United States and around the world.

**UTRC HONORED WITH R&D 100 AWARD.** Last fall, **United Technologies Research Center** (UTRC) was awarded *R & D Magazine's* R&D 100 Award for two eco-friendly technologies: EcoTuff corrosion inhibitor and a portable aluminum deposition

system (PADS). Both products are designed to prevent and/or repair corrosion on structural metal parts.

**CCAT PARTNERS WITH CRCOG TO BRING CLOUD TECHNOLOGY TO TOWNS.** **Connecticut Center for Advanced Technology, Inc.** (CCAT) announced it will work with the **Capitol Region Council of Governments** (CRCOG) and 18 Connecticut towns during 2015 to demonstrate how cloud technology over the **Connecticut Nutmeg Network** enhances municipal management. Five IT capabilities will be highlighted, including web hosting services, video streaming, voice-over-internet protocol telephony, electronic document management, and an HR portal, through projects coordinated by CRCOG. Funded by the **Connecticut Office of Policy and Management**, the projects are part of the state's **Municipal Opportunities for Regional Efficiencies (MORE) Commission's** goals to help cities and towns reduce costs and increase efficiencies through regional cooperation.

**DATTO FOUNDER NAMED TO '40 UNDER 40' BY MAGAZINE.** **Austin McChord**, founder and CEO of Norwalk-based **Datto**, has been named one of *Connecticut Magazine's* 40 under 40. McChord, 29, founded the global provider of comprehensive data backup in 2007 when he was 22. Since then, the company has expanded to offices in Rochester, New York and Boston, through its acquisition of the company, Backupify. In 2014, the company received \$6 million in state funding from the **Connecticut Department of Economic and Community Development** to help finance the expansion project.



### Transportation

**NEW REPORT CITES NEED FOR ROAD, BRIDGE UPGRADES.** A new report, "Connecticut Transportation by the Numbers: Meeting the State's Need for Safe and Efficient Mobility," published December 23 by the private, nonprofit transportation group The Road Information Program (TRIP), finds that inadequate roads and bridges cost Connecticut drivers \$4.2 billion annually, and as much as \$1,900 per driver in some areas, because of vehicle operating costs, traffic crashes and congestion-related delays. The report finds 41% of Connecticut major urban roads and highways are in poor condition with a third of the bridges structurally deficient.

**TRANSPORTATION IMPROVEMENTS URGED.** Governor **Dannel P. Malloy** dedicated much of his January State of the State Address to a call for improving Connecticut's transportation infrastructure, including highways, rail lines, ports, and bicycle and pedestrian systems, saying "It's time for Connecticut to establish a collective vision for the next 30 years. A vision for a best-in-class transportation system." His plan calls for a "lock-box" to ensure that money raised for transportation is used for transportation. Plans include widening I-95 statewide, building new rail stations, upgrading commuter rail lines, and creating a "statewide, 21st century bus service with real-time updates that commuters can check on their cellphones."

**DEMOLITION OF TERMINAL B BEGINS WITH TIME CAPSULE.** On December 30, a \$15 million demolition on Terminal B at **Bradley International Airport** began with airport officials opening a 63-year-old time capsule located behind the terminal's cornerstone. The capsule contained copies of the laws and regulations governing aeronautics in 1951, pictures of the terminal construction, newspaper articles on Bradley, and official records from surrounding municipalities. In the fall of 2015, the **Connecticut Airport Authority** will start a \$10 million road realignment for a new ground transportation center, scheduled for 2018.

—Compiled and edited by Wendy Swift

# 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)).

## ◆ Analyzing Cancer Risks Near US Nuclear Facilities

*Analysis of Cancer Risks in Populations near Nuclear Facilities: Phase II Pilot Planning* is part of the second phase of a study requested by the United States Nuclear Regulatory Commission to assess the risk of cancer near nuclear facilities in the United States. The Phase 1 study recommended two study designs appropriate for assessing cancer risks. It also recommended a pilot study of seven nuclear facilities to assess the technical feasibility of the recommended study designs. The Phase 2 study is the assessment of cancer risks. The pilot, which is part of the Phase 2 study, is being carried out in two steps: pilot planning and pilot execution. This report, *Phase 2 Pilot Planning*, is a brief report from the National Academy of Sciences that provides an expert committee's advice about general methodological considerations for carrying out a such a pilot study of cancer risks near nuclear facilities.

[http://www.nap.edu/openbook.php?record\\_id=18968](http://www.nap.edu/openbook.php?record_id=18968)

## ◆ Big Data: History, Status, Challenges

This article in the National Academy of Engineering's online journal *The Bridge* outlines the trends of Big Data development from a science and engineering point of view. The writer notes that technologies are lacking for efficient analysis of semi- and unstructured data, and the science of Big Data—called data science—remains almost unknown. This paper calls for data scientists and engineers to work toward breakthroughs on three challenges: (1) transformation of semi- and unstructured data to structured data; (2) advances in systematic modeling to explore the complexity and uncertainty of Big Data; and (3) understanding of the relationship of data heterogeneity, knowledge heterogeneity, and decision heterogeneity. The paper also calls for countries around the world to open governmental data sources so that people can access needed data to change and improve their life.

<http://www.nae.edu/Publications/Bridge/128772/129211.aspx>

## ◆ Overview of Big Data from US Perspective

It is projected that about 5 zettabytes (or  $10^{21}$  bits) of digital data are being generated each year by everything from retail transactions to underground physics experiments to global positioning systems. In the United States, public and private sector programs are being funded to deal with Big Data in all five sectors of the economy: services, manufacturing, construction, agriculture, and mining.

This article presents an overview and analysis of Big Data from a US perspective. The author explains the components of Big Data (acquisition, access, analytics, and application), contrasts traditional and Big Data methods, identifies potential applications of Big Data to the Grand Challenges of the US National Academy of Engineering, and presents remarks on issues specific to each component that warrant attention. Big Data, the author concludes, "have to be regarded as a permanent disruptive innovation."

<http://www.nae.edu/Publications/Bridge/128772/129195.aspx>

## ◆ IOM SMART Vaccines Software Tool Updated to Help Prioritize Vaccine Development

As infectious diseases emerge or re-emerge, new and improved vaccines are needed. The decisions about which vaccines should be developed first can affect the health of millions of people, as well as their quality of life and economic progress. Last year, the Institute of Medicine released version 1.0 of the Strategic Multi-Attribute Ranking Tool for Vaccines (SMART Vaccines), which is a software tool that allows those involved in vaccine research, development, and delivery to prioritize the vaccines most urgently needed in the United States and other countries. IOM, in partnership with the National Academy of Engineering, has updated SMART Vaccines and is releasing a new report that demonstrates its practical applications through case scenarios in collaboration with the Public Health Agency of Canada, New York State Department of Health, the Serum Institute of India, and the Mexico Ministry of Health.

<http://www.nap.edu/smartvaccines/>

*The following Connecticut scientists were recently elected Fellows of the American Association for the Advancement of Science (AAAS).*

**Andrew Arnold** ~ UConn School of Medicine

**Patrick L. Holland** ~ Yale University

**Marina R. Picciotto** ~ Yale School of Medicine

**Nancy Hartman Ruddle** ~ Yale School of Public Health

**Charles Albert Schmuttenmaer** ~ Yale University

## Liu (from page 1)

For Liu, there were many reasons he accepted the position. Among them is JAX's reputation as being the world's only repository of 7,000 genetically defined mice that serve as important genetic models for making discoveries about health and human disease. Knowing that he would be establishing a new genomic medicine research facility was another attractive challenge for Liu. He recognizes the advantages of pairing JAX's strong mouse genetics program with powerful, new genomic technology to find new treatments for human disease. "Genetics and genomics are front and center for all modern biology and medicine in understanding and conquering disease. We are using technology and technology is being developed to understand how a disease starts. Precise medicine is the key because each person is different and many disorders are unique to sub-populations, families and individuals," says Liu.

Liu comes from a family tradition of working in the field of medicine. Both his parents are doctors, having established a family-medicine practice in San Francisco's Chinatown when they moved from Hong Kong to the United States in the 1950s. Following this tradition, Liu began preparing for a career in medicine.

He earned his BS in chemistry and psychology, as well as his MD, from Stanford University. At that time, Liu wanted to guide patients through their battle with cancer. But, that was back in the 1980s and it was a losing battle, with ineffective and severe cancer treatments. About the same time, a door opened into the genetic causes of cancer via the study of the oncogene, a gene with the potential to cause cancer. Liu walked through that door and started honing his skills as a research scientist, examining the genetic causes of cancer.

Liu's career had morphed into a dual track as a physician and scientist. Somehow he found the time to treat cancer patients; research breast cancer; teach and mentor students; and direct other cancer research in progressively larger jobs, starting with the University of North Carolina at Chapel Hill and then at the National Cancer Institute (NCI), where he was responsible for 1,200 employees, including 100 principal investigators.

Clearly, Dr. Edison Liu has the right stuff to lead The Jackson Laboratory. —**Deborah Mearman**

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

## *Coming to a School Near You: Audubon CT's Schoolyard Habitat Program*

Although we have had a snowy winter, many of our feathered friends enjoyed a much warmer season at various sites throughout South and Central America. Birds that we share with our neighbors to the south are beginning to make their way up the eastern seaboard to breeding grounds further north. Along their commute is a network of habitats located in schoolyards, parks and backyards in Connecticut—places where they can rest and refuel. They will also be met by the observant eyes of hundreds of students making connections to nature in their new outdoor classrooms.

This is made possible by Audubon CT's Schoolyard Habitat Program (SYH), which enhances urban green spaces, enriches education for K-8 school children, and creates opportunities for youth to engage in meaningful conservation action and leadership.

Audubon developed a SYH Curriculum Guide, which serves as a companion handbook to the US Fish & Wildlife Service's Schoolyard Habitat Project Guide—the latter focusing on how to design and install a schoolyard habitat, and Audubon's Guide focusing on how to use that habitat as an outdoor classroom. Audubon works with local school districts and the CT Department of Education to fully integrate outdoor learning into the curriculum and to ensure that it is aligned with the CT Core Science Curriculum Framework, Common Core Standards, and Next Generation Science Standards. Numerous opportunities for long-term, inquiry-based investigations in schoolyards provide a foundation for budding scientists.

Even more, the SYH Program increases students' understanding of ecology, enables students to play leadership roles in the develop-



*Students from New Haven's Worthington Hooker Middle School help plant the school's Schoolyard Habitat. [Photo: Audubon CT]*

ment of the schoolyard habitat by using their ideas and drawings for their schoolyard, and engages them in meaningful conservation activities at home, at school, and in their community.

Learn more at <http://ct.audubon.org/> and for more information about Audubon CT's Schoolyard Habitat Program, contact Francesca Williams at [fwilliams@audubon.org](mailto:fwilliams@audubon.org)