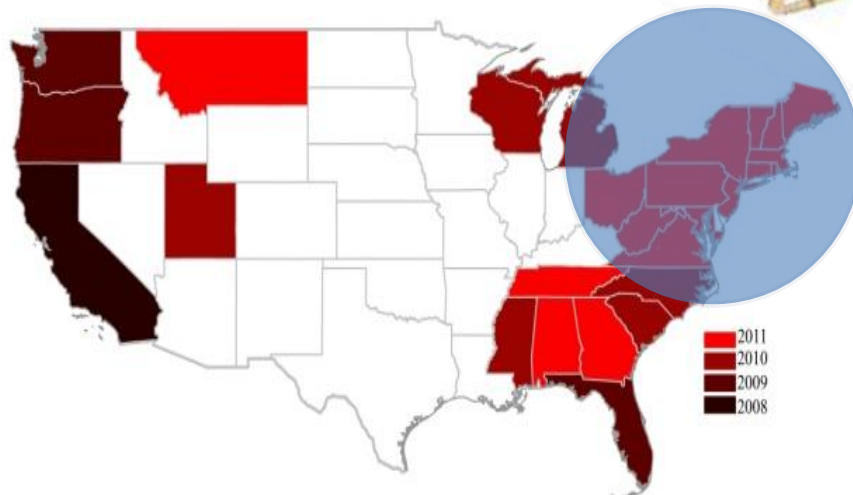


Entomological Society of America Eastern Branch

83rd Annual Meeting
March 16-19, 2012
Hilton Hotel
Hartford, CT



Entomologists Doing Entomology

The Program Encapsulated – 2012

Friday, March 16

Evening	President's Informal Reception	5:00-7:00	Hilton Ballroom West
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Saturday, March 17

Morning	Registration	8:00-12:00	3rd floor foyer
	Executive Committee Meeting	8:00-11:00	Mark Twain
	Spotted Wing Drosophila	8:00-12:00	Connecticut salon A
	Poster Setup	8:00-12:00	Hilton Ballroom East/Central
	Bug's world	10:00-12:00	Hilton Ballroom West & foyer
Afternoon	Registration	12:00-5:00	3rd floor foyer
	Bug's world	12:00-3:00	Hilton Ballroom West & foyer
	Posters, Sponsors	12:00-5:00	Hilton Ballroom East/Central
	Student Poster Competition	12:00-5:00	Hilton Ballroom East/Central
	Student Oral Competition	1:00-5:48	Ethan Allen
Evening	President's Reception	6:00-8:00	Hilton Ballroom East/Central
	Branch Awards, ESA Presidential	8:00-11:00	Hilton Ballroom West

Address & Linnaean Games

Sunday, March 18

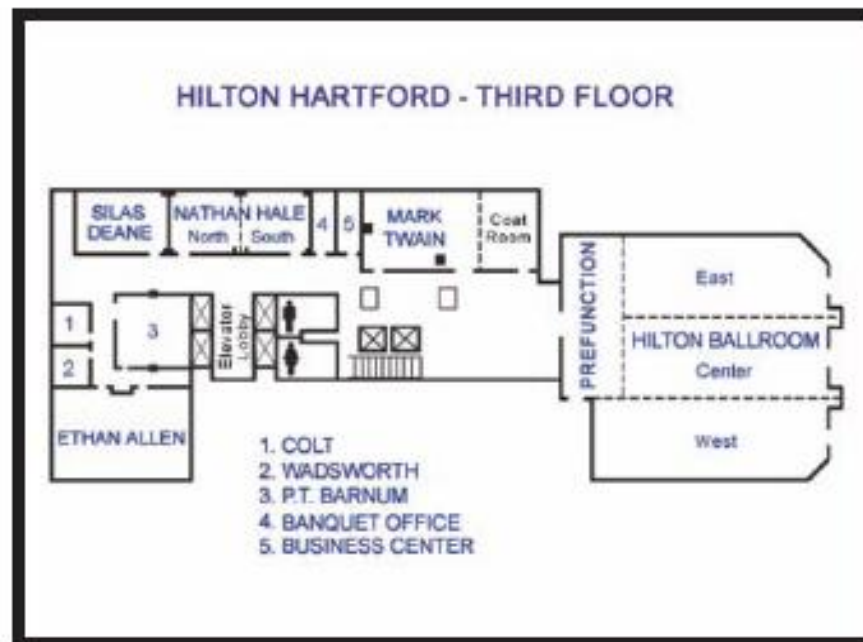
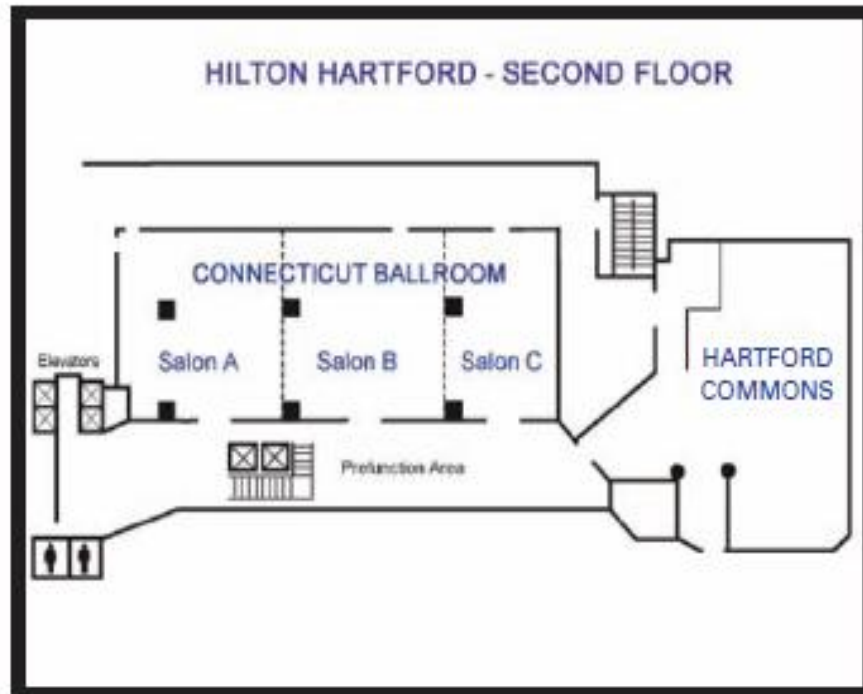
Morning	Registration	8:00-12:00	3rd floor foyer
	IDEP Symposium	8:00-12:00	Ethan Allen
	Urban Entomology Symposium	8:00-12:00	Connecticut salon A
	Student Symposium w/	8:00-12:00	Hilton Ballroom West
Asa Fitch & Comstock Award Winners			
Afternoon	Registration	12:00-5:00	3rd floor foyer
	Industry Symposium	1:00-5:00	Ethan Allen
	Taxonomy/Systematics Symposium	1:00-5:00	Connecticut salon A
	Submitted Oral Presentations	2:00-3:46	Mark Twain
Evening	Social and Cash Bar	6:00-7:00	3rd floor foyer
	Banquet, Student Competition	7:00-10:00	Hilton Ballroom West

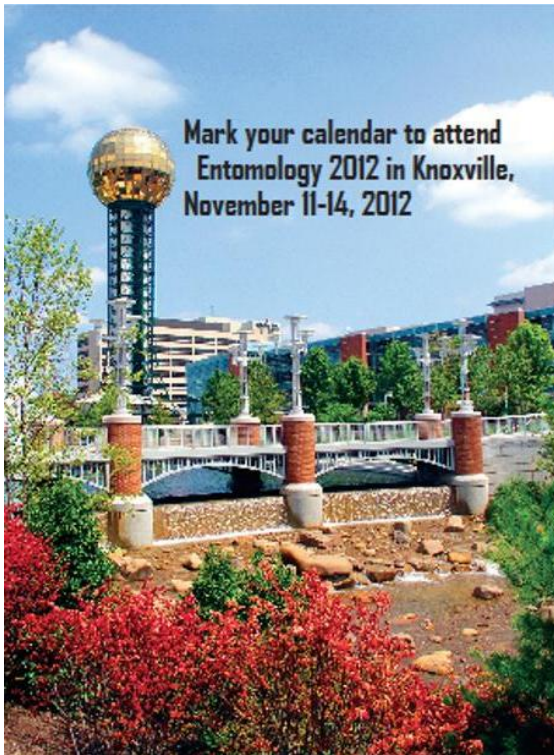
Awards & Keynote Speaker (Tom Turpin)

Monday, March 19

Morning	Final Business Meeting	7:00-8:00	Mark Twain
	Brown Marmorated Stink Bug	8:00-12:00	Hilton Grand Ballroom East
	Vector Biology Symposium	8:00-12:00	Ethan Allen
	Adjourn	12:00	

Hotel Floor Plan





Knoxville, Tennessee, home of the
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2012 Eastern Branch ESA Award Winners

ESA Achievement Award in Teaching

Laura Harrington



Dr. Laura Harrington's research focuses on the biology, ecology and behavior of mosquitoes that transmit human diseases. Current research projects in her laboratory address the feeding and mating behavior of mosquito vectors of dengue fever, West Nile virus, Chikungunya, malaria, human and animal-mosquito interactions and mosquito reproductive biology and behavior. Dr. Harrington studies mosquito biology in the field locally as well as abroad, with field sites in Thailand, Tanzania, and Southern Chiapas, Mexico. She is involved in cross-disciplinary projects on climate change and West Nile virus risk to human health in the United States. She offers courses in Medical and Veterinary Entomology (ENTOM 3520), a non-majors course, Plagues and People (BIO&SOC/ENTOM 2100) and she teaches the malaria module of Introduction to Global Health (NS 2060). Dr. Harrington also has offered seminars with international service in learning formats including ENTOM 4100: Malaria Interventions in Ghana, and ENTOM 4110: Health Care in Honduras. She advises and mentors a large group of undergraduate and graduate students in the areas of entomology, ecology and evolutionary biology, biomathematics, general biology, animal science, and biology and society.

ESA Achievement Award in Extension

Donald Rutz



Dr. Donald Rutz grew up on his family's livestock farm in Allentown, Pennsylvania. He received his B.A. degree in biology from Kutztown State College, his M.S. degree in entomology from Penn State University, and his Ph.D. in veterinary entomology from North Carolina State University. Don joined the Entomology faculty at North Carolina State University in 1978 where he served as the Director of the North Carolina Livestock and Poultry Integrated Pest Management Program, the first statewide implementation program of its kind in the US. Don and his wife Kathy moved to Ithaca, New York in 1981 when Don was offered a faculty position as an Assistant Professor of Veterinary Entomology in the Department of Entomology at Cornell. He was promoted to Associate Professor in 1987, and to Full Professor in 1995. Don's research, teaching and extension programs at Cornell have focused on the biology, ecology and management of arthropods of veterinary importance. During his tenure at Cornell, Don also served 11 years as the Director of Cornell's Pesticide Management Education Program, 10 years as Chair of the Department of Entomology and 6 years as Director of the New York State Integrated Pest Management Program. A highlight of Don's career in veterinary entomology occurred in 2004 when he received the Bayer Lifetime Achievement Award in Veterinary Entomology- an international award presented to veterinary entomologists in recognition of outstanding contributions to animal health and productivity.

**Entomological Foundation Award for Excellence in
Integrated Pest Management
Sponsored by Syngenta Crop Protection**

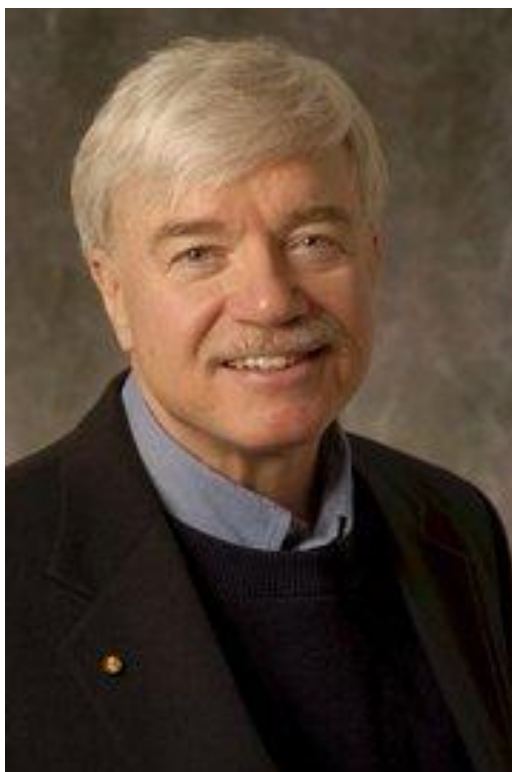
Jennifer Grant



Dr. Jennifer Grant was recently appointed as co-director of the New York State IPM Program at Cornell University, where she also serves as the Coordinator for Community IPM. She received a Ph.D. in entomology from Cornell University, and a Masters and Bachelors degree from the University of Vermont. Dr. Grant's specialty is researching and extending low-impact pest management practices for turfgrass. She is co-leader of the long-term Bethpage project researching and demonstrating low-risk management strategies for golf course turf; and is presently working on IPM Elements for Sod, Lawns, and Sports Turf. Dr. Grant is a co-author of the manual, *Reducing Chemical Use on Golf Course Turf: Redefining IPM* and has contributed to the ESA's *Handbook of Turfgrass Insect Pests*. Dr. Grant's past work has included researching biological control of turfgrass insects and diseases, the effects of organic topdressing on athletic fields, and alternative management of school grounds. She has designed IPM programs for golf course, institutional and residential turfgrass; and conducted training sessions and diagnostic courses for golf course superintendents and staff, IPM scouts, lawn care professionals and school grounds managers. The New York State Integrated Pest Management Program develops sustainable ways to manage pests and helps people to use methods that minimize environmental, health, and economic risks. www.nysipm.cornell.edu/

Eastern Branch L. O. Howard Distinguished Achievement Award

Randy Gaugler



Dr. Randy Gaugler earned his BS, MS and PhD degrees from North Dakota State, North Carolina State and the University of Wisconsin, respectively. In 1982 he joined Rutgers University, where he is currently director of the Center for Vector Biology. He is also a professor at the University of Medicine and Dentistry for New Jersey. Although his current research centers on integrating robotics into conventional mosquito control practices, his career has mostly focused on insect pathogens. He pioneered the development of molecular tools that culminated in the first field release of a transgenic nonmicrobial natural enemy, an advance ranked as a "Top Ten Research Milestone" by the New Jersey Agricultural Experiment Station. He has served ESA at branch and national levels as presenter, symposium organizer, display coordinator, judge, head judge, subsection officer (secretary & chair) and committee member (Program, Local Arrangements, Membership, Employment, Journal Liaison, Nominations, Linnaean Games, Rules). Dr. Gaugler has received many of the top national honors that ESA can bestow (e.g., Fellow, Recognition, IPM) in addition to being an AAAS Fellow and fellow of the Society of Nematologists, and a Fulbright Scholar. Dr. Gaugler also received the prestigious Albert Einstein award from the Chinese Academy of Sciences. He has published 225 journal papers and three books. He has received \$15M in grants during his career, served on the editorial boards of six journals, and has patents and licenses for ten bioinsecticide products. Dr. Gaugler has also lectured in more than 40 countries.

Herb Streu Meritorious Service Award

Dan Gilrein



Congratulations to **Dan Gilrein** for the **Eastern Branch Herbert T. Streu Meritorious Service Award for 2012**. Members of the Eastern Branch have benefited from Dan's dedicated and many faceted service that has enabled the Branch to operate smoothly in the past and present. Dan has served as Secretary of the Eastern Branch since 2007 and his efforts have been outstanding. Duties of the Secretary are incredibly diverse, spread throughout the year, and take a considerable amount of time. Dan has performed these duties admirably. In addition to these stated tasks, Dan has been a cheerleader and has worked behind the scenes to enable the Annual Meeting to run smoothly. Dan's regular job is Extension Entomologist at the Long Island Horticultural Research and Education Center (LIHREC), Cornell Cooperative Extension of Suffolk Co., Riverhead, NY. His responsibilities there include applied research and extension addressing regional arthropod pest management concerns for commercial vegetable and ornamental plant (greenhouse, nursery, landscape) industries. Dan received his BS in Forest Biology/Botany in 1980 and his MPS in Plant Protection/Integrated Pest Management from Cornell in 1982. Dan received the Prestigious Scholar Award, New York State Arborists, ISA Chapter, in 2003. In 2006, Dan received the Excellence in IPM Award from the New York State IPM Program.

John Henry Comstock Award

Sarah Jandricic



Sarah Jandricic grew up thinking she was going to be a Zoologist, a Marine Biologist, *and* an Environmental Lawyer. At 22, she decided she should maybe settle on just one profession, and picked Entomologist after falling in love first with honeybees, then with all other insects at the University of Guelph in Ontario, Canada. After completing a M.Sc. in Environmental Biology and Toxicology at Guelph with Dr. Cynthia Scott-Dupree and Dr. Bruce Broadbent (AAFC), she worked for 2 years as the Director for Research for Eco Habitat Agri-Services, a company offering integrated pest management consulting for greenhouse crops in the Niagara region. Realizing she had so much more to learn about insect pests and biological control in greenhouses, she returned to academia to begin her Ph.D. at Cornell University in Ithaca, NY in 2007 with Dr. John Sanderson. She hopes to continue to do research in the field Applied Entomology throughout her career.

Asa Fitch Award

Maggie Douglas



Maggie Douglas graduated with a B.A. in biology from Oberlin College. Following several years in non-profit sustainable agriculture advocacy, she pursued her interests in insect ecology research. After working in the labs of Dr. Bob Denno (University of Maryland), Dr. John Lill (George Washington University), and Dr. Gina Wimp (Georgetown University), Maggie melded her interests in insects and agriculture in her Master's work at Pennsylvania State University under Dr. John Tooker. Here she studies the ecology of slugs and their natural enemies in no-till agroecosystems. She looks forward to finishing her M.S. degree and pursuing future opportunities to apply her passion for entomology to improving agricultural sustainability.

Friday, March 16, 2012

President's Informal Reception	Ballroom west	5:00-7:00
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Saturday, March 17, 2012

Registration	3rd floor foyer	8:00-5:00
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Kristin Bartlett, Rutgers University

Public Outreach Program	Ballroom west and foyer	10:00-3:00
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It's a Bug's World

Organizer: Faith Kuehn, Delaware Department of Agriculture, Dover, DE

Back from sabbatical and just one flight up from the Hartford Commons is another entomological world. "It's a Bug's World", a public program for kids, parents and teacher, will be held in the Hilton Ballroom West and Foyer (3rd Floor). Displays will range from biosurveillance by bedbug detector dogs and wasps to the diversity of macroinvertebrates in the Farmington River watershed, honey bees and invasive insects. Students from a Hartford Environmental Sciences magnet school will host displays about their Vivarium. Local insect photographers will display their work, and a watercolor artist will help kids dabble with brushes and paint. All this plus insect-eating macrofauna, face painting, Build-a-Bug, and a possible visit by American Beekeeping Federation's Honey Princess.

"It's a Bug's World" is a public service of the Entomological Society of America-Eastern Branch, and is free to the public and meeting registrants.



Saturday Morning, March 17, 2012

Program Symposium

Connecticut salon A

8:00-12:00

Status of the Spotted Wing Drosophila in the US

Organizers: Cesar Rodriguez-Saona and Dean Polk, Rutgers University, 125A Lake Oswego Rd, PE Marucci Blueberry/Cranberry Center, Chatsworth, NJ, 08019

8:00 Introduction

8:05 Spotted Wing Drosophila, a pest of berries and cherries in the western USA. Peter W. Shearer, Oregon State University, Mid-Columbia Agricultural Research and Extension Center, 3005 Experiment Station Drive, Hood River, OR 97031; Robert A. Van Steenwyk, E.S.P.M, University of California-Berkeley, 137 Mulford Hall, Berkeley, CA 94720; Denny Bruck, USDA – ARS, 3420 N.W. Orchard Ave, Corvallis, OR 97330; Elizabeth H. Beers, Tree Fruit Research and Extension Center, Washington State University, 1100 N Western Ave, Wenatchee, WA 98801; Lynell Tanigoshi, Washington State University, 16650 State Route 539, Mt. Vernon, WA 98273

8:35 Integrating SWD management into established blueberry IPM programs for the Great Lakes region. Rufus Isaacs, Steven Van Timmeren, Keith Mason, and Craig R. Roubos, Entomology, Michigan State University, 202 CIPS Bldg, East Lansing, MI 48824; John C. Wise, Entomology, Michigan State University, Applied Insecticide Toxicology Lab, 206 Center for Integrated Plant Systems, East Lansing, MI 48824; Carlos Garcia-Salazar, Central Region-Ottawa County Extension, Michigan State University, Grand Haven, MI 49417

9:05 Spotted wing drosophila enters the Eastern Branch states: Distribution and potential impact as a fruit pest in Virginia. Douglas Pfeiffer, Department of Entomology, Virginia Tech, 205-C Price Hall, Blacksburg, VA 24061

9:25 First detections, phenology, and a possible biological control agent of spotted wing drosophila in Pennsylvania. Neelendra K. Joshi, Department of Entomology, Pennsylvania State University, 501 ASI Building, University Park, PA 16802; David J. Biddinger, Entomology, Pennsylvania State University, Fruit Research & Extension Center, 290 University Dr, Biglerville, PA 17307; Kathy Demchak, Department of Entomology, Pennsylvania State University, 501 ASI Building, University Park, PA 16802; Alex Surcica, Department of Entomology, Pennsylvania State University, 501 ASI Building, University Park, PA 16802; Edwin Rajotte, Center for Pollinator Research, Entomology, Pennsylvania State University, 501 Agricultural Sciences & Industries Building (ASI), State College, PA 16802

9:45 Break

10:00 Monitoring and distribution of SWD in NJ in 2011. Dean Polk and Cesar Rodriguez-Saona, Rutgers University, 125A Lake Oswego Rd, PE Marucci Blueberry/Cranberry Center, Chatsworth, NJ, 08019

10:20 SWD IPM ASAP. Richard Cowles, Connecticut Agricultural Experiment Station, Department of Entomology, 153 Hook Hill Road, Windsor, CT 06095

10:40 Spotted Wing Drosophila populations in New York and potential impacts on crops. Faruque U. Zaman, Long Island Horticultural Research & Extension Center, Cornell Cooperative Extension, 3059 Sound Avenue, Riverhead, NY 11901; Daniel Gilrein, Cornell Cooperative Extension of Suffolk County, Long Island Horticultural Research and Extension Center, 3059 Sound Avenue, Riverhead, NY 11901; Peter J. Jentsch, Department of Entomology, Cornell University - Hudson Valley Laboratory, 3357 Rt. 9W, Highland, NY 12528; Laura McDermott, Cornell Cooperative Extension, 415 Lower Main Street, Hudson Falls, NY 12839; Harvey Reissig, Arthur Agnello, and Gregory Loeb, Dept. of Entomology, Cornell University, NYS Agric. Expt. Sta, 630 W. North St, Geneva, NY 14456

11:00 Discussion

12:00 Adjourn

Saturday Afternoon, March 17, 2012

Student Oral Presentation

Ethan Allen

1:00-5:48

See appendix A for abstracts of talks for this session

Moderator: William Lamp, University of Maryland

- 1:00 Dynamics of *Erwinia tracheiphila* acquisition and retention by its insect vector, *Acalymma vittatum*.** Lori R. Shapiro, Dept. of Entomology, Pennsylvania State University, 509 ASI Building, State; Irmgard Seidl-Adams, Dept. of Entomology, Pennsylvania State University, Chemical Ecology Lab, State College, PA 16802; Consuelo M. De Moraes, Department of Entomology, Pennsylvania State University, 535 ASI Building, State College, PA 16802; Andrew G. Stephenson, Biology, Pennsylvania State University, 316 Mueller lab, Dept of Biology, PSU, University Park campus, State College, PA 16801; Mark C. Mescher, Biology, Pennsylvania State University, 316 Mueller lab, Dept of Biology, PSU, University Park campus, State College, PA 16801
- 1:12 Direct and indirect effects of light environment on host plant-herbivore-parasitoid interactions.** Teresa M. Stoepler, Department of Biological Sciences, George Washington University, 2023 G St NW Suite 340, Washington, DC 20052; John T. Lill, Department of Biological Sciences, George Washington University, 2023 G Street, NW, Suite 340, Washington, DC 20052
- 1:24 Using microsatellite markers and single nucleotide polymorphisms to identify the source of soybean aphid (*Aphis glycines*) populations in Pennsylvania.** Amanda Bachmann, Entomology, Penn State University, 501 Agricultural Sciences and Industries Building, State College, PA 16802; Shelby Fleischer, Entomology, Penn State University, 501 Agricultural Sciences and Industries Building, State College, PA 16802; Andrew Michel, Entomology, The Ohio State University, OARDC, 210 Thorne Hall, 1680 Madison Ave, Wooster, OH 44691
- 1:36 Role of *Herterorhabditis bacteriophora* infective juveniles in the spread of *Meterhizium anisopliae*.** Shaohui Wu, Entomology, Virginia Polytechnic Institute and State University, 216A Price Hall, MC 0319, Blacksburg, VA 24061; Roger R. Youngman, Entomology, Virginia Polytechnic Institute and State University, 216A Price Hall, Department of Entomology, Blacksburg, VA 24061; Loke T. Kok, Entomology, Virginia Polytechnic Institute and State University, 216A Price Hall, MC 0319, Blacksburg, VA 24061; Jarrod E. Leland, Novozymes Biologicals, Inc, 5400 Corporate Circle, Salem, VA, VA 24153; Curt A. Laub, Entomology, Virginia Polytechnic Institute and State University, 216A Price Hall, Blacksburg, VA 24061
- 1:48 Damsels in distress: host phylogeny and other host characteristics explain patterns of water mite parasitism.** Julia J. Mlynarek, Department of Biology, Carleton University, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada
- 2:00 Phototaxis, host cues, and host-plant finding in a monophagous weevil, *Rhinoncomimus latipes*.** Jeffrey R. Smith, Entomology & Wildlife Ecology, University of Delaware, 250 Townsend Hall, 531 South College Ave, Newark, DE 19716; Judith A. Hough-Goldstein, Entomology & Wildlife Ecology, University of Delaware, 250 Townsend Hall, 531 South College Ave, Newark, DE 19716
- 2:12 European corn borer (ECB) population assessment and the value of Bt corn to farmers in PA.** Eric Bohnenblust, Entomology, Pennsylvania State University, Merkle Building, Orchard Rd, State College, PA 16802; Jim Breining, Crop and Soil Sciences, Pennsylvania State University, ASI Bldg, University Park, PA 16802; John Shaffer, Crop and Soil Sciences, Pennsylvania State

University, ASI Bldg, University Park, PA 16802; Greg Roth, Crop and Soil Sciences, Pennsylvania State University, 407 ASI Bldg, University Park, PA 16802; John Tooker, Entomology, Pennsylvania State University, Merkle Building, Orchard Rd, State College, PA 16802

- 2:24 Effects of temperature and relative humidity on the vertical distribution of stink bugs (Hemiptera: Pentatomidae) within a soybean canopy and implications for field sampling.** David Owens, Entomology, Virginia Polytechnic Institute and State University, 6321 Holland Rd, Suffolk, VA 23437; D. Ames Herbert, Jr., Entomology, Virginia Polytechnic Institute and State University, 6321 Holland Rd, Suffolk, VA 23437; T. P. Kuhar, Entomology, Virginia Polytechnic Institute and State University, 216 Price Hall, Blacksburg, VA 24061; D. R. Reisig, Entomology, North Carolina State University, 207 Research Station Rd, Plymouth, NC 27962
- 2:36 Do tiphiid wasps use herbivore-induced plant volatiles for finding white grubs?** Piyumi Tilanka Obeysekara, Department of Plant Science & Landscape Architecture, University of Connecticut, 1376 Storrs Road, Unit 4067, Storrs, CT 06269; Ana Legrand, Department of Plant Science & Landscape Architecture, University of Connecticut, 1376 Storrs Road, Unit 4067, Storrs, CT 06269
- 2:48 Ground-dwelling arthropod activity-density levels in lawns and patches of annual flowers.** Elizabeth Futoma, Biology, Marine Biology and Environmental Science, Roger Williams University, One Old Ferry Road, Bristol, RI 02809; Loren Byrne, Biology, Marine Biology and Environmental Science, Roger Williams University, One Old Ferry Road, Bristol, RI 02809
- 3:00 Break**
- 3:12 Bed bug (*Cimex lectularius* L.) survivorship at various temperatures.** Molly L. Stedfast, Virginia Polytechnic Institute and State University, 216A Price Hall, Blacksburg, VA 24061; Dini M. Miller, Virginia Polytechnic Institute and State University, 216 Price Hall, Blacksburg, VA 24061
- 3:24 Effects of Urban Landscape Transitions on Arthropod Populations.** Carolyn Martin, Biology, Marine Biology and Environmental Science, Roger Williams University, One Old Ferry Road, Bristol, RI 02809; Loren Byrne, Biology, Marine Biology and Environmental Science, Roger Williams University, One Old Ferry Road, Bristol, RI 02809
- 3:36 Diurnal and nocturnal behavior of brown marmorated stink bugs, *Halyomorpha halys* (Stål) (Hemiptera: Pentatomidae) on fruit crops in Pennsylvania.** Deonna C. Soergel, Entomology, Pennsylvania State University, 290 University Drive, Fruit Research and Extension Center, Biglerville, PA 17307; Grzegorz Krawczyk, Entomology, Pennsylvania State University, 290 University Drive, Fruit Research and Extension Center, Biglerville, PA 17307
- 3:48 Armed robbery: parasitic plants steal toxins from host plants with implications for their own insect enemies.** Jason D. Smith, Department of Entomology, The Pennsylvania State University, 501 ASI Building, University Park, PA 16802; Consuelo M. De Moraes, Department of Entomology, The Pennsylvania State University, 501 ASI Building, University Park, PA 16802; Mark C. Mescher, Department of Entomology, The Pennsylvania State University, 501 ASI Building, University Park, PA 16802
- 4:00 Early-season patterns of onion thrips, *Thrips tabaci* (Lindeman), population densities in onion fields in New York.** Erik A. Smith, Department of Entomology, Cornell University, NYSAES, 630 W. North Street, Geneva, NY 14456; Elson J. Shields, Entomology, Cornell University, 4142 Comstock Hall, Ithaca, NY 14853; Marc Fuchs, Department of Entomology, Cornell University, New York State Agricultural Experimental Station, 630 W. North St, Geneva, NY 14456; Brian A. Nault, Department of Entomology, Cornell University, NYS Agricultural Experiment Station, 630 W. North Street, Geneva, NY 14456
- 4:12 Characterization of grape root borer spatial distribution in commercial vineyards.** Jhalendra P. Rijal, Department of Entomology, Virginia Tech, 595 Laurel Grove Road, Winchester, VA 22602; Carlyle C. Brewster, Department of Entomology, Virginia Tech, 202 Price

Hall, Blacksburg, VA 24061; J. Christopher Bergh, Department of Entomology, Virginia Tech, 595 Laurel Grove Road, Winchester, VA 22602

- 4:24 Feeding injury and management of brown marmorated stink bug in Virginia vineyards and raspberry plantings.** Sanjay Basnet, Entomology, Virginia Polytechnic Institute and State University, 216 A Price Hall, Blacksburg, VA 24061
- 4:36 Monarch (*Danaus plexippus* L.) caterpillar abundance on common milkweed (*Asclepias syriaca* L.) is reduced in experimental patches of ox-eyed daisy and common milkweed.** Sean M. Kent, Biology Department, Northeastern University, 430 Nahant Rd, Marine Science Center, Nahant, MA 01908
- 4:48 Potential of entomopathogenic fungi as bed bug control agents.** Alexis M. Barbarin, Entomology, Pennsylvania State University, 501 ASI Building, State College, PA 16802; Nina Jenkins, Department of Entomology, Pennsylvania State University, 107 Merkle lab, University Park, PA 16802; Naworaj Acharya, Entomology, Pennsylvania State University, 501 ASI Building, University Park, PA 16802; Edwin G. Rajotte, Entomology, Pennsylvania State University, 501 ASI Building, State College, PA 16802; Matthew B. Thomas, Department of Entomology, Pennsylvania State University, 112 Merkle lab, University Park, PA 16802
- 5:00 Monitoring of Asian Longhorned Beetles (*Anoplophora glabripennis*) in Worcester, Massachusetts using pheromone and kairomone blends.** Peter Meng, Entomology Department, Pennsylvania State University, Ag Sciences & Industries Building, State College, PA 16802; Maya Nehme, Department of Entomology, Pennsylvania State University, 501 ASI Building, University Park, PA 16802; Melody A. Keena, Northern Research Station, USDA - Forest Service, 51 Mill Pond Road, Hamden, CT 06514; R. Talbot Trotter, USDA Forest Service, 51 Mill Pond Road, Hamden, CT 06514; Clint McFarland, USDA APHIS, 151 West Boylston Drive, Worcester, MA 01606; Alan J. Sawyer, USDA APHIS PPQ CPHST Otis Laboratory, Bldg 1398, Otis ANGB, MA 02542; Kelli Hoover, Entomology, Pennsylvania State University, 501 ASI Building, State College, PA 16802
- 5:12 Biosynthesis of defensive compounds in the pupal secretion of the ladybird beetle *Delphastus catalinae*.** Eleanor E. Lucadamo, Department of Biology, Trinity College, Life Science Center, Hartford, CT 06106; Patrick H. McCarthy, Department of Biology, Trinity College, Life Science Center, Hartford, CT 06106; Jacqueline C. Knapp, Department of Biology, Trinity College, Life Science Center, Hartford, CT 06106; Stephen T. Deyrup, Department of Chemistry, Heidelberg University, 310 E. Market St, Tiffin, OH 44883; Jerrold Meinwald, Department of Chemistry & Chemical Biology, Cornell University, Goldwin Smith Professor of Chemistry, Emeritus, Baker Laboratory, Ithaca, NY 14853-1301; Frank C. Schroeder, Boyce Thompson Institute, Cornell University, Tower Rd, Ithaca, NY 14853; Scott R. Smedley, Department of Biology, Trinity College, Life Science Center, Hartford, CT 06106
- 5:24 Carbohydrate feeding increases male mosquito fitness through multiple mechanisms.** Alexandra Villiard, Rutgers, The State University of New Jersey, 180 Jones Ave, Headlee Labs, New Brunswick, NJ 08901
- 5:36 Does crop intraspecific diversity matter for pest management? Effects of crop diversity on herbivores and natural enemies in soybeans.** Ian M. Grettenberger, Department of Entomology, Pennsylvania State University, 101 Merkle, State College, PA 16802; John F. Tooker, Department of Entomology, Pennsylvania State University, 501 ASI Building, University Park, PA 16802

Saturday Afternoon, March 17, 2012

Student Poster Competition

Hilton Ballroom East/Central

12:00-5:00

See appendix B for abstracts of talks for this session

[Author attendance at posters during President's Reception, Saturday Evening]

1. **Efficacies of *Metarhizium anisopliae*, *Beauveria bassiana* and *Heterorhabditis bacteriophora* against 3rd-instar masked chafer white grubs.** Shaohui Wu, Roger R. Youngman, Loke T. Kok, and Curt A. Laub, Entomology, Virginia Polytechnic Institute and State University, 216A Price Hall, MC 0319, Blacksburg, VA 24061
2. **Using degree-days to predict egg and larval population peaks of cereal leaf beetle, *Oulema melanopus* (Coleoptera: Chrysomelidae).** Christopher R. Phillips, Entomology, Virginia Polytechnic Institute and State University, 216 Price Hall, Blacksburg, VA 24061; D. Ames Herbert, Entomology, Virginia Polytechnic Institute and State University, Tidewater AREC, 6321 Holland Road, Suffolk, VA 23437; Thomas P. Kuhar, Entomology, Virginia Tech, 216A Price Hall, Blacksburg, VA 24061, Dominic Reisig, Entomology, North Carolina State University, 207 Research Station Rd, Plymouth, NC 27962, E. A. Roberts, Entomology, Virginia Tech, 216 Price Hall, Blacksburg, VA 24060-5121
3. **Distributions of Phytophagous Larvae in mid-successional Allegheny Hardwoods: Impacts of Bird Exclusion.** R. A. Keating, T. Nuttle, and E. H. Yerger, Biology Department, Indiana University of Pennsylvania, Weyandt Hall, Room 114, 975 Oakland Avenue, Indiana, PA 15705
4. **Efficacy of *Beauveria bassiana* strain GHA against *Listronotus maculicollis* adults.** Christopher Drew Clavet, Emily Hampton, Patrick McNiece, and Steven Alm, Department of Plant Sciences and Entomology, University of Rhode Island, 9 East Alumni Ave., Suite 7, Kingston, RI 02881
5. **Natural enemies of onion thrips (*Thrips tabaci*) in New York onion agroecosystems.** Elaine J. Fok, Entomology, Cornell University, Comstock Hall, Ithaca, NY 14853; Brian A. Nault, Department of Entomology, Cornell University, NYS Agricultural Experiment Station, 630 W. North Street, Geneva, NY 14456
6. **Naturally occurring resistance to the hemlock woolly adelgid (*Adelges tsugae*) in eastern hemlock trees (*Tsuga canadensis*).** Laura Radville, Biological Sciences, University of Rhode Island, 9 East Alumni Avenue, Kingston, RI 02881; Evan L. Preisser, Biological Sciences, University of Rhode Island, 9 East Alumni Avenue,

Kingston, RI 02881; Richard Casagrande, Plant Sciences, University of Rhode Island, 9 East Alumni Avenue, Kingston, RI 02881

7. **Supercooling points of the brown marmorated stink bug (*Halyomorpha halys*).** John D. Aigner, Department of Entomology, Virginia Tech, 216 Price Hall, Blacksburg, VA 24061
8. **False ring formation in response to hemlock woolly adelgid (*Adelges tsugae*) feeding in eastern hemlocks (*Tsuga canadensis*).** Liahna Gonda-King, Laura Radville, and Evan L. Preisser, Biological Sciences, University of Rhode Island, 9 East Alumni Avenue, Kingston, RI 02881
9. **Avoidance of prey toxicity by the Chinese mantid, *Tenodera sinensis*.** Jamie L. Rafter and Evan Preisser, University of Rhode Island, 9 East Alumni Avenue, Kingston, RI 02881
10. **Variation in the kitchen scrap content of residential compost piles influences their beetle communities as reflected by pitfall trapping.** Bridget K. Tevnan, Katherine R. Sausen, and Jessica M. Scordamaglia, Department of Biology, Trinity College, Life Science Center, Hartford, CT 06106; William L. Krinsky, Division of Entomology, Peabody Museum, Yale University, 170 Whitney Ave, New Haven, CT 06511; Scott R. Smedley, Department of Biology, Trinity College, Life Science Center, Hartford, CT 06106
11. **Structure-Activity Relationships for Insecticide Transport Substrates and Inhibitory Ligands of Mosquito P-glycoproteins.** Ngoc Pham and Troy D. Anderson, Entomology, Virginia Tech, 216 Price Hall, Blacksburg, VA 24061
12. **Linking Honey Bee Colony Health to In-Hive Pesticide Residue Exposures.** Alison Reeves, Richard D. Fell, and Troy D. Anderson, Entomology, Virginia Tech, 216 Price Hall, Blacksburg, VA 24060
13. **Distribution of Forensically Important Blow Flies (Diptera: Calliphoridae) in New Jersey.** Lauren Weidner and George Hamilton, Entomology, Rutgers University, 93 Lipman Drive, New Brunswick, NJ 08901
14. **Acoustic and behavioral interactions between male and female dueting katydids.** Susan Villarreal and Cole Gilbert, Department of Entomology, Cornell University, 6132 Comstock Hall, Ithaca, NY 14853
15. **Three new planthopper species (Hemiptera: Fulgoroidea: Delphacidae) and a new genus from Florida.** Ashley C. Kennedy, Department of Entomology and Wildlife Ecology, University of Delaware, Newark, Delaware, 19717; Charles R. Bartlett Department of Entomology and Wildlife Ecology, University of Delaware, Newark, Delaware, 19717; Stephen W. Wilson, Department of Biology, University of Central Missouri, Warrensburg, MO 64093

16. **Interactive effects of sap-feeders and plant species on ant predation of caterpillars.** Robert E. Clark and Michael S. Singer, Department of Biology Wesleyan University Middletown CT 06459 USA
17. **Movement Behavior of Mid-Development European Corn Borer, *Ostrinia Nubilalis*, Larvae on Bt Corn Using Plant Specific Genetic Markers.** Holly Johnson and Charles Mason, Department of Entomology and Wildlife Ecology, University of Delaware, 531 S. College Avenue, Newark, DE 19716

Saturday Afternoon, March 17, 2012

Submitted Poster Presentations

Hilton Ballroom East/Central

8:00-5:00

[Author attendance at posters during President's Reception, Saturday Evening]

18. **Microcommunity ecology of Great Horned Owl (*Bubo virginianus*) pellets.** James R. Philips, Math/Science, Babson College, 231 Forest St, Babson Park, MA 02457
19. **Seasonal Biology of the Brown Marmorated Stink Bug in Virginia, 2011.** Katherine Kamminga, Entomology, Virginia Polytechnic Institute and State University, 216 Price Hall, Blacksburg, VA 24060; Thomas Kuhar, Entomology, Virginia Polytechnic Institute and State University, 216 Price Hall, Blacksburg, VA 24060; Ames Herbert, Entomology, Virginia Polytechnic Institute and State University, 216 Price Hall, Blacksburg, VA 24060
20. **Monitoring of Asian Longhorned Beetles in Worcester, Massachusetts using Pheromone and Kairomone Blends.** Peter Meng, Entomology Department, Pennsylvania State University, Ag Sciences & Industries Building, State College, PA 16802; Maya Nehme, Department of Entomology, Pennsylvania State University 501 ASI Building, University Park, PA 16802; Melody A. Keena, Northern Research Station, USDA - Forest Service, 51 Mill Pond Road, Hamden, CT 06514; R. Talbot Trotter, USDA Forest Service, 51 Mill Pond Road, Hamden, CT 06514; Clint McFarland, USDA APHIS, 151 West Boylston Drive, Worcester, MA 01606; Alan J. Sawyer, USDA APHIS PPQ CPHST Otis Laboratory, Bldg 1398, Otis ANGB, MA 02542; Kelli Hoover, Entomology, Pennsylvania State University, 501 ASI Building, State College, PA 16802
21. **Multixenobiotic transporters and detoxification-excretion in freshwater amphipods.** Sarah Y. Au, Bridget D. DeLay, David J. Hawthorne, and William O. Lamp, Department of Entomology, University of Maryland, 4112 Plant Sciences Bldg, College Park, MD 20742
22. **Nitrogen subsidies and yields in a grass/legume mixture: effect of potato leafhopper, *Empoasca fabae*.** William O. Lamp and Elizabeth J. Sancomb, Department of Entomology, University of Maryland, 4112 Plant Sciences Building, College Park, MD 20742-4454
23. **Brown marmorated stink bug (*Halyomorpha halys*) feeding injury and damage potential to mid-Atlantic soybeans.** David Owens, Entomology, Virginia Polytechnic Institute and State University, 6321 Holland Rd, Suffolk, VA 23437; D. Ames Herbert, Entomology, Virginia Polytechnic Institute and State University, Tidewater AREC, 6321 Holland Road, Suffolk, VA 23437; Thomas P. Kuhar, Entomology, Virginia Tech, 216A Price Hall, Blacksburg, VA 24061; D. R. Reisig, Entomology, North Carolina State University, 207 Research Station Rd, Plymouth, NC 27962, G. P. Dively, Department of Entomology, University of Maryland, 4112 Plant Science Building, College Park, MD 20742
24. **DuPont™ Cyazypyr™ insect control (cyantraniliprole, DPX-HGW86): Mode of Action and Other Product Attributes and their Implications for Insect Pest Management and Plant Protection.** I. Billy Annan, Rachel A. Cameron, Juan M.

Alvarez, and Hector E. Portillo, DuPont Crop Protection, Stine-Haskell Research Center, 1094 Elkton Road Box 30, Newark, DE 19714

25. **Gregarine infection in *Ochlerotatus triseriatus* and its effects on vulnerability to predation.** Linda Valsdottir, Clark University, 950 Main Street, Worcester, MA 01610; John Soghigian, Clark University, 950 Main Street, Worcester, MA 01610; Todd P. Livdahl, Clark University, 950 Main Street, Worcester, MA 01610
26. **Influence of dietary conditioning on territorial aggression in male *Drosophila melanogaster*.** Jannett Dinsmore and Aaron Haselton, Department of Biology, SUNY at New Paltz, 1 Hawk Drive, New Paltz, NY 12561
27. **Does mother know best? A survey of ovipositional location in the Two-spotted treehopper (*Enchenopa binotata*).** Dylan P. Kent and Robert L. Snyder Jr., Biology Department, SUNY Potsdam, 1894 Barrington Drive, Potsdam, NY 13676
28. **Endosymbiont Diversity of Northern New York *Enchenopa binotata* Treehoppers.** Justin McNally and Robert L. Snyder Jr., Biology, SUNY Potsdam, 2376 Barrington Dr, Potsdam, NY 13676
29. **Ecological suitability predicts the spatial patterns of insect abundance across golf course habitats.** Matthew Petersen, Department of Entomology, Cornell University, 630 West North Street, Geneva, NY 14456

Saturday Evening, March 17, 2012

President's Reception	Hilton Ballroom East/Central	6:00-8:00
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Branch Awards, ESA Presidential Address, and Linnaean Games	Hilton Ballroom West	8:00-11:00
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ESA Presidential Remarks

Grayson C. Brown
University of Kentucky

Branch Awards:

L.O. Howard
Herb Streu Meritorious Service
Distinguished Achievement Award for Teaching
Distinguished Achievement Award in Extension
Distinguished Award for Excellence in Integrated Pest Management

Linnaean Games

Coordinator – Douglas G. Pfeiffer

Sunday Morning, March 18, 2012

IDEP Symposium

Ethan Allen

8:00-12:00

Insect Detection, Evaluation and Prediction, Views and Updates from the Front Lines

Organizer: Robert B. Trumbule, Entomologist; Plant Protection and Weed Management,
Maryland Department of Agriculture, 50 Harry S Truman Parkway, Annapolis, MD 21401

8:00 Introduction

8:10 “SWD IPM ASAP” (Spotted Wing Drosophila IPM). Richard Cowles, Connecticut
Agricultural Experiment Station, Department of Entomology, 153 Hook Hill Road,
Windsor, CT 06095

8:40 Winter Moth, *Operophtera brumata* (L.) Geometridae: Status in the Northeast. Joe
Elkinton, Dept. of Plant Soil and Insect Sciences, University of Massachusetts, 101
Fernald Hall Amherst, MA 01003

9:10 External pressure: Insects Intercepted from International Cargo. Jim Young, USDA-
APHIS-PPQ, 2200 Broening Hwy, Suite 140, Baltimore, MD 21224

9:40 Break

**10:00 Asian Longhorned Beetle, *Anoplophora glabripennis* (Motschulsky) Coleoptera:
Cerambycidae, in Massachusetts. Challenges in the Northeastern Hardwood
Forest and Progress Towards Eradication.** Clint McFarland, USDA APHIS, 151 West
Boylston Drive, Worcester, MA 01606

**10:30 Establishment of parasitoids of Lily Leaf Beetle, *Lilioceris lili* (Scopoli)
Coleoptera: Chrysomelidae, in New England.** Lisa Tewksbury, Dept. of Plant
Sciences, University of Rhode Island, 9 East Alumni Ave, Kingston, RI 02881

11:00 Discussion

12:00 Adjourn

Sunday Morning, March 18, 2012

Urban Entomology Symposium

Connecticut salon A

8:00-12:00

Bed Bugs and Urban IPM

Organizer: Changlu Wang, Entomology, Rutgers, The State University of New Jersey, 93 Lipman Dr, New Brunswick, NJ 08901

8:00 Introduction

8:05 IPM Education and Implementation in K-12 Schools: Successes, Pitfalls and Lessons Learned. Kathy Murray, Division of Plant Industry, Maine Department of Agriculture, Food and Rural Resources, 28 State House Station, Augusta, ME 04333

8:35 Self-sustaining bed bug IPM methods for vulnerable apartment residents. Molly L. Stedfast, Virginia Polytechnic Institute and State University, 404 Harrell St, Blacksburg, VA 24060; Dini M. Miller, Entomology, Virginia Polytechnic Institute and State University, 216 Price Hall, Blacksburg, VA 24061

9:05 Protocol Development as a Framework for Managing Bed Bug Issues. Jody Gangloff-Kaufmann, NYS IPM Program, Cornell University, 228 Thompson Hall, SUNY Farmingdale, Farmingdale, NY 11735

9:35 Break

9:50 Cooperation and Coordination, the human side of the bed bug management coin. Gale E. Ridge, Connecticut Agricultural Experiment Station, 123 Huntington St, New Haven, CT 06504

10:20 Bed Bugs and Beyond – Can we get IPM on the Ground? Alexis M. Barbarin, Entomology, Pennsylvania State University, 501 ASI Building, State College, PA 16802; Lyn Garling, Pennsylvania IPM Program, The Pennsylvania State University, 317 Agricultural Administration Building, University Park, PA 16802

10:50 Comparison of three bed bug management programs in low income housing. Changlu Wang, Entomology, Rutgers, The State University of New Jersey, 93 Lipman Dr, New Brunswick, NJ 08901

11:20 Discussion

Sunday Morning, March 18, 2012

Student Symposium

Hilton Ballroom West

8:00-12:00

Playing Chutes and Ladders: Multitrophic Interactions in Insect Ecology

Organizer: Ian M. Grettenberger, Department of Entomology, Pennsylvania State University, 101 Merkle, State College, PA 16802

8:00 Introduction

8:05 Asa Fitch Award Winner

Bottom-up and top-down influences on slugs in no-till field crops. Maggie Douglas, Department of Entomology, Pennsylvania State University, Merkle Building, Orchard Road, State College, PA 16802; John F. Tooker, Department of Entomology, Pennsylvania State University, 501 ASI Building, University Park, PA 16802

8:30 John Henry Comstock Award Winner

Location, location, location: influence of preferred canopy distributions of two aphid pests on the biocontrol efficacy of the aphidophagous midge, *Aphidoletes aphidimyza*, in greenhouse crops. Sarah Jandricic, Department of Entomology, Cornell University, Comstock Hall, Ithaca, NY 14850; John P. Sanderson, Department of Entomology, Cornell University, Old Insectary Building, Ithaca, NY 14850; Stephen P. Wraight, USDA – ARS, Tower Road, Ithaca, NY 14853, Ithaca, NY 14853

8:55 Bottom-up cascades in a tree-caterpillar-parasitoid food web. John T. Lill, Biological Sciences, George Washington University, 2023 G Street, NW, Suite 340, Washington, DC 20052; Teresa M. Stoepler, Department of Biological Sciences, George Washington University, 2023 G St NW, Suite 340, Washington, DC 20052; Shannon M. Murphy, Department of Biological Sciences, University of Denver, 309 Mudd Hall, Denver, CO 80208

9:20 Multitrophic biotic interactions. Ursula S.R. Röse, Department of Biology, University of New England, 108 Morgane, 11 Hills Beach Road, Biddeford, ME 04005

9:45 Break

10:00 Playing chutes and ladders in Central Park: Do top-down or bottom-up forces underlie outbreaks of spider mites following insecticide applications in a federal quarantine zone? Michael J. Raupp, Dept. of Entomology, University of Maryland, 4112

Plant Sciences Bldg, College Park, MD 20742; Scott Creary, Department of Entomology, University of Maryland, 4112 Plant Sciences Bldg, College Park, MD 20742; Adrianna Szczepaniec, Department of Entomology, Texas A&M University, 2475 TAMU, College Station, TX 77843

10:25 Patterns in arthropod communities in native and alien urban landscapes. Paula M. Shrewsbury, University of Maryland, 4112 Plant Sciences Bldg, Dept. of Entomology, College Park, MD 20742; Douglas W. Tallamy, Dept. of Entomology and Wildlife Ecology, University of Delaware, 250 Townsend Hall, Newark, DE 2160; Michael J. Raupp, Dept. of Entomology, University of Maryland, 4112 Plant Sciences Bldg, College Park, MD 20742; Ellery A. Krause, Dept. of Entomology, University of Maryland, 4112 Plant Sciences Bldg, College Park, MD 20742

10:50 Seeking generality in the strength of vertical food web interactions. Daniel S. Gruner, Department of Entomology, University of Maryland, 4112 Plant Science Bldg, College Park, MD 20742

11:15 Discussion

12:00 Adjourn

Sunday Afternoon, March 18, 2012

Submitted Oral Presentations

Mark Twain

2:00-3:46

Moderator: Noel Hahn, Rutgers University

2:00 Introduction

2:10 Mating disruption plus novel barriers for dogwood borer (*Synanthedon scitula*) control. Arthur Agnello and Dave Kain, Dept. of Entomology, Cornell University, NYS Agric. Expt. Sta, 630 W. North St, Geneva, NY 14456

2:22 DuPont™ Exirel™ a new cross-spectrum insecticide with excellent fit in tree fruit insect management programs in the Northeast. Donald Ganske, Dupont Crop protection 125 Cotton Ridge Road, Winchester, VA 22603; Gregory Hannig, Dupont Crop Protection, 1199 Canandaigua Road, Palmyra, NY 14522; Robert W. Williams, DuPont Crop Protection, 13226 Ashford Park Drive, Raleigh, ND 27613; Hector E. Portillo, DuPont Crop Protection, Stine-Haskell Research Center, 1090 Elkton Road Box 30, Newark, DE 19714; I. Billy Annan, DuPont Crop Protection, Stine-Haskell Research Center, 1094 Elkton Road Box 30, Newark, DE 19714

2:34 DuPont™ Exirel™, Benevia™ and Verimark™ novel insecticides for Crop Protection in vegetables and potatoes in the Northeast. Greg T. Hannig, DuPont Crop Protection 1199 Canandaigua Road, Palmyra, NY 14522; Donald D. Ganske, DuPont Crop Protection, 125 Cotton Ridge Road, Winchester, VA 22603; Mick F. Holm, DuPont Crop Protection, 4902 Wakanda Drive, Waunakee, WI 53597; Hector E. Portillo, DuPont Crop Protection, Stine-Haskell Research Center, 1090 Elkton Road Box 30, Newark, DE 19714; I. Billy Annan, DuPont Crop Protection, Stine-Haskell Research Center, 1094 Elkton Road Box 30, Newark, DE 19714; Juan M. Alvarez, DuPont Crop Protection, Stine-Haskell Research Center, 1090 Elkton Road, Newark, DE 19714

2:46 Exploring the Bugs in Boston: Relationships between land covers in a city and arthropod communities. Loren Byrne, Biology, Marine Biology and Environmental Science, Roger Williams University, One Old Ferry Road, Bristol, RI 02809; Michael Strohbach, Department of Environmental Conservation, University of Massachusetts-Amherst, 160 Holdsworth Way, Amherst, MA 01003; Rachel Danford, Department of Environmental Conservation, University of Massachusetts-Amherst, 160 Holdsworth Way, Amherst, MA 01003; Susannah Lerman, Northern Research Station, USDA Forest Service, University of Massachusetts, Amherst, MA 01003; Paige S. Warren, Department of Environmental Conservation, University of Massachusetts, Room 225, 160 Holdsworth Way, Amherst, MA 01003

- 2:58 Effects of methyl salycilate (PredaLure) on *Leptinotarsa decemlineata* mortality in potatoes.** Adam Wimer, Eastern Shore AREC, Virginia Polytechnic Institute and State University, 33446 Research Dr, Painter, VA 23420; Thomas Kuhar, Entomology, Virginia Polytechnic Institute and State University, 216 Price Hall, Blacksburg, VA 24060
- 3:10 Use of pathogenic microorganisms for the management of turf grass pests.** Sudan Gyawaly, Entomology, Virginia Tech, 1125 South Main Street Apt#2D, Blacksburg, VA 24060; Roger Youngman, Entomology, Virginia Tech, 216A Price Hall, Blacksburg, VA 24061
- 3:22 Larval *Bradysia impatiens* (Diptera: Sciaridae) transmission of *Pythium* root rot pathogens.** Sarah Braun, Department of Biology, Quinnipiac University, 275 Mount Carmel Avenue, Hamden, CT 06518; John Sanderson, Department of Entomology, Cornell University, Comstock Hall, Ithaca, NY 14850; Stephen P. Wraight, USDA – ARS, Tower Road, Ithaca, NY 14853, Ithaca, NY 14853
- 3:34 Understanding how turfgrass habitat heterogeneity impacts the spatiotemporal dynamics of *Tipula paludosa* Meigen.** Matthew Petersen, Department of Entomology, Cornell University, 630 West North Street, Geneva, NY 14456

Sunday Afternoon, March 18, 2012

Industry Symposium

Ethan Allen

1:00-5:00

Managing Brown Marmorated Stink Bug Today and in the Future

Organizer: James Steffel, LABServices, 342 South Third Street, Hamburg, PA 19526

1:00 Introductory Remarks

1:05 What we learned about BMSB control with insecticides in the past year. James Steffel, LABServices, 342 South Third Street, Hamburg, PA 19526

1:30 Challenges to registering effective BMSB control products. Clayton Myers, EPA, 1200 Pennsylvania Avenue, Washington, DC 20460

1:55 The invasion of kudzu bug in urban and agricultural landscapes. Nicholas Seiter, Clemson University, 101 Appletree Ave, Central, SC 29630

2:20 Temperatures drop and stink bugs drop in: Challenges and solutions for BMSB in the Pest Control Industry. Nancy Troyano, Ehrlich-Rentokil North American Pest Control, 500 Spring Ridge Drive, Reading, PA 19610

2:45 Break

3:00 The impact of BMSB on agronomic row crops. Galen P. Dively, Department of Entomology, University of Maryland, 4112 Plant Science Building, College Park Maryland, MD 20742

3:25 BMSB the early years on east and west coasts. Peter Shearer, Oregon State University, Hood River OR; Ann Nielsen, Rutgers Agricultural Research and Extension Center, Rutgers, the State University of New Jersey, Bridgeton, NJ 08302-5919

3:50 BMSB in vegetable production. Gerald Ghidiu, Rutgers Agricultural Research and Extension Center, Rutgers, the State University of New Jersey, 121 Northville Rd, Bridgeton, NJ 08302-5919

4:15 Hemipteran-active proteins for transgenic plant applications. Konasale Anilkumar, Monsanto Company, 700 Chesterfield Pkwy. W, Zone GG3E, Chesterfield, MO 63017

4:40 Concluding Remarks

5:00 Adjourn

Sunday Afternoon, March 18, 2012

Taxonomy/Systematics Symposium

Connecticut salon A

1:00-5:00

Taxonomy and Systematics: Supporting Biological Control

Organizer: Michael W. Gates, USDA Systematic Entomology Laboratory, 10th & Constitution Ave., N.W, Washington, DC 20560-0168

1:00 Welcoming Remarks

1:10 Taxonomic follow-through: producing keys to facilitate biocontrol field research. John Strazanac, Division of Plant & Soil Sciences, West Virginia University, 1090 Agricultural Sciences Bldg, P.O. Box 6108, Morgantown, WV 26506-6108

1:40 Discovery of cryptic species among North American pine-feeding Chionaspis scale insects (Hemiptera: Diaspididae). Rodger Gwiazdowski, Entomology, University of Massachusetts, 270 Stockbridge Road, Fernald Hall, UMASS, Amherst, MA 01003

2:10 Break

2:30 Revision of Agrilus and implications for control of Emerald Ash Borer. Maria Lourdes Chamorro and Steve W. Lingafelter, USDA, Systematic Entomology Laboratory (SEL), c/o Smithsonian Institution, National Museum of Natural History - MRC 168, P.O. Box 37012, Washington, DC 20013-7012

3:00 Braconid wasps as allies and enemies in biological control. Robert R. Kula, USDA Systematic Entomology Laboratory, 10th & Constitution Ave., N.W, Washington, DC 20560-0168

3:30 Role of APHIS in biological control and invasive species management. Vic Mastro, USDA – APHIS, 1398 W. Truck Rd, Buzzards Bay, MA 02542

4:00 Discussion

5:00 Adjourn

Sunday Evening, March 18, 2012

Social and cash bar	3rd floor foyer	6:00-7:00
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Banquet, Student Competition Awards, and Keynote Speaker	Hilton Ballroom west	7:00-10:00
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Student Competition Awards

Asa Fitch Award Winner

Comstock Award Winner

Poster Student Competition Awards

Oral Competition Awards

2012 Eastern Branch ESA Banquet Speaker

Tom Turpin

Professor, Department of Entomology

Purdue University

“Insects as Poetic Inspiration: Shakespeare to Riley and Frost”

Monday Morning, March 19, 2012

Final Business Meeting

Mark Twain

7:00-8:00

Monday Morning, March 19, 2012

Program Symposium

Hilton Grand Ballroom east

8:00-12:00

Brown Marmorated Stink Bug - One Year Later

Organizers: George C. Hamilton, Department of Entomology, Rutgers, The State University of New Jersey, 93 Lipman Dr, New Brunswick, NJ 08901; Tracy C. Leskey, Appalachian Fruit Research Station, USDA – ARS, 2217 Wiltshire Road, Kearneysville, WV 25443

8:00 Greetings and Introduction

8:10 Prescribed Versus “Grower Standard” Programs Targeting Brown Marmorated Stink Bug in Commercial Apple and Peach Orchards in Virginia. Christopher Bergh and Shimat Joseph, Alson H. Smith, Jr. Agricultural Research and Extension Center, Virginia Polytechnic Institute and State University, 595 Laurel Grove Road, Winchester, VA 22602

8:30 Relative Suitability of Vegetable Crops as Host Plants of Brown Marmorated Stink Bug. Galen P. Dively, University of Maryland, 4112 Plant Sciences Bldg, Dept. of Entomology, College Park, MD 20742

8:50 Survey of Natural Overwintering Sites of the Brown Marmorated Stink Bug. Doo-Hyung Lee, Appalachian Fruit Research Station, USDA Agricultural Research Service, 2217 Wiltshire Road, Kearneysville, WV 25430-9425

9:10 The Impact of BMSB Management on IPM Practices in Fruit Systems. Greg Krawczyk and Larry A. Hull, Entomology, Pennsylvania State University, Fruit Research & Extension Center, 290 University Dr, Biglerville, PA 17307

9:30 Seasonal Biology of BMSB in Virginia and Insecticide Efficacy Research. Thomas Kuhar, Entomology, Virginia Polytechnic Institute and State University, 216 Price Hall, Blacksburg, VA 24060

9:50 Break

10:00 Important Considerations for Development of Monitoring Tools for Brown Marmorated Stink Bug. Tracy C. Leskey, Appalachian Fruit Research Station, USDA – ARS, 2217 Wiltshire Road, Kearneysville, WV 25443

- 10:20 Survey and Evaluation of Indigenous Natural Enemies of Brown Marmorated Stink Bug in Field, Vegetable and Ornamental Crops.** Ashley L. Jones, Cerruti Hooks and Paula M. Shrewsbury, Entomology, University of Maryland, 4112 Plant Sciences Bldg, College Park, MD 20742
- 10:40 Brown Marmorated Stink Bug Management Issues in Vineyards.** Douglas G. Pfeiffer, Entomology, Virginia Polytechnic Institute and State University, 216-A Price Hall; MC-0319, Department of Entomology, Blacksburg, VA 24061
- 11:00 Patterns of Host Use on Woody Plants: What Does Brown Marmorated Stink Bug Really Like?** Erik Bergman, University of Maryland, 4112 Plant Sciences Bldg, Dept. of Entomology, College Park, MD 20742; Katherine Kamminga, Entomology, Virginia Polytechnic Institute and State University, 216 Price Hall, Blacksburg, VA 24060; Holly M. Martinson, University of Maryland, 4112 Plant Sciences, College Park, MD 20742; Thomas Kuhar, Entomology, Virginia Polytechnic Institute and State University, 216 Price Hall, Blacksburg, VA 24060; Paula M. Shrewsbury, University of Maryland, 4112 Plant Sciences Bldg, Dept. of Entomology, College Park, MD 20742; Michael J. Raupp, University of Maryland, 4112 Plant Sciences Bldg, College Park, MD 20742
- 11:20 Impact of BMSSB in Fruit Crops in New Jersey.** Cesar Rodriguez-Saona and Dean Polk, Rutgers, The State University of New Jersey, P.E. Marucci Blueberry & Cranberry Research and Extension Center, 125A Lake Oswego Rd, Chatsworth, NJ 08019
- 11:40 Discussion**
- 12:00 Adjourn**

Monday Morning, March 19, 2012

Vector Biology Symposium

Ethan Allen

8:00-12:00

Evolution of Vectors and Parasites

Organizer: Dina M. Fonseca, Center for Vector Biology, Department of Entomology, Rutgers, The State University of New Jersey, 180 Jones Avenue, New Brunswick, NJ 08901

8:00 Welcoming Remarks

8:10 Evolutionary genetics of *Aedes aegypti*: a worldwide perspective. Jeffrey R. Powell and Julia Brown, Department of Ecology and Evolutionary Biology, Yale University, 21 Sachem Street, New Haven, CT 06511

8:55 Invasiveness associated with multiple introductions of a temperate mosquito. Jiawu Xu and Dina Fonseca, Center for Vector Biology, Entomology, Rutgers University, 180 Jones Avenue, New Brunswick, NJ 08901

9:40 Break

9:55 Mosquitoes as determinants of viral evolution. Laura D. Kramer, NY State Dept. of Health, 5668 State Farm Road, Slingerlands, NY 12159

10:40 The evolutionary history of the *Culex pipiens* complex. Dina M. Fonseca, Center for Vector Biology, Department of Entomology, Rutgers, The State University of New Jersey, 180 Jones Avenue, New Brunswick, NJ 08901

11:25 Discussion

12:00 Adjourn

APPENDIX A

Student Competition, Oral Presentations Abstracts

Dynamics of *Erwinia tracheiphila* acquisition and retention by its insect vector, *Acalymma vittatum*

Erwinia tracheiphila, the causal agent of bacterial wilt disease, is an ecologically and economically important pathogen of wild and cultivated cucurbits. *E. tracheiphila* is transmitted predominantly by the striped cucumber beetle *Acalymma vittatum* (Coleoptera: Chrysomelidae) in Central Pennsylvania, but the interactions between *E. tracheiphila* and *A. vittatum* are not well understood. To address this, we developed a quantitative Real-Time PCR method using a Taqman probe specific to an *E. tracheiphila* outer membrane protein (OmpA) to examine the acquisition and retention parameters of *E. tracheiphila* by *A. vittatum* and the quantitative dynamics of bacterial replication within the beetle's digestive tract as a function of time post-exposure to infected plants. My frass results show that acquisition of *E. tracheiphila* by beetles from infected host plants is not different at 24 vs. 3hr acquisition periods, but retention rate increases for beetles with longer exposure times. The highest absolute *E. tracheiphila* concentrations in frass are present immediately after exposure to infected plants and lowest 5 days post exposure, and then increase by 4 weeks. Inoculation experiments show that bacterial level in frass is an important determinant for inoculation success, indicating the bacterial growth in the beetle digestive tract over time is an important epidemiological parameter in this system. A better understanding of pathogen-vector interactions will allow for improvement of control systems in agricultural settings, which currently depends on broad-spectrum chemical control of vectors or expensive mechanical barriers to keep insects from contacting plants.

Direct and indirect effects of light environment on host plant-herbivore-parasitoid interactions

Parasitoid host use is influenced by both top-down and bottom-up factors. Sunlight level is known to influence a suite of plant nutritional and resistance traits which in turn affect herbivore performance, but the extent to which these bottom-up effects cascade up to affect higher trophic levels is unclear. Here, we aimed to understand how light environment (light gap v. shaded forest understory) and leaf type (sun v. shade leaves) affected the performance and incidence of parasitism of two species of moth caterpillars, *Acharia stimulea* and *Euclea delphinii* (Limacodidae).

To manipulate leaf type, we grew white oak (*Quercus alba*) saplings in either full sun or full shade throughout leaf expansion. Then we placed these saplings in light gap and shaded forest habitats in a 2 x 2 factorial design, and stocked them with sentinel caterpillars to be exposed to parasitism. Additional caterpillars were reared in sleeve cages (protected from parasitism) to isolate light environment and leaf treatment effects on caterpillar performance.

We found that light environment, but not leaf type, affected the likelihood of parasitism. *Euclea delphinii* caterpillars were 11 times more likely to be parasitized in sunny habitats than in shaded habitats. When protected from parasitism, both caterpillar species achieved the highest performance in the sun leaf + shade habitat treatment. Our results suggest that 1) the direct effects of light environment on the incidence of parasitism supersede any indirect effects resulting from altered leaf quality and 2) that herbivores choosing between sun and shade habitats face an inherent tradeoff.

Using microsatellite markers and single nucleotide polymorphisms to identify the source of soybean aphid (*Aphis glycines*) populations in Pennsylvania

Aphis glycines is an important pest of soybean as well as a competent virus vector in other legumes. It is present in Pennsylvania fields during the growing season, but does not successfully overwinter in population-sustaining numbers because of a lack of its primary host, Rhamnus species, in the environment. To better understand the origin of *A. glycines* in Pennsylvania, we used microsatellite

markers and SNPs to calculate genotypic diversity and clone frequency and used those measures to investigate its population structure over temporal and spatial scales. We looked at temporal change in allele frequency by collecting aphids at multiple time points during the summer of 2009 and 2010 from an unsprayed sentinel field in central Pennsylvania. To investigate the origin of *A. glycines* in Pennsylvania, we analyzed aphids collected in New York, Ontario, Quebec, Virginia, and the Midwest and compared them to aphids collected in Pennsylvania. This information will further our understanding of aphid movement to states that do not have a strong overwintering population of *A. glycines*.

Role of *Heterorhabditis bacteriophora* infective juveniles in the spread of *Metarhizium anisopliae*

White grubs (Coleoptera: Scarabaeidae) are among the most widespread and destructive turfgrass pests in the United States. Entomopathogenic nematodes, *Heterorhabditis bacteriophora*, and entomopathogenic fungus, *Metarhizium anisopliae*, are good alternatives to conventional insecticides for the control of these pests. However, the challenge of achieving an effective control level exists for using *M. anisopliae* under field conditions. With a surface application, most of the conidia are retained in the thatch layer, which limits its effectiveness against white grubs residing in the soil. This study tested the potential ability of *H. bacteriophora* infective juveniles (IJs) to enhance the spread of *M. anisopliae* conidia in the soil. There was no significant difference between the treatment with *M. anisopliae* alone or with both *M. anisopliae* and *H. bacteriophora* in the conidia distribution in soil profile. In addition, most of the conidia were observed to be within the first 10 cm. This indicates that *H. bacteriophora* did not assist the vertical spread of *M. anisopliae* conidia. Also, most nematodes were recovered within the depth of 5 cm, which may be due to the soil texture. In the water profile, *M. anisopliae* conidia germinated and developed a hyphae tube, which attached to the outer cuticle of the *H. bacteriophora* IJs. However, IJs mortality did not increase significantly. Within 192-hour, the IJs were observed to molt and detach from *M. anisopliae*.

Damsels in distress: host phylogeny and other host characteristics explain patterns of water mite parasitism

Factors explaining patterns of host-parasite interactions include host phylogeny, host species characteristics and host abundance. Parasite levels can be more similar in more closely related host species. The degree to which host characteristics and life history is important in explaining patterns remains unresolved. Using a well-characterised insect host system, this study investigated the presence of a taxonomic signal in larval water mite parasite levels in six species pairs (*Argia*, *Enallagma*, *Enallagma Chromatallagma*, *Ischnura*, *Nehalennia* and *Lestes*) representing two families within the suborder Zygoptera. Local abundance, geographic distribution and habitat affinities of hosts were also considered as possible explanatory variables to explain documented patterns. Host individuals were sampled from sites in the same region, Southeastern Ontario, during the same period in the 2010 summer. Water mite diversity and overall mite prevalence were evaluated for 1330 damselflies. Differences within species were evaluated. In several cases, water mite prevalence does not differ between sister species. The measures of parasitism were correlated between the species pairs to determine the presence of a host phylogenetic signal. Based on preliminary results water mite prevalence demonstrates a strong phylogenetic signal, even though water mite diversity differs between many of the species pairs. The other host characteristics, local abundance and geographic distribution, and prevalence of parasitism do not explain any of the remaining variation.

Phototaxis, host cues, and host-plant finding in a monophagous weevil, *Rhinoncomimus latipes*

Rhinoncomimus latipes is a monophagous weevil used successfully as a biological control agent for *Persicaria perfoliata* in the eastern United States. Damage by *R. latipes* to *P. perfoliata* has been shown to be lower in the shade than in the sun. The present study aimed to determine whether phototaxis, sensitivity to enhanced host cues from healthier sun-grown plants, or a combination is driving this pattern. A series of greenhouse choice tests between various combinations of plant and light conditions showed that *R. latipes* is positively phototactic, responsive to host cues, and preferentially attracted to sun-grown

plants over shade-grown plants. From our experiments we hypothesize two phases of dispersal and host finding in *R. latipes*. The initial stage is controlled primarily by phototaxis, while the later stage is controlled jointly by host cues and light conditions.

European corn borer (ECB) population assessment and the value of Bt corn to farmers in PA

European corn borer (ECB) has traditionally been a major economic pest of corn throughout the United States. Yearly losses from ECB injury have been estimated as high as \$35 million in the Northeastern US, and \$1 billion across the country. Recently it has become clear that ECB populations are declining across the Midwest US, and this decline has been attributed to widespread adoption of Bt traits for control of ECB. We assessed ECB populations and the economics of growing Bt and conventional hybrids at 16 sites across Pennsylvania's four maturity zones during 2010 and 2011 and compared them to previous records to determine if ECB populations are similarly declining in Pennsylvania. In 2010, conventional corn varieties averaged 0.12 larvae per stalk, and 0.46 tunnels per stalk across all sites, and 2011 levels were 0.05 larvae per stalk, and 0.17 tunnels per stalk. At sites common between our study and a study from ten years ago, most ECB populations appear to have decreased substantially, but at least one site had populations that appear unchanged. Yield and profit did not correlate well with ECB injury likely because ECB populations were so low; therefore, economic differences are attributable to seed costs, disease and other environmental factors. Our results appear to indicate that farmers in some parts of the state may have an opportunity to improve profitability by growing conventional hybrids.

Effects of temperature and relative humidity on the vertical distribution of stink bugs (Hemiptera: Pentatomidae) within a soybean canopy and implications for field sampling

The influences of temperature and relative humidity on the vertical distribution of stink bugs (Hemiptera: Pentatomidae) in soybean canopies are not well understood. Other Hemipterans have been shown to change their distribution based on temperature, cloud cover, and time of day. This movement could influence sweep net sampling accuracy. Our study examined the effects of time of day and both ambient and within-soybean canopy temperature and relative humidity on stink bug vertical distribution. Two full-season soybean fields with little defoliation and plant heights of 127 cm and 101 cm were selected for the study in 2010 and 2011, respectively. Temperature and relative humidity were measured using two data loggers placed at the top and bottom of the canopy. The vertical position of a minimum of 20 stink bugs was determined at each observation. The primary Pentatomid species encountered were *Acrosternum hilare* (88% and 59%) and *Euschistus servus* (12% and 39%) in 2010 and 2011, respectively. No significant relationship was observed between time of day, any of the temperature/ relative humidity parameters measured, and stink bug vertical distribution. Regardless of environmental conditions, an average of 15 to 20% of the stink bugs observed was located below the normal sweep net sampling zone. This study, although limited to one canopy type, showed that sweep net accuracy for stink bugs does not appear to be influenced by time of day or changes in temperature and relative humidity, but that sweeping the upper canopy may miss about 20% of the population.

Do tephritid wasps use herbivore-induced plant volatiles for finding white grubs?

Japanese beetle (*Popillia japonica*) and Oriental beetle (*Anomala orientalis*) are considered as invasive species and have been reported as key pests of urban landscapes in the Northeast. *Tiphia vernalis* Rohwer and *Tiphia popilliavora* Rohwer were introduced as biocontrol agents against these beetles. These parasitic wasps burrow into the soil and search for grubs. When a host is found, the wasp paralyzes it momentarily and attaches an egg in a location that is specific for that species. It is unknown if these wasps can detect patches of concealed hosts from a distance above ground and what role, if any, herbivore-induced plant volatiles play in their host location. The work reported here increases our understanding of *Tiphia* wasp host location in turfgrass systems. This study evaluated the responses of female *T. vernalis* and *T. popilliavora* to grub-infested and healthy plants in Y-tube olfactometer bioassays. Also the effect of root-herbivory on the composition of turfgrass volatile profiles was investigated by collecting volatiles from healthy and grub-infested grasses. *Tiphia* wasps were highly

attracted to volatiles emitted by grub-infested tall fescue (TF) and Kentucky bluegrass (KBG) over healthy grasses. In contrast, wasps did not exhibit a significant preference for grub-infested perennial ryegrass (PR) as compared to the control plants. Monoterpene levels emitted by grub-infested KBG and TF were greater than that of control plants. Low levels of monoterpenes were observed for both test and control PR plants.

Ground-dwelling arthropod activity-density levels in lawns and patches of annual flowers

As part of the growing study of urban ecology, relationships between arthropods and urban land covers such as lawns and perennial gardens have been increasingly examined. However, little research has been conducted that compares the relationships of arthropods with annual flowers, lawns and wood mulch. In this study, four replicated patches of six land cover types (lawn, old-field vegetation, shredded wood mulch, and three types of annual plants: marigolds, coleus, petunias) were established in a field experiment in Bristol, RI. We hypothesized that activity-density levels would differ among these land covers due to differences in their resources and environmental conditions. Arthropods were sampled from June to September in 2011 using pit fall traps. In general, the highest numbers of arthropods were collected from petunia and marigold plots, with the highest peaks in July. Variability was seen in responses among taxonomic groups and activity-density level patterns across dates. Results suggest that annual flowers can provide favorable habitat conditions for some arthropods during the growing season. However, lawns, bare mulch and unmowed vegetation can sometimes also support higher levels of arthropod activity-density. Therefore, annual flowers may provide benefits within heterogeneous urbanized landscapes for promoting the favorable conservation and activity of arthropods that provide valuable ecosystem services.

Bed bug (*Cimex lectularius* L.) survivorship at various temperatures

The effect of temperature on the survival of the common bed bug, *Cimex lectularius* L., will be studied using three pyrethroid resistant strains and one pyrethroid susceptible laboratory strain. Insects will be exposed to temperatures ranging from approximately 7 to 29 °C. These temperatures are intended to represent conditions similar to those seasonal temperatures found in outdoor storage facilities or garages in Virginia. Bed bugs will not be fed to further represent conditions of isolation. The practical application of this study will provide the pest management community with specific lengths of time that bed bug infested bags of personal belongings must remain closed in order to prevent a secondary introduction or reinfestation.

Effects of Urban Landscape Transitions on Arthropod Populations

Although urbanization transforms landscapes dramatically, humans in urbanized ecosystems continue to rely on ecosystem services that natural processes provide. Arthropods are a primary component of urban biodiversity and offer many ecosystem services including decomposition and pest control. An unexplored question is how urbanized landscapes can be managed to conserve and restore beneficial biodiversity and ecosystem services. This research focuses on understanding how historical urban landscape management affects arthropod colonization during land cover transitions (e.g., unvegetated soil to lawn). In a field experiment, two new land cover types were established on three types of previously managed land covers (unmowed vegetation from lawn, seeded turfgrass from wood and gravel mulch) in four replicated plots in Bristol, RI. Unchanged unmowed vegetation was included as a reference condition. Arthropods were sampled using pitfall traps on seven dates from June through October 2011. Results reveal that both current and historical urban landscape management impact arthropod activity/density levels. While there were fewer arthropods in mulch plots immediately following planting of turfgrass seed, after two months the number of some arthropods in formerly mulched plots were higher than the unmowed areas. In addition, plant-feeding arthropods such as homopterans were initially more abundant in the unmowed reference plots. However, as vegetative cover in the treatment plots increased, homopteran abundances in every treatment exceeded those of the reference plot. This study suggests that both landscape history and current management inputs affect arthropod abundances in urbanized

ecosystems; therefore, further research is warranted to determine what combinations of management inputs can help promote the ecosystem services to which arthropods contribute.

Diurnal and nocturnal behavior of brown marmorated stink bugs, *Halyomorpha halys* (Stål) (Hemiptera: Pentatomidae) on fruit crops in Pennsylvania

The invasive brown marmorated stink bug (*Halyomorpha halys*) is a major pest in a variety of field and orchard crops. Little is known about their biology or behavior, which is an important aspect of future management programs. Field studies of adult and nymphal behavior were conducted in orchards located at the Pennsylvania State University Fruit Research and Extension Center in Biglerville, Pennsylvania. Insect rearing sleeves were placed on tree limbs in Gold Rush and Pink Lady apples, Redhaven peach, SunGlo nectarine, and sweet cherry study plots. The observation period ran from May until August 2011, with emphasis on adult brown marmorated stink bug behavioral observations from May until June and nymphal observations from July until August. Diurnal and nocturnal behavior was observed at five distinct time periods from early morning until midnight with activities such as feeding, moving, and resting behaviors being observed and recorded. Results indicate differences between overall adult and nymphal behavior ($P=0.0016$); for adults both time of day ($P=0.0082$) and fruit variety ($P=0.0014$) affected behavior, while in nymphs the effects of both time and fruit variety were not significant ($P>0.05$). These results help us in better understanding *H. halys* behavior and suggest a potential for future development of improved management practices.

Armed robbery: parasitic plants steal toxins from host plants with implications for their own insect enemies

Parasitic plants and insect herbivores both feed on plants to acquire nutrition and other resources. Some herbivores also store plant toxins in their bodies to gain protection against their own enemies. While this defense mechanism is well-studied in insects, remarkably little research has explored analogous host-derived defenses in parasitic plants. Nevertheless, a few studies indicate that the resistance of parasitic plants to insect enemies can depend on the identity of the parasite's host. For example, aphids feeding on the parasitic vine dodder (genus *Cuscuta*) generally perform well when dodder is grown on tomato, but poorly when it is grown on turnip or onion—two plants bearing anti-insect toxins that are accessible to dodders via the phloem. However, cabbage aphids (*Brevicoryne brassicae*), brassica specialists that are well adapted to the glucosinolate defense compounds produced by these plants, performed optimally on turnip-hosted dodder. In light of these findings we hypothesize that toxins from infested turnips and onions translocate into dodders and confer resistance to aphids. This talk will report initial results from chemical and biological tests of this hypothesis, including the key finding that glucosinolates move readily into dodders from their Brassicaceous host plants. This work has significant implications for the ecology of parasitic plants and their insect herbivores, as well as for the management of some of the world's most devastating agricultural weeds.

Early-season patterns of onion thrips, *Thrips tabaci* (Lindeman), population densities in onion fields in New York

Onion thrips, *Thrips tabaci* Lindeman (Thysanoptera: Thripidae), is a serious yield-reducing pest of onion crops worldwide. Gaining a better understanding of early-season *T. tabaci* dispersal and field colonization patterns will be important for improving management of this pest. Researchers and growers have observed, anecdotally, that *T. tabaci* densities are greater along field edges (i.e., an edge effect) early in the onion growing season. To investigate this, adult *T. tabaci* population densities were recorded weekly in at least 19 onion fields in New York in June and early July 2011. Densities were recorded on plants located 10, 30, 50, 70, and 90 feet from field margins. Results indicated that an edge effect was observed; as distance toward the center of an onion field increased, *T. tabaci* densities decreased significantly. Differences in the magnitude of the edge effect were observed and influenced by adjacent habitat; less of an edge effect was observed when the adjacent habitat was another onion field, compared to non-onion habitats such as woods and other crops. These results suggest that targeting field edges for

T. tabaci management may be a viable strategy early in the onion growing season, thus potentially reducing pesticide application and crop production cost. This study is a first step in elucidating early-season patterns of *T. tabaci* dispersal and field colonization.

Characterization of grape root borer spatial distribution in commercial vineyards

Grape root borer (GRB), *Vitacea polistiformis* (Harris) is a potentially destructive pest of Vitaceae in the eastern United States. After feeding on the roots of grapevines for about two years, larvae pupate in the soil around the base of the vine. The presence of pupal exuviae left on the soil surface by emerging adults is the only unequivocal, non-destructive indication of vine infestation. In this study, weekly collections of pupal exuviae (July – August) in commercial vineyard blocks in Virginia were used to characterize the spatial distribution of GRB infestations. A grid of 80 sample vines in each block consisted of 1 vine/panel and 10 panels/row in 16 alternating rows. A 1-m diameter vegetation-free zone was created around the base of each vine. Data from 10 of 40 blocks from which exuviae were sampled in one season were used in these analyses. Five blocks were considered heavily (0.9 – 6.4 exuviae/vine) or lightly (0.24 – 0.4 exuviae/vine) infested. Following exploratory data analysis, the autocorrelation among the presence of pupal exuviae with distance and direction within each block was determined using the geostatistical analysis, semivariogram. The best fitted experimental semivariograms, based on the lowest residual sum of squares, were used in the interpolation technique, kriging. In heavily infested blocks, GRB exhibited spatial dependence (aggregated) within a linear distance of 11-13 m, while both random and aggregated patterns were indicated in lightly infested blocks. These results will be discussed in relation to the development of a quantitative sampling scheme for GRB.

Feeding injury and management of brown marmorated stink bug in vineyards and raspberry plantings

Since brown marmorated stink bug (BMSB) is a recently introduced pest, the behavior of this pest is very little known in vineyards. It causes injury to grape berries as well as taints the taste of wine when crushed with berries during wine making. In Virginia, BMSB was seen in 2004, and become established in many counties by 2010. The high reproductive capacity, different climatic adaptability, and hitchhiking potentiality in vehicles are responsible for tremendous spread of BMSB. It is threatening different crop composition in Virginia including grape and raspberry. Grape is one of the preferred hosts for reproduction and development. There is confusion about the type of injury imposed by BMSB in grape berries. Injury in grape is conspicuous a few days after BMSB feeding on the berries. After a few weeks of feeding, small necrotic spots develop in grape berries, which increase gradually, and finally the complete deformation of the berries occurs. Pesticides of different modes of action were evaluated against BMSB in the field. The cages with 10 BMSB were placed immediately around a raspberry stem soon after the foliar application of pesticides in the treatment plots. The organophosphate malathion, the pyrethroid etofenprox and the neonicotinoid dinotefuran were the pesticides tested in field condition. The synergist pipernoyl butoxide (PBO) was applied as combined treatment with Venom 70 SG and Trebon. Six days mortality data show the Trebon to be most efficacious pesticides followed by malathion and Venom 70 SG. The synergist PBO when applied with dinotefuran and trebon is found to be more efficacious than applied solely.

Monarch (*Danaus plexippus* L.) caterpillar abundance on common milkweed (*Asclepias syriaca* L.) is reduced in experimental patches of ox-eyed daisy and common milkweed

Species invasion is predicted to negatively impact monarch butterfly populations in North America, imperiling one of the most spectacular animal migrations in the world. Exotic species invasion can alter native species interactions, modify community structure, and disrupt ecosystem function. Interactions between monarchs and their obligate host plant, milkweeds in the genus *Asclepias*, could be especially vulnerable to species invasion because many milkweed and exotic plant species thrive in habitats degraded by anthropogenic activity. However, the effects of exotic plant species on monarch-milkweed interactions have received limited attention and are poorly understood. In the summer of 2011, I

conducted an experiment in which a focal common milkweed (*Asclepias syriaca*) was planted with exotic plants in a factorial design (none, either exotic, both exotic plant species). Ox-eyed daisy (*Leucanthemum vulgare*) and red clover (*Trifolium pratense*) were the exotic species used in the experiment and commonly co-occur with common milkweed. Monarch caterpillar abundance on common milkweed was significantly lower in plots that contained ox-eyed daisy, but not red clover. This result highlights the importance of accounting for the influence exotic species have on interactions between native plants and insects. Understanding how exotic species can influence monarch-milkweed interactions is critical to better manage and conserve monarch butterfly populations during a period of accelerating exotic species introduction.

Potential of entomopathogenic fungi as bed bug control agents

Current bed bug control measures rely heavily on the use of pyrethroid insecticides. However, increased insecticide resistance threatens bed bug control efforts. Recent research has illustrated the effectiveness of entomopathogenic fungi such as *Beauveria bassiana* on blood feeding insects and disease vectors, including several species of mosquito and the kissing bug *Triatoma infestans*. Importantly, insecticide resistance confers no cross-resistance to entomopathogenic fungi.

In laboratory-based studies we have demonstrated that bed bugs are susceptible to *B. bassiana* following only short-term exposure to a sprayed surface. We present mortality data for two bed bug strains (Harlan and Field), and demonstrate that males and females are equally susceptible to fungal infection. Data from our preliminary optimization trials indicate that Jersey knit cotton provides an excellent substrate for delivery of conidia and that all instars tested (first, fifth and adult) succumb to fungal infection within 3-4 days.

Monitoring of Asian Longhorned Beetles (*Anoplophora glabripennis*) in Worcester, Massachusetts using pheromone and kairomone blends

Development of an effective trapping system to detect *Anoplophora glabripennis*, the Asian longhorned beetle (ALB), has been a goal of the eradication program since beetles were discovered in New York City in 1996. Without eradication, ALB is estimated to kill 30.3% of all urban trees and cause \$669 billion in losses. To detect infestations, ground surveyors and climbers search for oviposition pits and exit holes. However, ground surveys are 30 percent effective at best and climbing is labor intensive and expensive. Trapping is a cost effective, efficient means of guiding surveyors and climbers towards infestations over large geographic areas. A two component male produced pheromone (MP) consisting of an aldehyde and alcohol 4-(n-heptyloxy)butanal and 4-(n-heptyloxy)butan-1-ol respectively has been utilized in previous trapping studies and is almost entirely attractive to females. Addition of maple plant volatile mixes \pm linalool, (Z)-3-hexen-1-ol, linalool oxide, and β -caryophyllene to MP baited traps significantly increased catches of virgin females in China and Worcester, Massachusetts in previous field seasons. The goal of this project was to test low and high release rates of MP and plant volatiles in a large-scale deployment of traps across previously infested and unsurveyed areas throughout Worcester, Massachusetts to detect ALB. A total of 23 beetles were caught including 21 females and 2 males during the summer of 2011.

Biosynthesis of defensive compounds in the pupal secretion of the ladybird beetle *Delphastus catalinae*

Ladybird beetles (Coccinellidae) are renowned for their use of alkaloids as anti-predator defenses. However, previous work in our labs with the ladybird beetle *Delphastus catalinae* showed that the larvae and pupae secrete a germacrene sesquiterpene and novel polypropanoids, but no alkaloids, from glandular hairs. Furthermore, these secretions and their isolated components were shown to serve defensively against predators. As part of an attempt to determine whether the constituent germacrene and polypropanoids are synthesized de novo or sequestered from the beetles' diet, we applied ¹³C-labeled and unlabeled glucose to the eggs of the whitefly, *Bemisia tabaci*, on which the beetle larvae normally feed. Larvae were allowed to consume the glucose-coated eggs for 24 h and were later sampled as pupae. Liquid chromatography-mass spectroscopy showed significantly higher ratios of

isotopically heavier to normal-weight germacrene in the pupal secretions of beetles that consumed ^{13}C -glucose versus unlabeled glucose. A similar pattern was seen for the polypropanoids. These results demonstrate that *D. catalinae* biosynthesizes both the terpene and the polypropanoids de novo. This appears to be the first demonstration of the biosynthesis of a non-alkaloidal chemical defense by ladybird beetles.

Carbohydrate feeding increases male mosquito fitness through multiple mechanisms

In the life of a male mosquito, the only true measure of success is fecundity; sugar feeding is one way for a male to maximize this. Frequent carbohydrate feeding results in increased mating success in male mosquitoes. The fitness of male *Aedes albopictus* (Skuse) given sucrose or water access for 0, 24, 48, or 72 hrs was evaluated by comparing longevity, number of inseminated females, and the volume of sperm transferred. Increased longevity was shown for each additional day of sucrose access. Following sucrose or water exposure, males were given access to new virgin females every 24 hrs; these were dissected to determine the number of females inseminated and the number of spermatheca containing sperm. Comparing males of the same age, sucrose-fed individuals attained greater mating success than water-fed individuals in the 24, 48, and 72 hr treatments. Sucrose-fed males in the 48 and 72 hr treatments also exhibited an increased volume of sperm transferred at 3-5 and 5-6 days post-emergence respectively. This study confirms that carbohydrate feeding not only increases the longevity of male mosquitoes, but also improves mating success and increases sperm volume; further, it demonstrates that adult males have the ability to store energy when females are scarce and sugar sources are readily available.

Does crop intraspecific diversity matter for pest management? Effects of crop diversity on herbivores and natural enemies in soybeans

Ecosystems benefit from high levels of diversity and the complex ecological interactions associated with high diversity. Unfortunately, the species and genetic monocultures of modern agriculture tend to harbor less biodiversity than natural systems and benefit little from these complex ecological interactions. Recent evidence suggests that intraspecific (i.e., genotypic) diversity can be as influential as plant species diversity in structuring arthropod communities and decreasing herbivore populations. We used soybeans as a model system and increased diversity with cultivar mixtures. We compared soybean aphid and natural enemy populations in high and low genotypic diversity plots in a two-year field experiment. High diversity plots were created by using all possible five-line mixtures chosen from a pool of six lines and low diversity plots were created by planting a monoculture of a single line. These treatments were planted in replicated 30 by 30 foot plots. Soybean aphid populations were assessed through weekly whole plant counts. Natural enemies were sampled multiple times throughout the summer with sweep netting and direct counts. Aphid populations did not respond to diversity in this experiment, although low soybean aphid populations did not allow us to test our hypothesis under high pest population when we expect diversity to have its greatest influence. Natural enemies did respond to increased diversity. Our results thus far appear to indicate that increasing crop genetic diversity holds promise as an insect pest management strategy that would be readily accessible to growers. Our experiment also builds on a growing body of work in natural and agricultural systems that has shown the importance of intraspecific diversity.

APPENDIX B

Student Competition, Poster Presentations Abstracts

1. Efficacies of *Metarhizium anisopliae*, *Beauveria bassiana* and *Heterorhabditis bacteriophora* against 3rd-instar masked chafer white grubs

Masked chafer white grubs (Coleoptera: Scarabaeidae) are among the most widespread and destructive turfgrass pests in Virginia. Currently, the control of these significant pests still relies heavily on the large-scale use of synthetic insecticides. The impact from the long-term use of insecticides, such as on human exposure, underground water pollution, impact on natural enemies, insecticide resistance pressure, etc., has increased public awareness for a more bio-rational approach to managing turfgrass pests. Entomopathogenic nematodes, *Heterorhabditis bacteriophora*, and entomopathogenic fungus, *Metarhizium anisopliae* and *Beauveria bassiana*, are good alternatives to conventional insecticides for the control of these pests. However, their efficacies vary significantly under field conditions. In the current study, the efficacy of the combined application of *H. bacteriophora* and a fungus was evaluated against 3rd-instar masked chafer grubs. Additive or synergistic effects were found in the interaction of *H. bacteriophora* with *B. bassiana* and *M. anisopliae* under laboratory conditions. In addition, the effect of temperature on the efficacies of *H. bacteriophora* and *M. anisopliae* was studied using 12, 20 and 28 °C. Higher temperatures significantly enhanced the efficacies of both agents against masked chafer grubs.

2. Using degree-days to predict egg and larval population peaks of cereal leaf beetle, *Oulema melanopus* (Coleoptera: Chrysomelidae)

Cereal leaf beetle is one of the most important insect pests of wheat in the Southeast with a damage potential of over \$20.6 million to Virginia and Carolina wheat growers. To improve scouting efficiency and encourage a more sound IPM approach for wheat production, degree-day models were developed to predict cereal leaf beetle egg and larval peaks. Previously published cereal leaf beetle temperature development data were used to create a predictive degree-day model to estimate the dates of peak egg and larval populations. This model was validated using cereal leaf beetle population data from four field study sites in Virginia and North Carolina in 2010, and six field sites in 2011. In addition, historical weather data were used to create a predictive map of when areas of Virginia and North Carolina typically would reach egg peak. Linear regression analysis was then performed using data from all cereal leaf beetle study populations, to determine if the number of eggs at peak could be used to predict larval peak numbers. Our model accurately predicted egg and larval peaks and there was a significant positive linear relationship between egg peak and larval peak density indicating that egg peaks could reliably predict larval infestations levels. If incorporated into cereal leaf beetle management programs, our predictive degree-day model could improve scouting efficiency by limiting the need to scout to only those few critical days at egg peak, rather than over several weeks during larval development allowing for more timely applications of insecticides, if needed.

3. Distributions of Phytophagous Larvae in mid-successional Allegheny Hardwoods: Impacts of Bird Exclusion

Phytophagous larvae are a crucial part of forest community structure, acting as herbivores, pollinators, and prey. Abundance on forest trees is determined by top-down forces, primarily predation by passerine

birds, and bottom-up forces such as plant quality and phenology. We examined these tritrophic effects on phytophagous larvae in forest communities of the Allegheny hardwoods forest type in northwestern Pennsylvania in May-August 2011. To examine the influence of avian predators, we compared abundance between 432 netted and un-netted branch pairs. To examine effects of plant quality and phenology, we distributed these paired branches across individuals of the six forest trees that comprise 95% of the basal area of the Allegheny hardwoods from leaf-out in mid May to late summer. Lepidoptera comprise over 90% of the collected specimens with Hymenoptera and Coleoptera constituting the remaining 10%. Birds significantly depressed abundance (larvae per gram foliage) on all tree species except birch (*Betula lenta* or *B. alleghaniensis*). Pin cherry (*Prunus pensylvanica*) and black cherry (*Prunus serotina*) had the highest abundance in the absence of bird predation, but exclusion of birds had a greater relative impact on pin cherry, suggesting birds forage more on this species than expected based solely on density of available larvae. Specimen identification is ongoing and subsequent analyses will assess impacts of bird predation on community composition across tree species.

4. Efficacy of *Beauveria bassiana* strain GHA against *Listronotus maculicollis* adults

A combination of petri dish assays and simulated field-trials were conducted with the commercial formulation of the fungus *B. bassiana* strain GHA, to assess its virulence to *L. maculicollis* adults in order to determine the practicality of implementing it into a control regime. Adult populations of *L. maculicollis* were collected from various golf courses in southern New England and placed on filter paper treated with various rates of the entomopathogen. In petri dish assays conducted with unsexed adults, treatments that utilized the highest labeled rate of the entomopathogen were effective in killing adults. Combining less than labeled rates of *B. bassiana* with neonicotinoid insecticides provided significantly more mortality than neonicotinoids alone. In order to assess the reliability of these results in a field application turf plugs were taken and treated with various rates of the entomopathogen and unsexed adults were confined to the plugs and rated for mortality up to 21 days after treatment. Control in the turf plugs was highly variable and the consistency evident in petri dish assays was not duplicated. The addition of a fungal enhancer, MycoMax, provided a moderate increase in the efficacy of the fungus but was not significant. These results indicate that successfully targeting *L. maculicollis* with *B. bassiana* will depend upon determining the factors reducing the efficacy of *B. bassiana* in the field and overcoming them.

5. Natural enemies of onion thrips (*Thrips tabaci*) in New York onion agroecosystems

Onion thrips, *Thrips tabaci* Lindeman (Thysanoptera: Thripidae), is a major insect pest of dry bulb onions (*Allium cepa*) in New York. Recently, growers have shifted away from broad-spectrum insecticides toward novel selective ones, suggesting compatibility with natural enemies. Natural enemy diversity has been shown to have positive correlations with pest population control. However, little is known about the natural enemy profile of onion agroecosystems in New York, both vegetable-producing muck regions and small-diversified vegetable farms. To assess natural enemy populations and their effect on onion thrips populations in these systems, surveys were conducted in four large commercial onion fields as well as onions grown on four small-diversified farms during the 2011 growing season. Small plots of “Red Bull” variety onions were transplanted at each location and the numbers of onion thrips and natural enemies were recorded weekly at each location. Common natural enemies included minute pirate bugs (Anthocoridae), lady bird beetles (Coccinellidae), hoverfly larvae (Syrphidae) and predatory thrips (Aeolothripidae). Throughout the season, predatory thrips were the most commonly encountered, 42.5% of the total adult or juvenile natural enemies sampled. Spiders, hoverfly larvae, minute pirate bugs and

ladybird beetles comprised 20.8, 13.4, 10.4 and 10.6% of the total natural enemies sampled, respectively. The remaining 2.3% were lacewing larvae (Chrysopidae). *Coleomegilla maculata* was the most common predator early in the season. Weekly averages of natural enemies per plant were used to assess population growth throughout the season and evaluate the effect on the pest population, measured by average thrips per leaf.

6. Naturally occurring resistance to the hemlock woolly adelgid (*Adelges tsugae*) in eastern hemlock trees (*Tsuga canadensis*)

Eastern hemlock trees (*Tsuga canadensis*) are currently being devastated by the invasive hemlock woolly adelgid (HWA; *Adelges tsugae*). Although there have been no reports of adelgid resistance among eastern hemlocks, other hemlock species are HWA-resistant. During landscape-level forest surveys, rare surviving eastern hemlocks were found in otherwise adelgid-devastated forests. Cuttings were taken from these mature, putatively resistant trees and brought back to the University of Rhode Island where they were grafted according to standard protocols. Putatively resistant scions were grafted onto nonresistant hemlock rootstock from a Michigan nursery, and scions from Michigan trees were grafted back onto Michigan rootstock as a control. In order to remove environmental differences and assess genetic variation in HWA-resistance, resistant plants were grown alongside controls in a common garden experiment. All trees were inoculated with HWA in spring 2011, and adelgid density (# HWA/cm hemlock growth) was monitored from May through October on old and new growth foliage. Using repeated-measures ANOVA, we found that putatively resistant trees supported consistently lower HWA densities than control trees on both old and new growth, suggesting that they possess some level of adelgid resistance. Additionally, by the end of the season, the second generation of adelgids on nonresistant control trees had between three and four times higher HWA densities than on resistant trees. This supports previous data showing rare, naturally-occurring resistance in these eastern hemlocks. These putatively resistant trees may be used in the restoration of eastern hemlocks and as a nursery crop in managed and natural landscapes.

7. Supercooling points of the brown marmorated stink bug (*Halyomorpha halys*)

Preliminary data suggests that the supercooling points for Adult Brown Marmorated Stink Bugs, *Halyomorpha halys*, from Lexington, VA range from -6.9 to -14.8°C and the BMSB from Kearneysville, WV range from -9.3 to -10.2°C. The bugs from Lexington were collected in October 2011 from houses and were processed throughout the Fall of 2011. The bugs from Kearneysville, WV were collected in natural overwintering sites in December 2011 and were processed within 48 hours. All BMSB were kept at ambient temperatures during their time in captivity.

8. False ring formation in response to hemlock woolly adelgid (*Adelges tsugae*) feeding in eastern hemlocks (*Tsuga canadensis*)

Herbivores can alter plant physiology through the induction of false rings, a band of thick-walled latewood cells within the earlywood portion of the tree ring that reduces water transport. These false rings may be caused by the hypersensitive response, a plant defense against sessile herbivores and pathogens. Hemlock woolly adelgid (*Adelges tsugae*), and elongate hemlock scale (*Fiorinia externa*) are invasive insects that both feed on eastern hemlock (*Tsuga canadensis*). *Adelges tsugae* has a greater effect on

tree health than *F. externa*, but the mechanism underlying their differential effect is unknown. We explored the effects of these herbivores by assessing growth ring formation in branches of trees that had been experimentally infested for four years with *A. tsugae*, *F. externa*, or neither insect. We measured false ring density, ring growth, and earlywood: latewood ratios in the two most recently deposited growth rings. Branches from *A. tsugae*-infested trees had 30% more false rings than branches from *F. externa*-infested trees and 50% more than branches from uninfested trees. In contrast, branches from *F. externa*-infested trees and control trees did not differ in false ring formation. Radial growth and earlywood: latewood ratios did not differ among treatments. Our results show that two invasive herbivores with similar feeding modes have differing effects on false ring formation in eastern hemlock. If false rings are responsible for or symptomatic of water stress, this may provide a potential explanation for the relatively large effect of *A. tsugae* infestations on tree health.

9. Avoidance of prey toxicity by the Chinese mantid, *Tenodera sinensis*

Monarch caterpillars, *Danaus plexippus*, feed on milkweed host plants (Asclepiadaceae) and sequester toxic cardenolides from the plant in their bodies. While this strategy provides an effective defense against most predators, the Chinese mantid, *Tenodera sinensis*, has been observed to consume monarch caterpillars in the field without any apparent ill effects. This behavior is of interest since naïve mantids that consume milkweed bugs vomit after consumption and subsequently refuse to consume these insects. We have begun to study how these mantids consume ‘toxic’ monarch caterpillars without harming themselves. We conducted a series of behavioral trials observing mantid predator-prey encounters with monarch caterpillars and ‘non-toxic’ larvae of European corn borers, *Ostrinia nubilalis*, and wax worms, *Galleria mellonella*. We also determined consumption rates and percent prey body mass discarded by the mantid.

We found that Chinese mantids gut monarch caterpillars, allowing the gut content to fall from the prey without any further intent to consume it, but never gut either of the non-toxic caterpillars (wax worms or European corn borers). Consumption rates (g prey eaten min⁻¹) for all three prey species was similar suggesting minimal costs associated with the gutting behavior. Mantids discarded a larger portion of monarch caterpillar mass than of either non-toxic prey.

The fact that the mantids consumed the gutted monarch caterpillars without any ill effects suggests that plant-derived cardenolides are concentrated in the monarch caterpillar’s gut. We plan on testing this hypothesis by using HPLC to assess cardenolide content in the discarded versus consumed tissues of mantid-gutted monarch caterpillars.

10. Variation in the kitchen scrap content of residential compost piles influences their beetle communities as reflected by pitfall trapping

Composting allows households to dispose food waste without contributing to landfills and creates the additional benefit of a nutrient-rich supplement for gardening. Addition of animal-based kitchen scraps to compost piles has long been discouraged on the grounds that it will attract vertebrate scavengers. Surprisingly, no experimental data exist to examine this claim. As an offshoot of such an experiment, underway in Andover, Connecticut, the effect of compost pile content [vegetable-based scraps only (VEG), vegetable and animal scrap mix (MIX), and control without kitchen scraps (CON)] on the piles’ invertebrate communities was tested. During the summer of 2009, several sampling methods, including pitfall trapping, were employed. Pitfall traps were placed on the perimeter of each pile to collect

invertebrates. From these samples, the beetle specimens were prepared, identified to at least the family level, and their frequency among pile treatments was analyzed. Fourteen species of ground beetles (Carabidae) were identified, as well as members of eleven other beetle families. Four carabid species showed a significant preference for the MIX pile while one species preferred the VEG pile. At the family level, significant preferences for pile type were also exhibited by the other coleopterans. We hypothesize that predatory beetles may prefer certain piles because the species upon which they prey frequent these piles. Additionally, microclimate and other aspects of pile location may influence preference for a particular pile by a given beetle taxon.

11. Structure-Activity Relationships for Insecticide Transport Substrates and Inhibitory Ligands of Mosquito P-glycoproteins

Mosquitoes affect millions of people worldwide as a result of their ability to vector disease. The mosquito central nervous system is a proven target site for high efficacy insecticides; however, widespread insecticide resistance limits their use to reduce the risk of mosquito-vectored disease. Insecticide resistance is considered a serious public health challenge that warrants the development of improved chemical control strategies for vector mosquitoes. The mosquito hemolymph-brain barrier is composed of P-glycoproteins (P-gps) that serve as the first line of cellular defense against chemical exposures and can impede the target-site action of insecticides for vector mosquito control. Herein, we provide the structure-activity relationships of insecticide transport substrates and inhibitor ligands for the P-gps of vector mosquitoes. This information will serve as a prerequisite for the characterization of mechanisms of action for established and experimental insecticide chemistries, the management of insecticide target-site resistance, and the development of improved insecticide chemistries for the control vector mosquitoes.

12. Linking Honey Bee Colony Health to In-Hive Pesticide Residue Exposures

Pollinators are a critical component to the plant health and production of agricultural systems. The decline of honey bee colonies presents a socio-ecological and -economic burden that threatens the sustainability and economic viability of agriculture to satisfy the food and fiber needs of society. Pesticide residue exposures to honey bees are implicated in the decline of these pollinators and their ecosystem services. Previous surveys of pesticide residues in honey bee colonies reveal multiple pesticides and their metabolites. However, knowledge of the toxicological consequences of these pesticide residues, alone and in combination, to honey bee colonies and their decline is limited. Herein, we provide a preliminary examination of the nutritional status, immunocompetence factors, and infectious disease susceptibility of honey bee colonies exposed to in-hive pesticide residues. This information will serve as a prerequisite for the characterization of pesticide residue consequences to honey bee colonies, the improvement of honey bee colony health, and the reduction of honey bee colony losses.

13. Distribution of Forensically Important Blow Flies (Diptera: Calliphoridae) in New Jersey

Entomological specimens collected from corpses have recently become commonly accepted and are frequently used as evidence in legal cases. One of the most important aspect where insects can be most beneficial in criminal cases is in the determination of colonization time, which can subsequently be used to predict a minimum post-mortem interval (m-PMI). The research presented here involves surveys of adult blow fly diversity in six locations, classified by their geographical region across New Jersey. This

quantification of the forensically important Diptera of New Jersey will be used to study blow fly development to determine whether certain environmental factors affect the development of individual species.

14. Acoustic and behavioral interactions between male and female dueting katydids

The Broad-winged Bush Katydid, *Scudderia pistillata*, is an acoustically dueting katydid, i.e., both males and females produce calls to attract the opposite sex for mating. The male's call is a series of increasing phrase lengths, from 3 syllables (wing closures) per phrase to 9/10 syllables per phrase. Females produce 1-8 acoustic ticks in response to each male phrase, adjusting the number of ticks with the number of syllables she hears, as well as with the length of the male series. The call characteristics for both sexes were recorded from isolated individuals and therefore do not address the acoustic interaction that could exist in natural duets. In order to examine the acoustic and behavioral dynamics between live individuals, a single male and female were placed in an arena with a microphone array and their interactions recorded. Our results demonstrate that only the male performs phonotaxis, mostly through short flights (<1m) at the end of his bout. The number of female acoustic ticks he hears influences the speed at which he reaches the signaling female. Also, when a male hears the tick of a female responding to the call of a rival male, he inserts a disruptive tick during the female's call, potentially confounding the location of the calling female for other rival males. Further analysis is underway to determine the effect of presentation order (first or second male) on female response, as well as female receptivity (young, virgin females versus old, mated females) on their response to males.

15. Three new planthopper species (Hemiptera: Fulgoroidea: Delphacidae) and a new genus from Florida

A new planthopper genus is here presented with one species from Florida (USA) and a second species from Florida (USA), Belize, and Guatemala. The new genus is placed in the delphacid tribe Delphacini (Delphacinae) and superficially resembles *Euides* Fieber, *Pareuidella* Beamer, and *Nilaparvata* Distant in size and color, but has unbranched parameres and symmetrical caudally or laterocaudally curved processes on segment 10. Also presented here is a new species from Florida from the existing genus *Muellerianella* Wagner.

16. Interactive effects of sap-feeders and plant species on ant predation of caterpillars

Food web ecology increasingly considers indirect effects in order to resolve the dynamics of trophic interactions. In insect community ecology, for example, trophic interactions can be indirectly affected by intraguild predation, mutualism, and plant traits. In this study, we investigated the indirect effects of bird predation, mutualism with sap-feeding Hemiptera, and host-plant species on ant-caterpillar interactions at a community level. This study system includes eight abundant tree species and their insect fauna in eastern deciduous forests. Effects of birds and ants were tested by experimentally excluding them from tree branches or entire saplings of each tree species. We evaluated effects of sap-feeders based on their natural patterns of presence or absence. We expected the presence of sap-feeders to recruit ants and increase the likelihood that ants would encounter and prey upon nearby caterpillars.

The presence of sap-feeders increased the abundance of foraging ants on experimental branches. Ant predation of caterpillars depended on the presence of sap-feeders, host-plant species, and their interaction. For example, on *Hamamelis virginiana* (Witch hazel) and *Acer rubrum* (Red Maple) the presence of sap feeding insects and ants reduced caterpillar density. Conversely, on *Prunus serotina* (Black Cherry) caterpillar abundance was highest when both ants and sap feeding insects were present. Therefore, the presence of an ant-sap-feeder mutualism did not necessarily increase ant predation of caterpillars. Birds reduced caterpillar density, but did not affect ant predation of caterpillars. These results show complex indirect effects of mutualism and host-plant species, but not intraguild predation, on ant-caterpillar interactions.

17. Movement Behavior of Mid-Development European Corn Borer, *Ostrinia Nubilalis*, Larvae on Bt Corn Using Plant Specific Genetic Markers

European corn borer (*Ostrinia nubilalis*) is a major economic pest of *Zea mays* L. The introduction of transgenic Bt corn has lead to a significant decrease in the damage and control costs associated with European corn borer. However, in attempts to better predict and implement resistance management strategies investigators need to understand the movement and feeding behaviors of European corn borer larvae. In our experiment plants were infested in an array of treatments designed to represent a block refuge strategy or a blended refuge strategy. Larvae were recaptured after 72 hours and movement was recorded. Recaptured larvae were frozen for quantitative PCR analysis to determine what Bt cry proteins the insects consumed.

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Following is the list of the Entomological Society of America – Eastern Branch officers, Executive, Standing and Ad Hoc Committees and their chairs. The ESA Eastern Branch depends upon volunteers to perform the critical functions that keep our Branch active and productive. Without the participation of members in these committees we would be unable to provide quality programming for our annual meeting. The next annual meeting is scheduled for March 16 - 19, 2012 at the Hartford Hilton, Hartford, CT. If you're considering volunteering a portion of your time for committee service this year, please contact either the current chair of the respective committee or the Branch Secretary, Mr. Dan Gilrein, or Eastern Branch President, Dr. George Hamilton.

On behalf of the entire Eastern Branch membership, please accept my thanks for your willingness to serve - Dan Gilrein.

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