

Bulletin *of the*

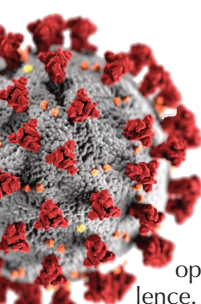
CONNECTICUT ACADEMY OF SCIENCE AND ENGINEERING



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Risk-Based, Systems Analysis: Cornerstone of COVID-19 Report



Shared clean energy facilities. Winter highway maintenance operations. Addressing family violence. Evaluating the value of prekindergarten programs. These are just some of the topics CASE has studied on behalf of the people of Connecticut.

In April 2020, CASE continued this legacy by commissioning a paper on COVID-19 for Governor Lamont's consideration. A small, multidisciplinary committee of CASE and National Academy members was convened and, in one month, the committee prepared an 80-page report that provided methodical, systems-based analysis and long-term guidance for daily life in the era of COVID-19.

"Early on, information was changing rapidly," said CASE Member and Committee Project Director David Parekh. "The immediate response was to shut everything down. We recognized that this disease was not going away, so we put some of the state's best minds to take a systems view of the problem and develop a strategy for living with it over the long haul." Parekh is retired Corporate Vice President, United Technologies Corporation and Director, United Technologies Research Center.

Drawing on experts in behavioral sciences, engineering, mathematics, medicine, public health, science and technology, the committee's report provides a comprehensive view and a sustainable, adaptable response to the pandemic using modeling and systems analysis.

"Connecticut scientists and engineers have spearheaded this kind of thinking; it has helped us build submarines, helicopters, and aircraft engines," said CASE and Committee Member Sten Vermund. "We took the same tools and applied them to developing a COVID-19 response." Vermund is Dean and Anna M.R. Lauder Professor of Public Health; Professor of Pediatrics, Yale School of Medicine.

The report, entitled "An Adaptive Risk-Based Strategy for Connecticut's Ongoing COVID-19 Response," provides a roadmap for finding a sense of normal life in spite of the disease and the ebb and flow in cases.

Taking a systems approach to the crisis led to the inclusion of human behavior as one of the key elements to the COVID-19 response.

"Early in the pandemic, there was a surprising lack of attention being paid to human behavior and its ability to control the spread," Vermund said. "There are still no magic bullets in terms of a vaccine or highly effective medical treatments so classic public health measures [like hand washing, wearing masks and maintaining distance] remain important. These all depend on human cooperation and social responsibility."

He noted that the coronavirus response has been particularly polarizing. "Some people have trivialized the pandemic, while others insist schooling be limited to online only," Vermund said. The goal of the committee was to find common ground and provide guidance for reopening when conditions are favorable.

Vermund went on to explain that the committee's representation from experts in a variety of areas led to full understanding and balance of issues, including social determinants and economic disparities. "When you look at the big picture, the people who are hurt most when schools are closed are lower-income students who have suboptimal internet access and limited economic resources," he said.

Blue-collar workers, in general, are more vulnerable during the pandemic due to the nature of their jobs. "They might not have the resources to handle a two- to three-month hiatus from their jobs," he said. "In contrast, a majority of white-collar workers adapted fairly easily by working remotely and safely from home."

(See COVID-19, 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).

◆ Rapid Expert Consultations on the COVID-19 Pandemic

In the early stages of the COVID-19 pandemic the National Academies, responding to a request from the Office of Science and Technology Policy and the Department of Health and Human Services, established a Standing Committee on Emerging Infectious Diseases and 21st Century Health Threats. The committee includes 27 national experts, headed by Harvey Fineberg, former president of the Institute of Medicine (now the National Academy of Medicine). The committee subsequently released a series of Rapid Expert Consultations, including 1. SARS-CoV-2 Viral Shedding and Antibody Responses; 2. Laboratory Testing for the COVID-19 Pandemic; 3. Effectiveness

(See NAS, page 7)

A Message to Our Readers

This is the last edition of the *Bulletin* in its current format, with a new version to be released in January 2020. The newer format will continue to celebrate and share news about our state's rich and diverse STEM resources but will do so in an interactive format with more frequent editions. The update will allow the Academy to dynamically include input from our membership to facilitate the celebration of individual and collective accomplishments. Stay tuned!

Of special note, this will be the last edition for Martha Sherman, the managing editor of the *Bulletin* for the past ~30 years. She has served as a true professional in this role and has been integral to our work. It is not possible to overstate the Academy's appreciation. Thank you and best wishes Marty.

—Christine Broadbridge, CASE President

The report also recommended educating the public about the risks associated with COVID-19.

“People didn’t have a full understanding of their own personal risk,” Parekh said. “How likely were they to get sick or to die? Numerous factors put each of us somewhere on the continuum for severity and risk.”

Parekh explained that risk is relative. For example, where actual and daily case counts are currently less than .1 of 1%, the likelihood that a person would catch COVID-19 in an elevator is low because, even though an elevator is a small, enclosed indoor space, people are wearing masks and not in the elevator for an extended time. “In contrast,” he said, “if you are sharing a house with an infected person, even if people stay six feet apart, other mitigations are necessary.”

At the beginning of the pandemic some people compared COVID-19 with the seasonal flu. “There are some similarities,” he said. “Even with a vaccine, 20,000 to 60,000 people die from the flu each year. In a similar fashion, [COVID-19] is not going away; it’s endemic and we need to figure out a way to live with it while minimizing public health and economic risks.”

He was quick to note the differences, saying that, “COVID-19 is much more contagious than the flu and more deadly in older people and those with underlying health conditions.”

Based on what we know now about the infection and treatments for more serious forms of the illness, Parekh said that the US infection mortality rate is currently around 0.2 to 0.5%. “That is still higher

than the mortality rate for the flu, but not as high as for SARS, MERS or Ebola,” he said.

This thinking led to the recommendation for reasonable and appropriate mitigation measures.

“Encouraging social distancing at parks is reasonable to slow the spread of disease,” Parekh said. “But mandating and enforcing mask usage in parks doesn’t materially contribute to safety and adds layers of cost, complexity and confusion. Having said that, science has shown that wearing masks, keeping distant and limiting the number of people you come in contact with indoors, can inhibit the spread of the disease so mandating those things indoors makes sense.”

The committee concluded that extreme measures may be warranted to protect the vulnerable.

One successful example of this was reported in Bristol, where a long-term care facility escaped COVID by isolating staff and residents. Staff members that were willing to isolate earned about five times their regular salary for 60-80 hour work weeks and to compensate for leaving their families and living in RVs for the duration of the initial outbreak. Facility Owner Tyson Belanger wishes his approach had been taken by others in the state. “Think of how proud we would have been if we were the only state that had done this and really protected its seniors,” he said, noting that thousands of lives could have been saved. (Erik Ofgang, *Connecticut Magazine*, “Inside the Connecticut assisted-living facility where COVID never had a chance,” July 7, 2020, https://www.connecticutmag.com/health-and-science/inside-the-connecticut-assisted-living-facility-where-covid-never-had-a-chance/article_22ad4694-c053-11ea-bba7-236a56535338.html)

The committee’s report also emphasized the importance of reopening the full healthcare system. This recommendation has clearly taken hold as, recently, Connecticut media outlets began airing public service announcements in which Governor Ned Lamont encourages people to return to healthcare facilities for routine visits.

CASE and Committee Member Bruce Liang explained that one reason for reopening the full healthcare system was the impact of other health issues facing patients. “At the peak of the pandemic, some management of chronic disease and prevention definitely got delayed, but you can’t delay treatment for very long without putting people at risk,” he said, noting that heart attacks, cancer, stroke and diabetes kill hundreds of thousands of Americans every year.

Liang is a fellow of the American College of Cardiology as well as dean of the UConn School of Medicine, director of the Pat and Jim Calhoun Cardiology Center and Ray Neag Distinguished Professor of Cardiovascular Biology and Medicine.

Another reason was the financial impact on the institutions we were relying on to provide COVID treatment. “At the onset of the pandemic, non-COVID treatment, including procedures like cardiac catheterization, colonoscopy and ambulatory surgery, dropped 25 to 50%,” he said, noting that if the trend had persisted, it would have been “devastating” on several levels.

“When staff members aren’t doing certain complicated procedures for a period of time, there is a potential for losing the skillset,” he said. “There was also the possibility that people would have decided to retire or to not continue in healthcare service due to the health risk. We stood to lose valuable healthcare professionals.”

Liang praised the creativity and dedication of medical professionals for developing creative solutions like isolating COVID testing and treatment areas that provided all patients with safe choices for care.

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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

CT FIRM PLANS DRONE-BASED DELIVERY SERVICE FOR ORGANS. Hartford-based **Aquiline Drones** (AD) is partnering with VyrTX, an advanced logistics-technology firm based in Ohio, to create a medical delivery service for human organs and tissues using unmanned aerial vehicles. Using the VyrTX technology platform, AD is creating an integrated virtual storage solution that offers real-time connectivity, big data storage, analytics and modeling through AD's cloud. "Currently, there is a 25% discard rate for unused human organs because they cannot physically get into the hands of the transplant surgeons in time before the window of opportunity expires," said Dalton Pont, CEO of VyrTX.

NEW HAVEN BIOTECH COMPLETES \$145M FINANCING. **RallyBio**, a privately-held biotechnology headquartered in **New Haven** with an additional location at the **UConn's Technology Incubation Program** in **Farmington** recently announced completion of \$145 million in Series B financing. The company, founded in 2018, is committed to identifying and accelerating the development of life-transforming therapies for patients with severe and rare disorders. Investors were led by San Francisco-based Pivotal bioVenture Partners. Additionally, the company has announced that **Rachael Alford** will lead the company's chemistry, manufacturing and controls (CMC) operations. Most recently, Alford served as vice president for Global Process Development at **Alexion Pharmaceuticals**, leading both biologic and small molecule process development, analytical and formulation development, device development, tech transfer and clinical tech services.

CASE MEMBER AMONG FOUNDERS OF NEW BIOTECH. Boston-based **Ventus Therapeutics** formally launched this spring with a \$60 million Series A financing round. The company, which focuses on inflammasomes to manufacture drugs that target autoimmune diseases and cancer, will first focus on three undisclosed targets, with the ability to work on 10 more. All targets relate to two parts of the innate immune system—the inflammasome pathways and nucleic-acid sensing pathways. Founders of the new company include: Feng Shao from the National Institute of Biological Sciences in Beijing who led studies on the structure and function of gasdermin proteins; Hao Wu and Judy Lieberman from Harvard Medical School, experts on gasdermin proteins; **Richard Flavell**, CASE member and professor at **Yale University School of Medicine** who studies inflammasomes; and Thomas Tuschl from Rockefeller University, who studies cGAS.

FIRST CLINICAL TRIAL FOR BOTANICAL CANCER DRUG BEGINS. This spring, CASE member **Yung-Chi Cheng**, Henry Bronson Professor of Pharmacology at **Yale University**, and research partners launched the first international clinical trial for a botanical drug, YIV-906. The trial—a multi-regional Phase IIB randomized, placebo-controlled clinical trial for the treatment of hepatitis B-associated liver cancer—is designed to test the first-in-class botanical drug candidate YIV-906 (also known as PHY906 and KD018), whose development has been supported by the National Foundation for Cancer Research (NFCR) for two decades. If the drug, an immune-enhancing and cytoprotective cancer therapeutic candidate which received orphan drug designation by the FDA in 2018, is approved by the FDA, it would be the country's first authorization of a purely botanical cancer drug. Cheng has been an NFCR-funded researcher since 1991.

YALE NAMED A TOP TEN CENTER FOR BIOMED RESEARCH.

The Hartwell Foundation named **Yale University** as a Top Ten Center of Biomedical Research for 2020, highlighting the university for its strengths in child health research that matches the foundation's mission. This designation provides \$300,000 of direct cost support over three years for research of benefit to children. Additionally, Yale will receive a two-year Hartwell Fellowship supporting one post-doctoral fellow from an area of biomedical science that exemplifies the values of the foundation. Each fellowship provides support at \$50,000 in direct costs per year. "A Top Ten designation by the foundation is a signal honor," said Yale President and CASE member **Peter Salovey**. "This distinction reflects both the excellence of Yale's faculty members, who define the frontiers of research and scholarship, and the support that the university provides our investigators to conduct transformative work."



Business & Industry

CI INVESTS \$8M IN CT COMPANIES. **Connecticut Innovations** (CI) made investments during the second quarter of its 2020 fiscal year totaling \$8.1 million across 27 transactions. CI directed \$4.7 million toward biotechnology companies and \$2.5 million toward information technology companies, with the remaining funds distributed across companies spanning a range of industries. The investments leveraged an additional \$54.8 million in outside capital.

UTC-RAYTHEON MERGER FINALIZED. **United Technologies Corporation** (UTC) formally completed a merger with **Raytheon Technologies** this past spring. The merger created **Raytheon Technologies Corporation**. Raytheon specializes in defense, civil government, and cybersecurity solutions and is headquartered in Waltham, Massachusetts. Based in **Farmington**, Connecticut, UTC specializes in high technology products and services to the building and aerospace industries. Immediately prior to the closing of the merger, UTC divided its **Otis** and **Carrier** businesses into separate publicly traded companies.

CT MANUFACTURER LAUNCHES INNOVATION CENTER. **Cromwell** manufacturer **Ripley Tools** announced the launch of the **Ripley Labs** innovation center at its Nooks Hill Road facility. The manufacturer has made a multimillion-dollar investment in the labs, with the new resource allowing engineers to use equipment like 3D printers and CNC (computer numerical control) machining tools to prototype products. The company's products are used for fiber optic cable installation.

OTIS COMMITS TO GENDER EQUITY IN EXECUTIVE RANKS. **Farmington**-based elevator manufacturing and maintenance company **Otis Worldwide Corp.** made a commitment for equal gender representation among the company's executives as part of joining the Paradigm for Parity campaign, a coalition of business leaders dedicated to addressing the corporate leadership gender gap. The company plans to increase women in senior executive positions to represent half of Otis' executives by 2030. As part of its plan it will work to eliminate or minimize unconscious bias in the workplace, increase the number of women in senior operating roles, measure targets and maintain accountability through regular progress reports, base career progress on business results and performance rather than physical presence in the office, and provide sponsors, not just mentors, to women well positioned for long-term success.

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.

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Science and Engineering Notes from Around Connecticut



Communication

TELECOMS PLEDGE COVID-RELATED CHANGES. Several telecommunications and Internet companies in Connecticut pledged to expand services amid the coronavirus outbreak to allow more access and at the lower costs needed to address the increased need caused by telecommuting. Companies that signed the pledge, which included a promise not to terminate service to any residential or small business customers because of their inability to pay their bills due to the disruptions caused by COVID-19, were **Frontier, Verizon** and **Cox Communications**. They will waive late fees incurred by any residential or small business customers due to economic circumstances related to the pandemic. They will also open their Wi-Fi hotspots to the public for free.

CT TOWN BANS 5G TECHNOLOGY ROLLOUT. **Easton** banned the rollout of 5G technology this spring citing uncertainty over its safety for humans and the environment. A 5G cease and desist resolution “until such technologies have been proven safe to human health and the environment through independent research and testing” was unanimously approved by the town’s Board of Selectmen on May 7. The American Academy of Pediatrics and hundreds of medical and scientific experts have advised the federal communication commission to test the long-term safety of 5G technology. Easton is the first town in Connecticut to ban 5G.



Education & Cognition

TRINITY COLLABORATES WITH INFOSYS FOR NEW LEARNING OPPORTUNITIES. **Trinity College**, under the leadership of **President Joanne Berger-Sweeney**, formed a partnership with the global technology company Infosys — the **Trinity-Infosys Applied Learning Initiatives** — to provide unique opportunities for students and alumni that will complement the college’s core liberal arts education with technological skills for the digital workplace.

CT TEACHERS AWARDED ENVIRONMENTAL EDUCATION GRANTS. **Old Saybrook** science teachers **Karen Carlone** and **Mary Looney** were each awarded a grant from the **Rockfall Foundation**, a Connecticut non-profit organization that promotes and supports environmental education and conservation in the **Lower Connecticut River Valley**. Both conservation programs are planned to begin in the 2020-2021 academic year and will focus on enhancing classroom curriculum through field work that is aligned with the Next Generation Science Standards.

STUDENTS TAKE TOP HONORS IN VIRTUAL CT SCIENCE FAIR. The top Life and Physical Science student winners of the senior division of the **Connecticut Science and Engineering Fair**, which was held virtually in March 2020, included **Patricia Joseph**, a sophomore from the **Engineering and Science University Magnet School** in West Haven and **Abigail Slanski**, a senior from **Amity Regional High School** in Woodbridge. The top winner of the Urban School Challenge Program (USC) Middle School was **Snigtha Mohanraj**, a 7th grade student from **Engineering and Science University Magnet School**, and for the USC high school division, the winners were a team from the **Academy of Aerospace and Engineering**, seniors **Devesh Kakar** and **Johnathan Bell**.

UNH LAUNCHES TECHNOLOGY INSTITUTE. In May, the **University of New Haven** announced the launch of the **Connecticut Institute of Technology** (Connecticut Tech) which will be part of

the university’s **Tagliatela College of Engineering**. Connecticut Tech will include the university’s undergraduate and graduate programs in cybersecurity and networks, computer science, data science, and electrical and computer engineering, as well as several research groups. The mission is to foster a technology hub featuring a focus on applied learning and research.

CT LEARNING HUB LAUNCHED. The **Connecticut State Department of Education** this summer launched the **CT Learning Hub**, a free centralized platform to provide students, teachers and families with universally available and multilingual quality content to advance equitable access and support learning and resources for continuous blended learning models. The hub is offered in partnership with the Common Sense Media Wide Open School, **CT Public**, the **Connecticut Commission for Educational Technology**, Greg Tang Math, Khan Academy, **RESC Alliance** and Scholastic.



Energy

NUCLEAR SIMULATOR LAB OFFERS UNIQUE CLASS. **Three Rivers Community College** is offering a nuclear simulator laboratory class in which students can operate the simulator at 100% power. The lab is capped at four students who are part of the nuclear engineering technology program. The simulator is more affordable and doesn’t come with the security risks associated with working with an actual reactor. It also provides the opportunity to plan for a failed cooling pump.

WORK CONTINUES AT FUELCELL ENERGY DESPITE COVID CLOSURE. **FuelCell Energy** temporarily closed its manufacturing facility in Torrington in March to preserve the health of its staff in the wake of the COVID-19 outbreak. The company kept its factory doors closed through June 22, continuing its research and development work on a carbon capture solution under a joint development agreement with ExxonMobil Research and Engineering. FuelCell also continued the development of its advanced solid oxide electrolysis, hydrogen storage, and hydrogen power generation under its US Department of Energy cooperative agreement. During this time, progress also was made on construction of a 7.4 megawatt fuel cell project located on the **US Navy Submarine Base** in **Groton**, as well as on construction of a 1.4 megawatt fuel cell platform in San Bernardino, California.

CT FIRMS DONATE CRITICAL PPE. In late March, **Avangrid**, based in **Orange**, and **The United Illuminating Co.**, **Southern Connecticut Gas** and **Connecticut Natural Gas** donated 6,900 masks to **Yale New Haven Health**, including 3,700 surgical masks and 3,200 N95 respirators. The masks are part of a stockpile of items the companies have in place for natural disasters and scenarios similar to this one. The masks are part of a larger donation of 31,000 masks that Avangrid and its utilities in several other states are making, according to **Tony Marone**, president and chief executive officer of **Avangrid Networks**.

CT GREEN BANK OFFERS ‘GREEN LIBERTY BONDS’. The **Connecticut Green Bank** began offering Green Liberty Bonds this summer with a face value of \$1,000. Proceeds from the bond sales will help fund the green bank’s clean energy efforts, otherwise supported through a utility bill surcharge, proceeds from the Regional Greenhouse Gas Initiative, and some federal funds. The program is intended to inspire a public effort to fight climate change much like the federal government’s sale of Series-E bonds during World War II. Due to the security of the pledged revenues and the reserve fund, S&P Global Ratings has assigned the issuance an A rating. The bonds will be certified as green by the Climate Bonds

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Initiative, a nonprofit international organization focused on developing the green bond market.

DEEP REJECTS PLANS FOR MIRA OVERHAUL. The **Connecticut Department of Energy and Environmental Protection (DEEP)** rejected plans from the **Materials Innovation and Recycling Authority** to refurbish an aging refuse-derived fuel facility for a capital cost of \$330 million. DEEP is requesting new ideas beyond converting the site to a transfer station and requested more attention consistent with the state's materials management strategy, such as organics diversion, recycling education and unit-based pricing to drive waste reduction.



Environment

DEEP ASKED TO BAN HORSEHOE CRAB HARVESTING. The **Connecticut Audubon Society** has asked state officials to ban the harvest of horseshoe crabs in the state and increase law enforcement efforts to curtail illegal harvesting. Horseshoe crabs have been in decline in Long Island Sound for at least 15 years. Along with the crabs, the migratory shorebirds that eat their protein-rich eggs are also in danger, including the threatened Red Knots, a medium-sized shorebird. The horseshoe crab decline in Long Island Sound has led to a near collapse of the population of these birds. The **Connecticut Department of Energy and Environmental Protection (DEEP)** has the request for regulation under consideration.

DEEP REPORTS 40% DROP IN EMISSIONS DURING COVID LOCKDOWN. The **Connecticut Department of Energy and Environmental Protection (DEEP)** reported a decline of close to 40% in emissions from March to April of 2020. State ambient air quality monitoring data showed a reduction in nitrogen dioxide, carbon monoxide, sulfur dioxide and black carbon since March 1, with fine particulate matter and ozone levels unchanged. Reduced traffic from early March through the end of the April was a primary factor. Most traffic on roads was down 40-50% on weekdays and sometimes 70% on weekends, due to the pandemic.

WCSU RESEARCHER TO STUDY 'BLUE-GREEN ALGAE'. **Edwin M. Wong**, a professor of biological and environmental sciences from **Western Connecticut State University**, received a \$20,000 grant from **Danbury-based Praxair/Linde** to fund environmental research. Specifically, Wong will investigate toxic cyanobacteria, commonly known as "blue-green algae," in Connecticut waterways. Cyanobacteria can produce microcystin, which is toxic and poses a major threat to drinking and recreational waters as well as the environment at large. The funding from Praxair/Linde will allow Wong to expand his research to identify which specific cyanobacteria produce microcystin, the genetics of toxin biosynthesis and the environmental conditions that lead to and support toxic blooms.

AGGRESSIVE STRAIN OF HYDRILLA FOUND IN CT RIVER. This spring hydrilla, an invasive aquatic plant found in Florida and other southern states, was found in the southern part of the 410-mile **Connecticut River**. It crowds out native vegetation, harms fisheries, sickens wildfowl, impedes recreation, and reduces property values. Now, surveillance led by **Greg Bugbee** of **The Connecticut Agricultural Experiment Station Invasive Aquatic Plant Program**, working in conjunction with Nicholas Tippery at the University of Wisconsin-Whitewater with funding from the Northeast Aquatic Nuisance Species Panel, has found an aggressive, genetically distinct strain of hydrilla in large sections of the Connecticut River's coves, marinas, and tributaries. The Connecticut River hydrilla is more abundant than that seen elsewhere in the state.

UCONN EARNS PLATINUM STATUS FOR SUSTAINABILITY.

UConn has earned platinum status, ranking sixth out of over 1,000 universities in 40 countries, in the Association for the Advancement of Sustainability in Higher Education (AASHE) 2020 Sustainable Campus Index. It is one of only seven institutions meriting platinum status. The rating system looks at sustainability measures implemented in four main areas: Academics, Engagement, Operations, and Planning and Administration. In 2019, UConn launched the **Institute of the Environment** to facilitate the University's portfolio of environmental research along with community-wide activities related to sustainability. CASE member **Michael Willig**, UConn Board of Trustees Distinguished Professor of Ecology and Evolutionary Biology, is executive director of the institute.



Food & Agriculture

LONE STAR, ASIAN LONGHORNED TICK SPECIES IDENTIFIED.

This June, **Goudarz Molaei**, research scientist in the Department of Environmental Sciences at **The Connecticut Agricultural Experiment Station's Center for Vector Biology & Zoonotic Diseases**, reported the rapid range expansion and established populations of the lone star tick (*Amblyomma americanum*) in **Fairfield** and **New Haven** counties. Previously limited to the southeastern United States, lone star ticks have been detected in areas with no previous record of activity including Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, and Rhode Island. The lone star tick has been associated with several human diseases and medical conditions including tularemia, ehrlichiosis, rickettsiosis, Heartland virus disease, southern tick-associated rash illness, red meat allergy, and likely the newly identified Bourbon virus disease. Results from the first year of a new federally funded surveillance program for ticks and tick-borne diseases released in February by the Experiment Station identified lone star ticks and *Haemaphysalis longicornis* (Asian longhorned tick) as newly emerging species in Connecticut. As part of the surveillance program, more than 2,500 ticks were collected during 2019 from 40 locations in all eight counties and screened for five pathogens that cause disease in humans.

CT FOOD BANK RECEIVES COVID AID GRANT. The **Ray and Barbara Dalio** and **Dalio Philanthropies** granted \$500,000 to the **Connecticut Food Bank** as part of a \$4 million donation to support medical care and food assistance to people in Connecticut affected by the COVID-19 pandemic. The funds will provide significant support during a time of increased challenges facing the food bank to source and transport food to meet rising need across the region. Connecticut Food Bank serves two-thirds of the state, providing food assistance through a network of 600 partners and programs.

SEEDS FROM CHINA REPORTED IN CT. The **Connecticut Department of Agriculture** and **The Connecticut Agricultural Experiment Station** learned over the summer that some state residents received unsolicited packages containing seeds that appear to have originated from China. Similar packages were received throughout the United States. Residents have been asked not to plant the seeds. Residents that receive these unsolicited seeds should hold onto the seeds and packaging, including the mailing label, and contact **Kirby Stafford** at Kirby.stafford@ct.gov or **Victoria Smith** at Victoria.smith@ct.gov.



Health

CT SEEKS ASSESSMENT OF COVID RESPONSE IN LONG-TERM CARE SITES. In July, the state of Connecticut engaged New Jersey-

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based Mathematica with a \$450K contract to assess and recommend strategies to improve its response to COVID-19 in long-term care facilities. Mathematica released an interim report indicating that the **Connecticut Department of Public Health** was unprepared to handle the infection, including under-staffing in key areas and archaic reporting systems. Nearly three-quarters of the state's deaths due to the pandemic were in long-term care facilities.

HEALTH VAN OFFERS COVID SUPPORT. On May 1, the **New Haven Community Health Care Van** began assisting the community combat the COVID-19 epidemic in vulnerable neighborhoods of the city. In addition to handing out facial coverings and information about COVID, the van offers postpartum visits for new mothers and their infants so they can avoid the need to take public transportation to a clinic, with the potential for exposure to COVID-19.

YALE COVID SALIVA TEST OKAYED FOR EMERGENCY USE. The **Yale School of Public Health** in August received emergency use authorization from the US FDA for a saliva-based laboratory diagnostic test. The test, called **SalivaDirect**, was developed by Yale researchers. Results thus far indicate the test is highly sensitive and yields outcomes similar to nasopharyngeal swabbing. **Jackson Laboratory for Genomic Medicine** in **Farmington** will partner with Yale to explore how to implement the test for a broader audience.

UCONN TEAM GETS GRANT FOR TOOTH PAIN SENSOR. In June, faculty from the **Division of Endodontology and Department of Biomedical Engineering** at the **UConn School of Dental Medicine** received a grant of \$462,964 from the National Institutes of Dental and Craniofacial Research to test a smartphone-based sensor and application that works with the electrodermal device to measure patient tooth pain. **I-Ping Chen**, associate professor of endodontics, and **Ki Chon**, CASE member and professor and chair of biomedical engineering, collaborated on the proposal. Chen and Chon hope this device can be used by providers and patients in dental offices to get an accurate, quantitative measurement of patient pain and provide care accordingly.

WEST NILE VIRUS FINDINGS PROMPT HEALTH ADVISORY. Mosquitoes trapped in **Stamford** on July 16 tested positive for West Nile Virus, prompting the **Stamford Department of Health** to issue an advisory urging homeowners and businesses "to remove standing water, discard cans and bottles, and cut back all grass, bushes, and shrubbery on their properties." West Nile Virus may cause a mild illness but can also cause more serious conditions such as encephalitis, an inflammation of the brain, or meningitis, an inflammation of the lining of the brain and spinal cord.

High Technology

TECH PARTNERSHIP TO PROVIDE STEM PROGRAMS TO CT HIGH SCHOOLS. On March 12, **New Haven-based District Innovation and Venture Center (DIVC)**, a nonprofit started by **District New Haven**, partnering with **Holberton School New Haven**, announced its partnership with **Milestone C** to provide STEM programs, along with teacher training and support, to Connecticut-based high schools at no cost. This is possible through a grant from DIVC/Holberton School New Haven, which will be awarded to local schools to cover the cost of implementing Milestone C's program for their students. High schools can apply for the grant awarded to up to 10 schools to cover the cost of implementing Milestone C's Software Design & Integration and Robotics & Automated Systems programs for the 2020/2021 school year.

FAIRFIELD UNIVERSITY PROGRAM RECOGNIZED BY ISTE. **Fairfield University** has earned the recognition of the International Society for Technology in Education (ISTE), the first program in Connecticut and in the Northeast to be awarded the distinction. Graduates of Fairfield's **Educational Technology Program** will have the opportunity to graduate with the ISTE Certification. This certification is an internationally-recognized credential awarded to educators who demonstrate effective use of technology to transform learning and ensure success in digital classrooms.

UCONN ASSISTS WITH EMERGENCY VENTILATOR DESIGN. The **Connecticut Center for Applied Separations Technologies** at **UConn** began work on an emergency ventilator that area hospitals could use if needed. The generic design originated in Spain, with UConn engineers working out the flaws and modifying the device. After the center finalized tests on the ventilator, the **Whitcraft Group** manufactured the devices at their **South Windsor** facility.

CASE MEMBER ELECTED TO LEADERSHIP OF COMPUTING ASSOCIATION. The Association for Computing Machinery announced the election of new officers who will lead the organization for a two-year term beginning July 1. Heading the new team will be incoming president Gabriele Kotsis, professor and head of the Department of Telecooperation at Johannes Kepler University in Linz, Austria. Joining Kotsis as vice president will be CASE member **Joan Feigenbaum**, **Grace Murray Hopper Professor of Computer Science** at **Yale University**.

UCONN INNOVATION FUND AWARDS \$2.25M TO UCONN STARTUPS. **UConn**, in partnership with **Connecticut Innovations** and **Webster Bank**, announced awards for two early-stage companies—**QRfertile LLC** and **Savkar Inc.**—with support from the \$2.25 million **UConn Innovation Fund**. Both companies are part of **UConn's Technology Incubation Program**. "We are excited to support these two promising UConn startups and provide them with critical early funding through the UConn Innovation Fund portfolio," said **Radenka Maric**, CASE member and vice president for research, innovation and entrepreneurship at UConn and **UConn Health**.

GRANT TO HELP FUND NEW STATION FOR HARTFORD LINE. The **Connecticut Department of Transportation** was awarded a \$17.4 million grant from the Federal Railroad Administration to build a new **Hartford Line** railroad station in **Windsor Locks**. The station will be located about a mile north of the existing Hartford Line station. Other improvements include track and signal work, street-level rail crossings, and Amtrak rail yard work.



Transportation

CTDOT ANNOUNCES PROGRAM TO AUTOMATE HEAVY-DUTY TRANSIT BUSES. The **Connecticut Department of Transportation** (CTDOT) announced this spring a collaboration with Maryland-based Robotic Research to enable the automation of heavy-duty transit buses for revenue service deployment on the **CTfastrak** corridor, a first-of-its-kind for mass transportation systems in North America. The new program, funded by the Federal Transit Administration's Integrated Mobility Innovation initiative, will use Robotic Research's proprietary AutoDrive advanced driver-assistance system. When the program launches for public use, three 40-foot automated, electric New Flyer Xcelsior Charge heavy-duty transit buses will be operating on the CTfastrak corridor.

CT COMMITS TO 100% ZERO-EMISSION VEHICLE SALES BY 2050. The **Connecticut Department of Energy and Environmental**

(See In Briefs, page 8)

of Fabric Masks; 4. SARS-CoV Survival in Relation to Temperature and Humidity and Potential for Seasonality; and 5. Possibility of Bioaerosol Spread of SARS-CoV-2. In June, the National Academies formed its Society Experts Action Network (SEAN), comprised of social and behavioral science researchers, which issued a “rapid expert consultation” on the benefits and drawbacks of specific epidemic measurements such as number of confirmed cases, hospitalizations, excess deaths, and positive fraction of tests.

<https://www.nationalacademies.org/our-work/standing-committee-on-emerging-infectious-diseases-and-21st-century-health-threats>

◆ Framework for Equitable COVID Vaccine Allocation

The Committee on Equitable Allocation of Vaccine for the Novel Coronavirus, launched in early July by the National Academies in response to a request from the NIH and CDC, released an unprecedented “fast track” report on October 2. The report provides a set of principles for the equitable distribution of COVID-19 vaccines, now under development. Ethical principles include maximum benefit, equal concern, and mitigation of health inequities. Procedural principles include fairness, transparency and evidence-based. As COVID-19 has affected racial and ethnic minority groups disproportionately, explicitly addressing this higher burden was deemed a moral imperative. The report recommends vaccine distribution in four phases, noting the approximate percentage of the US population represented by each phase:

- 1a. (~5%): High-risk health workers, first responders;
- 1b. (~10%): High risk with comorbid conditions and older adults in congregate settings;
2. (30-35%): K-12 teachers & child care workers, critical workers in high risk settings, people in homeless shelters, group homes and physical disabilities and staff in these settings, people in prisons and other detention facilities and staff, and all older adults not in 1b;
3. (40-45%): Young adults, children, workers important to functioning of society at increased risk not in #2;
4. Everyone else in United States.

The committee stressed the importance of immediate coordinated, evidence-based risk communication and community engagement, noting the rise of “vaccine hesitancy.” Finally the committee noted that failure to achieve equity of global distribution would ultimately fail to eliminate the risk of future outbreaks and urged US participation in relevant international entities.

Former Connecticut Commissioner of Public Health Jewel Mullen was a member of the National Academy committee.

<https://national-academies.org/covidvaccineframework>

◆ Feeding Infants and Children from Birth to 24 Months: Summarizing Existing Guidance

The National Academies evaluated the “wide array” of advice to parents and healthcare providers, ranging from social media to guidance from authoritative groups and found a number of inconsistencies, primarily due to differences in approaches taken in their development of advice by different entities. Supported by CDC and NIH, the committee was charged with compiling and comparing existing recommendations on what and how to feed infants and children up to 24 months of age. A total of 43 guidelines were identified and were found to vary widely in many respects. Few rated the evidence for their recommendations and those that did often used differing rating systems.

The committee concluded that there was substantial potential for collaboration and provided “a few insights” to align and improve future guidelines: 1. Collaboration in the planning and development; 2. Utilization of best practices in guideline development, review of evidence and dissemination; and 3. Timely and effective science-based dissemination.

CASE member Rafael Perez-Escamilla served on the committee.

<https://national-academies.org/feeding-infants-and-children>

◆ Impacts to Airports from Temporary Flight Restrictions (TFRs)

Temporary Flight Restrictions (TFRs) can be implemented for several reasons, including security, hazards, space operations, special events, and VIP travel. VIP TFRs, specifically presidential TFRs, have much greater impact than other types of TFRs because they encompass a larger geography, last longer, and may have little advance notice.

This report from the National Academies, the TRB Airport Cooperative Research Program’s ACRP Research Report 224: Understanding Impacts to Airports From Temporary Flight Restrictions, identifies financial and other ramifications of TFRs on airports and aviation-related businesses. The report includes an electronic tool that will estimate the financial ramifications of a TFR for a specific airport or related business.

<https://www.nap.edu/read/25934/>

◆ Privacy and Security in the 21st Century

New technologies and capabilities such as Google Cloud and artificial intelligence are changing the world at an unprecedented rate. A transition to cloud computing offers a variety of benefits, including worldwide access and faster networks. This digital transformation also presents an array of new challenges. The privacy and security of these systems is one of the most discussed subjects of the current century.

The theme of the National Academy of Engineering Annual Meeting on September 30–October 1, 2018, was privacy and security in the 21st century. Topics of discussion included new security regulations and procedures to mitigate the new range of threats that this era presents. Understanding privacy in new digital contexts and building security into systems with the use of artificial intelligence are necessary steps in order to protect our data in the future. This publication summarizes the presentations and discussions from the forum.

<https://www.nap.edu/catalog/25575/>

◆ Connected Vehicle Infrastructure

State Departments of Transportation (DOTs) and other government agencies recognize the value of connected vehicle (CV) technologies in helping save lives and relieve congestion. Several agencies are currently planning and preparing for a future when CV technologies that enable cars, buses, trucks, trains, roads and other infrastructure, and smartphones and other devices to “talk” to one another could become a part of their routine business operations. A core consideration in any such planning effort is assessing the need for and the nature of public infrastructure investments to support applications based on CV technologies. This new report from the National Academies presents methods to identify the most plausible CV infrastructure investments, shows how to build effective business case arguments, and details specific business model options.

<https://www.nap.edu/read/25946>

COVID-19 *(continued from page 2)*

"History will confirm that our healthcare workers, and all frontline workers as well, were truly heroes during this pandemic," he said.

Liang expects that a vaccine, which is the only thing that offers a return to pre-COVID normalcy, won't be widely available to the general public until sometime in 2021. "Until then, masks and social distancing offer us an effective alternative," he said.

The report also highlighted the need for improved testing, monitoring and feedback mechanisms to avoid extended closures.

"Rather than reacting like an on/off switch, where we shut down the state every time there is a spike in cases, we recommended a feedback control approach," Parekh said. "To make this possible, we'd need to take full advantage of testing and monitoring so we could model local conditions and fine-tune local mitigations as warranted."

The same thoughts were echoed by former Centers for Disease Control and Prevention Director Tom Frieden in what is known as the "box it in" strategy, a four-pronged approach that promotes widespread testing, isolation, contact tracing and quarantine. "The key here is to develop a systematic and rational way, gradually loosening the faucet so that we can resume activities as soon and safely as possible," Frieden said. (Issam Ahmed, *Barron's*, "Box It In: Ex US Health Chief on How to Beat the Coronavirus," April 15, 2020, <https://www.barrons.com/news/box-it-in-ex-us-health-chief-on-how-to-beat-the-coronavirus-01587001505>)

Frieden currently leads Resolve to Save Lives, a \$225 million, five-year initiative that aims to save millions of lives from cardiovascular disease and make the world safer from epidemics.

A similar "box it in" strategy has been adopted in Europe. "Europeans, for the most part, are putting to use the hard-won lessons from the pandemic's initial phase: the need to wear masks and practice social distancing, the importance of testing and tracing, the critical advantages of reacting nimbly and locally. All of those measures, tightened or loosened as needed, are intended to prevent the kind of national lockdowns that paralyzed the continent and crippled economies early this year." (Norimitsu Onishi, *New York Times*, "Even as Cases Rise, Europe Is Learning to Live With the Coronavirus," Sept. 15, 2020, https://www.nytimes.com/2020/09/15/world/europe/coronavirus-europe.html?campaign_id=9&emc=edit_nn_20200916&instance_id=22233&nl=the-morning®id=74717105§ion_index=2§ion_name=two_more_big_stories&segment_id=38240&te=1&user_id=fd7d44a148bfdd4d966c8fa8f1dd01a9)

Experts agree that a full understanding of the virus in a given community requires data from symptomatic and asymptomatic people as well from antigen tests, which show antibodies in the blood demonstrating that a person has recovered from the disease.

According to Mitchell O'Connell, a biochemist at the University of Rochester in New York, the most promising way to perform large numbers of tests will be to use a mix of methods that rely on different instruments and supply chains so that a sudden worldwide demand won't deplete any key materials. "Any new technology that is able to expand the number of tests that we can do is good news," he says. (Giorgia Guglielmi, *Nature*, "The explosion of new coronavirus tests that could help to end the pandemic," July 17, 2020, <https://www.nature.com/articles/d41586-020-02140-8>) One example is the SalivaDirect™ procedure developed by Yale School of Public Health scientists Nathan Grubaugh and Anne Wyllie. (<https://www.nejm.org/doi/full/10.1056/NEJMc2016359>)

Another committee recommendation was to eliminate "Essential/Nonessential" business designations.

"Rather than prolonged and repeated universal shutdowns of 'non-essential' businesses and activities, we can effectively deploy the tools

of physical distancing, PPE, hand/face/surfaces hygiene, outdoor alternatives, antigen testing, contact tracing and teleworking and extended work hours to reopen in an adaptive fashion," the report says.

According to Parekh, there was disparity in "essential" and "nonessential" designations across the country, noting that early on "essential" businesses appeared to be allowed to operate without a lot of due diligence to ensure safety, while the work to develop parameters for safe operation of "nonessential" businesses was unnecessarily delayed. Then there were the businesses that didn't clearly fall into either category. "Decisions about 'nonessential' businesses often got pushed off because people were focusing on businesses deemed 'essential,'" he said. "People needed guidance on how to make all businesses safer."

Many of the committee's recommendations have been echoed in the general media, confirmed in other studies or implemented, thus validating the committee's findings. "Our goal was to put the pieces on the table to equip decision makers with how to think about COVID holistically," Parekh said, noting that the committee is staying connected, sharing the latest advances and looking for opportunities to help. "With the appropriate use of controls, the risk will be lessened; it won't be 100% perfect, but the benefit will be significant and many health systems have shown that to be true based on their own experience."

"Through our membership alone, CASE offers access to 400 of the state's top science and engineering experts; not to mention the depth and reach our experts have within their given field," said Christine Broadbridge, who became CASE President in July. "Our members stand ready at a moment's notice to put their knowledge to work for the people and leaders of our state. I look forward to continuing our legacy of collaboration with the governor, our legislature and state agencies to serve the people of Connecticut."—*Karen Cohen, The Write Stuff, LLC.*

[Editor's note: [Click on this link](#) to view the full CASE study report.]

In Briefs *(continued from page 6)*

Protection (DEEP) this summer announced that the Connecticut will join 14 states to advance and accelerate the market for electric medium- and heavy-duty vehicles. Connecticut signed a Memorandum of Understanding to ensure that 100% of all new medium and heavy-duty vehicle sales be zero-emission vehicles (ZEVs) by 2050. The vehicles include: large pickup trucks and vans, delivery trucks, box trucks, school and transit buses and long-haul delivery trucks (big-rigs). Connecticut's major trucking routes, ports and other trucking hubs are located near many low-income communities where asthma rates are high. According to officials, the transportation sector is responsible for approximately 70% of smog forming air pollution and 38% of greenhouse gas emissions in the state.

ELECTRIC VEHICLE 'ROADMAP' OFFERS EV STRATEGIES. In May, the **Connecticut Department of Energy and Environmental Protection (DEEP)** issued its Electric Vehicle Roadmap for Connecticut (EV Roadmap). This 104-page report provides a comprehensive strategy for achieving widespread deployment of electric vehicles in the state to improve air quality for residents while addressing the climate crisis. The EV Roadmap includes transitioning public and private fleets and medium and heavy-duty vehicles to EVs; making the consumer charging experience more consistent; minimizing grid impacts through demand reduction measures; providing demand charge relief for charging station owners and EV fleet operators; exploring opportunities for pilot programs with local innovators in the EV field; working with the state and municipal governments to modify building codes and permitting requirements to support EV infrastructure deployment; and leveraging financial incentives, such as the **Connecticut Hydrogen and Electric Automobile Purchase Rebate (CHEAPR)**, to help make EV purchase price less of a barrier to consumers.

—*Compiled and edited by Wendy Swift*