

# Bulletin *of the*

## CONNECTICUT ACADEMY OF SCIENCE AND ENGINEERING



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### The Yale Institute for Global Health Bringing Resources Together to Benefit All



Participants in EPI LAMP (Expanded Program on Immunization Leadership and Management Program) visit the Mahama Refugee camp in Rwanda to learn about leadership in complex systems. [Photo by Cecille Joan Avila / Partners In Health]

According to the Centers for Disease Control and Prevention (CDC), “In today’s interconnected world, diseases can spread from an isolated, rural village to any major city in as little as 36 hours.” But global health involves more than communicable diseases. In January 2019, the World Health Organization (WHO) released a list of 10 threats to global health: air pollution and climate change, noncommunicable diseases (including cancer, hypertension, depression, obesity and heart disease); threat of a global influenza pandemic, fragile and vulnerable settings (such as regions affected by drought and conflict); antimicrobial resistance; Ebola and high-threat pathogens; weak primary care; vaccine hesitancy; dengue and HIV.

CASE Member Michael Cappello, professor of Pediatrics and co-director of Yale’s Africa Initiative, has firsthand experience conducting research in West Africa and Latin America. “This work includes field-based epidemiology and laboratory studies focused on the impact of parasitic diseases on maternal child health,” he said. “We also evaluate the effectiveness of deworming programs in endemic settings, and have identified genes associated with anti-parasitic drug resistance. A major reason for our success is the ongoing commitment to bidirectional exchange of students, reagents and resources, which has resulted in a collaboration that is mutually beneficial and based on trust.”

Among the challenges Cappello identifies for global health research are a lack of financial resources and adequate human capacity, especially in biomedical and health-related research. “If faculty can be energized and incentivized to collaborate with colleagues from other disciplines, then it might be possible to make the overall impact of Yale’s effort greater than the sum of its individual parts,” he said.

Yale University has a long history of addressing global health issues and in 2018 announced the formation of the Yale Institute for Global Health (YIGH) to help address the challenges of international research. “Yale has a breadth of excellence and our faculty has been doing great work in global health for years,” said Saad B. Omer, inaugural director of YIGH. “The formation of the Institute now allows us to strategically align and move forward in a coordinated, interdisciplinary way that will maximize our ability to apply

(See *Global Health*, page 2)

### From the National Academies

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

#### ◆ Enhancing Public Health Data for Physical Activity

Despite the extensive benefits of physical activity, most Americans do not meet current public health guidelines. The systematic collection, analysis and interpretation of data or “surveillance” is a core public health function to measure and analyze the prevalence of physical activity at a population level. There is a critical need to develop and implement surveillance systems that effectively integrate measurement of specific activities (i.e., walking) with assessment of environmental factors that influence behavior (i.e., the “walkability”/safety of the community). The study’s major focus was creation of a more robust system of activity surveillance by enhancing what is measured, while recognizing the broad and diverse range of stakeholders with a goal of equity and inclusivity. The resulting 22 strategies are in four categories: children, health care, workplaces and community supports for physical activity.

<https://www.nap.edu/read/25444/>

#### ◆ New Report Urges National Agenda to Improve Mental, Emotional, and Behavioral Health in Children, Youth

A new report from the National Academies of Sciences, Engineering, and Medicine calls for a comprehensive national agenda to improve mental, emotional, and behavioral (MEB) health in children and youth. Rates of depression, suicide and self-harm among young people have been increasing despite advances in research, the report found. New research into factors that influence MEB health, effective interventions, and better ways to implement

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global and local resources, enabling us to address health care inequities and enhance our impact worldwide."

Professor Omer shares the vision of founding deans and CASE members Robert Alpern (School of Medicine), Ann Kurth (School of Nursing) and Sten Vermund (School of Public Health). The three deans and their respective schools are the initial sponsors of the YIGH, but expansion is expected across other disciplines, departments, schools and geographic regions. All agree that the Institute will not compete with ongoing research projects, but will enable, facilitate, promote and build partnerships around the work that is currently being done.

"The Institute offers a 'center of gravity' that links Yale's three biomedical schools," Omer said. "The fact that we are interdisciplinary and focused on research with global impact as a university gives us tremendous strength. We have the reach to apply our resources globally, but also closer to home. We also have the capability to develop programs that inform public policy with regards to the global health agenda. We will ultimately measure our success in terms of the outcomes that actually affect the health of people and our ability to level the playing field and reduce inequities in health care."

Coordinating groups of researchers in a given country is one way the Institute can enhance Yale's impact. "When I arrived at Yale in 2017, I learned there were several ongoing Yale initiatives in Uganda," said Dean Vermund. "Folks didn't know each other, so we formed a Uganda interest group and now these people are in

touch and helping each other. The Institute will act as a convening and coordinating body to facilitate interaction between researchers and, when needed, things on the administrative side, making projects work properly. Researchers typically manage the grants, but we can provide help with tricky things like managing subcontracts with an in-country ministry of health or providing historical data about how other researchers have successfully navigated obstacles in a given country. We might be able to establish a common, in-country office to bring value and add to the investments being made by the people who are already doing important work. Through YIGH, we will know who is doing what and where, enabling us to work more expeditiously and with stronger teams and increase the science and health footprint of what our people are doing around the world."

In some cases, activities that fall under the YIGH umbrella will still be primarily associated with a certain school within Yale. "For example, in Sudan, we are working to enhance public health training," Vermund said. "We will inform the YIGH and welcome engagement, but the effort will primarily be a Yale School of Public Health activity."

According to Dean Kurth, the trust of Americans in science is on the rise, especially regarding environment and health. She notes that universities traditionally have been great at generating new knowledge, but the Grand Convergence paper ["Global health 2035: a world converging within a generation," *The Lancet*, Dec. 3, 2013] and its followup ["Alma-Ata at 40 years: reflections from the Lancet Commission on Investing in Health," *The Lancet*, Vol. 392, No. 10156, Oct. 25, 2018] "call researchers to focus more on the impact of this knowledge on populations; literally life and death issues."

As one example, she talked about the need to address environmental issues. "Particulate pollution accounts for seven million deaths per year," she said. "As we see smog increase, there are more cases of asthma and we can anticipate a rush in emergency rooms."

She cites the work of Health Care Without Harm, an international nongovernmental organization that works to transform health care worldwide so that it reduces its environmental footprint, becomes a community anchor for sustainability and a leader in the global movement for environmental health and justice.

"We know enough to know that we need to make changes to protect the environment," she said. "According to the Nobel Prize-winning IPPC (Intergovernmental Panel on Climate Change) report, we have about 12 years to make wholesale environmental changes to maintain current levels. This is a stake in the ground by scientists; we need to make changes in terms of prevention, mitigation and adaptation. Every country has things to work on and Yale has the opportunity to leverage the energy of our students and entrepreneurs to make a real difference."

Kurth is optimistic. "We can work together across sectors such as politics, law, science, technology, engineering, arts and math," she said. "We can define the scientific priorities and make positive change; we did that with HIV and we can do it again. The goal is to have deeper and larger impact and be more focused on current issues of urgency. I am a deep believer in the power of universities to impact the health of people and the planet. The YIGH allows us to harvest the assets of our university for science."

The Institute also offers access to global seed money through a business accelerator called the Sustainable Health Initiative (SHI), which was established this year through a partnership with CoWrks Foundry and India's RMZ Foundation. The goal of the SHI is to improve health outcomes in India and around the globe by

*(See Global Health, page 8)*

### 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."

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# IN BRIEF

## Science and Engineering Notes from Around Connecticut



### Biomedical Research

**NEW TOOL IN FIGHT AGAINST CANCER.** In a discovery that could lead to new ways for treating cancer, a team of **Yale** researchers led by CASE Member **Andre Levchenko**, the John C. Malone Professor of Biomedical Engineering and director of the **Yale Systems Biology Institute**, has discovered how metastasis—the spread of cancer cells throughout the body—is triggered on the molecular level, and has developed a process with the potential to detect those triggers in patients with certain cancers. The discovery could lead to new treatments. The study was published June 26 in the journal *Nature Communications*.

#### UConn Center First to Use New Disc Repair System.

**UConn Health's Comprehensive Spine Center** is the first Connecticut healthcare facility to use the AnchorKnot® Tissue Approximation Kit for herniated disc repair. Developed by Canada's Anchor Orthopedics XT Inc., the system uses tools that control and stabilize tissue closure, allowing surgeons to approximate tissue when the procedure is performed in a minimally invasive fashion, through a less than 1-inch incision.

#### Yale Study Suggests Link Between Zika Vaccine and West Nile.

A study published in June in the journal *Nature Microbiology* by **Yale** researchers proposes that a vaccination against the Zika virus might also be effective in tackling West Nile disease. West Nile Virus belongs to the same family of flaviviruses as Zika. In a prior study, the team led by **Erol Fikrig**, Section Chief for Infectious Diseases at the **Yale School of Medicine**, demonstrated that blocking a protein (AgBR1) found in the saliva of mosquitoes and transmitted to hosts could reduce Zika infection. For the latest study, they tested the same theory in mice exposed to West Nile by the same mosquito, *Aedes aegypti*, and found that an AgBR1 antiserum delayed West Nile Virus infection.

**UConn to Lead Syphilis Research Initiative.** The **UConn School of Medicine** will receive up to \$11 million over five years from the National Institute of Allergy and Infectious Diseases (NIH) to lead an international, multi-university team comprised of researchers from the UConn School of Medicine, the **Connecticut Children's Medical Center**, the Duke Human Vaccine Institute, the University of North Carolina (UNC) at Chapel Hill Institute for Global Health and Infectious Diseases, UNC Project-Malawi, Masaryk University in the Czech Republic and Southern Medical University in Guangzhou, China, to develop a vaccine for syphilis. This disease poses serious health consequences internationally and in the United States, with an estimated about 5.6 million people contracting it every year. Syphilis can also be passed from expecting mothers to their unborn children, with potentially devastating consequences for the health of the unborn child. The disease is the second leading cause of stillbirth and miscarriage worldwide.

#### UConn Team Announces New Pipette-Based Testing Technology.

Research assistant **Mohamed Sharafeldin** and his primary collaborator, **Kartek Kadimisetty**, working in **UConn** chemistry professor CASE Member **James Rusling's** lab, have developed pipette-based technology that reduces the time and costs associated with medical testing. The technology could also be used in rural or remote areas where traditional methods might otherwise be expensive and complicated. The 3D-printed pipette-tip test uses

the enzyme-linked immunosorbent assay (ELISA) and a 3D-printed adapter for commonly used pipettes that runs the ELISA test in the pipette tip, without the typical ELISA plate and the expensive equipment that goes with it.



### Business & Industry

**UTC ANNOUNCES MERGER WITH RAYTHEON.** In June, **United Technologies Corp. (UTC)** announced plans to merge with the **Raytheon Co.**, creating a new company, **Raytheon Technologies Corporation**. The company's projected annual revenue would be about \$74 billion, making it the second-largest US aerospace and defense company after Boeing. UTC shareholders would own 57% of the new company, with Raytheon shareholders owning the rest. The merger is subject to approval by government regulators, as well as by the two companies' shareholders. Pentagon officials have stated they have "no major concerns" about the merger. Raytheon Technologies Corporation will be based in the Boston area, with Connecticut likely to experience some job losses as a result of the merger, which is expected to close in early 2020, according to company officials.

#### STATE AWARDS \$750K TO EXPAND STEM OPPORTUNITIES.

Earlier this year, the **Connecticut Health and Educational Facilities Authority (CHEFA)** awarded several grants designed to expand science, technology, engineering and mathematics (STEM) programming and job training in the state. The two largest awards of \$500,000 and \$250,000 went to the **Workforce Development Council** and the **Connecticut Center for Advanced Technology**, respectively. Advanced manufacturing and health care are Connecticut's fastest-growing workforce sectors, according to CHEFA Executive Director **Jeanette Weldon**, who said there are 13,000 unfilled manufacturing jobs in the state.

**CTC HONORS CT 'WOMEN OF INNOVATION.'** This past spring, the **Connecticut Technology Council (CTC)** honored women in a dozen different fields at the 15th annual Women of Innovation Awards. Recipients included **Sally Gut Ruggeri of Pfizer**, honored for her work developing potential drugs for early clinical trials including Xeljanz technology to treat severe rheumatoid arthritis, and **UConn's Stephany Santos**, who co-founded Engineering Ambassadors in 2010. Santos' program now has over 100 members inspiring K-12 students to enter STEM fields. She develops courses teaching communication and engineering empathy and mentors underrepresented students in her research lab.

**CHILEAN AIRLINE SELECTS P&W ENGINES.** JetSMART, an ultra-low cost carrier based in Santiago, Chile, recently selected the **Pratt & Whitney GTF™** engine to power 85 Airbus A320neo family aircraft. Pratt & Whitney will also provide JetSMART with GTF engine maintenance through a 12-year EngineWise® Comprehensive service agreement. The first aircraft is expected to be delivered in the third quarter of 2019.

**CALIO NAMED TO HEAD PRATT & WHITNEY.** **United Technologies Corp. (UTC)** has announced the appointment of **Christopher T. Calio** as president of **Pratt & Whitney**, effective upon the retirement of **Bob Leduc** in early 2020. Calio, who joined UTC in 2005, has served as president of Pratt's commercial engines business since 2017. Prior to that, he was chief of staff to UTC Chairman and CEO **Greg Hayes**.

*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).*

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### Communication

**NEW LAW SUPPORTS 5G IMPLEMENTATION.** On July 16, Governor Ned Lamont signed into law Public Act 19-163, An Act Accelerating the Deployment of 5G Wireless Facilities intended to accelerate implementation of high-speed, wireless 5G technology in Connecticut. This legislation sets up a process to set 5G infrastructure on state property and establishes a process for municipalities interested in using the technology where utility or light poles are not available.

**CI INVESTS IN SPEECH RECOGNITION FIRM.** Connecticut Innovations (CI) recently announced it will provide an initial \$500,000 of a potential \$1.5 million investment award for Voiceitt, a speech recognition system for non-standard speakers, including those with impaired speech. This initial equity investment will help the company, which received the 2018 top investment award from VentureClash, accelerate its core speech recognition technology, support marketing efforts in the United States, and establish its Connecticut headquarters.

**STATE ROLLS OUT NEW APP IN OPIOID FIGHT.** This spring, state officials unveiled the “LiveLOUD – Live Life with Opioid Use Disorder” app designed to educate residents on how to administer naloxone and use GPS data to find nearby locations to obtain the medication. The app is administered by the Connecticut State Department of Public Health and free for all users, functioning through the web browser of most smartphones. Last year, the Office of the Chief Medical Examiner reported that there were 1,017 deaths in Connecticut due to accidental overdose, 93% of which were opioid-related.

**911 CENTERS WARNED TO PICK UP FASTER.** Eleven 911 centers in Connecticut received warnings from the state for failing to have enough staff or equipment in 2018 to meet a state standard of answering at least 90% of all 911 calls within 10 seconds, according to a report issued by state officials this spring. The eleven towns included Wolcott, Bloomfield, Bridgeport, Hartford, New Britain, Norwalk, Norwich, Redding, Stamford, Stratford, and Weston. State Emergency Telecommunications Manager Steve Verbil explained there are no penalties for failing to meet the standard.



### Education & Cognition

**ROBOTICS CLASS INTRODUCES GIRLS TO ENGINEERING OPPORTUNITIES.** Hartford’s Grace Academy, an all-girls school for grades 5-8, recently partnered with Collins Aerospace and parent company United Technologies Corp. to offer a class in robotics at the Connecticut Science Center. About sixty Grace students participated, working with Lego® building kits and laptop computers to program miniature cars to complete a series of tasks. Carolyn Begnoche, a product design drafting checker at Collins, oversaw the program, which was designed to expose girls to potential engineering and technical careers.

**MYSTIC OPENS NEW EDUCATION CENTER.** In March, Mystic Aquarium opened the Milne Center for Ocean Science and Conservation to further the aquarium’s mission of education, conservation and research. It houses the ‘Sea School’ preschool program, learning and education spaces and an aquaculture laboratory. The aquarium will be able to raise its own fish, instead of capturing them from the wild, consistent with its conservation focus. Con-

struction is underway at the Fish and Invertebrate Area aquaculture laboratory as well.

**NEW ROBOTICS & AUTOMATION CENTER OPENS.** At a ribbon cutting this past spring, officials from Rapid Global Business Solutions, Inc. (RGBSI) announced the company’s collaboration with Goodwin College to create the RGBSI Robotics & Automation Center of Excellence. Located in the Goodwin College Center for Advanced Manufacturing and Applied Technologies in Hartford, the center includes hardware, such as robot controllers, specialized electrical PLC transformers, end of arm tooling, holding fixtures, peripherals, and storage. Additionally, the collaboration will involve developing training curriculum that “aligns with industry demand for digital manufacturing skill sets,” according to RGBSI officials.

**WCSU PROFESSOR HONORED FOR CLIMATE CHANGE EDUCATION.** Mitch Wagener, a biology and environmental sciences professor at Western Connecticut State University (WCSU), recently received the 2019 Aquarion Environmental Champion Award for his efforts to educate the public about the science and consequences of climate change. The award recognized Wagener’s contributions in developing and coordinating the “Climate and Human Civilization” program at WCSU, an annual series of free public seminars led by faculty and students to explore the scientific evidence of change in the Earth’s climate and various manifestations of its impact, including wild fires, natural disasters and species evolution and survival.



### Energy

**OFFSHORE WIND FACILITY A JOINT VENTURE.** Connecticut officials recently announced plans to develop an offshore wind facility at State Pier in New London. The Connecticut Port Authority and terminal operator Gateway are partnering with Bay State Wind, a joint venture between the Danish firm Ørsted, which develops, constructs and operates offshore and onshore wind farms, and Eversource, on a project to redevelop State Pier through a combined public-private investment of \$93 million. The State Pier harbor development plan calls for two phases: the first to upgrade the infrastructure and the second, a ten-year lease with Ørsted and Eversource to use the State Pier for wind turbine generator assembly.

**CT GREEN BANK CITED AS NATIONAL MODEL.** US Senator Richard Blumenthal, joined by Senators Edward Markey and Chris Van Hollen, introduced the National Climate Bank Act in July. The legislation would create a federal bank—the National Climate Bank—modeled after the Connecticut Green Bank, the first of its kind in the nation. Under the proposed legislation, the National Climate Bank would leverage public and private funds to invest in clean energy technologies and infrastructure. It would be capitalized with \$10 billion initially with an additional \$5 billion every year for five years. The bank would provide financing to eligible regional, state and local green banks, make investments directly into projects that reduce carbon emission, and provide technical assistance for the startup of new green banks around the United States. The goal is to prompt large-scale, private investments in clean energy and energy efficiency projects, particularly for low- to moderate-income families, creating clean energy jobs while combating climate change.

**WALLETHUB RATES CT ‘MOST ENERGY-EXPENSIVE.’** In July, the personal finance website WalletHub found Connecticut to be the country’s most energy-expensive state. WalletHub listed 2019’s most and least energy-expensive states by looking at total monthly energy bills in all 50 states and the District of Columbia. It took into account electricity, natural gas, motor fuel and home heating oil.



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**KILLINGLY ENERGY CENTER APPROVED.** In June, the **Connecticut Siting Council** approved Florida-based NTE Energy's application for a Certificate of Environmental Compatibility and Public Need, clearing the way for construction of a new 650MW natural gas-fired power plant in **Killingly**. Company officials noted that the new plant will support the state's compliance with the Global Warming Solutions Act of 2008 through NTE's commitment to reduce greenhouse gas emission levels at least 80% below initial operating levels by 2050. The company has committed to retiring the facility in 2050 or otherwise operating it with zero net greenhouse gas emissions. In 2018, the Killingly Town Council approved a Tax Stabilization Agreement through which the **Killingly Energy Center** will become one of the town's largest taxpayers, contributing more than \$100 million to the town over the 20-year term of the agreement. Florida-based NTE is also providing an additional \$5 million for scholarships and other town projects under the Community Environmental Benefit Agreement between NTE and the town. In addition, NTE has committed to providing **Ellis Tech** students with valuable hands-on work experience on the Killingly Energy Center's construction.



### Environment

**AIRPORT FOAM SPILL FOULS FARMINGTON RIVER.** In early June, the **Connecticut Department of Environmental Protection** (DEEP) responded to a firefighting foam spill at the **Farmington River** in Windsor. The foam originated from a sprinkler system malfunction at **Bradley International Airport**. DEEP advised the public to avoid the foam they may encounter on the river or river banks and avoid fishing from the Farmington River near Poquonock Avenue and south to where it enters the **Connecticut River**. The water and foam from the spill contained PFAS (per- and polyfluoroalkyl substances) that can impact reproductive functions, livers and kidneys in laboratory animals, according to the federal Environmental Protection Agency. Close to 50,000 gallons of water and foam were released during the incident.

**SINGLE USE PLASTIC BAG BAN TAKES EFFECT.** On August 1, Public Act 19-117, § 355 took effect statewide. The new law requires all Connecticut retailers making sales of tangible personal property to the public to collect a \$0.10 fee per single-use plastic checkout bag. "Single-use checkout bag" is defined in the legislation as a plastic bag with a thickness of less than four mils that is provided by a store to a customer at the point of sale. "Single-use checkout bag" does not include: (A) a paper bag; (B) a reusable plastic bag (four mils or thicker); (C) a bag provided prior to checkout that is used only to contain meat, seafood, loose produce or other unwrapped food items; (D) a newspaper bag; or (E) a laundry or dry cleaning bag. By 2021, the state will completely ban plastic bags.

**CLIMATE CHANGE TO IMPACT STATE.** This summer, a report from the Union of Concerned Scientists noted that potentially lethal heat driven by climate change will affect every state, including Connecticut, in the decades ahead. The state has warmed two to three degrees (F) in the last century. Throughout the northeastern United States, spring is arriving earlier and bringing more precipitation, heavy rainstorms are more frequent, and summers are hotter and drier. Historically Connecticut has averaged about 10 days per year with a heat index above 90° F. It is predicted this will increase to an average of 40 days per year by 2050, absent any reduction in emissions. Cities like Bridgeport, Danbury, and New Haven would experience the highest frequency of these days. Connecticut is enrolled in the Global Warming Solutions Act, which requires the state to reduce its total greenhouse gas emissions to at least 10% below 1990 levels by 2020, and to at least 80% below 2001 levels by 2050.

**CT ASH TREES DISAPPEARING.** **Connecticut Agricultural Experiment Station** entomologist **Claire Rutledge** recently predicted that within ten years, all ash trees in Connecticut will be dead due to the emerald ash borer, first confirmed in Connecticut in 2012. According to Rutledge, many billions of trees are impacted. The beetles live most of their lives inside the trees, laying their eggs under the bark. The eggs hatch into larvae, which cause the damage. The emerald ash borer has no native predators.

**STATE'S ENVIRONMENTAL QUALITY GETS MIXED GRADES.** In its Annual Report released earlier this year, the **Connecticut Council on Environmental Quality** (CCEQ) noted a slow improvement in most measures of Connecticut's environmental quality, although the report also stated that discharges of nitrogen from sewer treatment plants to the Long Island Sound increased in 2018, as did levels of dissolved nitrogen in the Sound. **Susan Merrow**, CCEQ states "Warming temperatures and amplified rainfall will hinder Connecticut's mission to improve air and water quality."



### Food & Agriculture

**GRANT SUPPORTS BEARDSLEY ZOO TEEN PROGRAM.** **Beardsley Zoo** was awarded a \$25,000 grant from the Fairfield County Community Foundation to support its teen program, **Conservative Discovery Corps**. The year-long teen program provides an opportunity for high school students to work with field biologists to study the role of zoos in conservation and help educate zoo visitors. Zoo Director **Gregg Dancho** said the zoo helps educate not just city residents, but all those who come to the state's only zoo to learn about and see wildlife up close.

**STATE LICENSES HEMP GROWERS, PROCESSORS AND MANUFACTURERS.** Since Public Act 19-3, which authorizes a pilot program for growers and processors of hemp, was signed into law by **Governor Ned Lamont** in May, 82 hemp growers, 2 processors, and 21 manufacturers received licenses with 294 acres in Connecticut being used to grow hemp. The **Connecticut Department of Agriculture (DOAG)** is responsible for the program, including issuing licenses. Additionally, DOAG will study the growth, cultivation, and marketing of industrial hemp by licensees entities. The act requires the Department of Consumer Protection (DCP) to license manufacturers of hemp products for human consumption.



### Health

**STUDY FINDS E-CIGARETTES GENERATE IRRITATING CHEMICALS.** In a study published in the American Journal of Preventive Medicine in July, **Yale** researchers report that e-cigarette users are unknowingly inhaling chemicals that are irritating their airways. The researchers focused on acetals, chemicals that form when the common flavorant vanillin interacts with alcohols that carry the nicotine and flavors in e-cigarettes. Researchers in the lab of Yale professor of chemical and environmental engineering and CASE Member **Julie Zimmerman** found the presence of glycerol acetals in e-cigarette aerosol. The Yale team noted that while little is known about the health effects of inhaling the resulting acetals, research indicates that chemicals resulting from vanillin are more likely to irritate the airways than vanillin itself.

**INFECTED MOSQUITOES IDENTIFIED IN CT.** As of mid September, mosquitoes trapped in 22 towns in Connecticut had tested positive for West Nile virus (WNV) and mosquitoes trapped in 12 towns had tested positive for Eastern Equine Encephalitis (EEE), ac-

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cording to **The Connecticut Agricultural Experiment Station (CAES)**. The affected communities include: **Bridgeport, Chester, Darien, East Haven, Greenwich, Groton, Haddam, Hampton, Hartford, Killingworth, Ledyard, Madison, Manchester, Monroe, New Canaan, New Haven, Newington, North Haven, North Stonington, Norwalk, Plainfield, Shelton, South Windsor, Stamford, Stonington, Voluntown, West Hartford, West Haven and Wethersfield**. Equine EEE cases were also reported from **Colchester, Columbia, Salem, Sterling, and Voluntown**, with **Easton** reporting an equine WNV case. A human case of EEE was reported in **East Lyme**. **CAES Director and CASE Member Theodore Andreadis** said, "We are currently experiencing a steady buildup and geographic expansion of both of these mosquito-borne viruses throughout the state and anticipate that this will continue through September. We will be closely monitoring mosquitoes for virus amplification and we encourage everyone to simple measures such as wearing mosquito repellent and covering bare skin, especially during dusk and dawn when mosquitoes are most active." Every year from June until October, researchers from CAES trap mosquitoes at 92 sites throughout the state and test them for a variety of mosquito-borne illnesses, including WNV, EEE and Jamestown Canyon virus. As of September 18, a total of 226,895 mosquitoes had been tested.

**NEW PROGRAM WILL TRACK CT TICK POPULATIONS.** This past spring, **The Connecticut Agricultural Experiment Station** announced the start of a new program to collect and study tick numbers and the prevalence of tick-borne diseases in all eight Connecticut counties. The primary focus will be on blacklegged ticks, *Ixodes scapularis* (more commonly known as deer ticks), but other species studied include American dog ticks, *Dermacentor variabilis*, that may carry Rocky Mountain spotted fever; Lone Star ticks, *Amblyomma americanum*; and a newly discovered exotic species, the Asian longhorned tick, *Haemaphysalis longicornis*. Ticks are the primary transmitters of Lyme disease, but different types of ticks can also infect people with babesiosis, anaplasmosis, a relapsing fever called borreliosis, Rocky Mountain spotted fever and the emerging threat of the Powassan virus. Under the program, funded with \$96,000 from the federal Centers for Disease Control, ticks will be collected from 40 sites from April through October. **CAES Director and CASE Member Theodore Andreadis** said the CAES is requesting an increase in federal funding for tick monitoring to \$160,000 a year.

**SICKLE CELL DRUG SHOWS PROMISE.** The experimental drug to treat sickle cell disease developed by **UConn** medical researchers is "showing promise" in adult patients, according to researchers. **UConn School of Medicine** associate professor **Biree Andemariam** said the drug IMR-687 shows signs of working after 13 weeks of the clinical trial she is leading. The trial tests the drug's safety, tolerability, breakdown and movement through the bodies of about 70 patients, 10 of whom are in Connecticut, for 16 to 24 weeks.

**YNHCH CERTIFIED BY ORGAN NETWORK TO PERFORM PEDIATRIC HEART TRANSPLANTS.** **Yale New Haven Children's Hospital (YNHCH)** is the first hospital in Connecticut and Rhode Island to receive certification from the United Network of Organ Sharing (UNOS) to perform pediatric heart transplants. Last summer, YNHCH, in collaboration with the **Yale School of Medicine** and its clinical practice, **Yale Medicine**, formed a new YNHCH Heart Center team. YNHCH offers a full spectrum of medical and surgical treatments for children with congenital heart defects, cardiomyopathy, and other heart conditions.

**UConn USING AI SCREENING TECHNOLOGY TO AID RESEARCH.** Researchers at **UConn** are using an artificial intelligence screening technology developed by San Francisco-based

Atomwise, a biotech company, to identify potential new drugs to treat a wide range of diseases and conditions, including certain types of strokes, hand-foot-and-mouth disease, and an infection that causes reproductive failure in pigs. Through the company's Artificial Intelligence Molecular Screen (AIMS) Awards program, researchers have access to advanced screening technologies to expedite research. "We are thrilled that our faculty members have been able to take advantage of this program, which leverages cutting-edge technology from industry with innovative research from one of the nation's top universities," says **Radenka Maric**, CASE Member and vice president for research at UConn and **UConn Health**.

**DANBURY HOSPITAL TO OPEN NEW PEDIATRIC UNIT.** **Danbury Hospital** will open a six-room pediatric unit in May 2020 as part of a \$4 million remodeling project in partnership with **Connecticut Children's Medical Center**. The goal is to create a positive space that promotes healing for young patients. A large room will feature separate zones for different ages. The new rooms will feature a parent's area separated by a sliding glass door with a refrigerator, a closet, a monitor and a sleeping chair.

**CT CHILDREN'S HOSPITAL OPENS NEW THERAPY CENTER.** **Connecticut Children's Infusion Center** that opened April 24 is using virtual reality to provide therapy in multiple ways. The facility uses an approach reminiscent of a theme park with the centerpiece a virtual world, in which patients create their own avatar, download an exclusive app, and explore what is known as the Wilderverse.



## High Technology

**CT TECH INDUSTRY GROWS IN 2018.** Tech-related employment in Connecticut grew by some 1,000 new jobs in 2018, and the tech sector increased its contribution to the state's economy, according to Cyberstates 2019™, a report compiled by the Computing Technology Industry Association (CompTIA). Net tech employment — the sum of technology professionals working in technical positions plus business professionals employed by technology companies in areas such as sales, marketing, finance, HR, operations and management — in Connecticut grew by an estimated 1,076 jobs in 2018. Since 2010, net tech employment has increased by an estimated 9,000 new jobs. With more than 140,500 workers, the tech industry accounts for approximately 7.8% of the state's workforce. Connecticut ranks 26th nationwide in net tech employment; 20th in net tech jobs added last year; and 26th in the Cyberstates Innovation Score, which is based on a combination of factors including venture capital investments, tech startups and new business formations.

**UConn LAUNCHES FIRST CODING BOOT CAMP.** **UConn School of Engineering**, in partnership with workforce accelerator **Trilogy Education**, launched its first coding boot camp in July. The **UConn Coding Boot Camp**, a 24-week, part-time program, is designed to teach the front-end and back-end skills for a proficient full stack developer. CASE Member **Kazem Kazerounian**, dean of the School of Engineering, noted that the new program would "make it possible for adults from all backgrounds to quickly learn the skills to pivot into these high-demand tech roles and create a new pipeline of talent for local businesses." Boot Camp students will learn to develop end-to-end web applications, as well as receive a Certificate in Full-Stack Web Development from UConn.

**YALE TEAM REPORTS QUANTUM BREAKTHROUGH.** An article in the June 3 online edition of the journal *Nature* describes research by Yale professor **Michel Devoret** and lead author **Zlatko**

(See In Brief, page 8)



## Salmon-in-Schools Program Focuses on Education, Restoration of Atlantic Salmon

The award winning "Salmon-in-Schools" Program (S-i-S) is a science and conservation based educational program administered by the Connecticut River Salmon Association (CRSA) in partnership with the Connecticut DEEP Fisheries Division. The CT DEEP's Atlantic Salmon Legacy Program at the Kensington Hatchery provides the eyed salmon eggs, technical expertise and educational support for the program.

The Connecticut River Salmon Association is a volunteer, nonprofit 501(c)(3) organization dedicated to supporting wild Atlantic Salmon in the Connecticut River watershed through restoration, conservation and education. It was started in 1974 to assist in these efforts, thereby also assisting in the conservation of all migratory species to the watershed. Understanding the need for international cooperation to protect wild Atlantic Salmon throughout their range, the CRSA fully supported and participated in the creation of the international convention "The North Atlantic Salmon Conservation Organization" (NASCO) headquartered in Edinburgh, Scotland. Since NASCO's inception, CRSA members have held positions as US Commissioner, as members of the US Delegation and as an accredited "Non-Governmental Organization" (NGO) with a representative participating in NASCO conferences, most recently in Tromsø, Norway.

Started in 1995, "Salmon-in-Schools" was modeled after a program of the Atlantic Salmon Federation in Canada called "Fish Friends." One Connecticut school was recruited to gauge the potential. That school was North Haven Middle School, and the adventurous teacher was Marge Drucker, who participated as both teacher and Ambassador for the next 20 years. CRSA members Richard Bell and James Carroll, as-



Hartland School students at a salmon stockout with teacher Deb Costolnick. [Photo: CRSA]

sisted by DEEP Supervising Fisheries Biologist Stephen Gephard, took on the challenge to grow and manage the program with a dedicated group of volunteers for the next 22 years. CRSA estimates that more than 70,000 Connecticut students were introduced to the anadromous fish life cycle, water quality, habitat requirements and many other related subjects. The CRSA also assisted in starting the program

(See *Salmon*, page 8)

### NAS (from page 1)

those interventions on a broad scale are forming a foundation for significantly improving healthy MEB development.

<https://www.nap.edu/catalog/25201>

#### ◆ Machine Learning Algorithms and Systems for Detecting and Mitigating Adversarial Attacks

The Intelligence Community Studies Board (ICSB) of the National Academies of Sciences, Engineering, and Medicine convened a workshop on December 11–12, 2018, in Berkeley, California, to discuss robust machine learning algorithms and systems for the detection and mitigation of adversarial attacks and anomalies. This publication summarizes the presentations and discussions from the workshop, including critical analyses of the current state of machine learning and artificial intelligence.

<https://www.nap.edu/download/25534>

#### ◆ Medications for Opioid Use Disorder Save Lives

More than two million people in the United States have opioid use disorder (OUD), a life-threatening chronic brain disease caused by prolonged use of prescription opioids or illicit opioids such as heroin. Opioid related deaths in the United States continue to escalate. While medications such as methadone, naltrexone and buprenorphine reduce cravings and save lives, most US opioid addicts receive no effective treatment. A new report from the National Academies stresses that research should focus on developing new and better medications, on determining the most effective behavioral therapies to be used with medication and refining protocols for their more effective use, stressing the benefit of long-term retention. It concludes that curbing the epidemic requires an "all hands-on deck" strategy involving health care, criminal justice, patients and family members "and beyond" with making access to medications much broader and equitable a high priority.

<https://www.nap.edu/read/25310>

#### ◆ Monitoring Educational Equity

A new report by the National Academies concludes that a centralized, consistently reported system of indicators of educational equity is needed to bring attention to disparities in the US education system. Indicators — measures used to track performance and monitor change over time — can help identify why disparities arise, the groups most affected by them, and can inform policy and practice measures to improve equity in pre-K through 12th grade education.

<https://www.nap.edu/read/25389/>

#### ◆ Frontiers of Engineering Symposium

This annual symposium brings together 100 outstanding young leaders in engineering to share their cutting-edge research and innovations in selected areas. The 2018 symposium, held September 5–7 and hosted by MIT Lincoln Laboratory, covered topics from quantum computing to the role of engineering in the face of conflict and disaster to the new medical field of theranostics.

<https://www.nap.edu/catalog/25333/>

#### ◆ Protecting Coral Reefs in a Changing Climate

Coral reefs around the world face growing danger from a changing climate, on top of the historic threats from local pollution and habitat destruction. In response, scientists are researching new interventions that have the potential to slow coral reef damage from warming and acidifying oceans. The interventions span a wide range of physical and biological approaches for increasing the stability of coral reefs, but they have only been tested at small scales. A new report from the National Academies examines these resilience tools and provides decision-makers with a process to follow in considering whether to use one or more of these novel new approaches.

<https://www.nap.edu/read/25424/>

**Minev** that led to the discovery that a quantum jump can be predicted, a contradiction of Danish physicist Niels Bohr's adopted view that experimental observation is the requirement for objective knowledge of a physical system. The discovery allows researchers to establish an early warning system for imminent jumps of artificial atoms containing quantum information and represents an advance in understanding and controlling quantum information. Researchers say reliably managing quantum data and correcting errors as they occur is a key challenge in the development of fully useful quantum computers.

**TRAVELERS TO SPONSOR INNOVATION PRIZE.** **Connecticut Innovations** announced this summer that Hartford-based **Travelers** will offer an Innovation Prize to **VentureClash** competitors developing solutions and pursuing market opportunities in insurtech, a term that refers to the application of technology innovations to generate savings and efficiency from the current insurance industry model. VentureClash is a \$5 million global venture challenge for early-stage companies in digital health, financial technology, insurance technology, and industry 4.0. Companies that apply to VentureClash will automatically be considered for the Innovation Prize.



## Transportation

**BRADLEY TO GET NEW GROUND TRANSPORTATION CENTER.** Construction began this July on **Bradley International Airport's** new **Ground Transportation Center.** The Ground Transportation Center is designed to make travel more convenient. The new facility spans 1.4 million square feet across 13.4 acres and will have a direct connection to Terminal A. Major features include rental-car services, public parking, and access to public transportation, including high-frequency buses connecting the airport to the **CTrail** line, as well as regional bus services.

**CT BRIDGES SHOW SLIGHT IMPROVEMENT.** According to a report issued April 1 by the American Road & Transportation Builders Association, the condition of Connecticut bridges in 2018 was better than four years ago. The report found that of the 4,270 bridges in the state, 308 or 7.2% were classified as structurally deficient, down from 376 in 2014. The report ranks Connecticut 26th in the nation in percentage of structurally deficient bridges and 38th in the percentage of those bridges needing repair. The report noted that the pace of bridge repair nationally slowed to its lowest point in five years in 2018.

**SOLAR-POWERED CNG REFUELING STATION COMPLETED.** In June, **Clean Energy Fuels Corp., USA Hauling and Recycling,** and **Earthlight Solar** completed a solar-powered compressed natural gas (CNG) refueling station in East Windsor. The station uses nearly 1,700 rooftop solar panels installed by Earthlight Solar to power the equipment that fuels natural gas trucks. The 742.6 kW solar project is expected to produce renewable energy for the next 40 years and avoid carbon emissions equal to nearly 610,000 pounds of coal burned for fuel.

**CTDOT EXPANDS 'POLLINATOR CORRIDOR' PROGRAM.** In 2017, in accordance with Public Act 16-17, the **Connecticut Department of Transportation (CTDOT)** established a "Pollinator Corridor Program" along Connecticut highways where bees and butterflies can refuel on wildflowers. Initially, eight locations were identified where minimal mowing is done, allowing wildflowers such as fleabane, birdsfoot trefoil and daisies to blossom. CTDOT recently designated 50 additional spots along state highways, on- and off-ramps and medians as "Conservation Areas" where invasive plants will be removed and native flowers and grasses will be allowed to grow for pollinators. The state will reduce mowing at these locations to permit the existing wildflowers to propagate by reseeding, increasing the quality and value of these areas as pollinator resources and habitats.

— *Compiled and edited by Wendy Swift*

leveraging technology to launch innovative startups. Each year the program will select up to 10 innovative global health programs in a variety of areas, from infectious disease to urban health and the environment. This year, SHI provided \$70,000 in seed money to each of five early-stage startups.

Robert Rohrbaugh, the Yale School of Medicine lead for the YIGH, noted that the Institute also offers access to global health mentors and the opportunity to work across disciplines. "For example, work with social scientists could help us to better understand why people use (or don't use) health care services available to them," he said. "We can all benefit from understanding what works and what doesn't work in health-care systems around the world."

He cites the Latino behavioral health clinic at HAVEN Free Clinic, a student-run clinic for uninsured adults in New Haven, as one example. "This enterprise uses pre-clinical medical students to provide valuable services to a previously unserved population," he said. "It is based on a similar approach that originated in Mexico. The students are not yet formally trained, but they are able to help. This is a task-shifting approach that has potential for other communities."

Rohrbaugh notes that in addition to fighting communicable diseases and addressing noncommunicable diseases, there is a moral element to addressing global health. "We need to ensure that health care is valued around the world," he said. "Our health-care system is not equitable and some solutions from other places can help here. In addition, there are some existential threats to health, like climate change, that we can't solve as an individual country. If we don't work together, we run the risk of missing out on advances being made in other countries that could be advantageous to health in our own country."

"Our problems are not that dissimilar," he said. "They differ in degree depending on country, but access, quality and cost are three examples of problems that exist in low- to middle-income countries and also occur here. This is a great rationale for working together."

Initially funded through core Yale resources from the Schools of Medicine, Nursing and Public Health, the YIGH is now co-funded through external grants and research partnerships. Queries may be directed to Professor Omer or Michale Skonieczny, YIGH deputy director ([michael.skonieczny@yale.edu](mailto:michael.skonieczny@yale.edu)). — **Karen Cohen, freelance writer and owner, The WriteStuff, LLC**

## Salmon *(continued from page 7)*

in Rhode Island and Vermont. These efforts were recognized when the National Wildlife Federation (NWF) awarded the CRSA their "2010 – 2011 Conservation Achievement Award" in the Education category at their 75th anniversary celebration in Washington DC. Additionally, the CRSA was honored in 2019 with the "Dr. Sigmund Abeles Science Advocate Award" from the Connecticut Science Teachers Association and the Connecticut Science Supervisors Association.

Participating schools replicate the environment of a salmon stream in their tanks and raise salmon from the eyed egg stage through the Alvin stage and to the unfed fry stage when the fry have absorbed their yolk sack and reached 99% on the development index. At this point the students have a field trip to a DEEP-designated river with salmon habitat where they have the opportunity to release the fry into the river and experience other aspects of nature that make up salmon habitat. The CRSA provides an orientation each October, guidance, materials, technical support and other field trip opportunities to participating schools. There is also a password protected section of the CRSA website with educational resources for S-i-S teachers. Eggs are delivered by CRSA liaisons in early January and are generally stocked out in May. Interested schools can visit [www.ctriversalmon.org](http://www.ctriversalmon.org) or contact CRSA at [salmoninschools@ctriversalmon.org](mailto:salmoninschools@ctriversalmon.org).