Station News

The Connecticut Agricultural Experiment Station
Volume 9 Issue 10 October 2019

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.

CAES

The Connecticut Agricultural Experiment Station

Putting Science to Work for Society since 1875

This Issue

ADMINISTRATION

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).

Senator Richard Blumenthal addressing the media outside the State Department of Public Health Laboratory in Rocky Hill with **Dr. Andreadis** and CT State Epidemiologist & Director of Infectious Diseases, Dr. Mathew Cartter.

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.

ANALYTICAL CHEMISTRY

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

monthly Laboratory Preparedness meeting held at the CT Department of Public Health Laboratory in Rocky Hill (September 9); met with University of Alaska graduate student Ms. Taylor Gofstein about Department research projects and opportunities for collaboration (September 10); along with **DR. NUBIA ZUVERZA-MENA** and **DR. SARA NASON,** attended the CT PFAS Taskforce meeting in Harford at the Legislative Office Building LOB) (September 18); participated in the weekly all-hands ZOOM call for the Center for Sustainable Nanotechnology (September 11, 18); along with **DR. BRIAN EITZER, DR. WALTER KROL, DR. CHRISTINA ROBB, MS. TERRI ARSENAULT, MR. CRAIG MUSANTE, and MS. KITTY PRAPAYOTIN-RIVEROS,** participated in the monthly FDA FERN cCAP WebEx call (September 12); hosted the quarterly CAES Safety Committee meeting (September 13); participated in the monthly CSN Faculty ZOOM meeting (September 19); spoke by phone with Mr. Jerry Tardif, who is the CEO/CTO of Technological Solutions LLC, about agricultural applications of his technology (September 20); participated in the APHL-sponsored quarterly Agricultural/State Chemist Call WebEx call (September 20); attended the CHRO Workplace Discrimination Training at the LOB in Hartford (September 25); served on the NSF CBET Career Grant Review Panel at NSF in Alexandria, VA (September 26-27); and with **DR. THEODORE ANDREADIS,** met with the co-chairs of the Environment Committee and others to discuss the current ban on methoprene use for mosquito control in CT (September 30).

DR. BRIAN EITZER was a participant in the FERN cCAP metrics discussion phone call (September 4); participated in the North American Chemical Residue Workshop's Organizing Committee phone call (September 12); and participated in the FERN Northeastern group phone call (September 26).

DR. CHRISTINA ROBB attended the Eastern Analytical Symposium long term program planning meeting, board meeting and logistics meeting (30 attendees) (September 12-13); and represented the Department of Analytical Chemistry at the Connecticut National Guard (CTNG) Joint Staff SFE concepts and objectives meeting at Camp Nett, Niantic (September 25-26).

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 on 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

attended a meeting of The Apiary Inspectors of America and the Canadian Provincial Apiculturist on honey bee health topics and regulatory concerns (September 8-12) and was interviewed for an upcoming feature on honey bee health by Carol Hewitt from the Connecticut Examiner (September 27).

DR. MEGAN LINSKE gave an invited lecture entitled "Ticks: It's More Than Just Lyme Disease" at the Connecticut Pest Control Conference in Cromwell (85 attendees) (September 17); and participated in a collaborative call with US Biologic on current manuscript development and publication (September 30).

DR. GALE E. RIDGE presented a talk about bed bugs to the Southern Mental Health Authority in Norwich (47 attendees) (September 6); talked about bed bugs to affordable housing and property owners in Hartford (31 attendees) (September 12); conducted a training about managing bed bugs on public transportation for the Greater Bridgeport Transit and provided a copy of the CCABB bed bug bus poster from a previous campaign which they plan to display in their bus fleet (15 attendees) (September 18); was interviewed by Catherine Bowton from the Republican American about yellowjackets (September 25); spoke about bed bugs to Sound Community Services of New London (34 attendees) (September 26); was interviewed about yellowjackets by Rachael Rooney, Channel 3 Eye witness News (September 30); and was interviewed about insects that overwinter by Mary Jo DiLonardo, Senior Editor/Writer of the Mother Nature Network (September 30).

DR. VICTORIA L. SMITH with MS. TIA BLEVINS, participated in a demonstration of mobile inspection applications, presented by DAS-BEST, in Hartford (25 participants) (September 12); and with MS. TIA BLEVINS and USDA officer Eric Chamberlain, certified the cold treatment facilities at Blue Hills Orchard in Southington (September 26). Cold treatment certification will facilitate export of CT apples to Israel.

DR. KIMBERLY A. STONER was interviewed live on-air about bees, pollinator habitat, and the Pollinator Pathway by Lucy Napathanchil on the program "Where We Live," CT Public station WNPR (August 2); was interviewed about the insect apocalypse and the current status of the state bee checklist by Greg Hladky of the Hartford Courant (August 14); organized and spoke at a workshop for photographing insects on flowers and submitting photos to iNaturalist for identification and documentation of sightings at Wakeman Town Farm, Westport (25 attendees) (August 17); presented a poster entitled "Using color sorting and palynology to track pesticide residues in trapped honey bee pollen to a plant genus" at the COLOSS (Prevention of Honey Bee Colony Losses) meeting, and participated in the meetings of the Nutrition and Apitox Task Forces in Montreal, Quebec (150 participants) (September 7-8); and presented a talk to the South Central Connecticut Regional Council of Governments on "Pollinator habitat in Connecticut" (22 attendees) (September 24).

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).

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).

DR. SARA NASON participated in meetings of the Connecticut PFAS Taskforce in Hartford: Human Health Committee (September 10), Remediation Committee (September 12), and full Task Force (September 18); and participated in a conference call with Drs. Andrea Tokranov and James Gray of U.S. Geological Survey to discuss PFAS analysis methods (September 19).

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-U3TzOl0&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) (approx. 80 attendees) (September 14).

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); spoke 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-

brary in Vernon (8 attendees) (September 19); and participated in the NESAF 2020 planning committee conference call (September 24).

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).

PLANT PATHOLOGY AND ECOLOGY

DR. WASHINGTON DA SILVA met with CT Commissioner of Agriculture, Bryan P. Hurlburt, four CT wine makers, and Rebeca Eddy Murphy from the CT DoAg at Preston Ridge Vineyard and presented a talk on "The status of grape research at CAES" and discussed future research plans on securing funding for grape research in Connecticut (July 23).

DR. WADE ELMER met with Jack Swat (President) and Florian Carle (member) of the CT Chapter of The American Chestnut Foundation at Lockwood Farm and conducted an inventory of Dr. Anagnostakis' chestnut plantings (September 10); moderated and presented the keynote lecture at the opening plenary session on "Nanoparticles for foliar feed and crop health" at the World Conference on Plant Science and Molecular Biology held in Valencia, Spain (25 attendees) (September 17-19).

DR. YONGHAO LI talked about "Disease management in organic gardens" at the Cherry Brook Garden Club business meeting in Canton (30 adults) (September 10); presented "Important diseases in Connecticut landscapes" for a continuing education program of the Connecticut Chapter of the American Society of Landscape Architects in Watertown (60 adults) (September 13); was interviewed about "This year's foliage will be late, but it sure will wow you" by Bridgitte Ruthman of the Waterbury Republican-American (September 20); talked about "Delphinella shoot blight of Concolor fir and Rhizosphaera needle cast of spruce" at the Connecticut Christmas Tree Grower Association Annual Fall Meeting in Voluntown (50 adults) (September 21); presented "Selection and care of houseplants" at the Orchard Valley Garden Club business meeting in Southington (40 adults) (September 24); and staffed the Station booth at the event Pup-Up in the Garden at Winterberry Garden Center (September 28).

DR. ROBERT MARRA gave a presentation on the Plant Disease Diagnostics Office to the Yale University Women's Organization (30 adults) (September 24); gave a presentation and walking tour on invasive plants of the Connecticut shoreline to the West Haven Sustainability CT Team (12 adults) (September 28).

DR. LINDSAY TRIPLETT 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).

VALLEY LABORATORY

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 TRIPLETT**, 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.

DEPARTMENTAL RESEARCH UPDATES SEPTEMBER 2019

Hao, Y.; Wang, Y.; **Ma, C.; White, J.C.**; Duan, C.; Zhao, Z.; Zhang, Y.; Adeel, M.; Li, G.; Rui, Y.; Xing, B. 2019. Carbon nanomaterials increase methane production from livestock manure in an anaerobic digestion system. *J. Clean. Prod.* 240:118257.

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 digests 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.

Marmiroli, M.; Mussi, F.; Pagano, L.; Imperiale, D.; Lencioni, G.; Villani, M.; Zappettini, A.; White, J.C.; Marmiroli, N. 2020. Cadmium sulfide quantum dots and Cd2+ impact differently on *Arabidopsis thaliana* physiology and morphology. *Chemosphere* 240:124856.

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.

Majumdar, S.; Pagano, L.; Wohlschlegel, J.A.; Villani, M.; Li, W.; Parkash Dhankher, O.; Zappettini, A.; Marmiroli, N.; **White, J.C.**; Keller, A. 2019. Proteomic, gene and metabolite characterization reveal uptake and toxicity mechanism of cadmium sulfide quantum dots in soybean plants. *Environ. Sci.: Nano*. DOI: 10.1039/C9EN00599D.

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, mercaptoacetic 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 tolerancemechanisms in plants are specific to CdS-QD exposure and not entirely due to leaching of Cd ions.

Molaei*, G., Little, E. AH., **Stafford III**, K. C., Gaffe, H., A Seven-Legged Tick: Report of a Morphological Anomaly in *Ixodes scapularis* (Acari: Ixodidae) Biting A Human Host from the Northeastern United States *Ticks and Tick-borne Diseases* 2019; 10.1016/j.ttbdis.2019.101304, online September 23.

Abstract- Cases of morphological anomalies in the blacklegged tick, *Ixodes scapularis* (Acari: 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.

Rochlin, I., Faraji, A., Healy, K., and **Andreadis, T. G.** 2019. West Nile virus mosquito vectors in North America. *J. Med. Entomol.* doi: 10.1093/jme/tjz146

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.

JOURNAL ARTICLES APPROVED SEPTEMBER 2019

Maynard, Abigail A. and **Jeffrey S. Ward**. Brassica trials 2004-2012. *CAES Bulletin 1061.*

Tokarev, Y. S., W. F. Huang, L. F. Solter, J. M. Malysh, J. J. Becnel, and **Charles R. Vossbrinck**. A formal redefinition of the genera Nosema and Vairimorpha (Microsporidia: Nosematidae) and reassignment of species based on molecular phylogenetics. *Journal of Invertebrate Pathology*

Zhao, L., A. Wang, Q. Jin, A. Miao, **Jason C. White**, J. L. Gardea-Torresdey, and R. Ji. High-throughput screening for engineered nanomaterials that enhance photosynthesis using mesophyll protoplasts. *ACS Nano*

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Putting Science to Work for Society.

Main Laboratories, New Haven

Lockwood Farm, Hamden

Griswold Research Center, Griswold

Valley Laboratory, Windsor

The Connecticut Agricultural Experiment Station

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Station News was prepared and edited by Dr. Theodore G. Andreadis, Ms. Vickie Bomba-Lewandoski, Ms. Sandra Carney, and Ms. Brandi Marks.

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