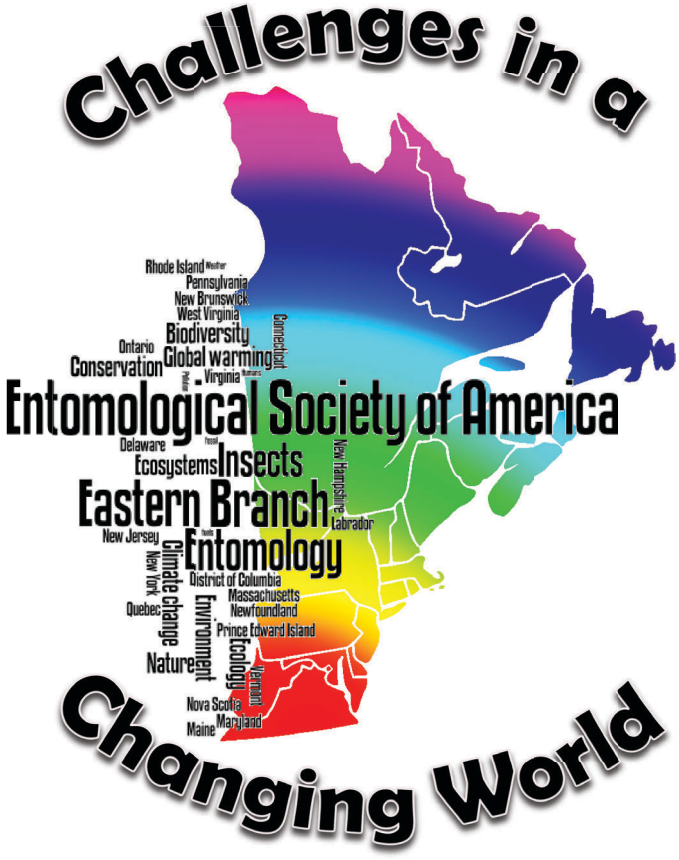
EASTERN BRANCH

ENTOMOLOGIAL SOCIETY OF AMERICA

88th ANNUAL MEETING



Newport Marriott

Newport Rhode Island

March 18-21, 2017

Sponsors of the Eastern Branch 88th Annual Meeting

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Code of Conduct

By attending the 2017 Eastern Branch Annual Meeting, you agree voluntarily to abide by our ethics policy.
The full policy may be found online at entsoc.org/conduct.
If you need to file a complaint, please contact Rosina Romano at rromano@entsoc.org, 703-593-0222.

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General Meeting Information

88th Annual Meeting of the Eastern Branch of ESA
Newport, RI
March 18-21, 2017

Getting to Newport Marriott:

Address: 25 America's Cup Avenue, Newport, RI 02840; Telephone (401) 849-1000

The hotel does not provide shuttle service. Valet parking is $20 USD daily. Complimentary off-site parking is available in the Gateway lot next to the hotel.

From T F Green Airport (PVD):

Follow Interstate 95 South to Route 4 to Route 1 to RI-138E to the Jamestown and Newport bridges. Take the first exit after crossing the Newport Bridge and at the bottom of the exit ramp turn right at the second traffic light.
Estimated taxi fare: $85 USD (one way)

From Boston Logan International Airport (BOS):

Follow signs for Interstate 90 West/Interstate 93 South/ Williams Tunnel/Mass Pike and merge onto Interstate 90 West. Take exit 24 for Interstate 93 and merge onto Interstate 93 South. Take exit 4 on the left to merge onto MA-24 South toward Brockton. Continue onto MA-79 South. Take the exit on the left for Interstate 195 East then take exit 8A to merge back onto MA-24 South toward Tiverton RI/Newport RI. Continue onto RI-24 South. Exit onto RI-114 South/West Main Road then onto Broadway. Make a slight right onto Marlborough Street. At America's Cup Avenue turn left and the hotel will be on the right.
Estimated taxi fare: $300 USD (one way)

Registration:

Meeting registration is located in the 3rd Floor Foyer and will be open during the following times:

Sunday, March 19, 8:00 AM – 5:00 PM

Monday, March 20, 8:00 AM – 5:00 PM

Internet:

Free wi-fi is available in the hotel lobby. Elsewhere (including guest rooms) it will cost $12.95/day. There is also a Panera Bread across the street with free wi-fi.

Poster Presentation Information:

Poster Size:

Poster must be contained within the 46 × 46 inch (117 × 117 cm) space provided. The poster must NOT exceed the size limit.

Set Up:

Your poster must be setup at your assigned space in Salon III/IV on Sunday, March 19 between 10:00 AM – 12:00 PM. **Bring your own Velcro strips or tacks to secure your display to the poster board.**

Author Presence:

All Student competitors and regular membership are to stand next to their posters at the President's Reception on Sunday, March 19 from 5:30 PM – 7:30 PM.

Audiovisual & Upload of Presentations:

Digital projectors with computers will be provided for oral presentations. Speakers must upload their presentations as PowerPoint files 30 minutes before the session during which they will present.

President's Reception:

All attendees are invited to attend the President's Reception on Sunday, March 19 from 5:30 PM – 7:30 PM in Salon III/IV. On the agenda: Welcome from ESA EB President Dr. Cesar Rodriguez-Saona and ESA Executive Director David Gammel, and presentation of the L.O. Howard and Herb Streu Awards. We hope to see you there!

It's a Bugs World:

Plan to join us for all the fun on Sunday, March 19 from 10:00 AM – 4:00 PM.

See details inside back cover of this book.

Silent Auction:

Please donate items and come prepared to bid at the Silent Auction, taking place Sunday, March 19 and Monday, March 20 in Salon III/IV, to benefit the Entomological Foundation.

Discover Newport:

Looking for something fun to do while in town? Check out Discover Newport (*https://www.discovernewport.org/*).

With offices located next to the hotel, Discover Newport is a great resource for those wishing to:

1. tour local mansions (*http://www.newportmansions.org/),*
2. find great local restaurants (*https://www.discovernewport.org/blog/post/15-new-restaurants-to-add-to-your-foodie-bucket-list/?preview=true&guid=138c9943-cb10-481b-a291-7d39d2052b6e*), and
3. participate in other exciting things in the city. View their Top 10 Things To Do (*https://www.discovernewport.org/things-to-do/top-10-things-to-do/*) to make the most of your trip.

Local Recommendations from URI Entomologists:

Excursions:

For a short walk, check out the water, Thames Street, and Brick Marketplace. Up for a longer walk? Cliff Walk is the way to go. Take a cab or Uber and explore the ocean side of many of the local mansions. For those with a car, go for a scenic drive along Ocean Drive and view the rocky coastline and its terrific views.

Restaurants:

While there are dozens of excellent choices near the hotel, our favorites include: Winner Winner, Mission, Binge BBQ, Boru Noodle Bar, Lucia Italian Restaurant, White Horse Tavern, Burger & Beer, and Bowens Wharf.

Additional details:

The Program Book and the searchable Online Program (*https://esa.confex.com/esa/2017eb/meetingapp.cgi*) are now available.

Visit the Branch meeting website (*http://www.entsoc.org/eastern/2017-eastern-branch-annual-meeting*) for more information.

We look forward to seeing you in Newport!

2017 ESA EB Standing Committees

Eastern Branch Executive Committee

Member Name	Position	Start Date	End Date	E-Mail
Dr. Cesar Rodrigues-Saona	President	01/07/2016	03/18/2017	*crodriguez@aesop.rutgers.edu*
Dr. Donald C. Weber	President-Elect	01/07/2016	03/18/2017	*don.weber@ars.usda.gov*
Dr. Tracy C. Leskey	Past President	01/07/2016	03/18/2017	*Tracy.leskey@ars.usda.gov*
Dr. Daniel L. Frank	Secretary	01/07/2014	03/05/2019	*dlfrank@mail.wvu.edu*
Mr. Mark C. Taylor	Treasurer	03/15/2012	03/20/2018	*mark.taylor@maryland.gov*
Dr. Paula M. Shrewsbury	Governing Board Representative	11/18/2016	11/14/2018	*pshrewsb@umd.edu*
Dr. Brenna E. Traver	Member-at-Large	01/07/2016	03/18/2017	*bet12@psu.edu*

Eastern Branch ESA Standing Committees

Committee	Chair	Members
Awards Committee *(L. O. Howard and Herbert T. Streu)*	**Tracy C. Leskey** (2016-17) *Tracy.leskey@ars.usda.gov*	Paula Shrewsbury (to 2020), Eric Day (to 2019), Chris Bergh (to 2018), and George C. Hamilton (to 2017)
Insect Detection, Evaluation, and Prediction (IDEP) Committee	Lisa Tewksbury (2015-17) *lisat@uri.edu*	Robert Trumbule, Jim Young, Mark Taylor, Dan Gilrein, Eric Day, Hannah Broadley, and Karen Walker
Meeting Site Selection Committee	Mark C. Taylor (2013-18) *mark.taylor@maryland.gov*	
Nominations Committee	Greg Krawczyk (2015-17) *gxk13@psu.edu*	Don Weber, George Hamilton
Program Committee	Doug Pfeiffer *dgpfeiff@vt.edu*	Dan Gruner *dsgruner@umd.edu*
Public Information Committee	Faith B. Kuehn *Faith.Kuehn@state.de.us*	
Rules Committee	Matthew Petersen (annual) *mjp266@cornell.edu*	
Screening for ESA Awards Committee *(ESA DAA in Teaching and in Extension, and the Entomological Foundation Award for Excellence in IPM)*	Geoff Attardo (2016-2017) *geoffrey.attardo@yale.edu*	Brian Weiss (2016-2017) *brian.weiss@yale.edu*
Student Affairs Committee	Kevin Cloonan (2016-2017) *krc204@psu.edu*	Co-chair Ashley Kennedy (2016-2017) *kennedya@udel.edu*

National ESA Standing Committees – Eastern Branch Representatives

Committee	Chair
Student Affairs	Ashley Kennedy *kennedya@udel.edu*
Finance	Eric Day *idlab@vt.edu*
Awards & Honors	Donald Weber *Don.Weber@ars.usda.gov*
Education & Outreach	Faith B. Kuehn *Faith.Kuehn@state.de.us*
Membership	Louela A. Castrillo *lac48@cornell.edu*
Diversity and Inclusion	Anne Nielsen (term: 9/30/2016 – 9/30/18) *nielsen@AESOP.Rutgers.edu*

Eastern Branch Ad Hoc Committees, 2016-2017

Committee	Chair
Archivist-Historian	George C. Hamilton *hamilton@aesop.rutgers.edu*
Auditing	Julie Byrd Hebert
Board and Associate Certified Entomologists	Chris Stelzig *cstelzig@entsoc.org*
Corporate Support Coordinator	James E. Steffel *jim@labservices.com*
Linnaean Games Committee	Douglas G. Pfeiffer *dgpfeiff@vt.edu*
Listserv and Website Manager	Daniel Frank *dlfrank@mail.wvu.edu*
Local Arrangements	Richard Casagrande *casa@uri.edu*
Parliamentarian	Donald Weber *Don.Weber@ars.usda.gov*
Student Paper Competition Committee	Oral Competition Chair: Yong-Lak Park *YoPark@mail.wvu.edu* Poster Competition Co-Chair: Carlyle Brewster *carlyleb@vt.edu*

2017 President, Speaker and Award Winners

2017 Eastern Branch President - Cesar Rodriguez-Saona

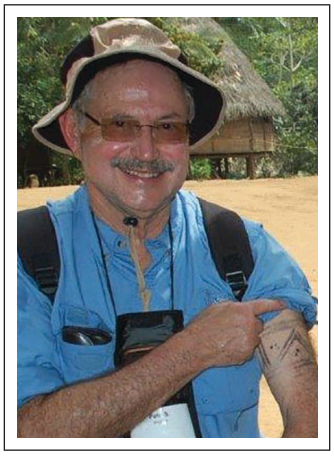
Dr. Cesar Rodriguez-Saona is a Professor and Extension Specialist in Blueberry and Cranberry IPM at Rutgers University. He received his M.S. degree in 1994 from Oregon State University and his Ph.D. in 1999 from the University of California, Riverside. Prior to joining Rutgers University, he worked for the USDA-ARS in Phoenix, AZ, University of Toronto, and Michigan State University. The goal of his research program is the development and implementation of cost-effective and reduced-risk IPM practices for blueberries and cranberries that are compatible with biological control agents. He is pursuing this goal by integrating chemical, behavioral, and biological methods in insect control and by gaining a better understanding of the ecology of pests and their natural enemies. His extension program delivers current and critical IPM information to growers. The specific areas of expertise within his research program include Biological Control, Tri-trophic Interactions, Integrated Pest Management, Insect Chemical Ecology, Insect-Plant Interactions, and Host-Plant Resistance. Cesar has served the National and Eastern Branch Entomological Society of America in various capacities. He is Subject Editor for the Journal of Economic Entomology and Journal of Insect Science, and regularly reviews for ESA journals. For the Eastern Branch, Cesar has served as co-chair and chair of the Program Committee in 2012 and 2013, respectively. He has also served as a judge for student competitions and organized several meeting symposia. Cesar and his graduate students regularly present at ESA National and Eastern Branch meetings. Cesar is currently President of the Eastern Branch ESA.

2017 EB Banquet Speaker Bernd Heinrich

Dr. Bernd Heinrich is a professor emeritus in the biology department at the University of Vermont and is the author of a number of books about nature writing, behavior, biology, ecology, and evolution. Dr. Heinrich has made major contributions to the study of insect physiology and behavior, as well as bird behavior In addition to other publications, he has written over a dozen highly praised books, mostly related to his research examining the physiological and behavioral adaptations of other animals to their physical environments. However, Dr. Heinrich has also written books that include more of his personal reflections on nature. He is the son of Ichneumon-expert Gerd Heinrich. Dr. Heinrich attended college at the University of Maine, then earned his Ph.D. in 1970 from the University of California, Los Angeles. In 1971, he accepted a position at the University of California, Berkeley, where he became a professor of entomology. Between 1976 and 1977 he was a Guggenheim and Harvard Fellow. In 1980 Dr. Heinrich accepted a position as a professor of zoology/biology at the University of Vermont. From 1988 to 1989 he was a von Humboldt Fellow. Dr. Heinrich is distinguished by his research work in the comparative physiology and behavior of insects. His work has elucidated new physiological mechanisms of temperature regulation of tropical versus temperate moths, bumble bees versus honey bees, beetles, dragonflies, flies, and butterflies, all done while at UCLA and Berkeley. After he moved back to Maine and started teaching at the University of Vermont, his comparative work on insect physiology led to behavioral and ecological studies from the perspective of all animals (e.g., comparisons of food sharing between social bumblebees and territorial ravens). His many years of research on ravens has culminated in numerous scientific papers on raven behavior and two books that put the research into a broad context. Dr. Heinrich's often popular books range from biologic detective stories (*Ravens in Winter*) to scientific specialties of field (*The Hot-blooded Insects*) to adventure and biography (*The Snor-*

ing Bird) to human evolution (*Why We Run*). Many of these books are based on his original research documented in his more than 100 articles in refereed scientific journals.

Herb Streu Award – Peter B. Schultz, Hampton Roads AREC, Virginia Tech



Dr. Peter Schultz received his B.S. in Entomology from University of California at Davis in 1968, M.S. in Biology from Midwestern State University in 1972, and Ph.D. in Entomology in 1978 from Virginia Tech. He also served in the U.S. Air Force as an entomology training instructor from 1969-1973. He has worked at the Hampton Roads Agricultural Research and Extension Center in Virginia Beach since 1973; the first 5 years as a state nursery inspector and thereafter as the "station" entomologist. He became an Associate Professor of Entomology when the AREC merged with Virginia Tech in 1985, and promoted to Professor in 1996. His research has focused on integrated pest management strategies on insect pests of ornamental plants in commercial nurseries and landscapes. His current research focuses on developing novel strategies for management of ambrosia beetles. Since 1992, he has also served as the Director of the Hampton Roads AREC. He served as Eastern Branch President in 2006; chaired the Awards Committee, Local Arrangements Committee 5 times; and served as elected Member-at-large. He served on ESA Nominations, Local Arrangements, and Membership Committees.

EB-ESA Excellence in Early Career Award – Rob Morrison

Dr. Rob Morrison is originally from Mesa, AZ. He graduated cum laude with his B.A. in biology and German from Kalamazoo College in 2006. Afterwards, he researched the speciation and chemical ecology of two closely related species of ants for his master's research at the University of Munich in Germany, where he graduated with his M.S. in ecology, evolution, and systematics in 2009. Rob received his Ph.D. from the Department of Entomology at Michigan State University in 2014. His doctoral work primarily focused on developing an integrated pest management program for the asparagus miner. From 2014-2016, Rob was a post-doctoral researcher with Tracy Leskey at the USDA-ARS Appalachian Fruit Research Station. During his post-doc, he investigated the integrated pest management of the invasive brown marmorated stink bug, including examining the chemical ecology, biological control, dispersal, and trapping of the species. Rob is currently a full-time Research Entomologist with the USDA-ARS Center for Grain and Animal Health Research in Manhattan, KS. The main goal of his research program is to increase the sustainability of agriculture by decreasing insecticide inputs. He is currently researching the integrated pest management of stored product pests by focusing on how to exploit their chemical and behavioral ecology to develop behaviorally-based management strategies. Rob has been highly active in ESA, published 23 peer-reviewed manuscripts (18 as first author), obtained over $7,000,000 in grants as PI and Co-PI, given 120+ research and extension presentations in over 25 states and four countries, and reached out to over 14,000 members of the public in his career, including youth, master gardeners, and adults.

John Henry Comstock Award – Flor Acevedo

FLOR EDITH ACEVEDO completed her Ph.D. at the Pennsylvania State University under the supervision of Dr. Gary Felton. Her dissertation research focused on the study of the adaptive mechanisms used by polyphagous insects to exploit different host plants. She has been working in entomology for the last 12 years; first, for her undergrad thesis research, she developed DNA molecular markers in the coffee berry borer to study the dispersion of this insect under field conditions. After receiving her Bachelor's degree in 2006 from Universidad de Caldas (Colombia), she joined the entomology team of the Colombian Center for Coffee Research, Cenicafe, where she studied the genetic variability of the coffee berry borer in Colombia. In 2010, she started her PhD studies at Penn State partially sponsored by a Fulbright scholarship. Flor has been captivated by research in the field of insect-plant interactions for several years. She is interested in understanding how insects evolve the ability to feed on plants and how these adaptations influence insect diversification. Further avenues that she would like to explore are related to the evolution of neuroethological adaptations mediating host finding in plant feeding insects.

Asa Fitch Award – Nicole Quinn

Nicole Quinn is a second semester PhD student at Virginia Tech in the Department of Entomology. She studies the behavior and biological control of the brown marmorated stink bug (*Halyomorpha halys*). She is passionate about entomology. Nicole left Medway, Massachusetts for Gettysburg College, PA to begin her undergraduate pre-vet studies in 2008. While she stayed in the biology major, Nicole did not stay on pre-vet track. Instead, she took more agroecology courses, including a study abroad in Ecuador and a thesis project in South Africa. Nicole enjoyed research so much that she ended up completing two more thesis (or capstone) projects. She then had an internship with Penn State that in her last semester, where she working in an entomology lab with BMSB, among other insects. After graduating in 2012, Nicole worked at the Journal of Visualized Experiments (JoVE) in Cambridge, MA, but quickly realized that she missed fieldwork and left after six months to work on a bat diet study in east Texas. In 2013, she began her MS at Michigan State University on habitat management in cucurbit agroecosystems. She graduated in December 2015 and started her PhD at Virginia Tech in January 2016.

Eastern Branch Nominee for Distinguished Teaching Award for Teaching - Charles Bartlett,

Associate Professor of Entomology, University of Delaware, Department of Entomology and Wildlife Ecology

Charles Bartlett received his B.S. in Wildlife Management from the University of Vermont (1987), his M.S. degree in Entomology and Applied Ecology from the University of Delaware (1992), and his Ph.D. in Systematic Entomology from North Carolina State University (1996). Charles is currently an Associate Professor at the University of Delaware, Department of Entomology and Wildlife Ecology, where has been since 1996. His research is on the systematics of planthoppers (Hemiptera: Fulgoroidea), with emphasis on the family Delphacidae, and has published over 40 papers. He maintains a research website "Planthoppers of North America" providing information about the systematics and biology of North American planthoppers. His current research includes investigating potential eupelmid egg parasites of the spotted lanternfly (*Lycorma delicatula*). His primary teaching duties include Insect Taxonomy, Insect Anatomy and Physiology, and Insect Field Taxonomy, all required for the entomology major at the University of Delaware, and all taught as 'duel-level' classes, i.e., to both undergraduate and graduate students. Insect Field Taxonomy is a memorable course for many students, as it requires a collection of 160 families and 700 specimens for undergraduates, 217 families and 1,000 specimens for graduate students. Additional regular courses include Insects and Society, Larval Insect Taxonomy. Charles is the director of the University of Delaware departmental insect research collection. Charles has served as Recording Secretary of the American Entomological Society since 1998, and is a Research Associate in Entomology at the Academy of Natural Sciences of Drexel University, Philadelphia.

ESA Eastern Branch Award for Excellence in Integrated Pest Management - Dr. Changlu Wang,

Associate Extension Specialist, Department of Entomology, Rutgers University

Dr. Changlu Wang is an Associate Extension Specialist in the Department of Entomology, Rutgers University. He received his B.S. from Beijing Forestry University (1985), M.S. from Chinese Academy of Forestry (1988), and Ph.D. from West Virginia University (1998). His previous positions include research assistant at Chinese Academy of Forestry (1988-1994), postdoctoral research associate at USDA Agricultural Research Service (1998-2001), and research scientist at Purdue University (2002-2008). His current position involves research, teaching, and extension in urban pest management. His research interests are developing new and improved techniques and materials for urban pest management, insecticide resistance, and insect behavior. He published 6 books/book chapters, 64 peer-reviewed papers, and 23 non-peer reviewed articles, and coauthored 4 patents. His research provided many practical solutions on bed bug and cockroach management. His award-winning invention "Insect interceptor device" is currently the most effective and affordable bed bug monitor used in the U.S. A bed bug lure developed by his team is the only lure that is used for bed bug monitoring. Recently, he received Eastern Regional Excellence in Extension award from U.S. Department of Agriculture, National Institute of Food and Agriculture (2015). He is currently the vice president-elect of the Medical and Urban and Veterinary Entomology section of ESA and vice president for Overseas Chinese Entomologists Association.

Program Summary

SATURDAY, MARCH 18, 2017		
Program	**Time**	**Location**
Executive Committee Meeting	2:00 PM - 5:00 PM	Boardroom
President's Informal Reception	5:00 PM - 7:00 PM	Salon III/IV

SUNDAY, MARCH 19, 2017		
Program	**Time**	**Location**
Registration	8:00 AM - 5:00 PM	Foyer (3rd Floor)
Silent Auction	8:00 AM - 6:00 PM	Salon III/IV
M.S./Undergraduate Student Oral Competition	9:00 AM - 11:30 AM	Freedom
Symposium I: Trends in Vector-Borne Diseases in the Northeastern United States	9:00 AM - 12:00 PM	Columbia
It's a Bug's World - Outreach	10:00 AM - 4:00 PM	Atrium
Student and Contributed Poster Set-up	10:00 AM - 12:00 PM	Salon III/IV
Student and Contributed Posters	12:00 PM - 5:00 PM	Salon III/IV
Symposium II: Individual, Population and Community Responses of Insects to Climate Change	1:00 PM - 5:00 PM	Weatherly
PhD Student Oral Competition	2:00 PM - 4:30 PM	Freedom
President's Reception and Posters: ESA EB President Dr. Cesar Rodriguez-Saona; Address from National ESA President Dr. Susan Weller; Presentation of ESA Awards, L.O. Howard and Herb Streu Awards	5:30 PM - 7:30 PM	Salon III/IV
Linnean Games	7:30 PM - 9:30 PM	Enterprise

MONDAY, MARCH 20, 2017		
Program	**Time**	**Location**
Registration	8:00 AM - 5:00 PM	Foyer (3rd Floor)
Silent Auction	8:00 AM - 6:00 PM	Salon III/IV
Symposium III: Applied Agriculture and Ag-Industry Symposium	8:00 AM - 12:00 PM	Freedom
Symposium IV: Recent Developments in IPM by Students and Early Career Professionals in the Eastern US	8:00 AM - 12:00 PM	Weatherly
Submitted Ten-Minute Papers	8:00 AM - 12:00 PM	Columbia
Student and Contributed Posters	10:00 AM - 12:00 PM	Salon III/IV
Symposium V: Thinking Ahead: Proactive Science Addressing Pest Invasions	1:00 PM - 5:00 PM	Freedom
Symposium VI: Integrating Pollinator Protection: Strategies, Methodologies, and Best Management Practices	1:00 PM - 5:00 PM	Weatherly
Social and Cash Bar	6:00 PM - 7:00 PM	Salon III/IV
Banquet: ESA President Address; Branch & Student Student Competition Awards; Keynote Address: Dr. Bernd Heinrich, "The Making of Entomologists"	7:00 PM - 9:30 PM	Atrium

TUESDAY, MARCH 21, 2017		
Program	Time	Location
Final Business Meeting	7:00 AM - 8:00 AM	Boardroom
Symposium VII: Mark-Release-Recapture Revisited: Historical, State-of-the-Art, and Future Developments for Tracking Insect Movement in the Field	8:00 AM - 12:00 PM	Columbia
Symposium VIII: What's New? (Status Updates on Historical Pests and New Introductions, IDEP Committee)	8:00 AM - 12:00 PM	Freedom

Program Schedule

SUNDAY, MARCH 19, 2017, MORNING

Program	Time	Location
Registration	8:00 AM - 5:00 PM	Foyer (3rd Floor)
Silent Auction	8:00 AM - 6:00 PM	Salon III/IV
M.S./Undergraduate Student Oral Competition	*9:00 AM - 11:30 AM*	*Freedom*
Symposium I: Trends in Vector-Borne Diseases in the Northeastern United States	9:00 AM - 12:00 PM	Columbia
It's a Bug's World - Outreach	10:00 AM - 4:00 PM	Atrium
Student and Contributed Poster Set-up	10:00 AM - 12:00 PM	Salon III/IV

M.S./Undergraduate Student Oral Competition

Freedom (Newport Marriott)

Moderators: Yong-Lak Park[1] and Carlyle C. Brewster[2], [1]West Virginia Univ., Morgantown, WV, [2]Virginia Polytechnic Institute and State Univ., Blacksburg, VA

9:00 AM 1 **Do hemlock woolly adelgid (*Adelges tsugae)* and elongate hemlock scale (*Fiorinia externa*) alter the timing of bud break?**
Elizabeth Whitney *(ewhitney@uri.edu), Univ. of Rhode Island, Kingston, RI*

9:12 AM 2 **A native lepidopteran is impacted by host defenses induced by hemlock woolly adelgid (*Adelges tsugae*).**
Mary Mallinger *(mallinger.mary@gmail.com)[1], Chad Rigsby[1], Robert Schaeffer[2], Colin M. Orians[3] and Evan L. Preisser[1], [1]Univ. of Rhode Island, Kingston, RI, [2]Washington State Univ., Pullman, WA, [3]Tufts Univ., Medford, MA*

9:24 AM 3 **Wild bee species assemblages on a land-use gradient in Meadville, PA.**
Erica Moretti *(morettie@allegheny.edu), Allegheny College, Meadville, PA*

9:36 AM 4 **Investigating the effect of floral composition on native bees in Meadville, PA.**
Paige Hickman *(hickmanp@allegheny.edu), Allegheny College, Meadville, PA*

9:48 AM 5 **Female autodetection of pheromones: what it means & why it matters.**
Robert Holdcraft *(rholdcra@rci.rutgers.edu)[1] and Cesar Rodriguez-Saona[2], [1]Rutgers, The State Univ. of New Jersey, Chatsworth, NJ, [2]Rutgers, The State Univ. of New Jersey, New Brunswick, NJ*

10:00 AM **Break**

10:30 AM 6 **Effects of kairomones from invasive brown marmorated stink bug (*Halyomorpha halys*) and native beneficial spined soldier bug (*Podisus maculiventris)* on the host foraging behavior of the egg parasitoid *Trissolcus japonicus*.**
Sean Boyle *(seanboyl@udel.edu)[1], Kim Hoelmer[2] and Judith A. Hough-Goldstein[3], [1]Univ. of Delaware, Dept. of Entomology and Wildlife Ecology, Newark, DE, Newark, DE, [2]USDA - ARS, Newark, DE, [3]Univ. of Delaware, Newark, DE*

10:42 AM 7 **Potential native parasitoids of brown marmorated stink bug (*Halymorpha halys* Stål) eggs in an organic orchard in southern Pennsylvania.**
Hillary Morin *(hjm5194@psu.edu), The Pennsylvania State Univ., Univ. Park, PA*

10:54 AM 8 **Effect of release time and diapause on phenology of newly introduced emerald ash borer parasitoid, *Oobius agrili*.**
Devan George *(devgeo1117@gmail.com)[1] and Jian Duan[2], [1]Univ. of Delaware, Elkton, MD, [2]USDA - ARS, Newark, DE*

11:06 AM 9 **Flea beetle impact and control methods on cabbage and eggplant in Virginia.**
James Mason *(jmason91@vt.edu) and Thomas Kuhar, Virginia Polytechnic Institute and State Univ., Blacksburg, VA*

11:18 AM 10 **Quantifying the impact of an invading shrub (*Berberis thunbergii*) on arthropod assemblages in forests of the northeastern U.S.**
Alison Molnar *(alison.molnar@chatham.edu)[1], Ryan Utz[1] and Robert Davidson[2], [1]Chatham Univ., Pittsburgh, PA, [2]Carnegie Museum of Natural History, Pittsburgh, PA*

Symposium I: Trends in Vector-Borne Diseases in the Northeastern United States

Columbia (Newport Marriott)

Moderators and Organizers: Howard Ginsberg, Jannelle Couret and Roger LeBrun, Univ. of Rhode Island, Kingston, RI

9:00 AM **11** **Why Lyme disease is common in the northeastern U.S. but rare in the southeast.**
Howard Ginsberg *(hginsberg@usgs.gov), Univ. of Rhode Island, Kingston, RI*

9:30 AM **12** **Drivers for change: habitat, winter survival, and the geographic range of *Ixodes scapularis*.**
Kirby Stafford *(kirby.stafford@ct.gov), Center for Vector Biology and Zoonotic Diseases The Connecticut Agricultural Experiment Station, New Haven, CT*

9:45 AM **13** **Microbiome changes through ontogeny and dietary influence of the blacklegged tick.**
Christine Zolnik *(christine.zolnik@einstein.yu.edu), Albert Einstein College of Medicine, Bronx, NY*

10:00 AM **14** **Anti-tick vaccine development: an alternative animal model.**
Wendy Shattuck *(coywendy@uri.edu), Univ. of Rhode Island, Kingston, RI*

10:15 AM **Break**

10:30 AM **15** **Evaluating the effect of minimal risk natural products for control of the tick, *Ixodes scapularis*.**
Megan Dyer *(mdyer@uri.edu), Univ. of Rhode Island, Kingston, RI*

10:45 AM **16** **An evaluation of washed and worn permethrin-treated clothing for repelling and killing *Ixodes scapularis* ticks.**
Neeta P. Connally *(connallyn@wcsu.edu), Western Connecticut State Univ., Danbury, CT*

11:00 AM **17** **Statistical prediction of human West Nile virus incidence based on changes in multiple land cover patterns.**
Sarah Bowden *(bowdens@caryinstitute.org), Cary Institute of Ecosystem Studies, Millbrook, NY*

11:15 AM **18** **Prevalence and distribution of Eastern Equine Encephalitis in cervids in northern New England.**
Charles Lubelczyk *(LUBELC@mmc.org), Maine Medical Center Research Institute, Scarborough, ME*

11:30 AM **19** **Factors influencing life history patterns of medically important mosquitoes of the Northeast.**
Jannelle Couret *(ncouret@uri.edu), Univ. of Rhode Island, Kingston, RI*

SUNDAY, MARCH 19, 2017, AFTERNOON

Program	Time	Location
Student and Contributed Posters	12:00 PM - 5:00 PM	Salon III/IV
Symposium II: Individual, Population and Community Responses of Insects to Climate Change	1:00 PM - 5:00 PM	Weatherly
PhD Student Oral Competition	2:00 PM - 4:30 PM	Freedom
President's Reception and Posters: ESA EB President Dr. Cesar Rodriguez-Saona; Address from National ESA President Dr. Susan Weller; Presentation of ESA Awards, L.O. Howard and Herb Streu Awards	5:30 PM - 7:30 PM	Salon III/IV
Linnean Games	7:30 PM - 9:30 PM	Enterprise

POSTERS

Student Competition - Ph.D. Posters

Salon III/IV (Newport Marriott)

DSP1 **Control of balsam woolly adelgid (*Adelges piceae*), on Fraser fir (*Abies fraseri*) using insecticides aimed at sap-feeding insects.**
Holly Wantuch *(wholly3@vt.edu), Scott Salom and Thomas Kuhar, Virginia Polytechnic Institute and State Univ., Blacksburg, VA*

DSP2 **A review of New World *Malaxa* (Hemiptera: Fulgoroidea: Delphacidae).**
Ashley Kennedy *(kennedya@udel.edu) and Charles Bartlett, Univ. of Delaware, Newark, DE*

Student Competition - Masters Posters

Salon III/IV (Newport Marriott)

DSP3 **An attract and kill approach for BMSB using pheromone lures and deltamethrin-incorporated screens.**
Hayley Bush *(hgbush93@vt.edu), Virginia Tech, Blacksburg, VA*

Student Competition - Undergraduate Posters

Salon III/IV (Newport Marriott)

DSP4 **How does the fear of predation affect the growth and development of luna moth (***Actias luna***) larvae?**
Alex Baranowski *(alexbaran74@my.uri.edu) and Evan L. Preisser, Univ. of Rhode Island, Kingston, RI*

DSP5 **The impact of artificial diet on wing development in tobacco hornworm (***Manduca sexta***).**
Austin Henken *(arh5513@psu.edu) and Alexandra Serpi, Pennsylvania State Univ., Univ. Park, PA*

DSP6 **Attraction of** *Bombus impatiens* **and** *Xylocopa virginica* **to Japanese beetle lures and traps.**
Sara Datson *(sara_datson@my.uri.edu), Steven Sipolski, Lauren Zeffer and Steven Alm, Univ. of Rhode Island, Kingston, RI*

DSP7 **Foraging preferences of the carpenter bee,** *Xylocopa virginica***, in Rhode Island.**
Lauren Zeffer *(lauren_zeffer@my.uri.edu), Sara Datson, Steven Sipolski and Steven Alm, Univ. of Rhode Island, Kingston, RI*

DSP8 **Nest structure and pollen storage of the carpenter bee,** *Xylocopa virginica***, in Rhode Island.**
Steven Sipolski *(steven_sipolski@my.uri.edu), Sara Datson, Lauren Zeffer and Steven Alm, Univ. of Rhode Island, Kingston, RI*

DSP9 **Using an Exon Primed Intron Crossing Marker to bolster tree resolution for a family of Neotropical damselfly.**
Renato Nunes *(rnunes11@gmail.com), Melissa Sánchez Herrera and Jessica Ware, Rutgers, The State Univ. of New Jersey, Newark, NJ*

DSP10 **Comparative analysis of trace metals in the ovipositors of wood-boring sawflies.**
Abigail Jago *(ajago@oswego.edu)[1], Karen Sime[2] and Paul Tomascak[2], [1]State Univ. of New York Oswego, Oswego, NY, [2]State Univ. of New York, Oswego, Oswego, NY*

Contributed Posters

Salon III/IV (Newport Marriott)

DSP11 **Misleading the harlequin bug (***Murgantia histrionica***) using synthetic volatiles to alter host plant choice.**
Emma Thrift, **Megan Herlihy** *(megan.herlihy@ars.usda.gov) and Donald Weber, USDA - ARS, Beltsville, MD*

DSP12 **Efficacy of mating disruption for control of peachtree borer and lesser peachtree borer in peach orchards in West Virginia.**
Daniel L. Frank *(dlfrank@mail.wvu.edu), West Virginia Univ., Morgantown, WV*

DSP13 **Degree-day requirements and phenology of** *Megacopta cribraria* **at its northern limit in Maryland.**
Jessica Grant *(grantji@umd.edu) and William O. Lamp, Univ. of Maryland, College Park, MD*

DSP14 **Non-target effects of genetically modified corn debris on aquatic macroinvertebrates in agricultural streams.**
Claire Hirt *(ccregan@umd.edu), Rebecca Eckert, Lauren Leffer and William O. Lamp, Univ. of Maryland, College Park, MD*

DSP15 **Spatial and temporal asynchrony between spring emergence of** *Osmia cornifrons* **(Hymenoptera: Megachilidae) and blueberry blooming in the eastern United States.**
Hyoseok Lee *(hl0027@mix.wvu.edu) and Yong-Lak Park, West Virginia Univ., Morgantown, WV*

DSP16 **Impacts of climate change on plant defense responses and plant-animal interactions .**
Rafael Fonseca Benevenuto *(rafaelb@hvl.no)[1], Tarald Seldal[2], Stein Joar Hegland[2], Stein Moe[3], Knut Rydgren[2] and Cesar Rodriguez-Saona[4], [1]Western Norway Univ. of Applied Sciences and Norwegian Univ. of Life Sciences, Ås, Norway, [2]Western Norway Univ. of Applied Sciences, Sogndal, Norway, [3]Norwegian Univ. of Life Sciences, Ås, Norway, [4]Rutgers, The State Univ. of New Jersey, New Brunswick, NJ*

DSP17 **Survey of beneficial insects visiting specialty cut flower plants.**
Ana Legrand *(ana.legrand@uconn.edu) and Piyumi Obeysekara, Univ. of Connecticut, Storrs, CT*

DSP18 **Understanding the population dynamics of pollinator insects and their host preferences at UMES campus.**
Simon Zebelo *(sazebelo@umes.edu), Univ. of Maryland Eastern Shore, Princess Anne, MD*

DSP19 **The levels of** *Nosema ceranae* **and** *Nosema apis* **in Dominica honey bee colonies.**
Marla Stoner *(mms6351@psu.edu)[1], Alyssa Hatter[1], Juliana Rangel[2] and Brenna E. Traver[1], [1]Penn State Schuylkill, Schuylkill Haven, PA, [2]Texas A&M Univ., College Station, TX*

DSP20 **Potential biotic interference between Lilioceris lilii Scopoli parasitoids and Lilioceris cheni Gressitt & Kimoto, a**

biological control agent of Dioscorea bulbifera L..
Miles Martin *(milesmartin1@my.uri.edu), Lisa Tewksbury and Richard Casagrande, Univ. of Rhode Island, Kingston, RI*

DSP21 **Host habitat, host selection, and potential non-target risk of Dastarcus helophoroides (Fairmaire)(Coleoptera: Bothrideridae), a potential biological control agent of the Asian longhorned beetle, Anoplophora glabripennis (Motschulsky)(Coleoptera: Cerambycidae).**
Kaitlin Rim *(Kaitlin.Rim@ars.usda.gov)[1], Jian Duan[1] and Julian Golec[2], [1]USDA - ARS, Newark, DE, [2]Univ. of Delaware, Newark, DE*

DSP22 **Evaluation of Aztec granular insecticide applied to Bt corn rootworm hybrids for efficacy, standability, and yields.**
Joseph Argentine *(joea@amvac-chemical.com)[1], Richard Porter[2], Peter Porpiglia[3] and Thomas Larsen[4], [1]AMVAC Chemical Corp, Tabernacle, NJ, [2]AMVAC Chemical Corp., Arkeny, IA, [3]AMVAC Chemical Corp., Newport Beach, CA, [4]AMVAC Chemical Corp., South Jordan, UT*

DSP23 **Pyrethroid-incorporated mosquito netting as a pest management tool in vegetables.**
Adam Formella *(adam4@vt.edu)[1], Thomas Kuhar[2] and James Mason[2], [1]Virginia Tech, Blacksburg, VA, [2]Virginia Polytechnic Institute and State Univ., Blacksburg, VA*

DSP24 **Mosquitoes, media, medicine, and mayhem - the WHO emergency news (Feb 2016 - Nov 2016).**
Mary Duggan *(mduggan1@antioch.edu), ANTIOCH Univ. New England, WAKEFIELD, MA*

DSP25 **The backyard integrated tick management (BITM) study: understanding and reducing peridomestic risk for tickborne disease.**
Neeta P. Connally *(connallyn@wcsu.edu)[1], Thomas N. Mather[2], Howard S. Ginsberg[3], Rayda K. Krell[1], Daniel W. Barrett[1], Alison F. Hinckley[4] and Lars Eisen[4], [1]Western Connecticut State Univ., Danbury, CT, [2]Univ. of Rhode Island, Kingston, RI, [3]U.S. Geological Survey, Kingston, RI, [4]Centers for Disease Control and Prevention, Fort Collins, CO*

DSP26 **Cell fusion to improve efficacy and thermotolerance of entomopathogenic fungus, Beauveria bassiana.**
Agrin Davari *(adavari@uvm.edu), Univ. of Vermont, Burlington, VT*

DSP27 **Enhanced immune-related protein in the hemolymph of offspring of Manduca sexta mothers subjected to stress.**
Bruck Gezahegn *(bgezaheg13@mail.bw.edu), Northeastern Univ., Washington, DC*

DSP28 **The effects of spider-venom derived peptide on the striped cucumber beetle.**
Robert Healey *(rob.e.healey@gmail.com), Lisa Tewksbury, Richard Casagrande and Rebecca Brown, Univ. of Rhode Island, Kingston, RI*

DSP29 **Maternal injury influences offspring gene expression and immune function in the tobacco hornworm** *Manduca sexta***.**
Wendy Smith *(w.smith@neu.edu)[1], Rebeca B. Rosengaus[1], Nicole Hays[1], Muizz Zaman[1], Steve Winston[1], Brittany Noonan[1], Bruck Gezahegn[2], Joseph Murray[3], Alex Ruditsky[1] and Chuck Roesel[1], [1]Northeastern Univ., Boston, MA, [2]Baldwin Wallace College and Northeastern Univ. REU, Boston, MA, [3]Le Moyne College and Northeastern Univ. REU, Boston, MA*

DSP30 **Proposed reintroduction effort for American burying beetle (Nicrophorus americanus) in eastern New York.**
Carmen Greenwood *(greenwcm@cobleskill.edu), Amy Quinn and Briana All, State Univ. of New York, Cobleskill, NY*

Symposium II: Individual, Population and Community Responses of Insects to Climate Change

Weatherly (Newport Marriott)

Moderators and Organizers: Daniel Gruner, Univ. of Maryland, College Park, MD

1:00 PM **Introductory Remarks**

1:10 PM **20** **Community level responses of Rocky Mountain grasshoppers to climate change over the last half century.**
Cesar Nufio *(Cesar.Nufio@colorado.edu), Univ. of Colorado, Boulder, CO*

1:40 PM **21** **Thermal tolerance and fitness of tropical insects at different elevations: Implications for global warming.**
Carlos Garcia-Robledo *(carlos.garcia-robledo@uconn.edu)[1], Erin Kuprewicz[1], John Kress[2], Terry Erwin[3] and Charles Staines[4], [1]Univ. of Connecticut, Storrs, CT, [2]Smithsonian Institution, Washington DC, WA, [3]Smithsonian Institution National Museum of Natural History, Washington, DC, [4]Smithsonian Institution, Washington, DC*

2:10 PM **22** **Managing migratory agricultural insect pests in a warming world – case studies and challenges.**
P. Dilip Venugopal *(venugopal.dilip@gmail.com)[1], Galen Dively[2] and William O. Lamp[2], [1]AAAS / U.S. Environmental Protection Agency, Washington, DC, [2]Univ. of Maryland, College Park, MD*

2:40 PM **23** **Pattern and process of ant community responses to climatic change.**
Sarah Diamond *(sarah.diamond@case.edu), Case Western Reserve Univ., Cleveland, OH*

3:10 PM **Break**

3:30 PM **24** **Effects of weather and climate on the life history and population dynamics of southern pine beetle and hemlock woolly adelgid.**
Aaron Weed *(aaron_weed@nps.gov)[1], Matthew Ayres[2], Joe Elkinton[3] and Jeff Lombardo[2], [1]U.S. National Park Service, Woodstock, VT, [2]Dartmouth College, Hanover, NH, [3]Univ. of Massachusetts, Amherst, MA*

4:00 PM **25** **Climate change and forest-defoliating insect outbreak dynamics.**
Kyle J. Haynes *(haynes@virginia.edu)[1], Andrew Allstadt[2], Dietrich Klimetzek[3] and Jacques Tardif[4], [1]Univ. of Virginia, Blandy, VA, [2]U.S. Dept. of Fish and Wildlife Service, Bloomington, MN, [3]Univ. of Freiburg, Freiburg, Germany, [4]The Univ. of Winnipeg, Winnipeg, MB, Canada*

4:30 PM **26** **Climatically driven range expansion and contraction along the 2000 km gypsy moth invasion front.**
Dylan Parry *(dparry@esf.edu)[1], Kristine Grayson[2] and Patrick Tobin[3], [1]State Univ. of New York, Syracuse, NY, [2]Univ. of Richmond, Richmond, VA, [3]Univ. of Washington, Seattle, WA*

PhD Student Oral Competition

Freedom (Newport Marriott)

Moderators: Yong-Lak Park[1] and Carlyle C. Brewster[2], [1]West Virginia Univ., Morgantown, WV, [2]Virginia Polytechnic Institute and State Univ., Blacksburg, VA

2:00 PM **27** **Mapping black fly nuisance swarms: Land use and meteorological correlates describe distribution patterns of *Simulium jenningsi* (Diptera: Simuliidae) in western Maryland.**
Rebecca Wilson *(rcwilson@umd.edu) and William O. Lamp, Univ. of Maryland, College Park, MD*

2:12 PM **28** **Bioactivity of heterocyclic amines to honey bees.**
Nicholas Larson *(nlarson@vt.edu)[1] and Troy D. Anderson[2], [1]Virginia Polytechnic Institute and State Univ., Blacksburg, VA, [2]Univ. of Nebraska, Lincoln, NE*

2:24 PM **29** **Arthropod response to organic cover crop-based reduced-tillage cropping systems.**
Karly Regan *(kjr5470@psu.edu), Christina Mullen and Mary Barbercheck, Pennsylvania State Univ., Univ. Park, PA*

2:36 PM **30** **Non-(co)linear patterns of metabolite induction in tea (*Camellia sinensis*) with continuous variation in herbivore density.**
Eric Scott *(eric.scott@tufts.edu), Colin M. Orians, Nicole Kfoury and Albert Robbat, Tufts Univ., Medford, MA*

2:48 PM **31** **Response of the brown marmorated stink bug (*Halyomorpha halys*) to thermal contrast in wall panels during winter shelter seeking.**
Benjamin Chambers *(bdc0112@vt.edu)[1], Thomas Kuhar[1], Annie Pearce[1], Georg Reichard[1] and Tracy C. Leskey[2], [1]Virginia Polytechnic Institute and State Univ., Blacksburg, VA, [2]USDA - ARS, Kearneysville, WV*

3:00 PM **Break**

3:30 PM **32** **Extended impacts of trichome consumption on tobacco hornworms (*Manduca sexta*).**
Alexandra Serpi *(alex.serpi@psu.edu), Pennsylvania State Univ., Univ. Park, PA*

3:42 PM **33** **Does tillage mitigate or magnify pest outbreaks? A meta-analysis**
Elizabeth Rowen *(epr5119@psu.edu) and John Tooker, Pennsylvania State Univ., Univ. Park, PA*

3:54 PM **34** **Myriads of millipedes: Investigating the defensive gland morphology and ecology of the greenhouse millipede, *Oxidus gracilis*.**
Kirsten Pearsons *(kfp5094@psu.edu), István Mikó and John Tooker, Pennsylvania State Univ., Univ. Park, PA*

4:06 PM **35** **Impact of neonicotinoid seed treatments on pestiferous arthropods and yield in a three-year grain crop rotation.**
Aditi Dubey *(aditid26@gmail.com)[1], Galen Dively[1], Margaret Lewis[2] and Kelly Hamby[3], [1]Univ. of Maryland, College Park, MD, [2]Pennsylvania State Univ., Univ. Park, PA, [3]Univ. of California, Davis, CA*

4:18 PM **36** **Complex interactions between temperature and diet in mosquitoes reveal new insights into malaria transmission under projected climate change scenarios.**
Shelley Whitehead *(saw359@psu.edu), Janet Teeple and Matthew Thomas, Pennsylvania State Univ., Univ. Park, PA*

SUNDAY, MARCH 19, 2017, EVENING

President's Reception and Posters

Salon III/IV (Newport Marriott)

5:30 PM	**Welcome**
6:00 PM	**ESA EB President Dr. Cesar Rodriguez-Saona**
6:10 PM	**ESA Executive Director David Gammel**
6:30 PM	**Presentation of ESA Awards, L.O. Howard and Herb Streu Awards**
7:30 PM	**Linnaean Games (Enterprise)**

MONDAY, MARCH 20, 2017, MORNING

Program	Time	Location
Registration	8:00 AM - 5:00 PM	Foyer (3rd Floor)
Silent Auction	8:00 AM - 6:00 PM	Salon III/IV
Symposium III: Applied Agriculture and Ag-Industry Symposium	8:00 AM - 12:00 PM	Freedom
Symposium IV: Recent Developments in IPM by Students and Early Career Professionals in the Eastern US	8:00 AM - 12:00 PM	Weatherly
Submitted Ten-Minute Papers	8:00 AM - 12:00 PM	Columbia
Student and Contributed Posters	10:00 AM - 12:00 PM	Salon III/IV

Symposium III: Applied Agriculture and Ag-Industry Symposium

Freedom (Newport Marriott)

Moderators and Organizers: Thomas Kuhar[1], Joseph Argentine[2] and James Steffel[3], [1]Virginia Polytechnic Institute and State Univ., Blacksburg, VA, [2]AMVAC Chemical, Tabernacle, NJ, [3]LABServices, Hamburg, PA

8:00 AM **37** **Introductions.**
Thomas Kuhar *(tkuhar@vt.edu)[1], Joseph Argentine[2] and James Steffel[3], [1]Virginia Polytechnic Institute and State Univ., Blacksburg, VA, [2]AMVAC Chemical, Tabernacle, NJ, [3]LABServices, Hamburg, PA*

8:20 AM **38** **Corn earworm resistance to Bt transgenic corn and recent performance of Bt sweet corn products in Maryland.**
Kelly Hamby *(kahamby@umd.edu) and Galen Dively, Univ. of Maryland, College Park, MD*

8:45 AM **39** **Corn earworm resistance to Bt transgenic corn in North Carolina and taking a fresh look at pyrethroid resistance.**
Sally Taylor *(svtaylor@vt.edu)[1] and Dominic Reisig[2], [1]Virginia Polytechnic Univ., Suffolk, VA, [2]North Carolina State Univ., Plymouth, NC*

9:10 AM **40** **Some hot topic insect concerns in vegetables in the Mid-Atlantic Region.**
Joe Ingerson-Mahar *(mahar@aesop.rutgers.edu), Rutgers Univ., New Brunswick, NJ*

9:35 AM **41** **Current gaps in insect control in vegetables.**
Daniel Gilrein *(dog1@cornell.edu), Long Island Horticultural Research and Extension Center, Riverhead, NY*

10:00 AM **Break**

10:15 AM **42** **Alternatives to chlorpyrifos for managing cabbage maggot.**
Victoria Kleczewski *(victoria.a.kleczewski@dupont.com), DuPont Crop Protection, Middletown, DE*

10:40 AM **43** **Recent efficacy trials with the diamide cyclaniliprole for control of various insects, as well as spirotetramat for wireworms in potatoes, and methomyl for slugs.**
Thomas Kuhar *(tkuhar@vt.edu)[1], Hélène Doughty[2], Louis Nottingham[1] and James Mason[1], [1]Virginia Polytechnic Institute and State Univ., Blacksburg, VA, [2]Virginia Polytechnic Institute and State Univ., Virginia Beach, VA*

11:05 AM **44** **Insecticides on the horizon.**
Erin Hitchner *(erin.hitchner@syngenta.com), Syngenta Crop Protection LLC, Elmer, NJ*

11:30 AM **Panel Discussion**

Symposium IV: Recent Developments in IPM by Students and Early Career Professionals in the Eastern US

Weatherly (Newport Marriott)

Moderators and Organizers: Rob Morrison[1] and Nicole Quinn[2], [1]USDA-ARS Center for Animal Health and Grain Research, Manhattan, KS, [2]Virginia Polytechnic Institute and State Univ., Winchester, VA

8:00 AM **45** **Identity matters: Localized effects of agricultural on natural enemies in sweet corn.**
Rebecca Schmidt-Jeffris *(schmidt-jeffris@cornell.edu) and Brian A. Nault, Cornell Univ., Geneva, NY*

8:20 AM **46** **From discovery to development: An oviposition deterrent for management of *Drosophila suzukii* (Diptera: Drosophilidae).**
Anna Wallingford *(akw52@cornell.edu), Dong H. Cha and Gregory Loeb, Cornell Univ., Geneva, NY*

8:40 AM **47** **Integrated tick management in Maryland: The effect of current control products on ticks and their hosts.**
Erika Machtinger *(erika.machtinger@ars.usda.gov), USDA - ARS, Beltsville, MD*

9:00 AM **48** **Biological control of brown marmorated stink bug eggs on wild hosts over two years.**
Rob Morrison *(william.morrison@ars.usda.gov)[1] and Tracy C. Leskey[2], [1]USDA-ARS Center for Animal Health and Grain Research, Manhattan, KS, [2]USDA - ARS, Kearneysville, WV*

9:20 AM **49** **Re-introducing IPM post BMSB detection in apples.**
Clement Akotsen-Mensah *(akotscl@auburn.edu)[1], Anne Nielsen[2], Rob Morrison[3], Tracy C. Leskey[4] and Christopher Bergh[5], [1]Rutgers Univ., Bridgeton, NJ, [2]Rutgers, The State Univ. of New Jersey, Bridgeton, NJ, [3]USDA-ARS Center for Animal Health and Grain Research, Manhattan, KS, [4]USDA - ARS, Kearneysville, WV, [5]Virginia Polytechnic Institute and State Univ., Winchester, VA*

9:40 AM **50** **Searching for the samurai wasp and its host: Sampling *Trissolcus japonicus* and *Halyomorpha halys* in tree of heaven (*Ailanthus altissima*).**
Nicole Quinn *(quinni01@vt.edu)[1], Tracy C. Leskey[2] and Christopher Bergh[1], [1]Virginia Polytechnic Institute and State Univ., Winchester, VA, [2]USDA - ARS, Kearneysville, WV*

10:00 AM **Break**

10:20 AM **51** **Does partridge pea, as an insectary plant, enhance beneficial arthropod communities?**
Lauren Hunt *(lhunt@umd.edu) and Cerruti Hooks, Univ. of Maryland, College Park, MD*

10:40 AM **52** **Exploring IPM in Virginia cucurbit production.**
James M. Wilson *(jamesmw3@vt.edu)[1], Troy D. Anderson[2] and Thomas Kuhar[1], [1]Virginia Polytechnic Institute and State Univ., Blacksburg, VA, [2]Univ. of Nebraska, Lincoln, NE*

11:00 AM **53** **Evaluation of host habitat and host plant impacts on natural enemy assemblage and biological control of EAB.**
Jackie Hoban *(jhoban1@umd.edu)[1], Jian Duan[2] and Paula M. Shrewsbury[1], [1]Univ. of Maryland, College Park, MD, [2]USDA - ARS, Newark, DE*

Submitted Ten-Minute Papers

Columbia (Newport Marriott)

Moderators: George C. Hamilton, Rutgers, The State Univ. of New Jersey, New Brunswick, NJ

8:00 AM **Presentation Cancelled**

8:12 AM **55** **Assessing attract and kill disks to manage spotted wing Drosophila, *Drosophila suzukii* Matsumara, in conventional and organic small fruit production.**
Peter Jentsch *(pjj5@cornell.edu)[1] and Timothy Lampasona[2], [1]Cornell Univ. - Hudson Valley Research Lab., Highland, NY, [2]Cornell Univ., Ithaca, NY*

8:24 AM **56** **A survey of the urban pest management industry: its history and relevance to modern society.**
Damisi Bailey *(damisi70@vt.edu)[1] and Douglas G. Pfeiffer[2], [1]Virginia Tech ALS Graduate Student, Saddle Brook, NJ, [2]Virginia Polytechnic Institute and State Univ., Blacksburg, VA*

8:36 AM **57** **A novel method of quantifying *Rhinoncomimus latipes* (Coleoptera: Curculionidae) feeding upon *Persicaria perfoliata* (Caryophyllales: Polygonaceae).**
John Moredock *(jtmoredock@mix.wvu.edu) and Yong-Lak Park, West Virginia Univ., Morgantown, WV*

8:48 AM **58** **Is the evolution of setal polymorphism between stases in the mite *Lamingtonacarus posidonis* (Astigmatina, Algophagidae) driven by the conflict beteen adaption for avoiding predation and facilitating copulation?**
Norman J. Fashing *(njfash@wm.edu), College of William and Mary, Williamsburg, VA*

9:00 AM **59** **Ambrosia beetle (*Xylosandrus germanus*) management trials in wooded areas bordering apple orchards.**
Arthur Agnello *(ama4@cornell.edu)[1], Dave Combs[1] and Joshua Neal[2], [1]Cornell Univ., Geneva, NY, [2]Finger Lakes Community College, Ontario, NY*

9:12 AM **60** **Biofuel feed stock production & practices - implications for pollinator health.**
P. Dilip Venugopal *(venugopal.dilip@gmail.com), AAAS / U.S. Environmental Protection Agency, Washington, DC*

9:24 AM **61** **Bumble bee colony density in cranberry marshes through the season.**
Vera Pfeiffer *(vpfeiffer@wisc.edu)[1], Janet Silbernagel[1] and Juan Zalapa[2], [1]Univ. of Wisconsin-Madison, Madison, WI, [2]USDA - ARS, Madison, WI*

9:36 AM **62** **Select flowering plants: A tool to increase pollinator diversity in ornamental nurseries.**
Rebeccah A. Waterworth *(rwater@umd.edu) and Paula M. Shrewsbury, Univ. of Maryland, College Park, MD*

9:48 AM **63** **Host specificity testing of *Dastarcus helophoroides*, a biological control agent of the Asian longhorned beetle.**
Breanne Aflague *(aflaguebreanne@gmail.com)[1], Juli Gould[2] and Micheal Salhany[3], [1]USDA, APHIS, PPQ- CPHST, Pocasset, MA, [2]USDA - APHIS, Buzzards Bay, MA, [3]USDA, APHIS, PPQ-CPHST, Buzzard's Bay, MA*

10:00 AM **Break**

10:20 AM **64** **Two new species of *Cyphotes* Burmeister, 1835 (Hemiptera: Membracidae: Darninae) .**
Laura Gonzalez-Mozo *(lacgonzalezmo@unal.edu.co), Rutgers Univ., Piscataway, NJ*

10:32 AM **65** **Termite embryos are not 'Sitting Ducks'.**
Alexa Diiorio *(diiorio.al@husky.neu.edu), Jeremy McDavid, Erin Cole and Rebeca B. Rosengaus, Northeastern Univ., Boston, MA*

10:44 AM **66** **Social buffering in a eusocial invertebrate: Termite soldiers reduce the lethal impact of competitor cues on workers.**
Evan L. Preisser *(preisser@uri.edu)[1], Li Tian[2], Kenneth F. Haynes[3] and Xuguo Zhou[3], [1]Univ. of Rhode Island, Kingston, RI, [2]Pennsylvania State Univ., Univ. Park, PA, [3]Univ. of Kentucky, Lexington, KY*

10:56 AM **Presentation Cancelled**

11:08 AM **68** **Eradication of Amur honeysuckle (*Lonicera maackii*) alters mosquito abundance and distribution.**
Allison Gardner *(allison.gardner@maine.edu)[1], Ephantus Muturi[2] and Brian F. Allan[2], [1]Univ. of Maine, Orono, ME, [2]Univ. of Illinois, Champaign, IL*

11:20 AM **69** **Parasitoid-induced host egg termination and enemy-mediated indirect effects.**
Joe Kaser *(joe.kaser@rutgers.edu)[1], Paul Abram[2] and Anne Nielsen[1], [1]Rutgers, The State Univ. of New Jersey, Bridgeton, NJ, [2]Agriculture and Agri-Food Canada, Agassiz, BC, Canada*

11:32 AM **70** **Population growth of three mirid predatory bugs feedingon eggs and larvae of *Tuta absoluta* on tomato.**
Diego Silva *(diegobs182@yahoo.com.br)[1,2], Vanda Bueno[3], Flávio Montes[3] and Joop van Lenteren[4], [1]Univesity of São Paulo, Piracicaba, Brazil, [2]Rutgers, New Brunswick, NJ, [3]Federal Univ. of Lavras, Lavras, Brazil, [4]Wageningen Univ., Wageningen, Netherlands*

Norwegian Univ. of Life Sciences, Ås, Norway, [2]Western Norway Univ. of Applied Sciences, Sogndal, Norway, [3]Norwegian Univ. of

MONDAY, MARCH 20, 2017, AFTERNOON

Program	Time	Location
Registration	8:00 AM - 5:00 PM	Foyer (3rd Floor)
Silent Auction	8:00 AM - 6:00 PM	Salon III/IV
Symposium III: Applied Agriculture and Ag-Industry Symposium	8:00 AM - 12:00 PM	Freedom
Symposium IV: Recent Developments in IPM by Students and Early Career Professionals in the Eastern US	8:00 AM - 12:00 PM	Weatherly
Submitted Ten-Minute Papers	8:00 AM - 12:00 PM	Columbia
Student and Contributed Posters	10:00 AM - 12:00 PM	Salon III/IV
Symposium V: Thinking Ahead: Proactive Science Addressing Pest Invasions	1:00 PM - 5:00 PM	Freedom
Symposium VI: Integrating Pollinator Protection: Strategies, Methodologies, and Best Management Practices	1:00 PM - 5:00 PM	Weatherly
Social and Cash Bar	6:00 PM - 7:00 PM	Salon III/IV
Banquet: ESA President Address; Branch & Student Student Competition Awards; Keynote Address: Dr. Bernd Heinrich, "The Making of Entomologists"	7:00 PM - 9:30 PM	Atrium

Symposium V: Thinking Ahead: Proactive Science Addressing Pest Invasions

Freedom (Newport Marriott)

Moderators and Organizers: Donald Weber[1], Richard Casagrande[2] and Matthew Buffington[3], [1]USDA - ARS, Beltsville, MD, [2]Univ. of Rhode Island, Kingston, RI, [3]USDA - ARS, Washington, DC

1:00 PM **71** **The value of scientific preparation for invasive species.**
Donald Weber *(don.weber@ars.usda.gov)[1], Richard Casagrande[2] and Matthew Buffington[3], [1]USDA - ARS, Beltsville, MD, [2]Univ. of Rhode Island, Kingston, RI, [3]USDA - ARS, Washington, DC*

1:10 PM **72** **Rhode Island case studies of early detection and rapid response: success and failure in an era of resource scarcity.**
David Gregg *(dgregg@rinhs.org), Rhode Island Natural History Survey, Kingston, RI*

1:40 PM **73** **Domestic diagnostics at the USDA APHIS Plant Protection and Quarantine.**
Stephen Bullington *(stephen.w.bullington@aphis.usda.gov), USDA-APHIS, Riverdale, MD*

2:10 PM **74** **Taxonomic preparedness: Examples of the interface between hymenopteran systematics and biological control.**
Jason Mottern *(jason.mottern@ars.usda.gov) and Matthew Buffington, USDA - ARS, Washington, DC*

2:40 PM **75** **Tracking invaders by their genes.**
Dietrich Gotzek *(gotzekd@si.edu), Smithsonian Institution, National Museum of Natural History, Washington, DC*

3:10 PM **Break**

3:30 PM **76** **Proactive semiochemical intelligence against invasive species: Stereoisomeric chemical libraries for pheromone discovery and development.**
Donald Weber *(don.weber@ars.usda.gov) and Ashot Khrimian, USDA - ARS, Beltsville, MD*

4:00 PM **77** **How specific can you get in weed bicontrol?**
Richard Casagrande *(casa@uri.edu), Univ. of Rhode Island, Kingston, RI*

4:30 PM **78** **Profiling cereal killers: Phylogenetic forays in the origins of grass-feeding moths.**
Paul Goldstein *(paul.goldstein@ars.usda.gov), Mark Metz and M. Alma Solis, USDA - ARS, Washington, DC*

Symposium VI: Integrating Pollinator Protection: Strategies, Methodologies, and Best Management Practices

Weatherly (Newport Marriott)

Moderators and Organizers: Nicholas Larson[1] and James Wilson[2], [1]Virginia Polytechnic Institute and State Univ., Blacksburg, VA, [2]Virginia Tech, Blacksburg, VA

1:00 PM **Introductory Remarks**

1:15 PM **79** **An act concerning pollinator health: State law and state efforts in Connecticut to protect pollinators.**
Kimberly Stoner *(Kimberly.Stoner@ct.gov), Connecticut Agricultural Experiment Station, New Haven, CT*

1:45 PM **80** **Environmental consultancy: Dancing bees bio-indicate the Virginian landscape's profitability for pollinators.**
Margaret Couvillon *(mjc@vt.edu)[1], Roger Schurch[1] and Francis Ratnieks[2], [1]Virginia Tech, Blacksburg, VA, [2]Univ. of Sussex, Brighton, United Kingdom*

2:15 PM **81** **Pollinator habitat and health: Policy challenges in Rhode Island.**
David Gregg *(dgregg@rinhs.org), Rhode Island Natural History Survey, Kingston, RI*

2:45 PM **82** **Evaluating integrated roadside vegetation management techniques to improve pollinator habitat.**
Lisa Kuder *(lkuder@umd.edu) and Dennis vanEngelsdorp, Univ. of Maryland, College Park, MD*

3:00 PM **Break**

3:20 PM **83** **Honey bees and urban landscapes: Colony success, foraging patterns, and future challenges.**
Douglas Sponsler *(sponslerdb@gmail.com)[1], Emma Matcham[2], Chia-Hua Lin[2], Jessie Lanterman[2], Reed Johnson[3], Christina M. Grozinger[4] and Harland Patch[4], [1]Pennsylvania State Univ., State College, PA, [2]The Ohio State Univ., Columbus, OH, [3]The Ohio State Univ., Wooster, OH, [4]Pennsylvania State Univ., Univ. Park, PA*

3:50 PM **84** **Science-based risk management of pesticides and bees.**
Daniel Schmehl *(daniel.schmehl@bayer.com) and David Fischer, Bayer CropScience, Research Triangle Park, NC*

4:20 PM **85** **A comparative study of conventionally and organically managed honey bee colonies.**
Brenna E. Traver *(bet12@psu.edu)[1], Robyn Underwood[2], Kristine Nichols[3] and Dennis vanEngelsdorp[4], [1]Penn State Schuylkill, Schuylkill Haven, PA, [2]Kutztown Univ., Kutztown, PA, [3]Rodale Institute, Kutztown, PA, [4]Univ. of Maryland, College Park, MD*

4:50 PM **Panel Discussion**

MONDAY, MARCH 20, 2017, EVENING

Banquet

Atrium (Newport Marriott)

7:00 PM	**Welcome**
7:30 PM	**ESA President Address Dr. Susan Weller**
8:00 PM	**Branch & Student Competition Awards**
8:15 PM	**Keynote Address Dr. Bernd Heinrich**

TUESDAY, MARCH 21, 2017, MORNING

Program	Time	Location
Final Business Meeting	7:00 AM - 8:00 AM	Boardroom
Symposium VII: Mark-Release-Recapture Revisited: Historical, State-of-the-Art, and Future Developments for Tracking Insect Movement in the Field	8:00 AM - 12:00 PM	Columbia
Symposium VIII: What's New? (Status Updates on Historical Pests and New Introductions, IDEP Committee)	8:00 AM - 12:00 PM	Freedom

Symposium VII: Mark-Release-Recapture Revisited: Historical, State-of-the-Art, and Future Developments for Tracking Insect Movement in the Field

Columbia (Newport Marriott)

Moderators and Organizers: Kevin Rice[1] and Rob Morrison[2], [1]USDA - ARS, Kearneysville, WV, [2]USDA, Manhattan, KS

8:00 AM **Welcoming Remarks**

8:10 AM **86** **Use of mark-release-recapture techniques to delineate foraging ranges of Formosan subterranean termite colonies: Importance for termite pest management.**
Mary Cornelius *(Mary.Cornelius@ars.usda.gov), USDA - ARS, Beltsville, MD*

8:30 AM **87** **Damsels in distress: Exploring adult survival and longevity of the polymorphic neotropical damselflies *Polythore* (Odonata:Polythoridae).**
Melissa Sanchez Herrera *(melsanc@gmail.com), Rutgers, The State Univ. of New Jersey, Newark, NJ*

8:50 AM **88** **Temporal and directional movement patterns of nymphal *Halyomorpha halys* on the trunk of selected wild and fruit tree hosts in the Mid-Atlantic region.**
Angelita Acebes-Doria *(aacebes@vt.edu)[1], Tracy C. Leskey[2] and Christopher Bergh[1], [1]Virginia Polytechnic Institute and State Univ., Winchester, VA, [2]USDA - ARS, Kearneysville, WV*

9:10 AM **89** **Movement of marked vegetable pests, with and without pheromone lures.**
Donald Weber *(don.weber@ars.usda.gov), USDA - ARS, Beltsville, MD*

9:30 AM **90** **Using radar to track the movement of the invasive brown marmorated stink bug on hosts augmented with varied host stimuli.**
Rob Morrison *(william.morrison@ars.usda.gov)[1] and Tracy C. Leskey[2], [1]USDA-ARS Center for Animal Health and Grain Research, Manhattan, KS, [2]USDA - ARS, Kearneysville, WV*

9:50 AM **Break**

10:10 AM **91** **Impacts of cover crop diversification on attraction, dispersal, and pest suppression by generalist predators.**
Jermaine Hinds *(jxh557@psu.edu), Pennsylvania State Univ., Univ. Park, PA*

10:30 AM **92** **A recipe for detection: Using milk and eggs to track stink bug movement patterns.**
Anne Nielsen *(nielsen@aesop.rutgers.edu)[1], Brett Blaauw[1] and Michael Toews[2], [1]Rutgers, The State Univ. of New Jersey, Bridgeton, NJ, [2]Univ. of Georgia, Tifton, GA*

10:50 AM **93** **Utility of eDNA in conducting surveillance of agricultural pests.**
Rafael Valentin *(Rafael.valentin@me.com)[1], Julie Lockwood[2], Brooke Maslo[3] and Dina Fonseca[1], [1]Rutgers Univ., New Brunswick, NJ, [2]Rutgers The State Univ. of New Jersey, New Brunswick, NJ, [3]Rutgers The State Univ. of New Jersey., New Brunswick, NJ*

11:10 AM **94** **Tracking insect in the field using lasers and drones.**
Kevin Rice *(ricekevinb@gmail.com)[1], Amy Tabb[2], Henry Medeiros[3], John Tooker[4], Tracy C. Leskey[1] and Rob Morrison[5], [1]USDA - ARS, Kearneysville, WV, [2]USDA-ARS, Kearneysville, WV, [3]Marquette Univ., Milwaukee, WI, [4]Pennsylvania State Univ., Univ. Park, PA, [5]USDA, Manhattan, KS*

Symposium VIII: What's New? (Status Updates on Historical Pests and New Introductions, IDEP Committee)

Freedom (Newport Marriott)

Moderators and Organizers: Lisa Tewksbury[1] and Daniel Gilrein[2], [1]Univ. of Rhode Island, Kingston, RI, [2]Long Island Horticultural Research and Extension Center, Riverhead, NY

8:00 AM **Introductory Remarks**

8:10 AM **95** **Update on the gypsy moth outbreak in New England.**
Joseph Elkinton *(elkinton@ent.umass.edu) and George Boettner, Univ. of Massachusetts, Amherst, MA*

8:30 AM **96** **A history of the Mexican bean beetle and *Pediobius foveolatus* in NJ.**
Mark A. Mayer *(mark.mayer@ag.state.nj.us), New Jersey Dept. of Agriculture, Trenton, NJ*

8:50 AM **97** **Update on Asian longhorned beetle in Worcester, MA.**
Ryan Vazquez *(Ryan.j.vazquez@gmail.com), USDA-APHIS, Worcester, MA*

9:10 AM **98** **Progress towards controlling the invasive emerald ash borer with biocontrol.**
Juli Gould *(Juli.R.Gould@aphis.usda.gov), USDA - APHIS, Buzzards Bay, MA*

9:30 AM **99** **Southern pine beetle range expansion in the Northeast.**
Carissa Aoki *(carissa.f.aoki.gr@dartmouth.edu), Dartmouth College, Hanover, NH*

9:50 AM **Break**

10:10 AM **100** **Japanese maple scale: Biology and management of an old time exotic species.**
Paula M. Shrewsbury *(pshrewsbury@umd.edu), Univ. of Maryland, College Park, MD*

10:30 AM **101** **Spotted lanternfly dispersal, monitoring, and biocontrol.**
Mauri Barrett *(Mauri.H.Barrett@aphis.usda.gov), USDA-APHIS, Buzzards Bay, MA*

10:50 AM **102** **Invasive insects in Connecticut: Two beetles expand their range and a bee stages a takeover.**
Chris Maier *(Chris.Maier@ct.gov), Connecticut Agricultural Experiment Station, New Haven, CT*

11:10 AM **Regional Reports and Discussion**

Student Abstracts

STUDENT TEN MINUTE PAPER COMPETITION

M.S./Undergraduate Student Oral Competition

1. Do hemlock woolly adelgid (Adelges tsugae) and elongate hemlock scale (Fiorinia externa) alter the timing of bud break?

Elizabeth Whitney (ewhitney@uri.edu), Univ. of Rhode Island, Kingston, RI

Eastern hemlocks (*Tsuga canadensis*; 'hemlock') are currently being attacked by two invasive species: hemlock woolly adelgid (*Adelges tsugae*; 'HWA') and the elongate hemlock scale (*Fiorinia externa*: 'EHS'), both sap-feeding insects. No research has yet documented whether and how bud break is affected by non-defoliating herbivorous insects. This study assesses the likelihood of shifts in bud break of eastern hemlock that are infested with HWA, EHS, or neither insect. Data collection was conducted over a six-week period during the spring of 2016. Results showed that there was no significant difference in the timing of bud break for insect infested hemlocks and non-infested hemlocks. However, there was a relationship between insect densities and the timing of bud break.

2. A native lepidopteran is impacted by host defenses induced by hemlock woolly adelgid (*Adelges tsugae*)

Mary Mallinger (mallinger.mary@gmail.com)[1], Chad Rigsby[1], Robert Schaeffer[2], Colin M. Orians[3] and Evan L. Preisser[1], [1]Univ. of Rhode Island, Kingston, RI, [2]Washington State Univ., Pullman, WA, [3]Tufts Univ., Medford, MA

Eastern hemlock, *Tsuga canadensis*, is currently experiencing widespread mortality due to the invasive hemlock woolly adelgid (*Adelges tsugae*). Eastern hemlock looper (*Lambdina fiscellaria*), another hemlock pest, is a native lepidopteran that has reached outbreak levels in the past. While these insects share a host and overlap in range, little is known about interactions between them. Previous research has shown that adelgid infestation increases methyl salicylate concentrations in hemlock tissue, while plant defense against looper, a chewing insect, likely occurs via jasmonic acid. Because the salicyclic- and jasmonic-acid plant defense pathways are mutually antagonistic, we tested the hypothesis that prior infestation with adelgid affects looper performance via the host's chemical defenses. Specifically, we hypothesized that hemlock responses to the early-arriving adelgid will reduce plant defense against the later-arriving looper. Looper were reared to pupation on hemlock foliage that was either infested or uninfested with adelgid. Within those treatments, groups of foliage were sprayed with defensive elicitors to induce either the jasmonic- or salicylic-acid pathways. Looper performance was assessed by measuring survival over time.

There was a marginally significant effect of adelgid infestation on looper larval survival over time. The chemical elicitor treatments as well as the interaction between elicitor and adelgid infestation had a significant effect on looper survival. Looper survival was lowest on adelgid infested trees that were treated with the salicylic acid inducer. This treatment group also had significantly higher levels of soluble phenolics and total terpenoids in needle tissue than control treatments.

3. Wild bee species assemblages on a land-use gradient in Meadville, PA

Erica Moretti (morettie@allegheny.edu), Allegheny College, Meadville, PA

Growing concern over honeybee (*A. mellifera*) declines has highlighted the dearth of information available on wild bee species and a need for their conservation. While it is widely held that bee species richness and abundance declines as the degree of urbanization increases, only more recently has research focused on how species composition shifts within these environments. Given wild bees' dependence on forage availability and nesting habits, they are closely tied to their nesting sites. In this way, urban environments have been observed to alter species composition in part based on nesting site availability. Specifically, soil-nester abundances tend to decline while cavity-nesting species become more prominent as the degree of urbanization increases. The objectives of this study are to determine if a decline in wild bee richness and abundance and a shift in species composition based on nesting habits can be seen across a local scale, spanning only 1-2 km. Bees were collected over two summers (2015-2016) in Meadville, PA and identified to species. Land-use was evaluated using GIS to assess the ratio of impervious to pervious surfaces, a proxy measurement for urbanization, around each site. The bee species abundance and diversity and the impact of urbanization on their assemblages with a focus on nesting habits will be discussed.

4. Investigating the effect of floral composition on native bees in Meadville, PA

Paige Hickman (hickmanp@allegheny.edu), Allegheny College, Meadville, PA

Loss of biodiversity can have vastly negative impacts on ecosystems, even at the level of insects. Bee species are declining due to factors such as climate change, habitat fragmentation resulting from urbanization and agricultural intensification, pesticide use, and disease. Aside from the non-native European honey bee, the United States alone is home to over 4,000 species of native bees.

All native bees play important roles in the environment, especially as pollinators. The extent of native bee declines is not well-known because many parts of the country lack consistent surveys. The objectives of this research are to assess native bee species diversity in an urban environment in northwestern PA and identify how floral composition influences native bee diversity and abundance. Using bee species data from the summers of 2015 and 2016, the relationship between bee diversity and blooming angiosperms present at sites of bee sampling will be evaluated. Many native bees are oligolectic, meaning they are specialized to access and thereby pollinate more efficiently native angiosperms with which they co-evolved. It is hypothesized that there will be greater diversity of native bees at sites with a higher percentage of native flowering plant species in comparison to that of sites with a higher percentage of non-naturally occurring introduced species.

5. Female autodetection of pheromones: what it means & why it matters

Robert Holdcraft (rholdcra@rci.rutgers.edu)[1] and Cesar Rodriguez-Saona[2], [1]Rutgers, The State Univ. of New Jersey, Chatsworth, NJ, [2]Rutgers, The State Univ. of New Jersey, New Brunswick, NJ

Olfactory communication research with insects utilizing sex pheromones has focused on the effects of pheromones on signal receivers. Early pheromone detection studies using the silkworm moth, *Bombyx mori* L., and saturniids led to the assumption that emitters, especially females, are unable to detect their own pheromone. Pheromone anosmia, i.e., the inability of females to detect their conspecific sex pheromone, was often assumed, and initially little attention was paid to female behaviors that may result from autodetection, i.e., the ability of females to detect their sex pheromone. Detection of conspecific pheromone plumes from nearby females may provide information to improve chances of mating success and progeny survival. Since the first documented example in 1972, numerous occurrences of autodetection have been observed and verified in field and laboratory studies. We summarize here a significant portion of research relating to autodetection. Electrophysiological and behavioral investigations, as well as expression patterns of proteins involved in pheromone autodetection are included. We discuss problems inherent in defining a boundary between sex and aggregation pheromones considering the occurrence of autodetection, and summarize hypothesized selection pressures favoring autodetection. Importance of including autodetection studies in future work is emphasized by complications arising from a lack of knowledge combined with expanding the use of pheromones in agriculture.

6. Effects of kairomones from invasive brown marmorated stink bug (*Halyomorpha halys*) and native beneficial spined soldier bug (*Podisus maculiventris)* on the host foraging behavior of the egg parasitoid *Trissolcus japonicus*

Sean Boyle (seanboyl@udel.edu)[1], Kim Hoelmer[2] and Judith A. Hough-Goldstein[3], [1]Univ. of Delaware, Dept. of Entomology and Wildlife Ecology, Newark, DE, Newark, DE, [2]USDA - ARS, Newark, DE, [3]Univ. of Delaware, Newark, DE

The brown marmorated stink bug, *Halyomorpha halys*, is a highly polyphagous species native to Asia that has become a serious invasive agricultural and nuisance pest across North America. Over the last decade, classical biological control host range evaluations have revealed the solitary egg parasitoid *Trissolcus japonicus* to be the primary candidate biocontrol agent for field release against *H. halys*. However, these evaluations only provide us with the physiological host range of *T. japonicus*. Previous studies with other *Trissolcus* species have demonstrated that contact kairomones from different host species elicit varied responses in the parasitoids' host foraging behaviors. To uncover the parasitoid's ecological host range, mated naïve *T. japonicus* females were exposed to leaf surfaces contaminated with contact kairomones from its preferred host, *H. halys*, or from a native non-target host, *Podisus maculiventris*. Red maple, apple, and soybean were used as plant substrate treatments. The wasp's residence time on the leaf surface, linear walking speed, and angular velocity were observed and measured using Noldus EthoVision XT tracking software. *T. japonicus* displayed significant host foraging preferences for leaves contaminated with contact kairomones from *H. halys*. The wasp's residence time on *H. halys* contaminated leaves was greater than on *P. maculiventris* contaminated leaves. Also, *T. japonicus* walked slower on *H. halys* contaminated leaves than on *P. maculiventris* contaminated leaves. Overall, our study suggests that kairomone-based behavioral studies can be utilized to further evaluate the host specificity of *T. japonicus* and can be an invaluable supplement to classic biocontrol host range testing regimes.

7. Potential native parasitoids of brown marmorated stink bug (*Halymorpha halys* Stål*)* eggs in an organic orchard in southern Pennsylvania

Hillary Morin (hjm5194@psu.edu), The Pennsylvania State Univ., Univ. Park, PA

The brown marmorated stink bug (BMSB), *Halymorpha halys* (Stål), is an invasive polyphagous insect causing damage to many agricultural commodities, including tree fruit. Insecticide based management programs, although effective against BMSB, have disrupted established integrated pest management programs. The aim of this study was to detect and identify biological control agents present in Pennsylvania orchards, which are potentially effective against BMSB. Our project concentrated on a search for native parasitoid wasps attacking stink bug egg mases, as well as the samurai wasp, *Trissolcus japonicus,* a successful parasitoid of

H. halys in its native range in Asia. Recently, the samurai wasp has been found in multiple locations in the United States. Between 20 June and 21 August 2016, a total of 61 freshly collected (<24 hours since laid) and 88 frozen *H. halys* sentinel egg masses were affixed to leaves of peach or apple trees, or fauna bordering an organic apple and peach orchards. Additionally, we also collected forty-seven BMSB and native stink bug egg masses naturally laid in the orchard and its vicinity. All sentinel and naturally collected egg masses were reared for at least four weeks to determine hatch and/or parasitism rate. Although no *T. japonicus* was found during our searches utilizing sentinel egg masses, numerous native parasitic wasps were collected. Parasitoids were reared from six frozen stink bug egg masses, one fresh egg mass, and twenty naturally occurring egg masses.

8. Effect of release time and diapause on phenology of newly introduced emerald ash borer parasitoid, *Oobius agrili*

Devan George (devgeo1117@gmail.com)[1] and Jian Duan[2], [1]Univ. of Delaware, Elkton, MD, [2]USDA - ARS, Newark, DE

Oobius agrili (Hymenoptera: Encrytidae) is a solitary egg parasitoid of the invasive emerald ash borer *Agrilius planipennis* (Coleoptera: Buprestidae), a phloem-feeding pest responsible for widespread ash mortality in the U.S. This parasitoid was introduced for biological control of *A. planipennis*, in 2007 and has successfully established self-sustaining populations in some areas of the United States such as Michigan, but not the mid-atlantic. To improve our understanding of the parasitoid's ability to establish self-sustaining populations in the new environment, we evaluated the potential impact of field releasing time and diapause status of the released parental parasitoids on their phenology in the mid-Atlantic. Adult parasitoids were released in open-air vials attached to ash trees in Susquehanna State Park in northwestern Maryland, and given fresh *A. planipennis* eggs weekly. Using a factorial design in which vials were placed on the trees either early or late in the season with diapaused or non-diapaused parental parasitoids. The emergence time, rate, longevity, fecundity, and diapause patterns of the subsequent generations were measured. The results of this study will help to determine the optimal releasing time and diapause type of released parental wasps for the control of *A. plannipennis* in mid-Atlantic states.

9. Flea beetle impact and control methods on cabbage and eggplant in Virginia

James Mason (jmason91@vt.edu) and Thomas Kuhar, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

The species complex and impact of flea beetles (FB) on yield of eggplant and cabbage was assessed in field experiments in Virginia in 2015 and 2016, to determine the impact of FB feeding injury on crop yield. FB density and defoliation were assessed weekly from transplanting for about one month by counting the number of beetles present on ten plants per plot. Individual plants were assigned an overall defoliation rating of 0%, 1-20%, 21-40%, 41-60%, or >60% defoliation. Ten random plants from each defoliation category were assessed for yield at harvest. Also in 2015 and 2016, the efficacy of 7 insecticide treatments was evaluated to determine which provided the best FB control. In 2016 a separate experiment using deltamethrin incorporated mosquito netting as a screen row cover was conducted to see if it provided similar control to traditional insecticide treatments. The predominant FB species found on eggplant was *Epitrix fuscula* and on cabbage were *Phyllotreta striolata* and *Phyllotreta cruciferae*. There was a significant negative relationship between defoliation rating and yield in both crops. The most effective insecticide treatments were soil-applied dinotefuran or bifenthrin as a foliar spray. Soil-applied imidacloprid or cyantraniliprole did not have as long of a residual as dinotefuran. The deltamethrin screen row cover was a highly effective method for controlling FBs.

10. Quantifying the impact of an invading shrub (*Berberis thunbergii*) on arthropod assemblages in forests of the northeastern U.S

Alison Molnar (alison.molnar@chatham.edu)[1], Ryan Utz[1] and Robert Davidson[2], [1]Chatham Univ., Pittsburgh, PA, [2]Carnegie Museum of Natural History, Pittsburgh, PA

Non-native plant species are expanding at unprecedented rates, exerting strong impacts on ecosystems. Invasive plants that entirely replace a fundamental ecosystem attribute, such as becoming the dominant ground cover, likely pose a serious threat to native flora and fauna. Japanese barberry (*Berberis thunbergii*) represents a particularly noxious invader currently spreading in range throughout the eastern United States, where it can become dominant in forest understories. Arthropods, specifically Carabidae, are especially sensitive to the conditions of their microhabitat and are frequently used to gauge the impacts of habitat alteration. We compared the arthropod abundance, diversity, indicator species, and community composition between relatively intact forest floor habitat and parcels heavily invaded by *B. thungbergii* in exurban forests outside of Pittsburgh, Pennsylvania USA. Pitfall sampling occurred throughout the spring and summer twice monthly. Results demonstrate that despite invaded areas exhibiting lower pH, less light, and cooler temperatures understories invaded by barberry appear to support very similar arthropod assemblages and abundances relative to control areas. We were unable to detect differences in trap capture rates, biodiversity, or community composition between control and invaded plots. The severe level of environmental disturbance in western Pennsylvania associated with urbanization, acid deposition, a history of forest clearance, and overabundant deer may have led to a tolerant assemblage of ground-dwelling arthropods that is able to occupy heavily invaded forest floors.

PhD Student Oral Competition

27. Mapping black fly nuisance swarms: Land use and meteorological correlates describe distribution patterns of *Simulium jenningsi* (Diptera: Simuliidae) in western Maryland

Rebecca Wilson (rcwilson@umd.edu) and William O. Lamp, Univ. of Maryland, College Park, MD

The black fly *Simulium jenningsi* (Diptera: Simuliidae) is a nuisance pest of humans and livestock throughout the Mid-Atlantic. In western Maryland residents in many communities report severe swarms of these flies appearing throughout the summer. However, neighboring communities in the region appeared to generate no resident complaints. Using this perceived spatial variability as a case study for why black flies form nuisance problems in some communities but not others, our objectives were to 1. determine the relative distribution of *S. jenningsi* swarms in the region surrounding southern Washington County, Maryland, 2. describe the spatial clustering patterns of nuisance swarm severity, and 3. model the correlation between swarm activity and environmental factors. Black flies were collected by sweep net at 250 sampling locations over the span of the summers of 2014 and 2015. Flies counts and nuisance severity were recorded at each sampling instance along with meteorological variables. Further analysis was conducted using ArcGIS and R to determine the spatial autocorrelation of nuisance severity and correlation to land cover. Although *S. jenningsi* was found to some extent throughout the sampling region, large numbers of the flies were encountered in relatively few locations. These locations were found to be clustered in regional hot spots, of note near regions from which large numbers of resident complaints had originated from. Nuisance severity was negatively correlated with developed land cover, indicating fewer instances of severe swarms in urban or suburban communities. These results will help management efforts determine which communities may be under higher risk of current and future nuisance swarms.

28. Bioactivity of heterocyclic amines to honey bees

Nicholas Larson (nlarson@vt.edu)[1] and Troy D. Anderson[2], [1]Virginia Polytechnic Institute and State Univ., Blacksburg, VA, [2]Univ. of Nebraska, Lincoln, NE

The loss of managed honey bee colonies presents a challenge to crop pollination services. The unintentional exposure of agrochemicals threatens the health of bee colonies and, thus, warrants an alternative approach to reduce the exposure of and provide protection to these pollinators against agrochemicals. The goal of this study was to examine the bioactivity of heterocyclic amines to bees for the identification of chemical deterrents that can elicit the short-term avoidance of these pollinators from crops that might be treated with agrochemicals. The data presented here demonstrate a video tracking protocol to screen the bioactivity of heterocyclic amines to bees in the laboratory, a near-field and semi-field experiment to examine bee deterrence from heterocyclic amine-treated sugar and nectar sources, and an electroantennogram response assay to profile the heterocyclic amine odor discrimination of bees. This work sets the stage for future investigations into the laboratory and field evaluation of chemistries that can manipulate bees away from agrochemical-treated crops.

29. Arthropod response to organic cover crop-based reduced-tillage cropping systems

Karly Regan (kjr5470@psu.edu), Christina Mullen and Mary Barbercheck, Pennsylvania State Univ., Univ. Park, PA

Reducing synthetic chemical inputs and tillage can have numerous benefits in agroecosystems, such as building soil health, promoting biodiversity, and reducing non-target effects. In addition to these benefits, reduced-tillage cropping systems may also enhance predator communities and biological control potential. We investigated effects of soil and cover crop management on herbivory and predation in corn. Our corn plots underwent four management systems in a reduced-tillage organic crop rotation in 2015 and 2016. Slugs caused the greatest early season crop damage in both years. The presence or absence of certain cover crop species had significant effects on the intensity of slug damage, though these effects were different in the two years studied. In both 2015 and 2016, damage by chewing herbivores was higher in no-till corn that was planted into a rolled hairy vetch (*Vicia villosa*) and triticale (*Triticale hexaploide*) mat compared to the three tilled systems, regardless of preceding cover crop in the tilled systems. In sentinel insect predation assays during 2015, predation rates did not differ among systems before cover crop termination but were higher in treatments preceded by hairy vetch and triticale than by red clover (*Trifolium pratense*) and timothy (*Phleum pretense*) after corn emergence. In 2016, the effect of cover crop species on predation was less clear. Thus, from our study, it appears that the types of cover crops used may be an important factor in pest pressure and predation in organic reduced-tillage cropping systems.

30. Non-(co)linear patterns of metabolite induction in tea (*Camellia sinensis*) with continuous variation in herbivore density

Eric Scott (eric.scott@tufts.edu), Colin M. Orians, Nicole Kfoury and Albert Robbat, Tufts Univ., Medford, MA

Induction of secondary metabolites in response to insect attack is described in numerous plant species. Studies describing induction generally treat insect herbivory as a binary variable, when in reality plants experience a continuum of herbivore pressure, potentially resulting in complex patterns of induction not observable in experiments with only control and herbivory treatments. We are using tea (*Camellia sinensis*) to explore the consequences of herbivore density on plant chemistry. In this system, differences in herbivore damage can change metabolite profile and quality

of 'oriental beauty tea', which is only processed from tea leaves attacked by the green tea leafhopper (*Empoasca onukii*). According to farm managers, intermediate damage creates the highest quality tea, indicating potential non-(co)linear changes in metabolites with increasing herbivory. To measure metabolite induction in response to a range of herbivore densities, we exposed branches of tea plants to varying densities of leafhoppers (0 - 0.75 per leaf bud) for a week at a tea farm in Fujian Province, China. We collected volatiles from live plants using a novel method, direct contact sorptive extraction (DCSE), and extracted non-volatiles from microwave-dried leaves harvested after a week of damage. Volatiles and non-volatiles were analyzed by GC-MS and LC-MS, respectively. Metabolites important for tea flavor and plant-insect interactions, including monoterpene alcohols and green leaf volatiles, showed non-linear responses to herbivore density. Non-linear induction patterns may be more widespread than we know and may impact quality of other crops as well as ecological interactions.

31. Response of the brown marmorated stink bug (*Halyomorpha halys*) to thermal contrast in wall panels during winter shelter seeking

Benjamin Chambers (bdc0112@vt.edu)[1], Thomas Kuhar[1], Annie Pearce[1], Georg Reichard[1] and Tracy C. Leskey[2], [1]Virginia Polytechnic Institute and State Univ., Blacksburg, VA, [2]USDA - ARS, Kearneysville, WV

The brown marmorated stink bug (*Halyomorpha halys*) is known for its habit of overwintering in human structures, where it can be a nuisance pest for occupants. Every fall, these insects aggregate on the sides of structures in search of entry to overwintering sites. This experiment was designed to test responses to thermal contrasts on walls during overwintering site searches. A choice arena was constructed consisting of four framed cavities arranged to create a box four feet high and two feet wide. Space heaters were inserted into two cavities, and two were left unheated. The experiment was conducted first with the heated walls opposite, and then repeated with the heated walls adjacent. The interior wall faces were heated to an approximately 5 °C difference from the unheated walls, with a 3 °C minimum difference. Bugs were released in twenty groups of five at the center of the box and allowed to select sides and move up for twenty minutes. Initial selection of the heated or unheated wall sections was recorded, as was movement between walls. Preliminary statistical analysis indicates no correlation between thermal contrast and wall selection.

32. Extended impacts of trichome consumption on tobacco hornworms (*Manduca sexta*)

Alexandra Serpi (alex.serpi@psu.edu), Pennsylvania State Univ., Univ. Park, PA

Botanists have at least 18 words to describe plant hairs, including trichomes. These common features of leaves are divided into two distinct categories: glandular trichomes contain defensive compounds that have been shown to deter herbivores, while non-glandular trichomes do not possess specialized structures for storage of defensive chemicals. Non-glandular leaf hairs have been shown to play a variety of roles, however their role in plant defense is only implicated. Some evidence shows that insects develop more slowly on plants with trichomes when compared to conspecifics that have reduced trichome numbers, but this could be due to other differences in leaf defensive chemistry or leaf microbiome. This study seeks to define the isolated function of stellate trichomes of horsenettle in anti-herbivore defenses. Specifically, we predicted and found that trichomes adversely affect larval survival, growth, and development of *Manduca sexta* (Lepidoptera: Sphingidae). These effects were determined by measuring consumption rates, growth rates, and survivorship after feeding on a series of diets with increasing defensive abilities. The diets range from an artificial media (completely defense-free) to an intact leaf (all possible horsenettle defenses). Larvae consuming a trichome-laced diet consumed less and grew less than larvae on the control diet. Moreover, we found that trichomes damaged the peritrophic membrane of the guts of 4th instar larvae using SEM imaging. Consequently, we hypothesize that a diet with horsenettle trichomes causes internal gut damage and poses a serious challenge to the immune system of the moth larvae.

33. Does tillage mitigate or magnify pest outbreaks? A meta-analysis

Elizabeth Rowen (epr5119@psu.edu) and John Tooker, Pennsylvania State Univ., Univ. Park, PA

Tilling soil can have devastating effects on soil health, including increasing erosion, oxidizing organic matter and destroying habitat for beneficial soil organisms. However, tillage is still used across much of the US as an IPM tactic to manage insects. Farmers who have moved to reduced and no-till systems struggle with pest outbreaks that they can not control, such as slugs. However, reducing tillage is known to have beneficial effects on predator populations and biological control services. Does practicing reduced tillage or no-till increase pest outbreaks? Or do conventionally tilled systems have worse pest outbreaks (perhaps under-recognized)? We investigated these questions using a meta-analysis of over 35 papers that compared pest abundances in reduced/no till systems and conventionally tilled systems. We used three methods to measure differences between reduced till and conventional systems: Hedge's D effect size, a response ratio, and vote counting, each with different strengths and weaknesses. We found that herbivore abundances were lower in reduced and no-till systems. Outbreaks of insects in these systems may be due to lack of technology aimed at controlling particular pests that plague reduced till systems, rather than greater abundances of all pests in these systems.

34. Myriads of millipedes: Investigating the defensive gland morphology and ecology of the greenhouse millipede, *Oxidus gracilis*

Kirsten Pearsons (kfp5094@psu.edu), István Mikó and John Tooker, Pennsylvania State Univ., Univ. Park, PA

Although the greenhouse millipede, *Oxidus gracilis*, is a cosmopolitan species, there is little work using modern tools to explore its morphology, nor much known about its role in invaded ecosystems. We used confocal laser scanning microscopy (CLSM) to image the defensive glands of adult and juvenile *Oxidus gracilis*. We found CLSM to be a promising technique to non-invasively investigate the development and mechanisms of polydesmid defensive glands. This method could be a useful tool in understanding predator-prey interactions between *Oxidus gracilis* and naïve predators, which may help explain the success of *Oxidus gracilis* as a globally invasive species.

35. Impact of neonicotinoid seed treatments on pestiferous arthropods and yield in a three-year grain crop rotation

Aditi Dubey (aditid26@gmail.com)[1], Galen Dively[1], Margaret Lewis[2] and Kelly Hamby[3], [1]Univ. of Maryland, College Park, MD, [2]Pennsylvania State Univ., Univ. Park, PA, [3]Univ. of California, Davis, CA

Introduction: Neonicotinoids are the most widely used class of insecticides in the U.S., with much of that application attributed to seed treatments on crops like corn and soybeans. As seed treatments, neonicotinoids only persist in the plant long enough to provide protection against early season soil and seedling pests. However, this protection does not always lead to an increase in yield, and in areas with low or late-season pest pressure, neonicotinoid seed treatments may not provide consistent economic benefits.

Methods: This study examines the effects of thiamethoxam and imidacloprid seed treatments on a three-year field crop rotation of soybean, winter wheat, double cropped soybean and corn at two sites in Maryland. Specifically, we report the effects of seed treatments on pestiferous arthropods and crop yield for the first two years of the study. Non-target impacts on beneficial arthropods and the soil microbial community are also being studied.

Results/Conclusion: Early season pest pressure was low throughout our study. However, neonicotinoid seed treatments reduced populations for some early season herbivorous arthropods in both full season and double-cropped soybeans. In winter wheat, these treatments reduced aphid (Hemiptera: Aphididae) numbers in the fall, but no treatment effects were seen the following spring. Despite the early season pest reduction, neonicotinoid seed treatments did not significantly impact yield in either crop. While the prophylactic use of neonicotinoid seed treatments provides cheap insurance against soil and seedling pests, it may not always provide an economic benefit, especially in areas where pest pressure is consistently low.

36. Complex interactions between temperature and diet in mosquitoes reveal new insights into malaria transmission under projected climate change scenarios

Shelley Whitehead (saw359@psu.edu), Janet Teeple and Matthew Thomas, Pennsylvania State Univ., Univ. Park, PA

There is great concern as to how global climate change may affect vector-borne diseases. Numerous studies demonstrate a link between mean temperature and mosquito survival; however, in the field, temperature fluctuates dynamically throughout the day. Furthermore, temperature has been shown to significantly affect mosquito blood feeding behavior. We observed the effect of several temperature regimes on daily survival of *Anopheles stephensi* females. Mosquitoes were divided into six temperature groups: 27°C, 30°C, 34°C, as well as three treatments of the same mean, but allowed to fluctuate a total of 10°C over the course of the day. Females were further allocated to one of four dietary regimes: 1) water feeding only, 2) sugar feeding only, 3) human blood meal every three days with water, or 4) human blood meal every three days with sugar water. Across all temperature treatments, the addition of blood feeding significantly improved survivorship compared to those maintained exclusively on sugar or water, respectively. And, mosquitoes imbibing both blood and sugar experienced the greatest survivorship. As temperatures increase, the time to complete development of the malaria parasite within the mosquito decreases; these data show that in hotter temperatures, the daily survival rate of *An. stephensi* females would be sufficient to effectively transmit malaria parasites. These results suggest a complex relationship between diet and temperature; not only are blood meals the source of disease transmission, but they also increase vector survival. It is crucial that these intricacies be considered in determining the best control programs for individual countries in the face of global climate change.

STUDENT POSTER COMPETITION

Student Competition - Ph.D. Posters

DSP1. Control of balsam woolly adelgid (*Adelges piceae*), on Fraser fir (*Abies fraseri*) using insecticides aimed at sap-feeding insects

Holly Wantuch (wholly3@vt.edu), Scott Salom and Thomas Kuhar, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

The balsam woolly adelgid, *Adelges piceae*, is an invasive species in North America native to Europe. It attacks *Abies* spp., causing high mortality in vulnerable North American trees. Balsam woolly adelgid control could be enhanced if more targeted insecticides were applied with fewer effects on natural enemies. Three novel chemical formulations intended for control of sap sucking pests were investigated for efficacy against balsam woolly adelgid on Fraser fir, *Abies fraseri*. Trees treated with flupyradifurone (Sivanto) had significantly fewer adelgids compared to the untreated control; for much of this study, adelgid populations in this group were similar to those of the trees treated with bifenthrin (Talstar). Sulfoxaflor (Closer) showed significant control soon after application, which decreased over time. Adelgid populations treated with spirotetramat (Movento) were decreased compared to those of the untreated control, but remained significantly greater than in the flupyradifurone and bifenthrin groups. Flonicamid (Beleaf) did not appear to impact adelgid populations in this study when compared to the untreated control group.

DSP2. A review of New World *Malaxa* (Hemiptera: Fulgoroidea: Delphacidae)

Ashley Kennedy (kennedya@udel.edu) and Charles Bartlett, Univ. of Delaware, Newark, DE

Malaxa Melichar, 1914 (Delphacidae: Tropidocephalini) has recently been redescribed based on Chinese species (Chen et al. 2006, Hou et al. 2013). *Malaxa* currently contains 12 species, 9 Indomalayan (Yang & Yang 1986, Chen et al. 2006, Hou et al. 2013) and 3 neotropical (Muir 1926, 1930, Fennah 1945). As noted by Bartlett (2009), the assignment of New World species to an Indomalayan genus deserves reassessment. Based on examination of key diagnostic features, the genus *Malaxa* should be redefined as a strictly Nearctic genus and a new genus should be established to accommodate the three Neotropical species (*M. occidentalis*, *M. microstylus*, and *M. gracilis*) currently allocated to *Malaxa*.

Student Competition - Masters Posters

DSP3. An attract and kill approach for BMSB using pheromone lures and deltamethrin-incorporated screens

Hayley Bush (hgbush93@vt.edu), Virginia Tech, Blacksburg, VA

Since the introduction of the brown marmorated stink bug (*Halyomorpha halys)* in the late 1990s, the insect has become an alarming pest in agricultural systems. This research uses an integrated approach to find a way to mass kill brown marmorated stink bugs (BMSB) in pepper plots, other than conventional sprays, to reduce damage to the fruit. To accomplish this, a strip of deltamethrin-incorporated mesh screen was posted on two tomato stakes that were located in pepper plots on a research farm at Virginia Tech. Placed on each strip of deltamethrin screen was a BMSB aggregation pheromone. Knowing that BMSB will be drawn towards the lure, the idea was that the screen would kill the pest before landing on plants. Results however showed higher bug counts and fruit damage closer to the screen than in control and conventional treatment plots. Data gathered from this study can help develop future implementation of the screen and lure combination.

Student Competition - Undergraduate Posters

DSP4. How does the fear of predation affect the growth and development of luna moth (*Actias luna*) larvae?

Alex Baranowski (alexbaran74@my.uri.edu) and Evan L. Preisser, Univ. of Rhode Island, Kingston, RI

Predators reduce prey populations by feeding upon them, and they alter the behavior of prey species by their mere presence. There have been studies on how the nonlethal presence of predatory or parasitic insects affects the development and behavior of potential prey items. We observed the effects that nonlethal predatory wasps had on the development of *Actias luna* larvae. We rendered wasps (*Vespula maculifrons*) harmless by applying plastic to their mandibles and stingers before placing them in bins with wasp treatment group larvae. Another group of larvae received similarly treated harmless flies to factor for the presence of a flying insect. The control group simply received toothpicks with the plastic material, and all larvae were reared to pupation or death. Larvae exposed to wasps suffered much higher mortality rates and were unable to speed development up in order to avoid the threat.

DSP5. The impact of artificial diet on wing development in tobacco hornworm (*Manduca sexta*)

Austin Henken (arh5513@psu.edu) and Alexandra Serpi, Pennsylvania State Univ., Univ. Park, PA

The tobacco hornworm (*Manduca sexta*) has been extensively developed into a model organism due to its rapid life cycle, ease of rearing, and large size. Their usefulness for biological study allow them to cross a broad spectrum of topics, including immunity, development, and morphology. In natural environments, the herbivorous larvae feed on plants of the nightshade family. Nightshades include economically important crops and produce notorious antiherbivore compounds like neonicotinoids. *Manduca* are rare among herbivores for their evolutionary tolerance of such these compounds. Their vociferous appetites make it difficult to supply enough fresh vegetation to sustain an entire colony. Instead, laboratory reared larvae are fed an artificial, wheat-based diet. As with any man-made copy of a natural diet, the artificial diet is expected to meet major nutritional requirements and calorie intake, but may lack some lesser micronutrients. Current evidence shows that larvae feeding on artificial diet grow larger and develop more quickly than larvae feeding on leaf-based diets. However, further evidence suggests that artificial diet may lack some necessary nutrients that aid in development. This study seeks to understand the nutritional limitations of both artificial diet and a leaf-based diet using horsenettle (*Solanum carolinense*). The developmental effects were estimated by observing growth rates, survivorship, and wing formation of moths after feeding on either artificial diet or leaves as larvae. As expected, larvae reared on artificial diet raced through development, but suffered greater number of deformed wings. Understanding these effects will guide future work when using artificial diet in experimental settings.

DSP6. Attraction of *Bombus impatiens* and *Xylocopa virginica* to Japanese beetle lures and traps

Sara Datson (sara_datson@my.uri.edu), Steven Sipolski, Lauren Zeffer and Steven Alm, Univ. of Rhode Island, Kingston, RI

Two important native pollinator bee species, *Bombus impatiens* and *Xylocopa virginica* as well as other native bees were attracted to Japanese beetle floral lures and captured in Japanese beetle traps. *Bombus impatiens* was significantly more attracted to traps baited with geraniol and the Japanese beetle lure three chemical blend (geraniol, eugenol, phenethyl propionate). *Xylocopa virginica* was more selective in that they were primarily attracted to the geraniol baited traps. Both species were less attracted to eugenol and phenethyl propionate baited traps. We captured 856 *B. impatiens* and 124 *X. virginica* in 15 days of trapping at two locations.

DSP7. Foraging preferences of the carpenter bee, *Xylocopa virginica*, in Rhode Island

Lauren Zeffer (lauren_zeffer@my.uri.edu), Sara Datson, Steven Sipolski and Steven Alm, Univ. of Rhode Island, Kingston, RI

A three year study was conducted at 15 cultivated highbush blueberry (*Vaccinuim corymbosum*) farms throughout Rhode Island to determine native bee pollinator diversity and their fidelity to blueberry and other pollen. Numerically, the carpenter bee, *Xylocopa virginica* was one of the top five native pollinators captured in all three years and the number one collected in 2016. *Xylocopa virginica* collected a relatively low percentage of blueberry pollen (30%) compared to the other top four pollinators. Other pollen collected by *X. virginica* consisted of oak (33.1%), rhododendron (13.0%), horsechestnut (10.4%), viburnum (8.8%), lily (5.5%), avens (5.0%), grape (4.9%), willow (4.3%), brambles (2.3%) and elm (2.1%).

DSP8. Nest structure and pollen storage of the carpenter bee, *Xylocopa virginica*, in Rhode Island

Steven Sipolski (steven_sipolski@my.uri.edu), Sara Datson, Lauren Zeffer and Steven Alm, Univ. of Rhode Island, Kingston, RI

Nest structure, cell contents, and stored pollen of the carpenter bee, *Xylocopa virginica*, were studied to better understand the nesting and forage requirements of this native pollinator. Nests in a 4 m board were planed so that they were exposed and the contents (larvae, pupae, and pollen loaves) could be removed, weighed, and locations recorded. Twenty eight tunnels were measured and the average length was 15.43 ± 1.24 cm. The average width of a first-year tunnel was 1.32 ± 0.04 cm and a multi-year tunnel (used for more than one year) was 1.68 ± 0.03 cm. The average cell length was 1.77 ± 0.03 cm. The average number of pollen grains in a full loaf needed to sustain a single larva was 60,260,000 and the number of foraging trips required to complete a full loaf was 50.

DSP9. Using an Exon Primed Intron Crossing Marker to bolster tree resolution for a family of Neotropical damselfly

Renato Nunes (rnunes11@gmail.com), Melissa Sánchez Herrera and Jessica Ware, Rutgers, The State Univ. of New Jersey, Newark, NJ

The Neotropical broad-damselflies belonging to the family Polythoridae distribute along South and Central America, and they comprise 57 species in 7 genera (*Chalcopteryx*, *Chalcothore*, *Cora*, *Euthore*, *Miocora*, *Polythore* and *Stenocora*). They are commonly known as banner winged damsels because some members display an array of color bands in their wings. Despite their color diversity, reproductive morphological traits (e.g. male genitalia) lack of variation. Here we tested a new nuclear protein coding gene reported for Odonata, the arginine

N-methyltransferase (PRMT). We developed new primers using the published transcriptome data for 4 species of *Calopteryx* and de novo sequence of *Polythore mutata* obtained using previously published primers for PRMT. To assess haplotype diversity of PMRT, and other mitochondrial (e.g. COI, ND1, 16s) and nuclear (e.g. 28s, 18s, EF1) genes, number of segregating sites for each gene was estimated and visualized using haplotype networks. We used maximum likelihood and Bayesian inference methods to estimate the best topologies, including and excluding PRMT gene. Our results suggest that PRMT didn't a show a significant variation at species level in the family Polythoridae. PRMT tree resolution was similar to the other nuclear ribosomal genes tested (e.g 18S and 28S) rather than the protein coding ones (e.g. EF1). Our results suggests that mitochondrial genes were more informative at a the species and populations levels, however they are prone to introgression that can obscure the true relationships among the taxa.

DSP10. Comparative analysis of trace metals in the ovipositors of wood-boring sawflies

Abigail Jago (ajago@oswego.edu)[1], Karen Sime[2] and Paul Tomascak[2], [1]State Univ. of New York Oswego, Oswego, NY, [2]State Univ. of New York, Oswego, Oswego, NY

In 1998, it was discovered that certain taxa of wood boring sawflies incorporate metal ions on the tips of their ovipositors. It has been hypothesized that the metals help strengthen the drilling surfaces. The aim of this project was to test that hypothesis by comparing the ovipositors of sawflies drilling into soft wood with those of species who drill into hard wood. We predicted that the ovipositors of the sawflies drilling into hard wood would have higher concentrations of metal ions than those adapted to drilling into soft wood. We used ICP mass spectrometry to analyze the ovipositors of a species of siricid known to specialize on soft wood and a species of xiphydriid, known to specialize on hard wood. In large numbers wood-feeding sawflies can become problematic for forest ecosystems and wood industries alike. This research can improve the understanding of these insects' reproductive strategies and help guide more efficient eradication efforts.

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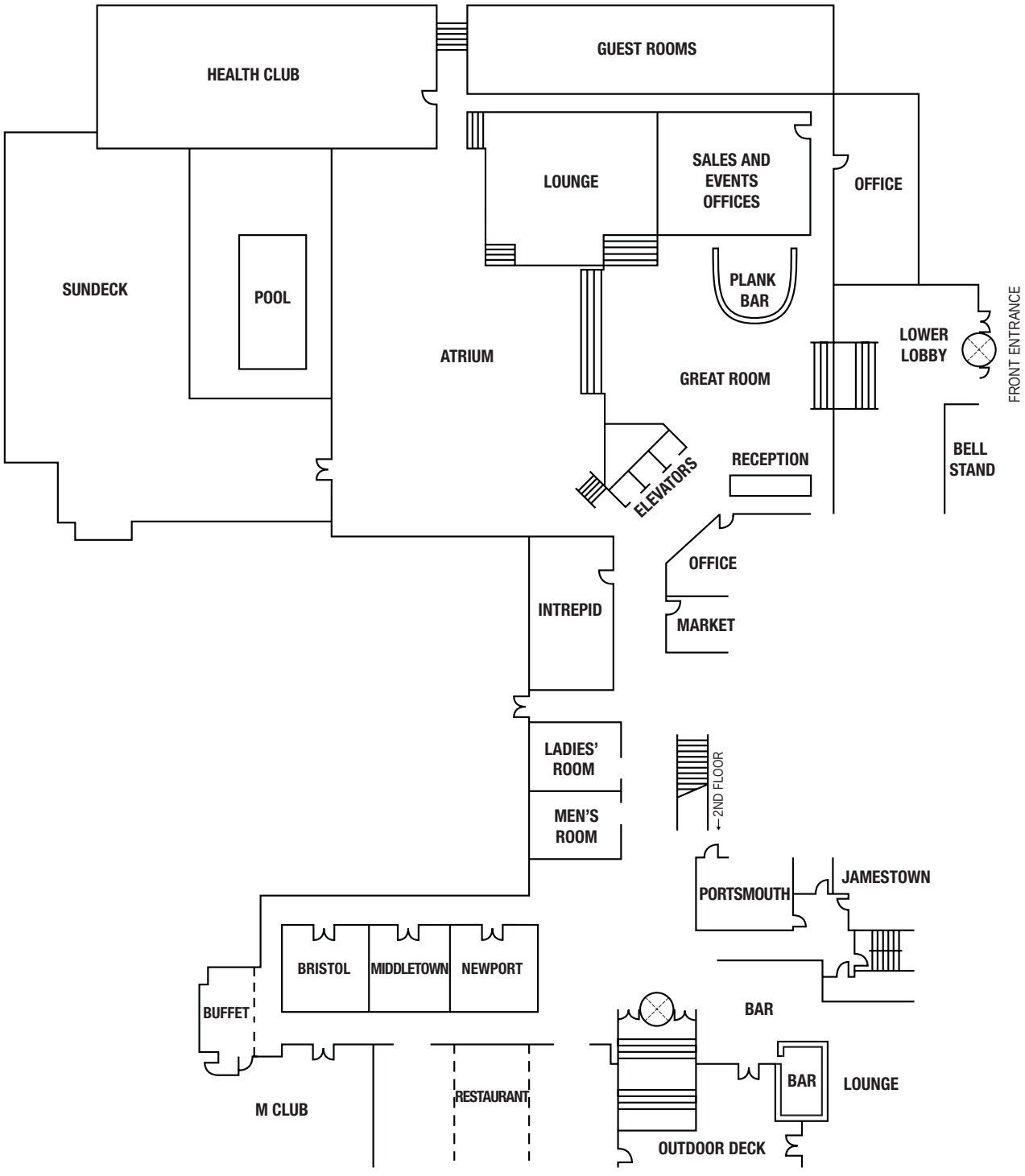
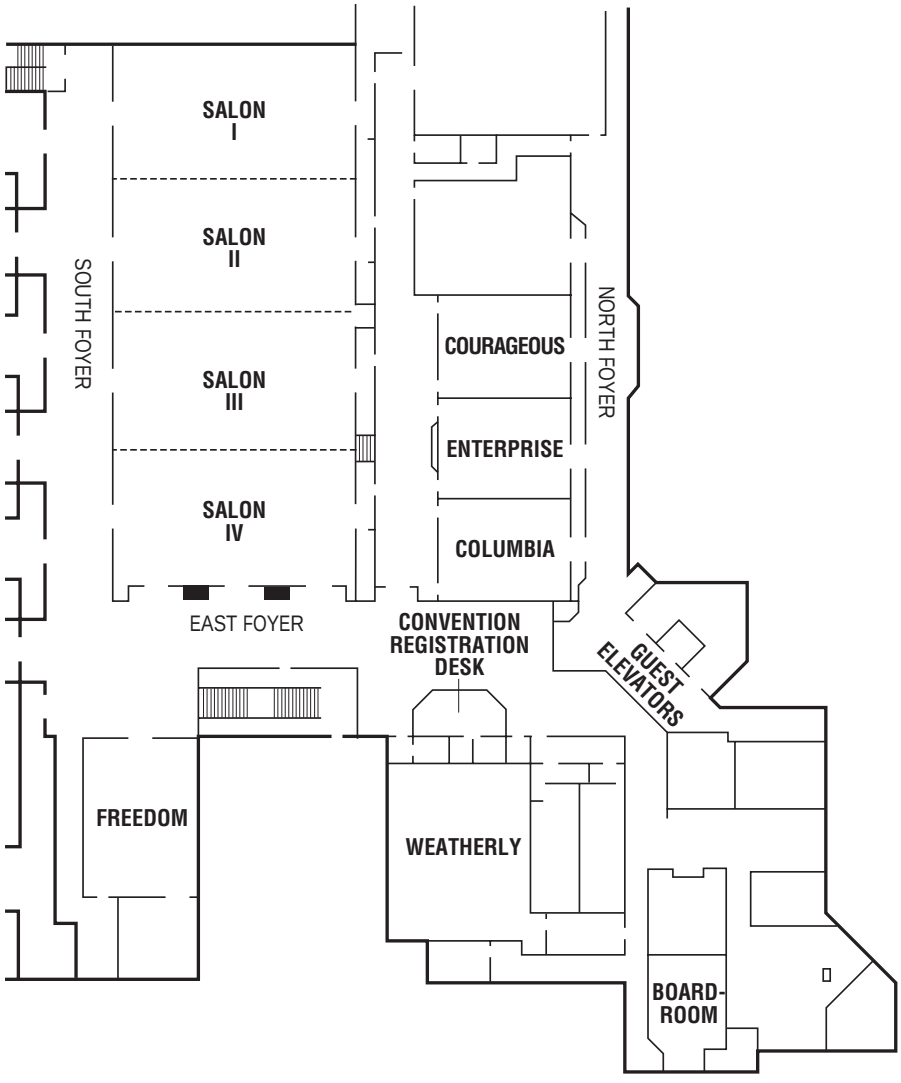
Newport Marriott Floor Plans

Second Floor Level



Third Floor Level



Notes

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- Are you TickSmart?
- Mosquitoes and Zika
- Dave the Bug Guy and UD's Insect Zoo
- The Well Pampered Cricket
- Arts from Parts (of Insects)
- Nibbles Woodaway
- USDA's Asian longhorned beetle robot
- Surprise pollinator garden and gardening for pollinators
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