Bulletin of the
Connecticut Academy of Science and Engineering
1976
Volume 31,1 / Spring 2016

In the White House Office of Science and Technology Policy: Crafting National Science Policy, Advising a President

For 40 years, US scientific policy has been informed by experts from the White House Office of Science and Technology Policy (OSTP). OSTP's mission is to provide the president and senior White House staff with accurate, relevant and timely scientific and technical advice, as well as to make sure the scientific and technical work of the executive branch is coordinated to provide the greatest benefit to society and to ensure that its policies are based on sound science.

Since being appointed Associate Director for Science at OSTP by President Obama in 2014, CASE member Jo Handelsman has provided input about subjects ranging from overcoming bias in STEM careers and climate change to viruses such as Ebola and Zika.

"I'm learning more per unit of time than ever before in my life," Handelsman said. "I'm learning about wildly and vastly different topics. In one day I could be exploring ways to

(See OSTP, page 2)

About Jo Handelsman

Jo Handelsman will present the keynote address at the CASE Annual Meeting on May 24, 2016.

Since 2014, CASE member Jo Handelsman has been serving as Associate Director for Science in the White House Office of Science and Technology Policy. She plans to return to her lab at Yale University in July.

A New York native, Handelsman earned her bachelor's degree at Cornell University and her PhD in molecular biology at the University of Wisconsin-Madison, where she served on the faculty from 1984 until 2010, when she joined Yale. Her research focuses on the genetic and functional diversity of microorganisms in soil, plant and insect gut communities. Handelsman's lab is one of the pioneers of functional metagenomics, an approach to accessing the genetic potential of unculturable bacteria in environmental samples. Their studies have led to discovery of novel antibiotics and determinants of antibiotic resistance and expanded understanding of multispecies interactions that enhance or diminish the health of host animals and plants.

In addition to her research, Handelsman is also known internationally for her efforts to improve science education and increase the participation of women and minorities in science at the university level.

Co-author of more than 100 scientific papers, 30 editorials and three books about teaching, Handelsman is a fellow of the American Academy of Microbiology, Wisconsin Academy of Arts and Sciences and the American Association for the Advancement of Science. She has received numerous awards in recognition of her mentoring, teaching and research contributions including the Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring.

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).

◆ Study Examines Barriers in STEM 'Educational Pathways'

In 2012, nearly 40% of the students entering 2- and 4-year postsecondary institutions indicated that they intended to major in science, technology, engineering, and mathematics (STEM). But about half of those who state an intention to earn a STEM bachelor's degree and more than two-thirds of those intending to earn a STEM associate's degree fail to earn these degrees 4 to 6 years after their initial enrollment. Many of those who do obtain a degree take longer than the advertised length of the programs, thus raising the cost of their education. Are there barriers that make STEM educational pathways less efficient than those for other fields of study? How might the losses be "stemmed" and greater efficiencies realized? These questions and others are at the heart of "Barriers and Opportunities for 2-Year and 4-Year STEM Degrees: Systemic Change to Support Students' Diverse Pathways," a new report from the National Academy of Engineering.

www.nap.edu/catalog/21739/

◆ Report Urges New Approach to Affordable Flood Insurance

A report from the National Academies identifies an approach for the Federal Emergency Management Agency (FEMA) to evaluate policy options for making premiums through the National Flood Insurance Program (NFIP) more affordable for those with limited ability to pay. The report finds that microsimulation is a modeling approach well-suited to estimating premiums and future flood damage claims at the individual policyholder level. A microsimulation modeling approach would, for example, allow

(See NAS, page 7)

manage the Zika virus and figuring out how to keep enough helium in the United States to support research and electronics manufacturing. In some cases, my background as a microbiologist has provided a good foundation for learning about other topics."

While admitting that highlighting areas she is proudest to have played a role in during her tenure is akin to choosing a favorite child, Handelsman cites advances in precision medicine. "I'm extremely proud of the large OSTP representation working in conjunction with the US Department of Health and Human Services and many partners in precision medicine," she said. "This is an area of interest for the president that dates back to his days as a senator. We are celebrating the one-year anniversary of the rollout of the president's Precision Medicine Initiative, which unites game changers who are generating and using data to make progress on medical challenges with clinicians and researchers, taking into account differences in people's genetic makeup, environments and lifestyles. The result is data-driven treatment tailored for the individual."

Another area of success during her tenure has been the Microbiome Initiative. For more than a year, OSTP has solicited and gathered information from a broad group of stakeholders about the use of communities of microorganisms, or microbiomes, to develop applications for environmental remediation, food production and nutrition, and medical research, among others. "It has been a gratifying process in which we've reached broadly into the community and received a breadth of information," she said. "The OSTP's National Science and Technology Council recently issued a report that details current federal research funding in this area and what future research and strategies are needed to realize advances in this area."

Handelsman also has brought her passion and evidence-based approach to STEM education to OSTP. "There is a projected industry need for an additional one million STEM graduates by 2022," she said. "We're looking to make dramatic inroads in this area through initiatives on a number of fronts." For example, President Obama's Computer Science for All Initiative calls for $4 billion in funding in his forthcoming budget to help states expand K-12 computer science by training teachers, expanding access to high-quality instructional material and building effective regional partnerships. "This initiative will provide new opportunities for students to participate in STEM in communities that have not previously had access to computer science," Handelsman said.

But for Handelsman, that is only the tip of the iceberg. "There are a lot of influences that determine who becomes and stays interested in science, engineering and related fields," she said.

(See OSTP, page 8)

OSTP's Strategic Goals and Objectives:

- Ensure that Federal investments in science and technology are making the greatest possible contribution to economic prosperity, public health, environmental quality, and national security
- Energize and nurture the processes by which government programs in science and technology are resourced, evaluated, and coordinated
- Sustain the core professional and scientific relationships with government officials, academics, and industry representatives that are required to understand the depth and breadth of the Nation's scientific and technical enterprise, evaluate scientific advances, and identify potential policy proposals
- Generate a core workforce of world-class expertise capable of providing policy-relevant advice, analysis, and judgment for the President and his senior staff regarding the scientific and technical aspects of the major policies, plans, and programs of the Federal government

OSTP Initiatives

- Improving Science, Technology, Engineering, and Mathematics (STEM) Education
- Broadening Participation in STEM
- Strengthening the American STEM Workforce
- Combating Climate Change
- Promoting Open Data, Open Science, and Open Government
- Advancing Basic and Applied Science
- Spurring Innovation
- Protecting National Security and Building International Partnerships
- Harnessing America's Expertise

For more information on the specific programs that support each of these initiatives, visit: https://www.whitehouse.gov/administration/eop/ostp/initiatives

The Connecticut Academy of Science and Engineering

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

Officers of the Academy
Sandra K. Weller, President
UConn Health Center

Laura Grabel, Vice President/President Elect
Wesleyan University

Regis A. Matzie, Secretary
Westinghouse Electric Company (ret.)

Phillip J. Gardner, Treasurer
Coherent Inc. (ret.)

Executive Director
Richard H. Strauss

Associate Director
Terri Clark

Assistant Director for Programs
Ann G. Bertini

Editors

Phillip Gardner, Executive Editor - Engineering
Coherent, Inc. (ret.)

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

Managing Editor
Martha Sherman

The *BULLETIN* of the Connecticut Academy of Science and Engineering is published by the Connecticut Academy of Science and Engineering, Inc., 805 Brook Street, Building 4-CERC, Rocky Hill, CT 06067-3405. Telephone: 860-571-7143. E-mail: acad@ctcase.org. Web site: www.ctcase.org. To subscribe to the Bulletin, contact us by phone or email or subscribe on our web site. The Connecticut Academy of Science and Engineering is a private, nonprofit public-service organization established by Special Act No. 76-53 of the Connecticut General Assembly.

IN BRIEF

Science and Engineering Notes from Around Connecticut

Biomedical Research

CT FIRM'S BIOSENSOR WINS TOP PRIZE. Connecticut medical device startup **Biorasis**, co-founded by CASE members **Faquir Jain** and **Fotios Papadimitrakopoulos**, both of the **University of Connecticut (UConn)**, was recently named one of four startup companies to receive MassChallenge's top prize of $100,000. The company won the award for their device, the Glucowizzard™, a tiny, implantable biosensor for continuous glucose monitoring. The device wirelessly transmits glucose levels to a watch-like unit for real-time display that in turn communicates with a smartphone. The device eliminates surgical sensor implantation and extraction and allows remote care for young people and the elderly. The technology functions for 3-6 months without intervention and saves between 50-70% in annual healthcare costs. The company was also awarded a share of an additional $500,000 grant from the Center for the Advancement of Science in Space and Boeing for research projects on the International Space Station.

Business & Industry

COALITION HIGHLIGHTS STATE'S LEADERSHIP IN FUEL CELL TECHNOLOGY. The **Connecticut Hydrogen-Fuel Cell Coalition**, participating in the 2015 Fuel Cell Seminar & Energy Exposition held November in Los Angeles, noted that Connecticut, home to two of the world's largest fuel cell companies, is a leader in research, development, and manufacture of hydrogen and fuel cell technology. Coalition members include the **Connecticut Green Bank, Precision Combustion Inc., Sustainable Innovations LLC, Infinity Fuel Cell and Hydrogen Inc., Proton OnSite, Dexmet Corporation, Doosan Fuel Cell America, FuelCell Energy, US Hybrid**, and the **Connecticut Center for Advanced Technology (CCAT).** The coalition is administered by CCAT.

GE ANNOUNCES MOVE TO BOSTON. On January 13, **General Electric** (GE) announced plans to move its corporate headquarters to Boston's Seaport District beginning in the summer of 2016. Massachusetts and Boston are offering grants and incentives up to $145 million for the move. According to GE spokesman **Seth Watson,** 200 Connecticut jobs will move to Boston, with other positions transferring to a GE facility in **Norwalk**. GE already has a large presence in Massachusetts, with nearly 5,000 employees in aviation, oil and gas and energy management. In 2014, GE moved its life sciences headquarters to Marlborough, and in 2015, announced that its energy services start-up, Current, would be located in Boston.

KAMAN'S JPF SALES GROWS. **Kaman's Aerospace** segment has been awarded three orders for the procurement of Joint Programmable Fuzes (JPF), with an expected total value of $54 million. The first award is an additional order with an expected value of $20.8 million under Kaman's JPF contract with the US Air Force (USAF). Delivery of the USAF fuzes is anticipated to occur in 2016 and 2017. Kaman has also received two direct commercial sale orders with an expected total value of $33.2 million for delivery in 2016, according to the company. Kaman, the sole provider of the JPF to the US Air Force since 2002, has greatly expanded its capacity to meet strong demand. The JPF allows the settings of a weapon to be programmed on the wing in flight and is the current bomb fuze of choice for the USAF.

ELECTRIC BOAT TO INCREASE HIRING IN 2016. In late January, **Electric Boat (EB)** President **Jeffrey S. Geiger** announced plans to hire about 1,500 Connecticut workers this year. The hiring will result in approximately 840 net new jobs in trades, design and engineering and support programs. An additional 300 employees will be hired at EB's shipworks in Quonset Point, Rhode Island. EB announced increased investments in varied submarine programs like the Virginia-class submarine, with the Ohio-class subs' replacement program expected to increase to about $8 billion.

PROTEIN SCIENCES TEAMS WITH CT FOOD BANK. In December, **Protein Sciences Corp.** and the **Connecticut Food Bank** joined forces to provide a program in **New Haven** at the **Community Baptist Church** where visitors could receive food and flu vaccines at the same time. Protein Sciences launched its own mobile unit in January of last year as part of a collaboration with **Hunter's Ambulance, Health Med Urgent Care, Health Mart Pharmacies** and others. The mobile clinic is a specially outfitted minibus owned by Hunters Ambulance but carrying Protein Sciences' logo.

Communication

NEW REPORT CITES BROADBAND WEAKNESSES. On January 25, the **Connecticut Office of Consumer Counsel** released "A Brief Overview of Broadband Deficiencies in Connecticut," a report that detailed Connecticut's weaknesses in the area of broadband service, including maximum speeds that are less than what businesses need for operations, limited competitive options for broadband business services in urban areas, business growth soon to exceed broadband availability and long delays in obtaining services even when infrastructure was nearby. State Comptroller **Kevin Lembo**, responding to the report, noted that technology infrastructure investment is imperative to both attract businesses to Connecticut and to keep existing industries from leaving.

NEW AREA CODE INTRODUCED FOR 860 REGION. A new 959 area code was introduced in Connecticut in December, overlaying the 860 region. The 959 area code will be used in the same geographic region as the existing area code 860 and customers will not need to change their existing area code, personal telephone numbers, or the manner in which they dial calls. Customers requesting new service, an additional line, or in some cases, moving their service may now be assigned a number in the new 959 area code.

COMCAST TO BOOST HIRING, TECHNOLOGY INVESTMENTS. In January, **Comcast** announced plans to hire more than 200 new customer service employees in 2016; the move accompanies major investments in technology and training; simplified billing; store renovation and new technologies for customer interaction.

Education & Cognition

UCONN MED SCHOOL CHOSEN FOR AMA CONSORTIUM. The American Medical Association (AMA) in Chicago announced in November that **UConn School of Medicine** was chosen to receive $75,000 and participate in the AMA's Accelerating Change in Medical Education Consortium to improve and innovate education and training. The consortium began with eleven schools in 2013. The newest additions were chosen as part of a competitive-grant process

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,

IN BRIEF
Science and Engineering Notes from Around Connecticut

among 170 US medical schools. Boston's Harvard Medical School was the only other New England institution among the 20 most recent additions.

NEW YALE CENTER FOR HEALTH & LEARNING GAMES OPENS. On November 30, **Yale University** announced the opening of the **Yale Center for Health & Learning Games**, partnering researchers in the departments of internal medicine, pediatrics, emergency medicine, psychiatry, obstetrics, gynecology and reproductive sciences with organizations such as **Women's Health Research at Yale**, the **Yale Child Study Center**, the **Center for Emotional Intelligence**, the **Center for Interdisciplinary Research on AIDS**, and the **Yale Entrepreneurial Institute.** Because games are powerful tools for teaching positive health and learning behaviors to youth, the new center will "focus on research and development and evaluation of evidence-based game and video-game interventions," said **Lynn Fiellin**, associate professor of medicine and the Yale Child Study Center and founder of the center.

CONN COLLEGE GETS $1M GRANT FOR ENVIRONMENTAL, BOTANY STUDIES. In December, the Conservation and Research Foundation awarded **Connecticut College** a $1.025 million grant to establish the **Richard H. Goodwin Environmental Fund** within the college's endowment. The fund, named in honor of the late **Richard H. Goodwin**, the Katharine Blunt Professor Emeritus of Botany and former chair of the botany department, is intended to enhance the college's prestige in the areas of botany and environmental studies. It will be used to support an environmental research fellowship, a long-term environmental monitoring fund, a visiting botany scholar program and a financial environmental studies award.

UCONN ANNOUNCES NEW DEAN OF NEAG SCHOOL OF EDUCATION. Gladis Kersaint was named the new dean of **UConn's Neag School of Education** in early January. Kersaint was associate dean of academic affairs and research for the College of Education at the University of South Florida (USF) since 2011, where she was also a professor of mathematics education. While at USF, she was the principal or co-principal investigator of approximately $30 million of National Science Foundation, US Department of Education, and Florida Department of Education grants. She has also collaborated on numerous STEM education projects involving faculty in the USF's College of Arts and Science and the College of Engineering.

Energy

EASTON TO INSTALL SOLAR PANELS TO HELP POWER SCHOOL. Last fall, the town of **Easton** announced that close to 1,000 solar panels covering more than an acre of land will be placed behind **Samuel Staples Elementary School** to power about 50% of the school's needs. Work was completed with financing from the **Connecticut Green Bank**. The project is the first phase of a plan to double the solar field and power the entire school.

MIRA PLANS TO REDEVELOP HARTFORD PLANT. The **Materials Innovation and Recycling Authority** (MIRA), which manages trash from more than 50 Connecticut municipalities, recently announced plans to redevelop an outdated waste-to-energy plant in Hartford. The agency annually recycles 65,000 tons of recyclables and burns garbage to produce energy sold to New England's power grid. The goal is to recycle more trash and burn less using composting, biological processes to break down biodegradable materials, and other technologies, with a new plant expected to be built and operating by 2023. In 2014, the state legislature set a target for the state to recycle or reuse 60% of its trash by 2024.

STAMFORD HONORED WITH CLEAN ENERGY AWARD. Last fall, **Stamford** was honored as a Silver Recipient at the **Clean Energy Communities** awards ceremony for a program that incentivizes cities and towns to support energy efficiency and renewable energy. Stamford was honored for becoming the sixth city in the country to achieve 2030 District designation, converting street lights to LEDs starting in 2011, having homes participate in residential energy-saving programs, having business and municipal energy-saving projects, installing solar photovoltaic systems at **Rogers International Environmental Magnet School** and **Sofield Middle School**, and partnering with the US Department of Energy's Rooftop Solar Challenge grant program. "2030 Districts" are forming to meet the energy, water and vehicle emissions reduction targets for existing buildings and new construction called for by Architecture 2030 in the "2030 Challenge for Planning."

UI PLANS MICROGRID FOR WOODBRIDGE. United Illuminating (UI) finalized an agreement to build a 2.2 MW microgrid for Woodbridge, using clean energy to power seven municipal facilities in the event of an outage. **FuelCell Energy, Inc.,** will power the microgrid, which will be located at the **Amity Regional High School**, where it will also provide heat and hot water. UI's "Direct FuelCell" plant will convert clean gas into electricity and heat through an electrochemical process described as free of combustion and "virtually absent" of harmful pollutants. It will generate both power and heat from the same unit of fuel, with a carbon footprint about 25% that of the average US electric grid.

Environment

CT GROUPS TO SHARE $600K FOR LI SOUND PROJECTS. On November 13, $1.3 million from the US Fish and Wildlife Service, the US Environmental Protection Agency and the National Fish and Wildlife Foundation was made available to various groups working to restore the **Long Island Sound**. The funds are administered through the **Long Island Sound Futures Fund**, with $600,000 going to Connecticut groups, including $82,000 for the **Connecticut Audubon Society** to be used to help inner-city children develop wildlife habitats in their school playgrounds, $307,000 to the **Connecticut Fund for the Environment** to build fish ladders on the **Noroton River** in Darien, and $230,000 to **Sacred Heart University** to plant native berry bushes at **Stratford Point** for migrating birds.

EPA GRANT TO FUND WATER SYSTEM IMPROVEMENTS. The US Environmental Protection Agency has awarded $26 million to Connecticut to improve water systems. The primary focus will be upgrading sewage plants and drinking water systems, as well as replacing aging infrastructure throughout the state. "This funding will pay for projects that improve water quality and protect drinking water across Connecticut, and will provide benefits for decades to come," said Curt Spalding, regional administrator of EPA's New England office.

REPORT URGES INVESTMENT IN LAND CONSERVATION TO PROTECT SPECIES. The **Connecticut Audubon Society** in December released the "Connecticut State of the Birds 2015" report, recommending the state spend $500 million for land conservation to improve survival for the state's fish, bird, reptile, and mammal species. The report focuses on the official goal of protecting 21% of Connecticut's land by 2023, and the **Department of Energy and Environmental Protection's** new Green Plan.

IN BRIEF

Science and Engineering Notes from Around Connecticut

DEEP AWARDS RECYCLING INCENTIVE GRANTS. Connecticut's **Department of Energy and Environmental Protection** will award seven communities more than $60,000 in grants to enhance local waste reduction, reuse, and recycling programs as part of the state's **Recycling Incentive Grants Program**. The towns include **Branford, Bridgewater, Columbia, Greenwich, Hebron, Mansfield,** and **Ridgefield**. The goals are to reduce trash volume by doubling the recycling rate to 60% by 2024, and reclaiming increased materials of value from the waste stream, reducing environmental impact and costs and creating new "green" jobs.

CT OFFICIALS SUPPORT DREDGING PLAN FOR SOUND. The US Army Corps of Engineers released a dredging plan for **Long Island Sound** on January 12; the plan allows up to 52 million cubic yards of sediment dredged from harbors and rivers to be placed in four underwater disposal sites over the next 30 years. New York State opposes the plan for environmental reasons; however, officials from Connecticut support the plan because ports and channels require more dredging to stay open. "Our ability to conduct dredging in coastal waterways is critical to sustaining Connecticut's water-dependent economy," said **Robert Klee**, commissioner of the Connecticut **Department of Energy and Environmental Protection.**

SEA GRANT PROGRAM TO FUND COASTAL RESEARCH. Six research projects with a total value of $879,091 will be funded by the **Connecticut Sea Grant College Program** for the period 2016-2018. Recipients included **Wei Zhang** and **Christine Kirchhoff** of the **UConn Department of Civil and Environmental Engineering** to research coastal community vulnerability; **Stephen Swallow** of **UConn's Department of Agricultural and Resource Economics**, who will study coastal residents and their attitudes regarding coastal preservation in view of sea level rise; CASE member **Robert Mason** and **Zofia Baumann** of **UConn's Department of Marine Sciences**, to examine mercury concentrations and methylation in water and sediments; and CASE member **Hans Dam, Hannes Bauman**, and **Michael Finiguerra**, also of **UConn's Department of Marine Sciences**, who will investigate the combined effects of warming waters and ocean acidification on various marine species.

Food & Agriculture

STATE'S LARGEST DAIRY FARM ADDED TO PRESERVATION PROGRAM. On November 2, **Oakridge Dairy** in **Ellington**, the largest dairy farm in Connecticut, was added to the state's farmland preservation program with a permanent ban placed on using the land for anything other than agriculture. The state will pay the **Bahler** family $1.1 million, with at least half reimbursed by the USDA Natural Resources Conservation Service, and Ellington will pay $370,000. The 126 acres are considered vulnerable to nonagricultural development because they are flat and clear, as well as located in an area of significant home construction.

LYMAN ORCHARDS CELEBRATES 275 YEARS. Family-owned **Lyman Orchards** will celebrate its 275th anniversary in 2016. The farm, which began with 32 acres, was founded in 1741 and has grown to 1,100 acres, with 300 acres of orchard and a 450-acre golf course. The Lyman family seeks to cultivate the next generation of owner-operators, concerned not enough younger members will keep the farm run by the family, as it has been since inception.

CT CITIES NAMED 'FOOD DESERTS.' Hartford, New Haven and **Bridgeport** are considered food deserts according to the US Department of Agriculture, because of limited accessibility to healthy foods. Fourteen new supermarkets opened across the state during the last four years; however, none opened in "food desert" cities like Hartford. Plans are currently underway for a small supermarket to open on Main Street in Hartford.

PUTTING POLLINATORS FIRST. In an effort to inspire plantings of wildflowers and other vegetation attractive to pollinators, **UConn** graduate student **John Campanelli** is using funds from transportation departments in the New England states to create a manual to help state agencies grow native grasses and plants along highway medians that need not be mowed as often; in addition to saving mowing costs, these native meadow areas would become habitats for pollinators such as bees and butterflies, who need places to feed and nest. **Kimberly Stoner**, an associate scientist at the **Connecticut Agricultural Experiment Station** who researches bees, noted interest in growing pollinator plantings on the old Hartford landfill. Federal officials are currently developing a national strategy to restore honeybee colony health to sustainable levels by 2025, increase Eastern monarch butterfly populations by 2020 and restore millions of acres of land for pollinators.

Health

YALE STUDY FINDS E-CIGARETTE BANS BOOST CIGARETTE SALES. A recent study published in the *Journal of Health Economics* based on data from the National Survey on Drug Use and Health and conducted by researchers from the **Yale School of Public Health** found that state bans on e-cigarette sales to minors yield a 0.9% increase in rates of conventional cigarette use by 12 to 17 year olds, relative to states without these bans. According to the Centers for Disease Control and Prevention, e-cigarette use by middle and high school students tripled between 2013 and 2014.

BETTER DECISION-MAKING REDUCES HEART PROCEDURES. A study by researchers at the **Yale School of Medicine** and published in the November 9 issue of the *Journal of the American Medical Association* shows a decline in heart patients undergoing unnecessary angioplasty as a result of improved decision-making. Past studies found many elective (non-acute) Percutaneous Coronary Intervention—commonly known as angioplasty, or PCI—procedures were considered "inappropriate," meaning it was unlikely that procedure benefits would outweigh the risks. The research team included CASE member **Harlan M. Krumholz**, first author **Nihar R. Desai** and senior author **Jeptha P. Curtis**, along with **Steven M. Bradley, Craig S. Parzynski, Brahmajee K. Nallamothu, Paul S. Chan, John A. Spertus, Manesh R. Patel, Jeremy Ader** and **Aaron Soufer.**

PROTEIN LINKED TO ULCERATIVE COLITIS. Research led by CASE member **Richard Flavell**, chair of the **Department of Immunobiology** at **Yale School of Medicine** and published in the December 3 issue of *CELL,* shows that a protein, IL-18, plays a key role in the development of ulcerative colitis. The researchers discovered elevated IL-18 causes a dysfunction in goblet cells—specialized epithelial cells that form a protective mucus layer in the intestines, preventing inflammation and colitis. Based on this finding, the Yale team established a target for therapy in ulcerative colitis and possibly Crohn's disease, with the next step to develop a therapy based on the findings, looking for different compounds that could block IL-18 in the intestines.

STATE MONITORING ZIKA VIRUS. In January, officials with the **Connecticut Department of Public Health** (DPH) asked health care providers to report suspected cases of Zika virus infection to the patient's local health department and the DPH. The first outbreak of Zika virus in the Americas was reported in Brazil in May of 2015.

IN BRIEF

Science and Engineering Notes from Around Connecticut

The virus, with generally mild symptoms, was first identified in Uganda and transmitted primarily by the *Aedes* species mosquito, which are widespread in tropical climates. A possible link between Zika virus infection in pregnant women and subsequent birth defects is being investigated in Brazil. "The mosquito species that is primarily responsible for transmission of Zika virus to people is not found in Connecticut," said **Phil Armstrong**, medical entomologist with the **Center for Vector Biology & Zoonotic Diseases** at the **Connecticut Agricultural Experiment Station**. At **UConn**, pathobiologist **Paulo Verardi** is working on a vaccine candidate that could be ready for testing soon. Noting that it normally takes at least ten years to develop a vaccine, Verardi says he is hopeful that progress on a Zika virus will go faster, since the federal government has made the Zika virus a high priority.

UCONN DENTAL SCHOOL HONORED. The **UConn School of Dental Medicine** was recognized in January as a winner of the 2016 William J. Gies Award for Outstanding Achievement by an Academic Dental Institution. The Gies Awards are among the top awards in the field of dental education, recognizing worthy and socially commendable actions contributing to oral health and dental education. CASE member **Mina Mina**, professor and chair of the **Division of Pediatric Dentistry, Department of Craniofacial Sciences**, and a graduate of the program notes, "The UConn School of Dental Medicine was considered a pioneer at the time for introducing the DMD/PhD training track. Our alumni have made an impact on the academic world by becoming successful researchers and educators not only in dental institutions but also in medical and graduate schools."

High Technology

HSC PATIENT FIRST IN CT TO GET 'REWALK' SYSTEM. A patient at **Hospital for Special Care** (HSC) has become the first in Connecticut to use the wearable device, ReWalk Rehabilitation 2.0, a robotic exoskeleton system providing powered hip and knee motion to enable individuals to stand upright and walk. The **Connecticut Health and Educational Facilities Authority** awarded $75,000 to HSC to fund the cost of the equipment—the only system of its kind approved by the federal Food and Drug Administration for home use. ReWalk uses battery-powered, motion-sensing technology controlled by on-board computers and software.

WELLINKS RECEIVES R&D FUNDING. **Wellinks**, a wearable health technology company founded by **Yale** students **Ellen Su**, **Levi DeLuke** and **Sebastian Monzon**, announced recently that it had raised $265,000 in funding from **Connecticut Innovations, Inc.**, the New England Pediatric Device Consortium and angel investors. The company is working on a brace-monitoring device and related app, first developed for scoliosis patients. The device uses sensors to track brace wear-time and tightness, allowing doctors to follow patient progress and respond in real time. The startup is actively pursuing expansion into knee braces, walking boots and other markets. A clinical study involving 30-40 patients is currently underway at New York Presbyterian Hospital.

YALE LAB FOCUSES ON OPTICAL QUANTUM PROCESSOR. On January 21, *Nature Communications* published work done in the **Yale** lab of CASE member **Hong Tang**, professor of electrical engineering, physics & applied physics in the **School of Engineering and Applied Science**, focusing on a process of nanofabrication to create a silicon chip containing all the components needed for a quantum information processor. The chip contains a nanophotonic waveguide that guides light into small spaces and to wherever it is needed on the chip. **Carsten Schuck**, post-doctoral researcher and lead author of the paper, said the research team should eventually realize a programmable optical quantum processor that can run a quantum algorithm. The scalability of the nanofabrication routines for silicon chips could then solve problems difficult for classical computers.

SCHOOLS GET $10.9M FOR TECHNOLOGY. The **State Bond Commission** has approved $10.9 million in technology grants to help state school districts purchase more classroom computers and increase Internet bandwidth. It is part of an effort to strengthen computer and technology resources as part of Connecticut Core Standards. The grants will go to 171 school districts.

Transportation

REPORT URGES GREATER TRANSIT INVESTMENTS. A report, *Connecticut's Top Transportation Issues: Meeting the State's Need for Safe, Smooth and Efficient Mobility,* issued in November and prepared by TRIP, a Washington-based national transportation organization, noted that close to three quarters of major roads in the **Bridgeport** and **Stamford** regions are in poor or mediocre condition with statewide congestion worsening. These problems create costs to motorists both in terms of lost time and wasted fuel, as well as auto repairs and tire degradation. The report stated that more local, state and federal investments in improved transit could alleviate road congestion, improve rail, highway and bridge conditions, increase public safety and help the state's economic growth.

STATE, AMTRAK REACH AGREEMENT FOR HARTFORD LINE. This winter, the **State of Connecticut** and **Amtrak** reached an agreement to complete the **Hartford Line** at a cost of $570 million, with guarantees for costs and a timetable for work completion. The completed rail project will triple the number of trains between **New Haven** and **Hartford** and double the service between **Hartford** and **Springfield**. Four station projects are under construction and expected to be completed before service begins; fiber optic signal cable and communication nodes will be installed to power a new signal system.

DEEP EXPANDS EV REBATE PROGRAM. Connecticut's **Department of Energy and Environmental Protection** (DEEP) recently announced additional funding for a consumer rebate initiative and grants to encourage state agencies and local governments to purchase zero emissions electric vehicles (EV) and install charging stations. DEEP's consumer rebate program, the **Connecticut Hydrogen and Electric Automobile Purchase Rebate Program** (CHEAPR), provides a cash rebate up to $3,000 for Connecticut residents, businesses, and municipalities who purchase or lease an eligible EV, including battery, fuel cell, and plug-in hybrid vehicles. Rebates of $1,500 and $750 are provided for EVs that travel shorter distances on battery power.

CTDOT TO USE DRONES FOR BRIDGE INSPECTIONS. This winter, the **Connecticut Department of Transportation** began using an Unmanned Aerial Vehicle (UAV), or drone, to perform bridge inspection tasks on the **Gold Star Memorial Bridges** that carry I-95 northbound and southbound over the **Thames River** between **Groton** and **New London**. These are the state's longest bridges, spanning just over one mile each. In October 2015, a routine inspection was performed on the same bridge using lifts, snooper-trucks and ropes and climbers. The UAV inspection will be analyzed to determine if this technology improves or supplements traditional bridge inspection processes.

— Compiled and edited by Wendy Swift

NAS *(from page 1)*

FEMA to compare the price of NFIP premiums that reflect true flood risk with measures of policyholders' ability to pay. FEMA currently does not have the policy analysis capacity or necessary data to comprehensively analyze different options for making flood insurance more affordable, the report says. For example, first-floor elevation data is unavailable for many properties, making it difficult to estimate risk of flood damage or the premiums those property owners would face under a risk-based pricing structure. The NFIP database does not contain data on policyholders' income, wealth, or housing costs, making it impossible for FEMA to analyze the likely impact of federal assistance programs that consider such factors. The report identifies some limited analyses FEMA can do now, and describes ways that the agency can build its modeling capacity and data resources to enable such analyses.

www.nap.edu/read/21848/

◆ Assessing Hurricane Risk in a Changing Climate

Recent disasters, such as Hurricanes Katrina in 2005 and Sandy in 2012, Cyclone Nargis in 2008, and Typhoon Haiyan in 2013, underscore the significant vulnerability of the United States and the world to landfalling hurricanes. And the impacts of these storms may worsen in the coming decades because of rapid coastal development coupled with sea-level rise and possibly increasing hurricane activity due to climate change. Major advances in hurricane risk management are urgently needed, concludes the author of "An Integrated Approach to Assess and Manage Hurricane Risk in a Changing Climate," in the latest issue of *The Bridge* from the National Academy of Engineering. Given the inherent uncertainties in hurricane activity, such management should be strongly informed by probabilistic risk assessment, the article says, noting that hurricane risk assessment should integrate physical knowledge and models with observational data.

www.nae.edu/Publications/Bridge/148391/148599.aspx

◆ Examining Interregional Travel Policies

In the United States, most long-distance trips begin in one metropolitan region and end in another less than 500 miles away. Developments, such as the emergence of express bus lines like Megabus and BoltBus, point to the importance of interregional travel. A new report from the National Academies reviews the demand for interregional travel and examines the uncertainties that arise in supplying transportation services and infrastructure to accommodate it.

www.nap.edu/catalog/21887

CASE Members Laurencin, Rothberg to Receive National Medal of Technology and Innovation

Two Connecticut technology pioneers and innovators, CASE members Cato T. Laurencin and Jonathan Rothberg, have been awarded the National Medal of Technology and Innovation. The medal, which was established in 1980 to recognize those who have made "lasting contributions to America's competitiveness and quality of life and helped strengthen the nation's technological workforce," will be awarded by President Barack Obama in a ceremony later this spring.

CATO T. LAURENCIN

Cato T. Laurencin, an orthopaedic surgeon and the Van Dusen Distinguished Professor of Orthopaedic Surgery at UConn, is known as a pioneer in the fields of tissue engineering, biomaterials science, nanotechnology, stem cell science, and regenerative engineering. He is also CEO of the Connecticut Institute for Clinical and Translational Science (CICATS), founding director of the Institute for Regenerative Engineering, and founding director of the Raymond and Beverly Sackler Center for Biomedical, Biological, Physical and Engineering Sciences at UConn Health. This award recognizes his work in musculoskeletal tissue regeneration. He is the inventor of the L-C Ligament, the first bioengineered matrix shown to completely regenerate ligament tissue inside the knee. The L-C Ligament was patented in 2013 and is in a Phase I clinical trial in Europe.

JONATHAN ROTHBERG

Jonathan Rothberg, winner of the Connecticut 2010 Medal of Technology, is a genetic sequencing technology pioneer, entrepreneur, and an adjunct professor at the Yale School of Medicine. He received his PhD in molecular biology from Yale in 1991 and is the founder of many successful Connecticut companies, including 454 Life Science, CuraGen, Ion Torrent, Raindance Technologies, Hyperfine Research, Butterfly Network Inc., LAM Therapeutics, and 4Catalyzer, where he is currently chief strategy officer. His introduction of massively parallel DNA sequencing technology increased the speed and efficiency of genomic analysis, and he led or has been a major part of well-known sequencing projects including the first human genome, the Neanderthal genome, and incorporation of sequencing technology on semi-conductor chips.

Connecticut State Museum of Natural History at UConn

Exploring the dynamic relationship between nature and human activity since 1985

The Connecticut State Museum of Natural History, part of UConn's College of Liberal Arts and Sciences, provides a unique platform to showcase the teaching, research, and resources of the university. The museum provides opportunities for people of all ages to interact with and learn from leading scholars in meaningful and engaging ways. Through its exhibits, campus and community-based programs, and outreach activities, the museum explores Connecticut's natural and cultural history while providing opportunities to learn about Connecticut's people, places, and wildlife.

The museum's permanent exhibit, "Human's Nature: Looking Closer at the Relationships between People and the Environment," explores how the natural history of Southern New England has shaped, and continues to shape, the lives of the people who live here—and, in turn, how people reshape the environment.

(See Museum, page 8)

During the museum's 'Aquatic Life' program, participants collected water samples that were brought back to the lab of UConn Associate Professor Mark Urban to look for insects, microbes, and other aquatic life. [Photo: CT State Museum]

Bulletin of the
Connecticut Academy of Science and Engineering
805 Brook Street, Building 4-CERC
Rocky Hill, CT 06067-3405

Visit our web site at www.ctcase.org

OSTP *(from page 2)*

Research shows the effect of implicit, which is usually not deliberate, and explicit bias on the decision to pursue, excel at and participate fully in tech-based study and careers. Handelsman noted the need for people interested in technical careers to be able to see and identify with real people in science and technology careers not only through firsthand experiences such as mentorships; but also, via subliminal influencers like the media.

OSTP has been working with people in Hollywood to help them to provide a more realistic view of the jobs of STEM professionals. "The entertainment industry people we've talked with are excited about broadening STEM themes in their work," she said. "They want information about how they can more accurately portray technical people and jobs and have asked for our help with story lines and images. It's exciting to play the role of convener of information to bridge the gap and figure out how to sustain this effort long term."

OSTP also has formed a best practices working group with representatives from about 20 federal agencies to address bias in STEM careers. "These are people from national labs and beyond who are working together to identify and mitigate STEM bias within government," Handelsman said. "They are so enthusiastic about rolling out their findings to all agencies later this year and, eventually, to the rest of the scientific community. I've enjoyed bringing my expertise and evidence-based approach to STEM education to OSTP. It has been rewarding to be part of efforts that are based on my scientific interests.

Handelsman also provided insight about the value scientists add to determining US science policy. "We use technical expertise to determine how the federal government organizes science education and research," she said. She explained that the executive branch provides guidance for research priorities and it is OSTP's role to bring the voice of the scientific community to policy. "We offer advice on policy for the scientific community and advice on science to the policy makers," she added. ***—Karen Cohen is a freelance writer and owner of The Write Stuff, LLC.***

[Editor's note: This article includes information from www.whitehouse.gov]

Museum *(from page 7)*

Currently on display in the Museum's rotating exhibit area is "Macrophotography in Science."

Macrophotography technology creates amazing close-up images of plants, animals, and artifacts. This exhibit takes a very close look at the fascinating research being done in UConn's Departments of Ecology and Evolutionary Biology, Molecular and Cell Biology, Chemistry, and the Center for Integrative Geosciences.

Museum programs include field learning activities, lectures, day trips, workshops, community and special events, and the Connecticut State BioBlitz—a 24-hour event in which teams of volunteers work together to find and identify as many species of plants, animals, microbes, fungi, and other organisms as possible.

Visit the museum's website at www.cac.uconn.edu/mnhhome.html for information about exhibits, programs and events.