The mission of The Connecticut Agricultural Experiment Station is to develop, advance, and disseminate scientific knowledge, improve agricultural productivity and environmental quality, protect plants, and enhance human health and well-being through research for the benefit of Connecticut residents and the nation. Seeking solutions across a variety of disciplines for the benefit of urban, suburban, and rural communities, Station scientists remain committed to "Putting Science to Work for Society", a motto as relevant today as it was at our founding in 1875.
DR. THEODORE ANDREADIS was interviewed about eastern equine encephalitis virus activity in the state and curtailing of afterschool activities in the affected communities by Greg Hladky, Hartford Courant (September 11); was interviewed about the current situation with eastern equine encephalitis virus in southeastern CT and risk of human infection by Brian Hallenbeck, The Day (September 13); was interviewed about the increasing buildup and threat of human infection of eastern equine encephalitis virus in eastern CT by Isa Gutierrez, NBC Connecticut (September 17); participated in a press conference with Senator Richard Blumenthal and officials from the CT Department of Public Health to discuss the current situation with eastern equine encephalitis in CT (September 20); was interviewed about the death of two CT residents with eastern equine encephalitis and increasing risk to the public by Cynthia Drummond, The Westerly Sun; Ed Cara, Gizmodo Media; and Isa Gutierrez, NBC Connecticut (September 23); presented welcoming remarks and an overview of the Experiment Station and its various research, regulatory, and public service programs to a visiting group from the Yale University Women’s Organization (20 attendees) (September 24); participated in a press conference held at the State Capitol with Governor Ned Lamont Lt. Governor, Susan Bysiewicz, and the commissioners of DPH, DEEP, DOT, and the Department of Agriculture concerning the current status of eastern equine encephalitis in the State, including human and horse cases, mosquito trapping results by CAES and recommendations on how people can best protect themselves (September 24); was interviewed about the outbreak of eastern equine encephalitis in the northeastern US this year by Dan Goldberg, Politico; and Isabelle Philippe, ABC News (September 26); hosted US Senator Chris Murphy who visited the Station for a tour of the mosquito and biosafety level 3 laboratories and update on the eastern equine outbreak in CT followed by a press briefing (September 27); participated in a meeting with State Environment Committee Co-chairs Senator Cohen and Representative Demicco held at the State Capitol to discuss methoprene and its role in mosquito control (September 30).
Dr. Andreadis addressing the media at the State Capitol as Lt. Governor Susan Bysiewicz, DEEP Commissioner, Katie Dykes and Department of AG Commissioner, Bryan Hurlburt look on.

Senator Chris Murphy addressing media with Dr. Andreadis outside the Slate Laboratory.

DR. JASON C. WHITE hosted the bi-weekly Center for Sustainable Nanotechnology (CSN) Nanochem-plant working group ZOOM call (September 3, 17); gave a presentation entitled “Nanomaterial interactions with plants: Transformative chemistry-driven work within the CSN” on the weekly CSN ZOOM all-hands call (50 attendees) (September 4); along with DR. CHUANXIN MA, participated in a monthly ZOOM meeting of the Nanyang Technological University-Harvard University TH Chan School of Public Health Initiative for Sustainable Nanotechnology (SusNano) (September 6); attended the
ENTOMOLOGY

DR. KIRBY C. STAFFORD III participated in a conference call of the Tick Biology, Ecology and Control subcommittee of the Tick Borne Disease Working Group and presented on tick integrated tick management (September 9); spoke on ticks and tick-borne diseases at the Burlington Garden Club meeting in Burlington (28 attendees) (September 12); participated in two panels at a meeting of the Armed Forces Pest Management Board specifically on ticks in Silver Spring, MD (September 16-17); participated in a conference call of the Tick Biology, Ecology and Control subcommittee of the Tick Borne Disease Working Group (September 23), spoke on ticks and tick-borne diseases to the Hartland Trust in East Hartland (34 attendees) (September 23); and spoke on tick-bite prevention at an Eversource safety meeting in Hartford (30 attendees) (September 25); and participated in an Asian longhorned tick project call (September 27).

MS. KATHERINE DUGAS staffed the CAES display table at the Woodstock Fair (September 2); with MS. ROSE HISKES, taught invasive insects and tree-of-heaven identification to Vernon Greenways volunteers prior to a visual survey for Asian longhorned beetle and the spotted lanternfly along the Vernon Rail Trail (10 attendees) (September 14); gave a talk about garden insects at the Quinnipiac Audubon Riverbound Farm Sanctuary in Cheshire (20 attendees) (September 15); and with DR. LINDSAY TRIPLETT, DR. SARA CARSON, and MS. ROSE HISKES, attended and staffed the CAES booth in the Connecticut Building at the Big E in Springfield, MA (52,447 people attended the fair that day) (September 17).

MR. MARK H. CREIGHTON attended the Apimondia World beekeeping conference held in Montreal with lectures on honey bee health and updates on the most current research on varroa mites; also...
ENVIRONMENTAL SCIENCES

DR. PHILIP ARMSTRONG was interviewed on the current EEE virus outbreak affecting Connecticut and neighboring states by the Connecticut Post (September 3 and 4); WNPR (September 4); Republican-American (September 4 and 17); WTIC (September 4, 16, and 24); Shoreline Times (September 9); The Providence Journal (September 19); Fox 61 (September 24); News Channel 3 (September 24); The Connecticut Examiner (September 24 and 26); and Patch Media (September 26); and attended and spoke at a press event at CAES with Senator Chris Murphy about EEE virus and federal support for research and response programs on mosquito- and tick-borne diseases (September 27).

MS. ANGELA BRANSFIELD participated in the Federal Select Agent Program webinar eFSAP Information System September 2019 Release Updates (September 19).
**FORESTRY AND HORTICULTURE**

**DR. JEFFREY S. WARD** met with Eric Hammerling and CFPA staff to discuss a citizen science forestry project (September 5); with DR. KIRBY STAFFORD, met with Chris Martin (CT DEEP) and Jim Duncan (Forest Ecosystem Monitoring Cooperative) at the Valley Laboratory to discuss regional data sharing (September 5); administered practical and oral examinations to arborist candidates for the Connecticut Tree Protection Examining Board (September 11); was interviewed about the importance of acorns for forest ecology by Bob Miller of the Danbury News-Times (September 12); met with Peter Punzi, new Executive Director of White Memorial Foundation, to discuss ongoing and future collaborative research (September 12); met with Mayor Robert Chatfield to discuss planting sites on the Prospect town green (September 13); met with Anthony D’Amato and Peter Clark (University of Vermont) about forest management and aboveground carbon sequestration (September 19); spoke on “A short history of the Connecticut forest” at the Rockville Public Li-

**MR. GREGORY BUGBEE** participated in the Northeast Aquatic Plant Management Society Board of Directors meeting held in Lake Placid, NY (September 9-10); judged a Future Farmers of America Science Fair at the Big E in West Springfield, MA (September 13); spoke on “Management of nuisance aquatic vegetation” to the Amos Lake Association at the Preston Public Library (approx. 30 attendees) (September 18); hosted the Connecticut Lakes Forum in the Jones Auditorium and gave the keynote address entitled “Connecticut lakes update” (approx. 70 attendees) (September 21); spoke on “Management of nuisance aquatic vegetation” to the Diamond Lake Association in Glastonbury (approx. 30 attendees) (September 26); and gave a talk entitled “Candlewood Lake Grass Carp Program” at the Regional Lake Communities Symposium at Western Connecticut State University (approx. 50 attendees) (September 30).

**DR. ANDREA GLORIA-SORIA** gave an invited seminar entitled “Tracking down invasions of the yellow fever mosquito, *Aedes aegypti*, at different time scales” at the 552th Connecticut Entomological Society Meeting hosted at Yale University (25 attendees, 5 of them students) (September 20).

**DR. GOUDARZ MOLAEI** gave an invited talk entitled, “Nature’s revenge: Resurgence of Eastern equine encephalitis as a serious mosquito-borne virus” at the Canterbury Public Library (10 attendees) (September 14); hosted two groups of the Yale University Women’s Organization in the Tick Testing Laboratory (approx. 40 attendees) (September 24); and was interviewed on tick and Lyme disease hotspots in Connecticut by the Norwich Bulletin (September 24).

**MR. JOHN SHEPARD** spoke to two tour groups from the Yale University Women’s Organization about the CT Mosquito Trapping and Arbovirus Surveillance Program and EEE (24 attendees) (September 24); and was interviewed about mosquito trapping and identification by Fox 61 (September 24).

**DR. BLAIRE STEVEN** gave a seminar to the Department of Plant Science and Landscape Architecture at the University of Connecticut, Storrs entitled “Can the apple flower microbiome provide a probiotic for fire blight disease?” (approx. 25 attendees, 15 of them students) (September 20); and participated in the “Mystery Scientists” program for the coastal wetlands-focused climate change module being developed for high school science educators (see: [https://www.youtube.com/watch?v=EzN-U3TzQl0&feature=youtu.be](https://www.youtube.com/watch?v=EzN-U3TzQl0&feature=youtu.be)) (various times in September).

**DR. CHARLES VOSSBRINCK** gave three talks at the West Haven Fig Festival held at Savin Rock Park (see: [https://patch.com/connecticut/westhaven/west-haven-international-food-fig-festival-september-14](https://patch.com/connecticut/westhaven/west-haven-international-food-fig-festival-september-14)) (approx. 80 attendees) (September 14).
DR. ABIGAIL A. MAYNARD judged fruits and vegetables at the North Haven Fair (September 5); reported on Station activities at a quarterly meeting of the Council on Soil and Water Conservation held in Middletown (14 adults) (September 19); inspected the food composting operation at Wesleyan University in Middletown (September 19); participated in a meeting of a committee on Soil Health in Middletown (September 24); reported on Station activities at a meeting of the State Technical Committee in Vernon (29 adults) (September 25); discussed the New Crops program with 3 growers in the Hamden Farmers Market (September 26).

DR. SCOTT C. WILLIAMS participated in a conference call on collaborative research updates with US Biologic, Inc. (September 30).

MR. JOSEPH P. BARSKY served as a judge at the 2019 Regional Agriscience Fair at the Big-E in Springfield, MA (15 students) (September 13); co-lead a biodiversity hike at Sleeping Giant State Park (12 adults) (September 15); participated in the New England Society of American Foresters Executive Committee Meeting in Concord, NH (September 18); and participated in the NESAF 2020 planning committee conference call (September 24).

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DR. LINDSAY TRIPPLETT with MS. KATHERINE DUGAS and MS. ROSE HISKES, staffed the CAES booth at the Eastern States Exhibition in West Springfield, MA (total attendance 52,447) (September 17).

DR. QUAN ZENG gave a presentation entitled “Bacterial plant pathogens and other plant associated microbes” at the research seminar of the Department of Biomedical Sciences, Quinnipiac University in Hamden (60 adults) (September 4).

DR. JATINDER AULAKH participated in a video conference with weed scientists from the Northeast for setting up ornamental weed management research priorities for 2020-2021 (September 12); and attended the annual fall meeting of the Connecticut Christmas Tree Growers Association and gave a talk on weed management updates and control of woody vines and shrubs (45 attendees) (September 21).

DR. RICHARD COWLES provided an update on “CCTGA grant progress” to the Connecticut Christmas Tree Growers’ Governing Board, Haddam (15 attendees) (September 11); discussed “Research at Allen Hill Farm” to the Experiment Station Associates, Brooklyn (40 attendees) (September 17); presented “Soil acidification to protect bare root transplants from Phytophthora root rot infection” for the NH/VT Christmas Tree Growers Association, North Pownal, VT (50 attendees) (September 21); talked about “Exotic pests as threats to forest health” to the Northern Connecticut Land Trust Association, Somers (September 22); and participated with an ECSU Mycology class in sampling irrigation ponds for Phytophthora at Prides Corner Nursery, Lebanon (15 students) (September 30).

MS. ROSE HISKES participated in a Spotted Lanternfly preparedness meeting in Jones Auditorium (August 1); taught “Plant diseases and garden pests” and “Invasive plants” to the Federated Garden Clubs of Connecticut Garden School held in Jones Auditorium (19 attendees) (September 4); gave a talk entitled “Insect pests of African violets” to the Windsor African Violet Society in Bolton (12 attendees) (September 11); with Katherine Dugas, taught invasive insects and tree of heaven identification to Vernon Greenways volunteers prior to a visual survey for Asian longhorned beetle and the spotted lanternfly along the Vernon rail trails (10 attendees) (September 14); and with MS. KATHERINE DUGAS and DR. LINDSAY TRIPPLETT, staffed the CAES booth at the Eastern States Exposition in West Springfield, MA (total attendance 52,447) (September 17).

DR. JAMES LAMONDIA conducted oral exams for candidates for the Connecticut arborist license and participated in the quarterly meeting of the Connecticut Tree Protection Examining Board in New Haven (September 11); was interviewed about Connecticut shade and broadleaf tobacco by Andrew Nagy of Cigar Aficionado magazine (September 11); was interviewed about breeding for Connecticut wrapper tobacco by Andrew Nagy of Cigar Aficionado magazine (September 12); was interviewed about hemp production in Connecticut and the role of the CAES in research and analytical testing by Darcy Cahill for Acres USA magazine (September 20); and presented “Fungicide effects on the boxwood blight pathogen” and “Cultivar testing for blight resistance” as a part of the Boxwood Blight Research Update webinar hosted by AmericanHort (50 participants) (September 24).

DR. DEWEI LI participated in and presented a poster “Phytophthora abietivora, a new species isolated from diseased Christmas trees in Connecticut” coauthored with Neil P. Schultes, James A. LaMondia, and Richard S. Cowles at the 18th Congress of European Mycologists (September 16 to 21) in Warsaw and Białowieża Primeval Forest, Poland.

**Abstract** - The present study investigated effects of two carbon-based nanomaterials (CNMs), multiwall carbon nanotubes (MWCNTs) and fullerenes (C60), on biogas and methane yield from sheep manure in an anaerobic digestion system over a 45-day period. The results show that the presence of 500 mg/kg MWCNTs or C60 increased the daily and accumulative production of methane, and decreased the total solid content (TS) and pH. Exposure 50 mg/kg CNMs had no impact on digestion. A high-throughput sequencing technique was used to analyze the microbial community diversity and composition in the digest across all treatments. The addition of 500 mg/kg C60 and MWCNTs notably altered the composition of the bacteria and archaea at the genus level. The was particularly evident for Methanobacterium, whose relative abundance was significantly increased, highlighting the positive effects of CNMs on microorganisms and the subsequent acceleration of methane production. These findings provide important information on the potential use of CNMs in methane production via altering or tuning the composition of the bacterial and archaeal communities and have relevance for exploring the use of CNMs in clean energy and agricultural water recycling.


**Abstract** - The differential mechanisms of CdS QDs (Quantum Dots) and Cd ion toxicity to *Arabidopsis thaliana* (L.) Heynh were investigated. Plants were exposed to 40 and 60 mg L-1 for CdS QDs and 76.9 and 115.2 mg L-1 CdSO4·7H2O and toxicity was evaluated at 5, 20, 35 (T5, T20, T35) days after exposure. Oxidative stress upon exposure was evaluated by biochemical essays targeting non-enzymatic oxidative stress physiological parameters, including respiration efficiency, total chlorophylls, carotenoids, ABTS and DPPH radicals reduction, total phenolics, GSH redox state, lipid peroxidation. Total Cd in plants was measured with AAS. Root and leaf morphology and element content were assessed in vivo utilizing low-vacuum Environmental Scanning Electron Microscopy (ESEM) with X-ray microanalysis (EDX). This integrated approach allowed identification of unique nanoscale CdS QDs toxicity to the plants that was distinct from CdSO4 exposure. The analyses highlighted that CdS QDs and Cd ions effects are modulated by the developmental stage of the plant, starting from T20 till T35 the plant development was modulated by the treatments, in particular CdS QDs induced early flowering. Both treatments induced Fe accumulation in roots, but at different intensities, while CdS QDs was associated with Mn increase into plant leaf. CdSO4 elicited higher levels of oxidative stress compared with QDs, especially the former treatment caused more intense respiration damages and reduction in chlorophyll and carotenoids than the latter. The two types of treatments impact differently on root and leaf morphology.


**Abstract** - Nanomaterial-specific response of quantum dots and the underlying mechanisms of their interaction with plants are poorly understood. In this study, we investigated the mechanism of cadmium sulfide-quantum dot (CdS-QD) uptake and stress response in soybean (Glycine max) plants using sensitive bio-analytical techniques. We adopted shotgun-proteomics and targeted analysis of metabolites and gene expression in the tissues of soybean plants exposed to 200 mg L-1 CdS-QDs in vermiculite for 14 days. The molecular response in the soybeans as a function of surface coatings on CdS-QDs, specifically, trioctylphosphine oxide, polyvinylpyrrolidone, mercaptacetic acid and glycine was also tested. The biological response of CdSQDs was compared to Cd-ions and bulk-CdS to identify the nanomaterial-specific response. The transmembrane proteins involved in uptake and genes including NRAMP6 and HMA8 were regulated differently in CdS-QD-treated plants compared to Cd-ion-treated plants. The ATP-dependent ion-transporters in the membranes presented feedback mechanisms in the soybean roots to restrict the uptake of CdS-QDs and simultaneously altered the mineral acquisition. CdS-
QDs perturbed major metabolic pathways in soybeans including glutathione metabolism, tricarboxylic acid cycle, glycolysis, fatty acid oxidation and biosynthesis of phenylpropanoid and amino acids. This study provides clear evidence that the toxic responses and tolerance mechanisms in plants are specific to Cds-QD exposure and not entirely due to leaching of Cd ions.


Abstract- Cases of morphological anomalies in the blacklegged tick, *Ixodes scapularis* (Acarii: Ixodidae), have recently been reported from the Northeastern and upper Midwestern United States, potentially complicating identification of this important vector of human disease-causing pathogens. We hereby report a case of a morphological anomaly in *I. scapularis*, biting a human host residing in Norwich, Connecticut. Using a dichotomous morphological key, high-resolution and scanning electron microscopy images, as well as DNA sequencing, the tick was identified as an adult female *I. scapularis* with three legs on the left side of the abdomen versus four on the right side, which we believe is the first case of ectromely in an adult *I. scapularis*. Using diagnostic genes in polymerase chain reaction, the specimen tested positive for *Borrelia burgdorferi* sensu lato and *Anaplasma phagocytophilum*, the causative agents for Lyme disease and anaplasmosis, respectively, and also showed evidence of a rickettsial endosymbiont. Here we discuss recent reports of morphological anomalies in *I. scapularis*, and emphasize the significance of additional studies of teratology in this important tick species and its potential implications.


Abstract- In North America, the geographic distribution, ecology, and vectorial capacity of a diverse assemblage of mosquito species belonging to the genus *Culex* determine patterns of West Nile virus transmission and disease risk. East of the Mississippi River, mostly ornithophagic *Culex pipiens* L. complex mosquitoes drive intense enzootic transmission with relatively small numbers of human cases. Westward, the presence of highly competent *Culex tarsalis* (Coquillett) under arid climate and hot summers defines the regions with the highest human risk. West Nile virus human risk distribution is not uniform geographically or temporally within all regions. Notable geographic ‘hotspots’ persist with occasional severe outbreaks. Despite two decades of comprehensive research, several questions remain unresolved, such as the role of non-*Culex* bridge vectors, which are not involved in the enzootic cycle, but may be involved in virus transmission to humans. The absence of bridge vectors also may help to explain the frequent lack of West Nile virus ‘spillover’ into human populations despite very intense enzootic amplification in the eastern United States. This article examines vectorial capacity and the eco-epidemiology of West Nile virus mosquito vectors in four geographic regions of North America and presents some of the unresolved questions.


Zhao, L., A. Wang, Q. Jin, A. Miao, Jason C. White, J. L. Gardea-Torresdrey, and R. Ji. High-throughput screening for engineered nanomaterials that enhance photosynthesis using mesophyll protoplasts. *ACS Nano*
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Station News was prepared and edited by Dr. Theodore G. Andreadis, Ms. Vickie Bomba-Lewandowski, Ms. Sandra Carney, and Ms. Brandi Marks.