

ENTOMOLOGY WITHOUT BORDERS



ICE

2016

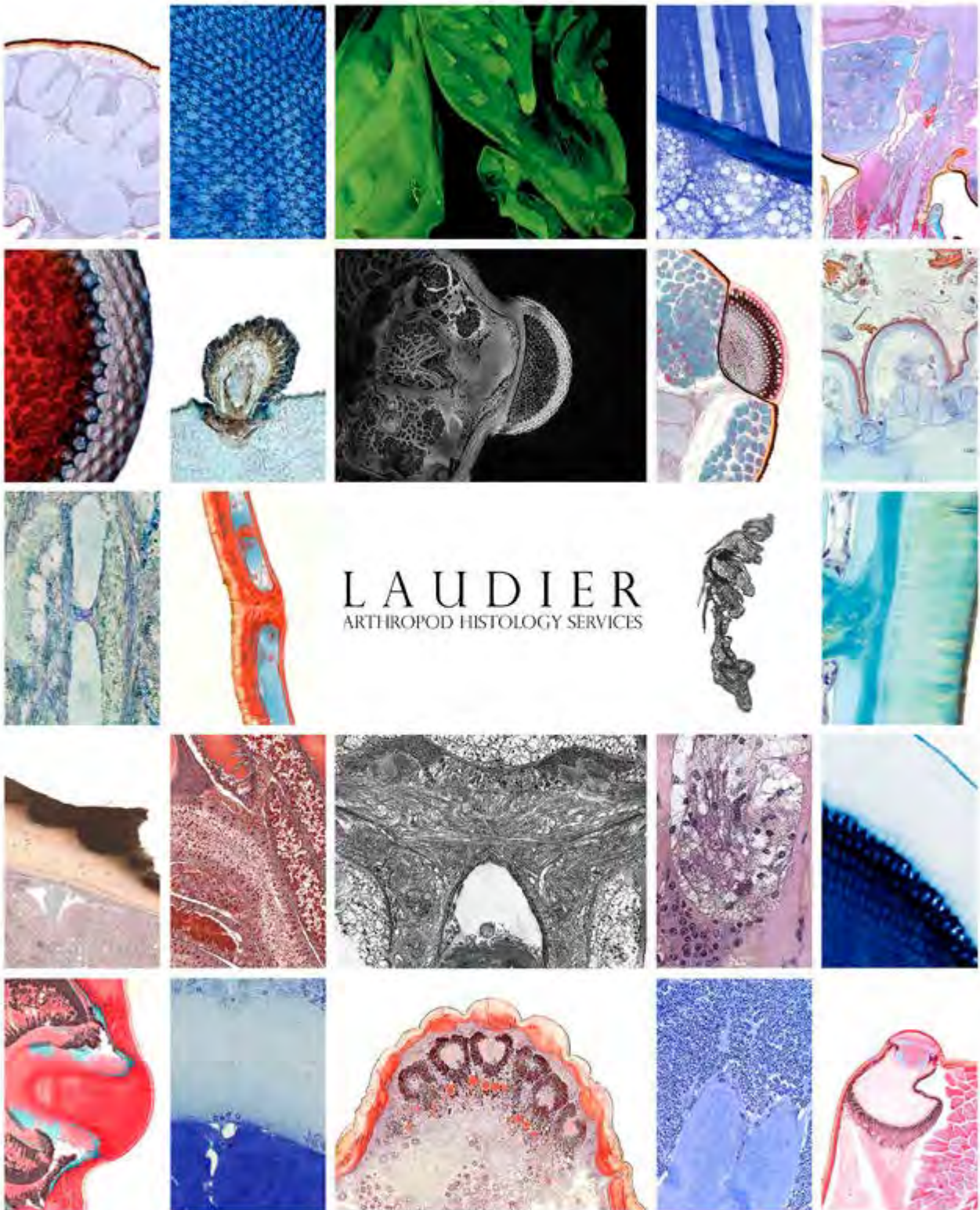
**XXV International  
Congress of Entomology**

Orlando, Florida, USA  
September 25–30



PROGRAM BOOK

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# ICE 2016

**XXV International Congress of Entomology**  
 Orlando, Florida, USA  
 September 25–30

Co-located with the 64th Annual Meeting of the Entomological Society of America, the 2016 Annual Meeting of the Entomological Society of Canada, and the 99th Annual Meeting of the Florida Entomological Society.

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## Annual Review of Entomology

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Editor: **May R. Berenbaum**, *University of Illinois, Urbana-Champaign*

The *Annual Review of Entomology*, in publication since 1956, reviews significant developments in the field of entomology, including biochemistry and physiology; morphology and development; behavior and neuroscience; ecology; agricultural entomology and pest management; biological control; forest entomology; acarines and other arthropods; medical and veterinary entomology; pathology; vectors of plant disease; genetics and genomics; and systematics, evolution, and biogeography.

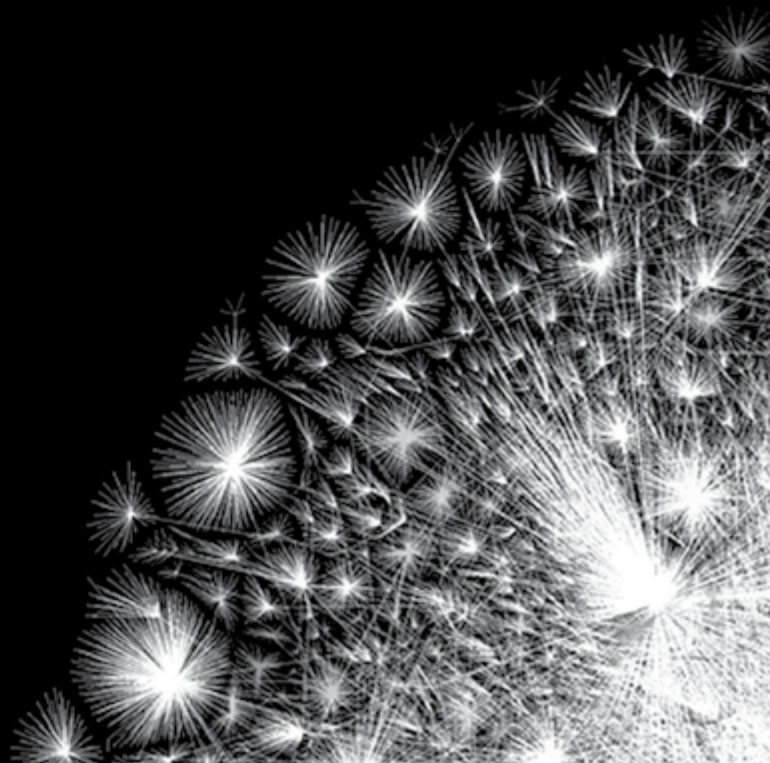
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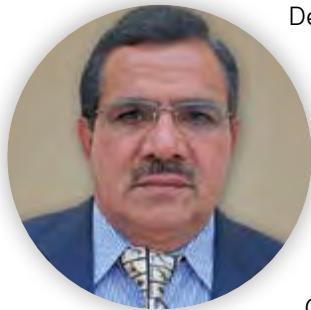
- *Structure and Evolution of Insect Sperm: New Interpretations in the Age of Phylogenomics*, Romano Dallai, Marco Gottardo, Rolf Georg Beutel
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- *Pesticide-Induced Stress in Arthropod Pests for Optimized Integrated Pest Management Programs*, R.N.C. Guedes, G. Smagghe, J.D. Stark, N. Desneux
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- *Invasion and Management of Agricultural Alien Insects in China*, Fang-Hao Wan, Nian-Wan Yang
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- *Chemical Ecology of Neuroptera*, Jeffrey R. Aldrich, Qing-He Zhang
- *Taxonomy, Ecology, and Management of Native and Exotic Fruit Fly Species in Africa*, Sunday Ekesi, Marc De Meyer, Samira A. Mohamed, Massimiliano Virgilio, Christian Borgemeister
- *Reproduction-Immunity Trade-Offs in Insects*, Robin A. Schwenke, Brian P. Lazzaro, Mariana F. Wolfner
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# Welcome Message from the Chairman of the ICE Council



Dear Colleagues:

On behalf of the Council for International Congresses of Entomology, I extend to all of you a warm welcome to the XXV International Congress of Entomology (ICE 2016) in Orlando, Florida, USA, September 25-30, 2016. The theme for ICE 2016 is “Entomology Without Borders.” ICE 2016 will provide an excellent opportunity to discuss and learn about the recent advances in the science of entomology and related disciplines, and to address basic issues such as food security and conservation of the environment. The

Congress will also provide an opportunity for delegates to interact with others from

different continents, establish contacts, and initiate collaboration among scientists from different parts of the world. ICE 2016 is being hosted by the Entomological Society of America (ESA).

The scientific deliberations of the XXV International Congress of Entomology are spread across 30 subject areas with eight plenary speakers of international repute, as well as keynote lectures by two Nobel Laureates. Consequently, ICE 2016 will create an awareness of the importance of arthropods in the environment, highlight the progress being made in the management of some of the intricate pest problems around the world, and detail the challenges that we need to address for food security and human health. The Congress will also provide an opportunity for delegates to discuss the challenges posed by the invasive pests, effects of climate change on pests and pest management, use of genetically modified organisms (GMOs) for pest management, and the biosafety of GMOs to the environment. Rapid and cost effective adoption of biotechnology-derived products will depend on the development of a full understanding of the interaction of genes within their genomic environment, and with the external environment in which their conferred phenotype must interact.

The enthusiasm and excitement displayed by the Organizing Committee, Co-Chaired by Dr. Alvin Simmons and Dr. Walter Leal, with outstanding support from the President of ESA, Dr. May Berenbaum, and the staff of the ESA, certainly promises that the XXV International Congress of Entomology will be a grand success. I take this opportunity to congratulate and thank the Organizing Committee of ICE 2016, which has left no stone unturned, to organize ICE 2016 in a highly professional and systematic manner. I look forward to meeting each of you and thank you for your enthusiastic participation and support to make ICE 2016 a grand success.

Sincerely yours,

**Hari C. Sharma**

Chairman, Council of the International Congresses of Entomology

[www.int-cong-ent.org](http://www.int-cong-ent.org)

# High impact research in entomology

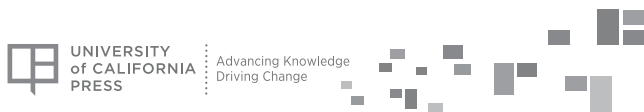
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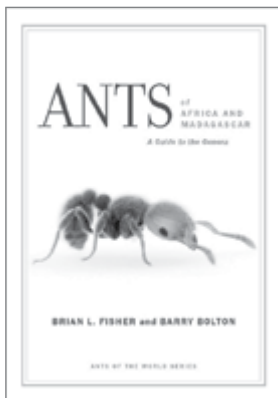
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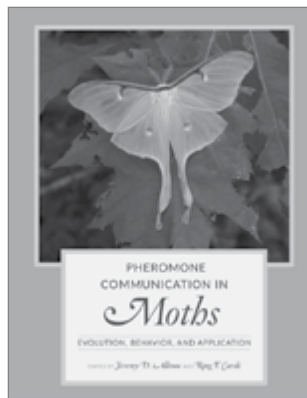
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Brian L. Fisher and Barry Bolton



**Pheromone Communication in Moths: Evolution, Behavior, and Application**  
Edited by Jeremy D. Allison and Ring T. Cardé

## Join your colleagues for the **Women in Entomology Breakfast**

Monday, September 26

6:15 – 8:00 AM • West Hall F2 (WF2)

A la carte breakfast menu available for purchase. **The first 175 student attendees will receive a complimentary voucher** to use at the breakfast kiosks that morning.

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Held each year since 1989 at the ESA Annual meetings, this breakfast encourages networking, mentoring, and collegiality among established entomologists and those who are students or beginning their careers in the field. Choose to sit at various birds-of-a-feather tables that will feature career-oriented topics to stimulate and aggregate discussions/interests. Open to all interested in promoting women in entomology.  
**No sign-up necessary!**

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## Welcome Message from the ICE Co-Chairs



Walter S. Leal



Alvin M. Simmons

On behalf of the 2016 XXV International Congress of Entomology (ICE) Organizing Committee, it is a distinct honor and pleasure to welcome each of you to Orlando, Florida, USA. The last time ICE was held in the USA (1976), delegates presented 551 oral papers and posters. For ICE 2016, nearly 6,000 oral and poster presentations, including 298 symposia, have been accepted, and the largest gathering of entomologists in history (over 6,500 delegates) is assembling. Among the highlights are keynote talks by two Nobel Laureates and talks by eight

plenary speakers. All aspects of entomology will be addressed within 30 subject sections. Papers among these entomological subjects will be presented within 50 concurrent sessions. Scientists of various disciplines are being represented at this Congress. Although not directly a part of the Congress, several workshops and satellite symposia will be held in conjunction with the Congress. The Entomological Society of America (ESA) is the host society for ICE 2016.

The theme of this Congress, “Entomology Without Borders,” is fitting for many reasons. Entomology has gone beyond borders in the 21st century. In this global system, there are increased challenges and opportunities. With its multidisciplinary approach, entomology explores new scientific frontiers. Arthropods do not respect human-established geographical borders. The ease of international transportation and global trade allows the convenient dispersal of arthropods and associated diseases affecting humans, animals, and plants. Changes in climatic boundaries, urban population development, and agro-ecosystem borders have implications for population dynamics of both native and invasive species. In our interconnecting world, it is essential that international stakeholders come together to solve entomological problems of mutual interest. Electronic systems and devices make it more convenient to communicate globally regarding entomological problems and solutions, and in forging collaborations. Therefore, this Congress was organized in concert with the Congress theme, and delegates from 97 countries are convening.

Many domestic and international colleagues (representing 32 countries) contributed to the organization of this historical premier entomological event, and our thanks are extended to them. We also thank the ESA staff members for their support. We acknowledge and value the participation of each delegate at this Congress whose combined contribution will provide a rewarding event for the entire Congress. We also very much appreciate the financial and in-kind support from sponsors and international societies and organizations.

The venue, the Orange County Convention Center, is a spacious facility that has all of the conveniences to meet our needs. Whether you avail yourself of professional tours or explore on your own, activities are unlimited in Orlando, throughout Florida, and across the USA. We are certain that this Congress will be rewarding professionally as well as personally for each of you, and we trust that you will have fond memories of your time at ICE 2016 in the USA.

Welcome back to the USA!

Handwritten signature of Walter S. Leal in black ink, with a small circular logo to the right.

**Walter S. Leal**  
ICE 2016 Co-Chairs

Handwritten signature of Alvin M. Simmons in black ink.

**Alvin M. Simmons**



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## Welcome Message from ESA President May Berenbaum



It's customary for the President to welcome everyone to the Annual Meeting of the Entomological Society of America (ESA) (our 64th), and to the host city (Orlando, Florida, for the first time), but this year I have the ineffable pleasure of welcoming you all to the XXV International Congress of Entomology (ICE) at the same time. It has been 40 years since ESA President Ray Smith welcomed 2,315 attendees, from 72 countries, to the XV International Congress of Entomology in Washington, D.C. I wasn't there—as a second-year graduate student, it was beyond my imagination to attend such an important meeting (and, truth be told, I wasn't yet an ESA member; I didn't join until spring 1981, my first year as an Assistant Professor of Entomology). Now, as President, I'm welcoming you to a meeting that promises to break all kinds of records, both in terms of the number and diversity of attendees and the breadth of topics covered. Appropriately enough, the USA seems to have super-sized ICE.

The theme of this Congress and our Annual Meeting is “Entomology Without Borders,” as befits the globalization of 21st century science in general, and ESA's strategic principle stating that, because the science of entomology is global, ESA must also act globally. Although there remain entomological challenges that are strictly regional (e.g., pests of Brazil nuts?), most of the challenges—and opportunities—are now thoroughly international in nature. Since it was first convened in 1910, ICE has been dedicated to promoting international communication and collaboration among entomologists, but today the benefits of sharing knowledge and working together simply can't be overstated. As in 1976, ICE will be the Annual Meeting of the Entomological Society of America, and, as well, the Annual Meeting of the Entomological Society of Canada, the Annual Meeting of the Florida Entomological Society, and International Branch of the ESA, and it will be the site of co-located meetings of the Entomological Society of China, the International Union for the Study of Social Insects North American Section, the International Organisation for Biological and Integrated Control, the Union of Japanese Societies of Insect Science, and the Sociedade Entomológica do Brasil.

Many of the same challenges that occupied ICE15 attendees in 1976 can be found among the symposia on the program for ICE25—such basic pursuits as tackling the systematics of hyperdiverse taxa, the physiology of adaptation to extreme environments, and the sensory biology of insect communication, and such practical challenges as managing invasive species, pesticide resistance, and arthropod-borne disease. But over the past 40 years, new tools, new approaches, and two generations of new investigators have led to astonishing progress. At ICE25, entire symposia are devoted to subjects that would have seemed like fantasy 40 years ago—gene editing technologies, microbiomes, unmanned aerial drones for mosquito control, genetically modified insecticidal crops, stable isotope “fingerprinting,” and the Zika virus pandemic, to cite a few. Another new emphasis for ICE25, and a new priority for ESA, is science communication and citizen-science, necessitated by the progressive erosion in public trust in scientists on many issues relevant to entomology.

One of the strategic principles of ESA is that, to realize our profession's full potential, ESA must increase its influence at home and abroad. Toward that end, on the heels of convening a Summit of the Americas on *Aedes aegypti* in March 2016 with the Sociedade Entomológica do Brasil in Maceió, Brazil, and a symposium on Integrated Tick Management in Washington, D.C., with the Centers for Disease Control and Prevention in May 2016, ESA is using its convening power to hold a summit of leaders of the global entomological community to develop a grand challenge agenda for developing solutions to societal problems relating to insects at ICE25.

Going global—pulling together what will likely go down as the largest meeting in the history of the science—has been a herculean task and we were all fortunate that two herculean heroes, Walter Leal of University of California-Davis and Alvin Simmons of USDA-Agricultural Research Service, South Carolina, stepped forward to take on the task. Just as the mythological Hercules had a little help from a couple of deities to tackle his 12 Labors, Walter and Alvin were ably assisted by the ESA Annual Meeting Co-Chairs, Jesus Esquivel (USDA-Agricultural Research Service, Texas) and



# Join the Fun in the ESA Booth

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Free **insect balloons** by Karen Climer Balloon Twister

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**ESA Certification** program information

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## Exhibit Hall Hours:

September 25, 7:30 p.m. – 9:30 p.m.

September 26, 9:00 a.m. – 5:00 p.m.

September 27, 9:00 a.m. – 5:00 p.m.

September 28, 9:00 a.m. – 1:00 p.m.

September 29, 9:00 a.m. – 5:00 p.m.

September 30, 9:00 a.m. – 2:00 p.m.

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Catherine Loudon (University of California-Irvine); Alvin also served as ESA Annual Meeting Co-Chair along with the many other members of the Program Committee. This group handled the complexity with efficiency, persistence, and good cheer, putting Hercules, with his measly 12 Labors, to shame.

And WHAT A PROGRAM! There's a spectacular lineup of plenary speakers, including members of the National Academy of Sciences and the Royal Society, as well as two Nobel Laureates—Peter Agre of Johns Hopkins University and Jules Hoffmann of University of Strasbourg. And, for the first time since 1928, Cuba will be represented in a U.S.-based ICE: Juan Andres Bisset Lazano will speak on *Aedes aegypti* management for dengue control. There are 298 symposia (approximately triple the number in 1976) and close to 1,000 posters (up almost an order of magnitude since 1976, when poster sessions were described in the program as “a recently developed means of handling a large number of contributed papers”). One statistic of which ESA can be particularly proud is the dramatic increase in student participation: With more than 500 Student Competition 15-Minute Papers and more than 250 Student Competition Posters, students are involved in unprecedented numbers, consistent with ESA's strategic principle to provide opportunities for professional development for all of its members, at all stages of their careers. New for ICE 2016 are virtual posters, posted online and available during the meeting, as well as remote presentations via Skype or prerecorded video, making use of technology that didn't exist in 1976. Also, ICE25 will host the first International Linnaean Games, the first International Student Debate, and an Insect Expo planning on over 6,000 school-age visitors.

Beyond those involved in the planning effort, thanks are due to the hundreds of volunteers who will be there at the Congress to make sure everything planned actually happens. And deserving of special thanks are the incredibly hard-working and endlessly capable staff members that we as a Society are extraordinarily fortunate to have in our corner. They include David Gammel, Executive Director; his assistant Nikki Olin; Director of Strategic Initiatives Chris Stelzig; Director of Meetings Rosina Romano; Program and Meetings Manager Becky Anthony; Manager of Meetings and Exhibits Cindy Myers; Director of Membership and Marketing Debi Sutton; Certification and Office Administrator Matthew Chism; Director of Finance Neil Willoughby; Staff Accountant Alexis Lyons; Data Manager Katherine Matthews; Director of Publications Lisa Junker; Manager of Publications Josh Lancette; Communications Program Manager Richard Levine; and Marketing and Web Manager Laura Sparks.

My term as ESA President has been a wild ride—so Orlando as a venue seems especially appropriate. There are all manner of wild rides for visitors to Orlando, which ranks as a top U.S. tourism destination. It's a paradise for visitors, with amusement parks, water parks, botanical gardens, zoos, aquaria, and, of course, Disney World (not to mention Universal Studios' newest attraction, The Wizarding World of Harry Potter). And, fortunately for us, September is generally regarded as one of the best times to visit Orlando. Not only is the weather generally pleasant, with daily temperatures ranging between 72°F (23°C) and 91°F (33°C), it's also among the least crowded months to visit the theme parks. We want you to enjoy the venue and have left Wednesday afternoon lightly scheduled so that those so inclined can check out the local attractions (offering discounts for some, too). Beyond Disney World, there's the natural world to enjoy. Florida is a biodiversity hub for America—Orange County alone is home to more than 100 species of butterflies and skippers—and the optional tours and post-Congress programs provide opportunities to experience the diversity first-hand, with choices including an airboat tour of swamps and marshes in a nearby wildlife park in Central Florida's Everglades, a trip to Cocoa Beach on a barrier island along Florida's Central East Coast, an overnight excursion to the famed Archbold Biological Station in the midst of Florida scrub, and a visit to the McGuire Center for Lepidoptera and Biodiversity, housing most of the world's 20,000 butterfly species.

Orlando occupies an important place in entomological history—it's where the insect repellent DEET, or diethyltoluamide, was developed at the Bureau of Entomology and Plant Quarantine in 1952, and it's the type locality for many insects, including one thrips and at least two parasitoid hymenopterans. ICE25 is yet another opportunity to make entomological history in Orlando—I look forward to seeing you there!



**May Berenbaum**  
ESA President



## 5 GREAT WAYS TO BUILD THE FUTURE OF ENTOMOLOGY...

**The Entomological Foundation is building the future of our profession by supporting the needs of educators in grades K-12. We promote science literacy through insect-based education. Please help support our work through these exciting events. Stop by the ESA Booth in the Exhibit Hall to learn more.**

**1**

The *Entomological Foundation Raffle* will be your chance to win one of a couple of great prizes, featuring a 64 GB iPad mini 4 or even a VIP package to attend Entomology 2017, including:

- Free VIP registration to Entomology 2017
- Free roundtrip domestic airfare to and from Denver, CO
- Free suite accommodations for 5 nights in Denver, CO
- Free roundtrip airport ground transportation
- Free invitation to the Governing Board reception



Raffle tickets are \$5 for 1, \$10 for 3, \$15 for 5, or \$20 for 10 tickets and a free Insect Diversity poster. Buy your raffle tickets online prior to the meeting, or in the ESA Booth on the Exhibit floor. The drawing will be held Friday evening at ESA's closing session. You do not need to be present to win. See [www.entfdn.org/pr\\_raffle.html](http://www.entfdn.org/pr_raffle.html) for details.

**2**

The *Silent Auction* is always one of the most popular events at the ESA Annual Meeting. Featuring donations from our supporters and vendors, this is a great chance to do some early holiday shopping for many insect-themed items and support the future of your profession at the same time. Bid early, bid often from Sunday through Friday.

**3**

Let's face it. Nothing says "I support entomology" quite like a financial contribution. We are working hard to fulfill the needs of educators and need your support to make that happen. **Please join us and financially support** the Entomological Foundation as part of your annual ESA renewal, year-end philanthropy, or just because. Donate year-round at [www.entfdn.org](http://www.entfdn.org).

**4**

This is a new era for the Entomological Foundation. We need your input, support, and **volunteerism** to help direct our efforts in the future. There are committee openings now and you can sign on to help build our future. Stop by the ESA Booth to learn how you can become more involved. Volunteers are needed for 2017 events and projects. Volunteer Today!



**5**

In need of literary resources? Consider purchasing your next **textbook** from the Entomological Foundation. Textbook selection includes topics on zoology, physiology of insects, insect conservation, soil ecology, migration, biological diversity, and more. Go to <http://shops.half.ebay.com> and enter `entomological_foundation` in the "Find a Seller" box on the left-hand side of the site.





## USEFUL INFORMATION FOR TRAVEL WITHIN THE UNITED STATES

### ● ATMS

Automated Teller Machines (ATMs) are located within the Orange County Convention Center and all ICE Congress hotels and are accessible 24 hours a day.

### ● CLIMATE

The temperature in Orlando in September ranges between 72°F (evening) and 91°F (daytime), with some expected rainfall.

### ● CURRENCY

The unit of American currency is the dollar (\$). Coin denominations are \$.01, \$.05, \$.10, \$.25, \$.50, and \$1. Banknotes are \$1, \$5, \$10, \$20, \$50, and \$100. Foreign banknotes and traveler's checks can be exchanged at foreign exchange banks (located at the airport) and local banks. Credit cards are widely accepted forms of payment at most business establishments. The most popularly accepted are Visa, MasterCard, and American Express. Traveler's checks are accepted at major hotels and attractions.

### ● OFFICIAL LANGUAGE

English is the official language of the International Congress of Entomology and all scientific sessions and posters should be presented in English.

### ● ELECTRICITY

In the U.S., 120-volt outlets are standard. Always check the power supply before charging your equipment.

### ● EMERGENCIES

In the event of an emergency outside of the Convention Center or hotel, dial 911 for local police, fire, or ambulance response.

### ● LOCAL TIME

The local time in Orlando is Eastern Standard Time (EST) and is UTC/GMT -4 hours.

### ● SMOKING

Smoking is prohibited in all buildings and at all ICE events.

### ● TELEPHONE CALLS

To place an international call, dial the US exit code (011) + the Country Code (a two-digit number) + the phone number.

### ● TIPPING

Tipping is customary within the U.S. for many service positions. Below is a general guide to tipping service professionals:

Restaurants .....	15% – 20% of the full check
Taxis .....	10% – 15% of the fare
Bellman .....	\$1 – \$2 per bag
Housekeeper .....	\$3 – \$5 per day
Bartender .....	\$1 – \$2 per drink
Valet .....	\$2 – \$5 when your car is returned
Porter or Skycap .....	\$1 – \$3 per bag

## ABOUT ORLANDO



Orlando, Florida, host for the XXV International Congress of Entomology, is a family-friendly, fun, easily accessible, and affordable city. One of its biggest draws is the year-round sunny, mild weather. It is also known for its world-top amusement/theme parks and attractions including Walt Disney World, Universal Orlando, and SeaWorld. The Convention Center area is the center of the entertainment, dining, and shopping district on International Drive (also known as "I-Drive") and is located in the center of all of the area attractions. Plan extra time around the meeting to explore all that Orlando has to offer.



# A Grand Challenge Agenda for Entomology

*Convening the global community of entomologists  
to improve the human condition*

As the largest insect-science society in the world, the Entomological Society of America is convening a global initiative to engage and empower other entities worldwide to take on grand challenges we face in the coming decades. The effort will bring together top scientists, policymakers, industry groups, NGOs, funders, and other organizations to create alliance-based coalitions to implement sustainable solutions to some of the world's insect-based problems.

Learn more about upcoming meetings, the esteemed Board of Advisors,  
and how you can support this important initiative:

[www.entomologychallenges.org](http://www.entomologychallenges.org)

Subscribe for updates: [www.goo.gl/Jyvljq](http://www.goo.gl/Jyvljq)

Entomological Society of America  
3 Park Place, Suite 307, Annapolis, MD 21401-3722 USA  
tel: +1-301-731-4535; fax: +1-301-731-4538  
[esa@entsoc.org](mailto:esa@entsoc.org)

# ORANGE COUNTY CONVENTION CENTER

Known as “The Center of Hospitality,” the Orange County Convention Center (OCCC) will be the site of all plenary, scientific, oral, and poster presentations for the duration of ICE. The OCCC is located in the heart of Downtown Orange County, minutes from the Orlando International Airport and within easy walking and driving distance of world-class dining, shopping, and entertainment. All ICE events at Convention Center will be held in the West building. The physical address is 9800 International Drive.

## GROUND TRANSPORTATION

Attendees for ICE will have a plethora of transportation options to get out and about to see the city of Orlando. It all starts when you arrive!

### ● ORLANDO INTERNATIONAL AIRPORT SHUTTLES

Complimentary shuttles for ICE attendees staying at the official hotel partners (listed in the hotel section on page 13) will depart from the first floor ground transportation area of the Orlando International Airport (MCO) every 30 minutes during the following dates and times:

Saturday, September 24	10:00 AM – 10:00 PM
Sunday, September 25	5:00 AM – 10:00 PM

Attendees should collect bags on the second floor baggage claim area and proceed to the first floor to ground transportation to meet with an ICE transportation coordinator.

To return to the airport, buses will depart from all of the ICE official hotels and the OCCC to the airport every 30 minutes during the following dates and times:

Friday, September 30	12:00 PM – 8:00 PM
Saturday, October 1	4:00 AM – 12:00 PM

Buses will depart from the same bus transportation area being used for the daily circular shuttle pick-up.

### ● HOTEL AND OCCC DAILY CIRCULAR SHUTTLES

Daily shuttles will run continuously from all ICE official hotels and the OCCC during the following times:

Sunday, September 25	10:30 AM – 10:30 PM
<i>Peak hours: 3:00 PM – 10:30 PM</i>	

Monday, September 26	5:30 AM – 11:00 PM
<i>Peak hours: 7:00 AM – 10:00 AM and 4:30 PM – 8:30 PM</i>	

Tuesday, September 27	5:30 AM – 12:00 AM
<i>Peak hours: 7:00 AM – 10:00 AM and 4:30 PM – 8:30 PM</i>	

Wednesday, September 28	5:30 AM – 6:00 PM
<i>Peak hours: 7:00 AM – 10:00 AM and 12:00 PM – 4:00 PM</i>	

Thursday, September 29	5:30 AM – 11:00 PM
<i>Peak hours: 7:00 AM – 10:00 AM and 4:30 PM – 8:30 PM</i>	

Friday, September 30	5:30 AM – 11:00 PM
<i>Peak hours: 7:00 AM – 10:00 AM and 5:00 PM – 11:00 PM</i>	

Shuttles will depart from designated shuttle service areas for each of the major hotels. For limited service hotels, shuttles will depart from the hotel’s main drive. During peak hours, shuttles will run every 10 minutes; during non-peak hours, shuttles will run every 30 minutes.

Mobility accessible shuttle service is available by request. Please contact +1 863-692-6843 to set up a pick-up.

### ● PARKING (OCCC)

For attendees who plan on driving to the Orange County Convention Center, we have designated parking areas for the West Concourse parking lot. Event-specific parking areas will be listed on overhead electronic (Dynamic Message System) signage on International Drive and the surrounding area. All parking at the Orange County Convention Center is available on a first-come, first-served basis, including accessible parking.

The fee for parking at the OCCC is \$15 per car per entry and \$25 for oversized vehicles, i.e., buses, per entry. After 5:00 PM, the charge is \$10 per car per entry and \$15 per oversized vehicle per entry. The OCCC accepts cash, traveler’s checks, American Express, MasterCard, and Visa.

### ● I-RIDE TROLLEY

The I-Ride Trolley is a convenient option for traveling via International Drive, connecting you to all of the nearby restaurants, shops, and attractions. Stops are located all along International Drive. The trolley runs daily from 8:00 AM to 10:30 PM and fares start at \$2 USD per rider, one-way. For a map of all the stops and pass options see the Wednesday tab.

### ● UBER DISCOUNT

Need to get out and see more of the city? Uber is offering new users of the service \$20 off your first ride for ICE attendees. Download the app to your smartphone and use the promo code **UBERON20** for your discount.

## HOTELS

The following hotels connect via elevated walkways to the OCCC:

- Hyatt Regency Orlando • 9801 International Drive
- Rosen Centre Hotel • 9840 International Drive
- Rosen Plaza Hotel • 9700 International Drive

The following hotels are located within a 15-minute walk to the OCCC:

- Clarion Inn & Suites International Drive  
9956 Hawaiian Court
- Days Inn Orlando Convention Center/International Drive  
9990 International Drive
- Red Roof Inn Orlando Convention Center  
9922 Hawaiian Court
- Rosen Inn at Pointe Orlando  
9000 International Drive

All hotels are on the daily circular shuttle connecting you to the OCCC. See the ground transportation schedule on page 13 for details.

# Don't just say you're a Professional. Prove it.



The ACE program makes professional entomology-based certification possible for those without a formal degree in entomology. If you have extensive experience and knowledge in entomology through on-the-job training, experience, and self-study, you may qualify to become an ACE.

## ACE International

And, just like the ICE 2016 theme suggests, *Entomology is without Borders*. That's why we are proud to offer our ACE certification program to an international audience, giving pest management professionals across the globe access to the same professional credentialing that U.S.-based PMPs have enjoyed since 2004.



## Want to ACE the exam?

### ACE Maker



Designed as a study guide for those pursuing their ACE certification, *IPM for the Urban Professional* also serves as a comprehensive introduction to the concepts of integrated pest management (IPM); basic classification, identification points, and pest biology; an outline of pesticide concepts; and an overview of important safety and regulatory issues. The book fills a gap in the structural pest control book market: It is far more comprehensive than an introductory overview, but does not get bogged down in the details on specific management techniques for every structural pest.

### Back Breaker



The best way to pass this exam is to study. And, the best book to study with is *IPM for the Urban Professional*. **Buy a discounted copy in the ESA Central booth and save the shipping fees.**

[www.entocert.org](http://www.entocert.org)





## GENERAL INFORMATION

### Registration and Information Center

The Registration and Information Center will be located at the Orange County Convention Center in the West C Lobby during the following times:

Saturday, September 24	2:00 PM – 6:00 PM
Sunday, September 25	10:00 AM – 9:00 PM
Monday, September 26	7:00 AM – 5:00 PM
Tuesday, September 27	7:00 AM – 5:00 PM
Wednesday, September 28	7:00 AM – 12:00 PM
Thursday, September 29	7:00 AM – 5:00 PM
Friday, September 30	7:00 AM – 12:00 PM

*Registration and Information Center phone number:*  
+1 407-685-4003

Attendees can pick up their registration materials at the Registration and Information Center. ESA staff and student volunteers are always available to answer your questions.

### Cancellation and Refund Policy

ESA will honor cancellation refunds in full for the Congress until 11:59 PM EDT, July 31, 2016. Partial refunds will be granted for requests submitted August 1–31, 2016 (20% service charge will apply). No refunds will be granted for cancellations received after September 1, 2016. Please submit cancellation requests via e-mail to [nwilloughby@entsoc.org](mailto:nwilloughby@entsoc.org). Requests can also be faxed to +1 301-731-4538. All refunds will be processed after the Congress, and no refunds will be made for on-site registrations.

Any tour reservation must be cancelled no later than September 1, 2016, to receive a refund. If insufficient tour enrollment causes a professional or destination tour to be cancelled, ESA will issue a full refund after the meeting closes.

### Certificates of Presentation and Attendance

Presenters can download and print on-site certificates of presentation and attendance in the Presentation Preview Room (PPR) in Room W221 AB in the Orange County Convention Center (OCCC) after their presentation has taken place. For hours of operation of the Presentation Preview Room, please see page 24. Attendees who did not present during the Congress may request certificates of attendance at the Registration and Information Center. Certificates will also be available for download via Speaker's Corner after the conference ends; a personalized link will be provided via e-mail after the Congress.

### Concessions and Refreshments

Centerplate catering at the Convention Center is offering a wide variety of breakfast, lunch, and snack options for purchase each day as well as several coffee carts located throughout the Center.

Breakfast and lunch will be available in the West Hall F foyer. In addition, West Hall D foyer and the Exhibit Hall (West Hall C) will each serve lunch options each day. A variety of cuisines will be featured daily including crepes, omelets, breakfast sandwiches,

yogurt, pizza, sandwiches and other cuisines. Food for purchase will include gluten-free, dairy-free, vegan and halal choices at a variety of price points.

### Business Center (FedEx Office)

The on-site FedEx Office Business Center offers a variety of services right from the main floor of the OCCC, offering all of the amenities of a full-service FedEx Office. Your shipping, copying, binding, printing, and signage needs can be handled on-site, prior to or during the Congress. From last-minute supplies to overnight shipping, the FedEx Office is available to serve your business demands.

The FedEx Office is set up to print your posters in advance and have them available for on-site pickup within the Convention Center. PDFs of your poster presentation may be submitted online in advance of the meeting. Payment may be made online or on-site during pickup. For more information or to submit your poster, please visit [ice2016orlando.org/scientific-program/poster-information/fedex-office-posters/](http://ice2016orlando.org/scientific-program/poster-information/fedex-office-posters/) or call +1 407-363-2831.

### Career Center

The Career Center will be set up in Exhibit Hall C in the Convention Center. Review current position openings and/or drop off your résumé. Operating hours are:

Sunday, September 25	7:30 PM – 9:30 PM
Monday, September 26	9:00 AM – 5:00 PM
Tuesday, September 27	9:00 AM – 5:00 PM
Wednesday, September 28	9:00 AM – 1:00 PM
Thursday, September 29	9:00 AM – 5:00 PM
Friday, September 30	9:00 AM – 2:00 PM

### Code of Conduct

By attending ICE 2016, you agree voluntarily to abide by our ethics policy.

**Authorship:** All authors connected to a presentation and/or abstract must agree on all information contained in the presentation. Failure of an author to agree to the presentation format will lead to the presentation being withdrawn from the conference.

An author who submits a presentation to the International Congress of Entomology must have intentions of attending, registering, and presenting at the meeting once the submission is accepted into the program. Repeated or consecutive last-minute cancellations by presenters may result in future submissions being denied.

**Harassment and Safety:** ESA is dedicated to providing a safe, hospitable, and productive environment for everyone attending our events, regardless of ethnicity, religion, disability, physical appearance, gender, or sexual orientation. It is important to remember that a community where people feel uncomfortable or threatened is neither healthy nor productive. Accordingly, ESA prohibits intimidating, threatening, or harassing conduct during our conferences. This policy applies to speakers, staff, volunteers, and attendees. Conference participants violating these rules may be sanctioned or expelled from the conference, at the discretion of ESA leadership.

Harassment of ICE 2016 participants will not be tolerated in any form. Harassment includes offensive gestures or verbal comments related to ethnicity, religion, disability, physical appearance, gender, or sexual orientation in public spaces, deliberate intimidation, stalking, following, harassing photography or recording, sustained disruption



# ICE 2016

**XXV International  
Congress of Entomology**  
Orlando, Florida, USA  
September 25–30



## Purchase a Colorful Print to Commemorate ICE 2016 and ESA's 64th Annual Meeting!

The original signed and numbered silk-screened print captures the spirit of this important international event. Only 250 original posters have been produced so they are a collector's item!

In a variety of blues and greens, the poster highlights the Congress theme, "Entomology Without Borders", the dragonfly from the logo, and the palm trees and iconic Spaceship Earth ball that so easily identify the host city of Orlando, Florida.

The poster measures 12" wide by 18" high and comes in a sturdy protective envelope so you can carry it home.

PRICE: \$20.00 IF PURCHASED IN THE ESA BOOKSTORE. WHILE SUPPLIES LAST. PLEASE HAVE EXACT CHANGE OR A CREDIT CARD TO PURCHASE.

*Continue your collection of ESA commemorative posters—don't miss this one!*



*Sharing Insect Science Globally • [www.entsoc.org](http://www.entsoc.org)*



*Sharing Insect Science Globally*

## Renew Your ESA Membership During ICE 2016



*We have a special gift for the first 100 members to join or renew during ICE 2016!*

ESA is a vital source of news, knowledge, and information about the entomological sciences. Renew your membership today and continue to join over 7,000 members around the world in discussions, research, learning, advocacy, diversity, and camaraderie. Build your contacts, advance your career, take advantage of no page charges in ESA subscription journals, access an expansive library of research and reference materials, and be recognized by colleagues.

Renew your 2017 membership early to take advantage of a full year's worth of benefits. Stop by the ESA booth in the center of the exhibit floor during ICE 2016 or renew at the Registration Desk!



of talks or other events, inappropriate physical contact, and unwelcome attention. Participants asked to stop any harassing behavior are expected to comply immediately.

If a participant or exhibitor engages in harassing behavior, ESA leadership may take any action they deem appropriate, ranging from a simple warning to the offender to expulsion from this and future conferences. If you are being harassed, notice that someone else is being harassed, or have any other concerns, please do not hesitate to contact ESA staff, who can work with appropriate ESA leadership to resolve the situation.

ESA staff will be happy to help participants contact convention center/hotel/venue security or local law enforcement, and otherwise assist those experiencing harassment, to enable them to feel safe for the duration of the conference. We value your attendance, and want to make your experience as productive and professionally stimulating as possible.

**Need to file a complaint?** Please contact Sherry Marts, sherry@smartsconsulting.com, +1 202-670-7746.

## Camp ICE – Child Care Services

Salons 13 and 14, Rosen Plaza Hotel

Connected to the Convention Center via Skybridge  
Phone: +1 407-996-2411

Camp ICE is a complimentary Child Care Service for children between the ages of 2 and 12 years old and is available to all registered ICE attendees. This service is run and operated by a licensed and insured Child Care Company (ACCENT on Children's Arrangements, Inc). ACCENT was founded in 1991 to offer parents the ability to be able to concentrate on their work and not to be distracted and worried about what is going on with their children. ACCENT provides on-site age-appropriate, curriculum-enriched environments for the children while parents can attend the meeting knowing their children are safe and happy.

Registration in advance is highly recommended and on-site registration is subject to availability. Camp ICE will be offered during the following times:

Monday, September 26	7:30 AM – 6:00 PM
Tuesday, September 27	7:30 AM – 6:00 PM
Wednesday, September 28	7:30 AM – 12:30 PM
Thursday, September 29	7:30 AM – 6:00 PM
Friday, September 30	7:30 AM – 6:00 PM

Please note that while Camp ICE is free, there will be a \$30 cancellation fee per day per child to anyone who cancels with less than 48 hours in advance or does not show up during the scheduled times. In addition to the cancellation fee, there is a \$10 processing fee for any cancellations.

## Coat/Bag Check

Attendees will be able to check their coats and bags at the Coat/Bag Check located in the main foyer near the registration and information center. This service is provided complimentary to you.

Sunday, September 25	11:00 AM – 10:00 PM
Monday, September 26	7:00 AM – 7:00 PM
Tuesday, September 27	7:00 AM – 8:00 PM
Wednesday, September 28	7:00 AM – 5:00 PM
Thursday, September 29	7:00 AM – 8:00 PM
Friday, September 30	7:00 AM – 11:00 PM

On Friday, September 30, guests traveling to the airport can print a boarding pass, check-in their bags direct to the airline and skip checking in bags at the airport. This bag check service is only available for domestic flights with the following participating airlines: Alaska, American, Delta, jetBlue, Southwest, United, and US Airways. The fee for this service is \$15 USD per bag in addition to any airline baggage fees and must be checked in three hours prior to the scheduled flight. This service will be available from 7:00 AM – 3:00 PM.

## Complimentary Coffee and Tea

Sponsored by: **MONSANTO**



Complimentary tea and coffee service will be provided daily (Monday – Friday) at 10:15 AM and 3:00 PM in convenient locations around the convention center. Be sure to savor a cup, compliments of Monsanto!

## Cyber Café and Charging Station

Sponsored by:  Science For A Better Life

If you left your laptop at home, we have you covered! Just head to the Exhibit Hall (Hall C) during regular exhibit hours, where you can use the computer stations located in the Cyber Café to check your e-mail.

Need a quick charge for your phone, tablet, or other mobile device? Charging stations will be set up in the Cyber Café and the ESA Membership Booth with power supply and a selection of popular chargers for you to stay connected while in Orlando.

## First Aid/Medical Emergencies

If first aid services are needed while in the Convention Center, please call +1 407-685-9808 (or from any house phone, dial 59808). Please have the following information ready: (1) your exact location, (2) the nature of the emergency, (3) whether the patient is conscious, and (4) whether there are life-threatening injuries, bleeding, etc. In a life-threatening emergency, dial 911. There is one permanent First Aid Station located in the lobby of Exhibit Hall C.

## Fitness Activities

Start each day with a healthy activity! Daily fitness classes will take place in the Hyatt Regency Orlando's Fitness Center. Classes are open to all attendees staying at any hotel. Each class is from 6:00 to 7:00 AM daily and something different is offered each day. Join us to kick-start your day!

**Monday, September 26: Morning Yoga**—An energizing morning yoga practice can work as a natural stimulant to set you up for a productive day. This back-bending sequence will help warm up the body and bring you from repose to refresh.

**Tuesday, September 27: Cardio Class**—Start your day with a high-energy class to get you moving and grooving for the start of the first scientific sessions!

**Wednesday, September 28: Morning Meditation**—Join us for guided meditation to start your day focused and energized for the free-afternoon activities.

**Thursday, September 29: RevUp Spin Class**—Jump on a bike and spin your way to an energized mind and body by working up a sweat in this high-intensive morning class!



**Friday, September 30: Morning Yoga**—An energizing morning yoga practice can work as a natural stimulant to set you up for a productive day. This back-bending sequence will help warm up the body and bring you from repose to refresh.

## Guest Hospitality

Accompanying guests of registered attendees are invited to register as guests and have access to the Exhibit Hall, Welcome Reception, Plenary sessions, and Linnaean Games, as well as to the presentation given by the primary registrant. A guest hospitality room will be set up daily from 8:00 AM to 6:00 PM in Salon 5 of the Rosen Centre Hotel. Here you will find brochures to all of the local attractions. Discounted tickets may be purchased online at [ice2016orlando.org](http://ice2016orlando.org) under “Travel and Hotel”, the attractions desk at the OCCC, or your hotel concierge. Each hotel offers different transportation options to the local area resorts. Be sure to check with your hotel for its schedule.

A welcome program will be hosted by the ICE Organizers on Monday, September 26, from 10:00 AM to 11:45 AM in the hospitality room, Salon 5 of the Rosen Centre Hotel.

**Moderator:** Cindy McKenzie, USDA-Agricultural Research Service, Fort Pierce, FL, USA

- 10:00 AM Welcome from Visit Orlando. Casey Sofka, Visit Orlando, Orlando, FL, USA
- 10:15 AM Beekeeping from Antiquity through the Middle Ages. Gene Kritsky, Mount St Joseph University, Cincinnati, OH, USA
- 10:30 AM Insects in Fireworks. Joe Coelho, Quincy University, Quincy, IL, USA
- 10:45 AM Insects in the World of Fiction. Erin Bauer, University of Nebraska, Lincoln, NE, USA
- 11:00 AM Insects and Popular Music. Stephen Clarke, USDA-Forest Service, Lufkin, TX, USA
- 11:15 AM Insects in Video Games. Matan Shelomi, Max Planck Institute for Chemical Ecology, Jena, Germany
- 11:30 AM Insect Ventriloquist. Hannah Leskosky, North Hollywood, CA, USA

## Internet Access

Complimentary internet access is available in all guest rooms. Complimentary Wi-Fi access will be provided in the public and meeting space for ICE attendees at the OCCC, the Rosen Centre Hotel, and the Rosen Plaza Hotel.

Password login is required at all facilities. Connect to the SSID network, open a browser and enter the associated password.

Convention Center SSID network: ICE2016  
Password: ICE2016!

Rosen Centre Hotel SSID network: Convention Wireless  
Password: ICE2016

Rosen Plaza Hotel SSID network: Convention Wireless  
Password: ICE2016

## Lost and Found

All lost and found items should be taken to the Security Command Station located inside the Exhibit Hall (West Hall C). To contact the Lost and Found, please call +1 407-685-4004.

## Meditation Room/Prayer Room

The Interfaith Prayer and Meditation Room is available for prayer, meditation and religious observances. Limited seating and travel prayer mats will be available on a first-come, first-served basis. Attendees are welcome to bring additional items for reflection. Please refrain from cell phone use and silence your phones before entering. This space is open all hours of the Congress and is located in Room W334 in the Convention Center.

## Mobile App

Sponsored by:  **Dow AgroSciences**

Enhance your experience at the International Congress of Entomology by downloading the ICE 2016 mobile app. Access the latest program information and schedules, stay organized with the show dashboard, create a personal schedule, link to exhibitors, connect with other attendees, and join in the show chatter with the built-in social media feeds— all from your smartphone. The app is fully integrated with the abstract management system so you will always have the latest information at your fingertips. Downloading the app for ICE 2016 is easy. For iPhone and Android, visit the App Store or Android Market on your phone and search for ICE 2016.

## Mothers' Room

ICE offers a comfortable, private space for nursing mothers within the Convention Center. Please stop by the Registration Desk and Information Center for room location and access information.

## Press

Members of the media who have preregistered can pick up their press passes at the Registration Desk. Those who have not yet registered can request passes; however proper media credentials must be presented upon arrival at the International Congress of Entomology, and the credentials must show a direct affiliation with an accredited news organization (print, TV, or radio) or membership with the National Association of Science Writers (NASW). Public information officers from universities with proper credentials and identification may also receive press passes.

Freelance journalists who do not have media credentials and who are not NASW members will generally not receive press passes, but exceptions will be considered on a case-by-case basis. Requests can be made by calling +1 301-602-8953.

Companies or organizations producing publications, videos, and/or other electronic media intended for marketing, advertising, financial analysis, or public relations purposes may not register as members of the media. The Entomological Society of America (ESA) reserves the right to bar from this and future meetings any registered media personnel who, at the determination of ESA's Executive Director, misuse media privileges to engage in activities other than journalistic pursuits.



No member of the media will be permitted to record symposia, lectures, meetings, or other events without prior written permission from the organizers and the presenters; and no film or videotape may be broadcast or rebroadcast without prior review and written permission from the organizers. The press contact for the ICE 2016 is Richard Levine, rlevine@entsoc.org or call +1 301-602-8953.

## Restrooms

Restrooms are conveniently located throughout the Convention Center and all surrounding hotel properties and can be found on all maps located on pages 552-556.

Gender neutral restrooms in the Convention Center are located immediately outside the Exhibit Hall (West Hall C), West Hall F 1 (WF1), and on the 4th floor around the corner from the Chapin Theater. General neutral restrooms at the Rosen Centre Hotel can be found on second floor of the meeting space near the top of the escalators and at the Rosen Plaza Hotel across from the Grand Ballroom.

## Security

Security will be stationed throughout the Orange County Convention Center. If you see any suspicious activity, please call +1 407-685-4004.

## Social Media

Get connected to ICE 2016 before you arrive in Orlando. Organizers are connected to you via social media in a variety of ways. Use the Congress hashtag #ICE2016 to share your experiences with entomologists around the world!



**Twitter:** Staff and volunteers will be using Twitter for live updates, highlights from sessions, and more. Follow us by visiting [twitter.com/ICE2016\\_Orlando](https://twitter.com/ICE2016_Orlando). Twitter users can simply login and click "Follow."

View and participate in conversations on Twitter by using the hashtag #ICE2016. Don't have a Twitter account? You can still view our updates and even bookmark the ICE 2016 Twitter webpage.



**Instagram:** Join us on Instagram via the mobile app and post the best photos of your experiences in Orlando using the hashtag #ICE2016.



**Facebook:** Join the online community on Facebook around ICE 2016 at [facebook.com/ICE2016Orlando](https://facebook.com/ICE2016Orlando). Connect with your colleagues and share your photos and experiences.



**YouTube:** View videos from previous ESA conferences on our YouTube Channel ([www.entsoc.org/youtube](http://www.entsoc.org/youtube)). View the ICE 2016 videos as they are posted or hear the highlights planned for this year's conference!

Student volunteers will be recording video throughout the meeting to upload to the ESA Channel on YouTube. Videographers also will be interviewing presenters and others during the meeting. You could be on ESA's YouTube channel!

## Tours (Daily Tours)

All tours required advance registration. To inquire about tickets on-site visit the registration and information center.

### ● AIRBOAT AND WILDLIFE PARK

Wednesday, September 28 and Friday, September 30

8:00 AM – 1:30 PM

Fee: \$153 USD per person (lunch included)

Location: *Meet at the ICE Registration and Information Center*

Enjoy a closer look at alligators and exotic wild life as your guests glide on an exclusive airboat ride through 4,200 acres (1700 hectares) of untouched nature preserve. The swamp is free of any development and is 100% pure Florida wilderness. After your rides, guests will have their picture taken while holding a baby alligator. A portion of the funds generated from photos then supports the Florida Panther Society for continuing the preservation of Florida's nature and wildlife.

The Wildlife Park gives guests the opportunity to watch, touch, and even feed some of Florida's native land-dwelling animals, as well as various species of tropical birds. Get up-close to gators from the viewing dock in the gator pond! The Wildlife Park is also home to several beautiful exotic species including zebras, watusi, water buffalo, emus, and zebus.

A day in this park offers an amazing array of wildlife including bald eagles, deer, cows, boars, turkeys, alligators, and more!

### ● BACKSTAGE SAFARI AT DISNEY'S ANIMAL KINGDOM

Wednesday, September 28 • 1:00 PM – 5:00 PM

Fee: \$156 USD per person (does not include park admission nor is it required)

Location: *Meet at the ICE Registration and Information Center*

Due to its behind-the-scenes nature, participants must be 16 years of age or older.

Take a journey to find out what happens behind-the-scenes at Walt Disney World's Animal Kingdom! During this in-depth program, your guests get an insider's look at conservation, animal nutrition and medicine, animal care, and behavioral studies. Highlights include visits to a backstage animal housing area, the Animal Nutrition Center, the Veterinary Hospital, and a special ride on Kilimanjaro Safaris. The majority of this program takes place behind-the-scenes—there may be no opportunity to view animals. Please note: No photos will be allowed in behind-the-scenes area.

**Kilimanjaro Safari:** Climb aboard the open-air safari vehicle for an incredible journey through more than 100 acres (40 hectares) of African savannah, forest, rivers, and rocky hills where hundreds of animals roam free. Unlike any experience this side of the equator, the Kilimanjaro Safari introduces your guests to the splendor and magnificence of creatures both large and small. An unexpected twist takes guests on an adventurous trip in pursuit of a band of poachers while messages of conservation are echoed throughout the expedition.

This tour takes place partly outdoors and includes moderate walking and stair climbing; we recommend participants wear comfortable shoes and dress for the weather.

# Download the ICE 2016 Mobile App!

Stay organized with up-to-the-minute Exhibitor, Speaker, and Event information

Receive important real-time communications from ESA

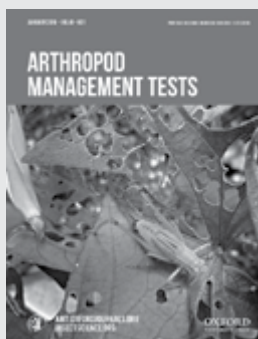
Build a personalized schedule and bookmark exhibitors.

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## ● COCOA BEACH

Sunday, September 25 and Wednesday, September 28  
9:00 AM – 3:00 PM  
Fee: \$58 USD per person (lunch included)  
Location: *Meet at the ICE Registration and Information Center*

Located on a barrier island nestled between the great Atlantic Ocean and the Banana River Lagoon on Florida's Central East Coast, Cocoa Beach continues to link the birth of the Space Age with the wonder of the future. Sun, brilliant blue sea, and warm sand all meet here at Cocoa Beach to offer you an exciting adventure in this spectacular beach-side paradise. Take time to explore the famous Ron Jon Surf Shop as well. Participants are encouraged to bring sunscreen, sunglasses, and towels, and wear comfortable shoes and clothing. Guests will have the day to enjoy the beach on their own.

## ● INSECT COLLECTING AT THE DISNEY WILDERNESS PRESERVE

Wednesday, September 28 • 12:00 PM – 6:00 PM  
Fee: \$45 USD per person  
Location: *Meet at the ICE Registration and Information Center*

At the Disney Wilderness Preserve, nature offers you a front-row seat to conservation at its best. Home to more than 1,000 species of plants and animals, the Disney Wilderness Preserve is an essential part of the Everglades ecosystem and contains 3,500 acres (1,416 hectares) of restored wetlands that act as nature's "sponges" in the landscape capturing rain, filtering out nutrients, and replenishing our ground water.

The core of the Disney Wilderness Preserve is comprised of what was once an 8,500-acre (3,440 hectares) cattle ranch situated at the head of the Greater Everglades watershed. In the early 1990s, the ranch was slated for extensive residential and commercial development, which would have spelled the end for the property's degraded—but restorable—wetlands, as well as the destruction of significant habitat for endangered plants and wildlife.

This tour lets the entomologists do what they do best: insect collecting. The participants will have opportunities to collect insects from interesting Florida habitats within the Disney Wilderness Preserve as well as take part in a swamp buggy tour of the preserve. Nets will be provided for those who need them. We recommend participants wear comfortable shoes, dress for the weather, and bring plenty of water.

## ● EPCOT

Monday, September 26 and Wednesday, September 28  
4:00 PM – 11:00 PM  
Fee: \$147 USD per person  
Location: *Meet at the ICE Registration and Information Center*

Travel to the future and around the world, all in one visit. Epcot is an ever-changing, always-entertaining world of discovery where you can explore the wonders of the universe and many of its cultures. Future World puts you in the middle of fantastic adventures and exploration as you take a hands-on look at the 21<sup>st</sup> century. World Showcase features 11 different countries offering the best of their culture, entertainment, and cuisine. Experience Illuminations: Reflections of Earth, a nighttime spectacular filled with thunderous fireworks, sky-piercing lasers, and a moving soundtrack. This tour includes an Epcot "After 4:00 PM" ticket and transportation to and from the park.

## ● LEU GARDENS

Tuesday, September 27 • 9:30 AM – 2:00 PM  
Fee: \$81 USD per person (lunch included)  
Location: *Meet at the ICE Registration and Information Center*

Led by trained docents, your guests will explore an amazing 50-acre (20 hectares) botanical oasis minutes from downtown Orlando. Each garden is designed specifically to further our mission: inspire visitors to appreciate and understand plants. The Leu House Museum, located in the heart of the gardens, reveals turn-of-the-century living for the families who once called this home. The gardens and historical home were donated to the City of Orlando in 1961 by Mr. Harry P. Leu and his wife, Ms. Mary Jane Leu. Participants are encouraged to wear comfortable shoes and dress for the weather.

## ● SHOPPING IN ORLANDO

Wednesday, September 28 • 1:00 PM – 7:00 PM  
Fee: \$48 USD per person  
Location: *Meet at the ICE Registration and Information Center*

This activity involves walking. Participants are encouraged to wear comfortable shoes and dress for the weather. Stops include:

**Orlando Premium Outlets – International Drive:** Welcome to Orlando's newest kingdom, devoted to shopping. With over 110 of the hottest brands including new additions like Hugo Boss Factory Store, Tournéau, Tumi, White House Black Market, Esprit, Le Crueset, Crabtree & Evelyn, ClarksBostonian Outlet, and Central Florida's only Neiman Marcus Last Call, as well as favorites like Coach Factory, Gap Outlet, Ann Taylor Factory Store, Tommy Hilfiger, Nike Factory Store, and The Children's Place, you're sure to find a great bargain.

**Orlando Premium Outlets – Vineland Avenue:** A sophisticated combination of quality designer brands, significant savings, and an architecturally themed outdoor village setting caters to upscale, value-minded shoppers. Some of the retailers located at Orlando Premium Outlets include Anne Klein, Barneys New York Outlet, Burberry, Coach, Fendi, Giorgio Armani, Tommy Hilfiger, and Versace. Upon arrival, you will receive a VIP coupon book filled with added savings at participating outlet stores.

## ● UNIVERSITY OF CENTRAL FLORIDA – BUG CLOSET TOUR

Wednesday, September 28 • 1:00 PM – 5:00 PM  
Fee: Complimentary  
Location: *Meet at the ICE Registration and Information Center*

Officially known as the University of Central Florida Collection of Arthropods (UCFC), the Bug Closet was founded by Stuart M. Fullerton in 1993, who possessed a lifelong passion for entomology. UCFC possesses one of the largest completely databased collections in the world, with over 510,000 specimen records for insects and other arthropods, with more being added daily. We especially pride ourselves on our Hymenoptera (ants, bees, and wasps) and Coleoptera (beetles) holdings. A shuttle from the Department of Biology at the University of Central Florida will be provided to transport participants to visit the Bug Closet. The participants will have opportunities to examine specimens and speak to the curator and the collection manager about the collection.



## DISCOVER ALL THAT'S NEW IN ORLANDO WELCOME TO THE 2016 XXV INTERNATIONAL CONGRESS OF ENTOMOLOGY

There are exciting new developments across the destination from the convention district to the attractions area including new award winning restaurants, exhilarating entertainment, over 100+ attractions across the city, plus seven of the world's top theme parks to discover. So there's no better time to come to Orlando.

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## Tours (Post-Congress)

### ● OVERNIGHT TO ARCHBOLD BIOLOGICAL STATION

Saturday, October 1 – Sunday, October 2

6:30 AM (October 1) – 5:00 PM (October 2)

Fee: \$215 per person (including meals and lodging based on double occupancy)

Location: *Group Shuttle departure locations at Hotels and the West Hall C Foyer of the Convention Center.*

Archbold Biological Station (ABS) is a scientific resource for field study of the natural environment. ABS is located in the remote heart of south central Florida. The station serves as a hub of discovery and a portal to the Florida scrub, one of the world's most threatened ecosystems.

Visitors have the unique opportunity to view and learn about this landscape that has been continually explored by ecologists for decades, and is still revealing intriguing science. You will have an opportunity to view collections and collect specimens in their natural habitat.

Come and discover more about this marvelous ecosystem and the great facilities. Early departures from the tour are not available. Please be sure to arrange all travel to depart Orlando after 6:30 PM on Sunday, October 2, to ensure you have plenty of time to return from the station.

### ● THE MCGUIRE CENTER FOR LEPIDOPTERA AND THE FLORIDA STATE COLLECTION OF ARTHROPODS

Saturday, October 1

8:00 AM – 5:00 PM

Fee: \$60 USD per person (lunch on your own)

Location: *Meet at the West Hall C Foyer of the Convention Center.*

The McGuire Center for Lepidoptera and Biodiversity houses one of the world's largest Lepidoptera collections, representing most of the world's 20,000 butterfly species and many of the estimated 245,000 moth species. The center includes the 6,400-square-foot living Butterfly Rainforest, an adjacent 4,600-square-foot exhibit gallery featuring information about Lepidoptera and rainforests worldwide, as well as more than 31,000 square feet of research laboratories and collection space. The Florida State Collection of Arthropods (FSCA) houses specimens from around the world and is ranked among the top 10 North American entomological collections. The collection features thousands of drawers, slides, and vials containing an estimated 9 million prepared specimens. We are pleased to offer a one-day tour to both the McGuire Center and FSCA for those who are interested in visiting these world-class facilities. The tour includes round-trip transportation from Orlando to Gainesville as well as the behind-the-scenes tour of the McGuire Center. Museum staff will be available to guide for the participants.

In addition to the available tours, Congress attendees can make arrangements to visit FSCA, Bug Closet, and Archbold Biological Station for a longer duration on an individual basis.

### The Sting of the Wild

Justin O. Schmidt

"[Schmidt's] low-down on sting biochemistry and physiology is relentlessly zestful, even as he recounts the swelling, burning consequences of his curiosity."—*Nature*

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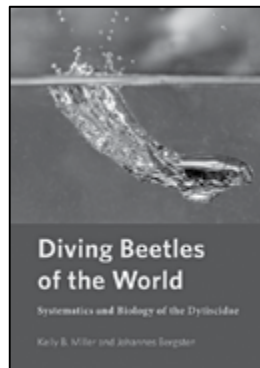
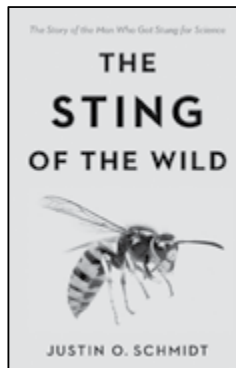
### Diving Beetles of the World

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The first comprehensive book in more than a century to reveal the diversity and natural history of diving beetles.

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# PROGRAM INFORMATION

## Uploading Presentations

All presenters are requested to upload their presentation at least 24 hours before the start of their session.

Presenters may upload and/or preview their presentations in the Presentation Preview Room (PPR) located in Room W221 AB of the Orange County Convention Center. If using video files or unusual file-types embedded in your presentation, you must stop by PPR to test the presentation within our system. Student volunteers and Confex staff will be available if you need assistance.

Please be aware that if you want to upload your file on the day of your presentation, you can only do so in the presentation room itself, prior to the start of the session, or during the 15-minute break. It is not the responsibility of the Program Committee or the moderator if there is not enough time available to upload the talk. If you are unable to upload your presentation the day prior to your assigned time, it would be considerate to contact the moderator to explain the delay and when you plan to upload the file.

The PPR room is located in W221 AB of the Orange County Convention Center. Operating hours are as follows:

Sunday, September 25	10:00 AM – 6:00 PM
Monday, September 26	7:00 AM – 5:00 PM
Tuesday, September 27	7:00 AM – 5:00 PM
Wednesday, September 28	7:00 AM – 12:00 PM
Thursday, September 29	7:00 AM – 5:00 PM
Friday, September 30	7:00 AM – 12:00 PM

## Published Abstracts

Abstracts for all ICE 2016 presentations have been published. Each registered attendee received a jump drive in the attendee bags with all of the abstracts preloaded. Abstracts have also been published in the online program at [esa.confex.com/esa/ice2016/meetingapp.cgi](http://esa.confex.com/esa/ice2016/meetingapp.cgi).

## Moderator Training

Moderators for symposia, student competition, and contributed paper sessions are required to attend one of the moderator training sessions. Here you will receive details on equipment operation, light controls, and other responsibilities. Audiovisual and Confex representatives will be available to answer your questions.

Moderators are responsible for keeping the session on schedule and must not advance talks in the schedule if one is withdrawn. In case of tardy file presentation uploads, moderators have the right to refuse a presentation, especially if the delay threatens disrupting the rest of the schedule. All moderator training sessions will be held in meeting Room W224 B in the Convention Center. Following are the dates and times for the training sessions:

Sunday, September 25	2:30 PM – 3:00 PM
Monday, September 26	7:30 AM – 8:00 AM 12:45 PM – 1:15 PM
Tuesday, September 27	7:30 AM – 8:00 AM 12:45 PM – 1:15 PM
Wednesday, September 28	7:30 AM – 8:00 AM
Thursday, September 29	7:30 AM – 8:00 AM 12:45 PM – 1:15 PM
Friday, September 30	7:30 AM – 8:00 AM

## Student Competition Judges' Training

Judges for the student competition are required to attend one of the judges' training sessions. Here you will receive details regarding the judging process, criteria, and reporting. All judges must submit their scores online by 8:00 PM on the day of their assigned session.

All judges' trainings will be held in Room W223 B in the Convention Center. The dates and times for the training sessions are as follows:

Sunday, September 25	3:00 PM – 3:30 PM
Monday, September 26	7:30 AM – 8:00 AM
Tuesday, September 27	7:30 AM – 8:00 AM
Wednesday, September 28	7:30 AM – 8:00 AM

## Lunch and Learn Sessions

Attendees have a great opportunity to get together with friends and colleagues after the morning sessions, have lunch together, and learn something new, all at the same time. Unless otherwise specified, lunches are not provided to attendees. Concession options will be available near the Lunch and Learn meeting rooms, so you can quickly purchase your lunch and enjoy it during the presentation.

There will be three Lunch and Learn sessions:

### ● MEET THE ESA JOURNAL EDITORS

Monday, September 26, 12:40 PM – 1:20 PM  
Room WF2, Convention Center

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This sponsored Lunch and Learn offers prospective authors the opportunity to interface directly with editors-in-chief and editorial staff from the ESA publications portfolio. Learn best practices for researching, writing, editing, submitting, and reviewing manuscripts and get the editors' take on the state of the field and its future. Informal Question and Answer breakout sessions will give attendees the opportunity to address questions regarding specific ESA journals and publications. This event will be an invaluable experience for students, early researchers, and veteran researchers alike.

Boxed lunches provided to the first 75 participants, sponsored by Oxford University Press.

Panelists: Sydney A. Cameron, Editor-in-Chief, *Insect Systematics and Diversity*; Murray B. Isman, Subject Editor, *Journal of Economic Entomology*; Gene Kritsky, Editor-in-Chief, *American Entomologist*; Thomas P. Kuhar, Subject Editor, *Journal of Integrated Pest Management*; Heather J. McAuslane, Subject Editor, *Environmental Entomology*; Eric T. Natwick, Editor-in-Chief, *Arthropod Management Tests*; William K. Reisen, Editor-in-Chief, *Journal of Medical Entomology*; Donald B. Thomas Jr., Subject Editor, *Annals of the ESA*; James B. Whitfield, Editor-in-Chief, *Insect Systematics and Diversity*; Phyllis G. Weintraub, Editor-in-Chief, *Journal of Insect Science*; and Jim Woolley, Editor-in-Chief, *Thomas Say Publications*

### ● NO MEANS NO: HOW TO STOP HARASSMENT IN PROFESSIONAL SETTINGS

Tuesday, September 27, 12:30 PM – 1:15 PM  
Room WF2, Convention Center

Harassment in professional settings comes in a lot of forms – subtle put-downs, off-color remarks, unwanted "compliments," unwanted touch and unsought invitations for "sexy-fun-times." What can you



do about it? Come learn some effective ways to resist gender-based and sexual harassment, and how to be an ally when you witness harassment. We'll talk about why harassers do what they do. We'll learn ways to deal with unwanted touch (including hugs and painful handshakes); how to use your tone of voice, and facial expression; what to say and when to say it; and how to intervene as a witness or bystander.

Moderator: Sherry Marts, Smarts Consulting

Boxed lunches provided to the first 50 participants.

## ● DOWN WITH PUBLISH OR PERISH! NONTRADITIONAL CAREERS IN ENTOMOLOGY

Friday, September 30, 12:30 PM – 1:15 PM

Room WF2, Orange County Convention Center

An introduction to nontraditional careers in entomology suitable for trained researchers and academics in the field of regulatory entomology. We will begin with a Questions and Answers session to a panel of selected individuals representing diverse agencies and career paths. Then, we will break so attendees will have time to mingle with Society of Regulatory Entomology committee members in a relaxed setting and discuss job opportunities.

Moderator: Esther Serrano, USDA – Animal and Plant Health Inspection Service

## ESA Plenary Session and Founders' Memorial Lecture

Sunday, September 25, 4:00 PM – 5:30 PM

Valencia Room, Convention Center

### • Welcoming Remarks

May R. Berenbaum, *President*

### • Presidential Address

May R. Berenbaum, *President*

### • ESA Executive Director Report

C. David Gammel, *Executive Director*

### • Entomological Foundation Report

Phillip G. Mulder Jr., *Entomological Foundation President*

### • ESA and Entomological Foundation Awards

May R. Berenbaum, *President*

### • Introduction of Founders' Memorial Lecture

May R. Berenbaum, *President*

## ● LECTURE HONORING DR. EDWARD F. KNIPLING



**Dr. Anthony A. James**, a distinguished professor at the University of California, Irvine, USA, has been selected to deliver the Founders' Memorial Award lecture at the 2016 International Congress of Entomology (ICE 2016) during the ESA Opening Session on Sunday, September 25.



The subject of Dr. James' lecture will be **Dr. Edward F. Knipling**, winner of the World Food Prize (1992), the Japan Prize (1995), the FAO Medal for Agricultural Science (1991), the President's National Medal of Science (1967), and many other awards. Dr. Knipling is internationally recognized

for the development of the Sterile Insect Technique (SIT), which has been widely applied for eradication of exotic insect species. SIT was instrumental in the eradication of the screwworm, a serious pest of

cattle and other livestock, and is used today to control insect pests such as the Mediterranean fruit fly.

Dr. James takes a similar approach for insect control, but instead of using SIT, he relies on more modern methods. He is the international leader among those using molecular genetic approaches to control the transmission of vector-borne diseases. His work has resulted in the creation of strains of mosquitoes that are incapable of transmitting two of the most devastating human diseases, malaria and dengue fever.

Dr. James is now preparing to apply this translational research to disease-affected areas in developing countries. His goals are to suppress vector populations and therefore reduce encounters between humans and mosquitoes, and to make mosquitoes incapable of transmitting pathogens.

"If Edward Knipling was alive today and was asked who would be the best researcher to tell his story, I'm convinced that he would pick Tony James," said Fred Gould, University Distinguished Professor at North Carolina State University. "Tony will do a great job of telling Knipling's story and of showing ESA members how the field of genetic pest management has matured from the early days into the start of the 21<sup>st</sup> century."

"Dr. Knipling's contribution to our discipline by developing the Sterile Insect Technique is truly outstanding and deserves to be honored in this way," said Dr. David Denlinger, Distinguished University Professor at Ohio State University. "I would rank the development of this technique as one of the major accomplishments in the field of entomology in the past century, and Dr. James' ground-breaking experiments in developing transgenic mosquitoes is indeed the next generation or iteration of Knipling's Sterile Insect Technique."

"The selection of Dr. James to honor Dr. Knipling is especially fitting for the theme of the 2016 International Congress of Entomology—'Entomology Without Borders'—in two ways," said Dr. Bruce Tabashnik, Regents' Professor and Head of the University of Arizona's Department of Entomology. "First, although Dr. James works in the U.S., his work aims to control mosquitoes far beyond U.S. borders, especially in Africa. Second, as the son of an African-American father and an Irish-American mother, his own origins transcend racial and national boundaries."

### • Concluding Remarks

May R. Berenbaum, *President*

## ICE Opening Plenary

Sunday, September 25, 6:00 PM – 7:30 PM

Valencia Room, Convention Center

ICE 2016 — the excitement has been building for the past four years! It is now time to usher in the gathering of international entomological colleagues for a premier Congress under the literal and figurative banner Entomology Without Borders. Delegates will be given warm and hospitable greetings followed by presentations of special ICE awards. Then, a keynote lecture will be given by an esteemed Nobel Laurate. After the lecture, everyone is invited to attend a welcome reception downstairs in West Hall C in the Convention Center.

### • Welcome Address by the ICE 2016 Co-Chair

Alvin M. Simmons, *ICE 2016 Co-Chair*

### • Welcome Address by the ICE 2016 Co-Chair

Walter S. Leal, *ICE 2016 Co-Chair*

### • Welcome Address by the President of the Entomological Society of America

May R. Berenbaum, *ESA President*



• **Welcome Address by the Chairman of the ICE Council**

Hari C. Sharma, *ICE Council Chairman*

• **ICE Council—Certificates of Distinction**

James Ridsdill-Smith, *ICE Council Secretary/Treasurer*

• **Entomology Without Borders from USDA-ARS' Perspective**

Chavonda Jacobs-Young, *USDA-Agricultural Research Service*

• **Introduction of Keynote Speaker**

Marcelo Jacobs-Lorena, *Johns Hopkins Bloomberg School of Public Health*

• **Opening Doors Worldwide Through Medical Science**

Peter Agre, *Johns Hopkins Bloomberg School of Public Health*

• **Adjourn to the Welcome Reception** • West Hall C, Convention Center

## Keynote Presentations

**Sunday, September 25, 6:40 PM – 7:30 PM**

*Valencia Room, Convention Center*

### Keynote Presentation Featuring **Dr. Peter Agre**

#### *Opening doors worldwide through medical science*

Introduction by Marcelo Jacobs-Lorena, *Johns Hopkins Bloomberg School of Public Health*



**Dr. Peter Agre** is the Bloomberg Distinguished Professor at the Johns Hopkins School of Medicine and Bloomberg School of Public Health.

Dr. Agre shared the 2003 Nobel Prize in Chemistry for discovering aquaporins, a family of water-channel proteins found throughout nature that underlie

numerous physiological processes and clinical disorders. He is deeply involved in multiple global issues, and is the current director of the Johns Hopkins Malaria Research Institute, which conducts research in Zambia and Zimbabwe.

From 2005-2008, he chaired the Committee on Human Rights of the National Academy of Sciences and led efforts on behalf of imprisoned scientists, engineers, and health professionals worldwide. He has also participated in diplomatic visits and meetings with leaders of Cuba, North Korea, Myanmar, and Iran.

A past president of the American Association for the Advancement of Science (AAAS), Dr. Agre is an ambassador for science. He has given numerous lectures and presentations, and has even appeared on the TV program *The Colbert Report*.

**Wednesday, September 28, 8:00 AM – 9:00 AM**

*Valencia Room, Convention Center*

### Keynote Presentation Featuring **Dr. Jules Hoffmann**

#### *Innate immunity: From insects to humans*

Introduction by Elena Levashina, *Max Planck Institute for Infection Biology*



**Dr. Jules Hoffmann** is a professor of integrative biology at the Strasbourg University Institute for Advanced Study. He is also emeritus research director of the French National Research Center, and he served as vice president and president of the French National Academy of Sciences from 2006 to 2010.

Dr. Hoffmann was awarded the 2011 Nobel Prize in Physiology or Medicine for “discoveries concerning the activation of innate immunity.” He and his colleagues used insects, namely the fruit fly

*Drosophila*, to decipher the potent antimicrobial defenses. Over many years, these studies have led to a general understanding of recognition of infection by flies, the connections between recognition and signaling, and the subsequent control of expression of immune responsive genes, namely of those encoding antimicrobial peptides that oppose the invading microorganisms.

His interest in insects began at an early age and was inspired by his father, a high school biology teacher in Luxembourg who worked on the systematics of various insect groups during his spare time.

“Most of my father’s studies focused on Odonata, Ephemeroptera, Orthoptera, Dermaptera, and Hemiptera, and he was particularly interested in the development and behavior of mayflies,” Dr. Hoffmann said. “Under his guidance, and with his strong involvement, I published my first paper on the aquatic Heteroptera of Luxembourg.”

After high school in Luxembourg, he attended the University of Strasbourg and worked on his Ph.D. with Professor Pierre Joly, a neuroendocrinologist, on the antimicrobial defenses of migratory locusts.

Dr. Hoffmann, who uses insects as model organisms to study the immune system, will talk about “Innate immunity: From insects to humans” and illustrate how basic research on insects can lead to broader discoveries relevant to human health.

## Daily Plenaries

The following international scientists have been selected to deliver Plenary Lectures at the 2016 International Congress of Entomology.

**Monday, September 26, 8:00 AM – 9:00 AM**

*Valencia Room, Convention Center*

### Plenary Presentation Featuring **Dr. James R. Carey**

#### *Insect biodemography: A 21<sup>st</sup> century guided tour*

Introduction by Frank Zalom, *University of California*



**Dr. James R. Carey**, distinguished professor of entomology at the University of California, Davis (UC Davis), is the world’s foremost authority on arthropod demography. He has authored more than 250 scientific articles, including landmark papers in science that shaped the way scientists think about lifespan limits and actuarial aging, and two articles in the *Annual Review* series that provide new syntheses on insect biodemography (2003, *Annual Review of Entomology*) and aging in the wild (2014, *Annual Review of Ecology, Evolution, and Systematics*). He directed a \$10 million, multi-university grant for more than a decade (2003-2013).

His three books include *Applied Demography for Biologists with Special Emphasis on Insects* (Oxford University Press), the go-to source for all entomologists studying demography. In 2014, Professor Carey received the C. W. Woodworth Award, the highest honor bestowed by the Pacific Branch of the Entomological Society of America (ESA), and the 2014 UC Davis Academic Senate Distinguished Teaching Award for innovative and creative teaching. He is a fellow of four professional organizations: ESA, the Gerontological Society of America, the California Academy of Sciences, and the American Association for the Advancement of Science.

Dr. Carey is the first entomologist to have a mathematical discovery named after him by demographers—the Carey Equality—which set the theoretical and analytical foundation for a new approach to



understanding wild populations. Dr. Carey received his bachelor's degree (animal ecology, 1973) and master's degree (entomology, 1975) from Iowa State University, and his doctorate in entomology from University of California, Berkeley in 1980.

**Monday, September 26, 8:00 AM – 9:00 AM**  
Chapin Theater, Convention Center

**Plenary Presentation Featuring Dr. José Roberto Postali Parra**

*The egg parasitoid Trichogramma as a tool for IPM in Brazil*

Introduction by Marcos Kogan, *Oregon State University*



**Dr. José Roberto Postali Parra** graduated in agronomic engineering from ESALQ/University of São Paulo in 1968 and obtained his M.Sc. and Ph.D. at the University of São Paulo in 1972 and 1975, respectively. He conducted postdoctoral studies during 1977-1978 at the University of Illinois at Urbana-Champaign.

He began his professional activity at the Agronomic Institute of Campinas (IAC) in Brazil, remaining in this institution from 1969 to 1974 in the Entomology Section. In 1974, he was hired as an assistant professor at the Department of Entomology, College of Agriculture "Luiz de Queiroz" (ESALQ), University of São Paulo, where he became associate professor in 1982 and full professor in 1999.

Dr. Postali Parra was dean of ESALQ/USP during 2003-2007, and has worked as chair of various academic and administrative committees and councils. His field of expertise is insect biology, nutrition, and biological control, with emphasis on parasitic Hymenoptera. He is nationally and internationally recognized as a leader in these areas.

**Tuesday, September 27, 8:00 AM – 9:00 AM**  
Valencia Room, Convention Center

**Plenary Presentation Featuring Dr. Carolina Barillas-Mury**

*Mosquito immunity and the invisible parasite: Implications for global malaria transmission*

Introduction by Anthony James, *University of California*



**Dr. Carolina Barillas-Mury** was born in Guatemala City, Guatemala, and obtained her B.S. degree from the Universidad del Valle de Guatemala and her M.D. from the Universidad Francisco Marroquin. She obtained her Ph.D. in biochemistry from the University of Arizona in 1991 in Dr. Michael Wells' laboratory studying *Aedes aegypti*, the mosquito that transmits dengue fever. She did her postdoctoral training in Dr. Fotis Kafatos' laboratory at Harvard University and at the European Molecular Biology Laboratory in Germany, characterizing transcription factors mediating immune responses in *Anopheles gambiae*.

She obtained a faculty position at Colorado State University in 1998, where she investigated the cell biology of *Plasmodium* midgut invasion. Dr. Barillas-Mury joined the National Institutes of Health in 1993 and heads the Mosquito Immunity and Vector Competence Section.

She is interested in understanding the interactions between the mosquito immune system and *Plasmodium* parasites that are critical for malaria transmission, with the ultimate goal of disrupting the parasite's life cycle and preventing human disease. Dr. Barillas-Mury received the 2010 Bailey K. Ashford Medal awarded by the American

Society of Tropical Medicine and Hygiene for distinguished work in tropical medicine and the 2013 Sanofi/Pasteur Award in Tropical and Neglected Diseases, and she was elected as a member of the National Academy of Sciences in 2014.

Society of Tropical Medicine and Hygiene for distinguished work in tropical medicine and the 2013 Sanofi/Pasteur Award in Tropical and Neglected Diseases, and she was elected as a member of the National Academy of Sciences in 2014.

**Tuesday, September 27, 8:00 AM – 9:00 AM**  
Chapin Theater, Convention Center

**Plenary Presentation Featuring Dr. Baldwin Torto**

*Rift Valley Fever in East Africa: Three frontiers, one purpose*

Introduction by Catherine Loudon, *University of California-Irvine*



**Dr. Baldwin Torto** is an organic chemist and principal scientist at the International Centre of Insect Physiology and Ecology (ICIPE) in Nairobi, Kenya. He is a fellow of the African Academy of Sciences (AAS) and was recently selected to serve as a member of AAS Commission on Science Education. He has over 25 years of progressive research experience on insects impacting on food security, human health, biodiversity, and environmental research, with outputs mostly geared toward improving the livelihoods of the rural and urban poor in Africa.

He was inspired to pursue a research career on insects by Professor Thomas R. Odhiambo, founding director of ICIPE, who once said, "Only scientific research will bring Africa to a position where it can control its destiny."

He has been true to this course, and he is currently coordinating research aimed at conserving the rich honey bee diversity in Africa for important ecosystem services for food security. He is also championing the development of improved management tools against vector-borne emerging infectious diseases on the continent.

He has delivered invited and plenary lectures at various meetings and conferences, including the 9<sup>th</sup> General Assembly of AAS in Brazzaville, Republic of Congo; European Bee Week in Brussels, Belgium (see <http://youtube/bTcSneAdDLI?t=2m39s>); the Royal Society of Chemistry/Pan African Chemistry Network Conference in Accra, Ghana; and the COLOSS Bee Conference in Belgrade, Serbia.

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**Tuesday, September 27, 4:30 PM – 5:30 PM**  
Room W331 A, Convention Center

**Invited Lecture Featuring Dr. Juan Andres Bisset Lazcano**

*Aedes aegypti management strategies for dengue control in Cuba*

Introduction by Walter S. Leal, *University of California*



**Dr. Juan Andres Bisset Lazcano** is a leading Cuban entomologist and the current head of the Vector Control Department at the Institute of Tropical Medicine "Pedro Kouri." He has published over 100 papers on ecology, dynamic population of insects, insecticide resistance, and the resistance mechanisms involved. His primary research focus is on *Culex quinquefasciatus*, *Anopheles albimanus*, and *Aedes aegypti*. Since 1990, he has served as an adviser to many projects related to malaria and dengue vector control in Latin America and has received numerous international awards for his work.

Dr. Bisset earned his Ph.D. in biological sciences from the University of Havana in 1998. In addition to working with the Institute of Tropical Medicine "Pedro Kouri," he also serves as an adviser to the Cuban Public Health Ministry.

Dr. Bisset earned his Ph.D. in biological sciences from the University of Havana in 1998. In addition to working with the Institute of Tropical Medicine "Pedro Kouri," he also serves as an adviser to the Cuban Public Health Ministry.



Thursday, September 29, 8:00 AM – 9:00 AM

Valencia Room, Convention Center

### Plenary Presentation Featuring **Dr. Jacqueline Beggs**

#### *Ecological impacts of insect invaders*

Introduction by Myron Zalucki, *University of Queensland*



**Associate Professor Jacqueline Beggs** is one of New Zealand's leading entomologists, and is based at the School of Biological Sciences, University of Auckland. She is currently Academic Leader of the Ecology, Evolution and Behavior group, and Director of the Centre for Biodiversity and Biosecurity. She is of Ngāti Awa (Māori) descent.

Her main research focus is on the ecology of invasive invertebrates, complemented by research on the biodiversity and conservation of native species. Jacqueline has demonstrated the major impact of introduced *Vespa* wasps in New Zealand, and her research on biological control and population modelling of these wasps has provided a sound basis for ongoing development of control tools.

Jacqueline advises government agencies (Minister of Primary Industries as well as the Environmental Protection Authority) on insect biosecurity issues, drawing on her knowledge and experience of conservation management, invasive species, ecology, and indigenous people. Jacqueline has received more than NZ\$9 million in research funding and was a recipient of a Fulbright Award in 2007. She has published more than 75 peer-reviewed research papers while juggling the demands of raising two boys.

Thursday, September 29, 8:00 AM – 9:00 AM

Chapin Theater, Convention Center

### Plenary Presentation Featuring **Dr. Jennifer Fewell**

#### *The spirit of the hive: Mechanisms of social evolution*

Introduction by Gene E. Robinson, *University of Illinois, Institute for Genomic Biology*



**Dr. Jennifer Fewell** is President's Professor at Arizona State University, and Faculty Leader for the Organismal, Integrative and Systems Biology group in the School of Life Sciences. She received her PhD in 1988 at the University of Colorado, Boulder. Her research focuses on the organization and evolution

of insect societies, particularly on the roles of self-organization and selection in shaping cooperative social groups. In current work, she examines the role that self-organization plays in the transition from solitary to group living, and again as groups scale up in size. She primarily works on harvester ants, but she has studied the social organization of a range of other cooperative groups, from sweat bees to NBA basketball teams.

With a strong interest in interdisciplinary synthesis, she led the effort to build the Center for Social Dynamics and Complexity at ASU, and served as its founding director from 2005-2009. The center brings together biological, social and mathematical scientists to examine issues of social complexity. She also serves on the board of the German Interdisciplinary Kolleg (IK). She was President of the North American Section of IUSSI in 1998, and an Executive Board member of the Animal Behavior Society from 2002-2007. At ASU, she served as President of the Faculty Women's Association, and has won awards for her work in mentoring and advocacy. She was named an ASU "exemplar" in 2008, was a 2009 Guggenheim Fellow, and is currently a Fellow at the Wissenschaftskolleg zu Berlin.

Thursday, September 29, 6:00 PM – 7:00 PM

Chapin Theater, Convention Center

### Wigglesworth Memorial Lecture Award Featuring **Dr. John G. Hildebrand**

#### *How insects smell, and why we should care*

Introduction by John Pickett, *Rothamsted Research*



**Dr. John G. Hildebrand**, recipient of the 2016 Wigglesworth Memorial Lecture Award, is a regents' professor of neuroscience and professor of chemistry and biochemistry, ecology and evolutionary biology, entomology, and molecular and cellular biology at the University of Arizona in Tucson. He

was founding head of the Division of Neurobiology (1985-2009) and the Department of Neuroscience after the division became a department (2009-2013).

He earned his baccalaureate degree at Harvard University and his Ph.D. in biochemistry at the Rockefeller University. He moved to Arizona in 1985 after 16 years as a faculty member at Harvard and Columbia Universities.

His research fields are insect neurobiology and behavior, chemical ecology, and vector biology. He is an author of more than 215 peer-reviewed research papers and reviews, and is editor of five books.

A past president of the Association for Chemoreception Sciences, the International Society of Chemical Ecology, and the International Society for Neuroethology, he currently is foreign secretary of the NAS and is a member of the American Academy of Arts and Sciences, the American Philosophical Society, the German Academy of Sciences "Leopoldina," the Norwegian Academy of Science and Letters, and the Royal Norwegian Society of Sciences and Letters. He is also an honorary fellow of the Royal Entomological Society (United Kingdom), and is a fellow of the AAAS, the Entomological Society of America, and the International Society for Neuroethology.

Friday, September 30, 8:00 AM – 9:00 AM

Chapin Theater, Convention Center

### Plenary Presentation Featuring **Dr. Fred Gould**

#### *Will genetically engineered pests protect health, biodiversity, and crop production?*

Introduction by May Berenbaum, *University of Illinois*



**Dr. Fred Gould** was born in New York City and grew up in New York and Rhode Island. He graduated from Queens College in New York City in 1971 with a B.S. in biology. In 1977, he received his Ph.D. in ecology and evolutionary biology from the State University of New York at Stony Brook, with his

thesis examining rapid host range evolution in a crop pest. Dr. Gould was then awarded an NSF postdoctoral fellowship to examine the relationship between insect adaptation to natural plant defenses and insecticides.

He was hired as a soil insect ecologist at North Carolina State University (NCSU) in 1979, and is now a distinguished university professor at that institution, with appointments in the Entomology and Biology Departments. Dr. Gould assisted in the development and deployment of insecticidal transgenic crops in ways that suppress the evolution of pest resistance. He is now focused on the potential for engineering insect pests to suppress disease and crop loss, and to protect endangered species.



Dr. Gould is co-director of the Genetic Engineering and Society program at NCSU. He has served on National Research Council committees, addressing regulation of genetic technologies in agriculture. Dr. Gould received the Alexander von Humboldt Award for most significant agricultural research over a five-year period, the Sigma Xi George Bugliarello Prize for written communication of science, and the O. Max Gardner Award in 2012 for being the UNC-system faculty member with the greatest contribution to human welfare. He was elected to the U.S. National Academy of Sciences in 2011 and serves on the National Research Council Board on Agriculture and Natural Resources.

**Friday, September 30, 8:00 AM – 9:00 AM**  
*Valencia Room, Convention Center*

### Plenary Presentation Featuring **Dr. John A. Pickett**

*Agro-ecological manipulation of insect behavior shows how to exploit signaling between insects and their hosts via GM*

Introduction by James Tumlinson, Pennsylvania State University



**Dr. John Pickett** was appointed head of the Insecticides and Fungicides Department (later the Department of Biological Chemistry) of Rothamsted Research in 1984 and, concurrently in 2007, scientific director of the Rothamsted Centre for Sustainable Pest and Disease Management. In 2010,

he relinquished these positions on being awarded the first Michael Elliott Distinguished Research Fellowship at Rothamsted. In addition to fulfilling this prestigious new role, he continues to contribute to the Chemical Ecology Group and is still very much involved with research activities in the United Kingdom and around the world.

He has more than 480 publications and patents. Dr. Pickett's contributions to the field of chemical ecology have been acknowledged with the 1995 Rank Prize for Nutrition and Crop Husbandry, election to fellowship of the Royal Society in 1996, the 2002 International Society of Chemical Ecology Medal, appointment to CBE for services to biological chemistry in 2004, and the Wolf Foundation Prize in Agriculture in 2008, among many other international measures of esteem.

He also presented, in 2008, the Royal Society's premier lecture in the biological sciences, the Croonian Prize Lecture, and the Cornell University Lecture in 2009. He was awarded the International Congress of Entomology Certificate of Distinction, presented at the XXIV International Congress of Entomology in Daegu, Korea. In June 2014, he became president of the Royal Entomological Society, and in April 2014 he was elected foreign associate of the U.S. National Academy of Sciences.

## ESA Closing Plenary

**Friday, September 30, 5:30 PM – 6:00 PM**

*Chapin Theater, Convention Center*

Join ESA President May R. Berenbaum as she acknowledges her 2016 team and passes the gavel to Vice-President Susan J. Weller, who will announce her theme and thoughts for Entomology 2017. Come get an advance preview of the new and exciting additions Dr. Weller and her team are bringing to the ESA Annual Meeting schedule, including an expanded Student Competition, workshops, and networking opportunities. Stay around afterward for the ICE Closing Plenary, which will include the announcement of the host for ICE 2020!

## ICE Closing Plenary

**Friday, September 30, 6:00 PM – 7:00 PM**

*Chapin Theater, Convention Center*

After five exciting days of interacting, it is now time to formally close ICE 2016. There are many individuals to thank for the success of this event, but too little time to thank them all individually. During this ICE 2016 Closing Ceremony, an announcement will be made on the winning bid to host ICE 2020. Immediately after the end of this closing program, everyone is invited to attend a farewell dinner celebration upstairs in the Valencia Room in the Convention Center.

- **Closing Remarks by ICE 2016 Co-Chairs**  
Walter S. Leal and Alvin M. Simmons, *ICE 2016 Co-Chairs*
- **Closing Remarks by May Berenbaum**  
May R. Berenbaum, *ESA Past President*
- **Announcement of the Host for ICE 2020**  
James Ridsdill-Smith, *ICE Council Secretary/Treasurer*
- **Invitation for ICE 2020 by the Host Society**  
James Ridsdill-Smith, *ICE Council Secretary/Treasurer*
- **Closing Remarks by ICE Council President**  
Hari C. Sharma, *ICE Council President*



# POSTER PRESENTATIONS

## Printed Posters

The Program Committee has scheduled four days of poster sessions for the Congress. Posters are numbered sequentially in the program book and, where possible, grouped according to ICE section topics and subject matter. Authors must display their posters on the board bearing the same number as that indicated in the program book for each poster.

**Poster Size:** Each poster must be contained within the 46- x 46-inch (117- x 117-cm) space provided. Two posters will be displayed on each side of a single board (four posters per board). The poster must NOT exceed the size limit. Please be considerate of the person with whom you are sharing a display space.

**Set Up:** Your poster must be placed in the assigned space in the Exhibit Hall (West Hall C) the night before your poster is scheduled, i.e., Sunday (7:30 PM – 9:30 PM), Monday (7:30 PM – 9:30 PM), Wednesday (11:00 AM – 12:00 PM), and Thursday (7:30 PM – 9:30 PM). Bring your own Velcro strips (push pins are not allowed in the Exhibit Hall) to secure your display to the poster board. The poster board is covered with felt cloth, and the frame is aluminum. Please do not attach anything to the metal frame.

**Poster Presentation Times:** Because the Exhibit Hall becomes quite congested during presentation hours, presenters of posters with odd and even numbers are assigned specific times to be present at their posters. Presenters are expected to be available at their displays during the “Authors Present” time slot for questions and discussion. The schedules below include the times of expected author availability:

### MONDAY, SEPTEMBER 26:

Set Up: Sunday, 7:30 PM – 9:30 PM

Viewing: Monday, 9:00 AM – 5:00 PM

Authors Present:

Posters with odd numbers: 12:30 PM – 1:00 PM

Posters with even numbers: 1:00 PM – 1:30 PM

Takedown: Monday, 6:30 PM – 7:30 PM

### TUESDAY, SEPTEMBER 27:

Set Up: Monday, 7:30 PM – 9:30 PM

Viewing: Tuesday, 9:00 AM – 5:00 PM

Authors Present:

Posters with odd number: 12:30 PM – 1:00 PM

Posters with even numbers: 1:00 PM – 1:30 PM

Takedown: Tuesday, 6:30 PM – 7:30 PM

### THURSDAY, SEPTEMBER 29

Set Up: Wednesday, 11:00 AM - 12:00 PM

Viewing: Thursday, 9:00 AM – 5:00 PM

Authors Present:

Posters with odd numbers: 12:30 PM – 1:00 PM

Posters with even numbers: 1:00 PM – 1:30 PM

Takedown: Thursday, 6:30 PM – 7:30 PM

### FRIDAY, SEPTEMBER 30

Set Up: Thursday, 7:30 PM – 9:30 PM

Viewing: Friday, 9:00 AM – 2:00 PM

Authors Present:

Posters with odd numbers: 12:30 PM – 1:00 PM

Posters with even numbers: 1:00 PM – 1:30 PM

Takedown: Friday, 2:30 PM – 3:30 PM

**Poster Removal:** Posters should be removed promptly between 6:30 PM and 7:30 PM on Monday, Tuesday, and Thursday, and between 2:30 PM and 3:30 PM on Friday. Please do not remove your poster before the close of the scheduled viewing time. Please do not remove poster numbers when removing posters from boards.

Organizers are not responsible for posters that are left up after the take down hours.

## Virtual Posters

Virtual posters provide a unique opportunity to view the research of entomologists from outside of the United States who cannot attend ICE 2016 in person. These electronic posters will be positioned in the Exhibit Hall near the printed posters on large, flat-screen monitors. Attendees will be able to scroll through the virtual posters throughout the day to view the variety of research taking place around the world.





## SOCIAL ACTIVITIES AND MIXERS

### Welcome Reception

Sponsored by:



**Sunday, September 25, 7:30 PM – 9:30 PM**

*Exhibit Hall C, Convention Center*

You are cordially invited to attend the Welcome Reception on Sunday evening in the ICE Exhibit Hall (Exhibit Hall C) immediately following the ICE Opening Plenary Session (Valencia Room). This is a great opportunity to have time with the exhibitors and colleagues and learn about the latest resources and tools available to entomologists. Grab some light refreshments and a drink, network with colleagues and friends, and check out the posters.

### Social Events

View the entire list of social events and functions starting on page 140. Everyone has the opportunity to network at numerous receptions throughout the week. Events are planned throughout the week; so, be sure to review the entire list to find events that interest you!

### Gala Dinner: Cirque I-C-E

**Thursday, September 26, 7:30 PM – 10:00 PM**

Ticket: \$90 USD per person (separate ticket required)

*Location: Grand Ballroom, Rosen Centre Hotel*

Join your fellow attendees for an all-immersive experience under the ICE big-top the night before the Congress ends. Cirque performers will surround and entertain you from the moment you enter the event. This unique dining experience will allow you an up-close-and-personal view of the most mesmerizing performances of the week. This is a dinner experience you will not want to miss! Stop by the Registration and Information Center to purchase your ticket to the Gala before it sells out!

### Farewell Dinner

**Friday, September 30, 7:00 PM – 10:00 PM**

*Location: Valencia Room, Convention Center*

When the Congress has come to a close, there is one last night to make connections and memories that will last four years—until the next ICE. Join us Friday evening to celebrate a week of learning, sharing, and camaraderie with colleagues and friends from around the world! Hot Latin and salsa beats showcasing the hottest in music from south Florida will cap off our fantastic week in Florida. An assembly of action stations showcasing the best of south Florida will energize you to dance the night away.

## STUDENT ACTIVITIES

### Linnaean Games

#### ● ESA LINNAEAN GAMES PRELIMINARY ROUNDS AND FINAL ROUND

**Monday, September 26, 2:00 PM – 6:00 PM**

*Valencia Room, Convention Center*

Be sure to check out the Linnaean Games, a “College Bowl”-type competition that is one of the more spirited sessions of our annual meetings. Stop in and cheer on your favorite team! Winners and runners-up will be recognized at the Student Awards Session on Friday, September 30.

#### ● GLOBAL LINNAEAN GAMES

**Tuesday, September 27, 2:00 PM – 6:00 PM**

*Valencia Room, Convention Center*

New for the International Congress of Entomology—watch as teams from across the globe participate. Come and cheer on your favorite country. Winners and runners-up will be recognized at the Student Awards Session on Friday, September 30.

### Student Competition

**Monday, September 25 – Thursday, September 29**

*Convention Center, various times and locations*

To support student attendees and encourage them to become more involved in the world of entomology, ICE 2016 is holding a student competition from Monday through Thursday during the Congress. There are 72 sessions containing graduate and undergraduate student oral presentations, posters, and virtual posters. A full list of presentations for all formats of the student competition can be found throughout the scientific program. Stop by and show your support for the students! This year’s first-place winners will receive a \$75 USD cash prize and complimentary 2017 ESA membership. A complimentary 2017 ESA membership will be awarded to second-place winners.

### Student Debates

**Thursday, September 29, 9:15 AM – 12:15 PM**

*Chapin Theater, Convention Center*

The main 2016 Student Debate theme is “Solving Problems Without Borders.” Each debate involves the teams making a choice regarding policy surrounding international issues. The first debate addresses which team’s proposed policy is the best for improving honey bee health worldwide. The next debate asks teams to choose and defend the best strategy for decreasing dengue incidence. The final debate has both teams advocating for a different invasive arthropod species as the most important to control. Audience members are welcome to ask questions at the end of each debate. Come cheer on your favorite team! Audience members who live tweet the entire debate session will be entered in a raffle to win a \$50 Amex gift card. Tweets must include the #ICE2016 meeting hashtag as well as #ICEdebate.



## Student Awards

Friday, September 30, 12:30 PM – 2:30 PM

Chapin Theater, Convention Center

The winners of the Student Competition, ESA Student Awards, Student Debates, and Linnaean Games will be recognized. Please join in on recognizing these award-worthy students.

## Student Reception

Sponsored by:  **BASF**  
We create chemistry

Tuesday, September 27, 7:30 PM – 11:00 PM

Club 39 at the Plaza and the Grand Ballroom AB, Rosen Plaza Hotel

Looking to dance the night away and connect with your friends and colleagues outside of the scientific sessions? Visit Club 39 at the Plaza and enjoy tunes mixed by a DJ and a full dance floor. If you are looking for a cozier but upbeat location where you can eat, relax, and play games, visit the Student Reception Lounge located in the Grand Ballroom AB. Both locations are next to one another so you can party-hop all night long. All registered students are invited to attend. Please be sure to have your ID and name badge as proof of registration.

## Student Volunteers

Volunteers can pick up their volunteer T-shirt from the volunteer coordinator at the Registration and Information Center located in the West C Lobby of the Orange County Convention Center, prior to the start of their first shift. All volunteers should report to their designated assignments 15 minutes before the start of their shift. Needed materials will be provided by ESA. If you cannot make it to your assignment or you need additional information, please see the volunteer coordinator at the Registration and Information Center.

## ENTOMOLOGICAL FOUNDATION

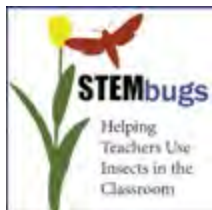
The Entomological Foundation is now being managed by the staff of ESA out of the Annapolis, MD, headquarters office. Our mission is: *Exciting young people about science through insects and building a future for entomology!*

Learn more about the Foundation at the ESA Central Booth on the Exhibit floor.

## Entomological Foundation Teacher Workshop

Saturday, September 24, 10:00 AM – 2:00 PM

Convention Center, Room W224 GH



The Entomological Foundation is once again offering a teacher workshop developed for educators in grades K–12. Educators from Florida and the surrounding areas will join us to learn how to increase science literacy in their students through the use of live insects in the classroom.

This practical and hands-on educational session is a great learning opportunity for teachers. Registration is just \$10.

More information, including a registration form, is online at [www.entfdn.org/pr\\_workshop](http://www.entfdn.org/pr_workshop).

The Entomological Foundation is very grateful to all who helped to prepare this great event, including Andrine Shufran, Marianne Shockley, Rebecca Baldwin, John Guyton, Doug Golick, Tanja McKay, and Tom Turpin.

## Entomological Foundation Silent Auction

A long-standing and popular tradition of the ESA Annual Meeting is the Entomological Foundation's Silent Auction and Raffle. Now located in the ESA Central Booth on the Exhibit Hall floor, this shopping event has become a go-to destination for many ESA Annual Meeting attendees as a fun place to get some insect-themed holiday gifts and still make a meaningful contribution to the future of the profession.

The Silent Auction will feature insect-themed jewelry, clothing, books, crafts, and other great items donated by your professional colleagues. All proceeds will go directly to the Foundation in support of our mission of developing a love of science in children through insects. The Silent Auction will be open during the regular ESA Central Booth hours. It is not too late to donate. Just stop by the ESA Central Booth and talk to an ESA staff member or Entomological Foundation volunteer. **All bids become final on Thursday at 4:00 PM.** Winning bids must be picked up before the Exhibit Hall closes at 2:00 PM on Friday, September 30. Items cannot be shipped by the Foundation.

### ● ENTOMOLOGICAL FOUNDATION RAFFLE

**Win a VIP trip to the ESA 2017 meeting in Denver, Colorado, USA!**

Your raffle ticket purchases do more than help fund the mission of the Foundation. They could also get you a free trip to Denver. The grand prize package includes domestic air travel (or a \$500 voucher for international travel), plush hotel accommodations for four nights, an invitation to the ESA Governing Board Reception, ground transportation to and from the airport, and more! The prize package has an estimated retail value of nearly \$2,000!

**You could also win an iPad mini (or similar device).** Stop by the Foundation booth in ESA Central to learn more. **Raffle tickets will be sold during regular hours of the ESA Central Booth**, with the winning ticket selected on Friday at the ESA Closing Session. Prices for raffle tickets are listed below:

- One for \$5
- Three for \$10
- Five for \$15
- 10 for \$20 (get a free "Insect Diversity" poster with every 10 tickets you purchase, while supplies last)



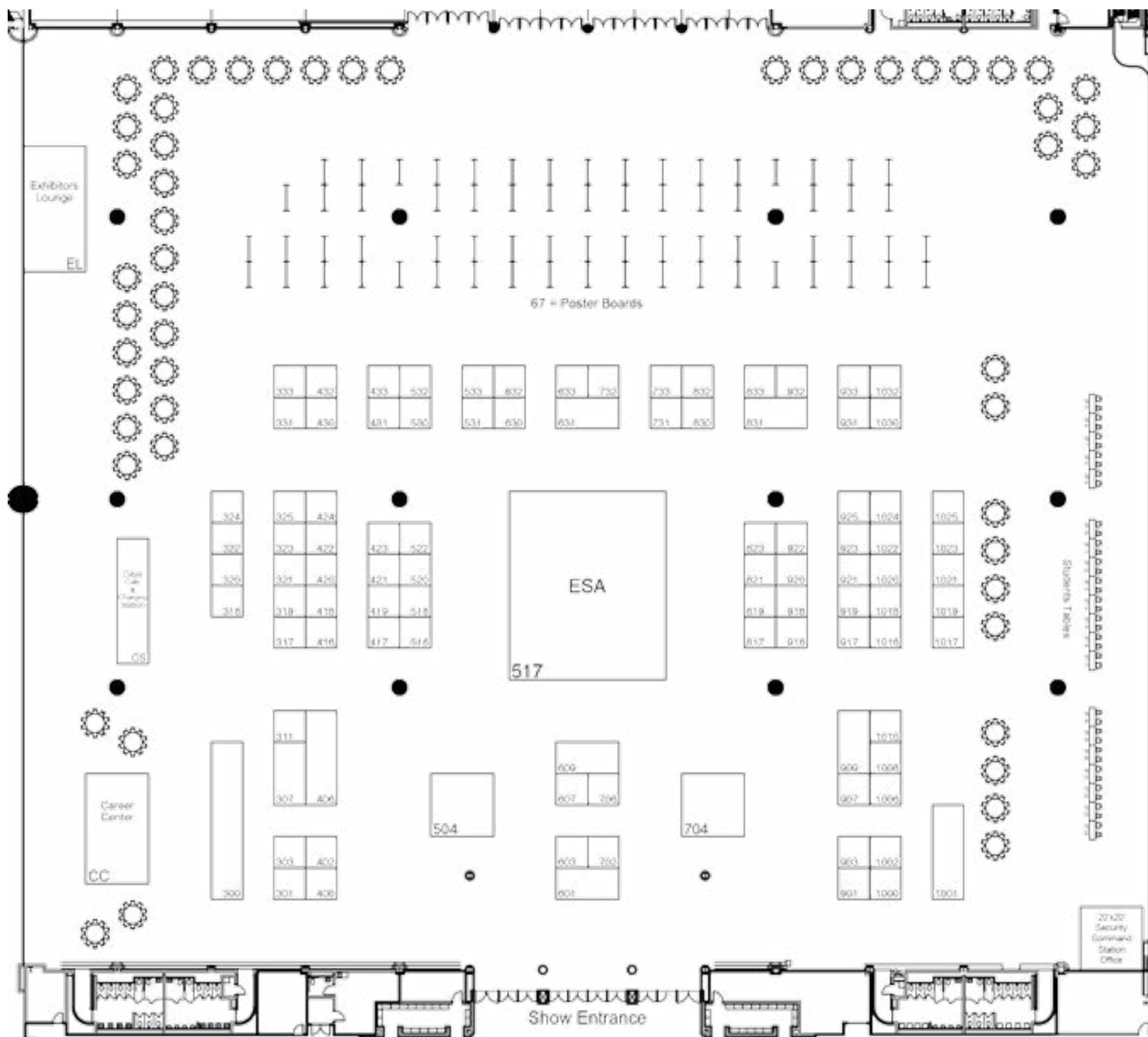
# ICE 2016 EXHIBITORS

## Exhibit Hall

Plan to visit the exhibits, poster presentations, and more in Exhibit Hall C in the Orange County Convention Center. See the latest in entomological equipment, supplies, gifts, and reference materials.

### Exhibit Hours:

Sunday, September 25	7:30 PM – 9:30 PM
Monday, September 26	9:00 AM – 5:00 PM
Tuesday, September 27	9:00 AM – 5:00 PM
Wednesday, September 28	9:00 AM – 1:00 PM
Thursday, September 29	9:00 AM – 5:00 PM
Friday, September 30	9:00 AM – 2:00 PM



## Exhibitors

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**ADAPCO, an Azelis Americas Company****Booth: 601**

Sanford, Florida, USA

**Website:** myadapco.com

ADAPCO has been serving the Mosquito Control community since 1985. Throughout the last 31 years, ADAPCO has represented the nation's leading manufacturers of Mosquito Control products. Now, ADAPCO is part of Azelis Americas. Azelis Americas is dedicated to providing leading-edge products, services, equipment, and technologies for the Mosquito Control industry.

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**Alpha Scents, Inc.****Booth: 431**

West Linn, Oregon, USA

**Website:** alphascents.com

A global supplier of quality insect monitoring systems—traps, lures, attract and kill, MalEx™—designed to reduce toxic pesticide use. Products for most native and exotic species in agriculture, horticulture, ornamentals, forestry, and the home and garden PestWizard® brand. Custom pheromone synthesis for research, manufacturing, and government. Made with high-purity pheromones per recommendations from the research community.

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**Arborjet****Booth: 609**

Woburn, Massachusetts, USA

**Website:** arborjet.com

Arborjet is focused on providing the most effective formulations and delivery systems to protect trees, shrubs, plants, and turf grasses from a wide variety of insect, disease, and nutrition concerns. Our product offerings also support the landscaping, growing, and gardening markets with water management and soil amendment solutions.

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**Art's Important, LLC****Booth: 1001**

Tulsa, Oklahoma, USA

**Website:** artsimportant.com

My work for the past four years has been capturing and displaying images of insects at a scale large enough for the viewer may appreciate beauty of these incredible creatures. My images display insects at a human scale, allowing everyone to see their patterns, textures, and details of nature's artwork. Most images are 60x40 or larger. 15 to 20 images will be displayed at ICE.

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**Atlas Screen Printing****Booth: 817**

Gainesville, Florida, USA

**Website:** wildcotton.com

We have the fun stuff! T-shirts, jewelry, kids' stuff, puzzles, mugs, magnets, tote bags, caps, and much more. Come early, come often. Most products endemic to this show, Christmas presents you will find nowhere else!

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**BASF****Booth: 704**

Research Triangle Park, North Carolina, USA

**Website:** basf.com

BASF Crop Protection provides innovative solutions for agriculture, turf and ornamental plants, pest control, and public health. Our broad portfolio of active ingredients, seed treatments, biological controls, formulations, and services optimizes efficient production of high-quality food and protects against post-harvest loss, damage to buildings, and the transmission of disease.

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**Bayer – Crop Science Division****Booth: 921**

Research Triangle Park, North Carolina, USA

**Website:** cropscience.bayer.com

Bayer's Crop Science Division offers grant programs to develop innovative ideas around novel molecular targets (modes-of-action) for weed, pest, and fungal disease control (Grants4Targets) and genetic traits to enhance crop productivity (Grants4Traits) in agriculture. Visit our booth to learn about Bayer, Grants4, and applying for the programs.

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**Bedoukian Research****Booth: 421**

Danbury, Connecticut, USA

**Website:** bedoukianbio.com

Bedoukian Research offers over 100 semiochemicals from gram to kilo quantities. Our Goal: supply our customers with the highest possible quality products and service, continuously improve processes and minimize waste and do our utmost to contribute to our customer's success. Active member of BPIA and IBMA. Visit our website [www.bedoukianbio.com](http://www.bedoukianbio.com).

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**Bio Chambers Incorporated****Booth: 522**

Winnipeg, Canada

**Website:** biochambers.com

Our focus at BioChambers is on building positive client experiences. We achieve this by delivering top-of-class reach-in plant growth chambers and walk-in rooms, providing excellent after-sales service, and introducing innovative designs to the marketplace. We invite you to drop by our booth to pick up our latest literature and to discuss your specific research needs.

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**BioQuip Products****Booth: 300**

Rancho Dominguez, California, USA

**Website:** bioquip.com

BioQuip has been providing equipment and books for use in the field, laboratory, museum, and classroom since 1947. Our 28 employees hold a valuable diversity of knowledge with more than 395 years of combined experience. Please stop by our booths at ICE 2016 for a visit and to see what's new.

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**BRILL****Booth: 311**

Leiden, The Netherlands, and Boston, Massachusetts, USA

**Website:** [brill.com/search/subject/science/subject/biology/subject/entomology](http://brill.com/search/subject/science/subject/biology/subject/entomology)

Founded in 1683, Brill is a publishing house with a rich history and a strong international focus. The company's head office is in Leiden (The Netherlands), with a branch office in Boston, MA (USA) and a representative office in Singapore. Visit our booth to learn about the success of our journal *Insect Systematics & Evolution*, and browse our latest books as well as KNNV Publishing titles and those formerly with Apollo Books.



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**Bruker microCT** **Booth: 423**

Kontich, Belgium

**Website:** [bruker-microct.com](http://bruker-microct.com)

Bruker microCT develops and produces X-ray microtomography instruments for nondestructive 3D imaging of objects' internal microstructure with spatial resolution on the micron level. More than 1,000 installations around the world proved high-quality and reliability of the instruments with comprehensive application support and service. For more information, visit [bruker-microct.com](http://bruker-microct.com).

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**CABI/CSIRO** **Booth: 307**

Sterling, Virginia, USA

**Website:** [styluspub.com](http://styluspub.com)

CABI is a not-for-profit international organization that improves people's lives by providing information and applying scientific expertise to solve problems in agriculture and the environment. CSIRO PUBLISHING operates as an independent science and technology publisher, covering a wide range of scientific disciplines, including agriculture, the plant and animal sciences, and environmental management. Distributed in North America by Stylus Publishing.

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**Cambridge University Press** **Booth 1002**

New York, New York USA

**Website:** [cambridge.org/academic](http://cambridge.org/academic)

Cambridge University Press' publishing in books and journals combines state-of-the-art content with the highest standards of scholarship, writing and production. Visit our stand to browse new titles, available at 20% discount, and to pick up sample copies of our journals. Visit our website to find out more about what we do: [www.cambridge.org/academic](http://www.cambridge.org/academic)

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**Canadian Centre for DNA Barcoding** **Booth: 1018**

Guelph, Ontario Canada

**Website:** [ccdb.ca](http://ccdb.ca)

The Canadian Centre for DNA Barcoding is the world's largest analytical hub with the primary goal of delivering the most reliable and comprehensive species identification platform on the planet. The CCDB is the birthplace of DNA barcoding proudly serving clients from private, government and academic sectors in over 50 countries.

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**Certis USA** **Booth: 1008**

Columbia, Maryland, USA

**Website:** [certisusa.com](http://certisusa.com)

Certis USA is a pioneer in the development of biological pesticides and has become one of the world's leading manufacturers and distributors of biopesticides. We specialize in biological product development, from screening to formulation to field development. Manufacturing: fermentation and formulation. Global registrations for biological products. We export globally.

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**ChemTica International** **Booth: 831**

San Domingo, Heredia

**Website:** [chemtica.com](http://chemtica.com)

ChemTica International is a leading supplier of semiochemical-based products for monitoring and control of insect pests. We produce traps, attractant lures, and repellents for over 200 pests. Our products are sold in over 50 countries and are integrated into the pest management strategies of several multinational agricultural companies.

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**Cognisys, Inc.** **Booth: 416**

Traverse City, Michigan, USA

**Website:** [cognisys-inc.com](http://cognisys-inc.com)

Capture the Hidden World—we are a small, innovative company that provides equipment that enables you to create images of subjects or events that are too small, too fast, too slow, too elusive, or even too dangerous to photograph by traditional methods.

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**The Coleopterists Society** **Booth: 317**

Santa Barbara, California, USA

**Website:** [coleopsoc.org](http://coleopsoc.org)

The Coleopterists Society is an international organization devoted to the study of all aspects of systematics and biology of beetles of the world. Membership is open to all people who share our passion in any pursuit of knowledge and appreciation of all things beetle. The Coleopterists Society is a national 501(c) 3 not-for-profit organization, organized and operated exclusively for scientific and educational purposes. The Coleopterists Society fosters collaboration and communication among professional and avocational Coleopterists, recognition of accomplishments of Coleopterists, and the publication of Coleoptera-related research in our refereed quarterly journal, *The Coleopterists Society Bulletin*, published continuously since 1947. Visit The Coleopterists Society's booth and examine our latest publications—and if you are not already a member, join now!

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**Conviron** **Booth: 923**

Winnipeg, Canada

**Website:** [conviron.com](http://conviron.com)

Conviron's controlled environments provide precise, uniform, and repeatable control of numerous environmental parameters including temperature, light, humidity, dehumidification, and CO<sub>2</sub>. Applications include plant growth, entomology, tissue culture, germination, and other research where tight environmental controls are required. Backed by a global distribution and service network, Conviron's reach-in chambers, walk-in rooms, and other controlled environments can be found in over 90 countries around the world. Learn more at [www.conviron.com](http://www.conviron.com).

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**Cornell University Press** **Booth: 322**

Ithaca, New York, USA

**Website:** [cornellpress.cornell.edu](http://cornellpress.cornell.edu)

Cornell University Press publishes well-designed works of lasting merit and scientific rigor in natural history, conservation science, and ecology. Visit the Cornell booth to see our most recent titles and discuss potential book projects with Science Editor Kitty Liu.

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**CRC Press** **Booth: 918**

Boca Raton, Florida, USA

**Website:** [crcpress.com](http://crcpress.com)

CRC Press/Taylor & Francis Group is a leading publisher of technical references and textbooks in entomology. Review new and bestselling books and receive up to 25% off on conference orders. Check out our show specials for even greater discounts. Talk to us about being a CRC Press author!

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**Cricket Science** **Booth: 830**

Pocatello, Idaho, USA

**Website:** [cricketscience.com](http://cricketscience.com)

Cricket Science offers a variety of ONE-OF-A-KIND eclectic items of interest to insect enthusiasts and entomologists, including antiquarian books, prints, jewelry, Baltic amber, cards, cricket cages, notepads, stamps, etc. Prepaid shipping available; all credit cards accepted. Consult the Cricket Science webpage for guidance to hundreds of Amazon and eBay offerings.

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**Dino-Lite Scopes (BigC)** **Booth: 823**

Torrance, California, USA

**Website:** [dinolite.us](http://dinolite.us)

Dino-Lite portable digital microscopes and eyepiece cameras provide high-quality microscopy video interfacing to PC and MAC with clear and steady imaging. Most models provide 10x-220x magnification, along with included software with features such as image and video capture, measurement, and annotation capabilities. Units with 5-MP resolution, extended depth of field, automatic magnification reading, and flexible LED control are available.

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**Doctor of Plant Medicine and Doctor of Plant Health** **Booth: 319**

Gainesville, Florida, USA

**Website:** [dpm.ifas.ufl.edu](http://dpm.ifas.ufl.edu)

The University of Florida DPM Program ([www.ufplantdoctors.org](http://www.ufplantdoctors.org)) is a degree for training professional plant health practitioners, or Plant Doctors. Our students complete hands-on courses, two elective substantial internships, and several credits of required internships. The following discipline departments collaboratively support DPM students through mentoring, teaching, and committee service: Agronomy, Entomology and Nematology, Environmental Horticulture, Food Science and Human Nutrition, Horticultural Sciences, Plant Pathology, School of Forest Resources and Conservation, and Soil and Water Sciences.

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**Elsevier** **Booth: 909**

San Diego, California, USA

**Website:** [elsevier.com](http://elsevier.com)

Elsevier is your access point into the recent advancements in entomology, providing cutting-edge research from worldwide experts. Explore the latest in research via our exciting books and journals on display such as *Insect Ecology, 4<sup>th</sup> Edition*, *Current Opinion in Insect Science*, *Microbial Control of Insect and Mite Pests*, and *Journal of Insect Biochemistry and Molecular Biology*. Discover our electronic research and solution tools on Science-Direct!

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**EMD Performance Materials Corp.** **Booth: 907**

Philadelphia, Pennsylvania, USA

**Website:** [ir3535.com](http://ir3535.com)

EMD Performance Materials Corp. (a subsidiary of Merck KGaA, Darmstadt, Germany) is the manufacturer of IR3535®, the key ingredient used in various insect repellents. The EPA-approved product, a perfect alternative to DEET, can be licensed and is available in three attractive formulations (pump spray, aerosol, and lotion). Detailed information available at [www.ir3535.com](http://www.ir3535.com).

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**Empire Technical Development** **Booth: 1006**

Spokane, Washington USA

**Website:** [empiretechdev.com](http://empiretechdev.com)

Empire Technical Development is the premier supplier of automated and semi-automated insect diet dispensing solutions. We also supply consumables and high-quality, pre-poured plates for live insect assays and rearing operations. We can build flexible, customizable automation solutions to meet all your dispensing needs.

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**Encyclopedia of Life / National Museum of Natural History** **Booth: 919**

Washington, DC, USA

**Website:** [eol.org](http://eol.org)

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**Entomological Society of America and the Entomological Foundation** **Booth: 620**

Annapolis, Maryland, USA

**Website:** [entsoc.org](http://entsoc.org)

Stop by ESA's Central Tower in the middle of the Exhibit Hall to learn about ESA programs and services, have a balloon insect made for you, and view our 3D printer in action. Place a sticker on our ICE delegate world map noting your home city. Get to know ESA's professional staff, meet a colleague, and learn about ESA membership benefits and the ESA Certification Programs. Join ESA or renew your ESA membership and receive a thank you gift. Buy your raffle tickets for an Entomology 2017 VIP travel experience (including hotel, airfare, ground transportation, and more) in the Entomological Foundation Raffle. And don't forget to bid on the great selection of gifts and other items at the Foundation's Silent Auction.

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**Entomological Souvenirs** **Booth: 917**

Gainesville, Florida, USA

Many years we exhibited at ESA, but now our last stand is ICE. We specialize in insect fossils and we have thousands. We have insect jewelry, riker mounts with butterflies and moths, and new specimens for decoration and taxonomic study. Great books on closeout. We want to sell out!

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**Environmental Growth Chambers** **Booth: 422**

Chagrin Falls, Ohio, USA

**Website:** [egc.com](http://egc.com)

EGC is celebrating 63 years of design and manufacturing experience with the largest selection of plant growth chambers of any company worldwide. Producing entomological research chambers, controlled environmental rooms, tissue culture chambers, lighted and refrigerated incubators, gas-exchange chambers, day-lit chambers, and root zone cabinets.

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**Excellence Through Stewardship** **Booth: 702**

Washington, DC, USA

**Website:** [ets.bio](http://ets.bio)

Excellence Through Stewardship is a nonprofit organization with more than 40 global members that promotes the adoption of best practices for agricultural technology. With the help of industry experts, ETS develops quality management and stewardship programs that work with existing company procedures and programs over the entire product life cycle.



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**Frontier Scientific** **Booth: 531**  
Newark, Delaware, USA  
**Website:** fsiag.com

Frontier Scientific is pleased to announce the expansion of its Agriculture Services Division, a leading provider of high-quality insect products supporting agricultural insecticide research. This expansion complements Frontier's preeminent contract services and onsite FTE staffing business models supporting R&D organizations in pharma, biotech, and agricultural research organizations.

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**Frontiers** **Booth: 925**  
Lausanne, Switzerland  
**Website:** frontiersin.org

Frontiers is a leading open-access publisher. Established in 2007, Frontiers drives innovations in peer review, post-publication review, impact metrics, and an ecosystem of open-science tools. Frontiers has published over 45,000 articles across 56 journals and over 400 disciplines, which receive over 4 million monthly views.

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**GBIF: Global Biodiversity Information Facility** **Booth: 331**  
Copenhagen, Denmark  
**Website:** gbif.org

As an open-data research infrastructure funded by the world's governments, GBIF—the Global Biodiversity Information Facility—provides free and open online access to species data through a network of member states and organizations along with hundreds of data-holding institutions around the world.

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**Gylling Data Management** **Booth: 516**  
Brookings, South Dakota, USA  
**Website:** gdmdata.com

Providing research management software since 1982. See the new ARM 2016 used to establish, manage, analyze, and report information for crop experiments, including field and greenhouse protocols and trials. Tablet Data Collector: Enter and analyze assessments, take plot pictures, and record trial GPS locations. ST: Summarize and report a trial series across locations and/or years; links with Trial Database to select trials based on information in any trial data entry field.

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**HarvestMaster** **Booth: 518**  
Logan, Utah, USA  
**Website:** junipersys.com

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**Hellenic Entomological Society** **Booth: 706**  
Kifissia, Greece  
**Website:** entsoc.gr

The Hellenic Entomological Society (HES) is a nonprofit organization located in Athens, Greece. The aim of HES is the promotion of entomological science as an integrating biological discipline. HES is seeking scientific cooperation and transfer of knowledge as well as bringing together expertise and technology from diverse sectors and research fields.

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**Hitachi High Technologies America, Inc.** **Booth: 400**  
Clarksburg, Maryland, USA  
**Website:** hitachi-hightech.com/us

Hitachi High Technologies America sells and supports innovative and reliable analytical instrumentation to meet the demands of today's research labs. The TM3030 and TM3030Plus tabletop scanning electron microscopes deliver superb imaging capabilities in a compact and portable footprint. Hitachi also sells and services Atmospheric SEM and Atomic Force Microscopes.

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**iDigBio** **Booth: 433**  
Gainesville, Florida, USA  
**Website:** idigbio.org

iDigBio is the national resource for digitized information about existing, vouchered natural history collections and as such promotes the uses of biological/paleontological collections data by the scientific community and stakeholders including government agencies, educational institutions, NGOs, and other national and international entities to benefit science and society through enhanced research, educational, and outreach activities.

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**Imerys** **Booth: 603**  
Roswell, Georgia, USA  
**Website:** imerys-mechanicalinsecticides.com

Imerys Mechanical Insecticides provides innovative solutions to the traditional vector control methods by offering a non-chemical based tool to complement existing vector control strategies in the insect borne disease, pest control, turf and plant markets.

ImerGard™ our latest product formulation offers a natural solution for vector control, combating insect borne disease.

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**Innovative Pest Control Products** **Booth: 420**  
Boca Raton, Florida, USA  
**Website:** antcafe.com

Innovative Pest Control Products produces environmentally friendly pest control products for the urban and agricultural pest control markets. Our premier products, (Gourmet)/Green Way Liquid Ant Bait and Antopia Bait Delivery Systems, are registered for use in organic agriculture and offer a proven method for controlling invasive ants.

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**Insect Art & Tattoos by Jads** **Booth: 430**  
Orlando, Florida, USA

Fine art prints and professional tattooing by Jads Drew, local artist and amateur beetle enthusiast. Pre-drawn insect designs available to be tattooed as well as custom work.

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**IPM Innovation Lab at Virginia Tech** **Booth: 1016**  
Blacksburg, Virginia, USA  
**Website:** oired.vt.edu/ipmil

The USAID funded IPM Innovation Lab, in collaboration with partners, supports IPM research, technology transfer, and capacity building in strengthening developing country small-holder farming systems. IAPPS is a professional society whose mission is to promote an integrated and sustainable approach to plant protection worldwide, from research to practical application.



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**ISCA Technologies****Booth: 1022**

Riverside, California, USA

**Website:** [iscatech.com](http://iscatech.com)

ISCA Technologies is located in Riverside, California, and has been in business for over 20 years. The company prides itself in research and development, pheromone synthesis, product manufacturing, and green technologies. Each product line provides a safe, effective, natural, and environmentally friendly solution for agriculture, forest, and urban insect pest management. ISCA's mission is to protect the world from damaging insects and disease-causing pathogens by developing tools and solutions that are economical, effective, and ecologically friendly. ISCA Technologies Inc., 1230 W. Spring Street, Riverside, CA 92507; 951-686-5008. For more information, please e-mail ISCA Technologies at [info@iscatech.com](mailto:info@iscatech.com).

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**Johns Hopkins University Press****Booth: 1010**

Baltimore, Maryland, USA

**Website:** [press.jhu.edu](http://press.jhu.edu)

One of the largest publishers in the United States, the Johns Hopkins University Press publishes 80 scholarly journals and nearly 200 new books each year. Award-winning lists in history, science, literary studies, political science, and medicine reach a worldwide audience of scholars, students, and discerning readers.

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**Koppert Biological Systems****Booth: 1030**

Howell, Michigan, USA

**Website:** [koppertonline.com](http://koppertonline.com)

Koppert Biological Systems is the market leader in biological crop protection and natural pollination. We develop and produce state-of-the-art biological systems used by professional growers throughout the world. Visit us to learn more about our tailor-made solutions, which include beneficial insects, microbials, bumblebees for pollination, and our iPM scout app!

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**L4iS****Booth: 931**

State College, Pennsylvania, USA

**Website:** [L4iS.com](http://L4iS.com)

L4iS is a technology company based in State College, Pennsylvania offering its patent-pending Laser Ablation Tomography ("LATScan") services. L4iS's LATScan provides highly-contrasted 3D imagery and structure analysis. LATScan offers greater resolution, greater contrast, and quicker sample processing speeds than competing imaging and microscopy techniques.

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**Laudier Histology****Booth: 922**

New York, New York, USA

**Website:** [laudierhistology.com](http://laudierhistology.com)

Laudier Histology is a boutique histology laboratory specializing in insect and related arthropod histology services. We offer: precision specimen preparation, histopathology analysis, applied histochemical assays, and a wide range of imaging services.

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**The Lepidopterists' Society****Booth: 432**

Champaign, Illinois, USA

**Website:** [lepsoc.org](http://lepsoc.org)

The Lepidopterists' Society is a nonprofit international organization that promotes the scientific study and appreciation of Lepidoptera. The Society was founded in 1947 on the principles of uniting amateur and professional lepidopterists. Our approximately 1,000 members include researchers, educators, conservationists, collectors, watchers, photographers, and students of all ages.

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**Loligo Systems****Booth: 1000**

Viborg, Denmark

**Website:** [loligosystems.com](http://loligosystems.com)

Loligo® Systems develops research equipment for measuring animal respiration and behavior. Products are automated respirometry systems for oxygen consumption measurements in anything from a single egg, embryo, larvae or adult animal ranging in size from a few µg and up; and animal video tracking and behavior analysis software.

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**Macroscopic Solutions****Booth: 417**

Tolland, Connecticut, USA

**Website:** [macroscopicsolutions.com](http://macroscopicsolutions.com)

Macroscopic Solutions sells the Macropod, which can be used to photograph everything from field sites to small samples and thin sections/slides almost to the level of a scanning electron microscope (SEM). The unique company provides an all-in-one portable professional imaging set up (backpack, camera, numerous lenses, stands, image stacking software, support, etc.) to conduct field- and lab-based professional 3D imagery, making it a fantastic tool for research and education.

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**Martin Microscope Co.****Booth: 530**

Easley, South Carolina, USA

**Website:** [martinmicroscope.com](http://martinmicroscope.com)

Celebrating our 70<sup>th</sup> year in business, Martin Microscope Company is a leading distributor of microscopes and digital microscopy equipment. Please visit [www.martinmicroscope.com](http://www.martinmicroscope.com) and click the ESA-2016 link to view all of the equipment we are demonstrating.

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**Monsanto****Booth: 504**

Chesterfield, Missouri, USA

**Website:** [monsanto.com](http://monsanto.com)

Monsanto Company is a leading global provider of technology-based solutions and agricultural products that improve farm productivity and food quality. Monsanto remains focused on enabling both small-holder and large-scale farmers to produce more from their land while conserving more of our world's natural resources such as water and energy. To learn more about our business and our commitments, please visit [www.monsanto.com](http://www.monsanto.com).





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**National Taiwan University** Booth: 325  
Taipei, Taiwan  
**Website:** [bem.bime.ntu.edu.tw](http://bem.bime.ntu.edu.tw)

With unique and patented technologies, we provide monitoring knowledge and systems for the pests and insects especially for medflies, oriental fruit flies, leafworm moths, and honey bees. The automatic monitoring systems can serve as a useful platform for many studies, and these systems are ideal for country-wide sentinel programs for ecological monitoring.

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**NIGHTSEA** Booth: 932  
Lexington, Massachusetts USA  
**Website:** [nightsea.com](http://nightsea.com)

Fluorescence! NIGHTSEA offers tools for viewing/photographing fluorescence over a wide range of scales. Natural fluorescence, fluorescent markers, fluorescent proteins and dyes – we can help you see it all. Flashlights, camera accessories, and an economical system that adapts existing stereomicroscopes for fluorescence! Come talk to us about your glowing applications.

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**Noldus Information Technology** Booth: 731  
Leesburg, Virginia, USA  
**Website:** [noldus.com/zebrafish](http://noldus.com/zebrafish)

Noldus IT develops professional software and instrumentation for animal behavior research for researchers worldwide to collect, analyze, manage, and present data. Solutions include high-throughput screening of embryo activity, heartbeat detection or activity monitoring in larvae, anxiety, learning and memory, shoaling, and social interaction tests in adults, and more.

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**Nouveaux Pest Solutions, LLC** Booth: 402  
Longwood, Florida, USA  
**Website:** [mosquitocare.com](http://mosquitocare.com)

Nouveaux Pest Solutions, LLC is the exclusive master distributor of Mosquito Care Insect Repellent, a 20% Picaridin, water-based, skin-friendly formulation with 14-hour effectiveness against the toughest mosquitoes. Mosquito Care is effective for biting flies, ticks, fleas, and biting midges. We are a Florida based business, [www.mosquitocare.com](http://www.mosquitocare.com).

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**Ockenfels SYNTECH GmbH** Booth: 607  
Kirchzarten, Germany  
**Website:** [syntech.nl](http://syntech.nl)

SYNTECH is a manufacturer of instruments for electrophysiological and behavioral research of insect olfaction and taste. Instruments dedicated to ElectroAntennography (EAG), Single Sensillum Recording (SSR), coupled GC-EAD and GC-SSR, and for multichannel recording and analysis of insects' chemical communication. We combine precision engineering with electronics and traditional German craftsmanship.

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**Oxford University Press** Booth: 406  
New York, New York, USA  
**Website:** [global.oup.com](http://global.oup.com)

Oxford University Press published some of the world's leading scientific books, journals, and online resources. Stop by our booth in the Entomology Exhibit Hall for discounts on new and classic titles, free journal samples, and information about online products. Please also visit us online at [www.oup.com/us](http://www.oup.com/us).

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**Parrot Inc.** Booth: 933  
San Francisco, Florida USA  
**Website:** [edu.parrot.com](http://edu.parrot.com)

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**Percival Scientific Inc.** Booth: 633  
Perry, Iowa, USA  
**Website:** [percival-scientific.com](http://percival-scientific.com)

Percival Scientific represents a rich tradition of product ingenuity and reliability throughout the world. We provide clients with reliable custom solutions designed to meet their specific research requirements. Customers rely upon Percival to meet their unique needs by providing chambers that are engineered and manufactured to their specifications. The ability to meet individual requirements to control extensive critical testing variables has allowed our company to become an industry leader. Every Percival chamber is designed and manufactured in America's heartland in Perry, Iowa. We take American Pride in engineering and manufacturing the best chambers used throughout the world.

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**Phbead** Booth: 533  
Paint Lick, Kentucky, USA  
**Website:** [phbead.com](http://phbead.com)

Dr. Melissa Senetar is a Kentucky native and self-taught artist who combines her love of science with fashion by creating resin jewelry with insect wings. Each piece is individually handcrafted and meticulously sealed to make a perfectly enveloped wing that is resistant to wear-and-tear, with no two pieces ever alike.

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**Pioneer Plastics** Booth: 920  
Dixon, Kentucky USA  
**Website:** [pioneerplastics.com](http://pioneerplastics.com)

Pioneer Plastics is a leading provider of clear plastic containers for Entomology—both research and hobbyist. Our containers are injection molded from FDA-grade crystal polystyrene material, which gives them great clarity at an affordable price. From the small petri dish to large 12" container, we have a size for most applications! Check us out at [www.pioneerplastics.com](http://www.pioneerplastics.com) or call 800-951-1551 today!

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**Polyguard Barrier Systems** Booth: 1019  
Ennis, Texas, USA  
**Website:** [insectexclusion.com](http://insectexclusion.com)

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**Rad Source Technologies** Booth: 821  
Suwanee, Georgia, USA  
**Website:** [radsources.com](http://radsources.com)

Rad Source Technologies is the only company in the world supplying a comprehensive line of commercial X-ray radiation products designed to replace self-shielded gamma sources. Current products are used for the irradiation of blood (NEW), small animals, cells, sterile insect technique (SIT) applications, viral inactivation, phytosanitation, and other scientific applications.



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**The Resource Shop**

Palatka, Florida, USA

**Website:** jeffmcgovern.com

The Resource Shop, Inc. is the brainchild of Jeff and Kate McGovern. Jeff, aka The Pest Coach is well known in the industry for his consultant work, entertaining speaking engagements, and feature articles in PCT and PMP magazines. The booth overflows with the best quality of equipment, materials and ideas that cover all aspects of pest management, especially green and IPM programs.

**Booth: 1020**

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**Springer**

New York, New York, USA

**Website:** springer.com

Looking to publish your research? Discover Springer's print and electronic publication services, including open access! Get highquality review, maximum readership, and rapid distribution. Visit our booth or [springer.com/authors](http://springer.com/authors). You can also browse key titles in your field and buy (e)books at discount prices. With Springer you are in good company.

**Booth: 903**

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**Sable Systems International**

Las Vegas, Nevada, USA

**Website:** sablesys.com

Founded in 1987 by comparative physiologists studying insects, Sable Systems' instruments, systems, analytical software, and expertise are borne from real research needs in metabolic science. Our staff is still active today in research. Sable designs bench-top or field-capable systems and individual instruments that are precise, reliable, and rugged for measurement and control of O<sub>2</sub>, CO<sub>2</sub>, humidity, temperature, and flow for biological, biomedical, agricultural, and environmental sciences.

**Booth: 630**

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**SpringStar, Inc.**

Woodinville, Washington, USA

**Website:** springstar.net

SpringStar is a primary manufacturer of science-based, environmentally friendly arthropod traps. We collaborate with researchers in academia, the CDC, and the U.S. military, providing material support and industrial design to develop brilliant ideas into marketable products. Recently, we released the pesticide-free CDC Autocidal Gravid Ovitrap to control Zika vector mosquitoes.

**Booth: 833**

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**SC Johnson & Son, Inc.**

Racine, Wisconsin, USA

**Website:** scjohnson.com

We are SC Johnson's global research facility that is dedicated to understanding insect life and promoting positive human-insect interactions. Located in Racine, Wisconsin, we are involved in all aspects of entomology that lead to technical innovations for improving the lives of consumers. Stop by and learn more about our Research Center.

**Booth: 301**

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**Sumitomo Chemical Group Companies**

Minneapolis, Minnesota, USA

**Website:** sumitomo-chem.co.jp/english**MGK, Minneapolis, Minnesota USA****Website:** mgk.com

MGK develops a broad portfolio of branded and customized insect control products based primarily on natural pyrethrum and pyrethroids.

**Booth: 819****Valent BioSciences Corporation (VBC)**

Libertyville, Illinois, USA

**Website:** valentbiosciences.com

Valent BioSciences Corporation is a leader in the research, development and commercialization of biorational products for the agricultural, public health, forestry and household market.

**Valent USA Corporation (Valent)**

Walnut Creek, California, USA

**Website:** valent.com

Valent USA Corporation is a leading crop protection firm serving the agricultural and plant products markets in North America.

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**Sigma Scientific LLC**

Micanopy, Florida, USA

**Website:** sigmascientificllc.com

Sigma Scientific manufactures controlled stimuli response systems for entomological research worldwide. Sigma's team has worked with researchers to develop industry standard products for over 40 years, specializing in Ento-CADST™ lab and field, air delivery systems, semio-chemical volatile collection traps/chambers, olfactometers, and wind tunnels that are configured to guarantee reproducible results.

**Booth: 520**

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**Silverspot Studio**

Cincinnati, Ohio, USA

**Website:** silverspotstudio.com / silverspotmetalworks.etsy.com

Silverspot Studio features a wide variety of insect-themed jewelry handmade by Jesse J. Smith, as well as a selection of prints, illustrations, and other artwork by talented artist-entomologists.

**Booth: 632**

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**Small Farm IPM at Alcorn State University and Other United States 1890 Land Grant Universities**

Lorman, Mississippi, USA

**Website:** alcorn.edu

We will present an overview of integrated pest management (IPM) research, educational, and extension activities at Alcorn State University, and other 1890 Land Grant Institutions. These universities actively engage in IPM projects vital to small farm sustainability.

**Booth: 733**

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**Taiwan Entomological Society**

Taipei, Taiwan

**Website:** entsoc.org.tw

The 7<sup>th</sup> International Symposium on Cecidology: Ecology and Evolution of Gall-Inducing Arthropods, will be held in Taiwan in the fall of 2018. You're always welcome to visit our booth to learn more information about galls, the symposium, the Taiwan Entomological Society, and Taiwan.

**Booth: 1023**

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**Taylor & Francis** Booth: 916  
Boca Raton, Florida, USA  
**Website:** [taylorandfrancis.com](http://taylorandfrancis.com)

CRC Press/Taylor & Francis is a leading international publisher of technical references and textbooks in entomology. Please visit our booth to browse the latest and best-selling books such as *Insect Physiology and Biochemistry, Third Edition*, and *Greenhouse Pest Management*, with special convention discounts on all purchases. Review our journal selections and pick up complimentary sample copies. Senior Editor John Sulzycki ([john.sulzycki@taylorandfrancis.com](mailto:john.sulzycki@taylorandfrancis.com)) will be available to discuss new project ideas.

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**Trécé Inc.** Booth: 631  
Adair, Oklahoma, USA  
**Website:** [trece.com](http://trece.com)

The industry leader in insect pheromone and kairomone-based monitoring and control products. Trécé has over 34 years of consistent reliability; a worldwide distribution network; state-of-the-art organic chemistry and controlled-release formulations; research and development and on-site manufacturing; and chemists following strict quality assurance programs producing premier pheromone and kairomone-based products for monitoring and controlling insects, including PHEROCON®, STORGARD®, and CIDETRAK®.

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**UGA Center for Invasive Species and Ecosystem Health** Booth: 333  
Tifton, Georgia, USA  
**Website:** [bugwood.org](http://bugwood.org)

We develop and utilize partnerships and information technology to advance invasive species management, integrated pest management, and forest health. By providing ready access to relevant information and tools, we empower stakeholders to make cost-effective management decisions that minimize disruptions to non-target organisms in the ecosystem and effectively control pest organisms.

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**Union Biometrica, Inc.** Booth: 424  
Holliston, Massachusetts, USA  
**Website:** [unionbio.com](http://unionbio.com)

Union Biometrica Large Particle Flow Cytometers automate analysis, sorting, and dispensing of objects too big/fragile for traditional cytometers, e.g., small model organisms like *C. elegans*, *Drosophila*, and mosquitoes as well as cell clusters. COPAS or BioSorter with interchangeable modules cover the full 10- to 1,500-µm range and are ideal for shared instrument grants.

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**University of Arkansas** Booth: 732  
Fayetteville, Arkansas, USA  
**Website:** [entomology.uark.edu](http://entomology.uark.edu)

The Department of Entomology at the University of Arkansas offers M.S. and Ph.D. degrees, with strengths in systematics, host-plant interactions, applied insect ecology, and other research areas. The department's display provides information on graduate study, available fellowships, and other opportunities.

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**University of Florida Entomology and Nematology** Booth: 321  
Gainesville, Florida, USA  
**Website:** [entnemdept.ifas.ufl.edu](http://entnemdept.ifas.ufl.edu)

Join us at the Entomology and Nematology Department of the University of Florida ([entnemdept.ifas.ufl.edu](http://entnemdept.ifas.ufl.edu)). From thesis master's and doctoral programs, to online non-thesis master's with specializations in Entomology, Medical Entomology, Urban or Landscape Pest Management, to undergraduate or graduate certificates or single courses, we cover all your educational needs!

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**University of Maryland Entomology Department** Booth: 1021  
College Park, Maryland USA  
**Website:** [entomology.umd.edu](http://entomology.umd.edu)

The Entomology Department at the University of Maryland, College Park, located just outside Washington, D.C. conducts research, teaching and extension with broad training opportunities available in agricultural and urban pest management, biological control, genetics and genomics, behavior, ecology, evolution, systematics, and related fields. For more information, please visit [entomology.umd.edu](http://entomology.umd.edu).

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**University of Maryland Insect Transformation Facility** Booth: 532  
Rockville, Maryland, USA  
**Website:** [ibbr.umd.edu/facilities/itf](http://ibbr.umd.edu/facilities/itf)

The University of Maryland's Insect Transformation Facility specializes in genome modification of non-model insects using all currently available technologies. Services include line creation, microinjection, collaboration, training, and consultation. The facility has an established history of success and will work with researchers to insure the success of their projects.

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**University of Notre Dame – ECK Institute for Global Health** Booth: 320  
Notre Dame, Indiana, USA  
**Website:** [globalhealth.nd.edu](http://globalhealth.nd.edu)

The Eck Institute for Global Health at the University of Notre Dame is a university-wide enterprise that recognizes health as a fundamental human right and endeavors to promote research, training, and service to advance health standards for all people, especially people in low- and middle-income countries who are disproportionately impacted by preventable diseases.

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**VectorBase** Booth: 323  
Notre Dame, Indiana, USA  
**Website:** [vectorbase.org](http://vectorbase.org)

VectorBase is a bioinformatics resource for invertebrate vectors of human pathogens, funded by NIH-NIAID. All code, data, tools, and resources are open access. Data include genomes, transcripts and transcriptomes, proteins and proteomes, mitochondrial sequences, and population biology data. Users can browse, query, and download small or big datasets. Help-desk: [info@vectorbase.org](mailto:info@vectorbase.org).



# Entomological Society of America's Upcoming Meetings



## Entomology 2017

November 5-8, 2017  
Denver, Colorado

## Entomology 2018

November 11-14, 2018  
Vancouver, Canada

*Joint meeting with the  
Entomological Society of Canada*

## Entomology 2019

November 17-20, 2019  
St. Louis, Missouri

For additional information visit [www.entsoc.org/am](http://www.entsoc.org/am)



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**Vestaron Corporation** **Booth: 419**  
Kalamazoo, Michigan, USA  
**Website:** [vestaron.com](http://vestaron.com)

Vestaron Corporation exploits the natural insecticidal properties of a class of peptides with potent insect-killing potential using two new modes of action, but which are safe to humans, birds, fish, and the environment. The first commercialization of this technology is Spear™-T bioinsecticide for control of thrips and other greenhouse pests.

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**VM Products, Inc** **Booth: 324**  
Bedford, Texas, USA  
**Website:** [vmproducts.com](http://vmproducts.com)

Remote monitoring for rodents

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**Virginia Tech Department of Entomology** **Booth: 318**  
Blacksburg, Virginia, USA  
**Website:** [ento.vt.edu](http://ento.vt.edu)

The Department of Entomology at Virginia Tech offers M.S. and Ph.D. degrees, with strengths in pest management in forest, agronomic, horticultural and urban systems, vector biology, vector-borne diseases, biological control, insect toxicology, and pollinator biology. Obtain information on graduate study and available fellowships, and mingle with current VT employees and alumni.

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**Visit Denver** **Booth: 418**  
Denver, Colorado, USA  
**Website:** [visitdenver.org](http://visitdenver.org)

Urban sophistication meets outdoor adventure in the Mile High City. With 300 days of sunshine, a walkable downtown, thriving art and cultural scenes, and the Rockies as a backdrop, Denver offers affordable exploration of the world's most spectacular playground. Come experience our award-winning restaurants and one-of-a-kind neighborhood boutiques. [VISITDENVER.org](http://VISITDENVER.org).

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**WildScape** **Booth: 303**  
Clover, South Carolina, USA  
**Website:** [wildscape.com](http://wildscape.com)

Jewelry created by the Caddisfly! Raised in a simulated stream, the Caddisfly larvae are given gemstones from around the world to create beautiful pieces of art. Their cases are then used to design unique jewelry.

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**Wiley** **Booth: 901**  
Malden, Massachusetts, USA  
**Website:** [wiley.com](http://wiley.com)

Wiley is a global provider of knowledge and knowledge-enabled services that improve outcomes in areas of research, professional practice, and education. Visit [www.wiley.com](http://www.wiley.com) for more information.

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**William Fisher Photography** **Booth: 832**  
Hillsborough, North Carolina, USA  
**Website:** [fisherwr2.smugmug.com](http://fisherwr2.smugmug.com)

William Fisher Photography will be selling unique photos of arthropods that illustrate the beauty and bizarre characteristics of these animals. Framed and matted images, plus notecards, will be available. Stop by booth 832 to see a close-up of your favorite insect. All credit cards accepted.



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Paul A. Weston, Charles Sturt University, Wagga Wagga, Australia
- (11) *Entomology Around the World*  
Grayson C. Brown, University of Kentucky, Lexington, KY, USA  
Antônio R. Panizzi, Embrapa Trigo, Passo Fundo - RS, Brazil
- (12) *Entomophagy and Entomology in Popular Culture*  
Florence V. Dunkel, Montana State University, Bozeman, MT, USA  
Gene Kritsky, Mount St Joseph University, Cincinnati, OH, USA  
Peter Smithers, Plymouth University, Plymouth, Devon, United Kingdom
- (13) *Frontiers in Entomology*  
John Carlson, Yale University, New Haven, CT, USA  
Sarjeet Gill, University of California, Riverside, CA, USA  
Ted C. Turlings, University of Neuchâtel, Neuchâtel, Switzerland
- (14) *Functional Genomics and Transgenesis*  
Susan J. Brown, Kansas State University, Manhattan, KS, USA  
Subba Reddy Palli, University of Kentucky, Lexington, KY, USA  
Wei Xu, Murdoch University, Western Australia, Australia
- (15) *Genetics and Evolutionary Entomology*  
Adrien Fonagy, Hungarian Academy of Sciences, Budapest, Hungary  
Ann M. Fraser, Kalamazoo College, Kalamazoo, MI, USA  
David G. Heckel, Max Planck Institute for Chemical Ecology, Jena, Germany
- (16) *Insect Biomechanics and Insect-Inspired Robotics*  
Marianne Alleyne, University of Illinois, Urbana, IL, USA
- (17) *Insect Chemical Ecology*  
Ylva Hillbur, Swedish University of Agricultural Science, Uppsala, Sweden  
Ann Ray, Xavier University, Cincinnati, OH, USA  
Paulo H. G. Zarbin, Federal University of Parana, Curitiba-PR, Brazil
- (18) *Insect Immunity*  
Angela E. Douglas, Cornell University, Ithaca, NY, USA  
Elizabeth McGraw, Monash University, Clayton, Australia  
Jens Rolff, Freie Universität, Berlin, Germany
- (19) *Insect Neurobiology*  
Richard Newcomb, Plant & Food Research, Auckland, New Zealand  
Peter Simmons, Newcastle University, Newcastle upon Tyne, United Kingdom  
James W. Truman, Janelia Farm Research Campus, Ashburn, VA, USA
- (20) *Insect-Plant Interactions in a Changing Climate*  
Saadia Lhaloui, INRA Morocco, Settat, Morocco  
Naoki Mori, Kyoto University, Sakyo, Japan  
Bonnie B. Pendleton, West Texas A&M University, Canyon, TX, USA
- (21) *Insects in Food Safety and Homeland Security*  
Anthony Robert Clarke, Queensland University of Technology, Brisbane, QLD, Australia  
Brian J. Kopper, USDA-Animal and Plant Health Inspection Service, Raleigh, NC, USA  
Alberto Pantoja, USDA-Agricultural Research Service, Peoria, IL, USA
- (22) *Integrated Pest Management and Sustainable Agriculture*  
Divina M. Amalin, De La Salle University, Manila, Philippines  
Margaret Appleby, Ministry of Agriculture, Food and Rural Affairs, Brighton, ON, Canada  
Thomas Green, IPM Works LLC, Madison, WI, USA
- (23) *Invasive and Exotic Entomology*  
Jose Romeno Faleiro, FAO of the UN, Date Palm Research Centre, Al Hassa, Saudi Arabia  
Lisa G. Neven, USDA-Agricultural Research Service, Wapato, WA, USA  
Daniel A. Strickman, Bill and Melinda Gates Foundation, Seattle, WA, USA
- (24) *Medical and Veterinary Entomology*  
Adriana Costero, DMID/NIAID/NIH, Bethesda, MD, USA  
Stephen Higgs, The Biosecurity Research Institute, Manhattan, KS, USA  
Anthony A. James, University of California, Irvine, CA, USA  
Willem Takken, Wageningen Agricultural University, Wageningen, Netherlands
- (25) *Molecular Basis of Insect Learning and Behavior*  
Emmanuelle Jacquin-Joly, INRA, Versailles, France  
Kevin Wanner, Montana State University, Bozeman, MT, USA
- (26) *Morphology, Systematics and Phylogeny*  
Adriana E. Marvaldi, División Entomología, Facultad de Ciencia, Buenos Aires, Argentina  
Joseph V. McHugh, University of Georgia, Athens, GA, USA  
Christiane Weirauch, University of California, Riverside, CA, USA
- (27) *RNAi and Gene Expression Control in Insects*  
Kent S. Shelby, USDA-Agricultural Research Service, Columbia, MO, USA  
Rosemarie Tedeschi, University of Torino, Grugliasco (TO), Italy
- (28) *Physiology and Biochemistry*  
Jon F. Harrison, Arizona State University, Tempe, AZ, USA  
Le Kang, Chinese Academy of Sciences, Beijing, China  
Jeffrey G. Scott, Cornell University, Ithaca, NY, USA
- (29) *Stored Products Entomology*  
Maria Otilia Carvalho, Tropical Research Institute of Portugal, Lisbon, Portugal  
Rizana M. Mahroof, South Carolina State University, Orangeburg, SC, USA
- (30) *Urban Entomology in a Changing Environment*  
S. Kristine Braman, University of Georgia, Griffin, GA, USA  
Chow-Yang Lee, BCE, Universiti Sains Malaysia, Minden, Penang, Malaysia  
Coby Schal, North Carolina State University, Raleigh, NC, USA





## 2016 ESA, ESA Certification and Entomological Foundation Awards

Each year the Entomological Society of America, Entomological Society of America Certification Corporation and the Entomological Foundation provide annual honors and awards to recognize scientists, educators, early professionals, and students, who have distinguished themselves through their contributions to entomology.

For more information on the ESA, Certification Corporation, and Entomological Foundation awards visit [www.entsoc.org/awards](http://www.entsoc.org/awards).



## Certificates of Distinction for Outstanding Achievements Awarded by the Council of International Congresses of Entomology

The Certificates of Distinction emphasize the central and continuing importance of entomology in both basic and applied studies, ranging from populations and organisms down to cellular and molecular levels.

The below awards will be presented at the ESA Opening Plenary Session,  
Sunday, September 25, 4:00 PM - 5:30 PM, Valencia Room, Convention Center.

## HONORARY MEMBERS

Dr. Ernest S. "Del" Delfosse  
Dr. David B. Hogg  
Dr. Norman C. Leppla

## ESA FELLOWS

Dr. Ernest S. "Del" Delfosse  
Dr. Sanford Eigenbrode  
Dr. Marcos Kogan  
Dr. Douglas A. Landis  
Dr. Ronald Nachman  
Dr. Leslie Pick  
Dr. Peter W. Price  
Dr. Daniel Strickman  
Dr. Matthew B. Thomas  
Dr. Baldwin Torto

## ESA PROFESSIONAL AWARDS

Dr. Greg Loeb, Award for Excellence in Integrated Pest Management (sponsored by Syngenta Crop Protection, Inc.)  
Dr. Robert Wright, Distinguished Achievement Award in Extension  
Dr. Pete Teel, Distinguished Achievement Award in Teaching  
Dr. Rob Morrison, Henry and Sylvia Richardson Research Grant  
Dr. David Riley, Recognition Award in Entomology  
Dr. Coby Schal, Nan-Yao Su Award for Innovation and Creativity in Entomology  
Dr. Gerhard Gries, Recognition Award in Insect Physiology, Biochemistry, and Toxicology (sponsored by Apex Bait Technologies, Inc.)  
Dr. Michael F. Potter, Recognition Award in Urban Entomology (sponsored by S.C. Johnson & Son, Inc.)  
Dr. Thomas Henry, Thomas Say Award

## EARLY CAREER PROFESSIONAL AWARDS

Dr. Adrian Smith, Early Career Professional Outreach and Public Engagement Award  
Dr. Lauren Diepenbrock, Early Career Professional Extension Award  
Dr. Nicolas Teets, Early Career Professional Research Award

## ESA CERTIFICATION AWARDS

Dr. Harold Harlan, Distinguished Service Award to the Certification Program

## ENTOMOLOGICAL FOUNDATION AWARDS

Ms. Denise Scribner, President's Prizes for Outstanding Achievement in Secondary Education  
Dr. Gwen Pearson, Foundation Medal of Honor

## ESA STUDENT AWARDS

*The winners of the Student Competition, ESA Student Awards, and the Linnaean Games will be recognized Friday, September 25, 12:30 PM - 2:30 PM, Chapin Theater, Convention Center.*

*The following student award winners will be honored:*

### ● JOHN HENRY COMSTOCK GRADUATE STUDENT AWARDS

Mrs. Heather (Connelly) Grab, Eastern Branch  
Mr. Kiran Gadhav, International Branch  
Mr. Anthony "Justin" McMechan, North Central Branch  
Dr. Rebecca Schmidt-Jeffris, Pacific Branch  
Dr. Blake Wilson, Southeastern Branch  
Mr. Derek Woller, Southwestern Branch

### ● ESA STUDENT AWARDS

Ms. Ashley Leach, The Larry Larson Graduate Student Award for Leadership in Applied Entomology  
Mr. Zachary DeVries, Lillian & Alex Feir Graduate Student Travel Award in Insect Physiology, Biochemistry, or Molecular Biology  
Ms. Theresa Cira, Student Activity Award (sponsored by Monsanto Company)

### ● ESA STUDENT CERTIFICATION AWARD

Dr. David Wangila, ESA Student Certification Award (sponsored by PestWest Environmental Science)



## ESA HONORARY MEMBERS

*Honorary Membership acknowledges those who have served ESA for at least 20 years through significant involvement in the affairs of the Society that has reached an extraordinary level. Candidates for this honor are selected by the ESA Governing Board and then voted on by the ESA membership.*



**Dr. Ernest S. "Del" Delfosse** is a 42-year ESA member. He is an international authority on biological control and IPM. He received a Ph.D. from the University of Florida, an M.Sc. from South Dakota State University, and a B.Sc. from the University of Louisville. He conducted foreign exploration for natural enemies of invasive species in Australia, Africa, the United States, and Europe. Other

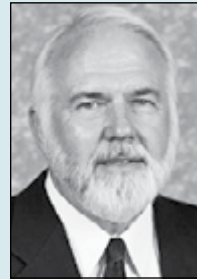
areas of interest include tri-trophic ecology, risk analysis, ethics, and science-based regulations. Del was a Research Scientist and Research Leader for Biological Control of Weeds with CSIRO in Australia (1979-91), where he developed the relatedness host-specificity testing procedure and the phenology-event agent evaluation system. Del was first Director of the USDA National Biological Control Institute (1991-97); Senior National Program Leader with USDA-ARS (1997-2008); and Chairperson of the Michigan State University Department of Entomology (2008-13), where he is currently a Professor. He published 114 scientific papers, edited seven books, and presented more than 400 talks. Del mentored students in Africa, Australia, Europe and the United States, and teaches biological control, IPM, ecology, and international plant protection. Del's service to ESA includes President (2011); Governing Board (2009-12); Chair of Subsection Ca-Biological Control (1999); Chair of Section C-Ecology (2000); student paper and poster judge; and chair or member of six other committees. He was Global President of IOBC (1992-96) and served on the editorial board of seven journals. He has received more than 20 awards and honors, including the 2007 Distinguished Scientist award from IOBC-NRS and the Florida Entomological Society's 1994 Entomologist-of-the-Year.



**Dr. David B. Hogg** is a 40-year ESA member. Hogg received B.S. (1970) and M.S. (1974) degrees in entomology from Purdue University, and a Ph.D. (1977) in entomology and insect ecology from the University of California, Berkeley. He then spent several years on the faculty at Mississippi State University, and in 1979 he accepted a faculty position at the University of Wisconsin (UW), where

he has been for 37 years. During his tenure at Wisconsin, Hogg has served two terms as department chair (1998-2002 and 2011-2015), and he has served as executive associate dean (2002-2005) and as interim dean (2005-2006) of the

College of Agricultural and Life Sciences. He became active in ESA (including North Central Branch) affairs in the early 1980s, which led to various leadership roles: ESA Annual Meeting Program Committee (1990 and 1991), ESA Section C chair (1991), ESA Presidential Committee on Transitioning to Electronic Publications (1997-1998), NCB Executive Council (1998-2000 and 2004-2006), NCB president (2000), co-chair of local arrangements for the Madison NCB meeting (2003), twice on committees to search for ESA executive directors (2007 and 2010), ESA Governing Board (2008-2011), and ESA president (2010). Hogg received the 2004 J.V. Osmun Alumni Award in Entomology (Purdue University), the 2015 NCB-ESA C.V. Riley Achievement Award, and the 2015 Spitzer Excellence in Teaching Award from the UW College of Agricultural and Life Sciences, and he has been named a UW-Madison "Honored Instructor" (student nominated) four of the past five years. Hogg has been a Board Certified Entomologist since 2012.



**Dr. Norman C. Leppla** has dedicated his nearly 50-year career as a professional entomologist to advancing the science and practice of entomology by studying insects in an effort to protect agriculture and human health. He received his B.S. and M.S. degrees from Arizona State University and his Ph.D. degree from the University of Arizona. Currently, he serves as professor and program

director, IPM, at the University of Florida, and previously was employed by the USDA, APHIS, and ARS. His major accomplishments include cooperatively establishing the USDA, APHIS National Biological Control Institute, a new research and education center in Central Florida, and the first statewide IPM program at the University of Florida. Dr. Leppla has been an active ESA member since 1968, including membership in the Pacific, Eastern, and Southeastern Branches. He has continuously presented symposia and research papers at national and branch meetings, became a Board Certified Entomologist in 1982, and directed the American Registry of Professional Entomologists during and after its transition to the Board Certified Entomologist program. He has chaired or served as a member of many ESA committees: ESA Public Information Committee (1997-1999), ESA-EB Program Committee (1993), ESA Strategic Planning Committee (1995), ESA-SEB Program Committee (1997), ESA-SEB Local Arrangements Committee (2008), and ESA-SEB Nominating Committee (2013-14), among others. He was elected ESA-SEB president in 2012, served as ESA-SEB Linnaean Games master and judge, and was biological control subject editor for *Environmental Entomology* (2005-2008). In 2014, he was founding chair of the ESA Grand Challenges Committee.



## ESA FELLOWS

The designation of ESA Fellow recognizes individuals who have made outstanding contributions to entomology.



**Dr. Ernest S. "Del" Delfosse**, professor and former chairperson of the Department of Entomology at Michigan State University (MSU), is internationally known for research on biological control, integrated pest management (IPM), tritrophic ecology, risk analysis, science-based biological control regulations, and administrative leadership.

Del was born in 1949 in Glen Ridge, New Jersey. His earliest recollection of collecting insects is stepping in a yellow jacket nest at about the age of five. Fortunately, he was wearing thick denim dungarees, which trapped hundreds of the wasps, preventing him from being stung. He received a B.Sc. in biology (University of Louisville, 1971), an M.Sc. in entomology (South Dakota State University, 1972), and a Ph.D. in entomology (University of Florida, 1975). He became research entomologist and supervisor at the Lee County Hyacinth Control District in Ft. Myers, Florida (1976-1979). He joined the Commonwealth Scientific and Industrial Research Organization in Canberra, Australia (1979-1991), where he became a principal research scientist and research leader. He returned to the USA as the first director of the National Biological Control Institute in Hyattsville, Maryland (1991-1996). He became a senior national program leader with the USDA-Agricultural Research Service (ARS) in Beltsville, Maryland (1996-2008). While with ARS, Del was acting laboratory director of the Northern Plains Agricultural Research Laboratory in Sydney, Montana (1991), and acting center director of the National Center for Agricultural Utilization Research in Peoria, Illinois (2007). He was chairperson of the Department of Entomology at MSU (2008-2013), and is now a professor there.

Del published 114 papers, abstracts, and invited book chapters on biological control, IPM, risk analysis, and ethics, and edited five books. He had 17 invited consultancies with groups such as the Food and Agriculture Organization of the United Nations/International Atomic Energy Agency, the Government of South Africa, the Australian House of Representatives' Standing Committee on Industry, Science, and Technology, USDA, and Bilateral Panels with Mexico; chaired or co-chaired more than 40 conferences and workshops; and chaired over 20 grant panels. He received competitive grant funding of nearly \$4 million. He mentored students in the USA, Australia, South Africa, and Europe. He developed the phenology-event relatedness testing procedure to clarify physiological versus ecological host range of biological control agents. Del presented more than 400 talks and posters, including 26 keynote addresses and 48 invited presentations. His service to ESA includes president (2011), chair of Section C (Ecology; 2001); chair of Section Ca (Biological Control; 2000); *Environmental Entomology* Biological Control subject editor (2002-09); chairing or serving on seven committees; teaching "Responsible Conduct of Research"; and judging student papers and posters. He was the first American to be elected

global president of the International Organization for Biological Control (1992-1996). He received more than 20 awards for his administrative leadership and research accomplishments, including three citations from the White House.

Del is an avid fly fisherman, and still avoids yellow jackets. He writes bad poetry and mediocre humorous essays. He has been married to the love of his life, Janet (an artist), for 46 years.



**Dr. Sanford D. Eigenbrode** is a professor in the Department of Plant, Soil, and Entomological Sciences (PSES) at the University of Idaho, where he is also a university distinguished professor. He pursues research on insect-plant and multitrophic interactions, sustainable production and biodiversity conservation in working landscapes, climate change and agricultural systems, and the science and practice of cross-disciplinary collaboration.

Professor Eigenbrode was born in Evanston, Illinois, in 1948. He grew up principally in Stamford, Connecticut. He attended Cornell University, receiving his B.S. in biology in 1970. He taught chemistry and biology in the Ithaca City School District at the Lehman Alternative School, working closely with its founding director, David Lehman, and the other innovative educators there. In 1983, he returned to Cornell for graduate work, earning an M.S. in natural resources (1986) with David Pimentel and a Ph.D. (1990) with Tony Shelton, conducting research on resistance to diamondback moth in *Brassica* at the New York State Agricultural Experiment Station in Geneva. After graduation, he worked as a postdoc on host plant resistance in tomato with John Trumble at the University of California, Riverside. In 1993, he moved to the University of Arizona as a Postdoctoral Fellow in the NSF-supported Plant-Insect Interdisciplinary Program directed by Elizabeth Bernays. In 1995, he joined the faculty at the University of Idaho, progressing through the ranks and assuming the position of chair of the Division of Entomology in 2004, serving until 2014.

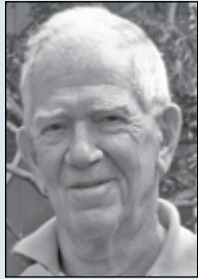
In science, Eigenbrode has striven to integrate fundamental discovery and application that supports sustainable agriculture. His major accomplishments include elucidating the effects of plant wax structure and chemistry on insect herbivores and their natural enemies, discovering chemically mediated interactions between plant viruses and their aphid vectors, and developing forecasting and decision tools to manage aphids and plant viruses. He has assumed leadership of broadly interdisciplinary projects that include entomology to address challenges to managing production systems and landscapes under drivers of change, most recently as director of a large USDA NIFA-sponsored coordinated agricultural project on cereal production systems of the Pacific Northwest under climate change. His efforts to improve scientific integration have included co-leadership in two NSF-IGERT projects, which has led to NSF-sponsored research on enhancing interdisciplinary communication and collaboration. Eigenbrode has published more than 120 scientific papers, 22 book chapters and review articles, and one co-edited book.



He has graduated seven M.S. and five Ph.D. students and currently has one M.S. student in his group. He has mentored seven postdoctoral scientists.

Eigenbrode has presented more than 120 invited presentations at state, national, and international venues. He received numerous institutional awards including the rank of University Distinguished Professor at the University of Idaho, the 2011 Award for Excellence in Research, and the Award for Excellence in Interdisciplinary or Collaborative Efforts or Creative Activity.

His wife, Sara Pepper, works at the Paul Allen School for Global Animal Health at Washington State University in Pullman, Washington, and his daughter, Clare, will attend Beloit College in Wisconsin this fall.



**Dr. Marcos Kogan** is professor emeritus of agricultural entomology, University of Illinois (UIUC), and professor emeritus of entomology, Oregon State University (OSU). His research focused on the interactions of insects and plants, and mechanisms of constitutive and induced plant resistance to herbivores. He is recognized for work linking ecological theory with integrated pest management

(IPM) practice. With emphasis on soybean entomology, he promoted IPM in South America, Africa, and Asia.

Marcos was born in 1933 in Rio de Janeiro, Brazil, where he began collecting and identifying insects at age 10. At the age of 20, Marcos married and spent the next four years in Israel. He worked in the fields of a collective farm, gaining appreciation for challenges of practical crop production. His later academic work was firmly rooted within this real-world experience. Marcos returned to Brazil and earned an agronomy degree from the Universidade Rural do Rio de Janeiro in 1961. After graduation, he was appointed biologist of the Instituto Oswaldo Cruz (IOC) in Rio. During that period he published papers on the biology and taxonomy of Coleoptera and Strepsiptera, and the biology of tomato and citrus pests. In 1966, with a Guggenheim Fellowship, he pursued a Ph.D. degree in entomology and biological control from the University of California, Riverside, graduating in 1968. The following year, after a short postdoctoral project at UC-Riverside on the taxonomy of a house-fly parasitoid complex, Marcos joined the Illinois Natural History Survey and UIUC. In 1991, he became director of the Integrated Plant Protection Center (IPPC) at OSU. He retired from OSU in 2003. He remains active in retirement studying extant and fossil Strepsiptera and writing on the history of IPM.

Throughout his 55-year career, Marcos authored/edited six books, including the first comprehensive treaty on sampling arthropods in row crops. He co-authored the only IPM textbook integrating entomology, plant pathology, and weed science. In 200+ book chapters, refereed journal and conference papers, and extension publications, he covered a wide range of basic and applied entomology. At UIUC, he developed a comprehensive soybean IPM program with strong international components. At OSU, he led IPPC to

become a center of excellence in IPM integration; focused on the ecological foundations of IPM; and took a lead role in a proposal to implement an area-wide IPM program for the codling moth on pome fruit crops in the three western U.S. states. The program, the first funded through the USDA-ARS, served as model for future area-wide IPM projects in the country. For his work, Marcos received several honors, including two Guggenheim Fellowships, an honorary doctorate from his Brazilian alma mater, a USDA-ARS recognition award for technology transfer, and awards from the Brazilian Entomological Society and the Brazilian Soybean Congress for contributions to IPM in Brazil. In 2000, he received the ESA Founders Memorial Award honoring, L.D. Newsom.

Marcos has been married for 63 years to Jenny, a librarian and close collaborator; they have two children and three grandsons.



**Dr. Douglas Landis**, a professor in the Department of Entomology at Michigan State University (MSU), is internationally known for his research on the role of agricultural landscape structure in shaping patterns of insect biodiversity and in regulating arthropod-mediated ecosystem services.

Professor Landis was born in Sellersville, Pennsylvania, in 1958. He received his

B.A. in biology in 1981 from Goshen College. He received his M.S. in entomology at North Carolina State in 1984 and his Ph.D. in entomology at North Carolina State in 1987. In 1988, he was a postdoctoral research fellow at North Carolina State University and visiting assistant professor at Duke University, before accepting a position at MSU in 1988. As the MSU field crops extension entomologist, he investigated biological control of the alfalfa weevil, potato leafhopper, and European corn borer. In 1996, he shifted into a research/teaching role at MSU, focusing on insect ecology and biological control. While at MSU, Landis has served as associate director of the Center for Integrated Plant Systems, and in 2013-2104 as interim chairperson of the Department of Entomology. Landis had held research leadership positions in the NSF-funded Kellogg Biological Station Long-Term Ecological Research program since 2003, and as biodiversity team leader in the Great Lakes Bioenergy Research Center since 2007.

Landis and collaborators pioneered the use of landscape structure to explain and predict the impact of shifting land use on ecosystem services, discovering that simplification of agricultural landscapes is associated with decreased pest suppression and increased reliance on insecticidal controls. Landis has published 135 peer-reviewed papers and 25 book chapters, including the seminal 2000 *Annual Review of Entomology's* "Habitat Management to Conserve Natural Enemies of Arthropod Pest in Agriculture." He has graduated 13 M.S. and eight Ph.D. students while serving on the graduate committees of over 100 students. He has also mentored 17 postdoctoral research scientists and 15 visiting scientists. Eleven of his former advisees hold professorships at U.S. and international institutions, while others serve as research





scientists or educators with other universities, U.S. Department of Agriculture, MSU Extension, and in domestic and international nongovernmental organizations.

Landis has presented or coauthored more than 130 invited presentations and 201 contributed presentations. He received an MSU Distinguished Faculty Award (2013) and the Outstanding Alumnus Award from North Carolina State University, College of Agriculture and Life Sciences (2013). He was awarded the ESA recognition Award in Entomology (2008) and multiple educational project awards from the Board Certified Entomologists of Mid-America (1996, 2001, and 2007). He has served the International Organization for Biological Control, Nearctic Regional Section, as member at large, secretary/treasurer, and president. He serves on the editorial boards of *Entomologia Experimentalis et Applicata* and *Biological Control*, and advises international projects in the Netherlands and Argentina.

Landis and Joy, his wife of 37 years, enjoy combining travel with running, hiking, and mountain biking. Their daughter, Allison, is a child therapist, and son, Jonathan, is a technology consultant.



**Dr. Ronald J. Nachman** is an ST Supergrade scientist at the Southern Plains Agricultural Research Center, U.S. Department of Agriculture (USDA), College Station, Texas. He is internationally known for research on insect neuropeptides, their structural/conformational characterization, physiological/behavioral roles, and design of biostable, bioavailable mimetic

analogs as neuroendocrinological tools and as leads in development of novel, safe pest management agents.

Dr. Nachman was born in Maryland in 1954, moved to Colorado in 1955, and then to California in 1963. He attended Revelle College, University of California, San Diego (UCSD), doing undergraduate research on unusual odd-numbered fatty acids in Antarctic organisms at UCSD's Scripps Institution of Oceanography. He received a B.S. in chemistry from UCSD in 1976, and a Ph.D. in organic chemistry from Stanford University in 1981 doing neurochemical research. He joined the USDA's Western Regional Research Center, Albany, California, in 1981, doing research on natural products of poisonous plants. During a post as visiting scientist in Nobel laureate Roger Guillemin's Laboratory for Neuroendocrinology at the Salk Institute (1985), he shifted his research focus to insect neuropeptides. In a second post as visiting scientist at the Department of Molecular Biology, Scripps Research Institute (1988-1989), he studied the active conformations of insect neuropeptides. He moved to the USDA laboratory in Texas in 1989.

Nachman identified the structure of sulfakinins, sulfated insect neuropeptides with homology to the mammalian gastrin/CCK family and shown to inhibit food intake in several insect species. He established the first active conformation of an insect neuropeptide and the conformations of several others, and utilized that knowledge to develop potent, biostable

neuropeptide mimetics that a) prevent cotton bollworm pupal entry into the diapause state (including topically active forms on pupae), thereby inducing them to commit a form of "ecological suicide"; b) reduce desiccation survival in flies; c) block sex pheromone production in heliothines with capability to traverse the cuticle; d) selectively, reversibly disrupt Malpighian tubule fluid secretion in flies; e) match the oral potency of several commercial aphicides; and f) elicit fly-away aversive behavior in mosquitoes and led to the discovery of neuropeptide receptors in the taste neurons of sensilla of leg/mouth parts, opening new targets for discovery of novel deterrents. Nachman has published 235 scientific papers (*Science*-2, *PNAS*-9) and seven patents, co-edited four books, was section editor (*Invertebrate Neuropeptides*) of first and second editions of the *Handbook for Biologically Active Peptides*, was guest editor for 15 special issues of *Peptides* on "Invertebrate Neuropeptides," and serves on editorial advisory boards for *Peptides* and *Pesticides*. He serves as president of the Invertebrate Neuropeptide Society of the International Neuropeptide Society (INS), and co-organizes the annual, international Invertebrate Neuropeptide Conference (INC) from 2000 to present.

Major awards have included the Arthur S. Flemming Award (1993), ARS/USDA Distinguished Scientist of the Year Award (2012), Lodz University of Technology Distinguished Medal (2014), INC Invertebrate Neuropeptide Award (2016), and election to Fellow of the INS (2000) and American Association for the Advancement of Science (2011).

He is married to wife Isidora, and they enjoy international travel, photography, and reading.



**Dr. Leslie Pick**, professor and chair of the Department of Entomology at the University of Maryland (UM), is internationally known for her work on the function and evolution of genes regulating embryonic development in insects, with much of her work using the powerful genetic tools available for the model insect *Drosophila melanogaster*.

Dr. Pick grew up in the Bronx, New York.

She attended the Bronx High School of Science, but not until after graduation from Wesleyan University did she discover her love for science. As a young college graduate unsure of career direction, she was fortunate to get a job as a research technician with renowned developmental geneticist Salome Gluecksohn-Waelsch. She went on to earn a Ph.D. degree from Albert Einstein College of Medicine with Jerry Hurwitz (1986), studying biochemical mechanisms involved in RNA processing. Dr. Pick did postdoctoral research with Walter Gehring, Basel, Switzerland, where she began her studies of *Drosophila* molecular genetics. Dr. Pick took her first faculty position at the Mt. Sinai School of Medicine, New York City (1990). She moved to the Entomology Department at UM in 2003 and became chair of that department in 2013.

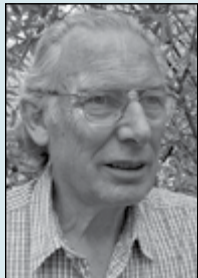
Dr. Pick's early work investigated the regulation of genes that control embryonic development using *Drosophila* as a model system. In more recent years, she expanded her research



program to study the functional evolution of regulatory genes that had been identified in *Drosophila* in a range of other insects representing diverse developmental strategies. These “evo-devo” studies have revealed unexpected variation in the expression and function of Hox and other embryonic transcription factors, along with rewiring of regulatory networks controlling insect segmentation. Her studies have also included investigations of insulin signaling pathways, using *Drosophila* as a model for diabetes. Finally, work in Dr. Pick’s lab is investigating the use of genetic technologies for insect pest control.

Dr. Pick has devoted significant effort throughout the course of her career to mentoring, with an emphasis on graduate education. She served as director of the UM graduate program in molecular and cell biology and is program director for an NIH-T32 training grant that supports graduate students. She has trained nine postdoctoral fellows, 15 graduate students, and numerous technicians, undergraduates, and high school students in her lab. Dr. Pick’s research has been supported by the NIH, NSF, USDA, and private foundations such as the March of Dimes. She has served on grant review panels and as program director at NSF, and received a 2015 UM Distinguished Scholar-Teacher Award. Dr. Pick has published over 50 scholarly articles, and has edited several compilations, most recently a *Current Topics in Developmental Biology* volume entitled “Fly Models of Human Diseases.”

Dr. Pick resides in Columbia, Maryland, with her husband, Ron Kohanski, a biochemist. She has two children, Alex and Emma, and three stepchildren, Michael, Anna, and Samson. Alex is completing a double major in theater and Slavic studies at Northwestern University, and Emma, a high school sophomore, is a dancer with plans to study fashion design.



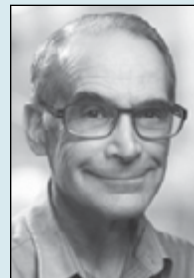
**Dr. Peter W. Price** is Regents’ Professor Emeritus at Northern Arizona University and author of the classic textbook *Insect Ecology*. He was born 14 miles south of London in Carshalton Beeches, Surrey, England, on April 17, 1938. Boyhood activities included Boy Scouts and natural history, with a preference for plants. In secondary school he was a member of the soccer, boxing, and

athletics teams. Each summer his family camped near the north Devon coast on the southwest English peninsula. He served two years in the Royal Air Force as a radar technician in West Germany.

Price earned his B.S. Honors (1962, forestry) from University College of North Wales and M.S. (1964, forest entomology) from University of New Brunswick in Canada. He was then employed in the Canadian Forest Service as a research entomologist. He obtained his Ph.D. (1970, ecology and evolutionary biology) from Cornell University with a research focus on the coexistence of parasitoids on the Swaine jack pine sawfly. Following his Ph.D., Price was an assistant and associate professor in the Department of Entomology, University of Illinois, where research developed into the study of three trophic-level interactions between natural enemies, insect herbivores, and plants. In 1979 he joined the Museum

of Northern Arizona as a research ecologist. The following year he accepted a professorship in the Department of Biology, Northern Arizona University, where he retired in 2002. He published over 200 research papers, with the most cited paper being his 1980 paper co-authored with his graduate students, “Interactions Among Three Trophic Levels,” which has been cited nearly 2,000 times.

Price’s field research concentrated on insect ecology: plant and herbivore interactions, multiple trophic-level interactions, population dynamics, and the distribution and abundance of insects. He focused particularly on the ecology and long-term population dynamics of galling sawflies. He hypothesized that evolved characters of organisms, such as morphology, behavior, and life history, strongly influence ecological relationships—a concept captured in his book, *Macroevolutionary Theory on Macroecological Patterns*. Price also authored *Evolutionary Biology of Parasites* and *Biological Evolution*; he co-authored *Insect Ecology: Behavior, Populations and Communities*, and co-edited *Evolutionary Strategies of Parasitic Insects and Mites, A New Ecology and Plant-Animal Interactions*. He has served on the Archbold Biological Station Scientific Advisory Board, and been recognized with a Guggenheim Fellowship and Fulbright Senior Scholar Award. In 1993, the Entomological Society of America gave Price the Founders’ Memorial Lecture Award for honoring Curtis P. Clausen. An interview of Price was featured in *American Entomologist* in Spring 2016.



**Dr. Daniel A. Strickman**, senior project officer at the Bill & Melinda Gates Foundation, is a medical entomologist who, through a series of many kinds of jobs, has had the pleasure to experience entomology from basic research to practical application.

Dr. Strickman was born in San Diego, California, in 1953. His interest in entomology began with an insect

collection in eighth grade. Attending Dartmouth College for two years in 1971-1973, he transferred to the University of California, Riverside, in order to take an entomology course, but ended up staying until graduation with a B.A. in biology in 1974. Going immediately to graduate school at the University of Illinois, Champaign-Urbana, he studied floodwater mosquitoes with Dr. William Horsfall, receiving his master’s degree in 1976 and his doctorate in 1978. Dr. Strickman’s first job was in the Peace Corps serving as a professor at the National University of Asunción, Paraguay. From there he served in the U.S. Air Force as a captain and consultant entomologist at the Occupational and Environmental Health Laboratory, Brooks AFB, Texas. Transferring to the Army in 1984, he worked for the Walter Reed Army Institute of Research in a series of research and administrative assignments, including work on mosquito taxonomy, scrub typhus, dengue, malaria, and repellent development, and served as chief of the Department of Entomology, and associate director. During his 22-year military career, Dr. Strickman had three deployments, to Honduras, Korea, and the Middle East. As a colonel, he served as a consultant to the Surgeon General. He retired from the



Army in 2003 and worked for three years as an entomologist at the Santa Clara County (California) Vector Control District, then eight years as national program leader and director of overseas laboratories for the Agricultural Research Service of the U.S. Department of Agriculture, and finally to his current position at the Gates Foundation in 2014.

Dr. Strickman has published 110 peer-reviewed papers, 12 book chapters, two co-edited books on repellents, and one co-authored book on personal protection from biting and stinging arthropods. His accomplishments have been team efforts that led to characterization of larval mosquito movement, discovery of drug-tolerant scrub typhus, elimination of *Aedes aegypti* from a series of Thai villages, and elimination of *Aedes albopictus* from San José, California, the lowest rate of disease in any U.S. conflict during the first six months of Operation Enduring Freedom, as well as the formation of the Foundation for the Study of Invasive Species in Buenos Aires. He served as subject editor for the *Journal of Medical Entomology* from 2006 to 2010.

Dr. Strickman has received the Dow AgroSciences IPM Team Award (2014), a Bronze Medal from the U.S. Environmental Protection Agency (2011), the John N. Belkin Award from the American Mosquito Control Association (2010), and the GreenGov Award from the Office of the President (2010). His highest military medals were the Legion of Merit (2005) and the Bronze Star (2002).

Married to his wife, Linda, for over 40 years, they are the parents of three daughters and have one grandson.



**Dr. Matt Thomas**, professor in the Entomology Department at Penn State University, is recognized internationally for his work on the ecology and evolution of pests and vector-borne diseases.

Thomas is originally from the United Kingdom and obtained his B.Sc. at University College Cardiff and his Ph.D. at the University of Southampton. From 1991 to the end of 2002 he worked as

a postdoc and research fellow at the Centre for Population Biology at Silwood Park, Imperial College. He then took up a position as a senior lecturer and then reader in population biology and biological control at Imperial College. At the end of 2005 he joined CSIRO Entomology in Australia as a senior principal research scientist. In 2008 he moved to the U.S. as a professor of entomology at Penn State University. In 2012 he became the Huck Scholar in ecological entomology, a named chair in lieu of distinguished professor.

Research in the Thomas lab (<http://www.thomaslab.net/>) explores many aspects of the ecology and evolution of insect pests and diseases with the aim of better understanding the consequences of global change and improving the effectiveness and sustainability of pest and disease management. The research combines empirical and theoretical approaches to address issues of fundamental and applied significance. He has worked in many systems and on diverse topics, including host-pathogen interactions, predicting and understanding the impact of invasive species, biodiversity and ecosystem

health, and many aspects of biological control. In recent years he has tended to focus on transferring knowledge and insights from ecology and agriculture into the public health arena. Current projects include research on the effects of environmental temperature on transmission of vector-borne diseases, understanding the consequences of insecticide resistance for malaria control, and developing and evaluating novel control tools for the development of improved integrated vector management. He currently manages a funding portfolio of around \$14 million, including support from NIH, NSF, and the Bill and Melinda Gates Foundation.

He has published widely—approximately 200 publications—with numerous papers in “high-impact” journals. There are numerous examples where his research has contributed practical outcomes, reflecting a desire not only to advance scientific understanding but also to have an impact in the real world. This outcome-oriented research includes foundational work on habitat manipulations to enhance biocontrol (beetle banks), development of optimal use strategies for use of biopesticides in locust control, development of risk assessment frameworks for invasive species and the safe introduction of natural enemies, and development of novel tools for the management of insecticide-resistant malaria vectors (fungal pathogens and “eave tubes”). He currently serves as director of the Ecology Institute at Penn State and is a Fellow of the American Association for the Advancement of Science.

Thomas is married with two teenage kids and has a fondness for English beer, classical guitars, and fishing.



**Dr. Baldwin Torto** is a principal scientist and head of the Chemical Ecology Unit, International Centre of Insect Physiology and Ecology (*icipe*), Nairobi, Kenya. He is internationally recognized for his research on the chemical ecology of mosquito vectors of infectious diseases, crop pests, honeybees, and research into entomophagy.

Torto was born in Accra, Ghana, on August 17, 1955. He completed his B.Sc. with honors in chemistry and biochemistry (1979) and M.Sc. (1982) and Ph.D. (1988) in organic chemistry at the University of Ghana, with his Ph.D. research in insect chemical ecology conducted at *icipe* between 1985 and 1988. He was a postdoctoral associate (1989-1991) at the University of Maine, Orono. In 1991, he accepted a scientist position at *icipe* and was later promoted to senior scientist in 2000. He was Rothamsted International Fellow (2000) at Rothamsted Research, United Kingdom, and visiting scientist at the USDA/ARS-Centre for Medical, Agriculture, and Veterinary Entomology, Gainesville, Florida (2001-2006). He returned to *icipe* in 2007 as principal scientist and research leader of the Behavioral and Chemical Ecology Unit.

Torto has made unique discoveries in the field of vector-host interactions, demonstrating that malaria parasite infection in mosquitoes can influence vector responses to plant odors and their feeding, opening up new avenues for vector control. Also, his lab pioneered work into the development of more



efficient semiochemical-based tools for monitoring vector populations of Rift Valley Fever, dengue, and malaria. He has also led genetic studies to reveal unique population structure of primary RVF vectors that coincide with the pattern of the disease outbreak in Kenya, and implemented an integrated community-based surveillance of RVF in order to minimize the public and veterinary health impact of the disease. Additionally, he has been at the forefront of research into understanding the impact of pests and diseases for improved bee health. More recently, he has initiated work on entomophagy, an area increasingly being recognized as having a huge potential to feed the ever growing rural and urban population in Africa. He has given several plenary and keynote presentations at national and international conferences. He has published 104 peer-reviewed scientific papers, including three patents and six book chapters.

Torto has mentored nine postdoctoral fellows and 36 graduate students (10 M.Sc. and 26 Ph.D.), and more than 50 undergraduate interns, many of whom have received prestigious awards across the globe.

Torto has served the ESA as a judge of students' presentations and organization of symposia and promoting the ESA agenda in Africa. He is a Fellow of the African Academy of Sciences, and served as councilor, International Society of Chemical Ecology, and member, American Chemical Society. He serves on the editorial boards of *Journal of Chemical Ecology*, *Pest Management Science*, and the *International Journal of Tropical Insect Science*. He is a recipient of the distinguished *icipe-ARPPIS Silver Jubilee Alumni Award for Best Achiever in Scientific Research and Innovation*.

Torto has been married to Rita, a neurophysiologist, for 33 years, and has three sons, Obaka, Nii Sai, and Nii Soja. His hobbies include gardening, cooking, and playing the guitar.

## ESA PROFESSIONAL AWARDS

### AWARD FOR EXCELLENCE IN INTEGRATED PEST MANAGEMENT

*This award, which is sponsored by Syngenta Crop Protection, is based on outstanding contributions that have a direct relation to Integrated Pest Management (IPM).*



**Dr. Greg Loeb** is professor of entomology at Cornell University, with his laboratory located at the New York State Agricultural Experiment Station in Geneva, New York, where he has research and extension responsibilities for grapes and small fruit crops. He received his Ph.D. in entomology from the University of California at Davis and M.S. in ecology from San Diego State

University. Broadly speaking, his research focuses on species interactions involving plants, herbivores, natural enemies, and, more recently, microbes, with the specific applied goal of developing novel approaches to pest management. Along with collaborators, his research on tritrophic interactions involving leaf morphology (acarodomatia) and predatory and

mycophagous mites has established new directions in plant breeding for enhancing conservation biological control.

Currently Dr. Loeb is directing considerable research effort toward developing a better understanding of the biology and management of the invasive species spotted wing drosophila (*Drosophila suzukii*), a significant pest of soft-skinned fruit crops throughout much of North America and abroad. Projects include the chemical ecology and behavior of host finding as a basis for behavioral management, overwintering and spring biology, monitoring and decision making, interactions with microbes, including biological control with entomopathogens, mechanical control using netting, and optimizing chemical control. Other research projects ongoing in his lab include vector-pathogen interactions and biological control and pollination ecosystem services. In addition to research and extension responsibilities, Dr. Loeb co-teaches a course on grape pest management and serves as program leader for the Department of Entomology and Geneva Experiment Station.

### DISTINGUISHED ACHIEVEMENT AWARD IN EXTENSION

*This annual award recognizes outstanding contributions to extension entomology.*



**Dr. Robert Wright** is professor of entomology and extension IPM coordinator at the University of Nebraska-Lincoln, where he has worked since 1988. He has developed a productive research and extension program in agronomic insect pest management, which has had local, regional, and national impacts.

He received his Ph.D. in entomology from North Carolina State University, M.S. in entomology from University of Arizona, and B.A. in zoology from University of California, Santa Barbara.

At Nebraska, Wright coordinates the activities of several faculty who contribute to the statewide multidisciplinary extension IPM program, and serves as entomology coordinator and contributor to several Nebraska Extension Crop Management programs. Regionally, he co-chairs the North Central Extension Entomologist Working Group, and chaired and is an active member of NCERA 222, the USDA-NIFA multistate committee on IPM. Wright led a group of national experts on corn rootworm biology and management to obtain funding for and produce an open access webinar, "Corn Rootworm Management in the Transgenic Era," published on the Plant Management Network. He has contributed as a member of the National IPM Coordinating Committee for several years, and has frequently provided service to the USDA-NIFA IPM Centers.

Wright has been active in ESA, including service as Program Committee chair, Student Competition Committee chair, Poster Committee chair, and Membership Committee member, and at the Branch level as Program Committee chair, Local Arrangements Committee co-chair, and Executive Committee



at-large member. He frequently serves as a judge for student competitions at ESA and North Central Branch ESA meetings.

## DISTINGUISHED ACHIEVEMENT AWARD IN TEACHING

*This award is presented annually to the member of the Society deemed to be the most outstanding teacher of the year.*



**Dr. Pete Teel**, professor of entomology at Texas A&M University, has been teaching undergraduate and graduate entomology courses for 38 years. He received B.S. and Ph.D. degrees in entomology at Oklahoma State University and an M.S. in entomology at Texas A&M University. He currently teaches Occupational and Professional Development for entomology and forensic science majors as well as Acarology for graduate students. He has developed and taught capstone courses in both entomology and forensic science curricula, and a science teacher preparation course, *Insects in the Classroom*. Dr. Teel directed development and implementation of a 12-credit-hour undergraduate academic certificate in Public Health Entomology with an enrollment of 129 students from multiple colleges in spring 2016. He regularly engages undergraduates in research activities on topics associated with ticks or forensic science. Dr. Teel developed and regularly teaches a workshop on tick identification and foreign animal disease awareness for animal health inspectors of the Texas Animal Health Commission and USDA that are engaged in tick surveillance programs in Texas. He taught a Forensic Acarology Workshop for the North American Forensic Entomology Association, and regularly contributes programs on tick biology, ecology, and management for extension and regional beef cattle short course audiences. He directs an annual Entomology Clinic that served 145 members of the 4-H and FFA organizations in 2016. He presently serves as associate department head for academic programs, associate director of the Forensic and Investigative Sciences Program, and departmental director for the Entomology and Forensic and Investigative Sciences Honors Program.

## HENRY & SYLVIA RICHARDSON RESEARCH GRANT

*This grant provides research funds to postdoctoral ESA members who have at least one year of promising work experience, are undertaking research in selected areas, and have demonstrated a high level of scholarship.*



**Dr. Rob Morrison** is originally from Mesa, Arizona. He received his bachelor of arts degree from Kalamazoo College in Michigan, where he majored in biology and minored in German. After several internships, including in the wetlands of Florida, he received his master's degree from the University of Munich in Germany, where he majored in ecology, evolution, and systematics, and studied the evolutionary biology between two closely related species of ants. Finally, Dr. Morrison received his Ph.D. from the Department of Entomology at Michigan State University, where he helped to develop an integrated pest management program for the asparagus miner. That research included investigating the development, chemical ecology, and natural enemies of the asparagus miner.

Dr. Morrison is currently a postdoctoral research entomologist at USDA-ARS and is working at the Appalachian Fruit Research Station in Kearneysville, West Virginia. He is researching an integrated pest management program for the invasive brown marmorated stink bug (BMSB). In particular, this includes evaluating an attract-and-kill tactic in apple, and other behaviorally based management and monitoring strategies. Dr. Morrison has over a decade of experience in helping to develop IPM programs for pests in vegetables and tree fruit, with 18 peer-reviewed publications, 100+ presentations, and more than \$7 million in extramural funding.

He is happily married to his best friend, and in his spare time, he enjoys hiking, photography, cooking, and spending time with his cats and friends.

## RECOGNITION AWARD IN ENTOMOLOGY

*This award recognizes entomologists who are making significant contributions to agriculture.*



**Dr. David G. Riley**, a professor in the Department of Entomology at the University of Georgia, is the 2016 recipient of the ESA Recognition Award in Entomology. He began his professional career at the University of Georgia as a student worker in the Institute of Ecology, graduating in 1981. He then spent two years as an agricultural extension Peace Corps volunteer in Ecuador, South America. He obtained an M.S. in entomology at North Carolina State University in 1986, researching bean leaf beetle, and completed his Ph.D. at the University of Florida in 1990, researching pepper weevil. He has worked as a vegetable research entomologist throughout his career, first



at Weslaco, Texas, Texas A&M University and, since 1996, at the University of Georgia, Tifton Campus. He is currently the president of the Southeastern Branch of the ESA. Also, he is the graduate coordinator for the master's in plant protection and pest management degree, in which he has developed and taught graduate courses. He has served as major professor for 17 graduate students, served on 13 other committees, and coordinated 44 programs. He has served as principal investigator for research grants totaling \$4,085,788, with over \$6,061,374 in total grant involvement. Dr. Riley has authored or co-authored 86 refereed journal articles or book chapters, 32 refereed extension station/publications, and 96 proceedings or experiment station reports, and has presented more than 310 invited and submitted papers at professional meetings. His career has focused on providing practical solutions for complex pest problems in high-value vegetable crops.

### NAN-YAO SU AWARD FOR INNOVATION AND CREATIVITY IN ENTOMOLOGY

*Each year this award is given to an ESA member who is able to demonstrate through his or her projects or accomplishments an ability to identify problems and develop creative, alternative solutions that significantly impact entomology.*



**Dr. Coby Schal** is the Blanton J. Whitmire Distinguished Professor of Entomology at North Carolina State University. He has a B.S. from SUNY-Albany, a Ph.D. from the University of Kansas (with Bell), and postdoctoral training at the University of Massachusetts (with Cardé). He was assistant and then associate professor of urban entomology at Rutgers University. Dr. Schal's

chemical ecology projects include cockroach sex and aggregation pheromones, roles of microbes in mosquito and sand fly oviposition, cuticular lipids in various insects, and the neuronal basis of sugar aversions in cockroaches. Research on cockroach-produced allergens also includes their biology, intervention strategies to mitigate their pervasiveness, and studies on the impacts of environmental interventions on health outcomes in asthmatic children. The Schal Lab has also been investigating the recent resurgence of bed bugs, through collaborative research in population genetics, chemical ecology, and pest and resistance management. Dr. Schal's research has been funded by EPA, HUD, NIH, NSF, USDA, private foundations, and industry, and he has published over 260 refereed papers. He has served as subject editor and on the editorial boards of six journals, and on the ESA Governing Board. Dr. Schal has mentored 35 graduate students and 36 postdoctoral researchers. He teaches Insect Behavior, Urban Entomology, and Chemical Ecology. Recent honors include Distinguished Achievement Award in Urban Entomology, ESA's Recognition Award in Urban Entomology, Fellow of ESA, Fellow of AAAS, NCSU's Outstanding Research Award and Outstanding Adviser Award, Silverstein-Simeone Award from the International Society for Chemical Ecology, and the Holladay Medal—NCSU's highest honor.

### RECOGNITION AWARD IN INSECT PHYSIOLOGY, BIOCHEMISTRY & TOXICOLOGY

*This award, which is sponsored by Apex Bait Technologies Inc., recognizes and encourages outstanding extension, research, and teaching contributions in urban entomology.*



**Dr. Gerhard Gries** is a professor in the Department of Biological Sciences at Simon Fraser University (SFU). He received his Ph.D. in forest entomology from the Georg-August-Universität in Göttingen (Germany) in 1984. Supported by a postdoctoral fellowship from the Deutsche Forschungsgemeinschaft, he joined Dr. John Borden's laboratory at SFU in 1986. After a two-year limited-

term appointment, he became a tenure-track faculty member in 1991, reaching the rank of full professor in 2000. He is currently in the 13th year of an industrial research chair on Multimodal Animal Communication Ecology, supported by Scotts Miracle-GRO and the Natural Sciences and Engineering Research Council of Canada. The chair's research embraces most sensory modalities (olfaction, vision, audition, vibration, magneto-reception, and infra-red sensing). A recent highlight was the identification of the bed bug aggregation pheromone, comprising five volatile attractants and one nonvolatile arrestant. Dr. Gries has graduated 39 master's and 11 Ph.D. students, published 240 peer-reviewed research articles (including 41 with undergraduate students as co-authors), filed 24 patent applications, and produced 13 scientific films on beetles, hoverflies, and aphids in collaboration with the Institute of Scientific Film in Germany. He has received over \$9 million of research support as a principal investigator and currently runs a large laboratory with 13 graduate students, three research associates, and many undergraduate students, often recruited from his Insect Biology class. His passion for teaching was recognized by SFU in 1994 through an Excellence in Teaching Award.

### RECOGNITION AWARD IN URBAN ENTOMOLOGY

*This award recognizes and encourages outstanding extension, research, and teaching contributions in urban entomology.*



**Dr. Michael F. Potter** is extension professor of entomology at the University of Kentucky, specializing in pests impacting people, buildings, and property. He received his B.S. in entomology from Cornell, and M.S. and Ph.D. in integrated pest management from the University of Arizona. Prior to joining the University of Kentucky in 1991, Potter was the national technical director for Orkin.

Before that he worked in the agrichemical industry for Union Carbide/Rhone-Poulenc.

Dr. Potter's full-time extension program provides cutting-edge aid and advice to millions of clients worldwide including homeowners, multifamily housing, schools, hospitals, food,



pharmaceutical and manufacturing facilities, businesses, museums, zoos, parks, government agencies, and especially the professional pest control industry. He has been a keynote or invited speaker at hundreds of professional meetings, and is routinely interviewed by news organizations throughout the world. He is the only contemporary academician to be honored with the National Pest Management Association's career Pinnacle Award as well as being inducted into the Pest Control Hall Of Fame.

Dr. Potter has also collaborated on societally important research. He was instrumental in pioneering perimeter treatment with nonrepellent termiticides that simplified how termites are managed throughout the world. He also collaborated on seminal research involving barrier treatment for mosquitoes in residential settings. For the past 15 years, Dr. Potter and his University of Kentucky research colleagues have worked on the front lines of the global bed bug resurgence, providing insight and direction to federal and state agencies, organizations and institutions, and the public. In 2013 he was named Provost's Distinguished Service Professor at the University of Kentucky.

## THOMAS SAY AWARD

*This ESA award acknowledges significant and outstanding work in the fields of insect systematics, morphology, or evolution.*



**Dr. Thomas J. Henry** is a research scientist and curator of Hemiptera with the Systematic Entomology Laboratory, ARS, USDA, at the National Museum of Natural History, Smithsonian Institution, Washington, D.C. He has a B.S. from Purdue University, an M.S. from the Pennsylvania State University, and a Ph.D. from the University of Maryland.

With 40 years of experience in the systematics and evolution of Heteroptera, or true bugs, especially those in the family Miridae and superfamily Lygaeoidea, Dr. Henry continues to be prolific with more than 245 research publications, including four books and 17 book chapters.

His systematic research, emphasizing the discovery of new characters and their evolution, leads to descriptions of new taxa, revisionary studies, phylogenetic analyses, and refined classifications. His 1997 phylogenetic analysis of the Pentatomomorpha has had major impact in understanding the higher classification of the Lygaeoidea, including justification for elevating 10 subfamilies to family status, and resulted in a monograph of the Berytidae of the Western Hemisphere and a cladistic analysis of the berytid genera of the world.

Dr. Henry's research has provided new insights regarding the role of plant bugs as predators, and his extensive fieldwork has provided valuable information on plant bug zoogeography and host selection. His research has led to the discovery and descriptions of one new family, three new tribes, 37 new genera, and more than 275 species new to science. He currently is co-editor of the *Proceedings of the Entomological*

*Society of Washington* and president-elect of the International Heteropterists' Society.

## EARLY CAREER PROFESSIONAL (ECP) AWARDS

### ECP OUTREACH AND PUBLIC ENGAGEMENT AWARD

*This award honors a student transition or early professional working within the field of entomology who has demonstrated excellence, leadership, and creativity in outreach and public engagement.*



**Adrian Smith** is the head of the Evolutionary Biology & Behavior Research Lab at the North Carolina Museum of Natural Sciences as well as a research assistant professor of biology at North Carolina State University. His research centers on how insect societies have evolved and function. He specializes in studies of ant chemical communication and behavioral ecology.

His research has yielded the discovery and description of new chemical compounds, the fastest insect movements ever documented, and more curious observations such as the function of grappling-hook hairs on the back of ant larvae.

Adrian holds a B.S. in biology from Florida State University where Prof. Walter Tschinkel was his research mentor. His Ph.D. is from Arizona State University, where he studied under Professor Jürgen Liebig and Professor Bert Hölldobler. His postdoctoral work was at the University of Illinois at Urbana-Champaign with Professor Andrew Suarez.

His science communication efforts center on the production of new media about scientific discoveries and the scientists who make them. These efforts include the "Age of Discovery" podcast, which is long-form interviews with notable biologists about their career paths and motivation in science, as well as the "Explained by the Author" YouTube video series, which features biologists presenting their primary scientific research papers in a three- to five-minute short film.

### ECP EXTENSION AWARD

*This award is given to a student transition or early professional who excels in entomological extension.*



**Dr. Lauren Diepenbrock** is a postdoctoral research scholar in the laboratory of Dr. Hannah Burrack at North Carolina State University. She earned a B.A. in biology at the University of Missouri, an M.S. in science education at Syracuse University, an M.S. in ecology and evolutionary biology at Florida State University, and a Ph.D. in plant, insect, and microbial sciences at the University of Missouri.



Dr. Diepenbrock's current research focuses on the management of the invasive fruit fly, *Drosophila suzukii*, in North Carolina berry crops. Recent projects include evaluation of on-farm insecticide-based management programs that meet various market needs of growers, understanding the role of non-crop host plants in the local persistence of *D. suzukii*, and exploring within-crop microhabitat use by this pest.

In addition to research, Dr. Diepenbrock is actively involved with the local grower community, presenting research findings at commodity meetings, field days, and via social media, and developing training materials to involve blackberry pickers in the management process. She also participates in local outreach opportunities, volunteering at the annual BugFest event at the North Carolina Museum of Natural Sciences and mentoring a local high school student.

### ECP RESEARCH AWARD

*This award recognizes a student transition or early professional who has made outstanding research contributions to the field of entomology.*



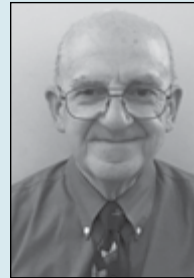
**Dr. Nicholas Teets** started as an assistant professor of entomology at University of Kentucky in January 2016. He received a B.S. in zoology from Miami University in Ohio and a Ph.D. in entomology from Ohio State University with David Denlinger. Dr. Teets recently completed postdoctoral training with Dan Hahn at University of Florida, where he was supported by a USDA fellowship.

Dr. Teets' primary focus is the overwintering biology of insects, and he uses an integrative approach that combines physiology, cell and molecular biology, and functional genomics to tackle a variety of questions. As a graduate student Dr. Teets revealed key insights into the mechanisms of rapid thermal acclimation, and he also participated in an NSF-funded project addressing adaptations to extreme environmental conditions in the Antarctic midge, the world's southernmost insect and only insect endemic to Antarctica. As a postdoc, Dr. Teets continued his research on insect overwintering biology and also received funding from USDA to develop strategies for improving the stress tolerance and performance of insects used in the Sterile Insect Technique. At University of Kentucky, three areas of emphasis for the Teets lab will be 1) the cell signaling mechanisms that mediate rapid adaptations to low temperature, 2) the genetic and physiological mechanisms of extreme freeze tolerance in insects, and 3) strategies for improving the stress tolerance and field performance of beneficial insects. As a teacher, Dr. Teets strives to make molecular and genomic concepts accessible to students from all disciplines.

## ENTOMOLOGICAL SOCIETY OF AMERICA CERTIFICATION CORPORATION AWARDS

### DISTINGUISHED SERVICE AWARD TO THE CERTIFICATION PROGRAM

*This award encourages, recognizes, and rewards outstanding contributions to the ESA Certification Program and the professionalism of entomology.*



**Harold Harlan** was the fifth son of a poor tenant farmer in Ohio. Supported by scholarships, loans, and part-time jobs, he earned a B.S. and an M.S. in entomology, and married his high school sweetheart before entering the U.S. Army in 1969. He earned a Ph.D. in 1984 from Ohio State, studying Rocky Mountain spotted fever. He served 25 years as an active-duty Army medical

entomologist, including tours to Vietnam and Desert Storm. An ESA member since 1967, he has been Board Certified in medical and veterinary entomology since 1973, and in urban entomology since 1999. Harold has authored or co-authored 39 scientific articles and book chapters on disease vectors, ectoparasites, and biology and control of ticks, mosquitoes, and bed bugs. He was senior entomologist for the National Pest Management Association for nine years and for the Armed Forces Pest Management Board for eight years. He has been honored with a number of military and civilian awards, observed and collected wild vampire bats and Onychophorans, joined MENSAs, had two arthropod species named in his honor, and raised a lot of bed bugs. Over the past 48 years, he has provided a considerable amount of technical material and information to many other applied and academic entomologists. He concurrently actively supported ESA, BCE, other scientific organizations, charities, service organizations, and the Boy Scouts by donating his own materials, funds, and time.





## ENTOMOLOGICAL FOUNDATION PROFESSIONAL AWARDS

### PRESIDENT'S PRIZES FOR OUTSTANDING ACHIEVEMENT IN SECONDARY EDUCATION

*This award recognizes educators who have gone beyond the traditional teaching methods by using insects as educational tools in grades 7-12.*



**Denise Scribner** has been empowering youth with the knowledge of entomology for over 45 years. She graduated from Emporia State University with a B.S.E. secondary education degree for biology, zoology, and physical education in 1975. She immediately began her teaching career in Texas. After her school closed, Denise became a staff member at both the council and national level with Girl

Scouts of the USA, continuing with this career for 31 years. In 2007, she moved back to the classroom, teaching biology, ecology, and forensic crime science at Goddard High School and later at the new Eisenhower High School, USD #265, in Goddard, Kansas. In addition to the Entomological Foundation's President's Prize, Denise has received several honors, including the 2010 Goddard Master Teacher Award, 2012 Presidential Innovation Award for Environmental Educators, State Finalist (Kansas) for the 2015 Presidential Award of Excellence for Math and Science Teachers (notification pending regarding national standing), and the 2016 Kansas Conservation Educator of the Year. Her leadership with the award-winning student-developed on-campus outdoor wildlife learning site, native plant gardens, and environmental class curricula has won her high school the Kansas Green School of Excellence Award, the U.S. Department of Education Green Ribbon Schools Award, and recognition as one of the top 10 Eco Schools in the nation by the National Wildlife Federation. Denise is also a Wichita Area Technical College instructor through the CTE law enforcement career track at Eisenhower High School forensic crime science classes. She is honored to receive this award.

## ENTOMOLOGICAL FOUNDATION MEDAL OF HONOR

*This award is the highest award presented by the Foundation and is given only to those who have attained preeminence in the field throughout outstanding contributions.*



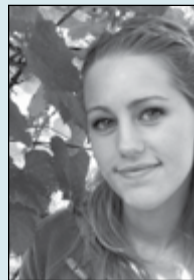
**Gwen Pearson** is Purdue Department of Entomology's education and outreach coordinator. She also works as a freelance science writer for *WIRED Magazine*, *Washington Post*, *Nature*, and other news outlets. She calls herself an "insect evangelist" because her mission is to help everyone discover they love bugs.

As well as the usual museum and school venues, Gwen conducts outreach at science fiction conventions, tech conferences, bars, and other unusual settings to reach beyond traditional audiences. Gwen has been a leader in digital outreach via social media, and her consulting work is directed toward science communication strategy and search engine optimization for nonprofits and extension.

## ESA STUDENT AWARDS

### JOHN HENRY COMSTOCK GRADUATE STUDENT AWARDS

*These six awards are given to one graduate student from each ESA Branch to promote interest in entomology and to stimulate interest in attending the ESA Annual Meeting.*



**Heather (Connelly) Grab** (Eastern Branch) is a fifth-year Ph.D. candidate in the Department of Entomology at Cornell University. Her research approach integrates large-scale field studies with new molecular techniques in order to develop integrated management strategies that promote synergy between the conservation of ecosystem services and agricultural

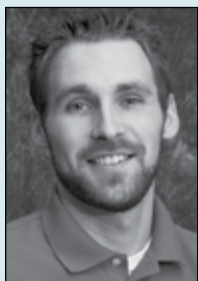
productivity. Her dissertation project investigates the influences of landscape simplification on pollination and biological control services provided by wild insects to strawberry production in New York. Specifically, her work focuses on understanding how farm level diversification and incorporation of wildflower strips may potentially buffer the negative impact of simplified landscape contexts. Heather has been particularly active in advocating for native pollinators and other ecosystem service providers, giving talks based on her dissertation research at more than 35 venues including both grower extension services and public science outreach. She expects to graduate with her Ph.D. this spring, and is currently looking for postdoctoral opportunities in landscape ecology, pollination biology, or biological control. In her free time, Heather runs a small organic farm with her husband, producing vegetables and raising chickens, ducks, pigs, and dairy goats.





**Kiran Gadhave** (International Branch) is currently a postdoctoral researcher at the University of Georgia (UGA). He has pursued his master's degrees from Tamil Nadu Agricultural University and from Cornell University, and his Ph.D. from the University of London. So far, he has published seven peer-reviewed papers, five as a lead and two as a contributing author, in leading entomology,

ecology, and microbiology journals. Two of his papers are currently being revised, and two more are in preparatory stage for the submission to *Ecology* and *Soil Biology and Biochemistry* (invited review) journals. In his academic pursuits, he has won four prestigious scholarships, a poster prize, and 10+ travel awards and field study grants. His research in the past few years has focused on microbes-plant-insect interactions, beginning with insect- and plant-associated bacteria and moving more recently to plant viruses. For his Ph.D., he has worked on a multidisciplinary research project investigating the interactions between soil bacteria, plant-insect herbivores, and higher trophic levels. This work showed that plant-associated bacteria have dramatic effects in altering endophytic bacterial community, altering life history of the cabbage aphid, and reducing the populations of cabbage aphid in field conditions. Over the years, he has communicated his research through nine oral (four invited in symposia) and five poster presentations, and has built a number of collaborations with leading experts across the globe. His current research at UGA seeks to explore vector-virus-natural enemy interactions in cucurbit systems through an array of behavioral, biochemical, and molecular techniques, with an ultimate aim of reducing vector populations and viral incidences. While advancing his quest in understanding how a suite of microbial species shape host (plant and insect) interactions in manipulated and natural settings, his future research seeks to exploit the potential of these microbial players in addressing major ecological and agricultural issues.



**Anthony "Justin" McMechan** (North Central Branch) is a Ph.D. candidate in the Department of Entomology at the University of Nebraska-Lincoln (UNL) under the supervision of Dr. Gary Hein, with an August 2016 graduation date. In addition, he graduated in May 2016 from the Doctor of Plant Health (DPH) Program at UNL. DPH is a professional program designed to develop plant

practitioners with broad expertise and experiences across all disciplines that impact plant health and the comprehensive management of plant production systems. The combination of these doctoral programs has allowed Justin to take an interdisciplinary approach in his dissertation research to address risk assessment of over-summering hosts for the wheat-mite-virus complex in winter wheat. Internships through the DPH program also provided extensive experience in extension programming, the incorporation of technologies for disseminating information, and the development of

interactive software to demonstrate field-to-field movement of mites and virus. Justin's philosophy is that growers do not encounter production issues from a single discipline, hence we should make every effort to understand, develop projects, and provide solutions that address issues at the multidisciplinary level. Justin recently accepted a position as extension assistant professor in the Department of Entomology at the University of Nebraska-Lincoln with the goal of developing an interdisciplinary research and extension program with a focus on integrating crop protection and management of cropping systems in eastern Nebraska. Justin has authored/co-authored eight research publications, and he has given 20 scientific presentations (four invited). He has won several oral and poster competitions at ESA, NCB-ESA, NC-APS, and ASA-CSSA-SSSA meetings. Justin has been active in the department's graduate student organization and departmental teaching and outreach activities.



**Dr. Rebecca Schmidt-Jeffris** (Pacific Branch) received her Ph.D. in entomology from Washington State University in 2015, under the direction of Dr. Elizabeth Beers. She received her B.S. in biology from Washburn University in Topeka, Kansas, in 2010. Her prior studies have focused on improving sustainability in agriculture by understanding factors that affect pest and natural enemy

populations in perennial and annual cropping systems. Rebecca's primary interests are using conservation biological control and landscape ecology to inform integrated pest management practices. Her dissertation research investigated phytoseiids as biological control agents in apple orchards and included augmentative releases, diversity surveys, behavioral and pesticide bioassays, phenology monitoring, and the investigation of tritrophic interactions. The research indicated that changing pest management practices had substantially altered the predatory mite community, which now includes a previously rare species. She is currently a postdoctoral research associate at Cornell University, working with Brian Nault to investigate the effects of landscape and management practices on European corn borer populations in vegetable and field crops. Rebecca enjoys participating in ESA and has chaired the Student Affairs Committee, and is currently the co-chair of the ICE Student Affairs Committee and represents the Plant-Insect Ecosystems Section on the Student Transition and Early Professional Committee. In these roles, she has organized many events, including symposia, the Student Debates, the Branch text messaging competition, and a Lunch and Learn. Rebecca has received the ESA Student Activity Award and the Pacific Branch Leadership Award. She hopes to eventually serve the agricultural community as a professor with a research and extension appointment, or in USDA-ARS.





**Derek A. Woller** (Southwestern Branch) began his entomological journey in Texas as a high school senior after taking up insect collecting as a hobby and has been deeply involved in the field since. After traveling across the U.S. and back again to obtain two other degrees, he is now pursuing his third degree as a Ph.D. candidate under the guidance of Dr. Hojun Song in the Department of

Entomology at Texas A&M University. Derek's primary interests are taxonomy and systematics, with possible aspirations of becoming a curator or collections manager of an insect collection. He also derives much satisfaction from teaching, having taught seven unique courses at two universities. Additionally, he has been invited to give presentations on his research and insects, in general, to classes from kindergarten to college, for seminars, and in symposia at ESA conferences and beyond. He has also co-organized multiple symposia focused on orthopteroids at ESA conferences. Derek is heavily engaged in entomological outreach and passionately believes such educational endeavors are one of the best ways to generate interest in insects and science.

Derek's dissertation research is focused on unraveling the evolutionary history of a group of grasshoppers known as the Puer Group, consisting of 24 species (Orthoptera: Acrididae: *Melanoplus*). Tiny and flightless, they inhabit scrubby, xeric habitats in the southeastern United States (primarily Florida) and are predominantly separated into species by their highly divergent male genitalia, similar to Darwin's famed finches and their unique beaks. Based on observational evidence, this geologically young group appears to have speciated via geographic isolation and genitalia evolution. This means the Puer Group makes an excellent living laboratory to better comprehend the biological black box that is speciation, which Derek is attempting to do by synergistically combining taxonomy and systematics, biogeography, ecology, genetics, geometric morphometrics, sexual selection, and 3D reconstructions.

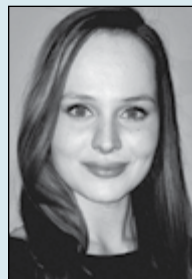


**Dr. Blake Wilson** (Southeastern Branch) began his career in entomology working as a laboratory assistant during the final semester of his undergraduate work at Louisiana State University (LSU). After receiving his B.S. in biology, Blake began his M.S. thesis in entomology/experimental statistics under Dr. T. E. (Gene) Reagan. Blake's thesis research focused on host plant resistance and insecticidal

management of the Mexican rice borer in sugarcane in the Rio Grande Valley of Texas. In 2013, Blake began his Ph.D. studies in entomology at LSU under Dr. Reagan and Dr. Julien Beuzelin. Blake's dissertation research focused on development of pheromone trapping strategies for monitoring and management of the Mexican rice borer. Blake received his Ph.D. in May of 2016, and is currently working as a postdoctoral researcher in sugarcane entomology at LSU. His research experience also includes IPM of stem borers in sugarcane, rice, bio-energy feedstocks, and conventional and transgenic corn. He has also studied management of the sugarcane aphid in sugarcane and grain sorghum. During his career, Blake has been active in research and extension activities for two of Louisiana's most important commodities, sugarcane and rice. He has published 10 peer-reviewed research articles, 10 Arthropod Management Test reports, and numerous extension publications. His research has been presented more than 40 times at professional society meetings in addition to many extension outreach presentations. Blake has previously received the Kirby L. Hays Award for outstanding M.S. student and the ESA President's Prize.

## LARRY LARSON GRADUATE STUDENT AWARD FOR LEADERSHIP IN APPLIED ENTOMOLOGY

*This award, which is sponsored by Dow AgroSciences, recognizes Dr. Larry Larson's role as a leader and pioneer in insect management and carries that legacy to the next generation of leaders in applied entomology.*



**Ashley Leach** graduated from Michigan State University with a B.S. in entomology. While an undergraduate, she was a research assistant in multiple entomology laboratories. After graduation, she scouted tree fruit for the agrichemical company, CHS, Inc., and was a technician for the Michigan Agricultural Environmental Assurance Program.

Ashley is currently in her second year at Cornell University's Department of Entomology, where she is finishing an M.S. degree with advisor Brian Nault. Her research project evaluates an integrated pest management strategy that combines cultural control, chemical control, and host-plant resistance to reduce onion thrips infestations in onion. Ashley also is heavily involved in SAGES, the graduate student organization at the New York State Agricultural Experiment Station. After graduation, Ashley will pursue a career in cooperative extension or industry.



## LILLIAN & ALEX FEIR GRADUATE STUDENT TRAVEL AWARD IN INSECT PHYSIOLOGY, BIOCHEMISTRY, OR MOLECULAR BIOLOGY

*This award aims to encourage graduate students working with insects or other arthropods in the broad areas of physiology, biochemistry, and molecular biology to affiliate with ESA's Physiology, Biochemistry, and Toxicology Section.*



**Zachary DeVries**, a native of Auburn, Alabama, began his collegiate career at Auburn University. To explore his interest in the natural world, Zach pursued a degree in biology while gaining both laboratory and field experience in both fish ecology and herpetology. Zach completed his B.S. degree in zoology with a minor in statistics in 2011. Upon completion of his

B.S., Zach began pursuing his master's degree in entomology at Auburn University, working with Dr. Art Appel. His research focused on the physiology of urban pests, such as silverfish, firebrats, and bed bugs. His work has led to some interesting discoveries about the metabolism of these species as well as numerous collaborations with other departments and universities. Zach completed his master's degree in 2013.

Zach is currently a Ph.D. student at North Carolina State University, where he is studying the physiology, behavior, and management of urban pests under the direction of Dr. Coby Schal. Zach's dissertation encompasses a number of topics, including bed bug host attraction, host-associated divergence among bed bug lineages, and German cockroach management and health effects. Through his work, Zach hopes to improve the management of both bed bugs and German cockroaches by acquiring and integrating both basic and applied knowledge. Finally, Zach would like to thank both the Entomological Society of America and the Feir family for their support.

## STUDENT ACTIVITY AWARD

*Sponsored by Monsanto Company, this award is presented annually to recognize a student for outstanding contributions to the Society, his or her academic department, and the community, while still achieving academic excellence.*



**Theresa Cira** is currently a Ph.D. candidate in the Department of Entomology at the University of Minnesota, advised by Dr. Bill Hutchison. Her research focuses on sustainable pest management and invasive insect biology in multiple agricultural systems. In Minnesota, she studies the cold hardiness and management of the brown marmorated stink bug, *Halyomorpha halys*. In Vietnam,

she has also explored the invasion biology of agricultural pests, with particular focus on insect vectors of pathogens in cassava. Additionally, she is pursuing a minor in science, technology, and environmental. Theresa received her B.S. in entomology from the University of Wisconsin–Madison.

Theresa enjoys volunteering in her department and community, and for ESA. She was a member of the ESA-Student Transitional and Early Professional (STEP) committee for two years before becoming the chair. During that time she helped organize Lunch & Learns and symposia, and establish new awards to benefit the ESA-STEP community. She has served as a session moderator and judge at branch and national ESA meetings. Within her department, Theresa is active in the entomology graduate student organization, previously elected secretary and vice president. She is the student representative on the curriculum committee and volunteers at the outreach booth at the Minnesota State Fair. In addition, she volunteer-taught the labs for an undergraduate IPM course for three years. She enjoys mentoring undergraduate students through the research process, from grant writing to publication. Two of her student mentees have presented their research at multiple ESA meetings and successfully submitted their work for publication.

## STUDENT CERTIFICATION AWARD

*Sponsored by PestWest Environmental Science, this award recognizes and encourages outstanding entomology graduate students with an interest in the mission of the ESA certification program, and to promote the understanding and importance of the program.*



**Dr. David Wangila** recently received his doctorate in entomology at the University of Nebraska-Lincoln, working on resistance management of western corn rootworm (*Diabrotica virgifera virgifera* LeConte), to transgenic *Bacillus thuringiensis* (Bt) corn in Nebraska, advised by Dr. Lance Meinke. As part of his dissertation research, Dr. Wangila documented field-evolved resistance in some populations of

western corn rootworm to several Cry-proteins. He completed his M.S. degree at Louisiana State University where he worked in Dr. Fangneng Huang's lab on the impact of transgenic corn traits on the sugarcane borer, *Diatraea saccharalis* (F.).

Dr. Wangila's work has been transferred to various clientele through research and extension outlets contributing to the knowledge base needed to effectively mitigate resistance. He published two refereed journal articles from his M.S. research and was co-author on three other journal articles. To date, he has one refereed journal article published and one in press from his dissertation. In 2012, his M.S. research was featured by ISAAA in the weekly summary of world developments in agri-biotech for developing countries. In 2013 his dissertation research was featured on National Public Radio, highlighting resistance-monitoring studies of western corn rootworm to Bt corn in Nebraska.

Since 2014, Dr. Wangila has been a Board Certified Entomologist specializing in plant-related entomology. His certification has bolstered his professional experience and increased opportunities in entomology. Dr. Wangila has maintained active student membership in ESA since 2010, participating in ESA meetings as a presenter and a volunteer in a number of capacities.



## YOUTUBE YOUR ENTOMOLOGY STINGER AWARDS (2016 FINALIST)

### “Benefits of Planting Flowers for Bees”

By Katharina Ullmann, University of California, Davis and Emily May  
Xerces Society

### “Black Cutworm Adult Trapping”

By Erin Hodgson, Adam Sisson, and Brandon Kleinke  
Iowa State University Extension and Outreach

### “How Butterflies Create Color & Microscopy in the Field”

By Aaron Pomerantz  
University of California, Berkeley

### “Pollination: Trading Food for Fertilization in 3 Minutes”

By Linda S. Rayor, Cornell University; and Carol Jennings  
Park Productions at Ithaca College

### “The Simplicity of Basic Insecticide Resistance Management Principles and Strategies”

By IRAC and CropLife

## CERTIFICATES OF DISTINCTION FOR OUTSTANDING ACHIEVEMENTS

### AWARDED BY THE COUNCIL OF INTERNATIONAL CONGRESSES OF ENTOMOLOGY

*By awarding these Certificates of Distinction, the Council wishes to emphasize the central and continuing importance of entomology in both basic and applied studies, ranging from populations and organisms down to cellular and molecular levels. By awarding these certificates, the Council recognizes outstanding contributions to entomology to help inspire and connect all entomologists throughout the world. The criteria for the awards are: contributions to fundamental knowledge; contributions to industry or the community; contributions to teaching, training, extension, and popularizing entomology; and contributions to the quality of life. Three awards have been made for this Congress.*



interests are in the molecular and biochemical bases of insect-plant interactions for the development of novel

**Professor Angharad Gatehouse** has the Chair of Invertebrate Molecular Biology at Newcastle University. She is also head of molecular agriculture within the Institute of Sustainability, which coordinates research across Newcastle University around key issues of sustainability, including food security. She obtained her Ph.D. at the University of Durham. Her overarching research

approaches to crop protection. Her research interests also encompass the potential impact of such technologies on non-target organisms, particularly beneficial insects, including pollinators such as bees and natural enemies such as parasitoids and predators.

Professor Gatehouse is regarded as one of the most influential scientists working on GM crops in the world. She has made outstanding contributions to both basic and applied entomology. She and her group have been among the first to show the compatibility between biotechnology-based crop protection and biological control using beneficial insects. The breadth of the research is impressive, encompassing not only the development of insect-resistant genetically engineered crops and novel biopesticides, but also the basic biology of both pest and beneficial insects. She and her group are probably best known for elucidating plant mechanisms of resistance and leveraging these in GM plants; recognition of lectins and proteinase inhibitors as potential insecticidal factors was an early success.

The results of the research have immediate application in farming, enhancing pest control without use of chemical insecticides. More recently, she and her group have used functional genomics to better understand the molecular responses of plants to biotic stress to inform crop-breeding programs. She has partnered with other scientists and industry to evaluate alternative agricultural practices to understand their limitations and form a rational basis for agricultural decisions and counter resistance to GM technology.

Professor Gatehouse runs an international laboratory with postgraduate students and researchers from around the world. She is known as an inspiring teacher, dedicated supervisor and collaborator, actively involved in long-term projects in other countries. She is passionate about public engagement with science and has made time to give interviews on radio and television and has been featured on BBC's "Tomorrow's World"; she has also contributed to "Week of Science Festival" to attract school children to science.

Professor Gatehouse's generous, imaginative, and cutting-edge contributions to entomology and agriculture make her a worthy recipient of this award.



**Professor Ring Cardé** holds a distinguished professorship and the Alfred M. Boyce Chair in entomology at the University of California, Riverside. He received his M.S. and Ph.D. degrees from Cornell. His main research interests are in basic and applied aspects of odor-mediated behavior of insects, focusing on communication by pheromones in moths and host-finding by female mosquitoes.

His contributions to our fundamental understanding of insect orientation and semiochemicals, and the methods used to study these phenomena, have set a high standard in this broad field of research. They are published in over 250 peer-reviewed scientific publications or book chapters and eight books.



# Oxford University Press is proud to publish the Entomological Society of America publications and to help disseminate entomology research globally!



## Meet the ESA Editors Lunch: Monday, September 26

Join us at the Meet the ESA Editors Lunch and Learn on Monday, September 26 at 12:40 PM-1:20 PM in West Hall F2. Prospective authors will have the opportunity to interface directly with editors from ESA publications. The event promises to be an invaluable experience for students, early researchers and veteran researchers alike.

## Join us at the Oxford University Press Booth (#406)

Visit OUP in the Exhibit Hall at booth 406 to check out our free conference collection featuring articles from around the world curated from the ESA collection and to enter our raffle for \$200 worth of OUP books. You'll receive a custom ESA USB upon entry and the chance to sign-up for ESA publication email alerts so you never miss out on the latest research!

**Don't forget** to check your attendee bag for your free copy of *American Entomologist* and for your golden ticket. Bring it to our booth (#406) to enter our raffle and to receive your custom ESA USB.

The translational impact of Dr. Cardé's research cannot be overstated. His research program has been at the core of methodologies utilizing pheromones to trap, detect, monitor, and manage insect pests, primarily focused on pestiferous Lepidoptera. His group has made breakthroughs in understanding mosquito orientation to host odor.

In addition to training many of the world's top chemical ecologists, he has also had a strong impact on popularizing entomology with the publishing of *The Encyclopedia of Insects*, and *A World of Insects*, which makes insects understandable to a lay audience.

Dr. Cardé's work has helped foster an appreciation and understanding of insects by both the scientific community and the public in general. His accomplishments have directly and significantly increased our ability to fight and manage noxious insects and opened up new ways of understanding how insects behave, evolve, and interact with their environment. Dr. Cardé's legacy of students and postdocs continues to add to this body of knowledge.



**Professor Maureen Coetzee** is director of the Wits Research Institute for Malaria, School of Pathology, Faculty of Health Sciences, University of the Witwatersrand (Wits), Johannesburg, South Africa. She holds a research professorship in medical entomology and vector control, supported jointly by the Department of Science and Technology and the National Research

Foundation through the South African Research Chair Initiative. She obtained both her M.S. and Ph.D. degrees at Wits.

We recognize Professor Coetzee's lifetime contribution to building fundamental and applied knowledge of African

malaria vector mosquitos, mainly of the *Anopheles gambiae* and *funestus* groups. Studies have ranged from classical to modern molecular taxonomy, field work in malarial areas, use of genetics, and molecular techniques to understand molecular mechanisms conferring resistance and to monitor genetic development of pyrethroid resistance. Mosquito surveys, including behavioral studies and insecticide resistance, have been carried out in 16 African countries. All knowledge has been firmly grounded in practical applications to control the spread of malaria via vector control, shared with other countries and international bodies responsible for policy, such as WHO. This extraordinary body of work has been achieved by a small group of professional researchers, postgraduate students, and limited support staff.

These studies have made highly valuable contributions to the community and quality of life. The sudden 1999-2000 malaria epidemic in South Africa was brought under control, saving thousands of lives and reducing infection rates, through effective cooperation between Professor Coetzee and the South African Department of Health.

Professor Coetzee has supervised 20 M.S. and 18 Ph.D. students from 13 African countries, many of whom have remained active in this research field and have returned to head vector control programs in African countries or work for organizations such as WHO. She has served on numerous local and international committees, most recently the Malaria Policy Advisory Committee (MPAC) of the WHO Global Malaria Programme that reports to the highest levels of WHO on policy for malaria control, elimination and eradication.

Professor Coetzee's contribution to an African problem, researched long term, intensely, and effectively, and widely shared through direct personal contact, training, and collaboration throughout the continent and elsewhere, is both unique and invaluable.



# Where will you go next year?



● Rhode Island

● Portland

● Austin

● Memphis

● Indianapolis

**Eastern Branch**  
March 17-21, 2017, Newport, RI  
Newport Marriott

**Pacific Branch**  
April 2-5, 2017, Portland, OR  
DoubleTree by Hilton

**Southwestern Branch**  
April 9-13, 2017, Austin, TX  
Wyndham Garden Hotel Austin

**Southeastern Branch**  
March 12-15, 2017, Memphis, TN  
Sheraton Memphis Downtown Hotel

**North Central Branch**  
June 3-8, 2017, Indianapolis, IN  
Crowne Plaza Downtown-Union Station

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**Don't miss out on next year's ESA Branch Meetings!**

For more information visit [www.entsoc.org/branch-meetings](http://www.entsoc.org/branch-meetings)





# To-Do List:


# Doodles and Sketches

A large, empty rounded rectangular box with a thin black border, occupying most of the page. It is intended for doodles and sketches.

# Help Encourage and Recognize Outstanding Entomologists

Each year the Entomological Society of America and the Entomological Foundation provide annual honors and awards.

Help hardworking and deserving entomologists gain the recognition they deserve for their contributions to our science—nominate yourself or someone you know today.

**Deadline for nomination submission is July 1st!**  
**Visit [www.entsoc.org/awards](http://www.entsoc.org/awards)**

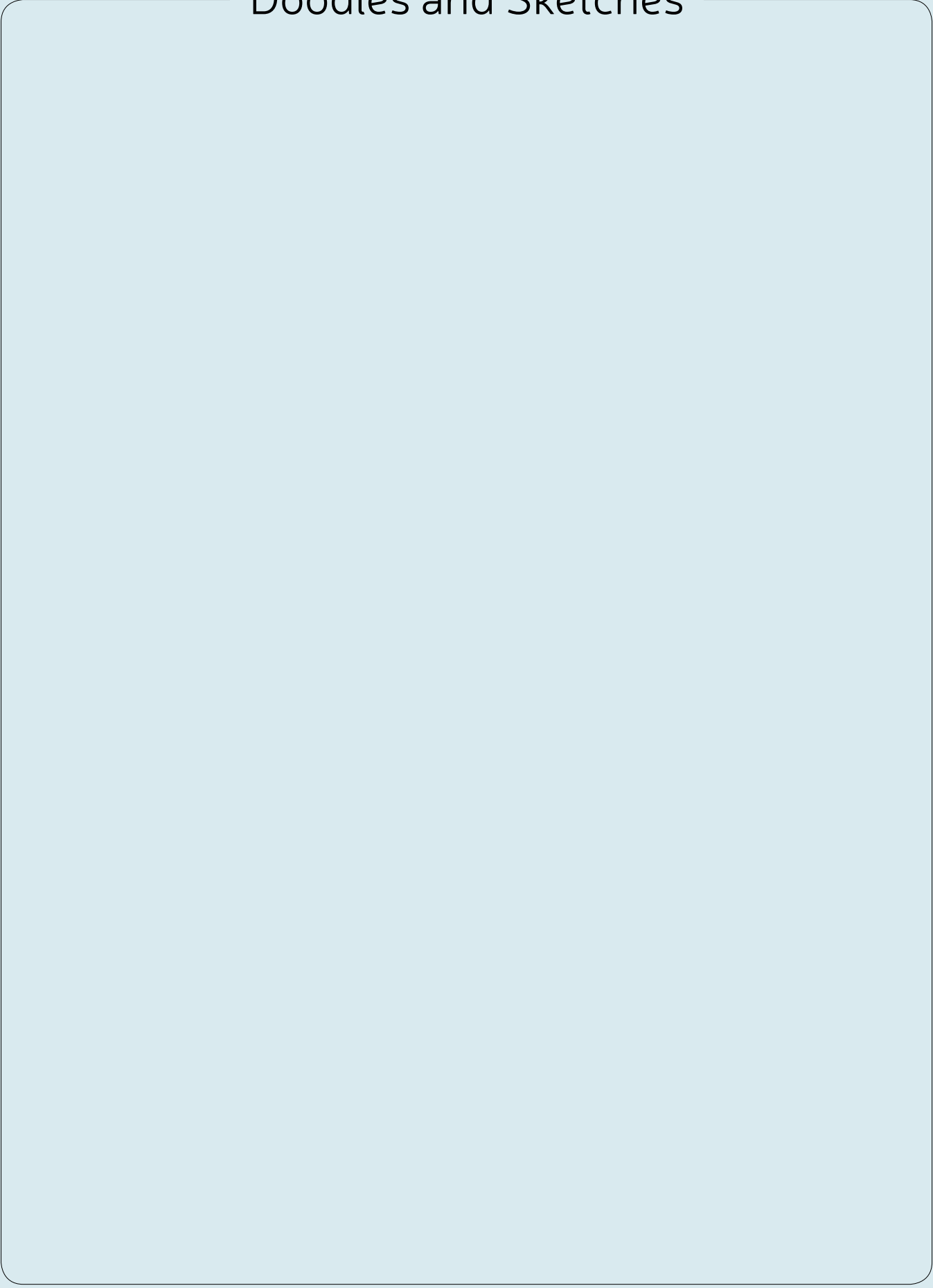
*ESA and the Entomological Foundation would like to thank all of the sponsors who make these awards possible.*

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# Doodles and Sketches



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# • ICE PERSONAL SCHEDULER •

DATE/TIME

EVENT

LOCATION

## Sunday, September 25

6:00 PM - 7:30 PM

ICE Opening Plenary Session

Valencia Room, Convention Center

7:30 PM - 9:30 PM

Welcome Reception

West Hall C, Convention Center

## Monday, September 26

8:00 AM - 9:00 AM

Plenary Presentation  
Featuring Dr. James R. Carey

Valencia Room, Convention Center

8:00 AM - 9:00 AM

Plenary Presentation  
Featuring Dr. José Roberto Postali Parra

Chapin Theater, Convention Center

9:15 AM - 12:30 PM

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9:15 AM - 12:30 PM

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1:30 PM - 5:30 PM

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West Hall C, Convention Center

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Evening Events

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Evening Events

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## Tuesday, September 27

8:00 AM - 9:00 AM

Plenary Presentation  
Featuring Dr. Baldwyn Torto

Chapin Theater, Convention Center

8:00 AM - 9:00 AM

Plenary Presentation  
Featuring Dr. Carolina Barillas-Mury

Valencia Room, Convention Center

9:15 AM - 12:30 PM

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9:15 AM - 12:30 PM

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West Hall C, Convention Center

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Evening Events

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– CONTINUED ON PAGE 80

# • ICE PERSONAL SCHEDULER •

– CONTINUED FROM PAGE 79

DATE/TIME	EVENT	LOCATION
<b>Wednesday, September 28</b>		
8:00 AM - 9:00 AM	Keynote Presentation Featuring Dr. Jules Hoffmann	Valencia Room, Convention Center
9:15 AM - 12:30 PM	_____	_____
9:15 AM - 12:30 PM	_____	_____
Offsite Tour	_____	_____
Evening Events	_____	_____
<b>Thursday, September 29</b>		
8:00 AM - 9:00 AM	Plenary Presentation Featuring Dr. Jacqueline Beggs	Valencia Room, Convention Center
8:00 AM - 9:00 AM	Plenary Presentation Featuring Dr. Jennifer Fewell	Chapin Theater, Convention Center
9:15 AM - 12:30 PM	_____	_____
9:15 AM - 12:30 PM	_____	_____
1:30 PM - 5:30 PM	_____	_____
1:30 PM - 5:30 PM	_____	_____
	Posters:	West Hall C, Convention Center
	_____	_____
	_____	_____
	_____	_____
Evening Events	_____	_____
7:30 PM - 10:00 PM	Gala Dinner <i>(separate ticket required)</i>	Grand Ballroom, Rosen Centre Hotel
<b>Friday, September 30</b>		
8:00 AM - 9:00 AM	Plenary Presentation Featuring Dr. Fred Gould	Chapin Theater, Convention Center
8:00 AM - 9:00 AM	Plenary Presentation Featuring Dr. John A. Pickett	Valencia Room, Convention Center
9:15 AM - 12:30 PM	_____	_____
9:15 AM - 12:30 PM	_____	_____
1:30 PM - 5:30 PM	_____	_____
1:30 PM - 5:30 PM	_____	_____
	Posters:	West Hall C, Convention Center
	_____	_____
	_____	_____
	_____	_____
6:00 PM - 7:00 PM	ICE Closing Plenary Session	Chapin Theater, Convention Center
7:00 PM - 10:00 PM	ICE Farewell Dinner	Valencia Room, Convention Center

# Don't Miss the ICE 2016 Plenary Presentations and Other Featured Lectures

## SUNDAY, SEPTEMBER 25



**Dr. Peter Agre** – Johns Hopkins School of Medicine, USA

*Opening doors worldwide through medical science*

ICE Plenary Opening Plenary Session

6:00 PM – 7:30 PM

Valencia, Convention Center

## MONDAY, SEPTEMBER 26



**Dr. James R. Carey** – University of California, Davis, USA

*Insect biodemography: A 21st century guided tour*

Plenary Presentation

8:00 AM – 9:00 AM

Valencia Room, Convention Center



**Dr. José Roberto Postali Parra** -ESALQ-University of Sao Paulo, Brazil

*The egg parasitoid Trichogramma as a tool for IPM in Brazil*

Plenary Presentation

8:00 AM – 9:00 AM

Chapin Theater, Convention Center

## TUESDAY, SEPTEMBER 27



**Dr. Carolina Barillas-Mury** – National Institute of Allergy and Infectious Diseases, USA

*Mosquito immunity and the invisible parasite: Implications for lobal malaria transmission*

Plenary Presentation

8:00 AM – 9:00 AM

Valencia Room, Convention Center



**Dr. Baldwyn Torto** – International Centre of Insect Physiology & Ecology (icipe), Kenya

*Rift valley fever in East Africa: Three frontiers, one purpose*

Plenary Presentation

8:00 AM – 9:00 AM

Chapin Theater, Convention Center



**Dr. Juan Andres Bisset Lazcano** – Institute of Tropical Medicine “Pedro Kouri”, Cuba

*Aedes aegypti* management strategies for dengue control in Cuba

Invited Lecture

5:30 PM – 6:30 PM

Room W331 A, Convention Center

## WEDNESDAY, SEPTEMBER 28



**Dr. Jules Hoffmann** – Strasbourg University Institute for Advanced Study, France

*Innate immunity: From insects to humans*

Plenary Presentation

8:00 AM – 9:00 AM

Valencia Room, Convention Center

## THURSDAY, SEPTEMBER 29



**Dr. Jacqueline Beggs** – University of Auckland, New Zealand

*Ecological impacts of insect invaders*

Plenary Presentation

8:00 AM – 9:00 AM

Valencia Room, Convention Center



**Dr. Robert E. Page, Jr.** – Arizona State University, USA

*The spirit of the hive: Mechanisms of social evolution*

Plenary Presentation

8:00 AM – 9:00 AM

Chapin Theater, Convention Center



**Dr. John G. Hildebrand** – University of Arizona, USA

*How insects smell and why we should care*

Wigglesworth Memorial Lecture

6:00 PM – 7:00 PM

Chapin Theater, Convention Center

## FRIDAY, SEPTEMBER 30



**Dr. Fred Gould** – North Carolina State University, USA

*Will genetically engineered pests protect health, biodiversity, and crop production?*

Plenary Presentation

8:00 AM – 9:00 AM

Chapin Theater, Convention Center



**Dr. John A. Pickett** – Rothamsted Research, UK

*Agro-ecological manipulation of insect behaviour shows how to exploit signaling between insects and their hosts via gm*

Plenary Presentation

8:00 AM – 9:00 AM

Valencia Room, Convention Center



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## DAILY SCHEDULE BY DATE AND TIME

## FRIDAY, SEPTEMBER 23

TIME	SESSION/FUNCTION	LOCATION
7:00 AM - 6:00 PM	Entomological Collections Network	Grand Ballroom A, Rosen Centre Hotel
7:30 AM - 5:00 PM	Annual Review of Entomology Editorial Committee Meeting	Salon 11, Rosen Centre Hotel
2:00 PM - 3:00 PM	ESA EB Executive Committee Meeting	Salon 24, Rosen Centre Hotel
6:00 PM - 9:00 PM	Entomological Collections Network	Grand Ballroom C, Rosen Centre Hotel
7:00 PM - 9:00 PM	CAMTech Industry Advisory Board Meeting (Reception)	Salon 13/14, Rosen Centre Hotel

## SATURDAY, SEPTEMBER 24

TIME	SESSION/FUNCTION	LOCATION
7:00 AM - 4:00 PM	ESA Governing Board Meeting	Signature 1, Rosen Centre Hotel
7:00 AM - 6:00 PM	Entomological Collections Network	Grand Ballroom A, Rosen Centre Hotel
7:00 AM - 6:00 PM	International Union for the Study of Social Insects (IUSSI), North American Section	Salon 11/12, Rosen Plaza Hotel
7:30 AM - 5:30 PM	CAMTech Industry Advisory Board Meeting	Salon 13/14, Rosen Centre Hotel
7:30 AM - 5:30 PM	NIFA Project Director Meeting	Grand Ballroom B, Rosen Plaza Hotel
8:00 AM - 4:30 PM	Past Developments, Current Frontiers, and Future Perspectives: Global Gathering of Chinese Entomologists in 2016	Grand Ballroom A, Rosen Plaza Hotel
8:00 AM - 5:00 PM	Meeting of the S1052 Working Group on Improving the Microbial Control of Arthropod Pests	Salon 13/14, Rosen Plaza Hotel
8:00 AM - 6:00 PM	Butterfly Net: A Planning Workshop for a System to Manage and Share Global Butterfly Data on Phylogeny, Distributions, and Traits	Salon 3, Rosen Plaza Hotel
8:30 AM - 5:30 PM	Entomological Society of Canada Board Meeting	Salon 4, Rosen Plaza Hotel
10:00 AM - 2:00 PM	STEMbugs Educator Workshop	Room W224 GH, Convention Center
1:00 PM - 4:00 PM	GDM ARM Electronic Data Entry Workshop	Salon 9, Rosen Plaza Hotel
1:00 PM - 4:00 PM	NCSRP Research Planning Meeting	Salon 18, Rosen Plaza Hotel
2:00 PM - 6:00 PM	Registration and Information Center	West Hall C Foyer, Convention Center
3:00 PM - 6:00 PM	Council of Entomological Department Administrators Meeting	Salon 12, Rosen Centre Hotel
3:30 PM - 5:30 PM	Informal Meeting of Leaf Beetle ( <i>sensu lato</i> ) Enthusiasts	Salon 17, Rosen Plaza Hotel
4:00 PM - 5:00 PM	New ESA Governing Board Orientation	Signature 1, Rosen Centre Hotel

## SUNDAY, SEPTEMBER 25

TIME	SESSION/FUNCTION	LOCATION
7:00 AM - 5:30 PM	North American Forensic Entomology Association	Salon 3/4, Rosen Centre Hotel
7:30 AM - 12:00 PM	CAMTech Industry Advisory Board Meeting	Salon 13/14, Rosen Centre Hotel
8:00 AM - 9:30 AM	Planning Meeting for the Summit on Mosquito-Vectored Disease Epidemics in the Americas	Salon 6, Rosen Centre Hotel
8:00 AM - 10:00 AM	<i>Journal of Economic Entomology</i> Editorial Board Meeting	Salon 12, Rosen Centre Hotel
8:00 AM - 10:00 AM	P-IE Governing Council Working Session	Salon 7, Rosen Centre Hotel
8:00 AM - 11:30 AM	Invasive Species: Collections Critical Infrastructure	Grand Ballroom A, Rosen Centre Hotel
8:00 AM - 1:00 PM	ENTOMOL Meeting Team Brazil	Salon 13/14, Rosen Plaza Hotel
8:00 AM - 5:15 PM	9th International Aphid Genomics Consortium (IAGC) Workshop	Room W224 E, Convention Center
8:15 AM - 3:40 PM	Brazilian Entomological Society (SEB) Satellite Symposium: Entomology in Brazil: Opportunity for Partnerships	Grand Ballroom A/B, Rosen Plaza Hotel
9:00 AM - 3:00 PM	Tour: Cocoa Beach	West Hall C Foyer, Convention Center
9:30 AM - 10:30 AM	ESA Presidential Committee on Section Leadership	Salon 6, Rosen Centre Hotel



## SUNDAY/MONDAY • DAILY SCHEDULE BY DATE AND TIME •

10:00 AM - 11:00 AM	ICE 2016/ESA Annual Meeting Planning Committee Meeting	Signature 1, Rosen Centre Hotel
10:00 AM - 11:00 AM	Thomas Say Books Editorial Board Meeting	Salon 12, Rosen Centre Hotel
10:00 AM - 12:00 PM	IOBC NRS Governing Board Meeting	Salon 8, Rosen Centre Hotel
10:00 AM - 12:00 PM	Lepidoptera of North America Network	Salon 10, Rosen Centre Hotel
10:00 AM - 6:00 PM	Presentation Preview Room (PPR)/Speaker Ready Room	Room W221 AB, Convention Center
10:00 AM - 9:00 PM	Registration and Information Center	West Hall C Foyer, Convention Center
11:00 AM - 2:00 PM	Certification Board Meeting	Salon 9, Rosen Centre Hotel
11:30 AM - 1:30 PM	ICE Council Meeting	Room W221 C, Convention Center
11:30 AM - 3:30 PM	Highlights of Medical, Urban, and Veterinary Entomology in 2016	Room W340 AB, Convention Center
11:30 AM - 3:30 PM	Physiology, Biochemistry, and Toxicology (PBT) Networking Section	West Hall F3 (WF3), Convention Center
12:20 PM - 3:40 PM	Recent Advances in Entomology in Japan - Ecology and Reproductive Biology: Satellite Symposium of the Union of Japanese Society for Insect Sciences	Salon 9/10, Rosen Plaza Hotel
12:30 PM - 3:30 PM	Plant-Insect Ecosystem (P-IE) Section Networking, Business, and Learning Session	West Hall F1 (WF1), Convention Center
12:30 PM - 3:30 PM	Pollinators: Critical Gene Banks	Grand Ballroom A, Rosen Centre Hotel
1:00 PM - 2:00 PM	Entomological Foundation Insect Expo Committee Meeting	Salon 7, Rosen Centre Hotel
1:00 PM - 3:30 PM	Systematics, Evolution, and Biodiversity (SysEB) Section Meeting	Room W230 AB, Convention Center
1:00 PM - 5:00 PM	The Acarological Society of America Remembers John Conrad Moser	Room W224 GH, Convention Center
2:00 PM - 3:30 PM	Medical, Urban, and Veterinary Entomology (MUVE) Section Preliminary Business Meeting	Room W340 AB, Convention Center
2:00 PM - 4:00 PM	IOBC Executive Committee Meeting and Executive Council Meeting	Salon 6, Rosen Centre Hotel
2:00 PM - 4:00 PM	International Society of Hymenopterists - Business Meeting	Room W414 D, Convention Center
2:30 PM - 3:00 PM	Moderator Training	Room W224 B, Convention Center
3:00 PM - 3:30 PM	Student Competition Judges Training	Room W223 B, Convention Center
3:00 PM - 3:45 PM	ESA New Member Reception	Room W414 AB, Convention Center
4:00 PM - 5:30 PM	ESA Opening Plenary Session and Founders' Memorial Lecture	Valencia Room, Convention Center
6:00 PM - 7:30 PM	ICE Opening Plenary Session	Valencia Room, Convention Center
7:30 PM - 9:30 PM	Exhibit Hall	West Hall C, Convention Center
7:30 PM - 9:30 PM	Welcome Reception	West Hall C, Convention Center

### MONDAY, SEPTEMBER 26

TIME	SESSION/FUNCTION	LOCATION
6:00 AM - 7:00 AM	Morning Yoga	Fitness Center, Hyatt Regency Orlando
6:15 AM - 8:00 AM	Women in Entomology Breakfast	West Hall F2 (WF2), Convention Center
7:00 AM - 1:00 PM	The Coleopterists Society Executive Council Meeting	Salon 7, Rosen Centre Hotel
7:00 AM - 5:00 PM	Presentation Preview Room (PPR)/Speaker Ready Room	Room W221 AB, Convention Center
7:00 AM - 5:00 PM	Registration and Information Center	West Hall C Foyer, Convention Center
7:30 AM - 8:00 AM	Moderator Training	Room W224 AB, Convention Center
7:30 AM - 8:00 AM	Student Competition Judges Training	Room W223 B, Convention Center
8:00 AM - 9:00 AM	Plenary Presentation Featuring Dr. James R. Carey	Valencia Room, Convention Center
8:00 AM - 9:00 AM	Plenary Presentation Featuring Dr. José Roberto Postali Parra	Chapin Theater, Convention Center
8:00 AM - 1:00 PM	IRAC-US Meeting	Salon 9, Rosen Centre Hotel
8:00 AM - 6:00 PM	Guest Hospitality	Salon 5, Rosen Centre Hotel
9:00 AM - 5:00 PM	Exhibit Hall	West Hall C, Convention Center
9:00 AM - 5:00 PM	Poster Session 1: Agriculture and Forest Entomology, Part 1	West Hall C, Convention Center

## MONDAY • DAILY SCHEDULE BY DATE AND TIME •

9:00 AM - 5:00 PM	Poster Session 1: Biodiversity, Biogeography, and Conservation of Arthropods, Part 1	West Hall C, Convention Center
9:00 AM - 5:00 PM	Poster Session 1: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops, Part 1	West Hall C, Convention Center
9:00 AM - 5:00 PM	Poster Session 1: Functional Genomics and Transgenesis	West Hall C, Convention Center
9:00 AM - 5:00 PM	Poster Session 1: Medical and Veterinary Entomology, Part 1	West Hall C, Convention Center
9:00 AM - 5:00 PM	Poster Session 1: Stored Products Entomology	West Hall C, Convention Center
9:00 AM - 5:00 PM	Graduate Student Poster Competition: Agricultural and Forest Entomology	West Hall C, Convention Center
9:00 AM - 5:00 PM	Graduate Student Poster Competition: Apidology, Sericulture, and Social Insects: Ants and Termites	West Hall C, Convention Center
9:00 AM - 5:00 PM	Graduate Student Poster Competition: Apidology, Sericulture, and Social Insects: Bees	West Hall C, Convention Center
9:00 AM - 5:00 PM	Graduate Student Poster Competition: Biological Control and Insect Pathology	West Hall C, Convention Center
9:00 AM - 5:00 PM	Graduate Student Poster Competition: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops	West Hall C, Convention Center
9:00 AM - 5:00 PM	Graduate Student Poster Competition: Ecology and Population Dynamics	West Hall C, Convention Center
9:00 AM - 5:00 PM	Graduate Student Poster Competition: Frontiers in Entomology	West Hall C, Convention Center
9:00 AM - 5:00 PM	Graduate Student Poster Competition: Genetics and Evolutionary Entomology	West Hall C, Convention Center
9:00 AM - 5:00 PM	Graduate Student Poster Competition: Insect Chemical Ecology	West Hall C, Convention Center
9:00 AM - 5:00 PM	Graduate Student Poster Competition: Invasive and Exotic Entomology	West Hall C, Convention Center
9:00 AM - 5:00 PM	Graduate Student Poster Competition: RNAi and Gene Expression Control in Insects	West Hall C, Convention Center
9:00 AM - 5:00 PM	Undergraduate Student Poster Competition: Ecology and Population Dynamics	West Hall C, Convention Center
9:00 AM - 5:00 PM	Undergraduate Student Poster Competition: Frontiers in Entomology	West Hall C, Convention Center
9:00 AM - 5:00 PM	Student Virtual Poster Competition: Graduate	West Hall C, Convention Center
9:00 AM - 5:00 PM	Student Virtual Poster Competition: Undergraduate	West Hall C, Convention Center
9:15 AM - 11:00 AM	Contributed Papers: Entomological Effects of Global Warming in Agriculture and Medical Entomology	Room W314 A, Convention Center
9:15 AM - 11:00 AM	Undergraduate Student Oral Competition: Frontiers in Entomology	Room W240 A, Convention Center
9:15 AM - 11:15 AM	Symposium: Host Adaptations in Insect Symbioses: Elements That Facilitate Stability and Persistence	Room W330 B, Convention Center
9:15 AM - 11:15 AM	Symposium: Small RNAs: A New Frontier in Insect Science	Room W231 B, Convention Center
9:15 AM - 11:15 AM	Graduate Student Oral Competition: Urban Entomology in a Changing Environment: Biting Pests	Room W232 C, Convention Center
9:15 AM - 11:30 AM	Symposium: Arthropods of Madagascar: Historical Biogeography, Diversity, and Patterns of Distribution	Room W414 C, Convention Center
9:15 AM - 11:30 AM	Symposium: Ecological and Developmental Insights from Comparative Hemipteroid Genomics	Room W330 C, Convention Center
9:15 AM - 11:30 AM	Symposium: Genomics and Genome Engineering in the Silkworm	Room W330 A, Convention Center
9:15 AM - 11:30 AM	Symposium: Host Plant Resistance Towards Insect Pests	Room W230 C, Convention Center
9:15 AM - 11:30 AM	Symposium: Insect-Plant Interactions in a Changing Climate: Effects on Populations Dynamics and Biological Control	Room W230 D, Convention Center
9:15 AM - 11:30 AM	Symposium: Microbial Associates and Microbial Control of Ambrosia Beetles	Room W223 A, Convention Center
9:15 AM - 11:30 AM	Symposium: Neuronal Correlates of Odorant Valence in Insects	Room W331 B, Convention Center
9:15 AM - 11:30 AM	Symposium: Sustainable Agriculture through Ecological Pest Management	Room W222 A, Convention Center
9:15 AM - 11:30 AM	Symposium: Vector Development and Reproduction	Room W414 A, Convention Center
9:15 AM - 11:30 AM	Contributed Papers: Medical and Veterinary Entomology: Forensic Entomology	Room W224 H, Convention Center
9:15 AM - 11:30 AM	Graduate Student Oral Competition: Insect Immunology	Room W232 A, Convention Center



## MONDAY • DAILY SCHEDULE BY DATE AND TIME •

9:15 AM - 11:45 AM	Symposium: From the Laboratory Bench to Commercial Products: Semiochemical-Based Technology Development and Regulation Worldwide	Room W314 B, Convention Center
9:15 AM - 11:45 AM	Symposium: Zoophytophagous Arthropods in Biological Control (IOBC)	Room W331 D, Convention Center
9:15 AM - 11:45 AM	Graduate Student Oral Competition: Apidology, Sericulture, and Social Insects: Termites	Room W231 C, Convention Center
9:15 AM - 12:00 PM	Symposium: Wild Sericulture for Alternative Income and Economic Incentive for Biodiversity Conservation	Room W222 B, Convention Center
9:15 AM - 12:00 PM	Graduate Student Oral Competition: Medical and Veterinary Entomology: Ticks	Room W232 B, Convention Center
9:15 AM - 12:15 PM	Symposium: Engineering Beneficial Traits into Insects Using Novel Gene Drive Systems	Room W414 B, Convention Center
9:15 AM - 12:15 PM	Symposium: Photoperiodic Induction of Diapause and Seasonal Morphs	Room W340 B, Convention Center
9:15 AM - 12:15 PM	Symposium: Stick Insect Research in the Era of Genomics: Exploring the Evolution of a Mesodiverse Insect Order	Room W414 D, Convention Center
9:15 AM - 12:15 PM	Contributed Papers: Biological Control and Insect Pathology: Unique Studies I	Room W224 D, Convention Center
9:15 AM - 12:15 PM	Contributed Papers: Ecology and Population Dynamics: Sampling	West Hall F3 (WF3), Convention Center
9:15 AM - 12:15 PM	Contributed Papers: Insect Immunology: Molecular	Room W315 A, Convention Center
9:15 AM - 12:15 PM	Graduate Student Oral Competition: Biological Control and Insect Pathology: Entomopathogens and Weed Biocontrol	Room W231 A, Convention Center
9:15 AM - 12:15 PM	Graduate Student Oral Competition: Biological Control and Insect Pathology: Predators	Room W240 C, Convention Center
9:15 AM - 12:30 PM	Symposium: Biology, Ecology, and Management of the Asian Citrus Psyllid, <i>Diaphorina citri</i> , Vector of Huanglongbing	Room W315 B, Convention Center
9:15 AM - 12:30 PM	Symposium: Global Entomological Collaborations	Room W340 A, Convention Center
9:15 AM - 12:30 PM	Symposium: Rapid Evolution of Insect Pests within Agroecosystems	Room W331 C, Convention Center
9:15 AM - 12:30 PM	Symposium: Zika Virus	Chapin Theater, Convention Center
9:15 AM - 12:30 PM	Contributed Papers: Frontiers in Entomology: Tools and Methods	Room W224 G, Convention Center
9:15 AM - 12:30 PM	Contributed Papers: Insect Chemical Ecology: Physiology	Room W224 B, Convention Center
9:15 AM - 12:30 PM	Contributed Papers: Insect Chemical Ecology: Plant Protection	West Hall F1 (WF1), Convention Center
9:15 AM - 12:30 PM	Contributed Papers: Medical and Veterinary Entomology: Anopheles Vectors of Malaria	West Hall F2 (WF2), Convention Center
9:15 AM - 12:30 PM	Contributed Papers: Urban Entomology in a Changing Environment: Bed Bugs, Cockroaches, and Flies	Room W331 A, Convention Center
9:15 AM - 12:30 PM	Graduate Student Oral Competition: Ecology and Population Dynamics: Behavior	Room W240 D, Convention Center
9:15 AM - 12:30 PM	Graduate Student Oral Competition: Invasive and Exotic Entomology: Drosophilids	Room W240 B, Convention Center
9:15 AM - 12:45 PM	Contributed Papers: Biological Control and Insect Pathology: Nematodes, Fungi, and Bt	Room W225 A, Convention Center
9:15 AM - 12:45 PM	Contributed Papers: Entomology Around the World	Room W224 A, Convention Center
9:15 AM - 12:45 PM	Contributed Papers: Stored Products Entomology: Novel Strategies I	Room W224 C, Convention Center
9:15 AM - 12:45 PM	Graduate Student Oral Competition: Apidology, Sericulture, and Social Insects: Honey Bees I	Room W230 B, Convention Center
9:15 AM - 1:15 PM	Contributed Papers: Agricultural and Forest Entomology: Behavioral and Chemical Ecology	Room W224 F, Convention Center
9:15 AM - 1:15 PM	Contributed Papers: Insect-Plant Interactions in a Changing Climate: Abiotic Factors, Pollinators, Pathogens	West Hall F4 (WF4), Convention Center
9:15 AM - 1:15 PM	Contributed Papers: Integrated Pest Management and Sustainable Agriculture: Agronomic Crops	Room W230 A, Convention Center
9:15 AM - 1:15 PM	Contributed Papers: Integrated Pest Management and Sustainable Agriculture: Insecticides	Room W224 E, Convention Center
9:30 AM - 1:30 PM	ESA Science Policy Fellows Workshop	Salon 6, Rosen Centre Hotel





## MONDAY • DAILY SCHEDULE BY DATE AND TIME •

10:00 AM - 11:00 AM	ESA Membership Committee Meeting	Salon 2, Rosen Centre Hotel
10:00 AM - 11:30 AM	<i>Journal of Medical Entomology</i> Editorial Board Meeting	Salon 12, Rosen Centre Hotel
10:00 AM - 11:45 AM	Welcome Program for Registered Guests	Salon 5, Rosen Centre Hotel
11:00 AM - 12:30 PM	Contributed Papers: Arthropod Vectors of Animal and Plant Disease: Insect Endosymbionts and Microbiota	Room W314 A, Convention Center
11:30 AM - 2:00 PM	Editorial Board Meeting <i>Archives of Insect Biochemistry and Physiology</i>	Salon 10, Rosen Plaza Hotel
12:00 PM - 2:00 PM	Editorial Board Meeting, <i>The Canadian Entomologist</i>	Salon 11/12, Rosen Plaza Hotel
12:15 PM - 1:30 PM	Editorial Board Meeting for <i>Current Opinion in Insect Science</i>	Salon 11, Rosen Center Hotel
12:40 PM - 1:20 PM	Lunch and Learn: Meet the ESA Journal Editors	West Hall F2 (WF2), Convention Center
12:45 PM - 1:15 PM	Moderator Training	Room W224 B, Convention Center
1:30 PM - 3:00 PM	USDA - ARS All Hands Meeting	Grand Ballroom A, Rosen Centre Hotel
1:30 PM - 3:30 PM	ESA Science Policy Committee Meeting	Salon 2, Rosen Centre Hotel
1:30 PM - 4:00 PM	Symposium: Novel Contributions of Chemical Ecology to Global IPM	Room W223 A, Convention Center
1:30 PM - 4:00 PM	Symposium: What Constitutes Responsible Field Release of Transgenic Insects?	Room W414 C, Convention Center
1:30 PM - 4:15 PM	Symposium: Entomology Around the World: Past, Present, and Future Challenges	Room W240 A, Convention Center
1:30 PM - 4:15 PM	Symposium: Global Status, Acceptance, and Challenges of GM Crops	Room W224 H, Convention Center
1:30 PM - 4:15 PM	Symposium: How Human Activities Shape the Global Distribution of Insects	Room W414 D, Convention Center
1:30 PM - 4:15 PM	Symposium: New Tools and Strategies for Integrated Pest Management (IPM) on Transgenic (Bt) and Non-Transgenic (Conventional) Cotton Crops	Room W330 C, Convention Center
1:30 PM - 4:15 PM	Symposium: Social Insect Pathobiology	Room W224 G, Convention Center
1:30 PM - 4:15 PM	Symposium: Status and Prospects for Biological Control in the 21st Century (IOBC)	Room W232 A, Convention Center
1:30 PM - 4:15 PM	Symposium: The Biochemical Signaling Interface Between Invaders and Their Insect Hosts	Room W330 A, Convention Center
1:30 PM - 4:15 PM	Symposium: The Khapra Beetle: A Potential Invasive Species	Room W315 B, Convention Center
1:30 PM - 4:15 PM	Symposium: Vector-Borne Diseases of Livestock	Room W331 B, Convention Center
1:30 PM - 4:30 PM	Symposium: Biological Control of the Invasive Brown Marmorated Stink Bug, <i>Halyomorpha halys</i> , by Exotic and Native Parasitoids and Predators: A Global Perspective	Room W315 A, Convention Center
1:30 PM - 4:30 PM	Symposium: Recent Advances in Heteropteran (Hemiptera) Systematics and Evolution	Room W231 C, Convention Center
1:30 PM - 4:30 PM	Symposium: Where are the Six Legs of Advanced Entomology Publishing Taking Us?	Room W224 F, Convention Center
1:30 PM - 4:30 PM	Symposium: Workshop on Gene Editing Technologies	Room W414 A, Convention Center
1:30 PM - 4:45 PM	Symposium: A Global Perspective on Insect Pests of Wood Products	Room W230 A, Convention Center
1:30 PM - 4:45 PM	Symposium: Pest Shifting, Invasive Species, and Resistance Development in Key Growing Areas of the World and the Need for New Technology to Manage Insect Pests	Room W314 B, Convention Center
1:30 PM - 4:45 PM	Graduate Student Oral Competition: Morphology, Systematics, and Phylogeny: Flies, Lepidopterans, and Others	Room W240 D, Convention Center
1:30 PM - 5:00 PM	Symposium: An Emerging Food Supply: Edible Insects	Room W230 B, Convention Center
1:30 PM - 5:00 PM	Symposium: Building the Biodiversity Knowledge Graph for Insects - Components, Progress, and Challenges	West Hall F4 (WF4), Convention Center
1:30 PM - 5:00 PM	Symposium: Deciphering Complex Signaling Mechanisms in Insect-Plant Interactions	West Hall F1 (WF1), Convention Center
1:30 PM - 5:00 PM	Symposium: Integrated Pest Management Components and Packages for Tropical Crops	Room W331 D, Convention Center
1:30 PM - 5:00 PM	Symposium: Wireworm and Click Beetle Management: IPM Toolbox for the 21st Century	Room W331 C, Convention Center
1:30 PM - 5:00 PM	Contributed Papers: Integrated Pest Management and Sustainable Agriculture: IPM Programs	Room W225 A, Convention Center



## MONDAY • DAILY SCHEDULE BY DATE AND TIME •

1:30 PM - 5:00 PM	Graduate Student Oral Competition: Agricultural and Forest Entomology: Hemipteran Pests	Room W232 B, Convention Center
1:30 PM - 5:15 PM	Symposium: Population Consequences of Pest Management Tactics on Non-Target Species	Room W222 A, Convention Center
1:30 PM - 5:15 PM	Symposium: Systematics, Biogeography, and Ecology of Cerambycidae and Buprestidae	Room W231 A, Convention Center
1:30 PM - 5:15 PM	Symposium: True Bugs (Heteroptera) from the Neotropics: Advances on Basic and Applied Research	Room W230 C, Convention Center
1:30 PM - 5:15 PM	Contributed Papers: Genetics and Evolutionary Entomology: Populations and Spatial Diversity	Room W330 B, Convention Center
1:30 PM - 5:15 PM	Contributed Papers: Integrated Pest Management and Sustainable Agriculture: Fruits and Vegetables	Room W231 B, Convention Center
1:30 PM - 5:15 PM	Graduate Student Oral Competition: Agricultural and Forest Entomology: Forest Pests	Room W232 C, Convention Center
1:30 PM - 5:15 PM	Graduate Student Oral Competition: Insect-Plant Interactions in a Changing Climate	Room W240 B, Convention Center
1:30 PM - 5:15 PM	Graduate Student Oral Competition: Integrated Pest Management and Sustainable Agriculture: Landscape Systems	Room W240 C, Convention Center
1:30 PM - 5:30 PM	Symposium: Biodiversity, Distribution, Behavior, and Activity of Forensically Important Entomofauna and Microbiota in Different Ecoregions	Room W224 D, Convention Center
1:30 PM - 5:30 PM	Symposium: Bt Mode of Action, Resistance Mechanisms, and Global Patterns	Room W230 D, Convention Center
1:30 PM - 5:30 PM	Symposium: Data without Borders: Collecting, Digitizing, Using, and Re-using Biological Specimen Data	Room W224 E, Convention Center
1:30 PM - 5:30 PM	Symposium: Emerging Technologies for Successful Applications of dsRNA to Reduce Pests and Pathogens in Agriculture	West Hall F2 (WF2), Convention Center
1:30 PM - 5:30 PM	Symposium: Evolution and Biology of Chalcidoidea: Integrating Genomics, Fossils, Microbiomes, and Natural History	Room W340 A, Convention Center
1:30 PM - 5:30 PM	Symposium: From Diet Breadth to Diversification: Understanding Host Shifts in Phytophagous Insects	Room W340 B, Convention Center
1:30 PM - 5:30 PM	Symposium: In Honor of Past ESA President Donald L. McLean: Electropenetrography (EPG) Without Borders: Plant Pathogen Vector Research Inspiring Novel Animal Disease Studies	West Hall F3 (WF3), Convention Center
1:30 PM - 5:30 PM	Symposium: In the Light of Morphometrics: Frontiers in Ecology and Evolution of Insect Morphology	Room W314 A, Convention Center
1:30 PM - 5:30 PM	Symposium: Innovative Strategies of Mosquito Control	Room W331 A, Convention Center
1:30 PM - 5:30 PM	Symposium: Insights into the Biology of Wild and Managed Native Bees	Room W224 C, Convention Center
1:30 PM - 5:30 PM	Symposium: Profiles of Forest Pests Ready to Cross Borders and Invade New Areas	Room W224 A, Convention Center
1:30 PM - 5:30 PM	Symposium: Scarabs without Borders: Lessons from a Century of Invasions	Room W222 B, Convention Center
1:30 PM - 5:30 PM	Symposium: Sex and Drugs and Bee Control: The Chemical Ecology of Pollination	Room W224 B, Convention Center
1:30 PM - 5:30 PM	Symposium: The Physiological Ecology of Insect Flight: From Millisecond Escape to Long-Distance Migration	Room W414 B, Convention Center
1:30 PM - 5:30 PM	Contributed Papers: Agricultural and Forest Entomology: Forest Insects, Pollinators, Systematics, and Remote Sensing	Chapin Theater, Convention Center
1:30 PM - 5:30 PM	Contributed Papers: Agricultural and Forest Entomology: Integrated Pest Management, Host-Plant Interactions, and Transgenic Crops	Room W225 B, Convention Center
1:30 PM - 5:30 PM	Graduate Student Oral Competition: Biodiversity, Biogeography, and Conservation of Arthropods: Diversity	Room W223 B, Convention Center
2:00 PM - 3:00 PM	ESA Common Names Committee Meeting	Salon 12, Rosen Centre Hotel
2:00 PM - 6:00 PM	ESA Linnaean Games	Valencia Room, Convention Center
3:00 PM - 5:00 PM	Society of Overseas Nepalese Entomologists Meeting	Salon 3, Rosen Plaza Hotel
4:00 PM - 11:00 PM	Tour: Epcot	West Hall C Foyer, Convention Center
6:00 PM - 7:30 PM	ESA Illinois Mixer	Salon 4, Rosen Centre Hotel



## MONDAY/TUESDAY • DAILY SCHEDULE BY DATE AND TIME •

6:00 PM - 8:00 PM	ICE Council Reception	Orchid Room/Verandah, Hyatt Regency Orlando
6:00 PM - 8:05 PM	IOBC General Assembly	Room W232 A, Convention Center
6:30 PM - 8:00 PM	Florida Mixer	Signature 1, Rosen Centre Hotel
6:30 PM - 8:30 PM	Colorado, Kansas, and Nebraska Joint Mixer	Salon 9/10, Rosen Centre Hotel
6:30 PM - 8:30 PM	Iowa State University Alumni Mixer	Salon 7, Rosen Centre Hotel
6:30 PM - 8:30 PM	Michigan State University and The Ohio State University Joint Mixer	Salon 3, Rosen Centre Hotel
6:30 PM - 8:30 PM	Northwest Mixer (UI, MSU, OSU, WSU)	Grand Ballroom B, Rosen Centre Hotel
6:30 PM - 8:30 PM	Purdue Mixer	Grand Ballroom A, Rosen Centre Hotel
6:30 PM - 8:30 PM	University of Wisconsin Mixer	Salon 6, Rosen Centre Hotel
6:30 PM - 9:00 PM	University of California Mixer for Alumni and Friends	Grand Ballroom D, Rosen Centre Hotel
7:00 PM - 9:00 PM	2016 Mid-Atlantic Mixer	Salon 13/14, Rosen Centre Hotel
7:00 PM - 9:00 PM	Auburn, Arkansas, Clemson, Kentucky, and Tennessee Mixer	Salon 1, Rosen Centre Hotel
7:00 PM - 9:00 PM	Texas A&M University, Oklahoma State University, and Southwestern Branch Mixer	Grand Ballroom E, Rosen Centre Hotel
7:00 PM - 9:00 PM	Penn State Mixer	Salon 8, Rosen Centre Hotel
7:00 PM - 10:00 PM	Entomological Society of Canada President's Reception	Salon 4, Rosen Plaza Hotel
7:30 PM - 9:00 PM	XI European Congress of Entomology	Salon 11/12, Rosen Plaza Hotel
8:00 PM - 10:00 PM	Cornell University Entomology Mixer-Reception	Salon 11, Rosen Centre Hotel

### TUESDAY, SEPTEMBER 27

TIME	SESSION/FUNCTION	LOCATION
6:00 AM - 7:00 AM	Cardio Class	Fitness Center, Hyatt Regency Orlando
7:00 AM - 8:00 AM	ESA Past-Presidents Breakfast	Signature 1, Rosen Centre Hotel
7:00 AM - 5:00 PM	Presentation Preview Room (PPR)/Speaker Ready Room	Room W221 AB, Convention Center
7:00 AM - 5:00 PM	Registration and Information Center	West Hall C Foyer, Convention Center
7:30 AM - 8:00 AM	Moderator Training	Room W224 B, Convention Center
7:30 AM - 8:00 AM	Student Competition Judges Training	Room W223 B, Convention Center
8:00 AM - 9:00 AM	Plenary Presentation Featuring Dr. Baldwyn Torto	Chapin Theater, Convention Center
8:00 AM - 9:00 AM	Plenary Presentation Featuring Dr. Carolina Barillas-Mury	Valencia Room, Convention Center
8:00 AM - 6:00 PM	Guest Hospitality	Salon 5, Rosen Centre Hotel
9:00 AM - 5:00 PM	Exhibit Hall	West Hall C, Convention Center
9:00 AM - 5:00 PM	Poster Session 2: Acarology	West Hall C, Convention Center
9:00 AM - 5:00 PM	Poster Session 2: Bioinformatics and Comparative Genomics of Arthropods	West Hall C, Convention Center
9:00 AM - 5:00 PM	Poster Session 2: Biological Control and Insect Pathology	West Hall C, Convention Center
9:00 AM - 5:00 PM	Poster Session 2: Ecology and Population Dynamics	West Hall C, Convention Center
9:00 AM - 5:00 PM	Poster Session 2: Entomological Effects of Global Warming in Agriculture and Medical Entomology	West Hall C, Convention Center
9:00 AM - 5:00 PM	Poster Session 2: Insect-Plant Interactions in a Changing Climate	West Hall C, Convention Center
9:00 AM - 5:00 PM	Graduate Student Poster Competition: Acarology and Stored Products	West Hall C, Convention Center
9:00 AM - 5:00 PM	Graduate Student Poster Competition: Arthropod Vectors of Animal and Plant Disease	West Hall C, Convention Center
9:00 AM - 5:00 PM	Graduate Student Poster Competition: Insect Immunology	West Hall C, Convention Center
9:00 AM - 5:00 PM	Graduate Student Poster Competition: Integrated Pest Management and Sustainable Agriculture: Management Tactics	West Hall C, Convention Center
9:00 AM - 5:00 PM	Graduate Student Poster Competition: Integrated Pest Management and Sustainable Agriculture: Pest Physiology	West Hall C, Convention Center
9:00 AM - 5:00 PM	Graduate Student Poster Competition: Medical and Veterinary Entomology	West Hall C, Convention Center



## TUESDAY • DAILY SCHEDULE BY DATE AND TIME •

9:00 AM - 5:00 PM	Graduate Student Poster Competition: Morphology, Systematics, and Phylogeny: Flies, Hemiptera, and Lepidoptera	West Hall C, Convention Center
9:00 AM - 5:00 PM	Graduate Student Poster Competition: Morphology, Systematics, and Phylogeny: Springtails, Beetles, and Hymenoptera	West Hall C, Convention Center
9:00 AM - 5:00 PM	Graduate Student Poster Competition: Physiology and Biochemistry: Moths and Mosquitoes	West Hall C, Convention Center
9:00 AM - 5:00 PM	Graduate Student Poster Competition: Physiology and Biochemistry: Physiology	West Hall C, Convention Center
9:00 AM - 5:00 PM	Undergraduate Student Poster Competition: Medical and Veterinary Entomology	West Hall C, Convention Center
9:00 AM - 5:00 PM	Undergraduate Student Poster Competition: Morphology, Systematics, and Phylogeny	West Hall C, Convention Center
9:15 AM - 11:15 AM	Symposium: Climate Change: Preventing the Spread of Invasive Species in Agriculture	Room W230 A, Convention Center
9:15 AM - 11:15 AM	Symposium: Insect-Plant Interactions in a Changing Climate	Room W222 A, Convention Center
9:15 AM - 11:15 AM	Symposium: Reproductive Interference and its Applications	Room W224 G, Convention Center
9:15 AM - 11:15 AM	Symposium: Spruce Budworm Genomics: From Basic Science to Outbreak Management	Room W340 A, Convention Center
9:15 AM - 11:15 AM	Symposium: Unmanned Aerial Systems (Drones) for Precision Mosquito Control and Agricultural Use	Room W315 B, Convention Center
9:15 AM - 11:30 AM	Symposium: Advancements in Resistance and Aversion Management for Urban Pests	Room W224 C, Convention Center
9:15 AM - 11:30 AM	Symposium: Bt Crops and Best Management Practices: Influence on the Technology Durability	West Hall F1 (WF1), Convention Center
9:15 AM - 11:30 AM	Symposium: Cross-Continental Patterns of Chemical Communication Among Subcortical Insects	Room W330 A, Convention Center
9:15 AM - 11:30 AM	Symposium: Genetic Architecture of Species Differences	Room W414 B, Convention Center
9:15 AM - 11:30 AM	Symposium: Innovative Responses to the Global Homogenization of Plantation Pests	Room W331 D, Convention Center
9:15 AM - 11:30 AM	Symposium: Mechanistic Insights into Mosquito-Parasite Interactions	Room W224 E, Convention Center
9:15 AM - 11:30 AM	Symposium: Worldwide Use of Kairomones to Enhance Management of Tortricids in Fruit Crops: New Opportunities and New Problems	Room W330 C, Convention Center
9:15 AM - 11:30 AM	Symposium: Wound Healing and Damage Signals in Insects	Room W330 B, Convention Center
9:15 AM - 11:30 AM	Contributed Papers: RNAi and Gene Expression Control in Insects: Pest Management	West Hall F4 (WF4), Convention Center
9:15 AM - 11:30 AM	Graduate Student Oral Competition: Medical and Veterinary Entomology: Livestock Pests and Decomposers	Room W232 A, Convention Center
9:15 AM - 11:45 AM	Symposium: Biocontrol and Induced Plant Defences: A Tale of Three Trophic Levels	Room W230 C, Convention Center
9:15 AM - 11:45 AM	Symposium: Chagas Disease: A Neglected Disease of Public Health Importance	Room W230 B, Convention Center
9:15 AM - 11:45 AM	Symposium: Insect-Plant Interactions in a Changing Arctic	Room W224 F, Convention Center
9:15 AM - 11:45 AM	Symposium: Microbial Modulation of Insect Immunity	Room W331 B, Convention Center
9:15 AM - 11:45 AM	Symposium: Opportunities and Challenges for Biological Control of Disease Vectors (IOBC)	Room W230 D, Convention Center
9:15 AM - 11:45 AM	Symposium: Stored Product Entomology: Challenges that Transcend Borders	Room W224 B, Convention Center
9:15 AM - 11:45 AM	Graduate Student Oral Competition: Apidology, Sericulture, and Social Insects: Honey Bees II	Room W240 A, Convention Center
9:15 AM - 11:45 AM	Undergraduate Student Oral Competition: Ecology and Population Dynamics	Room W231 C, Convention Center
9:15 AM - 12:00 PM	Symposium: Advances in Hermetic Storage for Smallholder Farms	Room W224 A, Convention Center
9:15 AM - 12:00 PM	Symposium: Avocados, Blueberries, and Olives: Pests of Small Fruit in Florida	Room W223 A, Convention Center
9:15 AM - 12:00 PM	Symposium: Entomological Issues Beyond Borders: Challenges and Opportunities for Sustainable Solutions	West Hall F3 (WF3), Convention Center



## TUESDAY • DAILY SCHEDULE BY DATE AND TIME •

9:15 AM - 12:00 PM	Symposium: Genomic and Genetic Strategies Toward Integrated Pest Management	Room W315 A, Convention Center
9:15 AM - 12:00 PM	Symposium: Global Spread and Management of the South American Tomato Leafminer, <i>Tuta absoluta</i>	Room W224 H, Convention Center
9:15 AM - 12:00 PM	Symposium: Recent Advances in the Study of the Neuropterida	Room W331 C, Convention Center
9:15 AM - 12:00 PM	Contributed Papers: Bioinformatics and Comparative Genomics of Arthropods: Genomes and Databases	Room W225 A, Convention Center
9:15 AM - 12:00 PM	Graduate Student Oral Competition: Apidology, Sericulture, and Social Insects: Ants	Room W240 B, Convention Center
9:15 AM - 12:15 PM	Symposium: Challenges and Opportunities for Management of Western Corn Rootworm	Room W414 A, Convention Center
9:15 AM - 12:15 PM	Symposium: Duplications, Deletions, and Other Mutations: Deciphering the Molecular Basis of Insecticide Resistance	West Hall F2 (WF2), Convention Center
9:15 AM - 12:15 PM	Symposium: Parasitoid Assemblages in Agroecosystems: Environmental Drivers Affecting Biocontrol	Room W231 A, Convention Center
9:15 AM - 12:15 PM	Contributed Papers: Ecology and Population Dynamics: Power of Prediction	Room W314 B, Convention Center
9:15 AM - 12:15 PM	Contributed Papers: Medical and Veterinary Entomology: Mosquito 'Omics and Biological Control	Chapin Theater, Convention Center
9:15 AM - 12:15 PM	Graduate Student Oral Competition: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops: Bt Toxins	Room W240 D, Convention Center
9:15 AM - 12:15 PM	Graduate Student Oral Competition: RNAi and Gene Expression Control in Insects	Room W232 C, Convention Center
9:15 AM - 12:30 PM	Symposium: Biological Control under Climate Change (IOBC)	Room W222 B, Convention Center
9:15 AM - 12:30 PM	Symposium: From Molecules to Management: New Tools for Understanding Locust Swarms across Species and Research Disciplines	Room W331 A, Convention Center
9:15 AM - 12:30 PM	Symposium: Repellents	Room W224 D, Convention Center
9:15 AM - 12:30 PM	Contributed Papers: Apidology, Sericulture, and Social Insects: Physiology, Genetics, and Genomics	Room W314 A, Convention Center
9:15 AM - 12:30 PM	Contributed Papers: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops	Room W414 C, Convention Center
9:15 AM - 12:30 PM	Contributed Papers: Frontiers in Entomology: Uses and Symbiosis	Room W223 B, Convention Center
9:15 AM - 12:30 PM	Contributed Papers: Genetics and Evolutionary Entomology: Mating and Competition	Room W414 D, Convention Center
9:15 AM - 12:30 PM	Contributed Papers: Insect Immunology: Environment	Room W231 B, Convention Center
9:15 AM - 12:30 PM	Contributed Papers: Invasive and Exotic Entomology: Control and Tools	Room W340 B, Convention Center
9:15 AM - 12:30 PM	Contributed Papers: Morphology, Systematics, and Phylogeny: Myriapoda and Insecta	Room W225 B, Convention Center
9:15 AM - 12:30 PM	Graduate Student Oral Competition: Genetics and Evolutionary Entomology: Behavior	Room W240 C, Convention Center
9:15 AM - 12:30 PM	Graduate Student Oral Competition: Physiology and Biochemistry: Physiology	Room W232 B, Convention Center
9:30 AM - 10:30 AM	ESA Student Transition & Early Professionals Committee (STEP, ECP) Meeting	Salon 2, Rosen Centre Hotel
9:30 AM - 11:30 AM	BCE Core Exam Writing Committee	Salon 6, Rosen Centre Hotel
9:30 AM - 2:00 PM	Tour: Leu Gardens	West Hall C Foyer, Convention Center
10:00 AM - 11:30 AM	ESA Awards and Honors Committee Meeting	Salon 1, Rosen Centre Hotel
10:00 AM - 12:00 PM	<i>Journal of Insect Science</i> Editorial Board Meeting	Salon 12, Rosen Centre Hotel
10:30 AM - 11:30 AM	ESA Diversity & Inclusion Committee Meeting	Salon 2, Rosen Centre Hotel
10:30 AM - 12:00 PM	Western Region IPM Center Bed Bug Work Group	Salon 3, Rosen Centre Hotel
12:00 PM - 1:00 PM	ESA Student Affairs Committee (SAC) Meeting	Salon 2, Rosen Centre Hotel
12:00 PM - 1:00 PM	ESA National Insect Photo Salon	West Hall F 4 (WF4) Salon, Convention Center
12:00 PM - 2:00 PM	ACE Support Committee	Salon 6, Rosen Centre Hotel
12:15 PM - 1:30 PM	Editorial Board Meeting for <i>Journal of Insect Physiology</i>	Salon 11, Rosen Centre Hotel



## TUESDAY • DAILY SCHEDULE BY DATE AND TIME •

12:30 PM - 1:15 PM	Lunch and Learn: No Means No: How to Stop Harassment in Professional Settings	West Hall F2 (WF2), Convention Center
12:30 PM - 1:15 PM	Entomology Research and the National Science Foundation	West Hall F1 (WF1), Convention Center
12:30 PM - 1:30 PM	Locust Lunch	Room W232 A, Convention Center
12:45 PM - 1:15 PM	Moderator Training	Room W224 B, Convention Center
1:00 PM - 2:00 PM	Association of Indian Entomologists Annual Meeting	Salon 11/12, Rosen Plaza Hotel
1:00 PM - 2:30 PM	Entomological Foundation Board of Counselors Meeting	Salon 1, Rosen Centre Hotel
1:00 PM - 2:30 PM	Entomological Society of Canada Gold Medal Presentation and Awards Ceremony	Room W340 A, Convention Center
1:00 PM - 3:00 PM	<i>Arthropod Management Tests</i> Editorial Board Meeting	Salon 12, Rosen Centre Hotel
1:30 PM - 3:45 PM	Symposium: Status of Worldwide Honey Bee Health and Its Impacts on Agriculture	Chapin Theater, Convention Center
1:30 PM - 4:00 PM	Symposium: Advances in the Molecular Biology and Microbial Ecology of Important Urban Pests	Room W224 B, Convention Center
1:30 PM - 4:00 PM	Symposium: Bark and Ambrosia Beetles: Biology, Ecology, and Management	Room W414 C, Convention Center
1:30 PM - 4:00 PM	Symposium: Emerging Technologies for Tomorrow's Collaborative Discoveries	West Hall F2 (WF2), Convention Center
1:30 PM - 4:00 PM	Symposium: Forest Insect Invasions in a Changing Climate: Mechanisms and Risks	Room W224 D, Convention Center
1:30 PM - 4:00 PM	Symposium: Mechanisms and Consequences of Phase Change in the Desert Locust, <i>Schistocerca gregaria</i>	Room W232 A, Convention Center
1:30 PM - 4:00 PM	Symposium: Parasitoids, Polydnviruses, and Pathogens: Genomes to Immune Physiology	Room W330 C, Convention Center
1:30 PM - 4:00 PM	Symposium: Plant Piercing-Sucking Insects and Vectors without Borders	Room W232 B, Convention Center
1:30 PM - 4:15 PM	Symposium: Advances in Pest Management	Room W240 C, Convention Center
1:30 PM - 4:15 PM	Symposium: Biology and Evolution of Social Insect Symbionts	Room W240 D, Convention Center
1:30 PM - 4:15 PM	Symposium: Forensic Entomology without Borders: Uniting the Worldwide Forensic Entomology Community	Room W222 B, Convention Center
1:30 PM - 4:30 PM	Symposium: Evolution of Biological Clocks	Room W224 C, Convention Center
1:30 PM - 4:30 PM	Symposium: Insect-transmitted Phytoviruses and Agricultural Pandemics: Current Scenarios and Sustainable Management	Room W231 B, Convention Center
1:30 PM - 4:30 PM	Symposium: Reducing Transmission Rates of Infectious Diseases by Targeting Mosquito Olfaction	Room W331 A, Convention Center
1:30 PM - 4:30 PM	Symposium: Ticks Are Different: The Impact of Tick Biology on Their Role As Vectors	Room W224 A, Convention Center
1:30 PM - 4:45 PM	Symposium: Entomological Research in China: Major Progresses and Perspectives	Room W414 B, Convention Center
1:30 PM - 4:45 PM	Symposium: Hitchhikers in Florida: History and Control	Room W224 H, Convention Center
1:30 PM - 4:45 PM	Symposium: Insect Effects on Ecosystem Services	Room W414 D, Convention Center
1:30 PM - 4:45 PM	Symposium: No More Invasive Insect Species: Is Quarantine the Answer?	West Hall F4 (WF4), Convention Center
1:30 PM - 5:00 PM	Symposium: Arthropod Movement in Agro-Ecosystems: Linking Individual Behaviours and Population Patterns Across Spatio-Temporal Scales. Just What Does Emerge?	Room W330 B, Convention Center
1:30 PM - 5:00 PM	Symposium: Industrialization of Insects as a Food Ingredient	Room W222 A, Convention Center
1:30 PM - 5:00 PM	Symposium: Insect Biocomposites: Cuticles and Peritrophic Matrices	Room W331 C, Convention Center
1:30 PM - 5:00 PM	Symposium: Insects and the Global Human Experience	Room W314 A, Convention Center
1:30 PM - 5:00 PM	Symposium: Novel Insecticidal Agents and Next-Gen Approaches for Insect Control	Room W225 A, Convention Center
1:30 PM - 5:00 PM	Graduate Student Oral Competition: Insect Chemical Ecology	Room W230 D, Convention Center
1:30 PM - 5:00 PM	Graduate Student Oral Competition: Medical and Veterinary Entomology: Biting Diptera	Room W230 A, Convention Center
1:30 PM - 5:15 PM	Symposium: Advances in the Behavioral Ecology of Entomopathogenic Nematodes	Room W315 B, Convention Center



## TUESDAY • DAILY SCHEDULE BY DATE AND TIME •

1:30 PM - 5:15 PM	Symposium: Insect-Resistant Genetically Engineered Crops: Current Status, Concerns, and Future Prospects	Room W414 A, Convention Center
1:30 PM - 5:15 PM	Symposium: Interactions Between the Insect Immune System and Parasites	Room W331 D, Convention Center
1:30 PM - 5:15 PM	Symposium: Physiological Systems for Arthropod Pest Management in the 21st Century	Room W330 A, Convention Center
1:30 PM - 5:15 PM	Symposium: Progress in Insect Phylogenomics: The Scale and Complexity of Next-Gen Datasets and Analyses	Room W315 A, Convention Center
1:30 PM - 5:15 PM	Symposium: Systematics and Diversity of Aquatic Beetles: An Emerging Model System in Evolutionary Biology	Room W223 A, Convention Center
1:30 PM - 5:15 PM	Symposium: The Role of National, Regional, and International Plant Protection Organizations to Prevent the Introduction and Spread of Plant Pests	Room W224 F, Convention Center
1:30 PM - 5:15 PM	Contributed Papers: Agricultural and Forest Entomology: Forest Insects	Room W225 B, Convention Center
1:30 PM - 5:15 PM	Contributed Papers: Functional Genomics and Transgenesis	Room W223 B, Convention Center
1:30 PM - 5:15 PM	Graduate Student Oral Competition: Integrated Pest Management and Sustainable Agriculture: Agricultural Systems	Room W240 A, Convention Center
1:30 PM - 5:30 PM	Symposium: Advances in Ant Systematics: Global Sampling, New Phylogenetic Methods, and Major Taxonomic Changes	Room W231 A, Convention Center
1:30 PM - 5:30 PM	Symposium: Arthropods and Decomposition	Room W224 E, Convention Center
1:30 PM - 5:30 PM	Symposium: Ion Channels as Targets of Synthetic and Natural Neurotoxins	Room W340 B, Convention Center
1:30 PM - 5:30 PM	Symposium: Phylogeny and Evolution of Weevils (Coleoptera: Curculionoidea): A Symposium in Honor of Guillermo "Willy" Kuschel	West Hall F3 (WF3), Convention Center
1:30 PM - 5:30 PM	Symposium: Research Frontiers into the Use of Preventive Medicine in Arthropod Pest Management	Room W240 B, Convention Center
1:30 PM - 5:30 PM	Symposium: Rise or Demise? A Global Outlook on the Future of Classical Biological Weed Control	West Hall F1 (WF1), Convention Center
1:30 PM - 5:30 PM	Symposium: The Evolution of Lepidoptera: Bringing it All Together	Room W224 G, Convention Center
1:30 PM - 5:30 PM	Symposium: The Limits of Respiratory Function: External and Internal Constraints on Insect Gas Exchange	Room W331 B, Convention Center
1:30 PM - 5:30 PM	Contributed Papers: Insect Chemical Ecology	Room W314 B, Convention Center
1:30 PM - 5:30 PM	Contributed Papers: Medical and Veterinary Entomology: Repellents, Toxicants, and Resistance	Room W231 C, Convention Center
1:30 PM - 5:30 PM	Graduate Student Oral Competition: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops: Insecticides	Room W230 B, Convention Center
1:30 PM - 5:30 PM	Graduate Student Oral Competition: Morphology, Systematics, and Phylogeny: Beetles, Bugs, and Others	Room W230 C, Convention Center
1:30 PM - 5:30 PM	Undergraduate Student Oral Competition: Entomology Around the World	Room W232 C, Convention Center
2:00 PM - 6:00 PM	Global Linnaean Games	Valencia Room, Convention Center
2:30 PM - 3:30 PM	Entomological Society of Canada AGM	Room W340 A, Convention Center
3:00 PM - 5:00 PM	<i>Environmental Entomology</i> Editorial Board Meeting	Salon 12, Rosen Centre Hotel
3:30 PM - 4:00 PM	Entomological Society of Canada Incoming Board Meeting	Room W340 A, Convention Center
4:00 PM - 5:00 PM	Synthesis Discussion for Locust Research and Management	Room W232 A, Convention Center
4:30 PM - 5:30 PM	Invited Lecture Featuring Dr. Juan Andres Bisset Lazcano	Room W331 A, Convention Center
4:45 PM - 6:00 PM	Reception for Insect Effects on Ecosystem Services	Room W414 D, Convention Center
5:00 PM - 7:00 PM	Members and Friends of the Australian Entomological Society Mixer	Salon 9, Rosen Plaza Hotel
5:00 PM - 8:00 PM	Chalcidoidea Classification Organizational Meeting	Room W333, Convention Center
5:30 PM - 6:30 PM	Triplehorn ICE Pinning Challenge	Salon 4, Rosen Centre Hotel
5:30 PM - 7:00 PM	ICE Council Meeting	Room W221 C, Convention Center
5:45 PM - 8:00 PM	Biology of Invasive Stink Bugs and Related Species (Pentatomoidea)	Room W314 A, Convention Center
6:00 PM - 9:00 PM	Korean Young Entomologists (KYE) Mixer	Salon 7, Rosen Centre Hotel
6:00 PM - 9:15 PM	International Entomology Leadership Summit: Improving the Human Condition through Insect Science	Grand Ballroom D/E, Rosen Centre Hotel
6:00 PM - 9:30 PM	IOBC NRS Annual Meeting, Awards, and Mixer	Room W340 A, Convention Center
6:30 PM - 8:30 PM	IOBC New Executive Committee Meeting	Salon 6, Rosen Centre Hotel



## TUESDAY/WEDNESDAY • DAILY SCHEDULE BY DATE AND TIME •

6:30 PM - 8:30 PM	North Central Branch-ESA Reception	Grand Ballroom B, Rosen Centre Hotel
6:30 PM - 8:30 PM	Southeastern Branch-ESA, North Carolina State University, University of Georgia, and Mississippi State University Mixer-Reception	Grand Ballroom A, Rosen Centre Hotel
7:00 PM - 8:00 PM	ESA Editors Reception	Salon 3, Rosen Centre Hotel
7:00 PM - 9:00 PM	ESA Governing Board Reception	Signature 1, Rosen Centre Hotel
7:00 PM - 9:00 PM	Life Table Software Sharing and Consulting	Room W224 E, Convention Center
7:00 PM - 9:30 PM	North American Dipterists Society (NADS) Meeting	Room W230 A, Convention Center
7:00 PM - 10:00 PM	Entomological Society of Canada Mixer	Salon 3/4, Rosen Plaza Hotel
7:00 PM - 10:00 PM	The Coleopterists Society Annual Meeting	West Hall F3 (WF3), Convention Center
7:00 PM - 11:00 PM	Student Lounge	Grand Ballroom A/B, Rosen Plaza Hotel
7:00 PM - 11:00 PM	Student Reception	Club 39 at the Plaza, Rosen Plaza Hotel

### WEDNESDAY, SEPTEMBER 28

TIME	SESSION/FUNCTION	LOCATION
6:00 AM - 7:00 AM	Morning Meditation	Fitness Center, Hyatt Regency Orlando
7:00 AM - 12:00 PM	Presentation Preview Room (PPR)/Speaker Ready Room	Room W221 AB, Convention Center
7:00 AM - 12:00 PM	Registration and Information Center	Registration and Information Center
7:30 AM - 8:00 AM	Moderator Training	Room W224 B, Convention Center
7:30 AM - 8:00 AM	Student Competition Judges Training	Room W223 B, Convention Center
8:00 AM - 9:00 AM	Keynote Presentation Featuring Dr. Jules Hoffmann	Valencia Room, Convention Center
8:00 AM - 1:30 PM	Tour: Airboat & Wildlife Park	West Hall C Foyer, Convention Center
8:00 AM - 6:00 PM	Guest Hospitality	Salon 5, Rosen Centre Hotel
8:30 AM - 12:30 PM	Simulation Modelling of Monarch Butterflies	Salon 11/12, Rosen Plaza Hotel
9:00 AM - 1:00 PM	Exhibit Hall	West Hall C, Convention Center
9:00 AM - 3:00 PM	Tour: Cocoa Beach	West Hall C Foyer, Convention Center
9:15 AM - 11:15 AM	Symposium: Insect Vectors as Drivers of Emerging Plant Diseases	Room W230 D, Convention Center
9:15 AM - 11:15 AM	Symposium: Insects, Ecosystem Functioning, and Services: New Questions and Experimental Perspectives	Room W224 C, Convention Center
9:15 AM - 11:15 AM	Symposium: Molecular Bases of Behavior in Kissing Bug Vectors of Human Disease	Room W330 A, Convention Center
9:15 AM - 11:15 AM	Symposium: Psocids as Global Pests of Stored Products	Room W231 A, Convention Center
9:15 AM - 11:15 AM	Symposium: Securing Borders While Promoting Trade: Regional Approaches to Control Agricultural Pests in the Greater Caribbean Area	Room W223 A, Convention Center
9:15 AM - 11:15 AM	Symposium: The Role of Microbiota in Vectors	Room W331 B, Convention Center
9:15 AM - 11:15 AM	Symposium: Weaving Your Web: Science Communication and Social Media for Insect Scientists	Room W414 A, Convention Center
9:15 AM - 11:30 AM	Symposium: Ecology and Adaptation for Survival of Termites	Room W331 C, Convention Center
9:15 AM - 11:30 AM	Symposium: Insect Molecular Physiology and Ecology: The Post-Genomic Era	Room W224 G, Convention Center
9:15 AM - 11:30 AM	Symposium: Microbiome and Vector Immunity	Room W230 C, Convention Center
9:15 AM - 11:30 AM	Symposium: Modern Studies of Gerrormorphan Insects: Behavior, Phylogeny, Physiology, and Ecology	Room W224 H, Convention Center
9:15 AM - 11:30 AM	Symposium: Novel Techniques in Urban IPM	Room W331 D, Convention Center
9:15 AM - 11:30 AM	Symposium: Public-Private Partnerships for Development of Next-Generation Pest Management Methods	Room W314 A, Convention Center
9:15 AM - 11:30 AM	Symposium: The Insect Circulatory System: Vital but Widely Neglected!	Room W222 A, Convention Center
9:15 AM - 11:30 AM	Symposium: Using Insect Diversity to Plan and Manage Conservation in Transformed Landscapes	Room W224 D, Convention Center
9:15 AM - 11:30 AM	Symposium: Vertebrate Host Factors: Effect on Vector Biology	Room W230 A, Convention Center
9:15 AM - 11:30 AM	Symposium: What Happens When Pest Occurrence Data is Shared: End of the World or New Horizons?	Room W224 E, Convention Center
9:15 AM - 11:45 AM	Symposium: Biological Control Perspective in South and Southeast Asia	Room W414 B, Convention Center



## WEDNESDAY • DAILY SCHEDULE BY DATE AND TIME •

9:15 AM - 12:00 PM	Symposium: Agronomic and Economic Benefits of Seed Treatments: The IPM Perspective	Room W331 A, Convention Center
9:15 AM - 12:00 PM	Graduate Student Oral Competition: Biological Control and Insect Pathology: Biological Control	Room W240 A, Convention Center
9:15 AM - 12:00 PM	Graduate Student Oral Competition: Ecology and Population Dynamics: Pollinators	Room W240 B, Convention Center
9:15 AM - 12:00 PM	Symposium: Endocrine and Neural Network in Control of Physiology	Room W330 C, Convention Center
9:15 AM - 12:00 PM	Symposium: Jumping Genes: Horizontal Gene Transfer in Insects and Beyond	Room W340 A, Convention Center
9:15 AM - 12:00 PM	Symposium: Medical and Veterinary Entomology in Florida	Room W414 C, Convention Center
9:15 AM - 12:00 PM	Symposium: The Use of Plant Resources Against Biting Flies	Room W414 D, Convention Center
9:15 AM - 12:15 PM	Symposium: Critical Factors Modifying the Effects of Climate Change on the Distributions of Vector-Borne Diseases	Room W230 B, Convention Center
9:15 AM - 12:15 PM	Symposium: 9th International Symposium on the Chrysomelidae	Room W224 A, Convention Center
9:15 AM - 12:15 PM	Contributed Papers: Stored Products Entomology: Fumigants and Hypoxia	West Hall F2 (WF2), Convention Center
9:15 AM - 12:15 PM	Graduate Student Oral Competition: Ecology and Population Dynamics: Ecology and Evolution	Room W240 C, Convention Center
9:15 AM - 12:15 PM	Graduate Student Oral Competition: Invasive and Exotic Entomology: Invasives	Room W240 D, Convention Center
9:15 AM - 12:30 PM	Symposium: Advances in Insect Control and in Resistance Management	Room W224 B, Convention Center
9:15 AM - 12:30 PM	Symposium: Department of Defense Entomology and Global Public Health: Working Together to Combat Vector Borne Disease and Protect the Environment	Room W222 B, Convention Center
9:15 AM - 12:30 PM	Symposium: IPM Strategies for the Management and Sustainability of Honey Bees ( <i>Apis mellifera</i> ) Across the Globe	Room W224 F, Convention Center
9:15 AM - 12:30 PM	Symposium: Insect Genetic Technologies: State of the Art and Promise for the Future	Room W340 B, Convention Center
9:15 AM - 12:30 PM	Symposium: <i>Sirex noctilio</i> : A Global Forest Insect	Room W330 B, Convention Center
9:15 AM - 12:30 PM	Contributed Papers: Ecology and Population Dynamics: Community Services	Room W225 A, Convention Center
9:15 AM - 12:30 PM	Contributed Papers: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops	West Hall F3 (WF3), Convention Center
9:15 AM - 12:30 PM	Contributed Papers: Invasive and Exotic Entomology: Geography and Biology	Room W223 B, Convention Center
9:15 AM - 12:30 PM	Contributed Papers: Medical and Veterinary Entomology: Flies of Veterinary Importance	West Hall F4 (WF4), Convention Center
9:15 AM - 12:30 PM	Contributed Papers: Medical and Veterinary Entomology: Ticks I	West Hall F1 (WF1), Convention Center
9:15 AM - 12:30 PM	Graduate Student Oral Competition: Genetics and Evolutionary Entomology: Population Genetics	Room W232 B, Convention Center
9:15 AM - 12:30 PM	Graduate Student Oral Competition: Physiology and Biochemistry: Abiotic/Biotic Effects	Room W232 C, Convention Center
9:15 AM - 12:45 PM	Contributed Papers: Agricultural and Forest Entomology: Fruits, Vegetables, Cereals, and Grains	Room W231 C, Convention Center
9:15 AM - 12:45 PM	Contributed Papers: Insect Chemical Ecology: Attractants	Room W314 B, Convention Center
9:15 AM - 12:45 PM	Contributed Papers: Integrated Pest Management and Sustainable Agriculture: Biological Pest Management	Room W231 B, Convention Center
9:15 AM - 12:45 PM	Contributed Papers: Physiology and Biochemistry: Fundamental	Room W315 A, Convention Center
9:15 AM - 1:00 PM	Contributed Papers: Ecology and Population Dynamics: Interactions	Room W225 B, Convention Center
9:15 AM - 1:00 PM	Contributed Papers: Physiology and Biochemistry: Molecular, Genetics, and Genomics	Room W315 B, Convention Center
9:15 AM - 1:15 PM	Contributed Papers: Agricultural and Forest Entomology: Pesticide Efficacy and Resistance Management	Room W232 A, Convention Center
9:30 AM - 5:45 PM	International Entomology Leadership Summit: Improving the Human Condition through Insect Science	Grand Ballroom D/E, Rosen Centre Hotel
10:00 AM - 12:00 PM	<i>Journal of Insects Systematics and Diversity</i> Editorial Board Meeting	Salon 12, Rosen Centre Hotel



## WEDNESDAY/THURSDAY • DAILY SCHEDULE BY DATE AND TIME •

10:00 AM - 2:00 PM	Entomological Foundation Insect Expo	Hall WD1, Convention Center
12:00 PM - 1:30 PM	Regional Plant Protection Organization Post-Symposium Meeting	Salon 3, Rosen Plaza Hotel
12:00 PM - 6:00 PM	Tour: Insect Collecting at the Disney Wilderness Preserve	West Hall C Foyer, Convention Center
12:15 PM - 1:30 PM	Editorial Board Meeting for <i>Insect Biochemistry and Molecular Biology</i>	Salon 11, Rosen Centre Hotel
12:30 PM - 4:00 PM	Florida Entomological Society Business Meeting	Room W414 C, Convention Center
1:00 PM - 5:00 PM	Tour: Backstage Safari at Disney's Animal Kingdom	West Hall C Foyer, Convention Center
1:00 PM - 5:00 PM	Tour: University of Central Florida—Bug Closet Tour	West Hall C Foyer, Convention Center
1:00 PM - 7:00 PM	Tour: Shopping in Orlando	West Hall C Foyer, Convention Center
2:00 PM - 4:00 PM	Enhance Lepidopteran Insects RNAi Efficiency and Accelerate Its Application in Pest Control	Room W224 A, Convention Center
4:00 PM - 11:00 PM	Tour: Epcot	West Hall C Foyer, Convention Center

### THURSDAY, SEPTEMBER 29

TIME	SESSION/FUNCTION	LOCATION
6:00 AM - 7:00 AM	RevUp Spin Class	Fitness Center, Hyatt Regency Orlando
7:00 AM - 5:00 PM	Presentation Preview Room (PPR)/Speaker Ready Room	Room W221 AB, Convention Center
7:00 AM - 5:00 PM	Registration and Information Center	West Hall C Foyer, Convention Center
7:30 AM - 8:00 AM	Moderator Training	Room W224 B, Convention Center
8:00 AM - 9:00 AM	Plenary Presentation Featuring Dr. Jacqueline Beggs	Valencia Room, Convention Center
8:00 AM - 9:00 AM	Plenary Presentation Featuring Dr. Jennifer Fewell	Chapin Theater, Convention Center
8:00 AM - 6:00 PM	Guest Hospitality	Salon 5, Rosen Centre Hotel
9:00 AM - 5:00 PM	Exhibit Hall	West Hall C, Convention Center
9:00 AM - 5:00 PM	Poster Session 3: Entomophagy and Entomology in Popular Culture	West Hall C, Convention Center
9:00 AM - 5:00 PM	Poster Session 3: Genetics and Evolutionary Entomology	West Hall C, Convention Center
9:00 AM - 5:00 PM	Poster Session 3: Insect Chemical Ecology	West Hall C, Convention Center
9:00 AM - 5:00 PM	Poster Session 3: Insect Neurobiology	West Hall C, Convention Center
9:00 AM - 5:00 PM	Poster Session 3: Integrated Pest Management and Sustainable Agriculture	West Hall C, Convention Center
9:00 AM - 5:00 PM	Poster Session 3: Invasive and Exotic Entomology	West Hall C, Convention Center
9:00 AM - 5:00 PM	Poster Session 3: Physiology and Biochemistry	West Hall C, Convention Center
9:00 AM - 5:00 PM	Poster Session 3: RNAi and Gene Expression Control in Insects	West Hall C, Convention Center
9:00 AM - 5:00 PM	Virtual Poster Session	West Hall C, Convention Center
9:15 AM - 11:15 AM	Symposium: Peridomestic Animals and Chagas Vector Control	Room W230 B, Convention Center
9:15 AM - 11:15 AM	Symposium: Case Studies in Entomology: Four Examples of Global Excellence	Room W222 A, Convention Center
9:15 AM - 11:15 AM	Symposium: Global Perspectives on Soft Ticks (Argasidae) as Pests and Disease Vectors	Room W414 D, Convention Center
9:15 AM - 11:15 AM	Symposium: Olfaction and Olfaction-Mediated Behaviors	West Hall F4 (WF4), Convention Center
9:15 AM - 11:15 AM	Symposium: Stable Flies in Agroecosystems: An International Problem	Room W232 B, Convention Center
9:15 AM - 11:15 AM	Symposium: Vector Biology and Ecology Perspective: Roadblocks and Solutions to Malaria Elimination	Room W414 B, Convention Center
9:15 AM - 11:15 AM	Symposium: <i>Trichogramma</i> in Augmentative Biological Control: A Worldwide View of the Past, Present, and Future	Room W222 B, Convention Center
9:15 AM - 11:15 AM	Contributed Papers: Biological Control and Insect Pathology: Plant and Other Extracts as Biocides	Room W314 A, Convention Center
9:15 AM - 11:15 AM	Graduate Student Oral Competition: Apidology, Sericulture, and Social Insects: Pollinators	Room W224 D, Convention Center
9:15 AM - 11:15 AM	Graduate Student Oral Competition: Urban Entomology in a Changing Environment: Home and Warehouse Pests	Room W224 A, Convention Center
9:15 AM - 11:30 AM	Symposium: Molecular Strategies/Mechanisms of Insect Reproduction	Room W331 B, Convention Center



## THURSDAY • DAILY SCHEDULE BY DATE AND TIME •

9:15 AM - 11:30 AM	Symposium: Entomology without Borders: Senior Member Symposium with Retired and Emeriti Professionals on Sharing their Involvement after Retirement	Room W231 C, Convention Center
9:15 AM - 11:30 AM	Symposium: Global Challenges in Applied Urban Entomology	Room W232 C, Convention Center
9:15 AM - 11:30 AM	Symposium: New Insights into the Metabolism of Mosquitoes that are Vectors of Human Diseases	Room W414 A, Convention Center
9:15 AM - 11:30 AM	Contributed Papers: Invasive and Exotic Entomology: Diagnostics, Methods, and Responses	Room W223 B, Convention Center
9:15 AM - 11:30 AM	Graduate Student Oral Competition: Agricultural and Forest Entomology: Vectors and Others	Room W240 B, Convention Center
9:15 AM - 11:30 AM	Graduate Student Oral Competition: Agricultural and Forest Entomology: Pollinators	Room W224 C, Convention Center
9:15 AM - 11:30 AM	Graduate Student Oral Competition: Urban Entomology in a Changing Environment: Ants	Room W224 B, Convention Center
9:15 AM - 11:45 AM	Symposium: Advances in Tick and Mite Biology, Animal Disease Transmission, and Control	Room W414 C, Convention Center
9:15 AM - 11:45 AM	Symposium: Endocrine and Neural Networks that Control and Regulate Behavioral Programs	Room W223 A, Convention Center
9:15 AM - 11:45 AM	Symposium: Integrated Pest Management Around the World	Room W231 A, Convention Center
9:15 AM - 11:45 AM	Symposium: Talking to Swarms Without Borders: Methods for Engaging the Public in the Buzz about Entomology	Room W330 B, Convention Center
9:15 AM - 11:45 AM	Contributed Papers: Ecology and Population Dynamics: Behavior	Room W225 B, Convention Center
9:15 AM - 12:00 PM	Symposium: Arboviruses and One Health	Room W230 C, Convention Center
9:15 AM - 12:00 PM	Symposium: Economics of IPM in the 21st Century: Multiple Perspectives from Around the World	Room W331 A, Convention Center
9:15 AM - 12:00 PM	Symposium: Epigenetics and Insect Adaptation to Their Environment	West Hall F3 (WF3), Convention Center
9:15 AM - 12:00 PM	Symposium: Stable Isotope 'Fingerprinting' in Insect Ecology	Room W231 B, Convention Center
9:15 AM - 12:00 PM	Symposium: Towards Improved Reference Assemblies for Insect Genomes	Room W224 E, Convention Center
9:15 AM - 12:00 PM	Symposium: <i>Drosophila suzukii</i> , an Invasive Pest of Small and Stone Fruits	Room W240 C, Convention Center
9:15 AM - 12:00 PM	Contributed Papers: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops	Room W340 B, Convention Center
9:15 AM - 12:00 PM	Contributed Papers: Morphology, Systematics, and Phylogeny: Bees, Ants, and Wasps	Room W224 H, Convention Center
9:15 AM - 12:15 PM	Symposium: Virus-Insect Interactions	West Hall F1 (WF1), Convention Center
9:15 AM - 12:15 PM	Symposium: Advances in Acarology	Room W314 B, Convention Center
9:15 AM - 12:15 PM	Symposium: Sin Fronteras: Forging Collaborations through the Americas: 4th Latin American/Hispanic Symposium	Room W340 A, Convention Center
9:15 AM - 12:15 PM	Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Population and Community Diversity	Room W331 D, Convention Center
9:15 AM - 12:15 PM	Contributed Papers: Medical and Veterinary Entomology: Mosquito Ecology and Management	Room W230 A, Convention Center
9:15 AM - 12:15 PM	Contributed Papers: Morphology, Systematics, and Phylogeny: Tenebrionids, Clerids, Staphylinids, and Scarabs	Room W225 A, Convention Center
9:15 AM - 12:15 PM	Student Debates	Chapin Theater, Convention Center
9:15 AM - 12:30 PM	Symposium: Beyond Pests: Biodiversity in the Urban Environment	Room W230 D, Convention Center
9:15 AM - 12:30 PM	Symposium: Excavation and Construction by Social Insects: Integrating Positive and Negative Space	Room W240 D, Convention Center
9:15 AM - 12:30 PM	Symposium: Phylogeny and Evolution of Insect Communication Systems	Room W315 B, Convention Center
9:15 AM - 12:30 PM	Symposium: Population Biology of Winter Moth, <i>Operophtera brumata</i> L., and Related Geometrids on Two Continents	Room W331 C, Convention Center
9:15 AM - 12:30 PM	Contributed Papers: Bioinformatics and Comparative Genomics of Arthropods: Gene Expression	Room W330 A, Convention Center
9:15 AM - 12:30 PM	Contributed Papers: Genetics and Evolutionary Entomology: Trait Expression	Room W224 G, Convention Center



## THURSDAY • DAILY SCHEDULE BY DATE AND TIME •

9:15 AM - 12:30 PM	Graduate Student Oral Competition: Biodiversity, Biogeography, and Conservation of Arthropods: Butterflies and Others	Room W224 F, Convention Center
9:15 AM - 12:30 PM	Graduate Student Oral Competition: Functional Genomics and Transgenesis	Room W240 A, Convention Center
9:15 AM - 12:45 PM	Contributed Papers: Morphology, Systematics, and Phylogeny: Lepidoptera	Room W330 C, Convention Center
9:15 AM - 12:45 PM	Graduate Student Oral Competition: Integrated Pest Management and Sustainable Agriculture: Thrips and Others	Room W232 A, Convention Center
9:15 AM - 1:00 PM	Symposium: Bioinspiration Crossing Disciplinary Borders	Room W315 A, Convention Center
10:00 AM - 12:00 PM	<i>Annals of the ESA</i> Editorial Board Meeting	Salon 12, Rosen Centre Hotel
10:30 AM - 12:30 PM	Public Health ACE Committee	Salon 6, Rosen Centre Hotel
11:30 AM - 1:00 PM	ESA International Branch Business Meeting and Awards Luncheon	West Hall F2 (WF2), Convention Center
12:00 PM - 1:00 PM	ESA and ESC 2018 Annual Meeting Planning	Signature 1, Rosen Centre Hotel
12:15 PM - 1:15 PM	Acarological Society of America	Room W 314 B, Convention Center
12:15 PM - 1:30 PM	ICE Council Meeting	Room W221 C, Convention Center
12:30 PM - 1:15 PM	Sin Fronteras: Forging Collaborations through the Americas: 4th Latin American/Hispanic Symposium Reception	Room W340 A, Convention Center
12:30 PM - 2:30 PM	ESA Education and Outreach Committee Meeting	Salon 2, Rosen Centre Hotel
12:40 PM - 1:30 PM	Yearly Meeting of the Society for Regulatory Entomology	Room W331 C, Convention Center
12:45 PM - 1:15 PM	Moderator Training	Room W224 B, Convention Center
1:00 PM - 4:00 PM	ESA Publications Council Meeting	Salon 12, Rosen Centre Hotel
1:30 PM - 3:00 PM	Symposium in Honor of the 2016 Recipients of Certificates of Distinction	Room W224 G, Convention Center
1:30 PM - 3:00 PM	Symposium: Dynamic Interactions at the Tick-Host-Pathogen Interface	Room W240 C, Convention Center
1:30 PM - 3:45 PM	Symposium: Neotropical Insect Galls	Room W224 A, Convention Center
1:30 PM - 3:45 PM	Symposium: Effect of Global Climate Change on Vector-Borne Disease Transmission	Room W240 B, Convention Center
1:30 PM - 3:45 PM	Symposium: Insect Gut Microbe Interactions	Room W330 B, Convention Center
1:30 PM - 4:00 PM	Symposium: Arthropod Saliva: From Basic Science to Practical Applications	Room W331 D, Convention Center
1:30 PM - 4:00 PM	Symposium: Biogeographical Lessons Learned from the West Indies	West Hall F4 (WF4), Convention Center
1:30 PM - 4:00 PM	Symposium: Innovative Application Technologies for Pest Management	Room W331 B, Convention Center
1:30 PM - 4:00 PM	Symposium: Insect Photography Symposium: Bringing the Small to the World	Room W230 B, Convention Center
1:30 PM - 4:00 PM	Symposium: Invasive Termite Species: Where Are They From, Where Are They Now, and Where Will They Be?	Room W240 D, Convention Center
1:30 PM - 4:15 PM	Symposium: Trade-offs and Immunity: Physiology, Life-History, and Evolution	Room W230 D, Convention Center
1:30 PM - 4:15 PM	Symposium: International Graduate Student Showcase	Room W340 B, Convention Center
1:30 PM - 4:15 PM	Symposium: Mosquito Host Detection	Room W330 C, Convention Center
1:30 PM - 4:30 PM	Symposium: Entomologists without Borders: The Need for Collaboration Between Medical Professionals and Entomologists for the Betterment of Global Public Health	Room W230 C, Convention Center
1:30 PM - 4:30 PM	Symposium: Regional Status of Microbial Control Programs	Room W232 B, Convention Center
1:30 PM - 4:30 PM	Symposium: SOLA Scarab Workers	Room W223 A, Convention Center
1:30 PM - 4:30 PM	Symposium: Sericigenous Insects and 3F's: Fibre, (Human) Food and Feed-Global Status, and Future Role in Resolving Global Challenges	Room W224 F, Convention Center
1:30 PM - 4:45 PM	Symposium: International Perspectives Contribute Towards a Clearer Understanding of <i>Drosophila suzukii</i>	Room W231 A, Convention Center
1:30 PM - 4:45 PM	Symposium: Next-Generation Technologies for Insect Control	Room W224 D, Convention Center
1:30 PM - 4:45 PM	Symposium: Ecology and Systematics of Elateridae (Coleoptera)	Room W224 E, Convention Center
1:30 PM - 4:45 PM	Symposium: Invasive Ants: Biology and Control	Room W232 A, Convention Center
1:30 PM - 4:45 PM	Symposium: Invasive Bark and Ambrosia Beetles: A Pest Problem of Worldwide Significance	Room W414 C, Convention Center



## THURSDAY • DAILY SCHEDULE BY DATE AND TIME •

1:30 PM - 4:45 PM	Symposium: Mechanisms Affecting the Efficiency of RNA Interference in Insects	Room W331 A, Convention Center
1:30 PM - 5:00 PM	Symposium: Approaches for Modeling Insect Pest Potential Distribution and Spread	Room W331 C, Convention Center
1:30 PM - 5:00 PM	Symposium: Breeding Honey Bees, <i>Apis mellifera</i> , for Resistance to <i>Varroa destructor</i>	Room W414 B, Convention Center
1:30 PM - 5:00 PM	Symposium: Engaging the World of Arthropod Education in a Digital Age	Room W230 A, Convention Center
1:30 PM - 5:00 PM	Symposium: Evolution of a Megadiverse Group: The Ichneumonoid Wasps (Hymenoptera: Braconidae, Ichneumonidae)	Room W222 A, Convention Center
1:30 PM - 5:00 PM	Symposium: Harnessing the Power of Genomics Tools: Functional Genomics of Pollinator Health	Room W340 A, Convention Center
1:30 PM - 5:00 PM	Symposium: Orthopteroids Without Borders	Room W231 C, Convention Center
1:30 PM - 5:00 PM	Symposium: Synthesis in Sternorrhyncha Systematics	Room W222 B, Convention Center
1:30 PM - 5:00 PM	Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Coleoptera	Room W414 A, Convention Center
1:30 PM - 5:15 PM	Symposium: Millions of Hectares and Counting: Knowledge Gained during Recent Bark Beetle Outbreaks in Western North America	Room W314 A, Convention Center
1:30 PM - 5:15 PM	Symposium: Ant-Plant Interactions in a Changing World	Room W224 H, Convention Center
1:30 PM - 5:15 PM	Symposium: Invasive Disease Vectors in Urban Environments: Current Challenges and Future Solutions	Room W414 D, Convention Center
1:30 PM - 5:15 PM	Symposium: Wings and Powered Flight: Core Novelties in Insect Evolution	Room W315 A, Convention Center
1:30 PM - 5:15 PM	Contributed Papers: Biological Control and Insect Pathology: Unique Studies II	West Hall F1 (WF1), Convention Center
1:30 PM - 5:15 PM	Contributed Papers: Ecology and Population Dynamics: Community	Room W315 B, Convention Center
1:30 PM - 5:15 PM	Contributed Papers: Apidology, Sericulture, and Social Insects: Behavior	Room W225 A, Convention Center
1:30 PM - 5:15 PM	Contributed Papers: Apidology, Sericulture, and Social Insects: Ecology	Room W225 B, Convention Center
1:30 PM - 5:15 PM	Contributed Papers: Physiology and Biochemistry: Neurophysiology and Hormone Regulation	Room W314 B, Convention Center
1:30 PM - 5:15 PM	Contributed Papers: Physiology and Biochemistry: Toxicology, Metabolism, and Nutrition	Room W223 B, Convention Center
1:30 PM - 5:30 PM	Symposium: Combining Insect Life Table, Consumption Rate, and Predation Rate for IPM and Biological Control	Room W224 C, Convention Center
1:30 PM - 5:30 PM	Symposium: Climate Change Impacts and Insect Population Dynamics	West Hall F2 (WF2), Convention Center
1:30 PM - 5:30 PM	Symposium: Cold Physiology in a Warming World	Room W231 B, Convention Center
1:30 PM - 5:30 PM	Symposium: Ecology, Surveillance, and Control of Biting Midges	Room W330 A, Convention Center
1:30 PM - 5:30 PM	Symposium: From Genes to Grains: The Current Sugarcane Aphid Outbreak on Sorghum in the Southern U.S.	Room W224 B, Convention Center
1:30 PM - 5:30 PM	Symposium: Impact of Native and Invasive Alien True Bug Species in Agro-Ecosystems: Range Expansion, Pest Status, and Control Tactics	Chapin Theater, Convention Center
1:30 PM - 5:30 PM	Symposium: Insect Sex Determination	West Hall F3 (WF3), Convention Center
1:30 PM - 5:30 PM	Contributed Papers: Arthropod Vectors of Animal and Plant Diseases: Plant-Insect-Pathogen Interactions	Room W240 A, Convention Center
1:30 PM - 5:30 PM	Graduate Student Oral Competition: Morphology, Systematics, and Phylogeny: Hymenoptera	Room W232 C, Convention Center
2:00 PM - 3:00 PM	ESA Branch Leaders Meeting	Salon 1, Rosen Centre Hotel
3:00 PM - 4:00 PM	ESA Section Leaders Meeting	Salon 1, Rosen Centre Hotel
3:00 PM - 4:30 PM	Entomological Foundation Board of Directors Meeting	Salon 2, Rosen Centre Hotel
3:30 PM - 5:15 PM	Contributed Papers: Biological Control and Insect Pathology: Utilizing Parasitoid Wasps II	Room W224 G, Convention Center
4:00 PM - 5:30 PM	<i>Journal of Integrated Pest Management</i> Editorial Board Meeting	Salon 12, Rosen Centre Hotel
5:00 PM - 8:00 PM	WERA1021: Spotted Wing Drosophila Biology, Ecology, and Management	Room W231 A, Convention Center
6:00 PM - 7:00 PM	Wigglesworth Memorial Lecture Award Featuring Dr. John G. Hildebrand	Chapin Theater, Convention Center
7:30 PM - 10:00 PM	ICE Gala Dinner	Grand Ballroom, Rosen Centre Hotel



FRIDAY • DAILY SCHEDULE BY DATE AND TIME •

FRIDAY, SEPTEMBER 30

TIME	SESSION/FUNCTION	LOCATION
6:00 AM - 7:00 AM	Morning Yoga	Fitness Center, Hyatt Regency Orlando
7:00 AM - 7:35 AM	Faunal Diversity of Insects	Salon 4, Rosen Plaza Hotel
7:00 AM - 8:00 AM	Medical, Urban, and Veterinary Entomology (MUVE) Section Final Business Meeting with Breakfast	Room W330 B, Convention Center
7:00 AM - 8:00 AM	Open P-IE Section Governing Council and Member Feedback Session	Room W333, Convention Center
7:00 AM - 12:00 PM	Presentation Preview Room (PPR)/Speaker Ready Room	Room W221 AB, Convention Center
7:00 AM - 12:00 PM	Registration and Information Center	West Hall C Foyer, Convention Center
7:30 AM - 8:00 AM	Moderator Training	Room W224 B, Convention Center
8:00 AM - 9:00 AM	Plenary Presentation Featuring Dr. Fred Gould	Chapin Theater, Convention Center
8:00 AM - 9:00 AM	Plenary Presentation Featuring Dr. John A. Pickett	Valencia Room, Convention Center
8:00 AM - 1:30 PM	Tour: Airboat & Wildlife Park	West Hall C Foyer, Convention Center
8:00 AM - 6:00 PM	Guest Hospitality	Salon 5, Rosen Centre Hotel
9:00 AM - 2:20 PM	Exhibit Hall	West Hall C, Convention Center
9:00 AM - 2:00 PM	Poster Session 4: Agriculture and Forest Entomology, Part 2	West Hall C, Convention Center
9:00 AM - 2:00 PM	Poster Session 4: Apidology, Sericulture, and Social Insects	West Hall C, Convention Center
9:00 AM - 2:00 PM	Poster Session 4: Biodiversity, Biogeography, and Conservation of Arthropods, Part 2	West Hall C, Convention Center
9:00 AM - 2:00 PM	Poster Session 4: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops, Part 2	West Hall C, Convention Center
9:00 AM - 2:00 PM	Poster Session 4: Insect Immunology	West Hall C, Convention Center
9:00 AM - 2:00 PM	Poster Session 4: Insects in Food Safety and Homeland Security	West Hall C, Convention Center
9:00 AM - 2:00 PM	Poster Session 4: Medical and Veterinary Entomology, Part 2	West Hall C, Convention Center
9:00 AM - 2:00 PM	Poster Session 4: Morphology, Systematics, and Phylogeny	West Hall C, Convention Center
9:00 AM - 2:00 PM	Poster Session 4: Arthropod Vectors of Animal and Plant Disease	West Hall C, Convention Center
9:15 AM - 11:15 AM	Symposium: Making Species Inventories Work for You: Diverse Uses Across Varied Fields	Room W224 B, Convention Center
9:15 AM - 11:15 AM	Symposium: Discovering Sustainable Insecticides: Resistance, Innovation, and Responsibility	Room W224 C, Convention Center
9:15 AM - 11:15 AM	Symposium: Keeping Science in Citizen Science	Room W315 A, Convention Center
9:15 AM - 11:15 AM	Symposium: Partners in Crime: Vector-Pathogen Interactome	Room W232 C, Convention Center
9:15 AM - 11:15 AM	Symposium: Rapid Evolutionary Radiations in Insects: Phylogenetic Causes and Consequences of Life in the Fast Lane	Room W231 A, Convention Center
9:15 AM - 11:30 AM	Symposium: Ecologically-Based Integrated Pest Management for Selected Food Security Crops in Central Asia	Room W240 C, Convention Center
9:15 AM - 11:30 AM	Symposium: Exploiting Multi-Trophic Interactions in the Management of Invasive Agricultural Arthropod Pests	Room W240 B, Convention Center
9:15 AM - 11:30 AM	Symposium: Genetics and Genomics of Mosquitoes and Implications for Transmission of Pathogens	Room W224 F, Convention Center
9:15 AM - 11:30 AM	Symposium: Insects and Landscape Ecology: Defining an Entomological Perspective	Room W414 B, Convention Center
9:15 AM - 11:30 AM	Symposium: New Approaches to Biological and Integrated Control Changing Global Perspectives on Filth Fly Management	Room W224 E, Convention Center
9:15 AM - 11:30 AM	Symposium: Outlaws of Immunology and Infection	Room W414 D, Convention Center
9:15 AM - 11:30 AM	Contributed Papers: Medical and Veterinary Entomology: Biting Flies	West Hall F3 (WF3), Convention Center
9:15 AM - 11:30 AM	Contributed Papers: Medical and Veterinary Entomology: Ticks II	Room W331 D, Convention Center
9:15 AM - 11:30 AM	Contributed Papers: RNAi and Gene Expression Control in Insects: Interactions	Room W315 B, Convention Center
9:15 AM - 11:30 AM	Contributed Papers: Morphology, Systematics, and Phylogeny: Parasitoid Wasps and Trichoptera	Room W230 D, Convention Center



DAILY SCHEDULE BY DATE AND TIME

## FRIDAY • DAILY SCHEDULE BY DATE AND TIME •

9:15 AM - 11:45 AM	Symposium: The Brown Marmorated Stink Bug: An Invasive Insect of Global Importance	Room W223 A, Convention Center
9:15 AM - 11:45 AM	Symposium: Advancement and Challenges in Biological Control of Invasive Forest Insects: A Global Perspective	Room W232 B, Convention Center
9:15 AM - 11:45 AM	Symposium: Forest Entomology without Borders: Balancing Market Forces with Government Intervention	Room W222 A, Convention Center
9:15 AM - 11:45 AM	Symposium: Future Approaches for the Control of Insect Pests	Room W231 C, Convention Center
9:15 AM - 11:45 AM	Symposium: Modulation of Insect Chemical Response at Different Time Scales: Ethology, Ecology, and Evolution	Room W230 B, Convention Center
9:15 AM - 11:45 AM	Symposium: Spreading the Word: Bed Bug Education and Training in Today's Society	West Hall F4 (WF4), Convention Center
9:15 AM - 11:45 AM	Contributed Papers: Biological Control and Insect Pathology: Unique Studies III	Room W340 A, Convention Center
9:15 AM - 11:45 AM	Contributed Papers: Morphology, Systematics, and Phylogeny: Behavior, Chrysomelids, Curculionids and Scarabs	Room W230 A, Convention Center
9:15 AM - 12:00 PM	Symposium: Hormones in Arthropod Vectors of Infectious Diseases	Room W232 A, Convention Center
9:15 AM - 12:00 PM	Symposium: Behavior and Ecology of Native, Naturalized, and Invasive Ladybird Beetles	Room W224 G, Convention Center
9:15 AM - 12:00 PM	Symposium: Cassava and Bean IPM throughout the Developing World: Honoring the Contributions of Anthony Bellotti and César Cardona Mejía	Room W330 A, Convention Center
9:15 AM - 12:00 PM	Symposium: Physiological Responses to Environmental Change	Room W414 C, Convention Center
9:15 AM - 12:00 PM	Contributed Papers: Acarology: Mites	Room W340 B, Convention Center
9:15 AM - 12:00 PM	Contributed Papers: Stored Products Entomology: Novel Strategies II	Room W331 C, Convention Center
9:15 AM - 12:15 PM	Symposium: Evolution of Insect Sociality: From Theory to Genomes and Back Again	Room W414 A, Convention Center
9:15 AM - 12:15 PM	Symposium: Globally Important Pests and Globally Important Control Tools: Comparing and Contrasting IRM Successes and Challenges, IRAC US Symposium	Room W224 H, Convention Center
9:15 AM - 12:15 PM	Symposium: Insect-Resistant GM Crops in Asia-Pacific: Current Status, Challenges, and Opportunities	Room W222 B, Convention Center
9:15 AM - 12:15 PM	Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Lepidoptera	Room W223 B, Convention Center
9:15 AM - 12:15 PM	Contributed Papers: Biological Control and Insect Pathology: Utilizing Parasitoid Wasps I	Room W225 B, Convention Center
9:15 AM - 12:15 PM	Contributed Papers: Medical and Veterinary Entomology: Mosquito Behavior and Trapping Technologies	West Hall F2 (WF2), Convention Center
9:15 AM - 12:15 PM	Contributed Papers: Urban Entomology in a Changing Environment: Termites and Ants	West Hall F1 (WF1), Convention Center
9:15 AM - 12:15 PM	Contributed Papers: Morphology, Systematics, and Phylogeny: Hemiptera	Room W225 A, Convention Center
9:15 AM - 12:30 PM	Symposium: Global Improvements in Invasive Ant Management	Room W224 D, Convention Center
9:15 AM - 12:30 PM	Symposium: Insects and Ecosystem Services with Special Reference to Pollination Biology	Room W224 A, Convention Center
9:15 AM - 12:30 PM	Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Pollination, Agriculture, and Disease Control	Room W230 C, Convention Center
9:15 AM - 12:30 PM	Contributed Papers: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops	Room W314 A, Convention Center
9:15 AM - 12:45 PM	Contributed Papers: Integrated Pest Management and Sustainable Agriculture: Tree Fruits and Nuts	Room W231 B, Convention Center
9:15 AM - 12:45 PM	Contributed Papers: Apidology, Sericulture, and Social Insects: Environmental Responses	Room W240 A, Convention Center
9:15 AM - 1:00 PM	Contributed Papers: Ecology and Population Dynamics: Pest Management	Room W240 D, Convention Center
9:15 AM - 1:00 PM	Contributed Papers: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops: Pollinators	Room W314 B, Convention Center
9:15 AM - 1:00 PM	Contributed Papers: Morphology, Systematics, and Phylogeny: Diptera	Room W331 B, Convention Center
9:30 AM - 10:30 AM	SysEB Final Business Meeting	Room W333, Convention Center
9:30 AM - 11:00 AM	Entomology 2017 Planning Committee Meeting	Signature 1, Rosen Centre Hotel



## FRIDAY • DAILY SCHEDULE BY DATE AND TIME •

10:00 AM - 12:00 PM	BCE MedVet Exam Writing Committee	Salon 2, Rosen Centre Hotel
12:15 PM - 1:15 PM	ICE Council Meeting	Room W221 C, Convention Center
12:30 PM - 1:15 PM	Lunch and Learn: Down with Publish or Perish! Non-Traditional Careers in Entomology	West Hall F2 (WF2), Convention Center
12:30 PM - 2:30 PM	Student Awards	Chapin Theater, Convention Center
1:00 PM - 3:00 PM	American Entomologist Editorial Board Meeting	Salon 12, Rosen Centre Hotel
1:30 PM - 3:45 PM	Symposium: Aquatic Entomology Around the World	Room W240 D, Convention Center
1:30 PM - 3:45 PM	Symposium: Ecology, Biodiversity, and Geography of Gall-Inducing Insects: Now and Beyond	Room W330 B, Convention Center
1:30 PM - 3:45 PM	Symposium: Vector Immunology	Room W240 C, Convention Center
1:30 PM - 4:00 PM	Symposium: Neuro-Endocrine Regulation of Reproduction in Insects	Room W224 B, Convention Center
1:30 PM - 4:00 PM	Symposium: Arthropod Population Genomics	Room W331 A, Convention Center
1:30 PM - 4:00 PM	Symposium: Global Research and Development of Insect Repellents	Room W224 C, Convention Center
1:30 PM - 4:00 PM	Symposium: Global Status of Native and Invasive Coccinellids	Room W224 E, Convention Center
1:30 PM - 4:00 PM	Symposium: Technological Innovations and Integrated Pest Management	Room W331 B, Convention Center
1:30 PM - 4:15 PM	Symposium: Optical Manipulation of Arthropod Pests and Beneficials	Room W331 D, Convention Center
1:30 PM - 4:15 PM	Symposium: An Invasive Planthopper Goes Global: Shedding Light on the Spotted Lanternfly ( <i>Lycorma delicatula</i> )	Room W232 C, Convention Center
1:30 PM - 4:15 PM	Symposium: Anti-Tick Vaccine Development: Possibilities in the Post-Genomics Era	Room W224 F, Convention Center
1:30 PM - 4:15 PM	Symposium: Harnessing the Power of Genomics Tools: Monitoring Stressors in Pollinator Populations	Room W315 A, Convention Center
1:30 PM - 4:15 PM	Symposium: Key Challenges with Bt Crops in Latin America	Room W231 B, Convention Center
1:30 PM - 4:30 PM	Symposium: Global Challenges in Rice Pest Management	Room W230 C, Convention Center
1:30 PM - 4:30 PM	Symposium: Integrated Crop Pollination in Theory and Practice	Room W414 C, Convention Center
1:30 PM - 4:30 PM	Symposium: Regulation of Honey Bee Polyethism: Clock, Neuroendocrine System, and Environmental Toxicants	Room W315 B, Convention Center
1:30 PM - 4:30 PM	Symposium: <i>Rhipicephalus sanguineus</i> : Tick without Borders	Room W224 H, Convention Center
1:30 PM - 4:45 PM	Symposium: Insect Symbiosis and Immunity	Room W330 A, Convention Center
1:30 PM - 4:45 PM	Symposium: New Insights into Biology, Resistance Mechanisms, and the Management of the Modern Bed Bug	West Hall F4 (WF4), Convention Center
1:30 PM - 4:45 PM	Symposium: Entomology in the Digital Age	Room W222 A, Convention Center
1:30 PM - 4:45 PM	Symposium: Molecular Pharmacology and Physiology of Membrane Transport and Signaling Processes	Room W330 C, Convention Center
1:30 PM - 4:45 PM	Symposium: Monitoring and Forecasting of Migratory Insect Movements	Room W232 A, Convention Center
1:30 PM - 4:45 PM	Symposium: Pink Hibiscus Mealybug ( <i>Maconellicoccus hirsutus</i> ) Invasions: What We Have Learned...What We Need to Re-Learn	Room W331 C, Convention Center
1:30 PM - 4:45 PM	Symposium: Wood Borer-Fungus Alliances and Conflicts: The Frontier of Forest Entomology	Room W414 D, Convention Center
1:30 PM - 5:00 PM	Symposium: Evolution, Classification, and Biology of Cucujooid Beetles (Coleoptera: Cucujoidea)	Room W225 B, Convention Center
1:30 PM - 5:00 PM	Symposium: Genetically Modified Insecticidal Crops and Sustainable Pest Management: An Ecological Perspective of Their Compatibility in Sustainable Agriculture	Room W340 B, Convention Center
1:30 PM - 5:00 PM	Symposium: Host Relations of Gall-Inducing Insects	Room W231 C, Convention Center
1:30 PM - 5:00 PM	Symposium: IPM: The Lucrative Bridge Connecting the Ever-Emerging Knowledge Islands of Genetics and Ecology	Room W231 A, Convention Center
1:30 PM - 5:00 PM	Symposium: Tales from the Understory: Unraveling Secrets behind Tropical Butterfly Communication, Behavior, Wing Patterns, and Diversity	West Hall F3 (WF3), Convention Center
1:30 PM - 5:00 PM	Contributed Papers: Insect-Plant Interactions in a Changing Climate: Host Plant Interactions	Room W232 B, Convention Center
1:30 PM - 5:00 PM	Contributed Papers: Integrated Pest Management and Sustainable Agriculture: Behavioral Pest Management	Room W223 B, Convention Center
1:30 PM - 5:15 PM	Symposium: Biotechnologically-Based Insect Control Strategies	Room W230 D, Convention Center





# FRIDAY/SATURDAY/SUNDAY/MONDAY • DAILY SCHEDULE BY DATE AND TIME •

1:30 PM - 5:15 PM	Symposium: Crop Domestication Effects on Plant-Insect Interactions: Patterns, Mechanisms, and Future Directions	Room W314 A, Convention Center
1:30 PM - 5:15 PM	Symposium: Industry-Academia Collaborative Research and Development in Biological Control of Arthropod Pests: Results from Four Years of Marie-Curie Staff Exchange, and Perspectives	Room W222 B, Convention Center
1:30 PM - 5:15 PM	Symposium: Next-Generation Ecology, Morphology, and Genomics: What can We Learn about the Evolution of Odonata?	Room W224 G, Convention Center
1:30 PM - 5:15 PM	Symposium: Resource Management and Biodiversity in Cockroach and Termite Lineages: Exploring the Common Ground in Their Nutrition, Biodiversity, and Systematics	Room W414 A, Convention Center
1:30 PM - 5:15 PM	Contributed Papers: Apidology, Sericulture, and Social Insects: Management	Room W314 B, Convention Center
1:30 PM - 5:15 PM	Contributed Papers: Urban Entomology in a Changing Environment: Unique Challenges	Room W230 B, Convention Center
1:30 PM - 5:30 PM	Symposium: Connecting with the World's Best Talent: Attracting and Retaining Diverse Entomologists	Room W340 A, Convention Center
1:30 PM - 5:30 PM	Symposium: Diptera Systematics: Deciphering Evolutionary Relationships with Diverse and Novel Data	Room W230 A, Convention Center
1:30 PM - 5:30 PM	Symposium: Eco-Immunology of Invertebrates	Room W224 D, Convention Center
1:30 PM - 5:30 PM	Symposium: Globalizing Sustainable Pest Management in Agriculture	Room W224 A, Convention Center
1:30 PM - 5:30 PM	Symposium: Greenhouse Insect Management Around the World: Common Problems and Solutions from Scientific Collaborations	Room W223 A, Convention Center
1:30 PM - 5:30 PM	Symposium: Interactions Between Pollination Services and Agricultural Practices	Room W414 B, Convention Center
1:30 PM - 5:30 PM	Symposium: Molecular Endocrinology	Room W240 B, Convention Center
1:30 PM - 5:30 PM	Symposium: Potential Invasive Pest Weevil Species of the World	Room W240 A, Convention Center
1:30 PM - 5:30 PM	Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Hymenoptera	West Hall F2 (WF2), Convention Center
1:30 PM - 5:30 PM	Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Novel Methods	West Hall F1 (WF1), Convention Center
1:30 PM - 5:30 PM	Contributed Papers: Integrated Pest Management and Sustainable Agriculture	Room W225 A, Convention Center
5:30 PM - 6:00 PM	ESA Closing Plenary Session	Chapin Theater, Convention Center
6:00 PM - 7:00 PM	ICE Closing Plenary Session	Chapin Theater, Convention Center
6:30 PM - 8:30 PM	ICE Weevil Workshop Registration and Pre-Workshop Mixer	Salon 13/14, Rosen Centre Hotel
7:00 PM - 10:00 PM	ICE Farewell Dinner	Valencia Room, Convention Center

## SATURDAY, OCTOBER 1

TIME	SESSION/FUNCTION	LOCATION
6:30 AM - 11:55 PM	Tour: Overnight to Archbold Biological Station (Day 1)	West Hall C Foyer, Convention Center
8:00 AM - 5:00 PM	Tour: The McGuire Center for Lepidoptera and the Florida State Collection of Arthropods	West Hall C Foyer, Convention Center
8:00 AM - 9:00 PM	ICE Weevil Workshop	Salon 13/14, Rosen Centre Hotel

## SUNDAY, OCTOBER 2

TIME	SESSION/FUNCTION	LOCATION
6:30 AM - 5:00 PM	Tour: Overnight to Archbold Biological Station (Day 2)	West Hall C Foyer, Convention Center
8:00 AM - 9:00 PM	ICE Weevil Workshop	Salon 13/14, Rosen Centre Hotel

## MONDAY, OCTOBER 3

TIME	SESSION/FUNCTION	LOCATION
8:00 AM - 5:45 PM	ICE Weevil Workshop	Salon 13/14, Rosen Centre Hotel





## DAILY SCHEDULE OF SCIENTIFIC PROGRAM

## SUNDAY, SEPTEMBER 25

SESSION	TIME	LOCATION
<b>PLENARY SESSION</b>		
Keynote Presentation Featuring Dr. Peter Agre	6:40 PM – 7:30 PM	Valencia Room, Convention Center

## MONDAY, SEPTEMBER 26

SESSION	TIME	LOCATION
<b>PLENARY SESSION</b>		
Plenary Presentation Featuring Dr. James R. Carey	8:00 AM – 9:00 AM	Valencia Room, Convention Center
Plenary Presentation Featuring Dr. José Roberto Postali Parra	8:00 AM – 9:00 AM	Chapin Theater, Convention Center

## POSTERS

Poster Session 1: Agriculture and Forest Entomology, Part 1	9:00 AM – 5:00 PM	West Hall C, Convention Center
Poster Session 1: Biodiversity, Biogeography, and Conservation of Arthropods, Part 1	9:00 AM – 5:00 PM	West Hall C, Convention Center
Poster Session 1: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops, Part 1	9:00 AM – 5:00 PM	West Hall C, Convention Center
Poster Session 1: Functional Genomics and Transgenesis	9:00 AM – 5:00 PM	West Hall C, Convention Center
Poster Session 1: Medical and Veterinary Entomology, Part 1	9:00 AM – 5:00 PM	West Hall C, Convention Center
Poster Session 1: Stored Products Entomology	9:00 AM – 5:00 PM	West Hall C, Convention Center

## STUDENT POSTER COMPETITION

Graduate Student Poster Competition: Agricultural and Forest Entomology	9:00 AM – 5:00 PM	West Hall C, Convention Center
Graduate Student Poster Competition: Apidology, Sericulture, and Social Insects: Ants and Termites	9:00 AM – 5:00 PM	West Hall C, Convention Center
Graduate Student Poster Competition: Apidology, Sericulture, and Social Insects: Bees	9:00 AM – 5:00 PM	West Hall C, Convention Center
Graduate Student Poster Competition: Biological Control and Insect Pathology	9:00 AM – 5:00 PM	West Hall C, Convention Center
Graduate Student Poster Competition: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops	9:00 AM – 5:00 PM	West Hall C, Convention Center
Graduate Student Poster Competition: Ecology and Population Dynamics	9:00 AM – 5:00 PM	West Hall C, Convention Center
Graduate Student Poster Competition: Frontiers in Entomology	9:00 AM – 5:00 PM	West Hall C, Convention Center
Graduate Student Poster Competition: Genetics and Evolutionary Entomology	9:00 AM – 5:00 PM	West Hall C, Convention Center
Graduate Student Poster Competition: Insect Chemical Ecology	9:00 AM – 5:00 PM	West Hall C, Convention Center
Graduate Student Poster Competition: Invasive and Exotic Entomology	9:00 AM – 5:00 PM	West Hall C, Convention Center
Graduate Student Poster Competition: RNAi and Gene Expression Control in Insects	9:00 AM – 5:00 PM	West Hall C, Convention Center
Undergraduate Student Poster Competition: Ecology and Population Dynamics	9:00 AM – 5:00 PM	West Hall C, Convention Center
Undergraduate Student Poster Competition: Frontiers in Entomology	9:00 AM – 5:00 PM	West Hall C, Convention Center
Student Virtual Poster Competition: Graduate	9:00 AM – 5:00 PM	West Hall C, Convention Center
Student Virtual Poster Competition: Undergraduate	9:00 AM – 5:00 PM	West Hall C, Convention Center

## SYMPOSIA

Symposium: Host Adaptations in Insect Symbioses: Elements That Facilitate Stability and Persistence	9:15 AM – 11:15 AM	Room W330 B, Convention Center
Symposium: Small RNAs: A New Frontier in Insect Science	9:15 AM – 11:15 AM	Room W231 B, Convention Center
Symposium: Arthropods of Madagascar: Historical Biogeography, Diversity, and Patterns of Distribution	9:15 AM – 11:30 AM	Room W414 C, Convention Center



Symposium: Ecological and Developmental Insights from Comparative Hemipteroid Genomics	9:15 AM - 11:30 AM	Room W330 C, Convention Center
Symposium: Genomics and Genome Engineering in the Silkworm	9:15 AM - 11:30 AM	Room W330 A, Convention Center
Symposium: Host Plant Resistance Towards Insect Pests	9:15 AM - 11:30 AM	Room W230 C, Convention Center
Symposium: Insect-Plant Interactions in a Changing Climate: Effects on Populations Dynamics and Biological Control	9:15 AM - 11:30 AM	Room W230 D, Convention Center
Symposium: Microbial Associates and Microbial Control of Ambrosia Beetles	9:15 AM - 11:30 AM	Room W223 A, Convention Center
Symposium: Neuronal Correlates of Odorant Valence in Insects	9:15 AM - 11:30 AM	Room W331 B, Convention Center
Symposium: Sustainable Agriculture through Ecological Pest Management	9:15 AM - 11:30 AM	Room W222 A, Convention Center
Symposium: Vector Development and Reproduction	9:15 AM - 11:30 AM	Room W414 A, Convention Center
Symposium: From the Laboratory Bench to Commercial Products: Semiochemical-Based Technology Development and Regulation Worldwide	9:15 AM - 11:45 AM	Room W314 B, Convention Center
Symposium: Zoophytophagous Arthropods in Biological Control (IOBC)	9:15 AM - 11:45 AM	Room W331 D, Convention Center
Symposium: Wild Sericulture for Alternative Income and Economic Incentive for Biodiversity Conservation	9:15 AM - 12:00 PM	Room W222 B, Convention Center
Symposium: Engineering Beneficial Traits into Insects Using Novel Gene Drive Systems	9:15 AM - 12:15 PM	Room W414 B, Convention Center
Symposium: Photoperiodic Induction of Diapause and Seasonal Morphs	9:15 AM - 12:15 PM	Room W340 B, Convention Center
Symposium: Stick Insect Research in the Era of Genomics: Exploring the Evolution of a Mesodiverse Insect Order	9:15 AM - 12:15 PM	Room W414 D, Convention Center
Symposium: Biology, Ecology, and Management of the Asian Citrus Psyllid, <i>Diaphorina citri</i> , Vector of Huanglongbing	9:15 AM - 12:30 PM	Room W315 B, Convention Center
Symposium: Global Entomological Collaborations	9:15 AM - 12:30 PM	Room W340 A, Convention Center
Symposium: Rapid Evolution of Insect Pests within Agroecosystems	9:15 AM - 12:30 PM	Room W331 C, Convention Center
Symposium: Zika Virus	9:15 AM - 12:30 PM	Chapin Theater, Convention Center
Symposium: Novel Contributions of Chemical Ecology to Global IPM	1:30 PM - 4:00 PM	Room W223 A, Convention Center
Symposium: What Constitutes Responsible Field Release of Transgenic Insects?	1:30 PM - 4:00 PM	Room W414 C, Convention Center
Symposium: Entomology Around the World: Past, Present, and Future Challenges	1:30 PM - 4:15 PM	Room W240 A, Convention Center
Symposium: Global Status, Acceptance, and Challenges of GM Crops	1:30 PM - 4:15 PM	Room W224 H, Convention Center
Symposium: How Human Activities Shape the Global Distribution of Insects	1:30 PM - 4:15 PM	Room W414 D, Convention Center
Symposium: New Tools and Strategies for Integrated Pest Management (IPM) on Transgenic (Bt) and Non-Transgenic (Conventional) Cotton Crops	1:30 PM - 4:15 PM	Room W330 C, Convention Center
Symposium: Social Insect Pathobiology	1:30 PM - 4:15 PM	Room W224 G, Convention Center
Symposium: Status and Prospects for Biological Control in the 21st Century (IOBC)	1:30 PM - 4:15 PM	Room W232 A, Convention Center
Symposium: The Biochemical Signaling Interface Between Invaders and Their Insect Hosts	1:30 PM - 4:15 PM	Room W330 A, Convention Center
Symposium: The Khapra Beetle: A Potential Invasive Species	1:30 PM - 4:15 PM	Room W315 B, Convention Center
Symposium: Vector-Borne Diseases of Livestock	1:30 PM - 4:15 PM	Room W331 B, Convention Center
Symposium: Biological Control of the Invasive Brown Marmorated Stink Bug, <i>Halyomorpha halys</i> , by Exotic and Native Parasitoids and Predators: A Global Perspective	1:30 PM - 4:30 PM	Room W315 A, Convention Center
Symposium: Recent Advances in Heteropteran (Hemiptera) Systematics and Evolution	1:30 PM - 4:30 PM	Room W231 C, Convention Center
Symposium: Where are the Six Legs of Advanced Entomology Publishing Taking Us?	1:30 PM - 4:30 PM	Room W224 F, Convention Center
Symposium: Workshop on Gene Editing Technologies	1:30 PM - 4:30 PM	Room W414 A, Convention Center
Symposium: A Global Perspective on Insect Pests of Wood Products	1:30 PM - 4:45 PM	Room W230 A, Convention Center
Symposium: Pest Shifting, Invasive Species, and Resistance Development in Key Growing Areas of the World and the Need for New Technology to Manage Insect Pests	1:30 PM - 4:45 PM	Room W314 B, Convention Center



# MONDAY • DAILY SCHEDULE OF SCIENTIFIC PROGRAM •

Symposium: An Emerging Food Supply: Edible Insects	1:30 PM - 5:00 PM	Room W230 B, Convention Center
Symposium: Building the Biodiversity Knowledge Graph for Insects – Components, Progress, and Challenges	1:30 PM - 5:00 PM	West Hall F4 (WF4), Convention Center
Symposium: Deciphering Complex Signaling Mechanisms in Insect-Plant Interactions	1:30 PM - 5:00 PM	West Hall F1 (WF1), Convention Center
Symposium: Integrated Pest Management Components and Packages for Tropical Crops	1:30 PM - 5:00 PM	Room W331 D, Convention Center
Symposium: Wireworm and Click Beetle Management: IPM Toolbox for the 21st Century	1:30 PM - 5:00 PM	Room W331 C, Convention Center
Symposium: Population Consequences of Pest Management Tactics on Non-Target Species	1:30 PM - 5:15 PM	Room W222 A, Convention Center
Symposium: Systematics, Biogeography, and Ecology of Cerambycidae and Buprestidae	1:30 PM - 5:15 PM	Room W231 A, Convention Center
Symposium: True Bugs (Heteroptera) from the Neotropics: Advances on Basic and Applied Research	1:30 PM - 5:15 PM	Room W230 C, Convention Center
Symposium: Biodiversity, Distribution, Behavior, and Activity of Forensically Important Entomofauna and Microbiota in Different Ecoregions	1:30 PM - 5:30 PM	Room W224 D, Convention Center
Symposium: Bt Mode of Action, Resistance Mechanisms, and Global Patterns	1:30 PM - 5:30 PM	Room W230 D, Convention Center
Symposium: Data without Borders: Collecting, Digitizing, Using, and Re-using Biological Specimen Data	1:30 PM - 5:30 PM	Room W224 E, Convention Center
Symposium: Emerging Technologies for Successful Applications of dsRNA to Reduce Pests and Pathogens in Agriculture	1:30 PM - 5:30 PM	West Hall F2 (WF2), Convention Center
Symposium: Evolution and Biology of Chalcidoidea: Integrating Genomics, Fossils, Microbiomes, and Natural History	1:30 PM - 5:30 PM	Room W340 A, Convention Center
Symposium: From Diet Breadth to Diversification: Understanding Host Shifts in Phytophagous Insects	1:30 PM - 5:30 PM	Room W340 B, Convention Center
Symposium: In Honor of Past ESA President Donald L. McLean: Electropenetrography (EPG) Without Borders: Plant Pathogen Vector Research Inspiring Novel Animal Disease Studies	1:30 PM - 5:30 PM	West Hall F3 (WF3), Convention Center
Symposium: In the Light of Morphometrics: Frontiers in Ecology and Evolution of Insect Morphology	1:30 PM - 5:30 PM	Room W314 A, Convention Center
Symposium: Innovative Strategies of Mosquito Control	1:30 PM - 5:30 PM	Room W331 A, Convention Center
Symposium: Insights into the Biology of Wild and Managed Native Bees	1:30 PM - 5:30 PM	Room W224 C, Convention Center
Symposium: Profiles of Forest Pests Ready to Cross Borders and Invade New Areas	1:30 PM - 5:30 PM	Room W224 A, Convention Center
Symposium: Scarabs without Borders: Lessons from a Century of Invasions	1:30 PM - 5:30 PM	Room W222 B, Convention Center
Symposium: Sex and Drugs and Bee Control: The Chemical Ecology of Pollination	1:30 PM - 5:30 PM	Room W224 B, Convention Center
Symposium: The Physiological Ecology of Insect Flight: From Millisecond Escape to Long-Distance Migration	1:30 PM - 5:30 PM	Room W414 B, Convention Center

## PAPER (ORAL) PRESENTATIONS

Contributed Papers: Entomological Effects of Global Warming in Agriculture and Medical Entomology	9:15 AM - 11:00 AM	Room W314 A, Convention Center
Contributed Papers: Medical and Veterinary Entomology: Forensic Entomology	9:15 AM - 11:30 AM	Room W224 H, Convention Center
Contributed Papers: Biological Control and Insect Pathology: Unique Studies I	9:15 AM - 12:15 PM	Room W224 D, Convention Center
Contributed Papers: Ecology and Population Dynamics: Sampling	9:15 AM - 12:15 PM	West Hall F3 (WF3), Convention Center
Contributed Papers: Insect Immunology: Molecular	9:15 AM - 12:15 PM	Room W315 A, Convention Center
Contributed Papers: Frontiers in Entomology: Tools and Methods	9:15 AM - 12:30 PM	Room W224 G, Convention Center
Contributed Papers: Insect Chemical Ecology: Physiology	9:15 AM - 12:30 PM	Room W224 B, Convention Center
Contributed Papers: Insect Chemical Ecology: Plant Protection	9:15 AM - 12:30 PM	West Hall F1 (WF1), Convention Center
Contributed Papers: Medical and Veterinary Entomology: Anopheles Vectors of Malaria	9:15 AM - 12:30 PM	West Hall F2 (WF2), Convention Center



Contributed Papers: Urban Entomology in a Changing Environment: Bed Bugs, Cockroaches, and Flies	9:15 AM - 12:30 PM	Room W331 A, Convention Center
Contributed Papers: Biological Control and Insect Pathology: Nematodes, Fungi, and Bt	9:15 AM - 12:45 PM	Room W225 A, Convention Center
Contributed Papers: Entomology Around the World	9:15 AM - 12:45 PM	Room W224 A, Convention Center
Contributed Papers: Stored Products Entomology: Novel Strategies I	9:15 AM - 12:45 PM	Room W224 C, Convention Center
Contributed Papers: Agricultural and Forest Entomology: Behavioral and Chemical Ecology	9:15 AM - 1:15 PM	Room W224 F, Convention Center
Contributed Papers: Insect-Plant Interactions in a Changing Climate: Abiotic Factors, Pollinators, and Pathogens	9:15 AM - 1:15 PM	West Hall F4 (WF4), Convention Center
Contributed Papers: Integrated Pest Management and Sustainable Agriculture: Agronomic Crops	9:15 AM - 1:15 PM	Room W230 A, Convention Center
Contributed Papers: Integrated Pest Management and Sustainable Agriculture: Insecticides	9:15 AM - 1:15 PM	Room W224 E, Convention Center
Contributed Papers: Arthropod Vectors of Animal and Plant Disease: Insect Endosymbionts and Microbiota	11:00 AM - 12:30 PM	Room W314 A, Convention Center
Contributed Papers: Integrated Pest Management and Sustainable Agriculture: IPM Programs	1:30 PM - 5:00 PM	Room W225 A, Convention Center
Contributed Papers: Genetics and Evolutionary Entomology: Populations and Spatial Diversity	1:30 PM - 5:15 PM	Room W330 B, Convention Center
Contributed Papers: Integrated Pest Management and Sustainable Agriculture: Fruits and Vegetables	1:30 PM - 5:15 PM	Room W231 B, Convention Center
Contributed Papers: Agricultural and Forest Entomology: Forest Insects, Pollinators, Systematics, and Remote Sensing	1:30 PM - 5:30 PM	Chapin Theater, Convention Center
Contributed Papers: Agricultural and Forest Entomology: Integrated Pest Management, Host-Plant Interactions, and Transgenic Crops	1:30 PM - 5:30 PM	Room W225 B, Convention Center

**STUDENT PAPER (ORAL) PRESENTATION COMPETITION**

Undergraduate Student Oral Competition: Frontiers in Entomology	9:15 AM - 11:00 AM	Room W240 A, Convention Center
Graduate Student Oral Competition: Urban Entomology in a Changing Environment: Biting Pests	9:15 AM - 11:15 AM	Room W232 C, Convention Center
Graduate Student Oral Competition: Insect Immunology	9:15 AM - 11:30 AM	Room W232 A, Convention Center
Graduate Student Oral Competition: Apidology, Sericulture, and Social Insects: Termites	9:15 AM - 11:45 AM	Room W231 C, Convention Center
Graduate Student Oral Competition: Medical and Veterinary Entomology: Ticks	9:15 AM - 12:00 PM	Room W232 B, Convention Center
Graduate Student Oral Competition: Biological Control and Insect Pathology: Entomopathogens and Weed Biocontrol	9:15 AM - 12:15 PM	Room W231 A, Convention Center
Graduate Student Oral Competition: Biological Control and Insect Pathology: Predators	9:15 AM - 12:15 PM	Room W240 C, Convention Center
Graduate Student Oral Competition: Ecology and Population Dynamics: Behavior	9:15 AM - 12:30 PM	Room W240 D, Convention Center
Graduate Student Oral Competition: Invasive and Exotic Entomology: Drosophilids	9:15 AM - 12:30 PM	Room W240 B, Convention Center
Graduate Student Oral Competition: Apidology, Sericulture, and Social Insects: Honey Bees I	9:15 AM - 12:45 PM	Room W230 B, Convention Center
Graduate Student Oral Competition: Morphology, Systematics, and Phylogeny: Flies, Lepidopterans, and Others	1:30 PM - 4:45 PM	Room W240 D, Convention Center
Graduate Student Oral Competition: Agricultural and Forest Entomology: Hemipteran Pests	1:30 PM - 5:00 PM	Room W232 B, Convention Center
Graduate Student Oral Competition: Agricultural and Forest Entomology: Forest Pests	1:30 PM - 5:15 PM	Room W232 C, Convention Center
Graduate Student Oral Competition: Insect-Plant Interactions in a Changing Climate	1:30 PM - 5:15 PM	Room W240 B, Convention Center
Graduate Student Oral Competition: Integrated Pest Management and Sustainable Agriculture: Landscape Systems	1:30 PM - 5:15 PM	Room W240 C, Convention Center



# TUESDAY • DAILY SCHEDULE OF SCIENTIFIC PROGRAM •

Graduate Student Oral Competition: Biodiversity, Biogeography, and Conservation of Arthropods: Diversity	1:30 PM - 5:30 PM	Room W223 B, Convention Center
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## TUESDAY, SEPTEMBER 27

SESSION	TIME	LOCATION
<b>PLENARY SESSION</b>		
Plenary Presentation Featuring Dr. Carolina Barillas-Mury	8:00 AM – 9:00 AM	Valencia Room, Convention Center
Plenary Presentation Featuring Dr. Baldwyn Torto	8:00 AM – 9:00 AM	Chapin Theater, Convention Center
Invited Lecture Featuring Dr. Juan Andres Bisset Lazcano	4:30 PM – 5:30 PM	Room W331 A, Convention Center

## POSTERS

Poster Session 2: Acarology	9:00 AM - 5:00 PM	West Hall C, Convention Center
Poster Session 2: Bioinformatics and Comparative Genomics of Arthropods	9:00 AM - 5:00 PM	West Hall C, Convention Center
Poster Session 2: Biological Control and Insect Pathology	9:00 AM - 5:00 PM	West Hall C, Convention Center
Poster Session 2: Ecology and Population Dynamics	9:00 AM - 5:00 PM	West Hall C, Convention Center
Poster Session 2: Entomological Effects of Global Warming in Agriculture and Medical Entomology	9:00 AM - 5:00 PM	West Hall C, Convention Center
Poster Session 2: Insect-Plant Interactions in a Changing Climate	9:00 AM - 5:00 PM	West Hall C, Convention Center

## STUDENT POSTER COMPETITION

Graduate Student Poster Competition: Acarology and Stored Products	9:00 AM - 5:00 PM	West Hall C, Convention Center
Graduate Student Poster Competition: Arthropod Vectors of Animal and Plant Disease	9:00 AM - 5:00 PM	West Hall C, Convention Center
Graduate Student Poster Competition: Insect Immunology	9:00 AM - 5:00 PM	West Hall C, Convention Center
Graduate Student Poster Competition: Integrated Pest Management and Sustainable Agriculture: Management Tactics	9:00 AM - 5:00 PM	West Hall C, Convention Center
Graduate Student Poster Competition: Integrated Pest Management and Sustainable Agriculture: Pest Physiology	9:00 AM - 5:00 PM	West Hall C, Convention Center
Graduate Student Poster Competition: Medical and Veterinary Entomology	9:00 AM - 5:00 PM	West Hall C, Convention Center
Graduate Student Poster Competition: Morphology, Systematics, and Phylogeny: Flies, Hemiptera, and Lepidoptera	9:00 AM - 5:00 PM	West Hall C, Convention Center
Graduate Student Poster Competition: Morphology, Systematics, and Phylogeny: Springtails, Beetles, and Hymenoptera	9:00 AM - 5:00 PM	West Hall C, Convention Center
Graduate Student Poster Competition: Physiology and Biochemistry: Moths and Mosquitoes	9:00 AM - 5:00 PM	West Hall C, Convention Center
Graduate Student Poster Competition: Physiology and Biochemistry: Physiology	9:00 AM - 5:00 PM	West Hall C, Convention Center
Undergraduate Student Poster Competition: Medical and Veterinary Entomology	9:00 AM - 5:00 PM	West Hall C, Convention Center
Undergraduate Student Poster Competition: Morphology, Systematics, and Phylogeny	9:00 AM - 5:00 PM	West Hall C, Convention Center
Student Virtual Poster Competition: Graduate	9:00 AM - 5:00 PM	West Hall C, Convention Center
Student Virtual Poster Competition: Undergraduate	9:00 AM - 5:00 PM	West Hall C, Convention Center

## SYMPOSIA

Symposium: Climate Change: Preventing the Spread of Invasive Species in Agriculture	9:15 AM - 11:15 AM	Room W230 A, Convention Center
Symposium: Insect-Plant Interactions in a Changing Climate	9:15 AM - 11:15 AM	Room W222 A, Convention Center
Symposium: Reproductive Interference and its Applications	9:15 AM - 11:15 AM	Room W224 G, Convention Center
Symposium: Spruce Budworm Genomics: From Basic Science to Outbreak Management	9:15 AM - 11:15 AM	Room W340 A, Convention Center
Symposium: Unmanned Aerial Systems (Drones) for Precision Mosquito Control and Agricultural Use	9:15 AM - 11:15 AM	Room W315 B, Convention Center



Symposium: Advancements in Resistance and Aversion Management for Urban Pests	9:15 AM - 11:30 AM	Room W224 C, Convention Center
Symposium: Bt Crops and Best Management Practices: Influence on the Technology Durability	9:15 AM - 11:30 AM	West Hall F1 (WF1), Convention Center
Symposium: Cross-Continental Patterns of Chemical Communication Among Subcortical Insects	9:15 AM - 11:30 AM	Room W330 A, Convention Center
Symposium: Genetic Architecture of Species Differences	9:15 AM - 11:30 AM	Room W414 B, Convention Center
Symposium: Innovative Responses to the Global Homogenization of Plantation Pests	9:15 AM - 11:30 AM	Room W331 D, Convention Center
Symposium: Mechanistic Insights into Mosquito-Parasite Interactions	9:15 AM - 11:30 AM	Room W224 E, Convention Center
Symposium: Worldwide Use of Kairomones to Enhance Management of Tortricids in Fruit Crops: New Opportunities and New Problems	9:15 AM - 11:30 AM	Room W330 C, Convention Center
Symposium: Wound Healing and Damage Signals in Insects	9:15 AM - 11:30 AM	Room W330 B, Convention Center
Symposium: Biocontrol and Induced Plant Defences: A Tale of Three Trophic Levels	9:15 AM - 11:45 AM	Room W230 C, Convention Center
Symposium: Chagas Disease: A Neglected Disease of Public Health Importance	9:15 AM - 11:45 AM	Room W230 B, Convention Center
Symposium: Insect-Plant Interactions in a Changing Arctic	9:15 AM - 11:45 AM	Room W224 F, Convention Center
Symposium: Microbial Modulation of Insect Immunity	9:15 AM - 11:45 AM	Room W331 B, Convention Center
Symposium: Opportunities and Challenges for Biological Control of Disease Vectors (IOBC)	9:15 AM - 11:45 AM	Room W230 D, Convention Center
Symposium: Stored Product Entomology: Challenges that Transcend Borders	9:15 AM - 11:45 AM	Room W224 B, Convention Center
Symposium: Advances in Hermetic Storage for Smallholder Farms	9:15 AM - 12:00 PM	Room W224 A, Convention Center
Symposium: Avocados, Blueberries, and Olives: Pests of Small Fruit in Florida	9:15 AM - 12:00 PM	Room W223 A, Convention Center
Symposium: Entomological Issues Beyond Borders: Challenges and Opportunities for Sustainable Solutions	9:15 AM - 12:00 PM	West Hall F3 (WF3), Convention Center
Symposium: Genomic and Genetic Strategies Toward Integrated Pest Management	9:15 AM - 12:00 PM	Room W315 A, Convention Center
Symposium: Global Spread and Management of the South American Tomato Leafminer, <i>Tuta absoluta</i>	9:15 AM - 12:00 PM	Room W224 H, Convention Center
Symposium: Recent Advances in the Study of the Neuropterida	9:15 AM - 12:00 PM	Room W331 C, Convention Center
Symposium: Challenges and Opportunities for Management of Western Corn Rootworm	9:15 AM - 12:15 PM	Room W414 A, Convention Center
Symposium: Duplications, Deletions, and Other Mutations: Deciphering the Molecular Basis of Insecticide Resistance	9:15 AM - 12:15 PM	West Hall F2 (WF2), Convention Center
Symposium: Parasitoid Assemblages in Agroecosystems: Environmental Drivers Affecting Biocontrol	9:15 AM - 12:15 PM	Room W231 A, Convention Center
Symposium: Biological Control under Climate Change (IOBC)	9:15 AM - 12:30 PM	Room W222 B, Convention Center
Symposium: From Molecules to Management: New Tools for Understanding Locust Swarms across Species and Research Disciplines	9:15 AM - 12:30 PM	Room W331 A, Convention Center
Symposium: Repellents	9:15 AM - 12:30 PM	Room W224 D, Convention Center
Symposium: Status of Worldwide Honey Bee Health and Its Impacts on Agriculture	1:30 PM - 3:45 PM	Chapin Theater, Convention Center
Symposium: Advances in the Molecular Biology and Microbial Ecology of Important Urban Pests	1:30 PM - 4:00 PM	Room W224 B, Convention Center
Symposium: Bark and Ambrosia Beetles: Biology, Ecology, and Management	1:30 PM - 4:00 PM	Room W414 C, Convention Center
Symposium: Emerging Technologies for Tomorrow's Collaborative Discoveries	1:30 PM - 4:00 PM	West Hall F2 (WF2), Convention Center
Symposium: Forest Insect Invasions in a Changing Climate: Mechanisms and Risks	1:30 PM - 4:00 PM	Room W224 D, Convention Center
Symposium: Mechanisms and Consequences of Phase Change in the Desert Locust, <i>Schistocerca gregaria</i>	1:30 PM - 4:00 PM	Room W232 A, Convention Center
Symposium: Parasitoids, Polydnnaviruses, and Pathogens: Genomes to Immune Physiology	1:30 PM - 4:00 PM	Room W330 C, Convention Center
Symposium: Plant Piercing-Sucking Insects and Vectors without Borders	1:30 PM - 4:00 PM	Room W232 B, Convention Center



## TUESDAY • DAILY SCHEDULE OF SCIENTIFIC PROGRAM •

Symposium: Advances in Pest Management	1:30 PM - 4:15 PM	Room W240 C, Convention Center
Symposium: Biology and Evolution of Social Insect Symbionts	1:30 PM - 4:15 PM	Room W240 D, Convention Center
Symposium: Forensic Entomology without Borders: Uniting the Worldwide Forensic Entomology Community	1:30 PM - 4:15 PM	Room W222 B, Convention Center
Symposium: Evolution of Biological Clocks	1:30 PM - 4:30 PM	Room W224 C, Convention Center
Symposium: Insect-transmitted Phytoviruses and Agricultural Pandemics: Current Scenarios and Sustainable Management	1:30 PM - 4:30 PM	Room W231 B, Convention Center
Symposium: Reducing Transmission Rates of Infectious Diseases by Targeting Mosquito Olfaction	1:30 PM - 4:30 PM	Room W331 A, Convention Center
Symposium: Ticks Are Different: The Impact of Tick Biology on Their Role As Vectors	1:30 PM - 4:30 PM	Room W224 A, Convention Center
Symposium: Entomological Research in China: Major Progresses and Perspectives	1:30 PM - 4:45 PM	Room W414 B, Convention Center
Symposium: Hitchhikers in Florida: History and Control	1:30 PM - 4:45 PM	Room W224 H, Convention Center
Symposium: Insect Effects on Ecosystem Services	1:30 PM - 4:45 PM	Room W414 D, Convention Center
Symposium: No More Invasive Insect Species: Is Quarantine the Answer?	1:30 PM - 4:45 PM	West Hall F4 (WF4), Convention Center
Symposium: Arthropod Movement in Agro-Ecosystems: Linking Individual Behaviours and Population Patterns Across Spatio-Temporal Scales. Just What Does Emerge?	1:30 PM - 5:00 PM	Room W330 B, Convention Center
Symposium: Industrialization of Insects as a Food Ingredient	1:30 PM - 5:00 PM	Room W222 A, Convention Center
Symposium: Insect Biocomposites: Cuticles and Peritrophic Matrices	1:30 PM - 5:00 PM	Room W331 C, Convention Center
Symposium: Insects and the Global Human Experience	1:30 PM - 5:00 PM	Room W314 A, Convention Center
Symposium: Novel Insecticidal Agents and Next-Gen Approaches for Insect Control	1:30 PM - 5:00 PM	Room W225 A, Convention Center
Symposium: Advances in the Behavioral Ecology of Entomopathogenic Nematodes	1:30 PM - 5:15 PM	Room W315 B, Convention Center
Symposium: Insect-Resistant Genetically Engineered Crops: Current Status, Concerns, and Future Prospects	1:30 PM - 5:15 PM	Room W414 A, Convention Center
Symposium: Interactions Between the Insect Immune System and Parasites	1:30 PM - 5:15 PM	Room W331 D, Convention Center
Symposium: Physiological Systems for Arthropod Pest Management in the 21st Century	1:30 PM - 5:15 PM	Room W330 A, Convention Center
Symposium: Progress in Insect Phylogenomics: The Scale and Complexity of Next-Gen Datasets and Analyses	1:30 PM - 5:15 PM	Room W315 A, Convention Center
Symposium: Systematics and Diversity of Aquatic Beetles: An Emerging Model System in Evolutionary Biology	1:30 PM - 5:15 PM	Room W223 A, Convention Center
Symposium: The Role of National, Regional, and International Plant Protection Organizations to Prevent the Introduction and Spread of Plant Pests	1:30 PM - 5:15 PM	Room W224 F, Convention Center
Symposium: Advances in Ant Systematics: Global Sampling, New Phylogenetic Methods, and Major Taxonomic Changes	1:30 PM - 5:30 PM	Room W231 A, Convention Center
Symposium: Arthropods and Decomposition	1:30 PM - 5:30 PM	Room W224 E, Convention Center
Symposium: Ion Channels as Targets of Synthetic and Natural Neurotoxins	1:30 PM - 5:30 PM	Room W340 B, Convention Center
Symposium: Phylogeny and Evolution of Weevils (Coleoptera: Curculionioidea): A Symposium in Honor of Guillermo "Willy" Kuschel	1:30 PM - 5:30 PM	West Hall F3 (WF3), Convention Center
Symposium: Research Frontiers into the Use of Preventive Medicine in Arthropod Pest Management	1:30 PM - 5:30 PM	Room W240 B, Convention Center
Symposium: Rise or Demise? A Global Outlook on the Future of Classical Biological Weed Control	1:30 PM - 5:30 PM	West Hall F1 (WF1), Convention Center
Symposium: The Evolution of Lepidoptera: Bringing it All Together	1:30 PM - 5:30 PM	Room W224 G, Convention Center
Symposium: The Limits of Respiratory Function: External and Internal Constraints on Insect Gas Exchange	1:30 PM - 5:30 PM	Room W331 B, Convention Center





**PAPER (ORAL) PRESENTATIONS**

Contributed Papers: RNAi and Gene Expression Control in Insects: Pest Management	9:15 AM - 11:30 AM	West Hall F4 (WF4), Convention Center
Contributed Papers: Bioinformatics and Comparative Genomics of Arthropods: Genomes and Databases	9:15 AM - 12:00 PM	Room W225 A, Convention Center
Contributed Papers: Ecology and Population Dynamics: Power of Prediction	9:15 AM - 12:15 PM	Room W314 B, Convention Center
Contributed Papers: Medical and Veterinary Entomology: Mosquito 'Omics and Biological Control	9:15 AM - 12:15 PM	Chapin Theater, Convention Center
Contributed Papers: Apidology, Sericulture, and Social Insects: Physiology, Genetics, and Genomics	9:15 AM - 12:30 PM	Room W314 A, Convention Center
Contributed Papers: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops	9:15 AM - 12:30 PM	Room W414 C, Convention Center
Contributed Papers: Frontiers in Entomology: Uses and Symbiosis	9:15 AM - 12:30 PM	Room W223 B, Convention Center
Contributed Papers: Genetics and Evolutionary Entomology: Mating and Competition	9:15 AM - 12:30 PM	Room W414 D, Convention Center
Contributed Papers: Insect Immunology: Environment	9:15 AM - 12:30 PM	Room W231 B, Convention Center
Contributed Papers: Invasive and Exotic Entomology: Control and Tools	9:15 AM - 12:30 PM	Room W340 B, Convention Center
Contributed Papers: Morphology, Systematics, and Phylogeny: Myriapoda and Insecta	9:15 AM - 12:30 PM	Room W225 B, Convention Center
Contributed Papers: Agricultural and Forest Entomology: Forest Insects	1:30 PM - 5:15 PM	Room W225 B, Convention Center
Contributed Papers: Functional Genomics and Transgenesis	1:30 PM - 5:15 PM	Room W223 B, Convention Center
Contributed Papers: Insect Chemical Ecology	1:30 PM - 5:30 PM	Room W314 B, Convention Center
Contributed Papers: Medical and Veterinary Entomology: Repellents, Toxicants, and Resistance	1:30 PM - 5:30 PM	Room W231 C, Convention Center

**STUDENT PAPER (ORAL) PRESENTATION COMPETITION**

Graduate Student Oral Competition: Medical and Veterinary Entomology: Livestock Pests and Decomposers	9:15 AM - 11:30 AM	Room W232 A, Convention Center
Graduate Student Oral Competition: Apidology, Sericulture, and Social Insects: Honey Bees II	9:15 AM - 11:45 AM	Room W240 A, Convention Center
Undergraduate Student Oral Competition: Ecology and Population Dynamics	9:15 AM - 11:45 AM	Room W231 C, Convention Center
Graduate Student Oral Competition: Apidology, Sericulture, and Social Insects: Ants	9:15 AM - 12:00 PM	Room W240 B, Convention Center
Graduate Student Oral Competition: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops: Bt Toxins	9:15 AM - 12:15 PM	Room W240 D, Convention Center
Graduate Student Oral Competition: RNAi and Gene Expression Control in Insects	9:15 AM - 12:15 PM	Room W232 C, Convention Center
Graduate Student Oral Competition: Genetics and Evolutionary Entomology: Behavior	9:15 AM - 12:30 PM	Room W240 C, Convention Center
Graduate Student Oral Competition: Physiology and Biochemistry: Physiology	9:15 AM - 12:30 PM	Room W232 B, Convention Center
Graduate Student Oral Competition: Insect Chemical Ecology	1:30 PM - 5:00 PM	Room W230 D, Convention Center
Graduate Student Oral Competition: Medical and Veterinary Entomology: Biting Diptera	1:30 PM - 5:00 PM	Room W230 A, Convention Center
Graduate Student Oral Competition: Integrated Pest Management and Sustainable Agriculture: Agricultural Systems	1:30 PM - 5:15 PM	Room W240 A, Convention Center
Graduate Student Oral Competition: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops: Insecticides	1:30 PM - 5:30 PM	Room W230 B, Convention Center
Graduate Student Oral Competition: Morphology, Systematics, and Phylogeny: Beetles, Bugs, and Others	1:30 PM - 5:30 PM	Room W230 C, Convention Center
Undergraduate Student Oral Competition: Entomology Around the World	1:30 PM - 5:30 PM	Room W232 C, Convention Center



## WEDNESDAY, SEPTEMBER 28

SESSION	TIME	LOCATION
<b>PLENARY SESSION</b>		
Keynote Presentation Featuring Dr. Jules Hoffmann	8:00 AM – 9:00 AM	Valencia Room, Convention Center
<b>SYMPOSIA</b>		
Symposium: Insect Vectors as Drivers of Emerging Plant Diseases	9:15 AM - 11:15 AM	Room W230 D, Convention Center
Symposium: Insects, Ecosystem Functioning, and Services: New Questions and Experimental Perspectives	9:15 AM - 11:15 AM	Room W224 C, Convention Center
Symposium: Molecular Bases of Behavior in Kissing Bug Vectors of Human Disease	9:15 AM - 11:15 AM	Room W330 A, Convention Center
Symposium: Psocids as Global Pests of Stored Products	9:15 AM - 11:15 AM	Room W231 A, Convention Center
Symposium: Securing Borders While Promoting Trade: Regional Approaches to Control Agricultural Pests in the Greater Caribbean Area	9:15 AM - 11:15 AM	Room W223 A, Convention Center
Symposium: The Role of Microbiota in Vectors	9:15 AM - 11:15 AM	Room W331 B, Convention Center
Symposium: Weaving Your Web: Science Communication and Social Media for Insect Scientists	9:15 AM - 11:15 AM	Room W414 A, Convention Center
Symposium: Ecology and Adaptation for Survival of Termites	9:15 AM - 11:30 AM	Room W331 C, Convention Center
Symposium: Insect Molecular Physiology and Ecology: The Post-Genomic Era	9:15 AM - 11:30 AM	Room W224 G, Convention Center
Symposium: Microbiome and Vector Immunity	9:15 AM - 11:30 AM	Room W230 C, Convention Center
Symposium: Modern Studies of Gerromorphan Insects: Behavior, Phylogeny, Physiology, and Ecology	9:15 AM - 11:30 AM	Room W224 H, Convention Center
Symposium: Novel Techniques in Urban IPM	9:15 AM - 11:30 AM	Room W331 D, Convention Center
Symposium: Public-Private Partnerships for Development of Next-Generation Pest Management Methods	9:15 AM - 11:30 AM	Room W314 A, Convention Center
Symposium: The Insect Circulatory System: Vital but Widely Neglected!	9:15 AM - 11:30 AM	Room W222 A, Convention Center
Symposium: Using Insect Diversity to Plan and Manage Conservation in Transformed Landscapes	9:15 AM - 11:30 AM	Room W224 D, Convention Center
Symposium: Vertebrate Host Factors: Effect on Vector Biology	9:15 AM - 11:30 AM	Room W230 A, Convention Center
Symposium: What Happens When Pest Occurrence Data is Shared: End of the World or New Horizons?	9:15 AM - 11:30 AM	Room W224 E, Convention Center
Symposium: Biological Control Perspective in South and Southeast Asia	9:15 AM - 11:45 AM	Room W414 B, Convention Center
Symposium: Agronomic and Economic Benefits of Seed Treatments: The IPM Perspective	9:15 AM - 12:00 PM	Room W331 A, Convention Center
Symposium: Endocrine and Neural Network in Control of Physiology	9:15 AM - 12:00 PM	Room W330 C, Convention Center
Symposium: Jumping Genes: Horizontal Gene Transfer in Insects and Beyond	9:15 AM - 12:00 PM	Room W340 A, Convention Center
Symposium: Medical and Veterinary Entomology in Florida	9:15 AM - 12:00 PM	Room W414 C, Convention Center
Symposium: The Use of Plant Resources Against Biting Flies	9:15 AM - 12:00 PM	Room W414 D, Convention Center
Symposium: Critical Factors Modifying the Effects of Climate Change on the Distributions of Vector-Borne Diseases	9:15 AM - 12:15 PM	Room W230 B, Convention Center
Symposium: 9th International Symposium on the Chrysomelidae	9:15 AM - 12:15 PM	Room W224 A, Convention Center
Symposium: Advances in Insect Control and in Resistance Management	9:15 AM - 12:30 PM	Room W224 B, Convention Center
Symposium: Department of Defense Entomology and Global Public Health: Working Together to Combat Vector Borne Disease and Protect the Environment	9:15 AM - 12:30 PM	Room W222 B, Convention Center
Symposium: IPM Strategies for the Management and Sustainability of Honey Bees ( <i>Apis mellifera</i> ) Across the Globe	9:15 AM - 12:30 PM	Room W224 F, Convention Center
Symposium: Insect Genetic Technologies: State of the Art and Promise for the Future	9:15 AM - 12:30 PM	Room W340 B, Convention Center
Symposium: <i>Sirex noctilio</i> : A Global Forest Insect	9:15 AM - 12:30 PM	Room W330 B, Convention Center



**PAPER (ORAL) PRESENTATIONS**

Contributed Papers: Stored Products Entomology: Fumigants and Hypoxia	9:15 AM - 12:15 PM	West Hall F2 (WF2), Convention Center
Contributed Papers: Ecology and Population Dynamics: Community Services	9:15 AM - 12:30 PM	Room W225 A, Convention Center
Contributed Papers: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops	9:15 AM - 12:30 PM	West Hall F3 (WF3), Convention Center
Contributed Papers: Invasive and Exotic Entomology: Geography and Biology	9:15 AM - 12:30 PM	Room W223 B, Convention Center
Contributed Papers: Medical and Veterinary Entomology: Flies of Veterinary Importance	9:15 AM - 12:30 PM	West Hall F4 (WF4), Convention Center
Contributed Papers: Medical and Veterinary Entomology: Ticks I	9:15 AM - 12:30 PM	West Hall F1 (WF1), Convention Center
Contributed Papers: Agricultural and Forest Entomology: Fruits, Vegetables, Cereals, and Grains	9:15 AM - 12:45 PM	Room W231 C, Convention Center
Contributed Papers: Insect Chemical Ecology: Attractants	9:15 AM - 12:45 PM	Room W314 B, Convention Center
Contributed Papers: Integrated Pest Management and Sustainable Agriculture: Biological Pest Management	9:15 AM - 12:45 PM	Room W231 B, Convention Center
Contributed Papers: Physiology and Biochemistry: Fundamental	9:15 AM - 12:45 PM	Room W315 A, Convention Center
Contributed Papers: Ecology and Population Dynamics: Interactions	9:15 AM - 1:00 PM	Room W225 B, Convention Center
Contributed Papers: Physiology and Biochemistry: Molecular, Genetics, and Genomics	9:15 AM - 1:00 PM	Room W315 B, Convention Center
Contributed Papers: Agricultural and Forest Entomology: Pesticide Efficacy and Resistance Management	9:15 AM - 1:15 PM	Room W232 A, Convention Center

**STUDENT PAPER (ORAL) PRESENTATION COMPETITION**

Graduate Student Oral Competition: Biological Control and Insect Pathology: Biological Control	9:15 AM - 12:00 PM	Room W240 A, Convention Center
Graduate Student Oral Competition: Ecology and Population Dynamics: Pollinators	9:15 AM - 12:00 PM	Room W240 B, Convention Center
Graduate Student Oral Competition: Ecology and Population Dynamics: Ecology and Evolution	9:15 AM - 12:15 PM	Room W240 C, Convention Center
Graduate Student Oral Competition: Invasive and Exotic Entomology: Invasives	9:15 AM - 12:15 PM	Room W240 D, Convention Center
Graduate Student Oral Competition: Genetics and Evolutionary Entomology: Population Genetics	9:15 AM - 12:30 PM	Room W232 B, Convention Center
Graduate Student Oral Competition: Physiology and Biochemistry: Abiotic/Biotic Effects	9:15 AM - 12:30 PM	Room W232 C, Convention Center

**THURSDAY, SEPTEMBER 29**

SESSION	TIME	LOCATION
<b>PLENARY SESSION</b>		
Plenary Presentation Featuring Dr. Jaqueline Beggs	8:00 AM – 9:00 AM	Valencia Room, Convention Center
Plenary Presentation Featuring Dr. Jennifer Fewell	8:00 AM – 9:00 AM	Chapin Theater, Convention Center
Wigglesworth Memorial Lecture Award Featuring Dr. John G. Hildebrand	6:00 PM – 7:00 PM	Chapin Theater, Convention Center

**POSTERS**

Poster Session 3: Entomophagy and Entomology in Popular Culture	9:00 AM - 5:00 PM	West Hall C, Convention Center
Poster Session 3: Genetics and Evolutionary Entomology	9:00 AM - 5:00 PM	West Hall C, Convention Center
Poster Session 3: Insect Chemical Ecology	9:00 AM - 5:00 PM	West Hall C, Convention Center
Poster Session 3: Insect Neurobiology	9:00 AM - 5:00 PM	West Hall C, Convention Center
Poster Session 3: Integrated Pest Management and Sustainable Agriculture	9:00 AM - 5:00 PM	West Hall C, Convention Center
Poster Session 3: Invasive and Exotic Entomology	9:00 AM - 5:00 PM	West Hall C, Convention Center
Poster Session 3: Physiology and Biochemistry	9:00 AM - 5:00 PM	West Hall C, Convention Center



# THURSDAY • DAILY SCHEDULE OF SCIENTIFIC PROGRAM •

Poster Session 3: RNAi and Gene Expression Control in Insects	9:00 AM - 5:00 PM	West Hall C, Convention Center
Virtual Poster Session	9:00 AM - 5:00 PM	West Hall C, Convention Center
<b>SYMPOSIA</b>		
Symposium: Peridomestic Animals and Chagas Vector Control	9:15 AM - 11:15 AM	Room W230 B, Convention Center
Symposium: Case Studies in Entomology: Four Examples of Global Excellence	9:15 AM - 11:15 AM	Room W222 A, Convention Center
Symposium: Global Perspectives on Soft Ticks (Argasidae) as Pests and Disease Vectors	9:15 AM - 11:15 AM	Room W414 D, Convention Center
Symposium: Olfaction and Olfaction-Mediated Behaviors	9:15 AM - 11:15 AM	West Hall F4 (WF4), Convention Center
Symposium: Stable Flies in Agroecosystems: An International Problem	9:15 AM - 11:15 AM	Room W232 B, Convention Center
Symposium: Vector Biology and Ecology Perspective: Roadblocks and Solutions to Malaria Elimination	9:15 AM - 11:15 AM	Room W414 B, Convention Center
Symposium: <i>Trichogramma</i> in Augmentative Biological Control: A Worldwide View of the Past, Present, and Future	9:15 AM - 11:15 AM	Room W222 B, Convention Center
Symposium: Molecular Strategies/Mechanisms of Insect Reproduction	9:15 AM - 11:30 AM	Room W331 B, Convention Center
Symposium: Entomology without Borders: Senior Member Symposium with Retired and Emeriti Professionals on Sharing their Involvement after Retirement	9:15 AM - 11:30 AM	Room W231 C, Convention Center
Symposium: Global Challenges in Applied Urban Entomology	9:15 AM - 11:30 AM	Room W232 C, Convention Center
Symposium: New Insights into the Metabolism of Mosquitoes that are Vectors of Human Diseases	9:15 AM - 11:30 AM	Room W414 A, Convention Center
Symposium: Advances in Tick and Mite Biology, Animal Disease Transmission, and Control	9:15 AM - 11:45 AM	Room W414 C, Convention Center
Symposium: Endocrine and Neural Networks that Control and Regulate Behavioral Programs	9:15 AM - 11:45 AM	Room W223 A, Convention Center
Symposium: Integrated Pest Management Around the World	9:15 AM - 11:45 AM	Room W231 A, Convention Center
Symposium: Talking to Swarms Without Borders: Methods for Engaging the Public in the Buzz about Entomology	9:15 AM - 11:45 AM	Room W330 B, Convention Center
Symposium: Arboviruses and One Health	9:15 AM - 12:00 PM	Room W230 C, Convention Center
Symposium: Economics of IPM in the 21st Century: Multiple Perspectives from Around the World	9:15 AM - 12:00 PM	Room W331 A, Convention Center
Symposium: Epigenetics and Insect Adaptation to Their Environment	9:15 AM - 12:00 PM	West Hall F3 (WF3), Convention Center
Symposium: Stable Isotope 'Fingerprinting' in Insect Ecology	9:15 AM - 12:00 PM	Room W231 B, Convention Center
Symposium: Towards Improved Reference Assemblies for Insect Genomes	9:15 AM - 12:00 PM	Room W224 E, Convention Center
Symposium: <i>Drosophila sukuzii</i> , an Invasive Pest of Small and Stone Fruits	9:15 AM - 12:00 PM	Room W240 C, Convention Center
Symposium: Virus-Insect Interactions	9:15 AM - 12:15 PM	West Hall F1 (WF1), Convention Center
Symposium: Advances in Acarology	9:15 AM - 12:15 PM	Room W314 B, Convention Center
Symposium: Sin Fronteras: Forging Collaborations through the Americas: 4th Latin American/Hispanic Symposium	9:15 AM - 12:15 PM	Room W340 A, Convention Center
Symposium: Beyond Pests: Biodiversity in the Urban Environment	9:15 AM - 12:30 PM	Room W230 D, Convention Center
Symposium: Excavation and Construction by Social Insects: Integrating Positive and Negative Space	9:15 AM - 12:30 PM	Room W240 D, Convention Center
Symposium: Phylogeny and Evolution of Insect Communication Systems	9:15 AM - 12:30 PM	Room W315 B, Convention Center
Symposium: Population Biology of Winter Moth, <i>Operophtera brumata</i> L., and Related Geometrids on Two Continents	9:15 AM - 12:30 PM	Room W331 C, Convention Center
Symposium: Bioinspiration Crossing Disciplinary Borders	9:15 AM - 1:00 PM	Room W315 A, Convention Center
Symposium in Honor of the 2016 Recipients of Certificates of Distinction	1:30 PM - 3:00 PM	Room W224 G, Convention Center
Symposium: Dynamic Interactions at the Tick-Host-Pathogen Interface	1:30 PM - 3:00 PM	Room W240 C, Convention Center
Symposium: Neotropical Insect Galls	1:30 PM - 3:45 PM	Room W224 A, Convention Center



Symposium: Effect of Global Climate Change on Vector-Borne Disease Transmission	1:30 PM - 3:45 PM	Room W240 B, Convention Center
Symposium: Insect Gut Microbe Interactions	1:30 PM - 3:45 PM	Room W330 B, Convention Center
Symposium: Arthropod Saliva: From Basic Science to Practical Applications	1:30 PM - 4:00 PM	Room W331 D, Convention Center
Symposium: Biogeographical Lessons Learned from the West Indies	1:30 PM - 4:00 PM	West Hall F4 (WF4), Convention Center
Symposium: Innovative Application Technologies for Pest Management	1:30 PM - 4:00 PM	Room W331 B, Convention Center
Symposium: Insect Photography Symposium: Bringing the Small to the World	1:30 PM - 4:00 PM	Room W230 B, Convention Center
Symposium: Invasive Termite Species: Where Are They From, Where Are They Now, and Where Will They Be?	1:30 PM - 4:00 PM	Room W240 D, Convention Center
Symposium: Trade-offs and Immunity: Physiology, Life-History, and Evolution	1:30 PM - 4:15 PM	Room W230 D, Convention Center
Symposium: International Graduate Student Showcase	1:30 PM - 4:15 PM	Room W340 B, Convention Center
Symposium: Mosquito Host Detection	1:30 PM - 4:15 PM	Room W330 C, Convention Center
Symposium: Entomologists without Borders: The Need for Collaboration Between Medical Professionals and Entomologists for the Betterment of Global Public Health	1:30 PM - 4:30 PM	Room W230 C, Convention Center
Symposium: Regional Status of Microbial Control Programs	1:30 PM - 4:30 PM	Room W232 B, Convention Center
Symposium: SOLA Scarab Workers	1:30 PM - 4:30 PM	Room W223 A, Convention Center
Symposium: Sericigenous Insects and 3F's: Fibre, (Human) Food and Feed-Global Status, and Future Role in Resolving Global Challenges	1:30 PM - 4:30 PM	Room W224 F, Convention Center
Symposium: International Perspectives Contribute Towards a Clearer Understanding of <i>Drosophila suzukii</i>	1:30 PM - 4:45 PM	Room W231 A, Convention Center
Symposium: Next-Generation Technologies for Insect Control	1:30 PM - 4:45 PM	Room W224 D, Convention Center
Symposium: Ecology and Systematics of Elateridae (Coleoptera)	1:30 PM - 4:45 PM	Room W224 E, Convention Center
Symposium: Invasive Ants: Biology and Control	1:30 PM - 4:45 PM	Room W232 A, Convention Center
Symposium: Invasive Bark and Ambrosia Beetles: A Pest Problem of Worldwide Significance	1:30 PM - 4:45 PM	Room W414 C, Convention Center
Symposium: Mechanisms Affecting the Efficiency of RNA Interference in Insects	1:30 PM - 4:45 PM	Room W331 A, Convention Center
Symposium: Approaches for Modeling Insect Pest Potential Distribution and Spread	1:30 PM - 5:00 PM	Room W331 C, Convention Center
Symposium: Breeding Honey Bees, <i>Apis mellifera</i> , for Resistance to <i>Varroa destructor</i>	1:30 PM - 5:00 PM	Room W414 B, Convention Center
Symposium: Engaging the World of Arthropod Education in a Digital Age	1:30 PM - 5:00 PM	Room W230 A, Convention Center
Symposium: Evolution of a Megadiverse Group: The Ichneumonoid Wasps (Hymenoptera: Braconidae, Ichneumonidae)	1:30 PM - 5:00 PM	Room W222 A, Convention Center
Symposium: Harnessing the Power of Genomics Tools: Functional Genomics of Pollinator Health	1:30 PM - 5:00 PM	Room W340 A, Convention Center
Symposium: Orthopteroids Without Borders	1:30 PM - 5:00 PM	Room W231 C, Convention Center
Symposium: Synthesis in Sternorrhyncha Systematics	1:30 PM - 5:00 PM	Room W222 B, Convention Center
Symposium: Millions of Hectares and Counting: Knowledge Gained during Recent Bark Beetle Outbreaks in Western North America	1:30 PM - 5:15 PM	Room W314 A, Convention Center
Symposium: Ant-Plant Interactions in a Changing World	1:30 PM - 5:15 PM	Room W224 H, Convention Center
Symposium: Invasive Disease Vectors in Urban Environments: Current Challenges and Future Solutions	1:30 PM - 5:15 PM	Room W414 D, Convention Center
Symposium: Wings and Powered Flight: Core Novelty in Insect Evolution	1:30 PM - 5:15 PM	Room W315 A, Convention Center
Symposium: Combining Insect Life Table, Consumption Rate, and Predation Rate for IPM and Biological Control	1:30 PM - 5:30 PM	Room W224 C, Convention Center
Symposium: Climate Change Impacts and Insect Population Dynamics	1:30 PM - 5:30 PM	West Hall F2 (WF2), Convention Center
Symposium: Cold Physiology in a Warming World	1:30 PM - 5:30 PM	Room W231 B, Convention Center
Symposium: Ecology, Surveillance, and Control of Biting Midges	1:30 PM - 5:30 PM	Room W330 A, Convention Center



# THURSDAY • DAILY SCHEDULE OF SCIENTIFIC PROGRAM •

Symposium: From Genes to Grains: The Current Sugarcane Aphid Outbreak on Sorghum in the Southern U.S.	1:30 PM - 5:30 PM	Room W224 B, Convention Center
Symposium: Impact of Native and Invasive Alien True Bug Species in Agro-Ecosystems: Range Expansion, Pest Status, and Control Tactics	1:30 PM - 5:30 PM	Chapin Theater, Convention Center
Symposium: Insect Sex Determination	1:30 PM - 5:30 PM	West Hall F3 (WF3), Convention Center

## PAPER (ORAL) PRESENTATIONS

Contributed Papers: Biological Control and Insect Pathology: Plant and Other Extracts as Biocides	9:15 AM - 11:15 AM	Room W314 A, Convention Center
Contributed Papers: Invasive and Exotic Entomology: Diagnostics, Methods, and Responses	9:15 AM - 11:30 AM	Room W223 B, Convention Center
Contributed Papers: Ecology and Population Dynamics: Behavior	9:15 AM - 11:45 AM	Room W225 B, Convention Center
Contributed Papers: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops	9:15 AM - 12:00 PM	Room W340 B, Convention Center
Contributed Papers: Morphology, Systematics, and Phylogeny: Bees, Ants, and Wasps	9:15 AM - 12:00 PM	Room W224 H, Convention Center
Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Population and Community Diversity	9:15 AM - 12:15 PM	Room W331 D, Convention Center
Contributed Papers: Medical and Veterinary Entomology: Mosquito Ecology and Management	9:15 AM - 12:15 PM	Room W230 A, Convention Center
Contributed Papers: Morphology, Systematics, and Phylogeny: Tenebrionids, Clerids, Staphylinids, and Scarabs	9:15 AM - 12:15 PM	Room W225 A, Convention Center
Contributed Papers: Bioinformatics and Comparative Genomics of Arthropods: Gene Expression	9:15 AM - 12:30 PM	Room W330 A, Convention Center
Contributed Papers: Genetics and Evolutionary Entomology: Trait Expression	9:15 AM - 12:30 PM	Room W224 G, Convention Center
Contributed Papers: Morphology, Systematics, and Phylogeny: Lepidoptera	9:15 AM - 12:45 PM	Room W330 C, Convention Center
Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Coleoptera	1:30 PM - 5:00 PM	Room W414 A, Convention Center
Contributed Papers: Biological Control and Insect Pathology: Unique Studies II	1:30 PM - 5:15 PM	West Hall F1 (WF1), Convention Center
Contributed Papers: Ecology and Population Dynamics: Community	1:30 PM - 5:15 PM	Room W315 B, Convention Center
Contributed Papers: Apidology, Sericulture, and Social Insects: Behavior	1:30 PM - 5:15 PM	Room W225 A, Convention Center
Contributed Papers: Apidology, Sericulture, and Social Insects: Ecology	1:30 PM - 5:15 PM	Room W225 B, Convention Center
Contributed Papers: Physiology and Biochemistry: Neurophysiology and Hormone Regulation	1:30 PM - 5:15 PM	Room W314 B, Convention Center
Contributed Papers: Physiology and Biochemistry: Toxicology, Metabolism, and Nutrition	1:30 PM - 5:15 PM	Room W223 B, Convention Center
Contributed Papers: Arthropod Vectors of Animal and Plant Diseases: Plant-Insect-Pathogen Interactions	1:30 PM - 5:30 PM	Room W240 A, Convention Center
Contributed Papers: Biological Control and Insect Pathology: Utilizing Parasitoid Wasps II	3:30 PM - 5:15 PM	Room W224 G, Convention Center

## STUDENT PAPER (ORAL) PRESENTATION COMPETITION

Graduate Student Oral Competition: Apidology, Sericulture, and Social Insects: Pollinators	9:15 AM - 11:15 AM	Room W224 D, Convention Center
Graduate Student Oral Competition: Urban Entomology in a Changing Environment: Home and Warehouse Pests	9:15 AM - 11:15 AM	Room W224 A, Convention Center
Graduate Student Oral Competition: Agricultural and Forest Entomology: Vectors and Others	9:15 AM - 11:30 AM	Room W240 B, Convention Center
Graduate Student Oral Competition: Agricultural and Forest Entomology: Pollinators	9:15 AM - 11:30 AM	Room W224 C, Convention Center
Graduate Student Oral Competition: Urban Entomology in a Changing Environment: Ants	9:15 AM - 11:30 AM	Room W224 B, Convention Center



Graduate Student Oral Competition: Biodiversity, Biogeography, and Conservation of Arthropods: Butterflies and Others	9:15 AM - 12:30 PM	Room W224 F, Convention Center
Graduate Student Oral Competition: Functional Genomics and Transgenesis	9:15 AM - 12:30 PM	Room W240 A, Convention Center
Graduate Student Oral Competition: Integrated Pest Management and Sustainable Agriculture: Thrips and Others	9:15 AM - 12:45 PM	Room W232 A, Convention Center
Graduate Student Oral Competition: Morphology, Systematics, and Phylogeny: Hymenoptera	1:30 PM - 5:30 PM	Room W232 C, Convention Center

**FRIDAY, SEPTEMBER 30**

SESSION	TIME	LOCATION
<b>PLENARY SESSION</b>		
Plenary Presentation Featuring Dr. Fred Gould	8:00 AM – 9:00 AM	Chapin Theater, Convention Center
Plenary Presentation Featuring Dr. John A. Pickett	8:00 AM – 9:00 AM	Valencia Room, Convention Center
<b>POSTERS</b>		
Poster Session 4: Agriculture and Forest Entomology, Part 2	9:00 AM - 2:00 PM	West Hall C, Convention Center
Poster Session 4: Apidology, Sericulture, and Social Insects	9:00 AM - 2:00 PM	West Hall C, Convention Center
Poster Session 4: Biodiversity, Biogeography, and Conservation of Arthropods, Part 2	9:00 AM - 2:00 PM	West Hall C, Convention Center
Poster Session 4: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops, Part 2	9:00 AM - 2:00 PM	West Hall C, Convention Center
Poster Session 4: Insect Immunology	9:00 AM - 2:00 PM	West Hall C, Convention Center
Poster Session 4: Insects in Food Safety and Homeland Security	9:00 AM - 2:00 PM	West Hall C, Convention Center
Poster Session 4: Medical and Veterinary Entomology, Part 2	9:00 AM - 2:00 PM	West Hall C, Convention Center
Poster Session 4: Morphology, Systematics, and Phylogeny	9:00 AM - 2:00 PM	West Hall C, Convention Center
Poster Session 4: Arthropod Vectors of Animal and Plant Disease	9:00 AM - 2:00 PM	West Hall C, Convention Center
Virtual Poster Session	9:00 AM - 2:00 PM	West Hall C, Convention Center
<b>SYMPOSIA</b>		
Symposium: Making Species Inventories Work for You: Diverse Uses Across Varied Fields	9:15 AM - 11:15 AM	Room W224 B, Convention Center
Symposium: Discovering Sustainable Insecticides: Resistance, Innovation, and Responsibility	9:15 AM - 11:15 AM	Room W224 C, Convention Center
Symposium: Keeping Science in Citizen Science	9:15 AM - 11:15 AM	Room W315 A, Convention Center
Symposium: Partners in Crime: Vector-Pathogen Interactome	9:15 AM - 11:15 AM	Room W232 C, Convention Center
Symposium: Rapid Evolutionary Radiations in Insects: Phylogenetic Causes and Consequences of Life in the Fast Lane	9:15 AM - 11:15 AM	Room W231 A, Convention Center
Symposium: Ecologically-Based Integrated Pest Management for Selected Food Security Crops in Central Asia	9:15 AM - 11:30 AM	Room W240 C, Convention Center
Symposium: Exploiting Multi-Trophic Interactions in the Management of Invasive Agricultural Arthropod Pests	9:15 AM - 11:30 AM	Room W240 B, Convention Center
Symposium: Genetics and Genomics of Mosquitoes and Implications for Transmission of Pathogens	9:15 AM - 11:30 AM	Room W224 F, Convention Center
Symposium: Insects and Landscape Ecology: Defining an Entomological Perspective	9:15 AM - 11:30 AM	Room W414 B, Convention Center
Symposium: New Approaches to Biological and Integrated Control Changing Global Perspectives on Filth Fly Management	9:15 AM - 11:30 AM	Room W224 E, Convention Center
Symposium: Outlaws of Immunology and Infection	9:15 AM - 11:30 AM	Room W414 D, Convention Center
Symposium: The Brown Marmorated Stink Bug: An Invasive Insect of Global Importance	9:15 AM - 11:45 AM	Room W223 A, Convention Center
Symposium: Advancement and Challenges in Biological Control of Invasive Forest Insects: A Global Perspective	9:15 AM - 11:45 AM	Room W232 B, Convention Center



## FRIDAY • DAILY SCHEDULE OF SCIENTIFIC PROGRAM •

Symposium: Forest Entomology without Borders: Balancing Market Forces with Government Intervention	9:15 AM - 11:45 AM	Room W222 A, Convention Center
Symposium: Future Approaches for the Control of Insect Pests	9:15 AM - 11:45 AM	Room W231 C, Convention Center
Symposium: Modulation of Insect Chemical Response at Different Time Scales: Ethology, Ecology, and Evolution	9:15 AM - 11:45 AM	Room W230 B, Convention Center
Symposium: Spreading the Word: Bed Bug Education and Training in Today's Society	9:15 AM - 11:45 AM	West Hall F4 (WF4), Convention Center
Symposium: Hormones in Arthropod Vectors of Infectious Diseases	9:15 AM - 12:00 PM	Room W232 A, Convention Center
Symposium: Behavior and Ecology of Native, Naturalized, and Invasive Ladybird Beetles	9:15 AM - 12:00 PM	Room W224 G, Convention Center
Symposium: Cassava and Bean IPM throughout the Developing World: Honoring the Contributions of Anthony Bellotti and César Cardona Mejía	9:15 AM - 12:00 PM	Room W330 A, Convention Center
Symposium: Physiological Responses to Environmental Change	9:15 AM - 12:00 PM	Room W414 C, Convention Center
Symposium: Evolution of Insect Sociality: From Theory to Genomes and Back Again	9:15 AM - 12:15 PM	Room W414 A, Convention Center
Symposium: Globally Important Pests and Globally Important Control Tools: Comparing and Contrasting IRM Successes and Challenges, IRAC US Symposium	9:15 AM - 12:15 PM	Room W224 H, Convention Center
Symposium: Insect-Resistant GM Crops in Asia-Pacific: Current Status, Challenges, and Opportunities	9:15 AM - 12:15 PM	Room W222 B, Convention Center
Symposium: Global Improvements in Invasive Ant Management	9:15 AM - 12:30 PM	Room W224 D, Convention Center
Symposium: Insects and Ecosystem Services with Special Reference to Pollination Biology	9:15 AM - 12:30 PM	Room W224 A, Convention Center
Symposium: Aquatic Entomology Around the World	1:30 PM - 3:45 PM	Room W240 D, Convention Center
Symposium: Ecology, Biodiversity, and Geography of Gall-Inducing Insects: Now and Beyond	1:30 PM - 3:45 PM	Room W330 B, Convention Center
Symposium: Vector Immunology	1:30 PM - 3:45 PM	Room W240 C, Convention Center
Symposium: Neuro-Endocrine Regulation of Reproduction in Insects	1:30 PM - 4:00 PM	Room W224 B, Convention Center
Symposium: Arthropod Population Genomics	1:30 PM - 4:00 PM	Room W331 A, Convention Center
Symposium: Global Research and Development of Insect Repellents	1:30 PM - 4:00 PM	Room W224 C, Convention Center
Symposium: Global Status of Native and Invasive Coccinellids	1:30 PM - 4:00 PM	Room W224 E, Convention Center
Symposium: Technological Innovations and Integrated Pest Management	1:30 PM - 4:00 PM	Room W331 B, Convention Center
Symposium: Optical Manipulation of Arthropod Pests and Beneficials	1:30 PM - 4:15 PM	Room W331 D, Convention Center
Symposium: An Invasive Planthopper Goes Global: Shedding Light on the Spotted Lanternfly ( <i>Lycorma delicatula</i> )	1:30 PM - 4:15 PM	Room W232 C, Convention Center
Symposium: Anti-Tick Vaccine Development: Possibilities in the Post-Genomics Era	1:30 PM - 4:15 PM	Room W224 F, Convention Center
Symposium: Harnessing the Power of Genomics Tools: Monitoring Stressors in Pollinator Populations	1:30 PM - 4:15 PM	Room W315 A, Convention Center
Symposium: Key Challenges with Bt Crops in Latin America	1:30 PM - 4:15 PM	Room W231 B, Convention Center
Symposium: Global Challenges in Rice Pest Management	1:30 PM - 4:30 PM	Room W230 C, Convention Center
Symposium: Integrated Crop Pollination in Theory and Practice	1:30 PM - 4:30 PM	Room W414 C, Convention Center
Symposium: Regulation of Honey Bee Polyethism: Clock, Neuroendocrine System, and Environmental Toxicants	1:30 PM - 4:30 PM	Room W315 B, Convention Center
Symposium: <i>Rhipicephalus sanguineus</i> : Tick without Borders	1:30 PM - 4:30 PM	Room W224 H, Convention Center
Symposium: Insect Symbiosis and Immunity	1:30 PM - 4:45 PM	Room W330 A, Convention Center
Symposium: New Insights into Biology, Resistance Mechanisms, and the Management of the Modern Bed Bug	1:30 PM - 4:45 PM	West Hall F4 (WF4), Convention Center
Symposium: Entomology in the Digital Age	1:30 PM - 4:45 PM	Room W222 A, Convention Center
Symposium: Molecular Pharmacology and Physiology of Membrane Transport and Signaling Processes	1:30 PM - 4:45 PM	Room W330 C, Convention Center
Symposium: Monitoring and Forecasting of Migratory Insect Movements	1:30 PM - 4:45 PM	Room W232 A, Convention Center





Symposium: Pink Hibiscus Mealybug ( <i>Maconellicoccus hirsutus</i> ) Invasions: What We Have Learned...What We Need to Re-Learn	1:30 PM - 4:45 PM	Room W331 C, Convention Center
Symposium: Wood Borer-Fungus Alliances and Conflicts: The Frontier of Forest Entomology	1:30 PM - 4:45 PM	Room W414 D, Convention Center
Symposium: Evolution, Classification, and Biology of Cucujooid Beetles (Coleoptera: Cucujoidea)	1:30 PM - 5:00 PM	Room W225 B, Convention Center
Symposium: Genetically Modified Insecticidal Crops and Sustainable Pest Management: An Ecological Perspective of Their Compatibility in Sustainable Agriculture	1:30 PM - 5:00 PM	Room W340 B, Convention Center
Symposium: Host Relations of Gall-Inducing Insects	1:30 PM - 5:00 PM	Room W231 C, Convention Center
Symposium: IPM: The Lucrative Bridge Connecting the Ever-Emerging Knowledge Islands of Genetics and Ecology	1:30 PM - 5:00 PM	Room W231 A, Convention Center
Symposium: Tales from the Understory: Unraveling Secrets behind Tropical Butterfly Communication, Behavior, Wing Patterns, and Diversity	1:30 PM - 5:00 PM	West Hall F3 (WF3), Convention Center
Symposium: Biotechnologically-Based Insect Control Strategies	1:30 PM - 5:15 PM	Room W230 D, Convention Center
Symposium: Crop Domestication Effects on Plant-Insect Interactions: Patterns, Mechanisms, and Future Directions	1:30 PM - 5:15 PM	Room W314 A, Convention Center
Symposium: Industry-Academia Collaborative Research and Development in Biological Control of Arthropod Pests: Results from Four Years of Marie-Curie Staff Exchange, and Perspectives	1:30 PM - 5:15 PM	Room W222 B, Convention Center
Symposium: Next-Generation Ecology, Morphology, and Genomics: What can We Learn about the Evolution of Odonata?	1:30 PM - 5:15 PM	Room W224 G, Convention Center
Symposium: Resource Management and Biodiversity in Cockroach and Termite Lineages: Exploring the Common Ground in Their Nutrition, Biodiversity, and Systematics	1:30 PM - 5:15 PM	Room W414 A, Convention Center
Symposium: Connecting with the World's Best Talent: Attracting and Retaining Diverse Entomologists	1:30 PM - 5:30 PM	Room W340 A, Convention Center
Symposium: Diptera Systematics: Deciphering Evolutionary Relationships with Diverse and Novel Data	1:30 PM - 5:30 PM	Room W230 A, Convention Center
Symposium: Eco-Immunology of Invertebrates	1:30 PM - 5:30 PM	Room W224 D, Convention Center
Symposium: Globalizing Sustainable Pest Management in Agriculture	1:30 PM - 5:30 PM	Room W224 A, Convention Center
Symposium: Greenhouse Insect Management Around the World: Common Problems and Solutions from Scientific Collaborations	1:30 PM - 5:30 PM	Room W223 A, Convention Center
Symposium: Interactions Between Pollination Services and Agricultural Practices	1:30 PM - 5:30 PM	Room W414 B, Convention Center
Symposium: Molecular Endocrinology	1:30 PM - 5:30 PM	Room W240 B, Convention Center
Symposium: Potential Invasive Pest Weevil Species of the World	1:30 PM - 5:30 PM	Room W240 A, Convention Center

### PAPER (ORAL) PRESENTATIONS

Contributed Papers: Medical and Veterinary Entomology: Biting Flies	9:15 AM - 11:30 AM	West Hall F3 (WF3), Convention Center
Contributed Papers: Medical and Veterinary Entomology: Ticks II	9:15 AM - 11:30 AM	Room W331 D, Convention Center
Contributed Papers: RNAi and Gene Expression Control in Insects: Interactions	9:15 AM - 11:30 AM	Room W315 B, Convention Center
Contributed Papers: Morphology, Systematics, and Phylogeny: Parasitoid Wasps and Trichoptera	9:15 AM - 11:30 AM	Room W230 D, Convention Center
Contributed Papers: Biological Control and Insect Pathology: Unique Studies III	9:15 AM - 11:45 AM	Room W340 A, Convention Center
Contributed Papers: Morphology, Systematics, and Phylogeny: Behavior, Chrysomelids, Curculionids, and Scarabs	9:15 AM - 11:45 AM	Room W230 A, Convention Center
Contributed Papers: Acarology: Mites	9:15 AM - 12:00 PM	Room W340 B, Convention Center
Contributed Papers: Stored Products Entomology: Novel Strategies II	9:15 AM - 12:00 PM	Room W331 C, Convention Center
Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Lepidoptera	9:15 AM - 12:15 PM	Room W223 B, Convention Center
Contributed Papers: Biological Control and Insect Pathology: Utilizing Parasitoid Wasps I	9:15 AM - 12:15 PM	Room W225 B, Convention Center



## FRIDAY • DAILY SCHEDULE OF SCIENTIFIC PROGRAM •

Contributed Papers: Medical and Veterinary Entomology: Mosquito Behavior and Trapping Technologies	9:15 AM - 12:15 PM	West Hall F2 (WF2), Convention Center
Contributed Papers: Urban Entomology in a Changing Environment: Termites and Ants	9:15 AM - 12:15 PM	West Hall F1 (WF1), Convention Center
Contributed Papers: Morphology, Systematics, and Phylogeny: Hemiptera	9:15 AM - 12:15 PM	Room W225 A, Convention Center
Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Pollination, Agriculture, and Disease Control	9:15 AM - 12:30 PM	Room W230 C, Convention Center
Contributed Papers: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops	9:15 AM - 12:30 PM	Room W314 A, Convention Center
Contributed Papers: Integrated Pest Management and Sustainable Agriculture: Tree Fruits and Nuts	9:15 AM - 12:45 PM	Room W231 B, Convention Center
Contributed Papers: Apidology, Sericulture, and Social Insects: Environmental Responses	9:15 AM - 12:45 PM	Room W240 A, Convention Center
Contributed Papers: Ecology and Population Dynamics: Pest Management	9:15 AM - 1:00 PM	Room W240 D, Convention Center
Contributed Papers: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops: Pollinators	9:15 AM - 1:00 PM	Room W314 B, Convention Center
Contributed Papers: Morphology, Systematics, and Phylogeny: Diptera	9:15 AM - 1:00 PM	Room W331 B, Convention Center
Contributed Papers: Insect-Plant Interactions in a Changing Climate: Host Plant Interactions	1:30 PM - 5:00 PM	Room W232 B, Convention Center
Contributed Papers: Integrated Pest Management and Sustainable Agriculture: Behavioral Pest Management	1:30 PM - 5:00 PM	Room W223 B, Convention Center
Contributed Papers: Apidology, Sericulture, and Social Insects: Management	1:30 PM - 5:15 PM	Room W314 B, Convention Center
Contributed Papers: Urban Entomology in a Changing Environment: Unique Challenges	1:30 PM - 5:15 PM	Room W230 B, Convention Center
Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Hymenoptera	1:30 PM - 5:30 PM	West Hall F2 (WF2), Convention Center
Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Novel Methods	1:30 PM - 5:30 PM	West Hall F1 (WF1), Convention Center
Contributed Papers: Integrated Pest Management and Sustainable Agriculture	1:30 PM - 5:30 PM	Room W225 A, Convention Center

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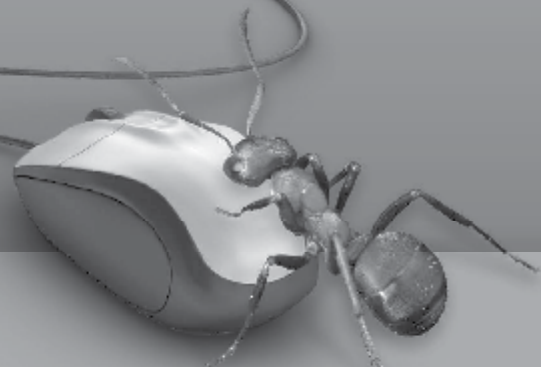
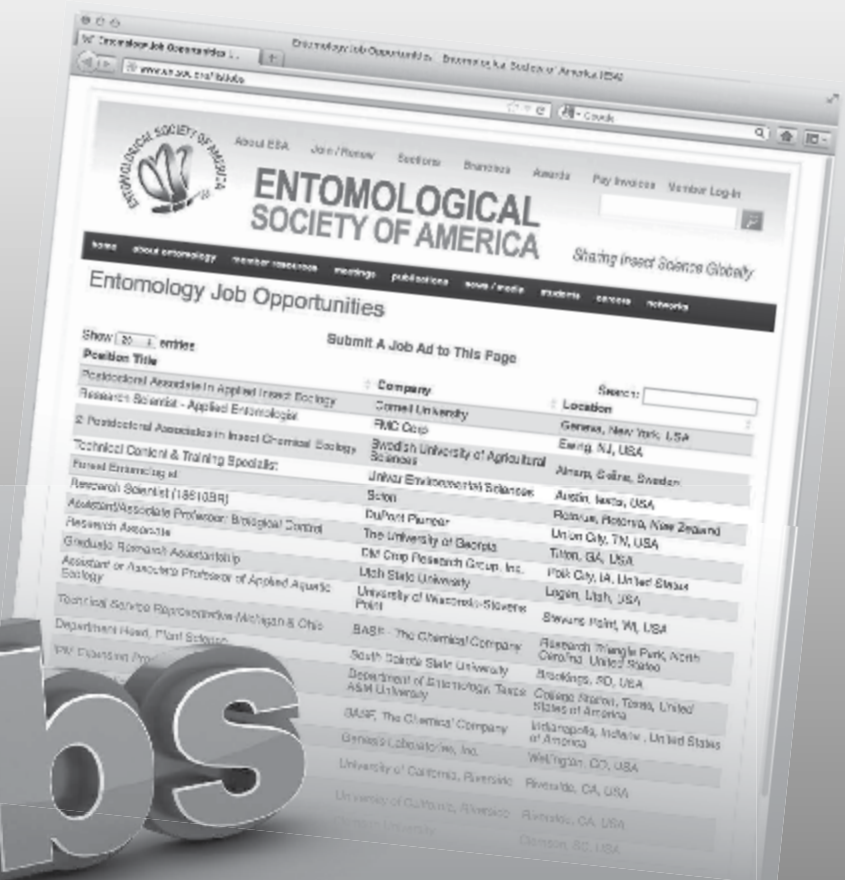
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## DAILY SCHEDULE OF SCIENTIFIC PROGRAM BY ICE TOPIC

ACAROLOGY		
SESSION	TIME	LOCATION
Graduate Student Poster Competition: Acarology and Stored Products	Tuesday, September 27 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Poster Session 2: Acarology	Tuesday, September 27 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Symposium: Advances in Acarology	Thursday, September 29 9:15 AM - 12:15 PM	Room W2314 B, Orange County Convention Center
Symposium: Advances in Tick and Mite Biology, Animal Disease Transmission, and Control	Thursday, September 29 9:15 AM - 11:45 AM	Room W414 C, Orange County Convention Center
Symposium: Global Perspectives on Soft Ticks (Argasidae) as Pests and Disease Vectors	Thursday, September 29 9:15 AM - 11:15 AM	Room W414 D, Orange County Convention Center
Symposium: Dynamic Interactions at the Tick-Host-Pathogen Interface	Thursday, September 29 1:30 PM - 3:00 PM	Room W240 C, Orange County Convention Center
Contributed Papers: Acarology: Mites	Friday, September 30 9:15 AM - 12:00 PM	Room W340 B, Orange County Convention Center

AGRICULTURAL AND FOREST ENTOMOLOGY		
SESSION	TIME	LOCATION
Graduate Student Poster Competition: Agricultural and Forest Entomology	Monday, September 26 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Poster Session 1: Agriculture and Forest Entomology, Part 1	Monday, September 26 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Symposium: Microbial Associates and Microbial Control of Ambrosia Beetles	Monday, September 26 9:15 AM - 11:30 AM	Room W223 A, Orange County Convention Center
Contributed Papers: Agricultural and Forest Entomology: Behavioral and Chemical Ecology	Monday, September 26 9:15 AM - 1:15 PM	Room W224 F, Orange County Convention Center
Symposium: Pest Shifting, Invasive Species, and Resistance Development in Key Growing Areas of the World and the Need for New Technology to Manage Insect Pests	Monday, September 26 1:30 PM - 4:45 PM	Room W314 B, Orange County Convention Center
Graduate Student Oral Competition: Agricultural and Forest Entomology: Hemipteran Pests	Monday, September 26 1:30 PM - 5:00 PM	Room W232 B, Orange County Convention Center
Graduate Student Oral Competition: Agricultural and Forest Entomology: Forest Pests	Monday, September 26 1:30 PM - 5:15 PM	Room W232 C, Orange County Convention Center
Contributed Papers: Agricultural and Forest Entomology: Forest Insects, Pollinators, Systematics, and Remote Sensing	Monday, September 26 1:30 PM - 5:30 PM	Chapin Theater, Orange County Convention Center
Contributed Papers: Agricultural and Forest Entomology: Integrated Pest Management, Host-Plant Interactions, and Transgenic Crops	Monday, September 26 1:30 PM - 5:30 PM	Room W225 B, Orange County Convention Center
Symposium: Profiles of Forest Pests Ready to Cross Borders and Invade New Areas	Monday, September 26 1:30 PM - 5:30 PM	Room W224 A, Orange County Convention Center
Symposium: Innovative Responses to the Global Homogenization of Plantation Pests	Tuesday, September 27 9:15 AM - 11:30 AM	Room W331 D, Orange County Convention Center
Symposium: Avocados, Blueberries, and Olives: Pests of Small Fruit in Florida	Tuesday, September 27 9:15 AM - 12:00 PM	Room W223 A, Orange County Convention Center
Symposium: Bark and Ambrosia Beetles: Biology, Ecology, and Management	Tuesday, September 27 1:30 PM - 4:00 PM	Room W414 C, Orange County Convention Center
Contributed Papers: Agricultural and Forest Entomology: Forest Insects	Tuesday, September 27 1:30 PM - 5:15 PM	Room W225 B, Orange County Convention Center
Symposium: Public-Private Partnerships for Development of Next-Generation Pest Management Methods	Wednesday, September 28 9:15 AM - 11:30 AM	Room W314 A, Orange County Convention Center
Symposium: Agronomic and Economic Benefits of Seed Treatments: The IPM Perspective	Wednesday, September 28 9:15 AM - 12:00 PM	Room W331 A, Orange County Convention Center



• DAILY SCHEDULE OF SCIENTIFIC PROGRAM BY ICE PROGRAM TOPIC •

Contributed Papers: Agricultural and Forest Entomology: Fruits, Vegetables, Cereals, and Grains	Wednesday, September 28 9:15 AM - 12:45 PM	Room W231 C, Orange County Convention Center
Contributed Papers: Agricultural and Forest Entomology: Pesticide Efficacy and Resistance Management	Wednesday, September 28 9:15 AM - 1:15 PM	Room W232 A, Orange County Convention Center
Graduate Student Oral Competition: Agricultural and Forest Entomology: Pollinators	Thursday, September 29 9:15 AM - 11:30 AM	Room W224 C, Orange County Convention Center
Graduate Student Oral Competition: Agricultural and Forest Entomology: Vectors and Others	Thursday, September 29 9:15 AM - 11:30 AM	Room W240 B, Orange County Convention Center
Symposium: Invasive Bark and Ambrosia Beetles: A Pest Problem of Worldwide Significance	Thursday, September 29 1:30 PM - 4:45 PM	Room W414 C, Orange County Convention Center
Symposium: Millions of Hectares and Counting: Knowledge Gained during Recent Bark Beetle Outbreaks in Western North America	Thursday, September 29 1:30 PM - 5:15 PM	Room W314 A, Orange County Convention Center
Poster Session 4: Agriculture and Forest Entomology, Part 2	Friday, September 30 9:00 AM - 2:00 PM	West Hall C, Orange County Convention Center
Symposium: The Brown Marmorated Stink Bug: An Invasive Insect of Global Importance	Friday, September 29 9:15 AM - 11:45 AM	Room W223 A, Orange County Convention Center
Symposium: Forest Entomology without Borders: Balancing Market Forces with Government Intervention	Friday, September 29 9:15 AM - 11:45 AM	Room W222 A, Orange County Convention Center
Symposium: Technological Innovations and Integrated Pest Management	Friday, September 29 1:30 PM - 4:00 PM	Room W331 B, Orange County Convention Center
Symposium: Global Challenges in Rice Pest Management	Friday, September 29 1:30 PM - 4:30 PM	Room W230 C, Orange County Convention Center

**APIDOLOGY, SERICULTURE, AND SOCIAL INSECTS**

SESSION	TIME	LOCATION
Graduate Student Poster Competition: Apidology, Sericulture, and Social Insects: Bees	Monday, September 26 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Graduate Student Poster Competition: Apidology, Sericulture, and Social Insects: Ants and Termites	Monday, September 26 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Symposium: Genomics and Genome Engineering in the Silkworm	Monday, September 26 9:15 AM - 11:30 AM	Room W330 A, Orange County Convention Center
Graduate Student Oral Competition: Apidology, Sericulture, and Social Insects: Termites	Monday, September 26 9:15 AM - 11:45 AM	Room W231 C, Orange County Convention Center
Symposium: Wild Sericulture for Alternative Income and Economic Incentive for Biodiversity Conservation	Monday, September 26 9:15 AM - 12:00 PM	Room W222 B, Orange County Convention Center
Graduate Student Oral Competition: Apidology, Sericulture, and Social Insects: Honey Bees I	Monday, September 26 9:15 AM - 12:45 PM	Room W230 B, Orange County Convention Center
Symposium: Insights into the Biology of Wild and Managed Native Bees	Monday, September 26 1:30 PM - 5:30 PM	Room W224 C, Orange County Convention Center
Graduate Student Oral Competition: Apidology, Sericulture, and Social Insects: Honey Bees II	Tuesday, September 27 9:15 AM - 11:45 AM	Room W240 A, Orange County Convention Center
Graduate Student Oral Competition: Apidology, Sericulture, and Social Insects: Ants	Tuesday, September 27 9:15 AM - 12:00 PM	Room W240 B, Orange County Convention Center
Contributed Papers: Apidology, Sericulture, and Social Insects: Physiology, Genetics, and Genomics	Tuesday, September 27 9:15 AM - 12:30 PM	Room W314 A, Orange County Convention Center
Symposium: Status of Worldwide Honey Bee Health and Its Impacts on Agriculture	Tuesday, September 27 1:30 PM - 3:45 PM	Chapin Theater, Orange County Convention Center
Symposium: IPM Strategies for the Management and Sustainability of Honey Bees ( <i>Apis mellifera</i> ) Across the Globe	Wednesday, September 28 9:15 AM - 12:30 PM	Room W224 F, Orange County Convention Center
Symposium: Excavation and Construction by Social Insects: Integrating Positive and Negative Space	Wednesday, September 28 9:15 AM - 12:30 PM	Room W240 D, Orange County Convention Center
Graduate Student Oral Competition: Apidology, Sericulture and Social Insects: Pollinators	Thursday, September 29 9:15 AM - 11:15 AM	Room W224 D, Orange County Convention Center
Symposium: Invasive Ants: Biology and Control	Thursday, September 29 1:30 PM - 4:45 PM	Room W232 A, Orange County Convention Center



• DAILY SCHEDULE OF SCIENTIFIC PROGRAM BY ICE PROGRAM TOPIC •

Symposium: Breeding Honey Bees, <i>Apis mellifera</i> , for Resistance to <i>Varroa destructor</i>	Thursday, September 29 1:30 PM - 5:00 PM	Room W414 B, Orange County Convention Center
Symposium: Harnessing the Power of Genomics Tools: Functional Genomics of Pollinator Health	Thursday, September 29 1:30 PM - 5:00 PM	Room W340 A, Orange County Convention Center
Contributed Papers: Apidology, Sericulture, and Social Insects: Ecology	Thursday, September 29 1:30 PM - 5:15 PM	Room W225 B, Orange County Convention Center
Contributed Papers: Apidology, Sericulture and Social Insects: Behavior	Thursday, September 29 1:30 PM - 5:15 PM	Room W225 A, Orange County Convention Center
Poster Session 4: Apidology, Sericulture, and Social Insects	Friday, September 30 9:00 AM - 2:00 PM	West Hall C, Orange County Convention Center
Symposium: Evolution of Insect Sociality: From Theory to Genomes and Back Again	Friday, September 30 9:15 AM - 12:15 PM	Room W414 A, Orange County Convention Center
Symposium: Insects and Ecosystem Services with Special Reference to Pollination Biology	Friday, September 30 9:15 AM - 12:30 PM	Room W224 A, Orange County Convention Center
Contributed Papers: Apidology, Sericulture, and Social Insects: Environmental Responses	Friday, September 30 9:15 AM - 12:45 PM	Room W240 A, Orange County Convention Center
Symposium: Harnessing the Power of Genomics Tools: Monitoring Stressors in Pollinator Populations	Friday, September 30 1:30 PM - 4:15 PM	Room W315 A, Orange County Convention Center
Symposium: Integrated Crop Pollination in Theory and Practice	Friday, September 30 1:30 PM - 4:30 PM	Room W414 C, Orange County Convention Center
Symposium: Regulation of Honey Bee Polyethism: Clock, Neuroendocrine System, and Environmental Toxicants	Friday, September 30 1:30 PM - 4:30 PM	Room W315 B, Orange County Convention Center
Contributed Papers: Apidology, Sericulture, and Social Insects: Management	Friday, September 30 1:30 PM - 5:15 PM	Room W314 B, Orange County Convention Center
Symposium: Interactions Between Pollination Services and Agricultural Practices	Friday, September 30 1:30 PM - 5:30 PM	Room W414 B, Orange County Convention Center

**ARTHROPOD VECTORS OF ANIMAL AND PLANT DISEASE**

SESSION	TIME	LOCATION
Symposium: Biology, Ecology, and Management of the Asian Citrus Psyllid, <i>Diaphorina citri</i> , Vector of Huanglongbing	Monday, September 26 9:15 AM - 12:30 PM	Room W315 B, Orange County Convention Center
Contributed Papers: Arthropod Vectors of Animal and Plant Disease: Insect Endosymbionts and Microbiota	Monday, September 26 11:00 AM - 12:30 PM	Room W314 A, Orange County Convention Center
Symposium: In Honor of Past ESA President Donald L. McLean: Electropenetrography (EPG) Without Borders: Plant Pathogen Vector Research Inspiring Novel Animal Disease Studies	Monday, September 26 1:30 PM - 5:30 PM	West Hall F3 (WF3), Orange County Convention Center
Graduate Student Poster Competition: Arthropod Vectors of Animal and Plant Disease	Tuesday, September 27 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Symposium: Insect-transmitted Phytoviruses and Agricultural Pandemics: Current Scenarios and Sustainable Management	Tuesday, September 27 1:30 PM - 4:30 PM	Room W231 B, Orange County Convention Center
Symposium: Insect Vectors as Drivers of Emerging Plant Diseases	Wednesday, September 28 9:15 AM - 11:15 AM	Room W230 D, Orange County Convention Center
Contributed Papers: Arthropod Vectors of Animal and Plant Diseases: Plant-Insect-Pathogen Interactions	Thursday, September 29 1:30 PM - 5:30 PM	Room W240 A, Orange County Convention Center
Symposium: Ecology, Surveillance, and Control of Biting Midges	Thursday, September 29 1:30 PM - 5:30 PM	Room W330 A, Orange County Convention Center
Poster Session 4: Arthropod Vectors of Animal and Plant Disease	Friday, September 30 9:00 AM - 2:00 PM	West Hall C, Orange County Convention Center
Symposium: Partners in Crime: Vector-Pathogen Interactome	Friday, September 30 9:15 AM - 11:15 AM	Room W232 C, Orange County Convention Center
Symposium: <i>Rhipicephalus sanguineus</i> : Tick without Borders	Friday, September 30 1:30 PM - 4:30 PM	Room W224 H, Orange County Convention Center



• DAILY SCHEDULE OF SCIENTIFIC PROGRAM BY ICE PROGRAM TOPIC •

BIODIVERSITY, BIOGEOGRAPHY, AND CONSERVATION OF ARTHROPODS		
SESSION	TIME	LOCATION
Poster Session 1: Biodiversity, Biogeography, and Conservation of Arthropods, Part 1	Monday, September 26 9:00 PM - 5:00 PM	West Hall C, Orange County Convention Center
Symposium: Arthropods of Madagascar: Historical Biogeography, Diversity, and Patterns of Distribution	Monday, September 26 9:15 AM - 11:30 AM	Room W414 C, Orange County Convention Center
Symposium: Building the Biodiversity Knowledge Graph for Insects - Components, Progress, and Challenges	Monday, September 26 1:30 PM - 5:00 PM	West Hall F4 (WF4), Orange County Convention Center
Graduate Student Oral Competition: Biodiversity, Biogeography, and Conservation of Arthropods: Diversity	Monday, September 26 1:30 PM - 5:30 PM	Room W223 B, Orange County Convention Center
Symposium: From Diet Breadth to Diversification: Understanding Host Shifts in Phytophagous Insects	Monday, September 26 1:30 PM - 5:30 PM	Room W340 B, Orange County Convention Center
Symposium: Data without Borders: Collecting, Digitizing, Using, and Re-using Biological Specimen Data	Monday, September 26 1:30 PM - 5:30 PM	Room W224 E, Orange County Convention Center
Symposium: Biodiversity, Distribution, Behavior, and Activity of Forensically Important Entomofauna and Microbiota in Different Ecoregions	Monday, September 26 1:30 PM - 5:30 PM	Room W224 D, Orange County Convention Center
Symposium: Insects, Ecosystem Functioning, and Services: New Questions and Experimental Perspectives	Wednesday, September 28 9:15 AM - 11:15 AM	Room W224 C, Orange County Convention Center
Symposium: Using Insect Diversity to Plan and Manage Conservation in Transformed Landscapes	Wednesday, September 28 9:15 AM - 11:30 AM	Room W224 D, Orange County Convention Center
Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Population and Community Diversity	Thursday, September 29 9:15 AM - 12:15 AM	Room W331 D, Orange County Convention Center
Graduate Student Oral Competition: Biodiversity, Biogeography, and Conservation of Arthropods: Butterflies and Others	Thursday, September 29 9:15 AM - 12:30 PM	Room W224 F, Orange County Convention Center
Symposium: Phylogeny and Evolution of Insect Communication Systems	Thursday, September 29 9:15 AM - 12:30 PM	Room W315 B, Orange County Convention Center
Symposium: Beyond Pests: Biodiversity in the Urban Environment	Thursday, September 29 9:15 AM - 12:30 PM	Room W230 D, Orange County Convention Center
Symposium: Biogeographical Lessons Learned from the West Indies	Thursday, September 29 1:30 PM - 4:00 PM	West Hall F4 (WF4), Orange County Convention Center
Symposium: SOLA Scarab Workers	Thursday, September 29 1:30 PM - 4:30 PM	Room W223 A, Orange County Convention Center
Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Coleoptera	Thursday, September 29 1:30 PM - 5:00 PM	Room W414 A, Orange County Convention Center
Poster Session 4: Biodiversity, Biogeography, and Conservation of Arthropods, Part 2	Friday, September 30 9:00 AM - 2:00 PM	West Hall C, Orange County Convention Center
Symposium: Keeping Science in Citizen Science	Friday, September 30 9:15 AM - 11:15 AM	Room W315 A, Orange County Convention Center
Symposium: Making Species Inventories Work For You: Diverse Uses Across Varied Fields	Friday, September 30 9:15 AM - 11:15 AM	Room W224 B, Orange County Convention Center
Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Lepidoptera	Friday, September 30 9:15 AM - 12:15 PM	Room W223 B, Orange County Convention Center
Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Pollination, Agriculture, and Disease Control	Friday, September 30 9:15 AM - 12:30 PM	Room W230 C, Orange County Convention Center
Symposium: Global Status of Native and Invasive Coccinellids	Friday, September 30 1:30 PM - 4:00 PM	Room W224 E, Orange County Convention Center
Symposium: Resource Management and Biodiversity in Cockroach and Termite Lineages: Exploring the Common Ground in Their Nutrition, Biodiversity, and Systematics	Friday, September 30 1:30 PM - 5:15 PM	Room W414 A, Orange County Convention Center
Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Hymenoptera	Friday, September 30 1:30 PM - 5:30 PM	West Hall F2 (WF2), Orange County Convention Center
Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Novel Methods	Friday, September 30 1:30 PM - 5:30 PM	West Hall F1 (WF1), Orange County Convention Center



**BIOINFORMATICS AND COMPARATIVE GENOMICS OF ARTHROPODS**

SESSION	TIME	LOCATION
Symposium: Ecological and Developmental Insights from Comparative Hemipteroid Genomics	Monday, September 26 9:15 AM - 11:30 AM	Room W330 C, Orange County Convention Center
Poster Session 2: Bioinformatics and Comparative Genomics of Arthropods	Tuesday, September 27 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Symposium: Spruce Budworm Genomics: From Basic Science to Outbreak Management	Tuesday, September 27 9:15 AM - 11:15 AM	Room W340 A, Orange County Convention Center
Contributed Papers: Bioinformatics and Comparative Genomics of Arthropods: Genomes and Databases	Tuesday, September 27 9:15 AM - 12:00 PM	Room W225 A, Orange County Convention Center
Symposium: Towards Improved Reference Assemblies for Insect Genomes	Thursday, September 29 9:15 AM - 12:00 PM	Room W224 E, Orange County Convention Center
Contributed Papers: Bioinformatics and Comparative Genomics of Arthropods: Gene Expression	Thursday, September 29 9:15 AM - 12:30 PM	Room W330 A, Orange County Convention Center

**BIOLOGICAL CONTROL AND INSECT PATHOLOGY**

SESSION	TIME	LOCATION
Graduate Student Poster Competition: Biological Control and Insect Pathology	Monday, September 26 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Contributed Papers: Biological Control and Insect Pathology: Unique Studies I	Monday, September 26 9:15 AM - 12:15 PM	Room W224 D, Orange County Convention Center
Graduate Student Oral Competition: Biological Control and Insect Pathology: Entomopathogens and Weed Biocontrol	Monday, September 26 9:15 AM - 12:15 PM	Room W231 A, Orange County Convention Center
Graduate Student Oral Competition: Biological Control and Insect Pathology: Predators	Monday, September 26 9:15 AM - 12:15 PM	Room W240 C, Orange County Convention Center
Contributed Papers: Biological Control and Insect Pathology: Nematodes, Fungi, and Bt	Monday, September 26 9:15 AM - 12:45 PM	Room W225 A, Orange County Convention Center
Symposium: Status and Prospects for Biological Control in the 21st Century (IOBC)	Monday, September 26 1:30 PM - 4:15 PM	Room W232 A, Orange County Convention Center
Symposium: Biological Control of the Invasive Brown Marmorated Stink Bug, <i>Halyomorpha halys</i> , by Exotic and Native Parasitoids and Predators: A Global Perspective	Monday, September 26 1:30 PM - 4:30 PM	Room W315 A, Orange County Convention Center
Poster Session 2: Biological Control and Insect Pathology	Tuesday, September 27 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Symposium: Biocontrol and Induced Plant Defences: A Tale of Three Trophic Levels	Tuesday, September 27 9:15 AM - 11:45 AM	Room W230 C, Orange County Convention Center
Symposium: Parasitoid Assemblages in Agroecosystems: Environmental Drivers Affecting Biocontrol	Tuesday, September 27 9:15 AM - 12:15 PM	Room W231 A, Orange County Convention Center
Symposium: Advances in the Behavioral Ecology of Entomopathogenic Nematodes	Tuesday, September 27 1:30 PM - 5:15 PM	Room W315 B, Orange County Convention Center
Symposium: Rise or Demise? A Global Outlook on the Future of Classical Biological Weed Control	Tuesday, September 27 1:30 PM - 5:30 PM	West Hall F1 (WF1), Orange County Convention Center
Symposium: Biological Control Perspective in South and Southeast Asia	Wednesday, September 28 9:15 AM - 11:45 AM	Room W414 B, Orange County Convention Center
Graduate Student Oral Competition: Biological Control and Insect Pathology: Biological Control	Wednesday, September 28 9:15 AM - 12:00 PM	Room W240 A, Orange County Convention Center
Contributed Papers: Biological Control and Insect Pathology: Plant and Other Extracts as Biocides	Thursday, September 29 9:15 AM - 11:15 AM	Room W314 A, Orange County Convention Center
Symposium: <i>Trichogramma</i> in Augmentative Biological Control: A Worldwide View of the Past, Present, and Future	Thursday, September 29 9:15 AM - 11:15 AM	Room W222 B, Orange County Convention Center
Symposium: Virus-Insect Interactions	Thursday, September 29 9:15 AM - 12:15 PM	West Hall F1 (WF1), Orange County Convention Center
Symposium: Regional Status of Microbial Control Programs	Thursday, September 29 1:30 PM - 4:30 PM	Room W232 B, Orange County Convention Center
Contributed Papers: Biological Control and Insect Pathology: Unique Studies II	Thursday, September 29 1:30 PM - 5:15 PM	West Hall F1 (WF1), Orange County Convention Center





• DAILY SCHEDULE OF SCIENTIFIC PROGRAM BY ICE PROGRAM TOPIC •

Contributed Papers: Biological Control and Insect Pathology: Utilizing Parasitoid Wasps II	Thursday, September 29 3:30 PM - 5:15 PM	Room W224 G, Orange County Convention Center
Contributed Papers: Biological Control and Insect Pathology: Unique Studies III	Friday, September 30 9:15 AM - 11:45 AM	Room W340 A, Orange County Convention Center
Symposium: Advancement and Challenges in Biological Control of Invasive Forest Insects: A Global Perspective	Friday, September 30 9:15 AM - 11:45 AM	Room W232 B, Orange County Convention Center
Symposium: Behavior and Ecology of Native, Naturalized, and Invasive Ladybird Beetles	Friday, September 30 9:15 AM - 12:00 PM	Room W224 G, Orange County Convention Center
Contributed Papers: Biological Control and Insect Pathology: Utilizing Parasitoid Wasps I	Friday, September 30 9:15 AM - 12:15 PM	Room W225 B, Orange County Convention Center
Symposium: Industry-Academia Collaborative Research and Development in Biological Control of Arthropod Pests: Results from Four Years of Marie-Curie Staff Exchange, Perspectives	Friday, September 30 1:30 PM - 5:15 PM	Room W222 B, Orange County Convention Center

**ECOLOGY AND POPULATION DYNAMICS**

SESSION	TIME	LOCATION
Graduate Student Poster Competition: Ecology and Population Dynamics	Monday, September 26 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Undergraduate Student Poster Competition: Ecology and Population Dynamics	Monday, September 26 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Contributed Papers: Ecology and Population Dynamics: Sampling	Monday, September 26 9:15 AM - 12:15 PM	West Hall F3 (WF3), Orange County Convention Center
Graduate Student Oral Competition: Ecology and Population Dynamics: Behavior	Monday, September 26 9:15 AM - 12:30 PM	Room W240 D, Orange County Convention Center
Symposium: New Tools and Strategies for Integrated Pest Management (IPM) on Transgenic (Bt) and Non-Transgenic (Conventional) Cotton Crops	Monday, September 26 1:30 PM - 4:15 PM	Room W330 C, Orange County Convention Center
Symposium: Population Consequences of Pest Management Tactics on Non-Target Species	Monday, September 26 1:30 PM - 5:15 PM	Room W222 A, Orange County Convention Center
Poster Session 2: Ecology and Population Dynamics	Tuesday, September 27 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Undergraduate Student Oral Competition: Ecology and Population Dynamics	Tuesday, September 27 9:15 AM - 11:45 AM	Room W231 C, Orange County Convention Center
Contributed Papers: Ecology and Population Dynamics: Power of Prediction	Tuesday, September 27 9:15 AM - 12:15 PM	Room W314 B, Orange County Convention Center
Symposium: Arthropod Movement in Agro-Ecosystems: Linking Individual Behaviours and Population Patterns Across Spatio-Temporal Scales. Just What Does Emerge?	Tuesday, September 27 1:30 PM - 5:00 PM	Room W330 B, Orange County Convention Center
Symposium: Arthropods and Decomposition	Tuesday, September 27 1:30 PM - 5:30 PM	Room W224 E, Orange County Convention Center
Graduate Student Oral Competition: Ecology and Population Dynamics: Pollinators	Wednesday, September 28 9:15 AM - 12:00 PM	Room W240 B, Orange County Convention Center
Graduate Student Oral Competition: Ecology and Population Dynamics: Ecology and Evolution	Wednesday, September 28 9:15 AM - 12:15 PM	Room W240 C, Orange County Convention Center
Contributed Papers: Ecology and Population Dynamics: Community Services	Wednesday, September 28 9:15 AM - 12:30 PM	Room W225 A, Orange County Convention Center
Contributed Papers: Ecology and Population Dynamics: Interactions	Wednesday, September 28 9:15 AM - 1:00 PM	Room W225 B, Orange County Convention Center
Contributed Papers: Ecology and Population Dynamics: Behavior	Thursday, September 29 9:15 AM - 11:45 AM	Room W225 B, Orange County Convention Center
Symposium: Stable Isotope 'Fingerprinting' in Insect Ecology	Thursday, September 29 9:15 AM - 12:00 PM	Room W231 B, Orange County Convention Center
Symposium: Population Biology of Winter Moth, <i>Operophtera brumata</i> L., and Related Geometrids on Two Continents	Thursday, September 29 9:15 AM - 12:30 PM	Room W331 C, Orange County Convention Center
Contributed Papers: Ecology and Population Dynamics: Community	Thursday, September 29 1:30 PM - 5:15 PM	Room W315 B, Orange County Convention Center



DAILY SCHEDULE OF SCIENTIFIC PROGRAM BY ICE TOPIC

• DAILY SCHEDULE OF SCIENTIFIC PROGRAM BY ICE PROGRAM TOPIC •

Symposium: Climate Change Impacts and Insect Population Dynamics	Thursday, September 29 1:30 PM - 5:30 PM	West Hall F2 (WF2), Orange County Convention Center
Symposium: Insects and Landscape Ecology: Defining an Entomological Perspective	Friday, September 30 9:15 AM - 11:30 AM	Room W414 B, Orange County Convention Center
Contributed Papers: Ecology and Population Dynamics: Pest Management	Friday, September 30 9:15 AM - 1:00 PM	Room W240 D, Orange County Convention Center
Symposium: Ecology, Biodiversity, and Geography of Gall-Inducing Insects: Now and Beyond	Friday, September 30 1:30 PM - 3:45 PM	Room W330 B, Orange County Convention Center
Symposium: Monitoring and Forecasting of Migratory Insect Movements	Friday, September 30 1:30 PM - 4:45 PM	Room W232 A, Orange County Convention Center
Symposium: Host Relations of Gall-Inducing Insects	Friday, September 30 1:30 PM - 5:00 PM	Room W231 C, Orange County Convention Center

**ECOLOGY OF PESTICIDES, RESISTANCE, TOXICOLOGY, AND GENETICALLY MODIFIED CROPS**

SESSION	TIME	LOCATION
Graduate Student Poster Competition: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops	Monday, September 26 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Poster Session 1: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops, Part 1	Monday, September 26 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Graduate Student Oral Competition: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops: Bt Toxins	Tuesday, September 27 9:15 AM - 12:15 PM	Room W240 D, Orange County Convention Center
Contributed Papers: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops	Tuesday, September 27 9:15 AM - 12:30 PM	Room W414 C, Orange County Convention Center
Graduate Student Oral Competition: Ecology of Pesticides, Resistance, Toxicology and Genetically Modified Crops: Insecticides	Tuesday, September 27 1:30 PM - 5:30 PM	Room W230 B, Orange County Convention Center
Contributed Papers: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops	Wednesday, September 28 9:15 AM - 12:30 PM	West Hall F3 (WF3), Orange County Convention Center
Contributed Papers: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops	Thursday, September 29 9:15 AM - 12:00 PM	Room W340 B, Orange County Convention Center
Symposium: Next-Generation Technologies for Insect Control	Thursday, September 29 1:30 PM - 4:45 PM	Room W224 D, Orange County Convention Center
Poster Session 4: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops, Part 2	Friday, September 30 9:00 AM - 2:00 PM	West Hall C, Orange County Convention Center
Symposium: Insect-Resistant GM Crops in Asia-Pacific: Current Status, Challenges, and Opportunities	Friday, September 30 9:15 AM - 12:15 PM	Room W222 B, Orange County Convention Center
Symposium: Globally Important Pests and Globally Important Control Tools: Comparing and Contrasting IRM Successes and Challenges, IRAC US Symposium	Friday, September 30 9:15 AM - 12:15 PM	Room W224 H, Orange County Convention Center
Contributed Papers: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops	Friday, September 30 9:15 AM - 12:30 PM	Room W314 A, Orange County Convention Center
Contributed Papers: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops: Pollinators	Friday, September 30 9:15 AM - 1:00 PM	Room W314 B, Orange County Convention Center
Symposium: Key Challenges with Bt Crops in Latin America	Friday, September 30 1:30 PM - 4:15 PM	Room W231 B, Orange County Convention Center
Symposium: Biotechnologically-Based Insect Control Strategies	Friday, September 30 1:30 PM - 5:15 PM	Room W230 D, Orange County Convention Center

**ENTOMOLOGICAL EFFECTS OF GLOBAL WARMING IN AGRICULTURE AND MEDICAL ENTOMOLOGY**

SESSION	TIME	LOCATION
Contributed Papers: Entomological Effects of Global Warming in Agriculture and Medical Entomology	Monday, September 26 9:15 AM - 11:00 AM	Room W314 A, Orange County Convention Center
Poster Session 2: Entomological Effects of Global Warming in Agriculture and Medical Entomology	Tuesday, September 27 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Symposium: Climate Change: Preventing the Spread of Invasive Species in Agriculture	Tuesday, September 27 9:15 AM - 11:15 AM	Room W230 A, Orange County Convention Center



• DAILY SCHEDULE OF SCIENTIFIC PROGRAM BY ICE PROGRAM TOPIC •

Symposium: Critical Factors Modifying the Effects of Climate Change on the Distributions of Vector-Borne Diseases	Wednesday, September 28 9:15 AM - 12:15 PM	Room W230 B, Orange County Convention Center
Symposium: Effect of Global Climate Change on Vector-Borne Disease Transmission	Thursday, September 29 1:30 PM - 3:45 PM	Room W240 B, Orange County Convention Center

**ENTOMOLOGY AROUND THE WORLD**

SESSION	TIME	LOCATION
Symposium: Global Entomological Collaborations	Monday, September 26 9:15 AM - 12:30 PM	Room W340 A, Orange County Convention Center
Contributed Papers: Entomology Around the World	Monday, September 26 9:15 AM - 12:45 PM	Room W224 A, Orange County Convention Center
Symposium: Global Status, Acceptance, and Challenges of GM Crops	Monday, September 26 1:30 PM - 4:15 PM	Room W224 H, Orange County Convention Center
Symposium: Entomology Around the World: Past, Present, and Future Challenges	Monday, September 26 1:30 PM - 4:15 PM	Room W240 A, Orange County Convention Center
Symposium: Where are the Six Legs of Advanced Entomology Publishing Taking Us?	Monday, September 26 1:30 PM - 4:30 PM	Room W224 F, Orange County Convention Center
Symposium: Entomological Issues Beyond Borders: Challenges and Opportunities for Sustainable Solutions	Tuesday, September 27 9:15 AM - 12:00 PM	West Hall F3 (WF3), Orange County Convention Center
Symposium: Entomological Research in China: Major Progresses and Perspectives	Tuesday, September 27 1:30 PM - 4:45 PM	Room W414 B, Orange County Convention Center
Undergraduate Student Oral Competition: Entomology Around the World	Tuesday, September 27 1:30 PM - 5:30 PM	Room W232 C, Orange County Convention Center
Symposium: Modern Studies of Gerromorphan Insects: Behavior, Phylogeny, Physiology, and Ecology	Wednesday, September 28 9:15 AM - 11:30 AM	Room W224 H, Orange County Convention Center
Symposium: Department of Defense Entomology and Global Public Health: Working Together to Combat Vector Borne Disease and Protect the Environment	Wednesday, September 28 9:15 AM - 12:30 AM	Room W222 B, Orange County Convention Center
Symposium: Case Studies in Entomology: Four Examples of Global Excellence	Thursday, September 29 9:15 AM - 11:15 AM	Room W222 A, Orange County Convention Center
Symposium: Entomology without Borders: Senior Member Symposium with Retired and Emeriti Professionals on Sharing their Involvement after Retirement	Thursday, September 29 9:15 AM - 11:30 AM	Room W231 C, Orange County Convention Center
Symposium: Sin Fronteras: Forging Collaborations through the Americas: 4th Latin American/Hispanic Symposium	Thursday, September 29 9:15 AM - 12:15 PM	Room W340 A, Orange County Convention Center
Symposium: Neotropical Insect Galls	Thursday, September 29 1:30 PM - 3:45 PM	Room W224 A, Orange County Convention Center
Symposium: Insect Photography Symposium: Bringing the Small to the World	Thursday, September 29 1:30 PM - 4:00 PM	Room W230 B, Orange County Convention Center
Symposium: International Graduate Student Showcase	Thursday, September 29 1:30 PM - 4:15 PM	Room W340 B, Orange County Convention Center
Symposium: Entomologists without Borders: The Need for Collaboration Between Medical Professionals and Entomologists for the Betterment of Global Public Health	Thursday, September 29 1:30 PM - 4:30 PM	Room W230 C, Orange County Convention Center
Symposium: Orthopteroids Without Borders	Thursday, September 29 1:30 PM - 5:00 PM	Room W231 C, Orange County Convention Center
Symposium: Engaging the World of Arthropod Education in a Digital Age	Thursday, September 29 1:30 PM - 5:00 PM	Room W230 A, Orange County Convention Center
Symposium: Cassava and Bean IPM throughout the Developing World: Honoring the Contributions of Anthony Bellotti and César Cardona Mejía	Friday, September 30 9:15 AM - 12:00 PM	Room W330 A, Orange County Convention Center
Symposium: Aquatic Entomology Around the World	Friday, September 30 1:30 PM - 3:45 PM	Room W240 D, Orange County Convention Center
Symposium: Tales from the Understory: Unraveling Secrets behind Tropical Butterfly Communication, Behavior, Wing Patterns, and Diversity	Friday, September 30 1:30 PM - 5:00 PM	West Hall F3 (WF3), Orange County Convention Center
Symposium: Connecting with the World's Best Talent: Attracting and Retaining Diverse Entomologists	Friday, September 30 1:30 PM - 5:30 PM	Room W340 A, Orange County Convention Center



**ENTOMOPHAGY AND ENTOMOLOGY IN POPULAR CULTURE**

SESSION	TIME	LOCATION
Symposium: An Emerging Food Supply: Edible Insects	Monday, September 26 1:30 PM - 5:00 PM	Room W230 B, Orange County Convention Center
Symposium: Insects and the Global Human Experience	Tuesday, September 27 1:30 PM - 5:00 PM	Room W314 A, Orange County Convention Center
Symposium: Industrialization of Insects as a Food Ingredient	Tuesday, September 27 1:30 PM - 5:00 PM	Room W222 A, Orange County Convention Center
Symposium: Weaving Your Web: Science Communication and Social Media for Insect Scientists	Wednesday, September 28 9:15 AM - 11:15 AM	Room W414 A, Orange County Convention Center
Poster Session 3: Entomophagy and Entomology in Popular Culture	Thursday, September 29 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Symposium: Sericigenous Insects and 3F's: Fibre, (Human) Food, and Feed-Global Status, and Future Role in Resolving Global Challenges	Thursday, September 29 1:30 PM - 4:30 PM	Room W224 F, Orange County Convention Center

**FRONTIERS IN ENTOMOLOGY**

SESSION	TIME	LOCATION
Graduate Student Poster Competition: Frontiers in Entomology	Monday, September 26 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Undergraduate Student Poster Competition: Frontiers in Entomology	Monday, September 26 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Undergraduate Student Oral Competition: Frontiers in Entomology	Monday, September 26 9:15 AM - 11:00 AM	Room W240 A, Orange County Convention Center
Symposium: Small RNAs: A New Frontier in Insect Science	Monday, September 26 9:15 AM - 11:15 AM	Room W231 B, Orange County Convention Center
Contributed Papers: Frontiers in Entomology: Tools and Methods	Monday, September 26 9:15 AM - 12:30 PM	Room W224 G, Orange County Convention Center
Symposium: What Constitutes Responsible Field Release of Transgenic Insects?	Monday, September 26 1:30 PM - 4:00 PM	Room W414 C, Orange County Convention Center
Symposium: In the Light of Morphometrics: Frontiers in Ecology and Evolution of Insect Morphology	Monday, September 26 1:30 PM - 5:30 PM	Room W314 A, Orange County Convention Center
Symposium: Unmanned Aerial Systems (Drones) for Precision Mosquito Control and Agricultural Use	Tuesday, September 27 9:15 AM - 11:15 AM	Room W315 B, Orange County Convention Center
Symposium: Reproductive Interference and its Applications	Tuesday, September 27 9:15 AM - 11:15 AM	Room W224 G, Orange County Convention Center
Symposium: Microbial Modulation of Insect Immunity	Tuesday, September 27 9:15 AM - 11:45 AM	Room W331 B, Orange County Convention Center
Contributed Papers: Frontiers in Entomology: Uses and Symbiosis	Tuesday, September 27 9:15 AM - 12:30 PM	Room W223 B, Orange County Convention Center
Symposium: Emerging Technologies for Tomorrow's Collaborative Discoveries	Tuesday, September 27 1:30 PM - 4:00 PM	West Hall F2 (WF2), Orange County Convention Center
Symposium: Biology and Evolution of Social Insect Symbionts	Tuesday, September 27 1:30 PM - 4:15 PM	Room W240 D, Orange County Convention Center
Symposium: Insect Effects on Ecosystem Services	Tuesday, September 27 1:30 PM - 4:45 PM	Room W414 D, Orange County Convention Center
Symposium: Novel Insecticidal Agents and Next-Gen Approaches for Insect Control	Tuesday, September 27 1:30 PM - 5:00 PM	Room W225 A, Orange County Convention Center
Symposium: Talking to Swarms Without Borders: Methods for Engaging the Public in the Buzz about Entomology	Thursday, September 29 9:15 AM - 11:45 AM	Room W330 B, Orange County Convention Center
Symposium: Economics of IPM in the 21st Century: Multiple Perspectives from Around the World	Thursday, September 29 9:15 AM - 12:00 PM	Room W331 A, Orange County Convention Center
Symposium in Honor of the 2016 Recipients of Certificates of Distinction	Thursday, September 29 1:30 PM - 3:00 PM	Room W224 G, Orange County Convention Center
Symposium: Discovering Sustainable Insecticides: Resistance, Innovation, and Responsibility	Friday, September 30 9:15 AM - 11:15 AM	Room W224 C, Orange County Convention Center



• DAILY SCHEDULE OF SCIENTIFIC PROGRAM BY ICE PROGRAM TOPIC •

Symposium: Future Approaches for the Control of Insect Pests	Friday, September 30 9:15 AM - 11:45 AM	Room W231 C, Orange County Convention Center
Symposium: Optical Manipulation of Arthropod Pests and Beneficials	Friday, September 30 1:30 PM - 4:15 PM	Room W331 D, Orange County Convention Center
Symposium: Wood Borer-Fungus Alliances and Conflicts: The Frontier of Forest Entomology	Friday, September 30 1:30 PM - 4:45 PM	Room W414 D, Orange County Convention Center
Symposium: Entomology in the Digital Age	Friday, September 30 1:30 PM - 4:45 PM	Room W222 A, Orange County Convention Center
Symposium: Next-Generation Ecology, Morphology, and Genomics: What can We Learn about the Evolution of Odonata?	Friday, September 30 1:30 PM - 5:15 PM	Room W224 G, Orange County Convention Center
Symposium: Crop Domestication Effects on Plant-Insect Interactions: Patterns, Mechanisms, and Future Directions	Friday, September 30 1:30 PM - 5:15 PM	Room W314 A, Orange County Convention Center

**FUNCTIONAL GENOMICS AND TRANSGENESIS**

SESSION	TIME	LOCATION
Poster Session 1: Functional Genomics and Transgenesis	Monday, September 26 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Symposium: Workshop on Gene Editing Technologies	Monday, September 26 1:30 PM - 4:30 PM	Room W414 A, Orange County Convention Center
Symposium: Genomic and Genetic Strategies Toward Integrated Pest Management	Tuesday, September 27 9:15 AM - 12:00 PM	Room W315 A, Orange County Convention Center
Contributed Papers: Functional Genomics and Transgenesis	Tuesday, September 27 1:30 PM - 5:15 PM	Room W223 B, Orange County Convention Center
Symposium: Insect Genetic Technologies: State of the Art and Promise for the Future	Wednesday, September 28 9:15 AM - 12:30 PM	Room W340 B, Orange County Convention Center
Symposium: Epigenetics and Insect Adaptation to Their Environment	Thursday, September 29 9:15 AM - 12:00 PM	West Hall F3 (WF3), Orange County Convention Center
Graduate Student Oral Competition: Functional Genomics and Transgenesis	Thursday, September 29 9:15 AM - 12:30 PM	Room W240 A, Orange County Convention Center

**GENETICS AND EVOLUTIONARY ENTOMOLOGY**

SESSION	TIME	LOCATION
Graduate Student Poster Competition: Genetics and Evolutionary Entomology	Monday, September 26 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Symposium: Rapid Evolution of Insect Pests within Agroecosystems	Monday, September 26 9:15 AM - 12:30 PM	Room W331 C, Orange County Convention Center
Contributed Papers: Genetics and Evolutionary Entomology: Populations and Spatial Diversity	Monday, September 26 1:30 PM - 5:15 PM	Room W330 B, Orange County Convention Center
Symposium: Genetic Architecture of Species Differences	Tuesday, September 27 9:15 AM - 11:30 AM	Room W414 B, Orange County Convention Center
Contributed Papers: Genetics and Evolutionary Entomology: Mating and Competition	Tuesday, September 27 9:15 AM - 12:30 AM	Room W414 D, Orange County Convention Center
Graduate Student Oral Competition: Genetics and Evolutionary Entomology: Behavior	Tuesday, September 27 9:15 AM - 12:30 AM	Room W240 C, Orange County Convention Center
Symposium: Evolution of Biological Clocks	Tuesday, September 27 1:30 PM - 4:30 PM	Room W224 C, Orange County Convention Center
Symposium: Jumping Genes: Horizontal Gene Transfer in Insects and Beyond	Wednesday, September 28 9:15 AM - 12:00 PM	Room W340 A, Orange County Convention Center
Graduate Student Oral Competition: Genetics and Evolutionary Entomology: Population Genetics	Wednesday, September 28 9:15 AM - 12:30 PM	Room W232 B, Orange County Convention Center
Poster Session 3: Genetics and Evolutionary Entomology	Thursday, September 29 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Contributed Papers: Genetics and Evolutionary Entomology: Trait Expression	Thursday, September 29 9:15 AM - 12:30 PM	Room W224 G, Orange County Convention Center
Symposium: Insect Sex Determination	Thursday, September 29 1:30 PM - 5:30 PM	West Hall F3 (WF3), Orange County Convention Center



• DAILY SCHEDULE OF SCIENTIFIC PROGRAM BY ICE PROGRAM TOPIC •

Symposium: Arthropod Population Genomics	Friday, September 30 1:30 PM - 4:00 PM	Room W331 A, Orange County Convention Center
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**INSECT BIOMECHANICS AND INSECT-INSPIRED ROBOTICS**

SESSION	TIME	LOCATION
Symposium: Bioinspiration Crossing Disciplinary Borders	Thursday, September 29 9:15 AM - 1:00 PM	Room W315 A, Orange County Convention Center

**INSECT CHEMICAL ECOLOGY**

SESSION	TIME	LOCATION
Graduate Student Poster Competition: Insect Chemical Ecology	Monday, September 26 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Symposium: From the Laboratory Bench to Commercial Products: Semiochemical-Based Technology Development and Regulation Worldwide	Monday, September 26 9:15 AM - 11:45 AM	Room W314 B, Orange County Convention Center
Contributed Papers: Insect Chemical Ecology: Physiology	Monday, September 26 9:15 AM - 12:30 PM	Room W224 B, Orange County Convention Center
Contributed Papers: Insect Chemical Ecology: Plant Protection	Monday, September 26 9:15 AM - 12:30 PM	West Hall F1 (WF1), Orange County Convention Center
Symposium: Novel Contributions of Chemical Ecology to Global IPM	Monday, September 26 1:30 PM - 4:00 PM	Room W223 A, Orange County Convention Center
Symposium: Sex and Drugs and Bee Control: The Chemical Ecology of Pollination	Monday, September 26 1:30 PM - 5:30 PM	Room W224 B, Orange County Convention Center
Symposium: Worldwide Use of Kairomones to Enhance Management of Tortricids in Fruit Crops: New Opportunities and New Problems	Tuesday, September 27 9:15 AM - 11:30 AM	Room W330 C, Orange County Convention Center
Symposium: Cross-Continental Patterns of Chemical Communication Among Subcortical Insects	Tuesday, September 27 9:15 AM - 11:30 AM	Room W330 A, Orange County Convention Center
Graduate Student Oral Competition: Insect Chemical Ecology	Tuesday, September 27 1:30 PM - 5:00 PM	Room W230 D, Orange County Convention Center
Contributed Papers: Insect Chemical Ecology	Tuesday, September 27 1:30 PM - 5:30 PM	Room W314 B, Orange County Convention Center
Contributed Papers: Insect Chemical Ecology: Attractants	Wednesday, September 28 9:15 AM - 12:45 PM	Room W314 B, Orange County Convention Center
Poster Session 3: Insect Chemical Ecology	Thursday, September 29 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Symposium: Olfaction and Olfaction-Mediated Behaviors	Thursday, September 29 9:15 AM - 11:15 AM	West Hall F4 (WF4), Orange County Convention Center
Symposium: Modulation of Insect Chemical Response at Different Time Scales: Ethology, Ecology, and Evolution	Friday, September 30 9:15 AM - 11:45 AM	Room W230 B, Orange County Convention Center
Symposium: Global Research and Development of Insect Repellents	Friday, September 30 1:30 PM - 4:00 PM	Room W224 C, Orange County Convention Center

**INSECT IMMUNOLOGY**

SESSION	TIME	LOCATION
Symposium: Host Adaptations in Insect Symbioses: Elements That Facilitate Stability and Persistence	Monday, September 26 9:15 AM - 11:15 AM	Room W330 B, Orange County Convention Center
Graduate Student Oral Competition: Insect Immunology	Monday, September 26 9:15 AM - 11:30 AM	Room W232 A, Orange County Convention Center
Contributed Papers: Insect Immunology: Molecular	Monday, September 26 9:15 AM - 12:15 PM	Room W315 A, Orange County Convention Center
Symposium: Social Insect Pathobiology	Monday, September 26 1:30 PM - 4:15 PM	Room W224 G, Orange County Convention Center
Symposium: The Biochemical Signaling Interface Between Invaders and Their Insect Hosts	Monday, September 26 1:30 PM - 4:15 PM	Room W330 A, Orange County Convention Center
Graduate Student Poster Competition: Insect Immunology	Tuesday, September 27 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center



DAILY SCHEDULE OF SCIENTIFIC PROGRAM BY ICE TOPIC

• DAILY SCHEDULE OF SCIENTIFIC PROGRAM BY ICE PROGRAM TOPIC •

Symposium: Wound Healing and Damage Signals in Insects	Tuesday, September 27 9:15 AM - 11:30 AM	Room W330 B, Orange County Convention Center
Contributed Papers: Insect Immunology: Environment	Tuesday, September 27 9:15 AM - 12:30 AM	Room W231 B, Orange County Convention Center
Symposium: Parasitoids, Polydnviruses, and Pathogens: Genomes to Immune Physiology	Tuesday, September 27 1:30 PM - 4:00 PM	Room W330 C, Orange County Convention Center
Symposium: Interactions Between the Insect Immune System and Parasites	Tuesday, September 27 1:30 PM - 5:15 PM	Room W331 D, Orange County Convention Center
Symposium: Insect Gut Microbe Interactions	Thursday, September 29 1:30 PM - 3:45 PM	Room W330 B, Orange County Convention Center
Symposium: Trade-offs and Immunity: Physiology, Life-History, and Evolution	Thursday, September 29 1:30 PM - 4:15 PM	Room W230 D, Orange County Convention Center
Poster Session 4: Insect Immunology	Friday, September 30 9:00 AM - 2:00 PM	West Hall C, Orange County Convention Center
Symposium: Outlaws of Immunology and Infection	Friday, September 30 9:15 AM - 11:30 AM	Room W414 D, Orange County Convention Center
Symposium: Vector Immunology	Friday, September 30 1:30 PM - 3:45 PM	Room W240 C, Orange County Convention Center
Symposium: Insect Symbiosis and Immunity	Friday, September 30 1:30 PM - 4:45 PM	Room W330 A, Orange County Convention Center
Symposium: Eco-Immunology of Invertebrates	Friday, September 30 1:30 PM - 5:30 PM	Room W224 D, Orange County Convention Center

**INSECT NEUROBIOLOGY**

SESSION	TIME	LOCATION
Symposium: Endocrine and Neural Network in Control of Physiology	Wednesday, September 28 9:15 AM - 12:00 PM	Room W330 C, Orange County Convention Center
Poster Session 3: Insect Neurobiology	Thursday, September 29 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Symposium: Endocrine and Neural Networks that Control and Regulate Behavioral Programs	Thursday, September 29 9:15 AM - 11:45 PM	Room W223 A, Orange County Convention Center

**INSECT-PLANT INTERACTIONS IN A CHANGING CLIMATE**

SESSION	TIME	LOCATION
Symposium: Insect-Plant Interactions in a Changing Climate: Effects on Populations Dynamics and Biological Control	Monday, September 26 9:15 AM - 11:30 AM	Room W230 D, Orange County Convention Center
Contributed Papers: Insect-Plant Interactions in a Changing Climate: Abiotic Factors, Pollinators, and Pathogens	Monday, September 26 9:15 AM - 1:15 PM	West Hall F4 (WF4), Orange County Convention Center
Symposium: Deciphering Complex Signaling Mechanisms in Insect-Plant Interactions	Monday, September 26 1:30 PM - 5:00 PM	West Hall F1 (WF1), Orange County Convention Center
Graduate Student Oral Competition: Insect-Plant Interactions in a Changing Climate	Monday, September 26 1:30 PM - 5:15 PM	Room W240 B, Orange County Convention Center
Poster Session 2: Insect-Plant Interactions in a Changing Climate	Tuesday, September 27 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Symposium: Insect-Plant Interactions in a Changing Climate	Tuesday, September 27 9:15 AM - 11:15 AM	Room W222 A, Orange County Convention Center
Symposium: Insect-Plant Interactions in a Changing Arctic	Tuesday, September 27 9:15 AM - 11:45 AM	Room W224 F, Orange County Convention Center
Symposium: Plant Piercing-Sucking Insects and Vectors without Borders	Tuesday, September 27 1:30 PM - 4:00 PM	Room W232 B, Orange County Convention Center
Symposium: Ant-Plant Interactions in a Changing World	Thursday, September 29 1:30 PM - 5:15 PM	Room W224 H, Orange County Convention Center
Contributed Papers: Insect-Plant Interactions in a Changing Climate: Host Plant Interactions	Friday, September 30 1:30 PM - 5:00 PM	Room W232 B, Orange County Convention Center



**INSECTS IN FOOD SAFETY AND HOMELAND SECURITY**

SESSION	TIME	LOCATION
Symposium: Securing Borders While Promoting Trade: Regional Approaches to Control Agricultural Pests in the Greater Caribbean Area	Wednesday, September 28 9:15 AM - 11:15 AM	Room W223 A, Orange County Convention Center
Poster Session 4: Insects in Food Safety and Homeland Security	Friday, September 30 9:00 AM - 2:00 PM	West Hall C, Orange County Convention Center

**INTEGRATED PEST MANAGEMENT AND SUSTAINABLE AGRICULTURE**

SESSION	TIME	LOCATION
Symposium: Host Plant Resistance Towards Insect Pests	Monday, September 26 9:15 AM - 11:30 AM	Room W230 C, Orange County Convention Center
Symposium: Sustainable Agriculture through Ecological Pest Management	Monday, September 26 9:15 AM - 11:30 AM	Room W222 A, Orange County Convention Center
Symposium: Zoophytophagous Arthropods in Biological Control (IOBC)	Monday, September 26 9:15 AM - 11:45 AM	Room W331 D, Orange County Convention Center
Contributed Papers: Integrated Pest Management and Sustainable Agriculture: Agronomic Crops	Monday, September 26 9:15 AM - 1:15 PM	Room W230 A, Orange County Convention Center
Contributed Papers: Integrated Pest Management and Sustainable Agriculture: Insecticides	Monday, September 26 9:15 AM - 1:15 PM	Room W224 E, Orange County Convention Center
Contributed Papers: Integrated Pest Management and Sustainable Agriculture: IPM Programs	Monday, September 26 1:30 PM - 5:00 PM	Room W225 A, Orange County Convention Center
Symposium: Integrated Pest Management Components and Packages for Tropical Crops	Monday, September 26 1:30 PM - 5:00 PM	Room W331 D, Orange County Convention Center
Symposium: Wireworm and Click Beetle Management: IPM Toolbox for the 21st Century	Monday, September 26 1:30 PM - 5:00 PM	Room W331 C, Orange County Convention Center
Contributed Papers: Integrated Pest Management and Sustainable Agriculture: Fruits and Vegetables	Monday, September 26 1:30 PM - 5:15 PM	Room W231 B, Orange County Convention Center
Graduate Student Oral Competition: Integrated Pest Management and Sustainable Agriculture: Landscape Systems	Monday, September 26 1:30 PM - 5:15 PM	Room W240 C, Orange County Convention Center
Symposium: True Bugs (Heteroptera) from the Neotropics: Advances on Basic and Applied Research	Monday, September 26 1:30 PM - 5:15 PM	Room W230 C, Orange County Convention Center
Graduate Student Poster Competition: Integrated Pest Management and Sustainable Agriculture: Management Tactics	Tuesday, September 27 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Graduate Student Poster Competition: Integrated Pest Management and Sustainable Agriculture: Pest Physiology	Tuesday, September 27 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Symposium: Bt Crops and Best Management Practices: Influence on the Technology Durability	Tuesday, September 27 9:15 AM - 11:30 AM	West Hall F1 (WF1), Orange County Convention Center
Symposium: Challenges and Opportunities for Management of Western Corn Rootworm	Tuesday, September 27 9:15 AM - 12:15 PM	Room W414 A, Orange County Convention Center
Symposium: Biological Control under Climate Change (IOBC)	Tuesday, September 27 9:15 AM - 12:30 PM	Room W222 B, Orange County Convention Center
Symposium: Advances in Pest Management	Tuesday, September 27 1:30 PM - 4:15 PM	Room W240 C, Orange County Convention Center
Graduate Student Oral Competition: Integrated Pest Management and Sustainable Agriculture: Agricultural Systems	Tuesday, September 27 1:30 PM - 5:15 PM	Room W240 A, Orange County Convention Center
Symposium: Insect-Resistant Genetically Engineered Crops: Current Status, Concerns, and Future Prospects	Tuesday, September 27 1:30 PM - 5:15 PM	Room W414 A, Orange County Convention Center
Symposium: Research Frontiers into the Use of Preventive Medicine in Arthropod Pest Management	Tuesday, September 27 1:30 PM - 5:30 PM	Room W240 B, Orange County Convention Center
Symposium: What Happens When Pest Occurrence Data is Shared: End of the World or New Horizons?	Wednesday, September 28 9:15 AM - 11:30 AM	Room W224 E, Orange County Convention Center
Symposium: Advances in Insect Control and in Resistance Management	Wednesday, September 28 9:15 AM - 12:30 PM	Room W224 B, Orange County Convention Center
Contributed Papers: Integrated Pest Management and Sustainable Agriculture: Biological Pest Management	Wednesday, September 28 9:15 AM - 12:45 PM	Room W231 B, Orange County Convention Center





• DAILY SCHEDULE OF SCIENTIFIC PROGRAM BY ICE PROGRAM TOPIC •

Poster Session 3: Integrated Pest Management and Sustainable Agriculture	Thursday, September 29 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Symposium: Integrated Pest Management Around the World	Thursday, September 29 9:15 AM - 11:45 AM	Room W231 A, Orange County Convention Center
Graduate Student Oral Competition: Integrated Pest Management and Sustainable Agriculture: Thrips and Others	Thursday, September 29 9:15 AM - 12:45 PM	Room W232 A, Orange County Convention Center
Symposium: Innovative Application Technologies for Pest Management	Thursday, September 29 1:30 PM - 4:00 PM	Room W331 B, Orange County Convention Center
Symposium: Combining Insect Life Table, Consumption Rate, and Predation Rate for IPM and Biological Control	Thursday, September 29 1:30 PM - 5:30 PM	Room W224 C, Orange County Convention Center
Symposium: Impact of Native and Invasive Alien True Bug Species in Agro-Ecosystems: Range Expansion, Pest Status, and Control Tactics	Thursday, September 29 1:30 PM - 5:30 PM	Chapin Theater, Orange County Convention Center
Symposium: From Genes to Grains: The Current Sugarcane Aphid Outbreak on Sorghum in the Southern U.S.	Thursday, September 29 1:30 PM - 5:30 PM	Room W224 B, Orange County Convention Center
Symposium: Ecologically-Based Integrated Pest Management for Selected Food Security Crops in Central Asia	Friday, September 30 9:15 AM - 11:30 AM	Room W240 C, Orange County Convention Center
Symposium: Exploiting Multi-Trophic Interactions in the Management of Invasive Agricultural Arthropod Pests	Friday, September 30 9:15 AM - 11:30 AM	Room W240 B, Orange County Convention Center
Contributed Papers: Integrated Pest Management and Sustainable Agriculture: Tree Fruits and Nuts	Friday, September 30 9:15 AM - 12:45 PM	Room W231 B, Orange County Convention Center
Contributed Papers: Integrated Pest management and Sustainable Agriculture: Behavioral Pest Management	Friday, September 30 1:30 PM - 5:00 PM	Room W223 B, Orange County Convention Center
Symposium: IPM: The Lucrative Bridge Connecting the Ever-Emerging Knowledge Islands of Genetics and Ecology	Friday, September 30 1:30 PM - 5:00 PM	Room W231 A, Orange County Convention Center
Symposium: Genetically Modified Insecticidal Crops and Sustainable Pest Management: An Ecological Perspective of Their Compatibility in Sustainable Agriculture	Friday, September 30 1:30 PM - 5:00 PM	Room W340 B, Orange County Convention Center
Contributed Papers: Integrated Pest Management and Sustainable Agriculture	Friday, September 30 1:30 PM - 5:30 PM	Room W225 A, Orange County Convention Center
Symposium: Globalizing Sustainable Pest Management in Agriculture	Friday, September 30 1:30 PM - 5:30 PM	Room W224 A, Orange County Convention Center
Symposium: Greenhouse Insect Management Around the World: Common Problems and Solutions from Scientific Collaborations	Friday, September 30 1:30 PM - 5:30 PM	Room W223 A, Orange County Convention Center

**INVASIVE AND EXOTIC ENTOMOLOGY**

SESSION	TIME	LOCATION
Graduate Student Poster Competition: Invasive and Exotic Entomology	Monday, September 26 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Graduate Student Oral Competition: Invasive and Exotic Entomology: Drosophilids	Monday, September 26 9:15 AM - 12:30 PM	Room W240 B, Orange County Convention Center
Symposium: Scarabs without Borders: Lessons from a Century of Invasions	Monday, September 26 1:30 PM - 5:30 PM	Room W222 B, Orange County Convention Center
Symposium: Global Spread and Management of the South American Tomato Leafminer, <i>Tuta absoluta</i>	Tuesday, September 27 9:15 AM - 12:00 PM	Room W224 H, Orange County Convention Center
Contributed Papers: Invasive and Exotic Entomology: Control and Tools	Tuesday, September 27 9:15 AM - 12:30 PM	Room W340 B, Orange County Convention Center
Symposium: Forest Insect Invasions in a Changing Climate: Mechanisms and Risks	Tuesday, September 27 1:30 PM - 4:00 PM	Room W224 D, Orange County Convention Center
Symposium: No More Invasive Insect Species: Is Quarantine the Answer?	Tuesday, September 27 1:30 PM - 4:45 PM	West Hall F4 (WF4), Orange County Convention Center
Symposium: Hitchhikers in Florida: History and Control	Tuesday, September 27 1:30 PM - 4:45 PM	Room W224 H, Orange County Convention Center
Symposium: The Role of National, Regional, and International Plant Protection Organizations to Prevent the Introduction and Spread of Plant Pests	Tuesday, September 27 1:30 PM - 5:15 PM	Room W224 F, Orange County Convention Center
Graduate Student Oral Competition: Invasive and Exotic Entomology: Invasives	Wednesday, September 28 9:15 AM - 12:15 PM	Room W240 D, Orange County Convention Center



• DAILY SCHEDULE OF SCIENTIFIC PROGRAM BY ICE PROGRAM TOPIC •

Contributed Papers: Invasive and Exotic Entomology: Geography and Biology	Wednesday, September 28 9:15 AM - 12:30 PM	Room W223 B, Orange County Convention Center
Symposium: <i>Sirex noctilio</i> : A Global Forest Insect	Wednesday, September 28 9:15 AM - 12:30 PM	Room W330 B, Orange County Convention Center
Poster Session 3: Invasive and Exotic Entomology	Thursday, September 29 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Contributed Papers: Invasive and Exotic Entomology: Diagnostics, Methods, and Responses	Thursday, September 29 9:15 AM - 11:30 AM	Room W223 B, Orange County Convention Center
Symposium: <i>Drosophila suzukii</i> , an Invasive Pest of Small and Stone Fruits	Thursday, September 29 9:15 AM - 12:00 PM	Room W240 C, Orange County Convention Center
Symposium: International Perspectives Contribute Towards a Clearer Understanding of <i>Drosophila suzukii</i>	Thursday, September 29 1:30 PM - 4:45 PM	Room W231 A, Orange County Convention Center
Symposium: Approaches for Modeling Insect Pest Potential Distribution and Spread	Thursday, September 29 1:30 PM - 5:00 PM	Room W331 C, Orange County Convention Center
Symposium: Global Improvements in Invasive Ant Management	Friday, September 30 9:15 AM - 12:30 PM	Room W224 D, Orange County Convention Center
Symposium: An Invasive Planthopper Goes Global: Shedding Light on the Spotted Lanternfly ( <i>Lycorma delicatula</i> )	Friday, September 30 1:30 PM - 4:15 PM	Room W232 C, Orange County Convention Center
Symposium: Pink Hibiscus Mealybug ( <i>Maconellicoccus hirsutus</i> ) Invasions: What We Have Learned...What We Need to Re-Learn	Friday, September 30 1:30 PM - 4:45 PM	Room W331 C, Orange County Convention Center
Symposium: Potential Invasive Pest Weevil Species of the World	Friday, September 30 1:30 PM - 5:30 PM	Room W240 A, Orange County Convention Center

**MEDICAL AND VETERINARY ENTOMOLOGY**

SESSION	TIME	LOCATION
Poster Session 1: Medical and Veterinary Entomology, Part 1	Monday, September 26 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Contributed Papers: Medical and Veterinary Entomology: Forensic Entomology	Monday, September 26 9:15 AM - 11:30 AM	Room W224 H, Orange County Convention Center
Symposium: Vector Development and Reproduction	Monday, September 26 9:15 AM - 11:30 AM	Room W414 A, Orange County Convention Center
Graduate Student Oral Competition: Medical and Veterinary Entomology: Ticks	Monday, September 26 9:15 AM - 12:00 PM	Room W232 B, Orange County Convention Center
Symposium: Engineering Beneficial Traits into Insects Using Novel Gene Drive Systems	Monday, September 26 9:15 AM - 12:15 PM	Room W414 B, Orange County Convention Center
Contributed Papers: Medical and Veterinary Entomology: <i>Anopheles</i> Vectors of Malaria	Monday, September 26 9:15 AM - 12:30 PM	West Hall F2 (WF2), Orange County Convention Center
Symposium: Zika Virus	Monday, September 26 9:15 AM - 12:30 PM	Chapin Theater, Orange County Convention Center
Symposium: Vector-Borne Diseases of Livestock	Monday, September 26 1:30 PM - 4:15 PM	Room W331 B, Orange County Convention Center
Symposium: Innovative Strategies of Mosquito Control	Monday, September 26 1:30 PM - 5:30 PM	Room W331 A, Orange County Convention Center
Graduate Student Poster Competition: Medical and Veterinary Entomology	Tuesday, September 27 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Undergraduate Student Poster Competition: Medical and Veterinary Entomology	Tuesday, September 27 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Graduate Student Oral Competition: Medical and Veterinary Entomology: Livestock Pests and Decomposers	Tuesday, September 27 9:15 AM - 11:30 AM	Room W232 A, Orange County Convention Center
Symposium: Mechanistic Insights into Mosquito-Parasite Interactions	Tuesday, September 27 9:15 AM - 11:30 AM	Room W224 E, Orange County Convention Center
Symposium: Opportunities and Challenges for Biological Control of Disease Vectors (IOBC)	Tuesday, September 27 9:15 AM - 11:45 AM	Room W230 D, Orange County Convention Center
Symposium: Chagas Disease: A Neglected Disease of Public Health Importance	Tuesday, September 27 9:15 AM - 11:45 AM	Room W230 B, Orange County Convention Center



• DAILY SCHEDULE OF SCIENTIFIC PROGRAM BY ICE PROGRAM TOPIC •

Contributed Papers: Medical and Veterinary Entomology: Mosquito 'Omics and Biological Control	Tuesday, September 27 9:15 AM - 12:15 PM	Chapin Theater, Orange County Convention Center
Symposium: Repellents	Tuesday, September 27 9:15 AM - 12:30 PM	Room W224 D, Orange County Convention Center
Symposium: Forensic Entomology without Borders: Uniting the Worldwide Forensic Entomology Community	Tuesday, September 27 1:30 PM - 4:15 PM	Room W222 B, Orange County Convention Center
Symposium: Reducing Transmission Rates of Infectious Diseases by Targeting Mosquito Olfaction	Tuesday, September 27 1:30 PM - 4:30 PM	Room W331 A, Orange County Convention Center
Symposium: Ticks Are Different: The Impact of Tick Biology on Their Role As Vectors	Tuesday, September 27 1:30 PM - 4:30 PM	Room W224 A, Orange County Convention Center
Graduate Student Oral Competition: Medical and Veterinary Entomology: Biting Diptera	Tuesday, September 27 1:30 PM - 5:00 PM	Room W230 A, Orange County Convention Center
Contributed Papers: Medical and Veterinary Entomology: Repellents, Toxicants, and Resistance	Tuesday, September 27 1:30 PM - 5:30 PM	Room W231 C, Orange County Convention Center
Symposium: The Role of Microbiota in Vectors	Wednesday, September 28 9:15 AM - 11:15 AM	Room W331 B, Orange County Convention Center
Symposium: Microbiome and Vector Immunity	Wednesday, September 28 9:15 AM - 11:30 AM	Room W230 C, Orange County Convention Center
Symposium: Vertebrate Host Factors: Effect on Vector Biology	Wednesday, September 28 9:15 AM - 11:30 AM	Room W230 A, Orange County Convention Center
Symposium: The Use of Plant Resources Against Biting Flies	Wednesday, September 28 9:15 AM - 12:00 PM	Room W414 D, Orange County Convention Center
Symposium: Medical and Veterinary Entomology in Florida	Wednesday, September 28 9:15 AM - 12:00 PM	Room W414 C, Orange County Convention Center
Contributed Papers: Medical and Veterinary Entomology: Flies of Veterinary Importance	Wednesday, September 28 9:15 AM - 12:30 PM	West Hall F4 (WF4), Orange County Convention Center
Contributed Papers: Medical and Veterinary Entomology: Ticks I	Wednesday, September 28 9:15 AM - 12:30 PM	West Hall F1 (WF1), Orange County Convention Center
Symposium: Vector Biology and Ecology Perspective: Roadblocks and Solutions to Malaria Elimination	Thursday, September 29 9:15 AM - 11:15 AM	Room W414 B, Orange County Convention Center
Symposium: Peridomestic Animals and Chagas Vector Control	Thursday, September 29 9:15 AM - 11:15 AM	Room W230 B, Orange County Convention Center
Symposium: Stable Flies in Agroecosystems: An International Problem	Thursday, September 29 9:15 AM - 11:15 AM	Room W232 B, Orange County Convention Center
Symposium: New Insights into the Metabolism of Mosquitoes that are Vectors of Human Diseases	Thursday, September 29 9:15 AM - 11:30 AM	Room W414 A, Orange County Convention Center
Symposium: Arboviruses and One Health	Thursday, September 29 9:15 AM - 12:00 PM	Room W230 C, Orange County Convention Center
Contributed Papers: Medical and Veterinary Entomology: Mosquito Ecology and Management	Thursday, September 29 9:15 AM - 12:15 PM	Room W230 A, Orange County Convention Center
Symposium: Arthropod Saliva: From Basic Science to Practical Applications	Thursday, September 29 1:30 PM - 4:00 PM	Room W331 D, Orange County Convention Center
Symposium: Mosquito Host Detection	Thursday, September 29 1:30 PM - 4:15 PM	Room W330 C, Orange County Convention Center
Poster Session 4: Medical and Veterinary Entomology, Part 2	Friday, September 30 9:00 AM - 2:00 PM	West Hall C, Orange County Convention Center
Contributed Papers: Medical and Veterinary Entomology: Biting Flies	Friday, September 30 9:15 AM - 11:30 AM	West Hall F3 (WF3), Orange County Convention Center
Contributed Papers: Medical and Veterinary Entomology: Ticks II	Friday, September 30 9:15 AM - 11:30 AM	Room W331 D, Orange County Convention Center
Symposium: Genetics and Genomics of Mosquitoes and Implications for Transmission of Pathogens	Friday, September 30 9:15 AM - 11:30 AM	Room W224 F, Orange County Convention Center
Symposium: New Approaches to Biological and Integrated Control Changing Global Perspectives on Filth Fly Management	Friday, September 30 9:15 AM - 11:30 AM	Room W224 E, Orange County Convention Center
Symposium: Hormones in Arthropod Vectors of Infectious Diseases	Friday, September 30 9:15 AM - 12:00 PM	Room W232 A, Orange County Convention Center



DAILY SCHEDULE OF SCIENTIFIC PROGRAM BY ICE TOPIC

• DAILY SCHEDULE OF SCIENTIFIC PROGRAM BY ICE PROGRAM TOPIC •

Contributed Papers: Medical and Veterinary Entomology: Mosquito Behavior and Trapping Technologies	Friday, September 30 9:15 AM - 12:15 PM	West Hall F2 (WF2), Orange County Convention Center
Symposium: Anti-Tick Vaccine Development: Possibilities in the Post-Genomics Era	Friday, September 30 1:30 PM - 4:15 PM	Room W224 F, Orange County Convention Center

**MOLECULAR BASIS OF INSECT LEARNING AND BEHAVIOR**

SESSION	TIME	LOCATION
Symposium: Neuronal Correlates of Odorant Valence in Insects	Monday, September 26 9:15 AM - 11:30 AM	Room W331 B, Orange County Convention Center
Symposium: Molecular Bases of Behavior in Kissing Bug Vectors of Human Disease	Wednesday, September 28 9:15 AM - 11:15 AM	Room W330 A, Orange County Convention Center

**MORPHOLOGY, SYSTEMATICS, AND PHYLOGENY**

SESSION	TIME	LOCATION
Symposium: Stick Insect Research in the Era of Genomics: Exploring the Evolution of a Mesodiverse Insect Order	Monday, September 26 9:15 AM - 12:15 PM	Room W414 D, Orange County Convention Center
Symposium: Recent Advances in Heteropteran (Hemiptera) Systematics and Evolution	Monday, September 26 1:30 PM - 4:30 PM	Room W231 C, Orange County Convention Center
Graduate Student Oral Competition: Morphology, Systematics, and Phylogeny: Flies, Lepidoptera, and Others	Monday, September 26 1:30 PM - 4:45 PM	Room W240 D, Orange County Convention Center
Symposium: Systematics, Biogeography, and Ecology of Cerambycidae and Buprestidae	Monday, September 26 1:30 PM - 5:15 PM	Room W231 A, Orange County Convention Center
Symposium: Evolution and Biology of Chalcidoidea: Integrating Genomics, Fossils, Microbiomes, and Natural History	Monday, September 26 1:30 PM - 5:30 PM	Room W340 A, Orange County Convention Center
Graduate Student Poster Competition: Morphology, Systematics, and Phylogeny: Flies, Hemiptera, and Lepidoptera	Tuesday, September 27 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Graduate Student Poster Competition: Morphology, Systematics, and Phylogeny: Springtails, Beetles, and Hymenoptera	Tuesday, September 27 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Undergraduate Student Poster Competition: Morphology, Systematics, and Phylogeny	Tuesday, September 27 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Symposium: Recent Advances in the Study of the Neuropterida	Tuesday, September 27 9:15 AM - 12:00 PM	Room W331 C, Orange County Convention Center
Contributed Papers: Morphology, Systematics, and Phylogeny: Myriapoda and Insecta	Tuesday, September 27 9:15 AM - 12:30 PM	Room W225 B, Orange County Convention Center
Symposium: Progress in Insect Phylogenomics: The Scale and Complexity of Next-Gen Datasets and Analyses	Tuesday, September 27 1:30 PM - 5:15 PM	Room W315 A, Orange County Convention Center
Symposium: Systematics and Diversity of Aquatic Beetles: An Emerging Model System in Evolutionary Biology	Tuesday, September 27 1:30 PM - 5:15 PM	Room W223 A, Orange County Convention Center
Graduate Student Oral Competition: Morphology, Systematics, and Phylogeny: Beetles, Bugs, and Others	Tuesday, September 27 1:30 PM - 5:30 PM	Room W230 C, Orange County Convention Center
Symposium: Advances in Ant Systematics: Global Sampling, New Phylogenetic Methods, and Major Taxonomic Changes	Tuesday, September 27 1:30 PM - 5:30 PM	Room W231 A, Orange County Convention Center
Symposium: Phylogeny and Evolution of Weevils (Coleoptera: Curculionoidea): A Symposium in Honor of Guillermo "Willy" Kuschel	Tuesday, September 27 1:30 PM - 5:30 PM	West Hall F3 (WF3), Orange County Convention Center
Symposium: The Evolution of Lepidoptera: Bringing it All Together	Tuesday, September 27 1:30 PM - 5:30 PM	Room W224 G, Orange County Convention Center
Symposium: 9th International Symposium on the Chrysomelidae	Wednesday, September 28 9:15 AM - 12:15 PM	Room W224 A, Orange County Convention Center
Contributed Papers: Morphology, Systematics, and Phylogeny: Bees, Ants, and Wasps	Thursday, September 29 9:15 AM - 12:00 PM	Room W224 H, Orange County Convention Center
Contributed Papers: Morphology, Systematics, and Phylogeny: Tenebrionids, Clerids, Staphylinids, and Scarabs	Thursday, September 29 9:15 AM - 12:15 PM	Room W225 A, Orange County Convention Center
Contributed Papers: Morphology, Systematics, and Phylogeny: Lepidoptera	Thursday, September 29 9:15 AM - 12:15 PM	Room W330 C, Orange County Convention Center



DAILY SCHEDULE OF SCIENTIFIC PROGRAM BY ICE TOPIC

• DAILY SCHEDULE OF SCIENTIFIC PROGRAM BY ICE PROGRAM TOPIC •

Symposium: Ecology and Systematics of Elateridae (Coleoptera)	Thursday, September 29 1:30 PM - 4:45 PM	Room W224 E, Orange County Convention Center
Symposium: Evolution of a Megadiverse Group: The Ichneumonoid Wasps (Hymenoptera: Braconidae, Ichneumonidae)	Thursday, September 29 1:30 PM - 5:00 PM	Room W222 A, Orange County Convention Center
Symposium: Synthesis in Sternorrhyncha Systematics	Thursday, September 29 1:30 PM - 5:00 PM	Room W222 B, Orange County Convention Center
Symposium: Wings and Powered Flight: Core Novelities in Insect Evolution	Thursday, September 29 1:30 PM - 5:15 PM	Room W315 A, Orange County Convention Center
Graduate Student Oral Competition: Morphology, Systematics, and Phylogeny: Hymenoptera	Thursday, September 29 1:30 PM - 5:30 PM	Room W232 C, Orange County Convention Center
Poster Session 4: Morphology, Systematics, and Phylogeny	Friday, September 30 9:00 AM - 2:00 PM	West Hall C, Orange County Convention Center
Symposium: Rapid Evolutionary Radiations in Insects: Phylogenetic Causes and Consequences of Life in the Fast Lane	Friday, September 30 9:15 AM - 11:15 AM	Room W231 A, Orange County Convention Center
Contributed Papers: Morphology, Systematics, and Phylogeny: Parasitoid Wasps and Trichoptera	Friday, September 30 9:15 AM - 11:30 AM	Room W230 D, Orange County Convention Center
Contributed Papers: Morphology, Systematics, and Phylogeny: Behavior, Chrysomelids, Curculionids, and Scarabs	Friday, September 30 9:15 AM - 11:45 AM	Room W230 A, Orange County Convention Center
Contributed Papers: Morphology, Systematics, and Phylogeny: Hemiptera	Friday, September 30 9:15 AM - 12:15 PM	Room W225 A, Orange County Convention Center
Contributed Papers: Morphology, Systematics, and Phylogeny: Diptera	Friday, September 30 9:15 AM - 1:00 PM	Room W331 B, Orange County Convention Center
Symposium: Evolution, Classification, and Biology of Cucujooid Beetles (Coleoptera: Cucujoidea)	Friday, September 30 1:30 PM - 5:00 PM	Room W225 B, Orange County Convention Center
Symposium: Diptera Systematics: Deciphering Evolutionary Relationships with Diverse and Novel Data	Friday, September 30 1:30 PM - 5:30 PM	Room W230 A, Orange County Convention Center

**PHYSIOLOGY AND BIOCHEMISTRY**

SESSION	TIME	LOCATION
Symposium: Photoperiodic Induction of Diapause and Seasonal Morphs	Monday, September 26 9:15 AM - 12:15 PM	Room W340 B, Orange County Convention Center
Symposium: The Physiological Ecology of Insect Flight: From Millisecond Escape to Long-Distance Migration	Monday, September 26 1:30 PM - 5:30 PM	Room W414 B, Orange County Convention Center
Symposium: Bt Mode of Action, Resistance Mechanisms, and Global Patterns	Monday, September 26 1:30 PM - 5:30 PM	Room W230 D, Orange County Convention Center
Graduate Student Poster Competition: Physiology and Biochemistry: Moths and Mosquitoes	Tuesday, September 27 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Graduate Student Poster Competition: Physiology and Biochemistry: Physiology	Tuesday, September 27 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Symposium: Duplications, Deletions, and Other Mutations: Deciphering the Molecular Basis of Insecticide Resistance	Tuesday, September 27 9:15 AM - 12:15 PM	West Hall F2 (WF2), Orange County Convention Center
Graduate Student Oral Competition: Physiology and Biochemistry: Physiology	Tuesday, September 27 9:15 AM - 12:30 PM	Room W232 B, Orange County Convention Center
Symposium: From Molecules to Management: New Tools for Understanding Locust Swarms across Species and Research Disciplines	Tuesday, September 27 9:15 AM - 12:30 PM	Room W331 A, Orange County Convention Center
Symposium: Mechanisms and Consequences of Phase Change in the Desert Locust, <i>Schistocerca gregaria</i>	Tuesday, September 27 1:30 PM - 4:00 PM	Room W232 A, Orange County Convention Center
Symposium: Insect Biocomposites: Cuticles and Peritrophic Matrices	Tuesday, September 27 1:30 PM - 5:00 PM	Room W331 C, Orange County Convention Center
Symposium: Physiological Systems for Arthropod Pest Management in the 21st Century	Tuesday, September 27 1:30 PM - 5:15 PM	Room W330 A, Orange County Convention Center
Symposium: Ion Channels as Targets of Synthetic and Natural Neurotoxins	Tuesday, September 27 1:30 PM - 5:30 PM	Room W340 B, Orange County Convention Center
Symposium: The Limits of Respiratory Function: External and Internal Constraints on Insect Gas Exchange	Tuesday, September 27 1:30 PM - 5:30 PM	Room W331 B, Orange County Convention Center



• DAILY SCHEDULE OF SCIENTIFIC PROGRAM BY ICE PROGRAM TOPIC •

Symposium: Insect Molecular Physiology and Ecology: The Post-Genomic Era	Wednesday, September 28 9:15 AM - 11:30 AM	Room W224 G, Orange County Convention Center
Symposium: The Insect Circulatory System: Vital but Widely Neglected!	Wednesday, September 28 9:15 AM - 11:30 AM	Room W222 A, Orange County Convention Center
Graduate Student Oral Competition: Physiology and Biochemistry: Abiotic/Biotic Effects	Wednesday, September 28 9:15 AM - 12:30 PM	Room W232 C, Orange County Convention Center
Contributed Papers: Physiology and Biochemistry: Fundamental	Wednesday, September 28 9:15 AM - 12:45 PM	Room W315 A, Orange County Convention Center
Contributed Papers: Physiology and Biochemistry: Molecular, Genetics, and Genomics	Wednesday, September 28 9:15 AM - 1:00 PM	Room W315 B, Orange County Convention Center
Poster Session 3: Physiology and Biochemistry	Thursday, September 29 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Symposium: Molecular Strategies/Mechanisms of Insect Reproduction	Thursday, September 29 9:15 AM - 11:30 AM	Room W331 B, Orange County Convention Center
Symposium: Mechanisms Affecting the Efficiency of RNA Interference in Insects	Thursday, September 29 1:30 PM - 4:45 PM	Room W331 A, Orange County Convention Center
Contributed Papers: Physiology and Biochemistry: Neurophysiology and Hormone Regulation	Thursday, September 29 1:30 PM - 5:15 PM	Room W314 B, Orange County Convention Center
Contributed Papers: Physiology and Biochemistry: Toxicology, Metabolism, and Nutrition	Thursday, September 29 1:30 PM - 5:15 PM	Room W223 B, Orange County Convention Center
Symposium: Cold Physiology in a Warming World	Thursday, September 29 1:30 PM - 5:30 PM	Room W231 B, Orange County Convention Center
Symposium: Physiological Responses to Environmental Change	Friday, September 30 9:15 AM - 12:00 PM	Room W414 C, Orange County Convention Center
Symposium: Neuro-Endocrine Regulation of Reproduction in Insects	Friday, September 30 1:30 PM - 4:00 PM	Room W224 B, Orange County Convention Center
Symposium: Molecular Pharmacology and Physiology of Membrane Transport and Signaling Processes	Friday, September 30 1:30 PM - 4:45 PM	Room W330 C, Orange County Convention Center
Symposium: Molecular Endocrinology	Friday, September 30 1:30 PM - 5:30 PM	Room W240 B, Orange County Convention Center

**RNAi AND GENE EXPRESSION CONTROL IN INSECTS**

SESSION	TIME	LOCATION
Graduate Student Poster Competition: RNAi and Gene Expression Control in Insects	Monday, September 26 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Symposium: Emerging Technologies for Successful Applications of dsRNA to Reduce Pests and Pathogens in Agriculture	Monday, September 26 1:30 PM - 5:30 PM	West Hall F2 (WF2), Orange County Convention Center
Contributed Papers: RNAi and Gene Expression Control in Insects: Pest Management	Tuesday, September 27 9:15 AM - 11:30 AM	West Hall F4 (WF4), Orange County Convention Center
Graduate Student Oral Competition: RNAi and Gene Expression Control in Insects	Tuesday, September 27 9:15 AM - 12:15 PM	Room W232 C, Orange County Convention Center
Poster Session 3: RNAi and Gene Expression Control in Insects	Thursday, September 29 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Contributed Papers: RNAi and Gene Expression Control in Insects: Interactions	Friday, September 30 9:15 AM - 11:30 AM	Room W315 B, Orange County Convention Center

**STORED PRODUCTS ENTOMOLOGY**

SESSION	TIME	LOCATION
Poster Session 1: Stored Products Entomology	Monday, September 26 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center
Contributed Papers: Stored Products Entomology: Novel Strategies I	Monday, September 26 9:15 AM - 12:45 PM	Room W224 C, Orange County Convention Center
Symposium: The Khapra Beetle: A Potential Invasive Species	Monday, September 26 1:30 PM - 4:15 PM	Room W315 B, Orange County Convention Center
Graduate Student Poster Competition: Acarology and Stored Products	Tuesday, September 27 9:00 AM - 5:00 PM	West Hall C, Orange County Convention Center



DAILY SCHEDULE OF SCIENTIFIC PROGRAM BY ICE TOPIC

• DAILY SCHEDULE OF SCIENTIFIC PROGRAM BY ICE PROGRAM TOPIC •

Symposium: Stored Product Entomology: Challenges that Transcend Borders	Tuesday, September 27 9:15 AM - 11:45 AM	Room W224 B, Orange County Convention Center
Symposium: Advances in Hermetic Storage for Smallholder Farms	Tuesday, September 27 9:15 AM - 12:00 PM	Room W224 A, Orange County Convention Center
Symposium: Psocids as Global Pests of Stored Products	Wednesday, September 28 9:15 AM - 11:15 AM	Room W231 A, Orange County Convention Center
Contributed Papers: Stored Products Entomology: Fumigants and Hypoxia	Wednesday, September 28 9:15 AM - 12:15 PM	West Hall F2 (WF2), Orange County Convention Center
Contributed Papers: Stored Products Entomology: Novel Strategies II	Friday, September 30 9:15 AM - 12:00 PM	Room W331 C, Orange County Convention Center

URBAN ENTOMOLOGY IN A CHANGING ENVIRONMENT		
SESSION	TIME	LOCATION
Graduate Student Oral Competition: Urban Entomology in a Changing Environment: Biting Pests	Monday, September 26 9:15 AM - 11:15 AM	Room W232 C, Orange County Convention Center
Contributed Papers: Urban Entomology in a Changing Environment: Bed Bugs, Cockroaches, and Flies	Monday, September 26 9:15 AM - 12:30 PM	Room W331 A, Orange County Convention Center
Symposium: How Human Activities Shape the Global Distribution of Insects	Monday, September 26 1:30 PM - 4:15 PM	Room W414 D, Orange County Convention Center
Symposium: A Global Perspective on Insect Pests of Wood Products	Monday, September 26 1:30 PM - 4:45 PM	Room W230 A, Orange County Convention Center
Symposium: Advancements in Resistance and Aversion Management for Urban Pests	Tuesday, September 27 9:15 AM - 11:30 AM	Room W224 C, Orange County Convention Center
Symposium: Advances in the Molecular Biology and Microbial Ecology of Important Urban Pests	Tuesday, September 27 1:30 PM - 4:00 PM	Room W224 B, Orange County Convention Center
Symposium: Ecology and Adaptation for Survival of Termites	Wednesday, September 28 9:15 AM - 11:30 AM	Room W331 C, Orange County Convention Center
Symposium: Novel Techniques in Urban IPM	Wednesday, September 28 9:15 AM - 11:30 AM	Room W331 D, Orange County Convention Center
Graduate Student Oral Competition: Urban Entomology in a Changing Environment: Home and Warehouse Pests	Thursday, September 29 9:15 AM - 11:15 AM	Room W224 A, Orange County Convention Center
Graduate Student Oral Competition: Urban Entomology in a Changing Environment: Ants	Thursday, September 29 9:15 AM - 11:30 AM	Room W224 B, Orange County Convention Center
Symposium: Global Challenges in Applied Urban Entomology	Thursday, September 29 9:15 AM - 11:30 AM	Room W232 C, Orange County Convention Center
Symposium: Invasive Termite Species: Where Are They From, Where Are They Now, and Where Will They Be?	Thursday, September 29 1:30 PM - 4:00 PM	Room W240 D, Orange County Convention Center
Symposium: Invasive Disease Vectors in Urban Environments: Current Challenges and Future Solutions	Thursday, September 29 1:30 PM - 5:15 PM	Room W414 D, Orange County Convention Center
Symposium: Spreading the Word: Bed Bug Education and Training in Today's Society	Friday, September 30 9:15 AM - 11:45 AM	West Hall F4 (WF4), Orange County Convention Center
Contributed Papers: Urban Entomology in a Changing Environment: Termites and Ants	Friday, September 30 9:15 AM - 12:15 PM	West Hall F1 (WF1), Orange County Convention Center
Symposium: New Insights into Biology, Resistance Mechanisms, and the Management of the Modern Bed Bug	Friday, September 30 1:30 PM - 4:45 PM	West Hall F4 (WF4), Orange County Convention Center
Contributed Papers: Urban Entomology in a Changing Environment: Unique Challenges	Friday, September 30 1:30 PM - 5:15 PM	Room W230 B, Orange County Convention Center



## DAILY SCHEDULE OF MEETINGS AND FUNCTIONS

## FRIDAY, SEPTEMBER 23

FUNCTION	TIME	LOCATION
Entomological Collections Network	7:00 AM - 6:00 PM	Grand Ballroom A, Rosen Centre Hotel
Annual Review of Entomology Editorial Committee Meeting	7:30 AM - 5:00 PM	Salon 11, Rosen Centre Hotel
ESA Eastern Branch Executive Committee Meeting	2:00 PM - 3:00 PM	Salon 24, Rosen Centre Hotel
Entomological Collections Network	6:00 PM - 9:00 PM	Grand Ballroom C, Rosen Centre Hotel
CAMTech Industry Advisory Board Meeting (Reception)	7:00 PM - 9:00 PM	Salon 13/14, Rosen Centre Hotel

## SATURDAY, SEPTEMBER 24

FUNCTION	TIME	LOCATION
ESA Governing Board Meeting	7:00 AM - 4:00 PM	Signature 1, Rosen Centre Hotel
Entomological Collections Network	7:00 AM - 6:00 PM	Grand Ballroom A, Rosen Centre Hotel
International Union for the Study of Social Insects (IUSSI), North American Section	7:00 AM - 6:00 PM	Salon 11/12, Rosen Plaza Hotel
CAMTech Industry Advisory Board Meeting	7:30 AM - 5:30 PM	Salon 13/14, Rosen Centre Hotel
NIFA Project Director Meeting	7:30 AM - 5:30 PM	Grand Ballroom B, Rosen Plaza Hotel
Past Developments, Current Frontiers, and Future Perspectives: Global Gathering of Chinese Entomologists in 2016	8:00 AM - 4:30 PM	Grand Ballroom A, Rosen Plaza Hotel
Meeting of the S1052 Working Group on Improving the Microbial Control of Arthropod Pests	8:00 AM - 5:00 PM	Salon 13/14, Rosen Plaza Hotel
Butterfly Net: A Planning Workshop for a System to Manage and Share Global Butterfly Data on Phylogeny, Distributions, and Traits	8:00 AM - 6:00 PM	Salon 3, Rosen Plaza Hotel
Entomological Society of Canada Board Meeting	8:30 AM - 5:30 PM	Salon 4, Rosen Plaza Hotel
STEMbugs Educator Workshop	10:00 AM - 2:00 PM	Room W224 GH, Convention Center
GDM ARM Electronic Data Entry Workshop	1:00 PM - 4:00 PM	Salon 9, Rosen Plaza Hotel
NCSRP Research Planning Meeting	1:00 PM - 4:00 PM	Salon 18, Rosen Plaza Hotel
Registration and Information Center	2:00 PM - 6:00 PM	West Hall C Foyer, Convention Center
Council of Entomological Department Administrators Meeting	3:00 PM - 6:00 PM	Salon 12, Rosen Centre Hotel
Informal Meeting of Leaf Beetle ( <i>sensu lato</i> ) Enthusiasts	3:30 PM - 5:30 PM	Salon 17, Rosen Plaza Hotel
New ESA Governing Board Orientation	4:00 PM - 5:00 PM	Signature 1, Rosen Centre Hotel

## SUNDAY, SEPTEMBER 25

FUNCTION	TIME	LOCATION
North American Forensic Entomology Association	7:00 AM - 5:30 PM	Salon 3/4, Rosen Centre Hotel
CAMTech Industry Advisory Board Meeting	7:30 AM - 12:00 PM	Salon 13/14, Rosen Centre Hotel
Planning Meeting for the Summit on Mosquito-Vectored Disease Epidemics in the Americas	8:00 AM - 9:30 AM	Salon 6, Rosen Centre Hotel
<i>Journal of Economic Entomology</i> Editorial Board Meeting	8:00 AM - 10:00 AM	Salon 12, Rosen Centre Hotel
P-IE Governing Council Working Session	8:00 AM - 10:00 AM	Salon 7, Rosen Centre Hotel
Invasive Species: Collections Critical Infrastructure	8:00 AM - 11:30 AM	Grand Ballroom A, Rosen Centre Hotel
ENTOMOL Meeting Team Brazil	8:00 AM - 1:00 PM	Salon 13/14, Rosen Plaza Hotel
9th International Aphid Genomics Consortium (IAGC) Workshop	8:00 AM - 5:15 PM	Room W224 E, Convention Center
Brazilian Entomological Society (SEB) Satellite Symposium: Entomology in Brazil: Opportunity for Partnerships	8:15 AM - 3:40 PM	Grand Ballroom A/B, Rosen Plaza Hotel
Tour: Cocoa Beach	9:00 AM - 3:00 PM	West Hall C Foyer, Convention Center
ESA Presidential Committee on Section Leadership	9:30 AM - 10:30 AM	Salon 6, Rosen Centre Hotel
ICE 2016/ESA Annual Meeting Planning Committee Meeting	10:00 AM - 11:00 AM	Signature 1, Rosen Centre Hotel
Thomas Say Books Editorial Board Meeting	10:00 AM - 11:00 AM	Salon 12, Rosen Centre Hotel





# SUNDAY/MONDAY • DAILY SCHEDULE OF MEETINGS AND FUNCTIONS •

IOBC NRS Governing Board Meeting	10:00 AM - 12:00 PM	Salon 8, Rosen Centre Hotel
Lepidoptera of North America Network	10:00 AM - 12:00 PM	Salon 10, Rosen Centre Hotel
Presentation Preview Room (PPR)/Speaker Ready Room	10:00 AM - 6:00 PM	Room W221 AB, Convention Center
Registration and Information Center	10:00 AM - 9:00 PM	West Hall C Foyer, Convention Center
Certification Board Meeting	11:00 AM - 2:00 PM	Salon 9, Rosen Centre Hotel
ICE Council Meeting	11:30 AM - 1:30 PM	Room W221 C, Convention Center
Highlights of Medical, Urban, and Veterinary Entomology in 2016	11:30 AM - 3:30 PM	Room W340 AB, Convention Center
Physiology, Biochemistry, and Toxicology (PBT) Networking Section	11:30 AM - 3:30 PM	West Hall F3 (WF3), Convention Center
Recent Advances in Entomology in Japan - Ecology and Reproductive Biology: Satellite Symposium of the Union of Japanese Society for Insect Sciences	12:20 PM - 3:40 PM	Salon 9/10, Rosen Plaza Hotel
Plant-Insect Ecosystem (P-IE) Section Networking, Business, and Learning Session	12:30 PM - 3:30 PM	West Hall F1 (WF1), Convention Center
Pollinators: Critical Gene Banks	12:30 PM - 3:30 PM	Grand Ballroom A, Rosen Centre Hotel
Entomological Foundation Insect Expo Committee Meeting	1:00 PM - 2:00 PM	Salon 7, Rosen Centre Hotel
Systematics, Evolution, and Biodiversity (SysEB) Section Meeting	1:00 PM - 3:30 PM	Room W230 AB, Convention Center
The Acarological Society of America Remembers John Conrad Moser	1:00 PM - 5:00 PM	Room W224 GH, Convention Center
Medical, Urban, and Veterinary Entomology (MUVE) Section Preliminary Business Meeting	2:00 PM - 3:30 PM	Room W340 AB, Convention Center
IOBC Executive Committee Meeting and Executive Council Meeting	2:00 PM - 4:00 PM	Salon 6, Rosen Centre Hotel
International Society of Hymenopterists - Business Meeting	2:00 PM - 4:00 PM	Room W414 D, Convention Center
Moderator Training	2:30 PM - 3:00 PM	Room W224 B, Convention Center
Student Competition Judges Training	3:00 PM - 3:30 PM	Room W223 B, Convention Center
ESA New Member Reception	3:00 PM - 3:45 PM	Room W414 AB, Convention Center
Exhibit Hall	7:30 PM - 9:30 PM	West Hall C, Convention Center
Welcome Reception	7:30 PM - 9:30 PM	West Hall C, Convention Center

## MONDAY, SEPTEMBER 26

FUNCTION	TIME	LOCATION
Morning Yoga	6:00 AM - 7:00 AM	Fitness Center, Hyatt Regency Orlando
Women in Entomology Breakfast	6:15 AM - 8:00 AM	West Hall F2 (WF2), Convention Center
The Coleopterists Society Executive Council Meeting	7:00 AM - 1:00 PM	Salon 7, Rosen Centre Hotel
Presentation Preview Room (PPR)/Speaker Ready Room	7:00 AM - 5:00 PM	Room W221 AB, Convention Center
Registration and Information Center	7:00 AM - 5:00 PM	West Hall C Foyer, Convention Center
Moderator Training	7:30 AM - 8:00 AM	Room W224 B, Convention Center
Student Competition Judges Training	7:30 AM - 8:00 AM	Room W223 B, Convention Center
IRAC-US Meeting	8:00 AM - 1:00 PM	Salon 9, Rosen Centre Hotel
Guest Hospitality	8:00 AM - 6:00 PM	Salon 5, Rosen Centre Hotel
Exhibit Hall	9:00 AM - 5:00 PM	West Hall C, Convention Center
Science Policy Fellows Workshop	9:30 AM - 1:30 PM	Salon 6, Rosen Centre Hotel
ESA Membership Committee Meeting	10:00 AM - 11:00 AM	Salon 2, Rosen Centre Hotel
<i>Journal of Medical Entomology</i> Editorial Board Meeting	10:00 AM - 11:30 AM	Salon 12, Rosen Centre Hotel
Welcome Program for Registered Guests	10:00 AM - 11:45 AM	Salon 5, Rosen Centre Hotel
Editorial Board Meeting <i>Archives of Insect Biochemistry and Physiology</i>	11:30 AM - 2:00 PM	Salon 10, Rosen Plaza Hotel
Editorial Board Meeting, <i>The Canadian Entomologist</i>	12:00 PM - 2:00 PM	Salon 11/12, Rosen Plaza Hotel
Editorial Board Meeting for <i>Journal of Insect Physiology</i>	12:15 PM - 1:30 PM	Salon 11, Rosen Centre Hotel
Editorial Board Meeting for <i>Current Opinion in Insect Science</i>	12:15 PM - 1:30 PM	Salon 11, Rosen Centre Hotel
Lunch and Learn: Meet the ESA Journal Editors	12:40 PM - 1:20 PM	West Hall F2 (WF2), Convention Center
Moderator Training	12:45 PM - 1:15 PM	Room W224 B, Convention Center



# MONDAY/TUESDAY • DAILY SCHEDULE OF MEETINGS AND FUNCTIONS •

USDA - ARS All Hands Meeting	1:30 PM - 3:00 PM	Grand Ballroom A, Rosen Centre Hotel
ESA Science Policy Committee Meeting	1:30 PM - 3:30 PM	Salon 2, Rosen Centre Hotel
ESA Common Names Committee Meeting	2:00 PM - 3:00 PM	Salon 12, Rosen Centre Hotel
ESA Linnaean Games	2:00 PM - 6:00 PM	Valencia Room, Convention Center
Society of Overseas Nepalese Entomologists Meeting	3:00 PM - 5:00 PM	Salon 3, Rosen Plaza Hotel
Tour: Epcot	4:00 PM - 11:00 PM	West Hall C Foyer, Convention Center
ESA Illinois Mixer	6:00 PM - 7:30 PM	Salon 4, Rosen Centre Hotel
ICE Council Reception	6:00 PM - 8:00 PM	Orchid Room/Verandah, Hyatt Regency Orlando
IOBC General Assembly	6:00 PM - 8:05 PM	Room W232 A, Convention Center
Florida Mixer	6:30 PM - 8:00 PM	Signature 1, Rosen Centre Hotel
Colorado, Kansas, and Nebraska Joint Mixer	6:30 PM - 8:30 PM	Salon 9/10, Rosen Centre Hotel
Iowa State University Alumni Mixer	6:30 PM - 8:30 PM	Salon 7, Rosen Centre Hotel
Michigan State University and The Ohio State University Joint Mixer	6:30 PM - 8:30 PM	Salon 3, Rosen Centre Hotel
Northwest Mixer (UI, MSU, OSU, WSU)	6:30 PM - 8:30 PM	Grand Ballroom B, Rosen Centre Hotel
Purdue Mixer	6:30 PM - 8:30 PM	Grand Ballroom A, Rosen Centre Hotel
University of Wisconsin Mixer	6:30 PM - 8:30 PM	Salon 6, Rosen Centre Hotel
University of California Mixer for Alumni and Friends	6:30 PM - 9:00 PM	Grand Ballroom D, Rosen Centre Hotel
2016 Mid-Atlantic Mixer	7:00 PM - 9:00 PM	Salon 13/14, Rosen Centre Hotel
Auburn, Arkansas, Clemson, Kentucky, and Tennessee Mixer	7:00 PM - 9:00 PM	Salon 1, Rosen Centre Hotel
Texas A&M University, Oklahoma State University, and Southwestern Branch Mixer	7:00 PM - 9:00 PM	Grand Ballroom E, Rosen Centre Hotel
Penn State Mixer	7:00 PM - 9:00 PM	Salon 8, Rosen Centre Hotel
Entomological Society of Canada President's Reception	7:00 PM - 10:00 PM	Salon 4, Rosen Plaza Hotel
XI European Congress of Entomology	7:30 PM - 9:00 PM	Salon 11/12, Rosen Plaza Hotel
Cornell University Entomology Mixer-Reception	8:00 PM - 10:00 PM	Salon 11, Rosen Centre Hotel

## TUESDAY, SEPTEMBER 27

FUNCTION	TIME	LOCATION
Cardio Class	6:00 AM - 7:00 AM	Fitness Center, Hyatt Regency Orlando
ESA Past-Presidents Breakfast	7:00 AM - 8:00 AM	Signature 1, Rosen Centre Hotel
Presentation Preview Room (PPR)/Speaker Ready Room	7:00 AM - 5:00 PM	Room W221 AB, Convention Center
Registration and Information Center	7:00 AM - 5:00 PM	West Hall C Foyer, Convention Center
Moderator Training	7:30 AM - 8:00 AM	Room W224 B, Convention Center
Student Competition Judges Training	7:30 AM - 8:00 AM	Room W223 B, Convention Center
Guest Hospitality	8:00 AM - 6:00 PM	Salon 5, Rosen Centre Hotel
Exhibit Hall	9:00 AM - 5:00 PM	West Hall C, Convention Center
ESA Student Transition & Early Professionals Committee (STEP, ECP) Meeting	9:30 AM - 10:30 AM	Salon 2, Rosen Centre Hotel
BCE Core Exam Writing Committee	9:30 AM - 11:30 AM	Salon 6, Rosen Centre Hotel
Tour: Leu Gardens	9:30 AM - 2:00 PM	West Hall C Foyer, Convention Center
ESA Awards and Honors Committee Meeting	10:00 AM - 11:30 AM	Salon 1, Rosen Centre Hotel
<i>Journal of Insect Science</i> Editorial Board Meeting	10:00 AM - 12:00 PM	Salon 12, Rosen Centre Hotel
ESA Diversity & Inclusion Committee Meeting	10:30 AM - 11:30 AM	Salon 2, Rosen Centre Hotel
Western Region IPM Center Bed Bug Work Group	10:30 AM - 12:00 PM	Salon 3, Rosen Centre Hotel
ESA National Insect Photo Salon	12:00 PM - 1:00 PM	West Hall F 4 (WF4) Salon, Convention Center
ESA Student Affairs Committee (SAC) Meeting	12:00 PM - 1:00 PM	Salon 2, Rosen Centre Hotel
ACE Support Committee	12:00 PM - 2:00 PM	Salon 6, Rosen Centre Hotel



## TUESDAY/WEDNESDAY • DAILY SCHEDULE OF MEETINGS AND FUNCTIONS •

Lunch and Learn: No Means No: How to Stop Harassment in Professional Settings	12:30 PM - 1:15 PM	West Hall F2 (WF2), Convention Center
Entomology Research and the National Science Foundation	12:30 PM - 1:15 PM	West Hall F1 (WF1), Convention Center
Locust Lunch	12:30 PM - 1:30 PM	Room W232 A, Convention Center
Moderator Training	12:45 PM - 1:15 PM	Room W224 B, Convention Center
Association of Indian Entomologists Annual Meeting	1:00 PM - 2:00 PM	Salon 11/12, Rosen Plaza Hotel
Entomological Foundation Board of Counselors Meeting	1:00 PM - 2:30 PM	Salon 1, Rosen Centre Hotel
Entomological Society of Canada Gold Medal Presentation and Awards Ceremony	1:00 PM - 2:30 PM	Room W340 A, Convention Center
<i>Arthropod Management Tests</i> Editorial Board Meeting	1:00 PM - 3:00 PM	Salon 12, Rosen Centre Hotel
Global Linnaean Games	2:00 PM - 6:00 PM	Valencia Room, Convention Center
Entomological Society of Canada AGM	2:30 PM - 3:30 PM	Room W340 A, Convention Center
<i>Environmental Entomology</i> Editorial Board Meeting	3:00 PM - 5:00 PM	Salon 12, Rosen Centre Hotel
Entomological Society of Canada Incoming Board Meeting	3:30 PM - 4:00 PM	Room W340 A, Convention Center
Synthesis Discussion for Locust Research and Management	4:00 PM - 5:00 PM	Room W232 A, Convention Center
Reception for Insect Effects on Ecosystem Services	4:45 PM - 6:00 PM	Room W414 D, Convention Center
Members and Friends of the Australian Entomological Society Mixer	5:00 PM - 7:00 PM	Salon 9, Rosen Plaza Hotel
Chalcidoidea Classification Organizational Meeting	5:00 PM - 8:00 PM	Room W333, Convention Center
Triplehorn ICE Pinning Challenge	5:30 PM - 6:30 PM	Salon 4, Rosen Centre Hotel
ICE Council Meeting	5:30 PM - 7:00 PM	Room W221 C, Convention Center
Biology of Invasive Stink Bugs and Related Species (Pentatomoidea)	5:45 PM - 8:00 PM	Room W314 A, Convention Center
Korean Young Entomologists (KYE) Mixer	6:00 PM - 9:00 PM	Salon 7, Rosen Centre Hotel
International Entomology Leadership Summit: Improving the Human Condition through Insect Science	6:00 PM - 9:15 PM	Grand Ballroom D/E, Rosen Centre Hotel
IOBC NRS Annual Meeting, Awards, and Mixer	6:00 PM - 9:30 PM	Room W340 A, Convention Center
IOBC New Executive Committee Meeting	6:30 PM - 8:30 PM	Salon 6, Rosen Centre Hotel
North Central Branch-ESA Reception	6:30 PM - 8:30 PM	Grand Ballroom B, Rosen Centre Hotel
Southeastern Branch-ESA, North Carolina State University, University of Georgia, and Mississippi State University Mixer-Reception	6:30 PM - 8:30 PM	Grand Ballroom A, Rosen Centre Hotel
ESA Editors Reception	7:00 PM - 8:00 PM	Salon 3, Rosen Centre Hotel
ESA Governing Board Reception	7:00 PM - 9:00 PM	Signature 1, Rosen Centre Hotel
Life Table Software Sharing and Consulting	7:00 PM - 9:00 PM	Room W224 E, Convention Center
North American Dipterists Society (NADS) Meeting	7:00 PM - 9:30 PM	Room W230 A, Convention Center
Entomological Society of Canada Mixer	7:00 PM - 10:00 PM	Salon 3/4, Rosen Plaza Hotel
The Coleopterists Society Annual Meeting	7:00 PM - 10:00 PM	West Hall F3 (WF3), Convention Center
Student Lounge	7:00 PM - 11:00 PM	Grand Ballroom A/B, Rosen Plaza Hotel
Student Reception	7:00 PM - 11:00 PM	Club 39 at the Plaza, Rosen Plaza Hotel

### WEDNESDAY, SEPTEMBER 28

FUNCTION	TIME	LOCATION
Morning Meditation	6:00 AM - 7:00 AM	Fitness Center, Hyatt Regency Orlando
Presentation Preview Room (PPR)/Speaker Ready Room	7:00 AM - 12:00 PM	Room W221 AB, Convention Center
Registration and Information Center	7:00 AM - 12:00 PM	West Hall C Foyer, Convention Center
Moderator Training	7:30 AM - 8:00 AM	Room W224 B, Convention Center
Student Competition Judges Training	7:30 AM - 8:00 AM	Room W223 B, Convention Center
Tour: Airboat & Wildlife Park	8:00 AM - 1:30 PM	West Hall C Foyer, Convention Center
Guest Hospitality	8:00 AM - 6:00 PM	Salon 5, Rosen Centre Hotel
Simulation Modelling of Monarch Butterflies	8:30 AM - 12:30 PM	Salon 11/12, Rosen Plaza Hotel
Exhibit Hall	9:00 AM - 1:00 PM	West Hall C, Convention Center



## WEDNESDAY/THURSDAY • DAILY SCHEDULE OF MEETINGS AND FUNCTIONS •

Tour: Cocoa Beach	9:00 AM - 3:00 PM	West Hall C Foyer, Convention Center
International Entomology Leadership Summit: Improving the Human Condition through Insect Science	9:30 AM - 5:45 PM	Grand Ballroom D/E, Rosen Centre Hotel
<i>Journal of Insects Systematics and Diversity</i> Editorial Board Meeting	10:00 AM - 12:00 PM	Salon 12, Rosen Centre Hotel
Entomological Foundation Insect Expo	10:00 AM - 2:00 PM	Hall WD1, Convention Center
Regional Plant Protection Organization Post-Symposium Meeting	12:00 PM - 1:30 PM	Salon 3, Rosen Plaza Hotel
Tour: Insect Collecting at the Disney Wilderness Preserve	12:00 PM - 6:00 PM	West Hall C Foyer, Convention Center
Editorial Board Meeting for <i>Insect Biochemistry and Molecular Biology</i>	12:15 PM - 1:30 PM	Salon 11, Rosen Centre Hotel
Florida Entomological Society Business Meeting	12:30 PM - 4:00 PM	Room W414 C, Convention Center
Tour: Backstage Safari at Disney's Animal Kingdom	1:00 PM - 5:00 PM	West Hall C Foyer, Convention Center
Tour: University of Central Florida—Bug Closet Tour	1:00 PM - 5:00 PM	West Hall C Foyer, Convention Center
Tour: Shopping in Orlando	1:00 PM - 7:00 PM	West Hall C Foyer, Convention Center
Enhance Lepidopteran Insects RNAi Efficiency and Accelerate Its Application in Pest Control	2:00 PM - 4:00 PM	Room W224 A, Convention Center
Tour: Epcot	4:00 PM - 11:00 PM	West Hall C Foyer, Convention Center

### THURSDAY, SEPTEMBER 29

FUNCTION	TIME	LOCATION
RevUp Spin Class	6:00 AM - 7:00 AM	Fitness Center, Hyatt Regency Orlando
Presentation Preview Room (PPR)/Speaker Ready Room	7:00 AM - 5:00 PM	Room W221 AB, Convention Center
Registration and Information Center	7:00 AM - 5:00 PM	West Hall C Foyer, Convention Center
Moderator Training	7:30 AM - 8:00 AM	Room W224 B, Convention Center
Guest Hospitality	8:00 AM - 6:00 PM	Salon 5, Rosen Centre Hotel
Exhibit Hall	9:00 AM - 5:00 PM	West Hall C, Convention Center
Student Debates	9:15 AM - 12:15 PM	Chapin Theater, Convention Center
<i>Annals of the ESA</i> Editorial Board Meeting	10:00 AM - 12:00 PM	Salon 12, Rosen Centre Hotel
Public Health ACE Committee	10:30 AM - 12:30 PM	Salon 6, Rosen Centre Hotel
ESA International Branch Business Meeting and Awards Luncheon	11:30 AM - 1:00 PM	West Hall F2 (WF2), Convention Center
ESA and ESC 2018 Annual Meeting Planning	12:00 PM - 1:00 PM	Signature 1, Rosen Centre Hotel
Acarological Society of America	12:15 PM - 1:15 PM	Room W 314 B, Convention Center
ICE Council Meeting	12:15 PM - 1:30 PM	Room W221 C, Convention Center
Sin Fronteras: Forging Collaborations through the Americas: 4th Latin American/Hispanic Symposium Reception	12:30 PM - 1:15 PM	Room W340 A, Convention Center
ESA Education and Outreach Committee Meeting	12:30 PM - 2:30 PM	Salon 2, Rosen Centre Hotel
Moderator Training	12:45 PM - 1:15 PM	Room W224 B, Convention Center
Yearly Meeting of the Society for Regulatory Entomology	12:40 PM - 1:30 PM	Room W331 C, Convention Center
ESA Publications Council Meeting	1:00 PM - 4:00 PM	Salon 12, Rosen Centre Hotel
ESA Branch Leaders Meeting	2:00 PM - 3:00 PM	Salon 1, Rosen Centre Hotel
ESA Section Leaders Meeting	3:00 PM - 4:00 PM	Salon 1, Rosen Centre Hotel
Entomological Foundation Board of Directors Meeting	3:00 PM - 4:30 PM	Salon 2, Rosen Centre Hotel
<i>Journal of Integrated Pest Management</i> Editorial Board Meeting	4:00 PM - 5:30 PM	Salon 12, Rosen Centre Hotel
WERA1021: Spotted Wing Drosophila Biology, Ecology, and Management	5:00 PM - 8:00 PM	Room W231 A, Convention Center
Discussion of Breeding Honey Bees for Resistance to Varroa	6:30 PM - 8:30 PM	Salon 2, Rosen Centre Hotel
ICE Gala Dinner	7:30 PM - 10:00 PM	Grand Ballroom, Rosen Centre Hotel



**FRIDAY, SEPTEMBER 30**

FUNCTION	TIME	LOCATION
Morning Yoga	6:00 AM - 7:00 AM	Fitness Center, Hyatt Regency Orlando
Faunal Diversity of Insects	7:00 AM - 7:35 AM	Salon 4, Rosen Plaza Hotel
MUVE Final Business Meeting with Breakfast	7:00 AM - 8:00 AM	Room W330 B, Convention Center
Open P-IE Section Governing Council and Member Feedback Session	7:00 AM - 8:00 AM	Room W333, Convention Center
Presentation Preview Room (PPR)/Speaker Ready Room	7:00 AM - 12:00 PM	Room W221 AB, Convention Center
Registration and Information Center	7:00 AM - 12:00 PM	West Hall C Foyer, Convention Center
Moderator Training	7:30 AM - 8:00 AM	Room W224 B, Convention Center
Tour: Airboat & Wildlife Park	8:00 AM - 1:30 PM	West Hall C Foyer, Convention Center
Guest Hospitality	8:00 AM - 6:00 PM	Salon 5, Rosen Centre Hotel
Exhibit Hall	9:00 AM - 2:20 PM	West Hall C, Convention Center
SysEB Final Business Meeting	9:30 AM - 10:30 AM	Room W333, Convention Center
Entomology 2017 Planning Committee Meeting	9:30 AM - 11:00 AM	Signature 1, Rosen Centre Hotel
BCE MedVet Exam Writing Committee	10:00 AM - 12:00 PM	Salon 2, Rosen Centre Hotel
ICE Council Meeting	12:15 PM - 1:15 PM	Room W221 C, Convention Center
Lunch and Learn: Down with Publish or Perish! Non-Traditional Careers in Entomology	12:30 PM - 1:15 PM	West Hall F2 (WF2), Convention Center
Student Awards	12:30 PM - 2:30 PM	Chapin Theater, Convention Center
<i>American Entomologist</i> Editorial Board Meeting	1:00 PM - 3:00 PM	Salon 12, Rosen Centre Hotel
ICE Weevil Workshop Registration and Pre-Workshop Mixer	6:30 PM - 8:30 PM	Salon 13/14, Rosen Centre Hotel
ICE Farewell Dinner	7:00 PM - 10:00 PM	Valencia Room, Convention Center

**SATURDAY, OCTOBER 1**

FUNCTION	TIME	LOCATION
Tour: Overnight to Archbold Biological Station	6:30 AM - 11:55 PM	West Hall C Foyer, Convention Center
Tour: The McGuire Center for Lepidoptera and the Florida State Collection of Arthropods	8:00 AM - 5:00 PM	West Hall C Foyer, Convention Center
ICE Weevil Workshop	8:00 AM - 9:00 PM	Salon 13/14, Rosen Centre Hotel

**SUNDAY, OCTOBER 2**

FUNCTION	TIME	LOCATION
Tour: Overnight to Archbold Biological Station	6:30 AM - 5:00 PM	West Hall C Foyer, Convention Center
ICE Weevil Workshop	8:00 AM - 9:00 PM	Salon 13/14, Rosen Centre Hotel

**MONDAY, OCTOBER 3**

FUNCTION	TIME	LOCATION
ICE Weevil Workshop	8:00 AM - 5:45 PM	Salon 13/14, Rosen Centre Hotel



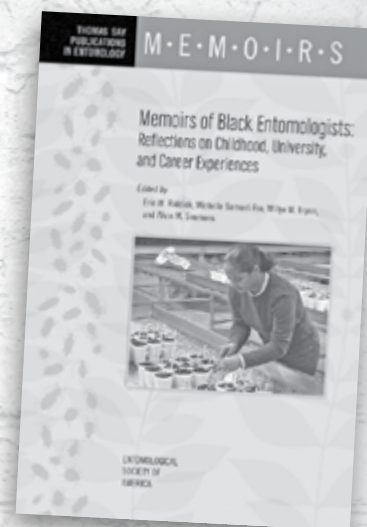


## **Memoirs of Black Entomologists: Reflections on Childhood, University, and Career Experiences**

Edited by Eric W. Riddick, Michelle Samuel-Foo,  
Willye W. Bryan, and Alvin M. Simmons

This first-of-its-kind Thomas Say Memoir presents the personal stories of 20 black entomologists who recall their unique paths to successful, fulfilling careers in entomology.

SOFTCOVER, 130 PAGES, 2015



**NEW!**

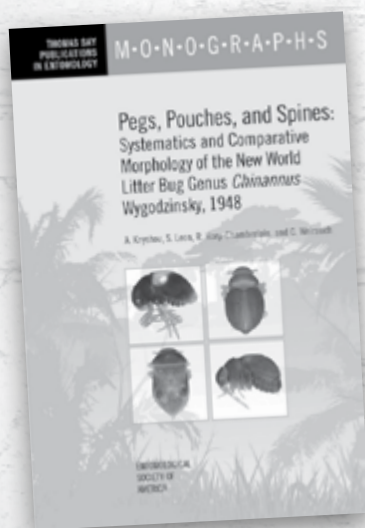
## **Pegs, Pouches, and Spines: Systematics and Comparative Morphology of the New World Litter Bug Genus *Chinannus* Wygodzinsky, 1948**

By A. Knyshov, S. Leon, R. Hoey-Chamberlain, and C. Weirauch

Dipsocoromorpha, the minute litter bugs, are minuscule true bugs with substantial undescribed biodiversity.

The authors of the newest Thomas Say Monograph taxonomically revise the genus *Chinannus* Wygodzinsky, 1948 (Dipsocoromorpha: Schizopteridae: Ogeriinae), describe 26 new species, and expand the known natural range of species in the genus to span most countries between Nicaragua and Bolivia.

SOFTCOVER, 112 PAGES, 2016

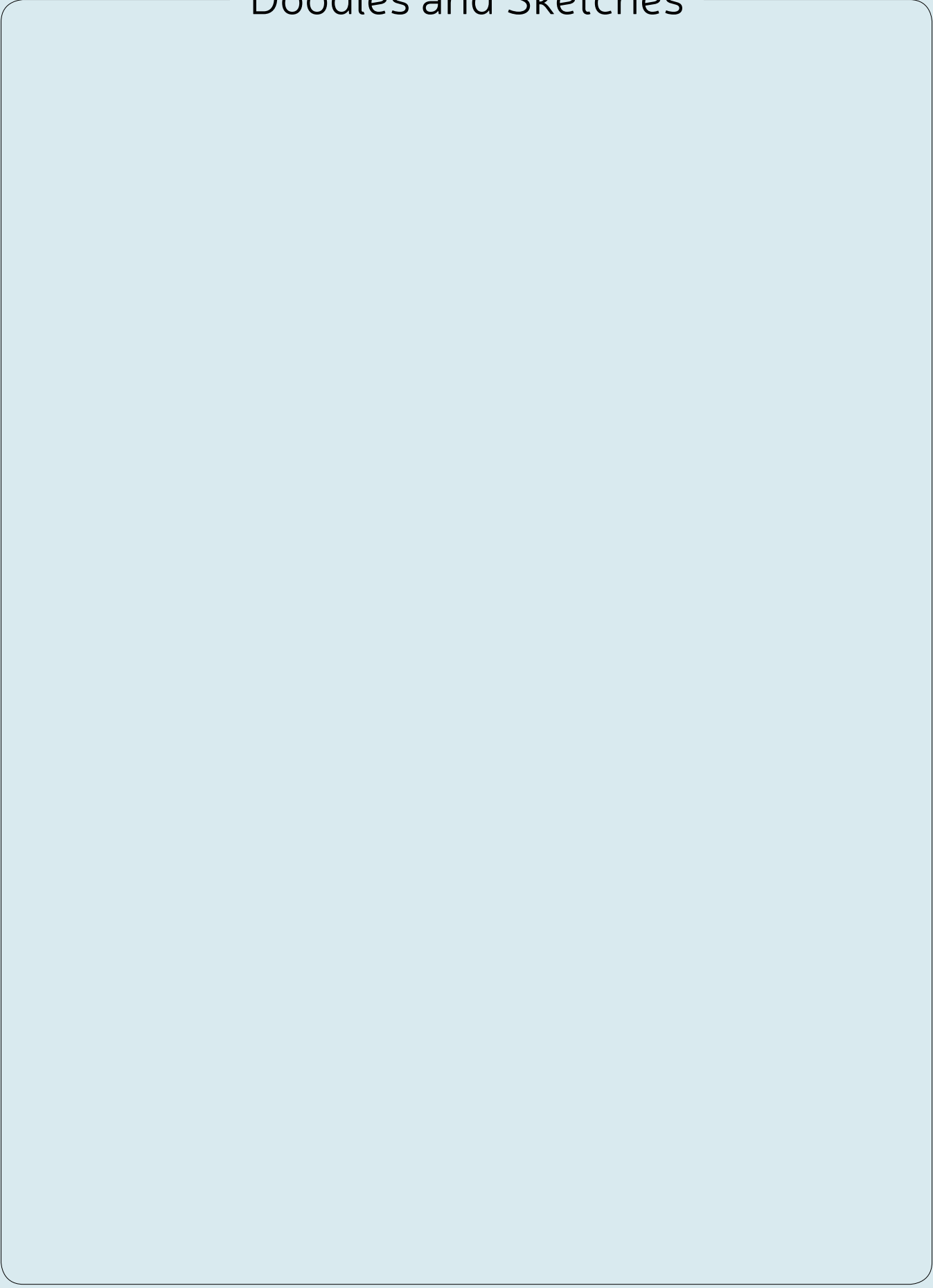








# Doodles and Sketches



# Doodles and Sketches





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# Did you know that Entomological Society of America offers a variety of publishing opportunities for each step of your career?

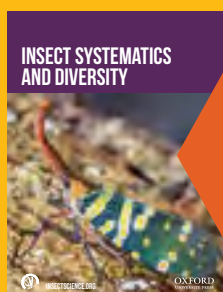
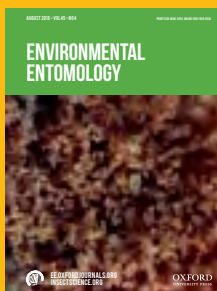
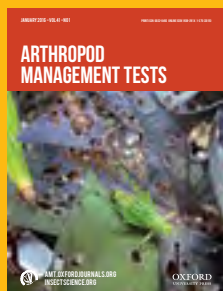
With eight publications currently and the launch of *Insect Systematics and Diversity* in 2017, we are able to accept a broad spectrum of article types and research allowing for a diverse group of contributors like you!

## Join us on Monday, September 26

for our Meet the ESA Editors Lunch and Learn from 12:40-1:20 in the West Hall Room F2, offering the unique opportunity to interface directly with representatives from each ESA publication! Lunch will be provided to the first 75 attendees. After lunch, learn about the future of publishing at the symposium "Where are the Six Legs of Advanced Entomology Publishing Taking Us?" down the hall in room W224 F.

Visit [oxford.ly/PublishESA](http://oxford.ly/PublishESA)

to learn more about publishing in the ESA collection!



SUNDAY/MONDAY

ESA members receive publication discounts. **JOIN TODAY!**



# See how far innovation can take you

Come see us at booth #704

Innovation transforms our world for the better. At BASF, we continue to expand our portfolio with innovative insecticides to better protect the food we produce and the places where we live, work, and play. In the next decade, we will be launching new and sustainable solutions around the globe. Let's start the conversation now.

Please visit us at booth #704 to see where innovation can lead.

 **BASF**

We create chemistry

Sunday, September 25, 2016 • AFTERNOON

ESA Opening Plenary Session and Founders' Memorial Lecture

Valencia Room (Convention Center)

**Moderators and Organizers:** C. David Gammel<sup>1</sup> and May R. Berenbaum<sup>2</sup>, <sup>1</sup>Entomological Society of America, Annapolis, MD, <sup>2</sup>Univ. of Illinois, Champaign, IL

- 4:00 **Welcoming Remarks**
- 4:05 **Presidential Address**
- 4:15 **ESA Executive Director Report**
- 4:20 **Entomological Foundation Report**
- 4:25 **ESA and Entomological Foundation Awards**
- 4:45 **Introduction of Founders' Memorial Lecture**
- 4:47 **0001** Lecture Honoring Dr. Edward F. Knipling. **Anthony James** (aajames@uci.edu), Univ. of California, Irvine, CA
- 5:28 **Concluding Remarks**

Sunday, September 25, 2016 • EVENING

ICE Opening Plenary Session

Valencia Room (Convention Center)

**Moderators and Organizers:** Walter S. Leal<sup>1</sup> and Alvin M. Simmons<sup>2</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>USDA - ARS, Charleston, SC

- 6:00 **0002** Welcome Address, ICE 2016 Co-Chair. **Alvin M. Simmons** (alvin.simmons@ars.usda.gov), USDA - ARS, Charleston, SC
- 6:05 **0003** Welcome Address, ICE 2016 Co-Chair. **Walter S. Leal** (wsleal@ucdavis.edu), Univ. of California, Davis, CA
- 6:10 **0004** Welcome Address, President of the Entomological Society of America. **May R. Berenbaum** (maybe@illinois.edu), Univ. of Illinois, Champaign, IL
- 6:15 **0005** Welcome Address, Chairman of the ICE Council. **Hari Sharma** (vcuhf@yahoo.com), Dr. YS Parmar Univ. of Horticulture & Forestry, Nauni, Solan, India
- 6:20 **0006** ICE Council - Certificates of Distinction. **James Ridsdill-Smith** (james.ridsdill-smith@csiro.au), CSIRO, Wembley, Australia
- 6:30 **0007** Entomology Without Borders from USDA - ARS's Perspective. **Chavonda Jacobs-Young** (administrator@ars.usda.gov), USDA - ARS, Washington, DC
- 6:35 **0008** Introduction of the Keynote Speaker. **Marcelo Jacobs-Lorena** (mlorena@jhsp.edu), Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
- 6:40 **0009** Opening Doors Worldwide through Medical Science. **Peter Agre** (pagre@jhu.edu), Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

Monday, September 26, 2016 • MORNING

Plenary Presentation Featuring Dr. James R. Carey

Valencia Room (Convention Center)

**Moderators and Organizers:** Walter S. Leal<sup>1</sup>, Alvin M. Simmons<sup>2</sup>, and Frank Zalom<sup>1</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>USDA - ARS, Charleston, SC

- 8:00 **0010** Introduction of the Plenary Speaker. **Frank Zalom** (fgzalom@ucdavis.edu), Univ. of California, Davis, CA
- 8:05 **0011** Insect biodemography: A 21<sup>st</sup> century guided tour. **James R. Carey** (jrcarey@ucdavis.edu), Univ. of California, Davis, CA

Plenary Presentation Featuring Dr. José Roberto Postali Parra

Chapin Theater (Convention Center)

**Moderators and Organizers:** Walter S. Leal<sup>1</sup>, Alvin M. Simmons<sup>2</sup>, and Marcos Kogan<sup>3</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>USDA - ARS, Charleston, SC, <sup>3</sup>Oregon State Univ., Corvallis, OR

- 8:00 **0012** Introduction of the Plenary Speaker. **Marcos Kogan** (koganm@science.oregonstate.edu), Oregon State Univ., Corvallis, OR
- 8:05 **0013** The egg parasitoid *Trichogramma* as a tool for IPM in Brazil. **José R. P. Parra** (jrpparra@esalq.usp.br), Univ. of São Paulo, Piracicaba, Brazil

Undergraduate Student Poster Competition: Ecology and Population Dynamics

West Hall C (Convention Center)

- D3002** Will the leaf beetle *Lilioceris egena* burrow to find plant storage organs? **Scott Goldstein** (scott.goldstein@ars.usda.gov)<sup>1,2</sup> and F. Allen Dray<sup>2</sup>, <sup>1</sup>Hispanic Association of Colleges and Universities, Washington, DC, <sup>2</sup>USDA - ARS, Davie, FL
- D3003** Development of sequential sampling plan for twospotted spider mite in strawberry greenhouses under consideration of spatial location. **Ye Jin Im** (yjin419@gmail.com), Ho Jeong Choe, Ju Wan Kang, and Jung-Joon Park, Gyeongsang National Univ., Jinju, South Korea
- D3004** Spatial distribution analysis of twospotted spider mite in strawberry greenhouses using geostatistics. **Ho Jeong Choe** (hojeong921@gmail.com), Ye Jin Im, Ju Wan Kang, and Jung-Joon Park, Gyeongsang National Univ., Jinju, South Korea
- D3005** Non-preference of the catalpa sphinx, *Ceratonia catalpae* (Lepidoptera: Sphingidae), to invertebrate predators. **Stephanie Brandys** (sfbran2872@ung.edu), Leah Orange, Evan Lampert, and Diana Porras, Univ. of North Georgia, Oakwood, GA
- D3006** The effect of border habitats on predation of a key pest. **Lidia Komondy** (lkomondy@msu.edu)<sup>1</sup>, Adam Ingrao<sup>1</sup>, Jason M. Schmidt<sup>1,2</sup>, and Zsofia Szendrei<sup>1</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>Univ. of Georgia, Tifton, GA



- D3007** Arthropod abundance and richness at occupied and unoccupied nesting sites of olive-sided flycatchers (*Contopus cooperi*) in Alaska. **Megan McHugh** (mcmchugh@alaska.edu)<sup>1</sup>, Adam Haberski<sup>1</sup>, Julie Hagelin<sup>2</sup>, and Derek S. Sikes<sup>1</sup>, <sup>1</sup>Univ. of Alaska, Fairbanks, AK, <sup>2</sup>Alaska Dept. of Fish and Game, Fairbanks, AK
- D3008** A survey of pest management practices in crucifers of Florida. **Sage Thompson** (sagemthompson@ufl.edu)<sup>1</sup>, Amanda C. Hodges<sup>1</sup>, and Eric Leveen<sup>2</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Florida Dept. of Agriculture and Consumer Services, Gainesville, FL
- D3009** Suitability of twenty North America tree species as secondary hosts of the invasive spotted lanternfly, *Lycorma delicatula* (White) (Hemiptera: Fulgoridae). **Cathryn Pugh** (cpugh853@live.kutztown.edu), Chelsea Johnson, Michael Toolan, and Gregory Setliff, Kutztown Univ., Kutztown, PA
- D3010** Japanese beetle composting: Converting pests to soil fertilizer using common farm materials. **Traron Shivers** (traron.shivers006@my.lincolnu.edu), Hwei-Yiing Johnson, and Jaime Pinero, Lincoln Univ., Jefferson City, MO

### Undergraduate Student Poster Competition: Frontiers in Entomology

#### West Hall C (Convention Center)

- D3011** Evaluating bee diversity and abundance in fields of genetically-modified herbicide-tolerant canola. **Colton O'Brien** (coltobrien@gmail.com)<sup>1</sup>, Mark Vandever<sup>2</sup>, and Arathi Seshadri<sup>1</sup>, <sup>1</sup>Colorado State Univ., Fort Collins, CO, <sup>2</sup>U.S. Geological Survey, Fort Collins, CO
- D3012** Are "eu" social? Evaluation of sociality in a Caribbean halictid bee. **Emilio Grau-Cruz** (egrau7266@gmail.com)<sup>1</sup> and Bert Rivera-Marchand<sup>2</sup>, <sup>1</sup>InterAmerican Univ. of Puerto Rico, Toa Alta, PR, <sup>2</sup>InterAmerican Univ. of Puerto Rico, Bayamon, PR
- D3013** The development of a motion detector that monitors and records bees entering and exiting a nest during the day. **Catherine Schlueter** (cschlueter@gatech.edu)<sup>1</sup>, Krystal LaFlora<sup>2</sup>, Eric Butler<sup>2</sup>, and Mark Schlueter<sup>3</sup>, <sup>1</sup>Georgia Institute of Technology, Atlanta, GA, <sup>2</sup>Shaw Univ., Raleigh, NC, <sup>3</sup>Georgia Gwinnett College, Lawrenceville, GA
- D3014** Carbohydrate-biased diets may improve locust performance in arid environments. **Ruth Farington** (rfaringt@asu.edu)<sup>1</sup> and Arianne Cease<sup>2</sup>, <sup>1</sup>Arizona State Univ., Jonesboro, AZ, <sup>2</sup>Arizona State Univ., Tempe, AZ
- D3015** Temporal variation in the apple bloom from year-to-year (2010-16) significantly affect diversity and abundance of native bee species in north Georgia. **Nicholas Stewart** (nstewart@ggc.edu) and Mark Schlueter, Georgia Gwinnett College, Lawrenceville, GA
- D3016** Effects of catalpa sphinx herbivory on defensive chemistry of catalpa trees. **Ansley Curry** (aecurr3488@ung.edu), Wesley Turner, and Evan Lampert, Univ. of North Georgia, Oakwood, GA

- D3017** Effects of dietary carotenoids on carotenoid sequestration and immune response in *Trichoplusia ni*. **Kameron Clark** (kaclar7988@ung.edu), Kieu Oanh Nguyen, and Evan Lampert, Univ. of North Georgia, Oakwood, GA
- D3018** Electroantennographic activity bioassay of the antennae of the Sri Lankan weevil (*Myllocerus undecimpustulatus undatus* Marshall) to headspace volatiles of peach (*Prunus persica*). **Sana Shareef** (sanas@steds.org), St. Edward's School, Port St. Lucie, FL
- D3019** Cycle affected mortality caused by imidacloprid through mediating P450s in the brown planthopper, *Nilaparvata lugens*. **Kui Kang** (hzausgkk@163.com), Sun Yat-sen Univ., Guangzhou, China
- D3020** Salt stress confers cold tolerance in *Drosophila*. **Gil Yerushalmi** (gili@my.yorku.ca), Heath MacMillan, and Andrew Donini, York Univ., Toronto, ON, Canada
- D3021** *Toxoneuron nigriceps* bracovirus (*TnBV*) inhibits ecdysteroidogenesis in *Heliothis virescens* by the inactivation of TOR pathway. **Marisa Nardiello** (nardiellomarisa@gmail.com)<sup>1</sup>, Carmen Scieuzo<sup>1</sup>, Rosanna Salvia<sup>1</sup>, Simona Laurino<sup>1</sup>, Gerarda Grossi<sup>1</sup>, Marta Petrone<sup>1</sup>, Andrea Scala<sup>1</sup>, S. Bradleigh Vinson<sup>2</sup>, Heiko Vogel<sup>3</sup>, Sabino A. Bufo<sup>1</sup>, and Patrizia Falabella<sup>1</sup>, <sup>1</sup>Univ. of Basilicata, Potenza, Italy, <sup>2</sup>Texas A&M Univ., College Station, TX, <sup>3</sup>Max Planck Institute for Chemical Ecology, Jena, Germany

### Graduate Student Poster Competition: Agricultural and Forest Entomology

#### West Hall C (Convention Center)

- D3022** Please pass the salt: The effect of sodium addition on insect contributions to nutrient cycling. **Audrey Maran** (amaran@bgsu.edu)<sup>1</sup>, Michael Weintraub<sup>2</sup>, and Shannon Pelini<sup>1</sup>, <sup>1</sup>Bowling Green State Univ., Bowling Green, OH, <sup>2</sup>Univ. of Toledo, Toledo, OH
- D3023** Settling behavior of the potato psyllid, *Bactericera cockerelli* (Šulc) (Hemiptera: Trioziidae), on potato germplasm with putative resistance to *Candidatus Liberibacter solanacearum* (Lso). **Austin Fife** (afife@uidaho.edu) and Erik Wenninger, Univ. of Idaho, Kimberly, ID
- D3024** Host selection in arrowhead scale, *Unaspis yanonensis*: Can arrowhead scale infest Kawanonatsudaidai *Citrus natsudaidai*? **Kanari Murakami** (kanari1104@gmail.com)<sup>1</sup>, Yuji Miyashita<sup>2</sup>, and Yohei Izumi<sup>1</sup>, <sup>1</sup>Shimane Univ., Matsue, Japan, <sup>2</sup>Ehime Research Institute of Agriculture, Forestry and Fisheries, Fruit Tree Research Center, Matsuyama, Japan
- D3025** Rapid molecular detection of thousand cankers disease. **Emel Oren** (eoren1@vols.utk.edu)<sup>1</sup>, William Klingeman<sup>1</sup>, Paris L. Lambdin<sup>1</sup>, John Moulton<sup>1</sup>, Mark Coggeshall<sup>2</sup>, Steven Seybold<sup>3</sup>, and Denita Hadziabdic<sup>1</sup>, <sup>1</sup>Univ. of Tennessee, Knoxville, TN, <sup>2</sup>Univ. of Missouri, Columbia, MO, <sup>3</sup>USDA - Forest Service, Davis, CA
- D3026** The forest edge effect on the distribution of saproxylic beetles in Xuejian recreation area. **Hao Su** (ted20438@gmail.com)<sup>1</sup> and Chung-Chi Lin<sup>2</sup>, <sup>1</sup>National Changhua Univ. of Education, Taichung, Taiwan, <sup>2</sup>National Changhua Univ. of Education, Changhua, Taiwan





- D3027** Field evaluation of lures to attract *Euwallacea* spp. nr. *forficatus* (Coleoptera: Scolytinae), the vectors of *Fusarium dieback*. **Christine Dodge** (cdodg001@ucr.edu)<sup>1</sup>, Jessica Coolidge<sup>1</sup>, Crystal May Johnston<sup>1</sup>, Amanda Alcaraz<sup>1</sup>, Shannen Hulse<sup>1</sup>, Miriam Cooperband<sup>2</sup>, Allard Cossé<sup>3</sup>, and Richard Stouthamer<sup>1</sup>, <sup>1</sup>Univ. of California, Riverside, CA, <sup>2</sup>USDA - APHIS, Buzzards Bay, MA, <sup>3</sup>USDA - ARS, Peoria, IL
- D3028** Energy use by the mountain pine beetle (Coleoptera: Curculionidae: Scolytinae) for dispersal by flight. **Asha Wijerathna** (wijerath@ualberta.ca) and Maya Evenden, Univ. of Alberta, Edmonton, AB, Canada
- D3029** Evaluating morphological characteristics of pheromone-trapped male gypsy moth (*Lymantria dispar* L.) as an index of habitat quality. **Chelsea Jahant-Miller** (cjahant@sy.edu)<sup>1</sup>, Patrick Tobin<sup>2</sup>, and Dylan Parry<sup>1</sup>, <sup>1</sup>State Univ. of New York, Syracuse, NY, <sup>2</sup>Univ. of Washington, Seattle, WA
- D3030** Presentation withdrawn
- D3031** Investigating canopy diversity in the Clemson Experimental Forest. **K. Cairco** (kcairco@g.clemson.edu), Robert Bennett, Langston Jones, Charles Matthews, John C. Morse, and Michael Caterino, Clemson Univ., Clemson, SC
- D3032** Impacts of prescribed fires on forest pollinator communities: Implications for burn size. **Conor Fair** (cfair13@uga.edu)<sup>1</sup>, Michael D. Ulyshen<sup>2</sup>, Joseph V. McHugh<sup>1</sup>, and Scott Horn<sup>2</sup>, <sup>1</sup>Univ. of Georgia, Athens, GA, <sup>2</sup>USDA - Forest Service, Athens, GA

### Graduate Student Poster Competition: Apidology, Sericulture, and Social Insects: Ants and Termites

#### West Hall C (Convention Center)

- D3033** Is genetic divergence the cause for the existence of two queen morphs in the ant *Myrmica ruginodis*? **Jana Wolf** (jana.wolf@helsinki.fi) and Perttu Seppä, Univ. of Helsinki, Helsinki, Finland
- D3034** The evolution of body size and body size variation in ants (Formicidae). **Michael Rivera** (mdriver3@illinois.edu) and Andrew Suarez, Univ. of Illinois, Champaign, IL
- D3035** Consistent self-organized foraging allocations in the macronutrient-regulating carpenter ant *Camponotus fragilis*. **Andrew Burchill** (andrew.burchill@asu.edu), Theodore Pavlic, and Stephen C. Pratt, Arizona State Univ., Tempe, AZ
- D3036** Macronutrient regulation by the desert leafcutter ant, *Acromyrmex versicolor*. **Nathan Smith** (nesmith6@asu.edu), Arizona State Univ., Tempe, AZ
- D3037** Relationship of imported fire ant species and hybrid status with worker size in colonies within Tennessee. **Manoj Pandey** (pandeymanoz@gmail.com)<sup>1</sup>, Jason B. Oliver<sup>2</sup>, Karla Adesso<sup>2</sup>, Steven Valles<sup>3</sup>, Reginald Archer<sup>1</sup>, Nadeer Youssef<sup>2</sup>, and Sujjan Dawadi<sup>1</sup>, <sup>1</sup>Tennessee State Univ., Nashville, TN, <sup>2</sup>Tennessee State Univ., McMinnville, TN, <sup>3</sup>USDA - ARS, Gainesville, FL
- D3038** Study of liquid baits control of *Dolichoderus thoracicus* on Xihu Township, Miaoli County, Taiwan (Hymenoptera: Formicidae). **Shao-Ming Huang** (andrew6313516@gmail.com), Chung-Chi Lin, and Po-Cheng Hsu, National Changhua Univ. of Education, Changhua, Taiwan
- D3039** Laboratory response of the eastern subterranean termite, *Reticulitermes flavipes*, to neighboring populations of the Formosan subterranean termite, *Coptotermes formosanus*, baited with noviflumuron. **Sarah Bernard** (s\_bernard@live.com) and Nan-Yao Su, Univ. of Florida, Davie, FL
- D3040** Soldier caste determination through regulation of social communications in termites. **Hajime Yaguchi** (thexxx777@yahoo.co.jp)<sup>1</sup>, Shuji Shigenobu<sup>2</sup>, Ken Sasaki<sup>3</sup>, and Kiyoto Maekawa<sup>1</sup>, <sup>1</sup>Univ. of Toyama, Toyama, Japan, <sup>2</sup>National Institute for Basic Biology, Okazaki, Japan, <sup>3</sup>Tamagawa Univ., Tokyo, Japan

### Graduate Student Poster Competition: Apidology, Sericulture, and Social Insects: Bees

#### West Hall C (Convention Center)

- D3041** Occurrence of select parasites and pathogens in Arkansas honey bees. **Dylan Cleary** (dacleary@uark.edu), A. L. Szalanski, and Donald C. Steinkraus, Univ. of Arkansas, Fayetteville, AR
- D3042** Patterns of parentage in *Ceratina calcarata* (Hymenoptera: Apidae): The costs and benefits of worker production in a socially polymorphic bee. **Wyatt Shell** (was2000@wildcats.unh.edu) and Sandra Rehan, Univ. of New Hampshire, Durham, NH
- D3043** Environmental effects on a complex system: Size variation within a bumble bee (*Bombus impatiens*) colony changes with temperature. **Evan Kelemen** (evankelemen@email.arizona.edu) and Anna Dornhaus, Univ. of Arizona, Tucson, AZ
- D3044** Nutraceuticals for bees? Dietary phytochemicals of honey may boost pesticide detoxification and longevity in honey bees. **Ling-Hsiu Liao** (liao19@illinois.edu) and May R. Berenbaum, Univ. of Illinois, Champaign, IL
- D3045** Determining ideal soil conditions for rearing alkali bees (*Nomia melanderi*). **Emily Wine** (emily.wine@wsu.edu)<sup>1</sup> and Douglas Walsh<sup>2</sup>, <sup>1</sup>Washington State Univ., Pullman, WA, <sup>2</sup>Washington State Univ., Prosser, WA
- D3046** Conservation genomics of the yellowbanded bumblebee, *Bombus terricola*. **Kailey Michnal** (kvmichna@gmail.com), Amro Zayed, and Sheila R. Colla, York Univ., Toronto, ON, Canada
- D3047** Assessing ultraviolet reflection and aspect effects on establishing wild bumble bees (*Bombus* sp.) in arboreal nest boxes. **James Herndon** (james.herndon85@gmail.com)<sup>1</sup>, Amber D. Tripodi<sup>2</sup>, James Strange<sup>2</sup>, and Karen Kapheim<sup>1</sup>, <sup>1</sup>Utah State Univ., Logan, UT, <sup>2</sup>USDA - ARS, Logan, UT
- D3048** Identifying native plants to enhance pollination services for sustainable crop production in Michigan. **Logan Rowe** (roweloga@msu.edu), Dan Gibson, Douglas Landis, and Rufus Isaacs, Michigan State Univ., East Lansing, MI

- D3049** Bee conservation in the urban landscape.  
**Bernadette Mach** (bernadettemach@uky.edu), Adam Baker, Abiya Saeed, Carl T. Redmond, and Daniel Potter, Univ. of Kentucky, Lexington, KY
- D3050** Bumble bees and blueberry fields: An analysis of how coarse-scaled landscape characteristics influence the development of *Bombus impatiens* colonies.  
**Christopher Andrews** (crandrews@dal.ca), Dalhousie Univ., Truro, NS, Canada
- D3051** The Maryland native bee survey: Utilizing citizen scientists to monitor native bee populations.  
**Olivia Bernauer** (bernauer@umd.edu) and Dennis vanEngelsdorp, Univ. of Maryland, College Park, MD

### Graduate Student Poster Competition: Biological Control and Insect Pathology

#### West Hall C (Convention Center)

- D3052** Can conversion of land influence the presence of native versus exotic lady beetles (Coccinellidae)?  
**Denisha Parker** (parkerdenisha@yahoo.com), The Ohio State Univ., Columbus, OH
- D3053** Improving the efficacy of mass rearing *Tamarixia radiata* for biological control of *Diaphorina citri*.  
**Heather Hernandez** (heather.hernandez01@utrgv.edu)<sup>1</sup>, Daniel Flores<sup>2</sup>, and Christopher Vitek<sup>1</sup>, <sup>1</sup>The Univ. of Texas, Edinburg, TX, <sup>2</sup>USDA - APHIS, Edinburg, TX
- D3054** Identification, expression, and bio-activity characterization of a thioredoxin from *Plutella xylostella*, and effects of parasitoid, *Cotesia vestalis*, on its transcript.  
**Ze-hua Wang** (wang382732003@163.com), Shuang Zhao, Min Shi, and Xue-xin Chen, Zhejiang Univ., Hangzhou, China
- D3055** Does emerald ash borer (*Agrilus planipennis*) host plant impact the performance of its larval parasitoids?  
**Jackie Hoban** (jhoban1@umd.edu)<sup>1</sup>, Jian Duan<sup>2</sup>, David E. Jennings<sup>1</sup>, and Paula M. Shrewsbury<sup>1</sup>, <sup>1</sup>Univ. of Maryland, College Park, MD, <sup>2</sup>USDA - ARS, Newark, DE
- D3056** The effects of host-produced wax on searching behavior and efficacy of parasitoids of the giant whitefly *Aleurodicus dugesii* (Hemiptera: Aleyrodidae).  
**Erich Schoeller** (escho002@ucr.edu), Maher Yassin, and Richard Redak, Univ. of California, Riverside, CA
- D3057** *In vitro* compatibility of selected systemic insecticides with *Beauveria bassiana* (Cordycipitaceae), strain SGI921.  
**Nokulunga Mzimela** (mzimelan@arc.agric.za)<sup>1,2</sup>, Justin Hatting<sup>1</sup>, and Mark Laing<sup>2</sup>, <sup>1</sup>Agricultural Research Council, Bethlehem, South Africa, <sup>2</sup>Univ. of KwaZulu-Natal, Pietermaritzburg, South Africa
- D3058** Field evaluation of *Nomuraea rileyi* against larvae of *Spodoptera frugiperda* on corn in Nuevo Leon.  
**Diego Camacho-Ponce** (diegoponce01@hotmail.com), Reyna Torres-Acosta, Francisco Lopez-Monzon, and Sergio Sanchez-Peña, Antonio Narro Agrarian Autonomous Univ., Saltillo, Mexico

- D3059** *hcf-1* gene of AcMNPV is an essential viral factor required for productive infection of HycuMNPV in Tn368 cells.  
**Ami Tachibana** (ami\_wlolw@yahoo.co.jp), Rina Hamajima, Moe Tomizaki, Takuya Kondo, Yoshie Nanba, Michihiro Kobayashi, and Motoko Ikeda, Nagoya Univ., Nagoya, Japan
- D3060** Biological control of Florida red scale (*Chrysomphalus aonidum*).  
**Ruth Carter** (ruth7db01@gmail.com), Harper Adams Univ., Beds, United Kingdom
- D3061** Host specificity of the psyllid *Calophya terebinthifolii* (Hemiptera: Calophyidae), a potential biological control agent against Brazilian peppertree in Florida, USA.  
**Patricia Prade** (prade@ufl.edu)<sup>1</sup>, James P. Cuda<sup>1</sup>, and William A. Overholt<sup>2</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Univ. of Florida, Ft. Pierce, FL
- D3062** Field host specificity of a potential hydrilla biological control agent, *Cricotopus lebetis* Sublette (Diptera: Chironomidae).  
**Eutyclus M. Kariuki** (eutyclus1.kariuki@famu.edu)<sup>1,2</sup>, James P. Cuda<sup>1</sup>, Raymond L. Hix<sup>2</sup>, Jennifer Gillett-Kaufman<sup>1</sup>, and Stephen Hight<sup>3</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Florida A&M Univ., Tallahassee, FL, <sup>3</sup>USDA - ARS, Tallahassee, FL

### Graduate Student Poster Competition: Ecology and Population Dynamics

#### West Hall C (Convention Center)

- D3063** Population dynamics of aphid defensive phenotypes.  
**Clesson Higashi** (clessonh@uga.edu) and Kerry M. Oliver, Univ. of Georgia, Athens, GA
- D3064** Relative importance of multiple environmental variables to Ephemeroptera, Plecoptera, and Trichoptera species richness in Kaskaskia River conservation land streams.  
**Eric South** (ejsouth@illinois.edu), Univ. of Illinois, Champaign, IL
- D3065** The demography of an endangered grassland butterfly species, *Melitaea ambigua*, has traced a historical change in semi-natural grassland area in Japan.  
**Naoyuki Nakahama** (nakahama.naoyuki.68r@st.kyoto-u.ac.jp)<sup>1</sup>, Kei Uchida<sup>2</sup>, Atushi Ushimaru<sup>3</sup>, and Yuji Isagi<sup>1</sup>, <sup>1</sup>Kyoto Univ., Kyoto, Japan, <sup>2</sup>The Univ. of Tokyo, Tokyo, Japan, <sup>3</sup>Kobe Univ., Kobe, Japan
- D3066** Determining bioindicators for the impact of oil spills using the food web of larvae of the greenhead horse fly (*Tabanus nigrovittatus*).  
**Devika Bhalerao** (dbhale1@lsu.edu), Daniel R. Swale, Lane Foil, and Claudia Husseneder, Louisiana State Univ., Baton Rouge, LA
- D3067** Differences in Oklahoma leafhopper (Hemiptera: Cicadellidae) abundance and diversity in mixed grasses compared to King Ranch Bluestem.  
**Natalie Gahm** (ngahm@okstate.edu), W. Wyatt Hoback, and Astri Wayadande, Oklahoma State Univ., Stillwater, OK
- D3068** Response of larval Lepidoptera and their natural enemies to experimental ice storms in a northeastern forest.  
**Wendy Leuenberger** (wleuenbe@syr.edu)<sup>1</sup>, Kimberly F. Wallin<sup>2</sup>, and Dylan Parry<sup>1</sup>, <sup>1</sup>State Univ. of New York, Syracuse, NY, <sup>2</sup>Univ. of Vermont, Burlington, VT
- D3069** Influence of tri-trophic fitness on diet breadth of a generalist herbivore (*Hyphantria cunea*, Lepidoptera: Erebididae).  
**Mayra Vidal** (mayracvidal@gmail.com) and Shannon Murphy, Univ. of Denver, Denver, CO



- D3070** Genetic variation in the riparian foundation tree predicts arthropod community structure in wild. **Shinnosuke Kagiya** (slotapir-1035@fsc.hokudai.ac.jp)<sup>1</sup> and Shunsuke Utsumi<sup>2</sup>, <sup>1</sup>Hokkaido Univ., Nayoro, Japan, <sup>2</sup>Hokkaido Univ., Horokanai, Japan
- D3071** Development of binomial sampling plan for *Bemisia tabaci* in paprika greenhouses. **Ju Wan Kang** (kang3904@gmail.com)<sup>1</sup>, Ye Jin Im<sup>1</sup>, Ho Jeong Choe<sup>1</sup>, won Seok Choi<sup>2</sup>, and Jung-Joon Park<sup>1</sup>, <sup>1</sup>Gyeongang National Univ., Jinju, South Korea, <sup>2</sup>Kyung Nong Co., Gyeongju, South Korea

## Graduate Student Poster Competition: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops

### West Hall C (Convention Center)

- D3072** Characterising the amino acid substitutions (L925I, L925M, and L925V) associated with pyrethroid resistance in *Varroa destructor*. **John Grzeskowiak** (stxjwg@nottingham.ac.uk)<sup>1</sup>, Joel González-Cabrera<sup>2</sup>, Ian Mellor<sup>1</sup>, T. G. Emyr Davies<sup>3</sup>, and Martin Williamson<sup>3</sup>, <sup>1</sup>Univ. of Nottingham, Nottingham, United Kingdom, <sup>2</sup>Univ. of València, Burjassot, Spain, <sup>3</sup>Rothamsted Research, Harpenden, United Kingdom
- D3073** Identification of neonicotinoid-tolerant honey bee (*Apis mellifera*) colony for commercial development. **Yiyun Xu** (xuyiy@missouri.edu)<sup>1</sup> and Moneen Jones<sup>2</sup>, <sup>1</sup>Univ. of Missouri, Columbia, MO, <sup>2</sup>Univ. of Missouri, Portageville, MO
- D3074** Determination of toxic pesticide reference standards for use in semi-field methods to assess the toxicity of pesticide exposure to *Bombus impatiens* (Cresson). **Tara Celetti** (tceletti@uoguelph.ca)<sup>1</sup>, Angela Gradish<sup>1</sup>, Cynthia Scott-Dupree<sup>1</sup>, Chris Cutler<sup>2</sup>, and Paul Sibley<sup>1</sup>, <sup>1</sup>Univ. of Guelph, Guelph, ON, Canada, <sup>2</sup>Dalhousie Univ., Truro, NS, Canada
- D3075** Cytochrome P450s are responsible for the metabolism of thiacloprid in a solitary bee pollinator. **Katherine Beadle** (k.beadle@exeter.ac.uk)<sup>1</sup>, Bartek Troczka<sup>2</sup>, Emma Randall<sup>1</sup>, Christoph Zimmer<sup>1</sup>, T. G. Emyr Davies<sup>2</sup>, Lin Field<sup>2</sup>, Martin Williamson<sup>2</sup>, Ralf Nauen<sup>3</sup>, and Chris Bass<sup>1</sup>, <sup>1</sup>Univ. of Exeter, Penryn, United Kingdom, <sup>2</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>3</sup>Bayer CropScience, Monheim, Germany
- D3076** A genomic approach to understanding metabolic insecticide resistance to diamides in diamondback moth (*Plutella xylostella*). **Mark Mallott** (mark.mallott@rothamsted.ac.uk)<sup>1</sup>, Lin Field<sup>1</sup>, Jan Elias<sup>2</sup>, Russell Slater<sup>3</sup>, Mark Paine<sup>4</sup>, Charles Wondji<sup>4</sup>, Martin Williamson<sup>1</sup>, and Chris Bass<sup>5</sup>, <sup>1</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>2</sup>Syngenta Crop Protection, Stein, Switzerland, <sup>3</sup>Syngenta Crop Protection, Basel, Switzerland, <sup>4</sup>Liverpool School of Tropical Medicine, Liverpool, United Kingdom, <sup>5</sup>Univ. of Exeter, Penryn, United Kingdom
- D3077** Toxicology and mode of action of basic amines to mosquitoes. **Minyuan Tie** (mtie@ufl.edu)<sup>1</sup>, Baonan Sun<sup>1</sup>, Maia Tsikolia<sup>1</sup>, Ulrich Bernier<sup>2</sup>, and Jeffrey Bloomquist<sup>1</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>USDA - ARS, Gainesville, FL

- D3078** Pyrethroid resistance reduces the biting protection of treated clothing against Puerto Rican *Aedes aegypti*. **Natasha Agramonte** (nme@ufl.edu)<sup>1,2</sup>, Jeffrey Bloomquist<sup>1</sup>, and Ulrich Bernier<sup>2</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>USDA - ARS, Gainesville, FL
- D3079** Ryanodine receptor from the rice stem borer (*Chilo suppressalis*): Gene identification, cloning, phylogenetic analysis, and expression levels on induction by chlorantraniliprole. **Yingchuan Peng** (ycpeng13@gmail.com), Chengwang Sheng, Zhaojun Han, and Chunqing Zhao, Nanjing Agricultural Univ., Nanjing, China
- D3080** The degradation of imidacloprid and thiamethoxam in sugar beet plants in open field conditions and in glasshouses. **Zrinka Drmic** (zdrmic@agr.hr), Helena Viric Gasparic, Maja Cacija, Darija Lemic, and Renata Bazok, Univ. of Zagreb, Zagreb, Croatia
- D3081** Effects of insecticide synergists and cross-resistance on pyrethroid resistant western corn rootworm (*Diabrotica virgifera virgifera* LeConte) populations. **Adriano Pereira** (aelias374@yahoo.com.br)<sup>1</sup>, Dariane Souza<sup>1</sup>, Haichuan Wang<sup>1</sup>, Sarah Zukoff<sup>2</sup>, Blair Siegfried<sup>3</sup>, and Lance Meinke<sup>1</sup>, <sup>1</sup>Univ. of Nebraska, Lincoln, NE, <sup>2</sup>Kansas State Univ., Manhattan, KS, <sup>3</sup>Univ. of Florida, Gainesville, FL
- D3082** Proactive resistance management of *Bemisia tabaci* in the cross-commodity systems of Arizona and California. **Naomi Pier** (nmpier@email.arizona.edu)<sup>1</sup>, Peter Ellsworth<sup>1</sup>, John Palumbo<sup>2</sup>, Yves Carrière<sup>3</sup>, Al Fournier<sup>1</sup>, Wayne Dixon<sup>1</sup>, Lydia Brown<sup>1</sup>, Steven J. Castle<sup>4</sup>, and Nilima Prabhaker<sup>5</sup>, <sup>1</sup>Univ. of Arizona, Maricopa, AZ, <sup>2</sup>Univ. of Arizona, Yuma, AZ, <sup>3</sup>Univ. of Arizona, Tucson, AZ, <sup>4</sup>USDA - ARS, Maricopa, AZ, <sup>5</sup>Univ. of California, Riverside, CA

## Graduate Student Poster Competition: Frontiers in Entomology

### West Hall C (Convention Center)

- D3083** Geographic variation in the responses of insect herbivores to nutrient balance and temperature. **Kate Augustine** (kaugust1@live.unc.edu) and Joel Kingsolver, Univ. of North Carolina, Chapel Hill, NC
- D3084** The role of timing in the heat shock effects on a host-parasitoid system. **Aleix Valls** (aleix.valls@ndsu.edu), James Kopco, and Jason Harmon, North Dakota State Univ., Fargo, ND
- D3085** Digitization: What is it good for? Or, how biodiversity informatics can inform us about the inherent and social aspects of entomology. **Katherine Nesheim** (nesheim.1@buckeyemail.osu.edu) and Norman Johnson, The Ohio State Univ., Columbus, OH
- D3086** Effects of host-plant density on herbivores and their parasitoids: A field experiment with a native perennial legume. **Andrea Salas** (asala035@fui.edu)<sup>1</sup>, Suzanne Koptur<sup>1</sup>, Krishnaswamy Jayachandran<sup>1</sup>, Jay Sah<sup>1</sup> and Tomas Ayala-Silva<sup>2</sup>, <sup>1</sup>Florida International Univ., Miami, FL, <sup>2</sup>USDA - ARS, Miami, FL

- D3087** Assessing the role of sugar nutrition in braconid parasitoids that specialize on the wheat stem sawfly. **Dayane Reis** (dayane.reis@msu.montana.edu), Megan L. Hofland, Robert K. D. Peterson, and David K. Weaver, Montana State Univ., Bozeman, MT
- D3088** Vectorial capacity of female sciarid flies (*Lycoriella ingenua* Dufour) towards mushroom green mold disease (*Trichoderma aggressivum*) in commercial (*Agaricus bisporus*) mushroom production: A fitness related behaviour. **Maria Mazin** (mtm267@psu.edu) and Edwin Rajotte, Pennsylvania State Univ., University Park, PA
- D3089** Sequential infection of soybean vein necrosis virus in the alimentary canal and salivary glands of its vector, soybean thrips (*Neohydathothrips variabilis*). **Jinlong Han** (hanj01@ipfw.edu), Vamsi Nalam, and Punya Nachappa, Indiana Univ.-Purdue Univ., Fort Wayne, IN
- D3090** A framework for the application of genetic pest management in agriculture. **Jennifer Baltzegar** (jen\_baltzegar@ncsu.edu), Johanna Elsensohn, Nicole Gutzmann, Jessica Cavin Barnes, Michael Jones, Sheron King, and Jayce Sudweeks, North Carolina State Univ., Raleigh, NC
- D3091** Edible insects of Nagaland, India. **Lobeno Mozhui** (lobenomozhui@gmail.com), Sapu Changkija, and L. N. Kakati, Nagaland Univ., Nagaland, India

### Graduate Student Poster Competition: Genetics and Evolutionary Entomology

#### West Hall C (Convention Center)

- D3092** Getting useful information from RNA-seq contaminants: A case of study in *Tetrapedia diversipes* transcriptome. **Natalia Araujo** (na.araujo@usp.br), Alexandre Zuntini, and Maria Arias, Univ. of São Paulo, São Paulo, Brazil
- D3093** Physical mapping and integration of the genome assemblies for the malaria mosquito *Anopheles funestus*. **Jiyoung Lee** (jylee43@vt.edu)<sup>1</sup>, Phillip George<sup>2</sup>, Maryam Kamali<sup>1</sup>, Adam Phillippy<sup>2</sup>, Sergey Koren<sup>2</sup>, Scott Emrich<sup>3</sup>, Igor Sharakhov<sup>1</sup>, and Nora J. Besansky<sup>3</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>National Human Genome Research Institute, Bethesda, MD, <sup>3</sup>Univ. of Notre Dame, South Bend, IN
- D3094** Integrated transcriptomic and proteomic approach to identify the major *Toxoneuron nigriceps* venom proteins. **Gerarda Grossi** (gerarda.grossi@unibas.it)<sup>1</sup>, Simona Laurino<sup>1</sup>, Pietro Pucci<sup>2</sup>, S. Bradleigh Vinson<sup>3</sup>, Heiko Vogel<sup>4</sup>, Carmen Scieuzo<sup>1</sup>, Marisa Nardiello<sup>1</sup>, Rosanna Salvia<sup>1</sup>, Marta Petrone<sup>1</sup>, Andrea Scala<sup>1</sup>, Sabino Bufo<sup>1</sup>, and Patrizia Falabella<sup>1</sup>, <sup>1</sup>Univ. of Basilicata, Potenza, Italy, <sup>2</sup>CEINGE-Biotecnologie Avanzate, Napoli, Italy, <sup>3</sup>Texas A&M Univ., College Station, TX, <sup>4</sup>Max Planck Institute for Chemical Ecology, Jena, Germany
- D3095** Transcriptome analysis of a polyembryonic parasitoid *Copidosoma floridanum*. **Takuma Sakamoto** (tsakamoto1988@gmail.com), Hitomi Ono, and Kikuo Iwabuchi, Tokyo Univ. of Agriculture and Technology, Tokyo, Japan

- D3096** Developmental causes of allometry in *Manduca sexta*. **Kenneth McKenna** (kzm@duke.edu) and Fred Nijhout, Duke Univ., Durham, NC
- D3097** Transcriptome and functional analysis of JH dependent genes in termites and woodroaches. **Yudai Masuoka** (yudaisan20@yahoo.co.jp)<sup>1</sup>, Hajime Yaguchi<sup>1</sup>, Kouhei Toga<sup>1</sup>, Shuji Shigenobu<sup>2</sup>, Christine Nalepa<sup>3</sup>, and Kiyoto Maekawa<sup>1</sup>, <sup>1</sup>Univ. of Toyama, Toyama, Japan, <sup>2</sup>National Institute for Basic Biology, Okazaki, Japan, <sup>3</sup>North Carolina State Univ., Raleigh, NC
- D3098** A survey of chemosensory gene expression patterns within the vampire moth genus *Calyptra* Ochseneheimer (Lepidoptera: Erebidae: Calpinae). **Julia Snyder** (snyder65@purdue.edu) and Jennifer Zaspel, Purdue Univ., West Lafayette, IN
- D3099** Mechanism of stable polymorphism of antennal segments number: Trade-off between pre- and post-copulatory fitness in a seed beetle species. **Katsuto Fukuda** (fukudparty@yahoo.co.jp) and Midori Tuda, Kyushu Univ., Fukuoka, Japan
- D3100** Molecular evidence of host-associated genetic differentiation in *Prodiplosis longifila* (Diptera: Cecidomyiidae). **Diana Duque-Gamboa** (diana.nataly.duque@correounivalle.edu.co)<sup>1</sup>, Maria Castillo-Cardenas<sup>1</sup>, Luis Hernández<sup>2</sup>, Yoan Guzman<sup>2</sup>, Maria Manzano<sup>2</sup>, and Nelson Toro-Perea<sup>1</sup>, <sup>1</sup>Univ. of Valle, Cali, Colombia, <sup>2</sup>National University of Colombia, Palmira, Colombia
- D3101** Transcriptome analysis of the large milkweed bug (*Oncopeltus fasciatus*) testis. **Ashley Duxbury** (aduxbur@uga.edu) and Patricia Moore, Univ. of Georgia, Athens, GA

### Graduate Student Poster Competition: Insect Chemical Ecology

#### West Hall C (Convention Center)

- D3102** Chemically-mediated dispersal and mating behavior of billbugs (Coleoptera: Curculionidae) associated with turfgrass. **Alexandra Duffy** (duffy14@purdue.edu), Gabriel Hughes, Matthew Ginzel, and Douglas Richmond, Purdue Univ., West Lafayette, IN
- D3103** Behavioral chemical disruption of the host selection behavior of the walnut twig beetle: A chemical ecological approach. **Jackson Audley** (jpaudley@ucdavis.edu)<sup>1</sup>, Paul L. Dallara<sup>1</sup>, Wittko Francke<sup>2</sup>, and Steven Seybold<sup>3</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>Univ. of Hamburg, Hamburg, Germany, <sup>3</sup>USDA - Forest Service, Davis, CA
- D3104** Evaluating the behavior of oriental beetle (*Anomala orientalis*) in proximity to pheromone point sources used in mating disruption and attract-and-kill. **Robert Holdcraft** (rholdcra@rci.rutgers.edu)<sup>1</sup> and Cesar Rodriguez-Saona<sup>2</sup>, <sup>1</sup>Rutgers, The State Univ. of New Jersey, Chatsworth, NJ, <sup>2</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ
- D3105** Expression pattern and functional analysis of pheromone receptors in two sibling species, *Helicoverpa armigera* and *H. assulta*. **Ke Yang** (yangke@ioz.ac.cn), Ling-Qiao Huang, and Chen-Zhu Wang, Chinese Academy of Sciences, Beijing, China



- D3106** Comparison of gene expression involving in pheromone biosynthesis in the pheromone gland of *Plutella xylostella* (L.). **Yoon Jung Hwang** (kum3245@hanmail.net) and Dae-weon Lee, Kyungsoong Univ., Busan, South Korea
- D3107** Identification of genes involving in pheromone production via transcriptome of the pheromone gland in the diamondback moth, *Plutella xylostella* (L.). **Wook Hyun Cha** (whcha17@gmail.com) and Dae-weon Lee, Kyungsoong Univ., Busan, South Korea
- D3108** Host preference in parasitic phorid flies: Response of *Pseudacteon curvatus* and *P. obtusus* to venom alkaloids of native and imported *Solenopsis* fire ants. **Olufemi Ajayi** (osa0001@auburn.edu)<sup>1</sup>, Li Chen<sup>2</sup>, and Henry Fadamiro<sup>1</sup>, <sup>1</sup>Auburn Univ., Auburn, AL, <sup>2</sup>Chinese Academy of Sciences, Beijing, China
- D3109** Effect of canola infection with clubroot disease on oviposition by the bertha armyworm. **Chaminda De Silva Weeraddana** (weeradda@ualberta.ca), Victor Manolii, Stephen Strelkov, and Maya L. Evenden, Univ. of Alberta, Edmonton, AB, Canada
- D3110** The use of synthetic pheromone lures to assess presence of Cerambycidae species at several sites across Idaho. **Claudia D. Lyons-Yerion** (yeri5309@vandals.uidaho.edu)<sup>1</sup>, Stephen P. Cook<sup>1</sup>, Lawrence M. Hanks<sup>2</sup>, Jocelyn G. Millar<sup>3</sup>, Christopher J. Williams<sup>1</sup>, Frank W. Merickel<sup>1</sup>, Renae Shrum<sup>1</sup>, and James D. Barbour<sup>4</sup>, <sup>1</sup>Univ. of Idaho, Moscow, ID, <sup>2</sup>Univ. of Illinois, Urbana, IL, <sup>3</sup>Univ. of California, Riverside, CA, <sup>4</sup>Univ. of Idaho, Parma, ID
- D3111** Glutathione S-transferase *SIGSTE1* in *Spodoptera litura* may be involved in feeding adaption of host plants. **Xiaopeng Zou** (z0625p@126.com), South China Normal Univ., Guangzhou, China
- D3112** Daily patterns of insect herbivory and secondary plant metabolites in a lowland tropical forest. **Luke Zehr** (lnzehr2@illinois.edu)<sup>1</sup>, Brian Sedio<sup>2</sup>, and May R. Berenbaum<sup>1</sup>, <sup>1</sup>Univ. of Illinois, Champaign, IL, <sup>2</sup>Smithsonian Tropical Research Institute, Panama City, Panama
- D3116** Laboratory assessment of the attractiveness of selected fruit and leaf volatiles to *Drosophila suzukii*. **Grant Bolton** (lgbcm4@mail.missouri.edu)<sup>1</sup>, Bruce A. Barrett<sup>1</sup>, and Jaime Pinero<sup>2</sup>, <sup>1</sup>Univ. of Missouri, Columbia, MO, <sup>2</sup>Lincoln Univ., Jefferson City, MO
- D3117** *Drosophila suzukii* in North Dakota: Distribution and future research. **Caitlin Krueger** (c.krueger@ndsu.edu)<sup>1</sup>, Janet Knodel<sup>1</sup>, Esther McGinnis<sup>1</sup>, Harlene Hatterman-Valenti<sup>1</sup>, Kathy Wiederholt<sup>2</sup>, Charles Elhard<sup>3</sup>, Patrick Beauzay<sup>1</sup>, and Jesse Ostrander<sup>1</sup>, <sup>1</sup>North Dakota State Univ., Fargo, ND, <sup>2</sup>North Dakota State Univ. Extension, Carrington, ND, <sup>3</sup>North Dakota Dept. of Agriculture, Fargo, ND
- D3118** Tracking spatial and temporal patterns of host use by *Drosophila suzukii* (Matsumura) to improve management programs in fruit crops. **Katharine Swoboda Bhattarai** (kaswobod@ncsu.edu) and Hannah Burrack, North Carolina State Univ., Raleigh, NC
- D3119** The relative attractiveness of different host substrates to parasitoids (Hymenoptera) of frugivorous drosophilids. **James Wahls** (jcew90@vt.edu), Douglas G. Pfeiffer, and Scott Salom, Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- D3120** Structure access and settling behavior of overwintering brown marmorated stink bugs (*Halymorpha halys*). **Benjamin Chambers** (bdc0112@vt.edu)<sup>1</sup>, Thomas P. Kuhar<sup>1</sup>, Annie Pearce<sup>1</sup>, Tracy C. Leskey<sup>2</sup>, and Georg Reichard<sup>1</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>USDA - ARS, Kearneysville, WV

## Graduate Student Poster Competition: Invasive and Exotic Entomology

### West Hall C (Convention Center)

- D3113** Spatial patterns in the morphology and microbiome of the invasive kudzu bug, *Megacopta cribraria*. **Riley Lovejoy** (rztunnell@crimson.ua.edu) and Jeffrey D. Lozier, Univ. of Alabama, Tuscaloosa, AL
- D3114** Comparative transcriptome analysis reveals differences in flight ability between *Bactrocera dorsalis* and *B. correcta* (Diptera: Tephritidae). **Shaokun Guo** (mscgsk@163.com), Zihua Zhao, Lijun Liu, Jie Shen, and Zhihong Li, China Agricultural Univ., Beijing, China
- D3115** The spatial and temporal distribution of spotted wing drosophila and other drosophilids. **Amanda Chamberlain** (amanda.chamberlain@ubc.ca)<sup>1</sup>, Robert Lalonde<sup>1</sup>, and Howard Thistlewood<sup>2</sup>, <sup>1</sup>The Univ. of British Columbia, Kelowna, BC, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Summerland, BC, Canada
- D3121** Variations in RNAi efficacy among insect species, mediated through different delivery modes, is attributable to dsRNA degradation *in vivo*. **Kangxu Wang** (Kangxwang@hotmail.com), Yingchuan Peng, Jian Pu, Jiale Wang, and Zhaojun Han, Nanjing Agricultural Univ., Nanjing, China
- D3122** RNA interference as a novel approach to control red flour beetle, *Tribolium castaneum* (Herbst). **Baida Alshukri** (b.m.h.alshukri@newcastle.ac.uk), Martin Edwards, and Angharad M. R. Gatehouse, Newcastle Univ., Newcastle upon Tyne, United Kingdom
- D3123** Silencing of *Laccase2* in *Dectes texanus* (Coleoptera: Cerambycidae) by RNA interference. **Lina Aguirre-Rojas** (liaguero@ksu.edu) and C. Michael Smith, Kansas State Univ., Manhattan, KS
- D3124** RNA interference of carboxyesterases increases pesticides susceptibility in the Asian citrus psyllid, *Diaphorina citri*. **Abdelaziz Kishk** (akishk@ufl.edu) and Nabil Killiny, Univ. of Florida, Lake Alfred, FL
- D3125** Screening of RNAi targets and impacts on spotted wing drosophila, *Drosophila suzukii*. **Siew Bee Tang** (tangsie@oregonstate.edu)<sup>1</sup>, Kelly Donahue<sup>2</sup>, Seung-Joon Ahn<sup>1,2</sup>, and Man-Yeon Choi<sup>2</sup>, <sup>1</sup>Oregon State Univ., Corvallis, OR, <sup>2</sup>USDA - ARS, Corvallis, OR

- D3126** Epigenetic regulation of molting and metamorphosis in the red flour beetle, *Tribolium castaneum* (Herbst). **Smitha George** (smitha.george@uky.edu) and Subba Reddy Palli, Univ. of Kentucky, Lexington, KY
- D3127** Presentation withdrawn
- D3128** The function and DNA methylation regulation of *Bombyx mori* chitin synthase 2b (*BmCHSA-2b*). **Guanfeng Xu** (1473220308@qq.com), South China Normal Univ., Guangzhou, China
- D3129** RNAi targeted to the circadian clock gene *period* disrupts photoperiodism of the jewel wasp, *Nasonia vitripennis*. **Ayumu Mukai** (ayumukai64@gmail.com) and Shin Goto, Osaka City Univ., Osaka, Japan

### Student Virtual Poster Competition: Undergraduate

#### West Hall C (Convention Center)

- VP01** How specific are specific primers? A *Beauveria* and *Metarhizium* case. **Tania Leandro-Espinoza** (tle109@gmail.com)<sup>1</sup>, Ruth Castro<sup>2</sup>, Ramón Molina-Bravo<sup>2</sup>, and Mauricio Montero-Astúa<sup>1</sup>, <sup>1</sup>Univ. of Costa Rica, San José, Costa Rica, <sup>2</sup>National Univ. of Costa Rica, Heredia, Costa Rica
- VP02** Morphological separateness of aphid genera *Stomaphis* Walker and *Parastomaphis* Pašek (Insecta, Hemiptera, Aphididae). **Mariusz Kanturski** (mariusz.kanturski@us.edu.pl) and Lukasz Depa, Univ. of Silesia, Katowice, Poland
- VP03** Aphids as biosensors: Exploring a protocol to characterize aphids' DNA methylation in response to changes in temperature. **Izayana Sandoval** (izayanasc@yahoo.com), William Villalobos, Laura Garita, and Mauricio Montero-Astúa, Univ. of Costa Rica, San José, Costa Rica
- VP04** Presence of secondary bacterial endosymbionts according to whitefly species in tomato crops from Costa Rica. **Xareni Can** (xareni.can@ucr.ac.cr), Natalia Barboza, and Eduardo Hernandez, Univ. of Costa Rica, San Jose, Costa Rica

### Student Virtual Poster Competition: Graduate

#### West Hall C (Convention Center)

- VP05** Competing for space: A case study of horse chestnut leaf miner (*Cameraria ohridella*) and leaf blotch disease (*Guignardia aesculi*). **Michal Kopacka** (michalkopacka@seznam.cz)<sup>1,2</sup> and Rostislav Zemek<sup>1</sup>, <sup>1</sup>Czech Academy of Sciences, České Budějovice, Czech Republic, <sup>2</sup>Univ. of South Bohemia, České Budějovice, Czech Republic
- VP06** Morphology of the forewing base articulation among Sternorrhyncha groups. **Barbara Franielczyk-Pietyra** (barbara.franielczyk-pietyra@us.edu.pl) and Piotr Wegierek, Univ. of Silesia, Katowice, Poland
- VP07** Antennal transcriptome analysis of odorant receptor genes in *Hyphantria cunea* (Drury). **Ke Kang** (kangke@ahau.edu.cn)<sup>1</sup>, Long-Wa Zhang<sup>1</sup>, and Ya-Nan Zhang<sup>2</sup>, <sup>1</sup>Anhui Agricultural Univ., Hefei, China, <sup>2</sup>HuaiBei Normal Univ., Huaibei, China

- VP08** Effects of temperature on life demographic parameters of two Malaysian strains of *Aedes albopictus* Skuse. **Rozilawati Harun** (rozilawatiharun80@gmail.com)<sup>1</sup>, Zairi Jaal<sup>1</sup>, and Mohd Masri Saranam<sup>2</sup>, <sup>1</sup>Univ. of Science, Minden, Malaysia, <sup>2</sup>Mardi, Kuala Lumpur, Malaysia
- VP09** Plant-provided resources for omnivorous natural enemies: The spatial aspect of prey and plant feeding. **Tarryn Schuldiner-Harpaz** (tarryn.harpaz@mail.huji.ac.il) and Moshe Coll, The Hebrew Univ., Rehovot, Israel
- VP10** Polarized light cues affect host selection in *Pieris rapae*. **Adam Blake** (adam@ajblake.info), Matthew Go, and Gerhard Gries, Simon Fraser Univ., Burnaby, BC, Canada
- VP11** Survival and development of *Hermetia illucens* L. (Diptera: Stratiomyidae): A biodegradation agent of organic waste. **Ana Samayoa** (anaclariza@gmail.com), National Chung Hsing Univ., Taichung, Taiwan

### Poster Session 1: Agriculture and Forest Entomology, Part 1

#### West Hall C (Convention Center)

- D3130** Populations of sugarcane aphid and corn leaf aphid infesting *Sorghum bicolor* and *S. halepense* in Kansas show low levels of genetic diversity. **Alicia Timm** (aetimm@gmail.com) and C. Michael Smith, Kansas State Univ., Manhattan, KS
- D3131** Sugarcane aphid crisis for sweet sorghum in southeastern United States. **Ric Bessin** (rbessin@uky.edu), Univ. of Kentucky, Lexington, KY
- D3132** Interactions of green peach aphid, *Myzus persicae* (Sulzer) (Hemiptera: Aphididae), feeding and initial infestation of oriental fruit moth, *Grapholita molesta* (Busck) (Lepidoptera: Tortricidae). **Wilson Barros-Parada** (wbarros@utalca.cl), Jaime Verdugo, Eduardo Fuentes-Contreras, and Claudio Ramirez, Univ. of Talca, Talca, Chile
- D3133** Field guide of Spanish pollinators. **Elisa Viñuela** (elisa.vinuela@upm.es)<sup>1</sup>, Alberto Fereres<sup>2</sup>, and Oscar Aguado<sup>1</sup>, <sup>1</sup>Polytechnic Univ., Madrid, Spain, <sup>2</sup>Institute of Agricultural Sciences, Madrid, Spain
- D3134** Rapid community assembly and species saturation in coffee agroecosystems suggest caffeine does not deter host-switching on a global scale. **Zachary Hajian-Forooshani** (zhajianf@umich.edu), Univ. of Michigan, Ann Arbor, MI
- D3135** Insect pests of rice in Burkina Faso and their control. **Souleymane Nacro** (snacro2006@gmail.com)<sup>1</sup>, Dakouo Dakouo<sup>1</sup>, Malick Ba<sup>1</sup>, Lucien Sawadogo<sup>2</sup>, and Minyèmba Souobou<sup>3</sup>, <sup>1</sup>INERA, Bobo-Dioulasso, Burkina Faso, <sup>2</sup>Dept. of Plant Protection and Packaging, Ouagadougou, Burkina Faso, <sup>3</sup>AMVS, Tougan, Burkina Faso
- D3136** A new electronic guide to arthropods of floriculture and greenhouses. **Matthew Bertone** (matt\_bertone@ncsu.edu), Steven Frank, and Brian Whipker, North Carolina State Univ., Raleigh, NC
- D3137** Influences of agroecosystem edge plant communities on insect community structure. **Daniel M. Pavuk** (dmpavuk@bgnet.bgsu.edu), Bowling Green State Univ., Bowling Green, OH



- D3138** The weekly occurrence of hymenopteran insects in *Miscanthus* fields in Korea in the spring. **June-Yeol Choi** (scelio@korea.kr) and Nakjung Choi, National Institute of Crop Science, Wanju, South Korea
- D3139** Presentation withdrawn
- D3140** The *JpL* species of the *Bemisia tabaci* complex in Korea: Detection by an extensive field survey and analysis of *COI* sequence variability. **Gwan-Seok Lee** (gslee12@korea.kr)<sup>1</sup> and Wonhoon Lee<sup>2, 3</sup>, <sup>1</sup>National Academy of Agricultural Science, Wanju, South Korea, <sup>2</sup>Animal and Plant Quarantine Agency, Gyeonggi-do, South Korea
- D3141** Updating economic thresholds for lygus bugs in canola in Alberta, Canada. **Héctor Cárcamo** (hector.carcamo@agr.gc.ca)<sup>1</sup>, Jennifer Otani<sup>2</sup>, Neil Harker<sup>3</sup>, James Broatch<sup>4</sup>, Sheree Daniels<sup>1</sup>, and Patty Reid<sup>3</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, Lethbridge, AB, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Beaverlodge, AB, Canada, <sup>3</sup>Agriculture and Agri-Food Canada, Lacombe, AB, Canada, <sup>4</sup>Alberta Agriculture and Forestry, Lacombe, AB, Canada
- D3142** Estimation of minimum sample size for scouting of *Frankliniella occidentalis* in flowers crops in Cundinamarca, Colombia. **Marco Diaz Tapias** (control.biologico@unimilitar.edu.co), Daniel Rodriguez, Jhon Avellaneda, and Stephanie Numa, Nueva Granada Military Univ., Cajica, Colombia
- D3143** Development and emergence of *Cleruchoides noackae* (Hymenoptera: Mymaridae) in *Thaumastocoris peregrinus* (Hemiptera: Thaumastocoridae) eggs at different temperatures. Juliana Maia<sup>1</sup>, Luciane Becchi<sup>2</sup>, Angelo Rodrigues<sup>3</sup>, Luis Junqueira<sup>2</sup>, **Leonardo Barbosa** (leonardo.r.barbosa@embrapa.br)<sup>1</sup>, and Carlos Wilcken<sup>2</sup>, <sup>1</sup>Brazilian Agricultural Research Corporation, Colombo, Brazil, <sup>2</sup>São Paulo State Univ., Botucatu, Brazil, <sup>3</sup>Federal Univ. of Paraná, Curitiba, Brazil
- D3144** Using agent-based models to prepare for the impending invasion of *Rhagoletis pomonella* (Walsh) (Diptera: Tephritidae) into the southern interior of British Columbia. **Brian Muselle** (btmuselle@gmail.com)<sup>1</sup>, Jason Pither<sup>1</sup>, Lael Parrott<sup>1</sup>, and Howard Thistlewood<sup>2</sup>, <sup>1</sup>The Univ. of British Columbia, Kelowna, BC, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Summerland, BC, Canada
- D3145** First report of lemon scent *Eucalyptus* gall wasp *Epichrysocharis burwelli* Schauff & Garrison, 2000 (Hymenoptera: Eulophidae) from Uruguay. **Carolina Jorge** (carolina.jorge@cut.edu.uy)<sup>1,2</sup>, Gonzalo Martinez<sup>3</sup>, Sofia Simeto<sup>3</sup>, Gustavo Balmelli<sup>3</sup>, and Demian Gomez<sup>3</sup>, <sup>1</sup>Univ. of the Republic, Tacuarembó, Uruguay, <sup>2</sup>São Paulo State University, Botucatu, Brazil, <sup>3</sup>National Institute of Agricultural Research, Tacuarembó, Uruguay
- D3146** Biology and management of the peanut burrower bug (*Pangaeus bilineatus*) in Southeast United States runner-type peanut. **Mark R. Abney** (mrabney@uga.edu)<sup>1</sup>, Mark Crosby<sup>2</sup>, and Stephanie Hollifield<sup>3</sup>, <sup>1</sup>Univ. of Georgia, Tifton, GA, <sup>2</sup>Univ. of Georgia, Swainsboro, GA, <sup>3</sup>Univ. of Georgia, Quitman, GA
- D3147** Regulatory entomology: Protecting agriculture and natural resources. **Michelle DaCosta** (michelle.dacosta@aphis.usda.gov), Fernando Lenis, and Charles Brodel, USDA - APHIS, Miami, FL
- D3148** Parameter estimation for the temperature-dependent development models of *Phyllocnistis citrella* (Lepidoptera: Gracillaridae) in the laboratory. Hyun Seung Young<sup>1</sup>, Elekçioglu Zula<sup>2</sup>, Kim Su Bin<sup>1</sup>, Soon Hwa Kwon<sup>1</sup>, and **Dong-Soon Kim** (dongsoonkim@jejunu.ac.kr)<sup>1</sup>, <sup>1</sup>Jeju National Univ., Jeju, South Korea, <sup>2</sup>Çukurova Univ., Adana, Turkey
- D3149** Host alternation by the mother of pearl moth, *Patania ruralis* (Lepidoptera: Crambidae). **Atsuhiko Nagasawa** (atsu.nagasawa@gmail.com), Tohoku Univ., Sendai, Japan
- D3150** Presentation withdrawn
- D3151** Maize leaf weevil (*Tanymecus dilaticollis* Gyll): Present situation in Romania. **Georgescu Emil** (emilgeorgescu2013@gmail.com)<sup>1</sup>, Cana Lidia<sup>1</sup> and Rasnoveanu Luxita<sup>2,3</sup>, <sup>1</sup>National Agricultural Research Development, Fundulea, Romania, <sup>2</sup>Agricultural Research Development Station, Braila, Romania, <sup>3</sup>"Dunarea de Jos" Univ. of Galati, Braila, Romania
- D3152** Differences in wing morphometrics of *Lymantria dispar* between populations that vary in female flight capability. **Juan Shi** (shi\_juan@263.net)<sup>1</sup>, Fang Chen<sup>1</sup>, and Melody A. Keena<sup>2</sup>, <sup>1</sup>Beijing Forestry Univ., Beijing, China, <sup>2</sup>USDA - Forest Service, Hamden, CT
- D3153** Effect of common beech leaves on development of *Lymantria dispar* larvae. **Milan Pernek** (milanp@sumins.hr), Ivan Lukiač, and Nikola Lackovic, Croatian Forest Research Institute, Jastrebarsko, Croatia
- D3154** Occurrence of forest pests in *Eucalyptus* plantations in Brazil during 2010-2015. **Luis Junqueira** (Irenatoj2@yahoo.com.br)<sup>1</sup>, Leonardo Barbosa<sup>2</sup>, José Zanuncio<sup>3</sup>, and Carlos Wilcken<sup>1</sup>, <sup>1</sup>São Paulo State Univ., Botucatu, Brazil, <sup>2</sup>Brazilian Agricultural Research Corporation, Colombo, Brazil, <sup>3</sup>Federal Univ. of Viçosa, Viçosa, Brazil
- D3155** Characterization and patterning spatial dispersal of pine wilt disease on the basis of GIS data from 1994 to 2005 in the Republic of Korea. **Kwang Choi** (choiks99@korea.kr)<sup>1</sup>, Hye Jung Song<sup>1</sup>, Won Il Choi<sup>1</sup>, Youngwoo Nam<sup>1</sup>, and Young-Seuk Park<sup>2</sup>, <sup>1</sup>National Institute of Forest Science, Seoul, South Korea, <sup>2</sup>Kyung Hee Univ., Seoul, South Korea
- D3156** Study on sterilization using gamma rays on *Monochamus saltuarius* (Coleoptera: Cerambycidae). **Gun-Hyung Kwon** (zuron1000@gmail.com), Min-Seop Lee, Yoon-Mi Jeong, Geun-Seop Lee, and Young-Dae Kwon, Gyeonggi-do Forestry Environment Research Institute, Osan, South Korea
- D3157** Effects of continued prescribed fire and fire surrogates on insect pollinators of the Blue Ridge province in North Carolina. **Patrick Vigueira** (pvigueir@highpoint.edu)<sup>1</sup>, Joshua Campbell<sup>2</sup>, and Cindy Vigueira<sup>1</sup>, <sup>1</sup>High Point Univ., High Point, NC, <sup>2</sup>Univ. of Florida, Gainesville, FL

**D3158** The sublethal effect of microsporidian infection on flight capacity of the forest tent caterpillar, *Malacosoma disstria* (Lepidoptera: Lasiocampidae). **Maya Evenden** (mevenden@ualberta.ca)<sup>1</sup>, Pasan Arachchige<sup>1</sup>, Chetna Saran<sup>1</sup>, B. Andrew Keddie<sup>1</sup>, and Chris J. K. MacQuarrie<sup>2</sup>, <sup>1</sup>Univ. of Alberta, Edmonton, AB, Canada, <sup>2</sup>Natural Resources Canada, Sault Ste. Marie, ON, Canada

## Poster Session 1: Biodiversity, Biogeography, and Conservation of Arthropods, Part 1

### West Hall C (Convention Center)

**D3159** Chrysomelid beetles along an altitudinal gradient in Southeast Brazil. **Vivian Flinte** (flinte@biologia.ufrj.br)<sup>1</sup>, Margarete de Macedo<sup>1</sup>, Peter Mayhew<sup>2</sup>, and Ricardo Monteiro<sup>1</sup>, <sup>1</sup>Federal Univ. of Rio de Janeiro, Rio de Janeiro, Brazil, <sup>2</sup>Univ. of York, York, United Kingdom

**D3160** Beetles in fine-woody flood-debris. **Michael Ferro** (spongymesophyll@gmail.com), Clemson Univ., Clemson, SC

**D3161** Diversity and distribution in the world of Megalopodidae Latreille (Coleoptera: Chrysomeloidea). **Geovanni Rodriguez Mirón** (geo20araa@yahoo.com.mx), National Autonomous Univ. of México, Mexico City, Mexico

**D3162** The faunal elements of Bostrichidae (Insecta: Coleoptera). **Lan-Yu Liu** (liulysky@gmail.com), National Pingtung Univ., Pingtung City, Taiwan

**D3163** Phylogeography of weaver ant, *Oecophylla smaragdina*, in Bangladesh (Hymenoptera: Formicidae). **Md. Mamunur Rahman** (mamunur111@gmail.com), Kazuo Ogata, and Shingo Hosoishi, Kyushu Univ., Fukuoka, Japan

**D3164** Variability of mitochondrial DNA shows strong structuration among populations of *Melipona subnitida* (Apidae: Meliponini) in Northeast of Brazil. **Vanessa Bonatti** (vanessa\_bonatti@usp.br)<sup>1</sup>, Marcela Barbosa<sup>2</sup>, Juliana Teixeira<sup>2</sup>, Maria Arias<sup>2</sup>, and Tiago Franco<sup>2</sup>, <sup>1</sup>Univ. of São Paulo, Ribeirão Preto, Brazil, <sup>2</sup>Univ. of São Paulo, São Paulo, Brazil

**D3165** Biogeography of Afrotropical Tachinidae (Diptera). **James O'Hara** (james.ohara@agr.gc.ca)<sup>1</sup>, Pierfilippo Cerretti<sup>2</sup>, and John Stireman III<sup>3</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, Ottawa, ON, Canada, <sup>2</sup>Univ of Padova, Legnaro, Italy, <sup>3</sup>Wright State Univ., Dayton, OH

**D3166** The fauna of Tachinidae (Insecta: Diptera) of Northeast China. **Chuntian Zhang** (chuntianzhang@aliyun.com)<sup>1</sup>, Qiang Wang<sup>2</sup>, Yansen Zhang<sup>1</sup>, Xin Li<sup>1</sup>, Houcan Liang<sup>1</sup>, and Henan Li<sup>1</sup>, <sup>1</sup>Shenyang Normal Univ., Shenyang, China, <sup>2</sup>Nankai Univ., Tianjin, China

**D3167** Expansion of the northeastern range of selected North American gall-forming midges (Diptera: Cecidomyiidae: *Celticecis* spp.) on hackberries (Cannabaceae: *Celtis* spp.). **Carol Mapes** (mapes@kutztown.edu) and Duncan Brown, Kutztown Univ., Kutztown, PA

**D3168** Comparative phylogeography of three widespread dung beetles (Coleoptera: Scarabaeinae) in Cameroon. **Christie Sukhdeo** (christie.sukhdeo@gmail.com)<sup>1</sup> and T. Keith Phillips<sup>2</sup>, <sup>1</sup>The Univ. of New Orleans, New Orleans, LA, <sup>2</sup>Western Kentucky Univ., Bowling Green, KY

**D3169** *Guyalna platyrhina* Sanborn & Heath 2014 (Hemiptera: Cicadidae): First registry from Brazil. **Douglas Maccagnan** (douglas.hbm@ueg.br) and Marco de Sá, Goiás State Univ., Iporá, Brazil

**D3170** Recent discoveries of Trichoptera (caddisfly) biodiversity in Florida. **Andrew K. Rasmussen** (andrew.rasmussen@fam.u.edu)<sup>1</sup>, Dana R. Denson<sup>2</sup>, and Steven C. Harris<sup>3</sup>, <sup>1</sup>Florida A&M Univ., Tallahassee, FL, <sup>2</sup>Reedy Creek Improvement District, Lake Buena Vista, FL, <sup>3</sup>Clarion Univ., Clarion, PA

**D3171** Diversity of terrestrial arthropods in a tropical moist forest from west Ecuador. **Marcos Medina-Pinoargote** (malmedin@espol.edu.ec)<sup>1</sup>, Jorge Paredes-Montero<sup>2</sup> and Myriam Arias<sup>3</sup>, <sup>1</sup>Superior Polytechnical School of the Coast, Guayaquil, Ecuador, <sup>2</sup>Univ. of Arizona, Tucson, AZ, <sup>3</sup>National Independent Institute of Agricultural Research, Quito, Ecuador

**D3172** Diversity of Araneidae (Arachnida: Araneae) in Sierra de Huautla, Morelos, Mexico. **Monica Salas-Rodríguez** (msalalrod@hotmail.com)<sup>1</sup>, Ventura Rosas-Echeverría<sup>1</sup>, and Griselda Montiel-Parra<sup>2</sup>, <sup>1</sup>Autonomous State Univ. of Morelos, Cuernavaca, Mexico, <sup>2</sup>National Autonomous Univ. of México, Mexico City, Mexico

**D3173** Diversity of Salticidae (Arachnida: Araneae) in Sierra de Huautla, Morelos: A first taxonomic inventory. Miguel Menéndez-Acuña<sup>1</sup>, César Durán-Barrón<sup>2</sup>, and **Ventura Rosas-Echeverría** (mvrosase@gmail.com)<sup>3</sup>, <sup>1</sup>Autonomous State Univ. of Morelos, Cuernavaca, Mexico, <sup>2</sup>National Autonomous Univ. of México, Mexico City, Mexico, <sup>3</sup>Autonomous State Univ. of Morelos, Jojutla, Mexico

**D3174** Distribution and demography of arthropod taxa of conservation concern on the high alpine Maunakea volcano in Hawaii. **Jesse A. Eiben** (eiben@hawaii.edu)<sup>1</sup> and Daniel Rubinoff<sup>2</sup>, <sup>1</sup>Univ. of Hawai'i, Hilo, HI, <sup>2</sup>Univ. of Hawai'i, Honolulu, HI

**D3175** Distribution and conservation status of butterflies in South Carolina. **Brian G. Scholtens** (scholtensb@cofc.edu)<sup>1</sup>, Dennis Forsythe<sup>2</sup>, and Tom Smith<sup>3</sup>, <sup>1</sup>College of Charleston, Charleston, SC, <sup>2</sup>The Citadel, Charleston, SC, <sup>3</sup>College of Charleston, Woodbridge, VA

**D3176** Caddisfly (Trichoptera) of National Park Service properties in the Heartland Inventory and Monitoring Network. **David E. Bowles** (david\_bowles@nps.gov), U.S. National Park Service, Republic, MO

**D3177** Arctiidae and Sphingidae diversity (Insecta: Lepidoptera) in Sierra de Huautla, Morelos, Mexico. **Nazario García Ángel** (n.angel.g21@gmail.com)<sup>1</sup>, Ventura Rosas-Echeverría<sup>2</sup>, and Adolfo Ibarra Vazquez<sup>3</sup>, <sup>1</sup>Autonomous State Univ. of Morelos, Cuernavaca, Mexico, <sup>2</sup>Autonomous State Univ. of Morelos, Jojutla, Mexico, <sup>3</sup>National Autonomous Univ. of México, Mexico City, Mexico

**D3178** Exploration of 'A few observations on the genus *Papilio*', thought to be from the field notebook of a youthful W. J. Holland (1848-1932), circa 1861. **David B. Hogg** (dhogg@cals.wisc.edu), Walter Goodman, and Gene R. DeFoliart (deceased), Univ. of Wisconsin, Madison, WI





- D3179** OKEON Chura-mori Project: A new environmental monitoring project in Okinawa, Japan. **Masashi Yoshimura** (myoshimura@ant-database.org), Takuma Yoshida, Masako Ogasawara, and Evan Economo, Okinawa Institute of Science and Technology, Onna, Japan
- D3180** Preliminary list of the ants (Hymenoptera: Formicidae) of Virginia. **Kaloyan Ivanov** (antzmail@gmail.com), Virginia Museum of Natural History, Martinsville, VA
- D3181** Trap-nesting bees and wasps of deep east Texas. **Daniel Bennett** (bennettdj@sfasu.edu)<sup>1</sup>, David Kulhavy<sup>1</sup>, and R. Alan Shadow<sup>2</sup>, <sup>1</sup>Stephen F. Austin State Univ., Nacogdoches, TX, <sup>2</sup>USDA - NRCS, Nacogdoches, TX
- D3182** Survey of Hymenoptera parasitoids of Geometridae (Lepidoptera) larvae in Brazil. **Manoel Dias** (manoelmd@ufscar.br), Mariana Geraldo and Angélica Dias, Federal Univ. of São Carlos, São Carlos, Brazil
- D3183** Abundance of parasitoids along a vertical tree gradient in temperate deciduous forest. **Martin Sigut** (martin.sigut@osu.cz)<sup>1</sup>, Nela Kotaskova<sup>1</sup>, Petr Pyszko<sup>1</sup>, Jan Šipoš<sup>2</sup>, and Pavel Drozd<sup>1</sup>, <sup>1</sup>Univ. of Ostrava, Ostrava, Czech Republic, <sup>2</sup>Czech Academy of Sciences, Brno, Czech Republic
- D3184** Diversity of Braconidae (Hymenoptera) from a Brazilian mountain ecosystem. **Angélica Dias** (angelica@ufscar.br), Carolina Gessner, Clóvis Castro, and Giulia Campos, Federal Univ. of São Carlos, São Carlos, Brazil
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- Poster Session 1: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops, Part 1**
- West Hall C (Convention Center)**
- D3185** Effect of Mohlo insecticide bait on German cockroach, *Blattella germanica*, populations in residential areas of South Africa. **Maboko Mphosi** (maboko.mphosi@ul.ac.za)<sup>1</sup>, Clarah Mbowani<sup>1</sup>, and Phatu Mashela<sup>2</sup>, <sup>1</sup>Univ. of Limpopo, Sovenga, South Africa, <sup>2</sup>Univ. of Limpopo, Polokwane, South Africa
- D3186** Determining the correlation between *Drosophila melanogaster* toluene exposure and the resulting toxicity effects on fly survival and fecundity. **Vanessa Trivino** (trivinovanessa@gmail.com), Rosemarie Rosell, Luke Hebert, Heidi Reinhardt, Quy Lam, Elmer Ledesma, Zara Lodhra, Laura Castillo, Anna Donnelly, Tang Nguyen, Michael MacGregor, and Brenda Nunez, Univ. of St. Thomas, Houston, TX
- D3187** Fitness of pyrethroid resistance in *Triatoma infestans*, a vector of Chagas disease. **María Picollo** (mpicollo@gmail.com)<sup>1</sup>, Monica Germano<sup>2</sup>, and Gastón Mougabure-Cueto<sup>2</sup>, <sup>1</sup>Center for Insecticide and Pest Research, Villa Martelli, Argentina, <sup>2</sup>Center for Insecticide and Pest Research, Buenos Aires, Argentina
- D3188** Reduction of clothianidin and thiamethoxam susceptibilities under selection pressure by imidacloprid in the brown planthopper, *Nilaparvata lugens*. **Tomohisa Fujii** (tomofujii@affrc.go.jp), Sachiyo Sanada-Morimura, and Masaya Matsumura, NARO Kyushu Okinawa Agricultural Research Center, Kumamoto, Japan
- D3189** Presentation withdrawn
- D3190** Evaluation of imidacloprid ingestion on honey bee, *Apis mellifera*, colony health. **Jon Zawislak** (jzawislak@uaex.edu)<sup>1</sup>, Don Johnson<sup>2</sup>, Gus Lorenz<sup>2</sup>, John Adamczyk<sup>3</sup>, William Meikle<sup>4</sup>, Milagra Weiss<sup>4</sup>, and Quinton Hornsby<sup>2</sup>, <sup>1</sup>Univ. of Arkansas, Little Rock, AR, <sup>2</sup>Univ. of Arkansas, Lonoke, AR, <sup>3</sup>USDA - ARS, Poplarville, MS, <sup>4</sup>USDA - ARS, Tucson, AZ
- D3191** Neonicotinoid residues in fresh corn pollen and proportion of corn pollen in bee-collected pollen during corn pollination. **Yingen Xue** (yingen.xue@uoguelph.ca)<sup>1</sup>, Victor Limay-Rios<sup>1</sup>, Jocelyn Smith<sup>1</sup>, Luis Forero<sup>1</sup>, Tracey Baute<sup>2</sup>, and Arthur Schaafsma<sup>1</sup>, <sup>1</sup>Univ. of Guelph, Ridgetown, ON, Canada, <sup>2</sup>Ontario Ministry of Agriculture, Food and Rural Affairs, Ridgetown, ON, Canada
- D3192** A novel source for off-target movement of neonicotinoid residues during agricultural practices in southwestern Ontario, Canada. **Luis Forero** (lforerom@uoguelph.ca), Victor Limay-Rios, and Arthur Schaafsma, Univ. of Guelph, Ridgetown, ON, Canada
- D3193** Development of regional resistance of twospotted spider mite, *Tetranychus urticae*, against several kinds of acaricides. **Il Hyun Byun** (ilhyun45@naver.com), Chungnam National Univ., Daejeon, South Korea
- D3194** Chemical structure advantage of cyclaniliprole against the diamides-resistant diamondback moth, *Plutella xylostella*. **Taku Hamamoto** (t-hamamoto@iskweb.co.jp)<sup>1</sup>, Chiaki Takeda<sup>1</sup>, Shigeru Mitani<sup>1</sup>, Kiyomitsu Yoshida<sup>1</sup>, and Masayuki Morita<sup>2</sup>, <sup>1</sup>Ishihara Sangyo Kaisha, Ltd., Kusatsu, Japan, <sup>2</sup>Ishihara Sangyo Kaisha, Ltd., Osaka, Japan
- D3195** Global pesticide registration: What constitutes a bee data package for a globally registered insecticide? **Bridget O'Neill** (bridget.o-neill@dupont.com), DuPont Crop Protection, Newark, DE
- D3196** Presentation withdrawn
- D3197** The effect of some insecticides on behaviour of the large pine weevil, *Hylobius abietis*. **Ivar Sibul** (ivar.sibul@emu.ee) and Angela Ploomi, Estonian Univ. of Life Sciences, Tartu, Estonia
- D3198** Preliminary data on the effects of chlorantraniliprole treatment of grasshoppers and Mormon crickets on non-target rangeland insects. **Brian Reily** (brianhreily@gmail.com) and Nico Franz, Arizona State Univ., Tempe, AZ
- D3199** Population genetic structure of *Frankliniella fusca*. **Alana Jacobson** (alj0043@auburn.edu)<sup>1</sup>, Paul Labadie<sup>2</sup>, George G. Kennedy<sup>2</sup>, and Anders Huset<sup>2</sup>, <sup>1</sup>Auburn Univ., Auburn, AL, <sup>2</sup>North Carolina State Univ., Raleigh, NC
- D3200** Insecticide resistance monitoring and correlation analysis of insecticides in field populations of *Nilaparvata lugens* in China. **Jianhong Li** (jianhl@mail.hzau.edu.cn), Huazhong Agricultural Univ., Wuhan, China
- D3201** Development of natural insecticides for *Bemisia tabaci* (Hemiptera: Aleyrodidae) on greenhouse sweet pepper. **Soowan Kim** (cygnus0721@naver.com), Minhyung Jung, Yoon-Jae Song, Se Chan Kang, and Doo-Hyung Lee, Gachon Univ., Seongnam, South Korea

**D3202** Genotyping for the G4946E site of the ryanodine receptor gene in *Plutella xylostella* (Lepidoptera: Yponomeutidae) considering gene duplication. **Shoji Sonoda** (sonodas@cc.utsunomiya-u.ac.jp), Utsunomiya Univ., Utsunomiya, Japan

### Poster Session 1: Functional Genomics and Transgenesis

#### West Hall C (Convention Center)

- D3203** Identification and functional analysis of peroxiredoxin genes in the diamondback moth, *Plutella xylostella* (L.). **Miao Xie** (xmshelly@gmail.com)<sup>1,2</sup>, Jianyu Li<sup>2</sup>, Minsheng You<sup>2</sup>, and Qisheng Song<sup>1</sup>, <sup>1</sup>Univ. of Missouri, Columbia, MO, <sup>2</sup>Fujian Agriculture and Forestry Univ., Fuzhou, China
- D3204** Comparative analyses of Cu-Zn superoxide dismutase (SOD1) and thioredoxin reductase (TrxR) at the mRNA level between *Apis mellifera* L. and *Apis cerana* F. under stress conditions. **Hyun-Na Koo** (hyunnakoo@hanmail.net)<sup>1</sup>, Seung-Hwan Yun<sup>1</sup>, JaeSeon Lee<sup>1</sup>, Hyun Kyung Kim<sup>1</sup>, Yong Soo Choi<sup>2</sup>, and Gil-Hah Kim<sup>1</sup>, <sup>1</sup>Chungbuk National Univ., Cheongju, South Korea, <sup>2</sup>National Academy of Agricultural Science, Wanju-gun, South Korea
- D3205** Corazonin gene controls gregarious characteristics in the desert and migratory locusts. **Ryohei Sugahara** (rsugahara@affrc.go.jp)<sup>1,2</sup>, Seiji Tanaka<sup>1</sup>, Akiya Jouraku<sup>1</sup>, and Takahiro Shiotsuki<sup>1</sup>, <sup>1</sup>National Institute of Agrobiological Sciences, Tsukuba, Japan, <sup>2</sup>Japan Society for the Promotion of Science, Tsukuba, Japan
- D3206** Gene expression profiles during post-embryonic development in the mosquito, *Aedes aegypti*. **Caroline Gonçalves** (carolinemacedo@yahoo.com.br)<sup>1</sup>, Kenner Morais Fernandes<sup>1</sup>, Franciane Miranda<sup>1</sup>, Matthew Heerman<sup>2</sup>, Marcelo Ramalho-Ortigao<sup>2</sup>, and Gustavo Martins<sup>1</sup>, <sup>1</sup>Federal Univ. of Viçosa, Viçosa, Brazil, <sup>2</sup>Kansas State Univ., Manhattan, KS
- D3207** Transcriptome analysis of the genes differentially expressed between two *Bombyx* body color mutants *i-lem* and *lem*. Junshan Gao<sup>1</sup>, Rui Shu<sup>1</sup>, Lanlan Wu<sup>1</sup>, Daobo Zhang<sup>1</sup>, Chun Liu<sup>2</sup>, and **Yan Meng** (mengyan@ahau.edu.cn)<sup>1</sup>, <sup>1</sup>Anhui Agricultural Univ., Hefei, China, <sup>2</sup>Southwest Univ., Chongqing, China
- D3208** Characterization of the moth color mutation, wild wing spot, in the silkworm *Bombyx mori*. **Katsuhiko Ito** (katsuito@cc.tuat.ac.jp), Manabu Yoshikawa, Takeshi Fujii, Hiroko Tabunoki, and Takeshi Yokoyama, Tokyo Univ. of Agriculture and Technology, Fuchu, Japan
- D3209** The influence of viral infection of host plant on Colorado potato beetle's growth and midgut gene expression. **Marko Petek** (marko.petek@nib.si)<sup>1</sup>, Ana Rotter<sup>1</sup>, Polona Kogovšek<sup>1</sup>, Špela Baebler<sup>1</sup>, Axel Mithöfer<sup>2</sup>, and Kristina Gruden<sup>1</sup>, <sup>1</sup>National Institute of Biology, Ljubljana, Slovenia, <sup>2</sup>Max Planck Institute for Chemical Ecology, Jena, Germany
- D3210** Metabolic and genetic implications of survival in anoxic *Drosophila*. **Jacob Campbell** (jacob.campbell.1@asu.edu) and Jon Harrison, Arizona State Univ., Tempe, AZ

- D3211** Localized expression of water-specific aquaporins in the salivary glands of the Formosan subterranean termite, *Coptotermes formosanus*. **Kohei Kambara** (kambara@ffpri.affrc.go.jp)<sup>1</sup>, Wakako Ohmura<sup>1</sup>, Mariya Maruyama<sup>2</sup>, and Masaaki Azuma<sup>2</sup>, <sup>1</sup>Forestry and Forest Products Research Institute, Tsukuba, Japan, <sup>2</sup>Tottori Univ., Tottori, Japan
- D3212** The role of circadian clock genes in the overwintering diapause of the northern house mosquito, *Culex pipiens*. **Megan E. Meuti** (meganmeuti@gmail.com)<sup>1</sup>, Alena Kobelkova<sup>2</sup>, and David L. Denlinger<sup>3</sup>, <sup>1</sup>Kenyon College, Gambier, OH, <sup>2</sup>Czech Academy of Sciences, České Budějovice, Czech Republic, <sup>3</sup>The Ohio State Univ., Columbus, OH
- D3213** microRNAs may regulate pupal diapause in the flesh fly, *Sarcophaga bullata*. **Julie Reynolds** (reynolds.473@osu.edu) and David L. Denlinger, The Ohio State Univ., Columbus, OH
- D3214** A large family of bacterial genes in the Hessian fly, *Mayetiola destructor*, genome. **Xiaoyan Cheng** (ycheng@ksu.edu)<sup>1</sup>, Sandra Carrera<sup>1</sup>, R. Jeff Whitworth<sup>1</sup>, Yoonseong Park<sup>1</sup>, Jeffrey J. Stuart<sup>2</sup>, and Ming-Shun Chen<sup>1</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>Purdue Univ., West Lafayette, IN
- D3215** Obtaining a robust larval gastric caecae and posterior midgut-specific promoter from *Aedes aegypti* mosquitoes and its application for development of tissue-specific Gal4-UAS system. **Jianwu Chen** (jwchen97@yahoo.com), Univ. of California, Riverside, CA
- D3216** Reducing gene expression level in *Drosophila* embryos by strong maternal Gal4 lines: For building a gene drive system in insects. **Cheng Han Hiseh** (041211@nhri.org.tw), National Health Research Institutes, Miaoli, Taiwan
- D3217** Expression of *hairy* gene is induced by juvenile hormone in tissue-dependent manner. **Toru Togawa** (togatoru@chs.nihon-u.ac.jp)<sup>1</sup>, Takumi Kayukawa<sup>2</sup>, Kosuke Uchida<sup>1</sup>, Haruna Ishino<sup>1</sup>, Daiki Suzuki<sup>1</sup>, and Tetsuro Shinoda<sup>2</sup>, <sup>1</sup>Nihon Univ., Tokyo, Japan, <sup>2</sup>National Institute of Agrobiological Sciences, Tsukuba, Japan
- D3218** Analysis of core  $\alpha 1$ , 3-fucosyltransferase gene of the silkworm, *Bombyx mori*, cell line for metabolic engineering of *N*-glycosylation pathway by genome editing. **Hiroyuki Kayaki** (v009gm@yamaguchi-u.ac.jp)<sup>1</sup> and Jun Kobayashi<sup>2</sup>, <sup>1</sup>Yamaguchi Univ., Yoshida, Japan, <sup>2</sup>Yamaguchi Univ., Yamaguchi, Japan
- D3219** Development of CRISPR/Cas9 for use in codling moth, *Cydia pomonella*. **Stephen F. Garczynski** (steve.garczynski@ars.usda.gov), Jessica A. Martin, Margaret Griset, Laura Willett, and William Rodney Cooper, USDA - ARS, Wapato, WA
- D3220** RNAi and Cas9-mediated gene editing in *Bombus impatiens* ovaries. **Vanessa Macias** (vzm10@psu.edu), Vanessa Macias, and Jason Rasgon, Pennsylvania State Univ., University Park, PA
- D3221** Identifying functional domains of a pesticide receptor using CRISPR/Cas9. **Nicole Gutzmann** (negutzma@ncsu.edu)<sup>1</sup>, Marcé Lorenzen<sup>1</sup>, and Brenda Oppert<sup>2</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>USDA - ARS, Manhattan, KS



- D3222** Genetic variations of *Tetranychus kanzawai* conferring different abilities on host plant adaptation and pesticide resistance. **Rika Ozawa** (ozawar@ecology.kyoto-u.ac.jp)<sup>1</sup>, Hiroki Endo<sup>2</sup>, Koichi Sugimoto<sup>1</sup>, Junji Takabayashi<sup>1</sup>, Tetsuo Gotoh<sup>3</sup>, and Gen-ichiro Arimura<sup>2</sup>, <sup>1</sup>Kyoto Univ., Otsu, Japan, <sup>2</sup>Tokyo Univ. of Science, Tokyo, Japan, <sup>3</sup>Ibaraki Univ., Ibaraki, Japan
- D3223** Genomic and transcriptomic insights into the cytochrome P450 monooxygenase gene repertoire in the rice pest brown planthopper, *Nilaparvata lugens*. **Yanyuan Bao** (yybao@zju.edu.cn) and Chuan-Xi Zhang, Zhejiang Univ., Hangzhou, China
- D3224** *Drosophila* validation of CYP9Q-mediated detoxification of insecticides in the honey bee, *Apis mellifera*. **Rafael Homem** (rafael.homem@rothamsted.ac.uk)<sup>1</sup>, Christoph Zimmer<sup>2</sup>, Bartek Troczka<sup>1</sup>, Lin Field<sup>1</sup>, Ralf Nauen<sup>3</sup>, Chris Bass<sup>2</sup>, Martin Williamson<sup>1</sup>, and T. G. Emyr Davies<sup>1</sup>, <sup>1</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>2</sup>Univ. of Exeter, Penryn, United Kingdom, <sup>3</sup>Bayer CropScience, Monheim, Germany
- D3225** Targeting a detoxification enzyme gene using two genome editing technologies to test causality for insecticide resistance. **Kentaro Itokawa** (Itokawa@nih.go.jp)<sup>1,2</sup>, Osamu Komagata<sup>2</sup>, Kohei Ogawa<sup>2</sup>, Shinji Kasai<sup>2</sup>, and Takashi Tomita<sup>2</sup>, <sup>1</sup>Japan Agency for Medical Research and Development, Tokyo, Japan, <sup>2</sup>National Institute of Infectious Diseases, Tokyo, Japan
- D3226** Proteomic identification of sex biomarkers for two fruit fly species at pupal stage. **Chiou Ling Chang** (stella.chang@ars.usda.gov)<sup>1</sup>, Cynthia Goodman<sup>2</sup>, Beverly DaGue<sup>3</sup>, and David Stanley<sup>2</sup>, <sup>1</sup>USDA - ARS, Hilo, HI, <sup>2</sup>USDA - ARS, Columbia, MO, <sup>3</sup>Univ. of Missouri, Columbia, MO
- D3227** Construction of *Aedes aegypti* genetic sexing strain. **Helena Araújo** (helenarca@gmail.com), André Costa-da-Silva, Danilo Carvalho, Bianca Kojin, and Margareth Capurro, Univ. of São Paulo, São Paulo, Brazil
- D3228** Developing a death upon infection system in transgenic *Aedes aegypti* infected with Dengue virus. **André Costa-da-Silva** (alcosta@icb.usp.br), Danilo Carvalho, Bianca Kojin, Helena Araújo, Rafaella Ioshino, Isabel Marques, and Margareth Capurro, Univ. of São Paulo, São Paulo, Brazil
- D3230** Calliphoridae as vectors of antibiotic-resistant bacteria in the agricultural industry. **Sarah Russell** (smruss3913@ung.edu)<sup>1</sup> and Evan Lampert<sup>2</sup>, <sup>1</sup>Univ. of North Georgia, Dahlonega, GA, <sup>2</sup>Univ. of North Georgia, Oakwood, GA
- D3231** The search for a null hypothesis in vertebrate decomposition: How should insect species be included? **Trevor I. Stampler** (stampert@purdue.edu)<sup>1</sup>, M. Eric Benbow<sup>2</sup>, and Jeffrey Holland<sup>1</sup>, <sup>1</sup>Purdue Univ., West Lafayette, IN, <sup>2</sup>Michigan State Univ., East Lansing, MI
- D3232** The feeding behavior of forensically significant Coleoptera and its effect on their gut microbiota. **Bethany Walker** (bah029@shsu.edu), Sibyl Bucheli, and Aaron Lynne, Sam Houston State Univ., Huntsville, TX
- D3233** Comparison of forensic interest diptero fauna in distinct regions of São Paulo, Brazil: Calliphoridae, Fanniidae, Muscidae, and Sarcophagidae. **Maria Cavallari** (malu\_bio@hotmail.com)<sup>1,2</sup>, Fabio Baltazar<sup>2</sup>, Daniel Muñoz<sup>1</sup>, and José Tolezano<sup>2</sup>, <sup>1</sup>Univ. of São Paulo, São Paulo, Brazil, <sup>2</sup>Adolfo Lutz Institute, São Paulo, Brazil
- D3234** The effect of tissues and temperatures under the development of immature *Chrysomya megacephala* (Diptera: Calliphoridae) and implications for forensics. Fábio Rezende. **Aricio Linhares** (aricio@unicamp.br), Maria Paseto, Patricia J. Thyssen, and Marina Aquino, Univ. of Campinas, Campinas, Brazil
- D3235** Estimation of the postmortem interval of a highly decayed body with the development of *Aldrichina grahmi* (Diptera: Calliphoridae) in southwestern China: A case report. **Zhou Lyu** (forensicluzhou@hotmail.com)<sup>1</sup> and Li-hua Wan<sup>2</sup>, <sup>1</sup>Southwest Univ. of Political Science and Law, Chongqing, China, <sup>2</sup>Chongqing Medical Univ., Chongqing, China
- D3236** Maggot debridement therapy for a case of Fournier's gangrene. **Alicia Fonseca Muñoz** (afonsem@yahoo.com.mx)<sup>1,2</sup>, Hugo Edgardo Sarmiento Jimenez<sup>2</sup>, Jeffery K. Tomberlin<sup>3</sup>, Rafael Perez Pacheco<sup>1</sup>, and Liliana Robles Bautista<sup>4</sup>, <sup>1</sup>National Polytechnic Institute, Oaxaca, Mexico, <sup>2</sup>Hospital Bianni San Jose, Oaxaca, Mexico, <sup>3</sup>Texas A&M Univ., College Station, TX, <sup>4</sup>Benito Juárez Autonomous Univ., Oaxaca, Mexico
- D3237** Establishment of monitoring system of scrub typhus vectors using chigger mite collecting trap in South Korea (2013-2014). Seong Yoon Kim, **Won Il Park** (pwi4014@korea.kr), Bong Gu Song, Eun Hee Shin, Kyu Sik Chang, Wook Gyo Lee, E-Hyun Shin, Mi Yeoun Park, Young Ran Ju, and Jong Yul Roh, Korea National Research Institute of Health, Cheongju, South Korea
- D3238** Phenology of *Ixodes scapularis* and emerging tick-borne pathogens in Wisconsin. **Susan Paskewitz** (paskewit@entomology.wisc.edu)<sup>1</sup>, Darby Murphy<sup>1</sup>, Scott Larson<sup>1</sup>, and Diep Hoang Johnson<sup>2</sup>, <sup>1</sup>Univ. of Wisconsin, Madison, WI, <sup>2</sup>Wisconsin Dept. of Health Services, Madison, WI

## Poster Session 1: Medical and Veterinary Entomology, Part 1

### West Hall C (Convention Center)

- D3229** Metagenomic analyses of viral communities carried by mosquitoes in the greater Houston area. **Annette Phan** (phanaa@stthom.edu)<sup>1</sup>, Marlen Benitez<sup>1</sup>, Cristina Garcia<sup>1</sup>, Ezinne Ufomadu<sup>1</sup>, Yasmine Hoballah<sup>1</sup>, Amber Day<sup>1</sup>, Niki Knepper<sup>2</sup>, Anna Fields<sup>2</sup>, Dalton McWhinney<sup>2</sup>, Maia Larios-Sanz<sup>1</sup>, and Rosemarie C. Rosell<sup>1</sup>, <sup>1</sup>Univ. of St. Thomas, Houston, TX, <sup>2</sup>Houston Community College, Houston, TX

- D3239** Transovarial transmission of severe fever with thrombocytopenia syndrome virus in ixodid tick, *Haemaphysalis flava* (Acari: Ixodidae). Eun Hee Shin, Seong Yoon Kim, Chang Won Jang, Won Il Park, Bong Gu Song, Kyu Sik Chang, Wook Gyo Lee, E-Hyun Shin, Young Ran Ju, and **Jong Yul Roh** (rohling@korea.kr), Korea National Research Institute of Health, Cheongju, South Korea
- D3240** Screening of novel antigens for the control of *Boophilus microplus* through artificial feeding. **Charluz Arocho Rosario** (charluz.aroch@upr.edu)<sup>1</sup>, Robert J. Miller<sup>1</sup>, Felix Guerrero<sup>2</sup>, Pete Teel<sup>3</sup>, and Adalberto A. Pérez de León<sup>2</sup>, <sup>1</sup>USDA - ARS, Edinburg, TX, <sup>2</sup>USDA - ARS, Kerrville, TX, <sup>3</sup>Texas A&M Univ., College Station, TX
- D3241** Proteomic characterization of *Rhipicephalus microplus* saliva. Lucas Tirloni<sup>1</sup>, Tae Kim<sup>2</sup>, Carlos Termignoni<sup>1</sup>, Antônio Pinto<sup>3</sup>, Jolene Diedrich<sup>4</sup>, James Moresco<sup>4</sup>, John Yates III<sup>4</sup>, Albert Mulenga<sup>2</sup>, and **Itabajara Vaz** (itabajara.vaz@ufrgs.br)<sup>1</sup>, <sup>1</sup>Federal Univ. of Rio Grande, Porto Alegre, Brazil, <sup>2</sup>Texas A&M Univ., College Station, TX, <sup>3</sup>Pontifical Catholic Univ., Porto Alegre, Brazil, <sup>4</sup>The Scripps Research Institute, La Jolla, CA
- D3242** Proteome analysis of *Rickettsia parkeri*-infected *Amblyomma maculatum* ticks. **Karthik Balamurugan** (karthik.balamurugan@eagles.usm.edu)<sup>1</sup>, Chien-Chung Chao<sup>2</sup>, Khemraj Budachetri<sup>1</sup>, Gary Crispell<sup>1</sup>, Wei-Mei Ching<sup>2</sup>, and Shahid Karim<sup>1</sup>, <sup>1</sup>Univ. of Southern Mississippi, Hattiesburg, MS, <sup>2</sup>Naval Medical Research Center, Silver Spring, MD
- D3243** Reverse chemical ecology-based approach for the identification of repellents for a Chagas disease vector, *Rhodnius prolixus*. **Thiago A. Franco** (thiago.biovr@gmail.com)<sup>1</sup>, Pingxi Xu<sup>2</sup>, Monica F. Moreira<sup>1</sup>, Walter S. Leal<sup>2</sup>, and Ana C. A. Melo<sup>1,2</sup>, <sup>1</sup>Federal Univ. of Rio de Janeiro, Rio de Janeiro, Brazil, <sup>2</sup>Univ. of California, Davis, CA
- D3244** Demystifying kissing bugs identification for a broad audience: Guide to Chagas disease vector species of the United States (Hemiptera: Reduviidae: Triatominae). **Justin Bejcek** (jbejcek13@tamu.edu)<sup>1</sup>, Sarah Hamer<sup>2</sup>, and Gabriel Hamer<sup>2</sup>, <sup>1</sup>Texas A&M Univ., Celina, TX, <sup>2</sup>Texas A&M Univ., College Station, TX
- D3245** Chagas disease in New Mexico? Changes in incidence of *Trypanosoma cruzi* in NM Triatomines. **Jane Breen Pierce** (japierce@nmsu.edu)<sup>1</sup>, Stephen Hanson<sup>1</sup>, Derik Bendixsen<sup>2</sup>, and Devin Bendixsen<sup>2</sup>, <sup>1</sup>New Mexico State Univ., Las Cruces, NM, <sup>2</sup>New Mexico State Univ., Artesia, NM
- D3246** Presentation withdrawn
- D3247** Incidence, factors associated with pediculosis capitis and control populations of basic education in the states of Yucatán and Nuevo León, Mexico. Adriana Flores<sup>1</sup>, **Gerardo Trujillo-Rodriguez** (gerardo.trujillo36@hotmail.com)<sup>1</sup>, Olga Villanueva<sup>1</sup>, Iram Rodriguez<sup>1</sup>, Pablo Manrique-Saide<sup>2</sup>, and Gutsavo Ponce-García<sup>1</sup>, <sup>1</sup>Autonomous Univ. of Nuevo León, San Nicolas de los Garza, Mexico, <sup>2</sup>Autonomous Univ. of Yucatán, Mérida, Mexico
- D3248** Research to enhance mass rearing screwworms, *Cochliomyia hominivorax*. **S. R. Skoda** (steve.skoda@ars.usda.gov)<sup>1</sup>, M. Chaudhury<sup>2</sup>, P. Phillips<sup>1</sup>, and A. Sagel<sup>3</sup>, <sup>1</sup>USDA - ARS, Kerrville, TX, <sup>2</sup>USDA - ARS, Lincoln, NE, <sup>3</sup>USDA - ARS, Panama City, Panama
- D3249** A new module of AFRIMS' spoon for larval food quantity affects development time, survival, and adult body size of *Anopheles dirus* under laboratory conditions. **Kanchana Pantuwattana** (kanchanap@afirms.org), Siriporn Phasomkusolsil, Jaruwan Tawong, Weeraphan Khongtak, Yossasin Kertmanee, Nantaporn Monkanna, Sakon Khaosanorh, and Silas Davidson, Armed Forces Research Institute of Medical Sciences, Rachatewee, Thailand
- D3250** Production of *Plasmodium vivax* sporozoites in laboratory-bred *Anopheles darlingi* mosquitoes. **Gissella Vasquez** (gissella.m.vasquez.fn@mail.mil)<sup>1</sup>, Victor López-Sifuentes<sup>2</sup>, Karin Escobedo-Vargas<sup>2</sup>, Anibal Huayanay-Repetto<sup>2</sup>, Luz Romero-Dávila<sup>2</sup>, Carmen Flores-Mendoza<sup>1</sup>, Salomon Durand<sup>2</sup>, Edward Smith<sup>1</sup>, Christian Baldeviano<sup>1</sup>, Robert Gerbasí<sup>1</sup>, and Craig Stoops<sup>1</sup>, <sup>1</sup>U.S. Naval Medical Research Unit, Callao, Peru, <sup>2</sup>U.S. Naval Medical Research Unit, Iquitos, Peru
- D3251** Mosquito metabolic pathways are influenced by West Nile virus infection and contribute to vector ability. **Dongyoung Shin** (dshin@ufl.edu) and Chelsea Smartt, Univ. of Florida, Vero Beach, FL
- D3252** Vector competence of British mosquitoes for arboviruses. **Marcus Blagrove** (marcus.blagrove@liverpool.ac.uk)<sup>1</sup>, Matthew Baylis<sup>1</sup>, Daniel Impoinvil<sup>2</sup>, Jolyon Medlock<sup>3</sup>, Philip McCall<sup>1</sup>, Tom Solomon<sup>1</sup>, and Gareth Lycett<sup>1</sup>, <sup>1</sup>Univ. of Liverpool, Liverpool, United Kingdom, <sup>2</sup>Centers for Disease Control and Prevention, Atlanta, GA, <sup>3</sup>Public Health England, Salisbury, United Kingdom
- D3253** Characterization of different *Aedes aegypti* populations in Florida for interfering with chikungunya virus transmission. **Chelsea Smartt** (ctsmart@ufl.edu) and Dongyoung Shin, Univ. of Florida, Vero Beach, FL
- D3254** Factors affecting epidemic potential for chikungunya virus in Florida. **Cynthia C. Lord** (clord@ufl.edu), L. Philip Lounibos, Naoya Nishimura, Joseph J. Pohedra, and Barry Alto, Univ. of Florida, Vero Beach, FL

## Poster Session 1: Stored Products Entomology

### West Hall C (Convention Center)

- D3255** Efficacy and residue analysis of nitric oxide fumigation of strawberries for control of *Drosophila suzukii*. **Xiang-Bing Yang** (xbaya@ucdavis.edu)<sup>1</sup> and Yong-Biao Liu<sup>2</sup>, <sup>1</sup>Univ. of California, Salinas, CA, <sup>2</sup>USDA - ARS, Salinas, CA
- D3256** Synergistic effects of oxygen on phosphine and ethyl formate for the control of *Phthorimaea operculella* (Lepidoptera: Gelechiidae). **Hyun Kyung Kim** (nshk0917@gmail.com)<sup>1</sup>, Seon-Woo Lee<sup>1</sup>, Ju-Il Kim<sup>2</sup>, Jeong Oh Yang<sup>3</sup>, Hyun-Na Koo<sup>1</sup>, and Gil-Hah Kim<sup>1</sup>, <sup>1</sup>Chungbuk National Univ., Cheongju, South Korea, <sup>2</sup>Rural Development Administration, Pyeongchang, South Korea, <sup>3</sup>Animal and Plant Quarantine Agency, Suwon, South Korea



- D3257** Edible gels as methyl bromide alternatives to protect dry cured hams from infestation by *Tyrophagus putrescentiae* (Acari: Acaridae). **Salehe Abbar** (abbar@k-state.edu)<sup>1</sup>, Yan Campbell<sup>2</sup>, Yuanjun Zhao<sup>2</sup>, M. Wes Schilling<sup>2</sup>, and Thomas Phillips<sup>1</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>Mississippi State Univ., Mississippi State, MS
- D3258** Biotoxic efficacy of different fractions of *Acalypha godseffiana* oil extract against *Callosobruchus maculatus* infesting stored cowpea. **Mercy Oni** (mercyinka2007@yahoo.co.uk) and Olaniyi Ogungbite, Federal Univ. of Technology, Akure, Nigeria
- D3259** Effects of low rates of application of essential oils of *Eugenia aromatica* and *Piper guineense* on the cowpea seed weevil, *Callosobruchus maculatus*. **Joy Idoko** (jeidoko@yahoo.com) and Thomas Ofuya, Federal Univ. of Technology, Akure, Nigeria
- D3260** Electroantennographic and behavioral responses of *Sitophilus zeamais* to cereal volatiles. **Giacinto Germinara** (giacinto.germinara@unifg.it)<sup>1</sup>, Antonio De Cristofaro<sup>2</sup>, and Giuseppe Rotundo<sup>2</sup>, <sup>1</sup>Univ. of Foggia, Foggia, Italy, <sup>2</sup>Univ. of Molise, Campobasso, Italy
- D3261** Thermal remediation in flour mill: Response of three stored food pests to heat treatments. **Orlando Campolo** (orlando.campolo@unirc.it), Giuseppe Algeri, Francesca Laudani, Antonino Malacrino, Cinzia Strano, Paolo Zoccali, and Vincenzo Palmeri, Univ. of Reggio Calabria, Reggio Calabria, Italy
- D3262** New technology in fumigant scrubbers. James Feston, Tom Mueller, and **David Mueller** (d.mueller@insectslimited.com), Insects Limited, Westfield, IN
- D3263** Presentation withdrawn
- D3264** Transcriptomic analysis of the drugstore beetle, *Stegobium paniceum*, in response to hypercarbia stress. **Wenjia Yang** (yangwenjia10@126.com), Kangkang Xu, Yonglu Meng, Yu Cao, and Can Li, Guiyang Univ., Guiyang, China
- D3265** Phototactic response of Laemophloeidae insects to light-emitting diodes. **Zhongming Wang** (wzm@chinagrain.org)<sup>1</sup>, Yang Cao<sup>1</sup>, Yanyu Li<sup>1</sup>, and Yanmei Qi<sup>2</sup>, <sup>1</sup>Academy of State Administration of Grain, Beijing, China, <sup>2</sup>Henan Univ. of Technology, Zhengzhou, China

### Symposium: Microbial Associates and Microbial Control of Ambrosia Beetles

#### Room W223 A (Convention Center)

**Moderators and Organizers:** John Vandenberg<sup>1</sup> and Louela Castrillo<sup>2</sup>, <sup>1</sup>USDA - ARS, Ithaca, NY, <sup>2</sup>Cornell Univ., Ithaca, NY

- 9:15 **0014** Assessing coevolution between the hyperdiverse ambrosia beetles and their microbiomes. **Craig Bateman** (batemanc@gmail.com), Univ. of Florida, Gainesville, FL
- 9:30 **0015** Diversity, ecology, and evolution of the fungal symbionts of ambrosia beetles. Thomas Harrington and **Chase G. Mayers** (cgmayers@iastate.edu), Iowa State Univ., Ames, IA

- 10:00 **0016** Evolution of the *Fusarium-Euwallacea* ambrosia beetle mutualism. **Kerry O'Donnell** (kerry.odonnell@ars.usda.gov), USDA - ARS, Peoria, IL

#### 10:15 BREAK

- 10:30 **0017** *Raffaelea* species associated with *Xyleborus glabratus* with particular emphasis on *R. lauricola*, the cause of laurel wilt. **Stephen W. Fraedrich** (sfraedrich@fs.fed.us), USDA - Forest Service, Athens, GA

- 10:45 **0018** Management of ambrosia beetles using entomopathogenic fungi. **John Vandenberg** (john.vandenberg@ars.usda.gov), USDA - ARS, Ithaca, NY

- 11:00 **0019** Competitive interactions between biological control fungi and fungal symbionts of ambrosia beetles *Xylosandrus crassiusculus* and *X. germanus*. **Louela Castrillo** (lac48@cornell.edu), Cornell Univ., Ithaca, NY

#### 11:15 Discussion

### Symposium: Genomics and Genome Engineering in the Silkworm

#### Room W330 A (Convention Center)

**Moderators and Organizers:** Takashi Kiuchi<sup>1</sup> and Kallare Arunkumar<sup>2</sup>, <sup>1</sup>The Univ. of Tokyo, Tokyo, Japan, <sup>2</sup>Centre for DNA Fingerprinting and Diagnostics, Hyderabad, India

- 9:15 **0020** Genomics and gene engineering in the silkworm: Toward the next era. **Marian Goldsmith** (mki01@etal.uri.edu), Univ. of Rhode Island, Kingston, RI

- 9:45 **0021** Development of transgenic and genome editing technologies in the silkworm. **Takuya Tsubota** (tsubota@affrc.go.jp), National Institute of Agrobiological Sciences, Tsukuba, Japan

- 10:00 **0022** Efficient multiplex editing of *Bombyx* genome and global effect of off-target cleavage. **Sanyuan Ma** (masy@swu.edu.cn) and Qingyou Xia, Southwest Univ., Chongqing, China

#### 10:15 BREAK

- 10:30 **0023** Genome editing in the masculinizing gene of the silkworm, *Bombyx mori*. **Takashi Kiuchi** (kiuchi@ss.ab.a.u-tokyo.ac.jp), Yudai Sugano, Toru Shimada, and Susumu Katsuma, The Univ. of Tokyo, Tokyo, Japan

- 10:45 **0024** Studies on silkworm sex chromosome dosage compensation through large-scale transcriptome sequence analysis. **Kallare Arunkumar** (arun@cdfd.org.in) and Gajula Gopinath, Centre for DNA Fingerprinting and Diagnostics, Hyderabad, India

- 11:00 **0025** Sex chromosome dosage compensation in Lepidoptera: Insights from nymphalid butterflies and codling moth. **Jamie Walters** (jrwalters@ku.edu)<sup>1</sup>, Aloy Gu<sup>1</sup>, and Thomas Hardcastle<sup>2</sup>, <sup>1</sup>Univ. of Kansas, Lawrence, KS, <sup>2</sup>Univ. of Cambridge, Cambridge, United Kingdom

- 11:15 **0026** Electroporation-mediated functional analyses for various developmental processes in insects. **Haruhiko Fujiwara** (haruh@k.u-tokyo.ac.jp), The Univ. of Tokyo, Kashiwa, Japan

## Symposium: Wild Sericulture for Alternative Income and Economic Incentive for Biodiversity Conservation

Room W222 B (Convention Center)

**Moderators and Organizers:** Ken Fening<sup>1</sup> and Esther Kioko<sup>2</sup>,  
<sup>1</sup>Univ. of Ghana, Accra, Ghana, <sup>2</sup>National Museums of Kenya,  
Nairobi, Kenya

- 9:15 **0027** Wild silk farming as an economic incentive for resource-poor forest adjacent communities to participate in biodiversity conservation in Africa. **Ken Fening** (kenof2@yahoo.com)<sup>1</sup>, Esther Kioko<sup>2</sup>, and Suresh Raina<sup>3</sup>, <sup>1</sup>Univ. of Ghana, Accra, Ghana, <sup>2</sup>National Museums of Kenya, Nairobi, Kenya, <sup>3</sup>International Centre of Insect Physiology and Ecology, Nairobi, Kenya
- 9:45 **0028** Economic benefits of utilizing wild silkworm bioresources for sericultural development in Kenya. **Muo Kasina** (kasina.j@gmail.com)<sup>1</sup>, Hannah Gitonga<sup>1</sup>, Eliud Gatambia<sup>1</sup>, M. Guantai<sup>1</sup>, M. Maina<sup>1</sup>, Joyce Wainaina<sup>1</sup>, D. Mutisya<sup>2</sup>, D. Nyamango<sup>3</sup>, C. Omondi<sup>4</sup> and L. Wasilwa<sup>4</sup>, <sup>1</sup>The National Sericulture Research Center, Thika, Kenya, <sup>2</sup>Kenya Agricultural and Livestock Research Organization, Machakos, Kenya, <sup>3</sup>Genetic Resources Research Institute, Mtwapa, Kenya, <sup>4</sup>Kenya Agricultural and Livestock Research Organization, Nairobi, Kenya
- 10:00 **0029** Possibilities of commercializing native silkworms through increased cultivation and conservation of their host plants in Kenya. **Eliud Gatambia** (eliud.gatambia@kalro.org), Muo Kasina, J. Wanjeri and J. Wambui, The National Sericulture Research Center, Thika, Kenya
- 10:15 **BREAK**
- 10:30 **0030** Survey on diversity of wild silkworm species and their potential role in forest based sericulture: A case study in Arabuko Sokoke Forest, Kenya. Boniface Ngoka<sup>1</sup>, Everlyne Nguku<sup>1</sup>, **Esther Kioko** (ekioko@museums.or.ke)<sup>2</sup>, Suresh Raina<sup>1</sup> and Jones Mueke<sup>3</sup>, <sup>1</sup>International Centre of Insect Physiology and Ecology, Nairobi, Kenya, <sup>2</sup>National Museums of Kenya, Nairobi, Kenya, <sup>3</sup>Kenyatta University, Nairobi, Kenya
- 10:45 **0031** Biology of the wild silkworm *Anaphe panda* in the Kakamega Forest of Western Kenya. **Norbert Mbahin** (norber.mbahin@au-ibar.org)<sup>1</sup>, Esther Kioko<sup>2</sup> and Suresh Raina<sup>3</sup>, <sup>1</sup>African Union – InterAfrican Bureau for Animal Resources, Nairobi, Kenya, <sup>2</sup>National Museums of Kenya, Nairobi, Kenya, <sup>3</sup>International Centre of Insect Physiology and Ecology, Nairobi, Kenya
- 11:00 **0032** Formation of *Anaphe panda* regenerated silk fibrion nanofibres/nets via electro-netting. **Benson Dulo** (githaiga03@yahoo.com)<sup>1</sup>, Bin Ding<sup>2</sup>, Eric Oyondi<sup>1</sup>, and Diana Madara<sup>1</sup>, <sup>1</sup>Moi Univ., Eldoret, Kenya, <sup>2</sup>Donghua Univ., Shanghai, China
- 11:15 **0033** Assessment of sericin loss and spun silk yield from cocoons of *Gonometa postica* (Lepidoptera: Bombycidae). **Esther Kioko** (ekioko@museums.or.ke)<sup>1</sup>, Ken Fening<sup>2</sup>, Boniface Ngoka<sup>3</sup>, and Suresh Raina<sup>3</sup>, <sup>1</sup>National Museums of Kenya, Nairobi, Kenya, <sup>2</sup>Univ. of Ghana, Accra, Ghana, <sup>3</sup>International Centre of Insect Physiology and Ecology, Nairobi, Kenya

**SD0034** Status of wild sericulture in Ghana. Gloria Agyeiwaa<sup>1</sup>, **Ken Fening** (kenof2@yahoo.com)<sup>1</sup> and Daniel Obeng-Ofori<sup>2</sup>, <sup>1</sup>University of Ghana, Accra, Ghana, <sup>2</sup>University of Energy and Natural Resources, Sunyani, Ghana

**SD0035** Identification and documentation of wild silkworm *Epiphora bauhini* in West Pokot, Northern Kenya. Clement Ng'oriareng<sup>1</sup>, Owuor Okeyo<sup>2</sup>, **Esther Kioko** (ekioko@museums.or.ke)<sup>3</sup>, Suresh Raina<sup>4</sup> and Rolf Gloor<sup>5</sup>, <sup>1</sup>Kenya Forest Service, Nairobi, Kenya, <sup>2</sup>University of Eldoret, Eldoret, Kenya, <sup>3</sup>National Museums of Kenya, Nairobi, Kenya, <sup>4</sup>International Centre of Insect Physiology and Ecology, Nairobi, Kenya, <sup>5</sup>International Centre of Insect Physiology and Ecology, Kapenguria, Kenya

**SD0036** Supplementing household income through wild silk farming. Hannah Gitonga and **Muo Kasina** (kasina.j@gmail.com), The National Sericulture Research Center, Thika, Kenya

## Symposium: Biology, Ecology, and Management of the Asian Citrus Psyllid, *Diaphorina citri*, Vector of Huanglongbing

Room W315 B (Convention Center)

**Moderators and Organizers:** Philip A. Stansly and Jawwad A. Qureshi, Univ. of Florida, Immokalee, FL

- 9:15 **0037** Rising against the wind: Effects of wind speed and direction on the host selection and field distribution of Asian citrus psyllid (Hemiptera: Liviidae). **Mamoudou Setamou** (mamoudou.setamou@tamuk.edu), Texas A&M Univ., Weslaco, TX
- 9:30 **0038** Examining color vision in the Asian citrus psyllid. **Sandra Allan** (sandy.allan@ars.usda.gov)<sup>1</sup>, Thomson Paris<sup>2</sup> and Philip A. Stansly<sup>3</sup>, <sup>1</sup>USDA - ARS, Gainesville, FL, <sup>2</sup>Univ. of Florida, Gainesville, FL, <sup>3</sup>Univ. of Florida, Immokalee, FL
- 9:45 **0039** Patterns and drivers of Asian citrus psyllid movement behavior. **Lukasz L. Stelinski** (stelinski@ufl.edu), Xavier Martini, and Kirsten S. Pelz-Stelinski, Univ. of Florida, Lake Alfred, FL
- 10:00 **0040** Psyllid vector-*Liberibacter* interactions at cellular and molecular interfaces. **Judith K. Brown** (jkbrown@ag.arizona.edu), Timothy J. Rast, and Tonja W. Fisher, Univ. of Arizona, Tucson, AZ
- 10:15 **BREAK**
- 10:30 **0041** Harnessing the Asian citrus psyllid microbiome for management of huanglongbing. **Kirsten S. Pelz-Stelinski** (pelzstelinski@ufl.edu), Univ. of Florida, Lake Alfred, FL
- 10:45 **0042** An integrative taxonomic approach to control Asian citrus psyllid. **Laura Boykin** (lboykin@mac.com), Univ. of Western Australia, Crawley, Australia
- 11:00 **0043** Surprising results and implications of the Florida psyllid testing project. **Susan Halbert** (halbers@doacs.state.fl.us), Florida Dept. of Agriculture and Consumer Services, Gainesville, FL



- 11:15 **0044** Molecular interdiction of important feeding/digestive processes as a novel control strategy for the Asian citrus psyllid. **Angela Kruse** (ark253@cornell.edu)<sup>1</sup>, Eldesouky Ammar<sup>2</sup>, Dov Borovsky<sup>2</sup>, Abdullah Ozer<sup>1</sup>, Ric Strange<sup>2</sup>, Richard Johnson<sup>3</sup>, Kasie Sturgeon<sup>4</sup>, Michael MacCoss<sup>3</sup>, John Lis<sup>1</sup>, Robert G. Shatters<sup>2</sup>, Michelle Cilia<sup>5</sup>, and Erica Warwick<sup>4</sup>, <sup>1</sup>Cornell Univ., Ithaca, NY, <sup>2</sup>USDA - ARS, Ft. Pierce, FL, <sup>3</sup>Univ. of Washington, Seattle, WA, <sup>4</sup>Univ. of Florida, Ft. Pierce, FL, <sup>5</sup>USDA - ARS, Ithaca, NY
- 11:30 **0045** Functional response and implications for mass rearing of *Tamarixia radiata* (Hymenoptera: Eulophidae), parasitoid of the citrus greening disease vector *Diaphorina citri* (Hemiptera: Psyllidae). **Xulin Chen** (xulin527@ufl.edu) and Philip A. Stansly, Univ. of Florida, Immokalee, FL
- 11:45 **0046** Integrated use of conventional and organic insecticides and biological control for management of Asian citrus psyllid. **Jawwad A. Qureshi** (jawwadq@ufl.edu), Univ. of Florida, Immokalee, FL
- 12:00 **0047** Thresholds for HLB vector control in infected commercial citrus and compatibility with biological control. **Cesar Monzo** (cmonzo@ufl.edu), Univ. of Florida / IVIA Valencia Spain, Immokalee, FL
- 12:15 **0048** Strategies for bringing young citrus trees into production in the face of HLB. **Philip A. Stansly** (pstansly@ufl.edu) and Scott D. Croxton, Univ. of Florida, Immokalee, FL

### Symposium: Arthropods of Madagascar: Historical Biogeography, Diversity, and Patterns of Distribution

#### Room W414 C (Convention Center)

**Moderator and Organizer:** Michael Irwin, Univ. of Illinois (Emeritus), Vail, AZ

- 9:15 **0049** Madagascar: Historical biogeography, diversity, and patterns of distribution. **Steve Goodman** (sgoodman@vahatra.mg), Vahatra Foundation, Antananarivo, Madagascar
- 9:45 **0050** Biogeography of spiders (Arachnida: Araneae) in and around Madagascar. **Charles Griswold** (cgriswold@calacademy.org), California Academy of Sciences, San Francisco, CA
- 10:00 **0051** Insights into the origin of leafhoppers (Cicadellidae) in Madagascar. **Sindhu Krishnankutty** (oriolealis@gmail.com), Xavier Univ., Buzzards Bay, MA
- 10:15 BREAK**
- 10:30 **0052** Dryinidae (Hymenoptera: Chrysidoidea) of Madagascar: Current status and knowledge gaps. **Massimo Olmi** (olmi@unitus.it), Tropical Entomology Research Center, Viterbo, Italy
- 10:45 **0053** Mapping habitat and species to restore and sustain natural capital in Madagascar. **Brian L. Fisher** (bfisher@calacademy.org), California Academy of Sciences, San Francisco, CA
- 11:00 **0054** The *Paussus* L. (Carabidae: Paussinae) of Madagascar: An explosive adaptive radiation of myrmecophilous beetles. **James Robertson** (erotyld@gmail.com) and Wendy Moore, Univ. of Arizona, Tucson, AZ

- 11:15 **0055** Riffle bugs of Madagascar (Heteroptera: Veliidae): An insular radiation in freshwater lotic ecosystems. **Dan Polhemus** (bugman@bishopmuseum.org), Bishop Museum, Honolulu, HI

### Symposium: Ecological and Developmental Insights from Comparative Hemipteroid Genomics

#### Room W330 C (Convention Center)

**Moderator and Organizer:** Kristen Panfilio, Univ. of Cologne, Cologne, Germany

- 9:15 **0056** Trends in bug genome size, gene structure, and gene repertoires. **Kristen Panfilio** (kristen.panfilio@alum.swarthmore.edu), Univ. of Cologne, Cologne, Germany
- 9:45 **0057** Transcriptomics of the *F. occidentalis*-tospovirus interaction. **Dorith Rotenberg** (drotenbe@ksu.edu), Derek Schneweis, and Anna Whitfield, Kansas State Univ., Manhattan, KS
- 10:00 **0058** Transcriptomic and genomic dissection of microbial symbiosis in a hemipteran insect *Nysius plebeius*. **Yu Matsuura** (yumatsu@comb.u-ryukyuu.ac.jp), Univ. of the Ryukyus, Nishihara, Japan
- 10:15 BREAK**
- 10:30 **0059** Segmentation genes in the brown marmorated stink bug, *Halyomorpha halys*. **Leslie Pick** (lpick@umd.edu)<sup>1</sup>, Yong Lu<sup>1,2</sup>, and Mengyao Chen<sup>1</sup>, <sup>1</sup>Univ. of Maryland, College Park, MD, <sup>2</sup>State Univ. of New York, Stony Brook, NY
- 10:45 **0060** Dorsoventral patterning in the milkweed bug, *Oncopeltus fasciatus*: An evolutionary perspective. **Siegfried Roth** (siegfried.roth@uni-koeln.de), Univ. of Cologne, Cologne, Germany
- 11:00 **0061** Development, selection, and species diversification. **Abderrahman Khila** (abderrahman.khila@ens-lyon.fr), École Normale Supérieure, Lyon, France
- 11:15 **0062** Transcriptomic analysis of variation in a life history trade-off in response to diet. **Patricia Moore** (pjmoore@uga.edu) and Ashley Duxbury, Univ. of Georgia, Athens, GA

### Symposium: Global Entomological Collaborations

#### Room W340 A (Convention Center)

**Moderators and Organizers:** Theresa M. Cira<sup>1</sup>, Ian M. Grettenberger<sup>2</sup>, Amy C. Morey<sup>1</sup>, and William R. Morrison<sup>3</sup>, <sup>1</sup>Univ. of Minnesota, St. Paul, MN, <sup>2</sup>Univ. of California, Davis, CA, <sup>3</sup>Michigan State Univ., East Lansing, MI

- 9:15 **0063** The art and science of global collaborations: Keys to establishing and sustaining international research collaborations. **Henry Fadamiro** (fadamhy@auburn.edu), Auburn Univ., Auburn, AL
- 9:30 **0064** International entomological research: Rewards of fighting through the red tape. **Mariana Bulgarella** (mbulgare@umn.edu)<sup>1</sup>, Charlotte Causton<sup>2</sup>, Martin Quiroga<sup>3</sup>, and George Heimpel<sup>1</sup>, <sup>1</sup>Univ. of Minnesota, St. Paul, MN, <sup>2</sup>Charles Darwin Foundation for the Galapagos Islands, Galapagos Islands, Ecuador, <sup>3</sup>National Univ. of Litoral, Esperanza, Argentina

10:00 **0065** Collaborating internationally: Taking risks and finding your niche. **Susan Worner** (susan.worner@lincoln.ac.nz), Lincoln Univ., Canterbury, New Zealand

**10:15 BREAK**

10:30 **0066** Building an international network as a graduate student. **Theresa M. Cira** (cirax002@umn.edu), Univ. of Minnesota, St. Paul, MN

10:45 **0067** Contextualizing the entomology graduate degree in preparation for an international career. **Edwin Rajotte** (egrajotte@psu.edu) and Melanie Miller-Foster, Pennsylvania State Univ., University Park, PA

11:00 **Recognition of ESA STEP ICE Travel Awards**

11:30 **Student Transition and Early Career Professional (STEP/ECP) Reception**

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**Symposium: Small RNAs: A New Frontier in Insect Science**

**Room W231 B (Convention Center)**

**Moderators and Organizers:** Sassan Asgari<sup>1</sup> and Alexander Raikhel<sup>2</sup>, <sup>1</sup>Univ. of Queensland, Brisbane, Australia, <sup>2</sup>Univ. of California, Riverside, CA

9:15 **0068** MicroRNAs and the evolution of insect metamorphosis. **Xavier Belles** (xavier.belles@ibe.upf-csic.es), Guillem Ylla, Ana Fernandez-Nicolas and Maria-Dolors Piulachs, Institute of Evolutionary Biology, Barcelona, Spain

9:45 **0069** Sex-biased expression of microRNAs: Causes and consequences. **Antonio Marco** (amarco@essex.ac.uk), Univ. of Essex, Colchester, United Kingdom

10:00 **0070** RNAi in the American house dust mite. **Alex Flynt** (alex.flynt@usm.edu), Univ. of Southern Mississippi, Hattiesburg, MS

**10:15 BREAK**

10:30 **0071** Regulation and function of *let-7-Complex* microRNAs in *Drosophila melanogaster*. **Nicholas Sokol** (nsokol@indiana.edu), Indiana Univ., Bloomington, IN

10:45 **0072** Exploring the role of microRNAs in insect development and immunity. **Andreas Vilcinskas** (andreas.vilcinskas@agr.uni-giessen.de)<sup>1,2</sup>, Andre Billion<sup>2</sup>, and Krishnendu Mukherjee<sup>2</sup>, <sup>1</sup>Justus Liebig Univ., Gießen, Germany, <sup>2</sup>Fraunhofer Institute for Molecular Biology and Applied Ecology, Gießen, Germany

**Symposium: Rapid Evolution of Insect Pests within Agroecosystems**

**Room W331 C (Convention Center)**

**Moderators and Organizers:** Yolanda Chen<sup>1</sup> and Sean Schoville<sup>2</sup>, <sup>1</sup>Univ. of Vermont, Burlington, VT, <sup>2</sup>Univ. of Wisconsin, Madison, WI

9:15 **Introductory Remarks**

9:30 **0073** Biological invasions in agricultural settings: Insights from evolutionary biology and population genetics. **Eric Lombaert** (lombaert@sophia.inra.fr)<sup>1</sup>, Emeline Deleury<sup>2</sup>, and Thomas Guillemaud<sup>2</sup>, <sup>1</sup>Sophia Institute of Agrobiotechnology, Sophia Antipolis, France, <sup>2</sup>INRA, Sophia Antipolis, France

9:45 **0074** Understanding mechanisms of rapid evolution from spatial analysis of genomic variation in the Colorado potato beetle. **Sean Schoville** (sean.schoville@wisc.edu)<sup>1</sup>, David J. Hawthorne<sup>2</sup>, and Yolanda Chen<sup>3</sup>, <sup>1</sup>Univ. of Wisconsin, Madison, WI, <sup>2</sup>Univ. of Maryland, College Park, MD, <sup>3</sup>Univ. of Vermont, Burlington, VT

10:00 **0075** Anthropogenic selection pressures and the consequences of sublethal pesticide usage. **Leena Lindstrom** (leena.m.lindstrom@jyu.fi), Univ. of Jyväskylä, Jyväskylä, Finland

**10:15 BREAK**

10:30 **0076** Effects of insecticide on methylation on the Colorado potato beetle. **Kristian Brevik** (kristian.a.brevik@gmail.com)<sup>1</sup>, Stephanie McKay<sup>1</sup>, Sean Schoville<sup>2</sup>, and Yolanda Chen<sup>1</sup>, <sup>1</sup>Univ. of Vermont, Burlington, VT, <sup>2</sup>Univ. of Wisconsin, Madison, WI

10:45 **0077** A link between host plant adaptation and pesticide resistance in the polyphagous spider mite *Tetranychus urticae*. **Wannes Dermauw** (dermauwannes@gmail.com)<sup>1</sup>, Nicky Wybouw<sup>2</sup>, Rene Feyereisen<sup>1</sup>, Richard Clark<sup>3</sup>, and Thomas Van Leeuwen<sup>1</sup>, <sup>1</sup>Ghent Univ., Ghent, Belgium, <sup>2</sup>Univ. of Amsterdam, Amsterdam, Netherlands, <sup>3</sup>Univ. of Utah, Salt Lake City, UT

11:00 **0078** Symbiotic complements of insect pests. **Takema Fukatsu** (t-fukatsu@aist.go.jp), National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan

11:15 **0079** Host-associated differentiation in agro-ecosystems: Findings and implications. **Raul Medina** (rfmedina@tamu.edu), Texas A&M Univ., College Station, TX

11:30 **0080** How to weed out wannabes and evolve the perfect pest: The critical influence of insect dispersal in agroecosystems. **Thomas Sappington** (tom.sappington@ars.usda.gov), USDA - ARS, Ames, IA

11:45 **0081** Evolutionary trade-offs and insecticide resistance. **Andrei Alyokhin** (andrei.alyokhin@umit.maine.edu), Univ. of Maine, Orono, ME

12:00 **0082** Managing soybean aphid virulence: Can we achieve an evolutionarily stable state within an agroecosystem? **Matt O'Neal** (oneal@iastate.edu) and Adam Varenhorst, Iowa State Univ., Ames, IA

12:15 **0083** Rapid adaptation to aphid-resistant soybean by the invasive soybean aphid. **Andrew Michel** (michel.70@osu.edu), Jacob Wenger, Brian Cassone, Ashley Yates, and Vitor Pavinato, The Ohio State Univ., Wooster, OH



MONDAY





## Symposium: From the Laboratory Bench to Commercial Products: Semiochemical-Based Technology Development and Regulation Worldwide

### Room W314 B (Convention Center)

**Moderators and Organizers:** Jerry Zhu<sup>1</sup>, Jocelyn G. Millar<sup>2</sup>, and Thomas C. Baker<sup>3</sup>, <sup>1</sup>USDA - ARS, Lincoln, NE, <sup>2</sup>Univ. of California, Riverside, CA, <sup>3</sup>Pennsylvania State Univ., University Park, PA

- 9:15 **0084** Decisions, trials, and tribulations of synthesizing and commercializing semiochemicals in the US and internationally. **Robert Bedoukian** (rhb@bedoukian.com), Bedoukian Research, Inc., Danbury, CT
- 9:45 **0085** Commercial development and applications of a plant volatile-based attract-and-kill product. **Peter Gregg** (pgregg@une.edu.au)<sup>1</sup>, Alice Del Socorro<sup>1</sup>, Matt Binns<sup>1</sup>, and Anthony Hawes<sup>2</sup>, <sup>1</sup>Univ. of New England, Armidale, Australia, <sup>2</sup>AgBiTech Pty, Ltd., Toowoomba, Australia
- 10:00 **0086** Importance of linking technologies with mechanisms when developing behavioral controls for insects: Examples from mating disruption of moths. **Jim Miller** (miller20@msu.edu), Michigan State Univ., East Lansing, MI
- 10:15 BREAK**
- 10:30 **0087** Development and registration of a mating disruptant for a carpenter moth, *Cossus insularis* (Lepidoptera: Cossidae). **Kiyoshi Nakamuta** (nakamuta@faculty.chiba-u.jp), Chiba Univ., Matsudo, Japan
- 10:45 **0088** Commercial semiochemical synthesis — scaling and getting green. **Cam Oehlschlager** (cam@pheroshop.com), ChemTica Internacional, San Jose, Costa Rica
- 11:00 **0089** Current status of practical applications of semiochemical-based pest management in China. **Yinzhong Cui** (sino@aliyun.com), Pherobio Technology Co., Ltd., Beijing, China
- 11:15 **0090** Development of semiochemical products in fruit growing regions around the world: Successes and pitfalls. **Amanda Ramsey** (aramsey@scentry.com), Scentry Biologicals, Inc., Billings, MT
- 11:30 **0091** Development of new pheromone products poised to increase semiochemical-based market share in the insect pest management industry. **Agenor Mafra-Neto** (president@iscatech.com), ISCA Technologies, Inc., Riverside, CA

## Symposium: Host Adaptations in Insect Symbioses: Elements That Facilitate Stability and Persistence

### Room W330 B (Convention Center)

**Moderators and Organizers:** Gaelen Burke and Kevin J. Vogel, Univ. of Georgia, Athens, GA

- 9:15 **0092** Symbiont-mediated shift in the evolutionary ecology of host-parasite interactions. **John Jaenike** (joja@mail.rochester.edu)<sup>1</sup>, Vince Martinson<sup>1</sup>, Tamara Haselkorn<sup>2</sup>, Robert Unckless<sup>3</sup>, and Steve J. Perlman<sup>4</sup>, <sup>1</sup>Univ. of Rochester, Rochester, NY, <sup>2</sup>Washington Univ., St. Louis, MO, <sup>3</sup>Univ. of Kansas, Lawrence, KS, <sup>4</sup>Univ. of Victoria, Victoria, BC, Canada

- 9:30 **0093** Mosquito-fungus interactions enhance susceptibility to dengue virus. **Yesseinia Anglero-Rodriguez** (yangler1@jhu.edu), Benjamin Blumberg, Celia Demby, Octavio Talyuli, and George Dimopoulos, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
- 9:45 **0094** Gut microbiota and larval mosquito development. **Kevin J. Vogel** (kjavogel@uga.edu), Mark R. Brown, and Michael R. Strand, Univ. of Georgia, Athens, GA
- 10:00 **0095** The first collaboration: Gut morphogenesis stimulated by symbiotic bacteria in the bean bug *Riptortus pedestris*. **Yoshitomo Kikuchi** (y-kikuchi@aist.go.jp), National Institute of Advanced Industrial Science and Technology, Sapporo, Japan
- 10:15 BREAK**
- 10:30 **0096** Mechanisms of host regulation at the symbiotic interface in sap-feeding insects. **Alex C. C. Wilson** (acwilson@bio.miami.edu), Univ. of Miami, Coral Gables, FL
- 10:45 **0097** Aphid gene of bacterial origin encodes a protein transported to *Buchnera*. **Atsushi Nakabachi** (nakabachi@eiiris.tut.ac.jp), Toyohashi Univ. of Technology, Aichi, Japan
- 11:00 **0098** The role of methylation in the aphid-*Buchnera* symbiosis. Dohyup Kim and **Allison Hansen** (akh@illinois.edu), Univ. of Illinois, Champaign, IL

## Symposium: Insect-Plant Interactions in a Changing Climate: Effects on Populations Dynamics and Biological Control

### Room W230 D (Convention Center)

**Moderators and Organizers:** Ruth A. Hufbauer and Ellyn Bitume, Colorado State Univ., Fort Collins, CO

- 9:15 **0099** Effects of land-use change and altitudinal variation on the outcome of plant-insect interactions in agricultural systems. **Katja Poveda** (kap235@cornell.edu), Cornell Univ., Ithaca, NY
- 9:30 **0100** Effects of hybridization on population genetic structure along a latitudinal gradient. **Ellyn Bitume** (ebitume@gmail.com)<sup>1</sup>, Dan W. Bean<sup>2</sup>, and Ruth A. Hufbauer<sup>1</sup>, <sup>1</sup>Colorado State Univ., Fort Collins, CO, <sup>2</sup>Colorado Dept. of Agriculture, Palisade, CO
- 9:45 **0101** Understanding the mechanism driving changes in herbivory under elevated atmospheric carbon dioxide. **Evan H. DeLucia** (delucia@life.uiuc.edu)<sup>1</sup>, May R. Berenbaum<sup>1</sup>, and Linus Gog<sup>2</sup>, <sup>1</sup>Univ. of Illinois, Champaign, IL, <sup>2</sup>Western Illinois Univ., Macomb, IL
- 10:00 **0102** Climate warming affects biological control by shifting interactions of invasive plants and insects. **Jianqing Ding** (dingjianqing@yahoo.com)<sup>1</sup>, Xinmin Lu<sup>1</sup>, and Evan Siemann<sup>2</sup>, <sup>1</sup>Chinese Academy of Sciences, Wuhan, China, <sup>2</sup>Rice Univ., Houston, TX
- 10:15 BREAK**
- 10:30 **0103** Understanding how insects manipulate plant resources: Implications for resource use under climate change. **Paul Nabity** (paul.nabity@wsu.edu), Washington State Univ., Pullman, WA

- 10:45 **O104** Changes in the timing of life cycle events along a climatic gradient: Causes, mechanisms, and implications for biological control. **Peter McEvoy** (mcevoyp@science.oregonstate.edu) and Linda Buerger, Oregon State Univ., Corvallis, OR
- 11:00 **O105** Biological control under experimental CO<sub>2</sub> enrichment and warming: Increased seed consumption tempers invasive plant response. **Dana Blumenthal** (dana.blumenthal@ars.usda.gov)<sup>1</sup> and Justin L. Reeves<sup>2</sup>, <sup>1</sup>USDA - ARS, Fort Collins, CO, <sup>2</sup>Kent State Univ., Kent, OH
- 11:15 **Discussion**

### Symposium: Host Plant Resistance Towards Insect Pests

#### Room W230 C (Convention Center)

**Moderator and Organizer:** Ben Vosman, Wageningen Univ. and Research Centre, Wageningen, Netherlands

- 9:15 **O106** Host plant resistance towards insects. **Ben Vosman** (ben.vosman@wur.nl) and Roeland E. Voorrips, Wageningen Univ. and Research Centre, Wageningen, Netherlands
- 9:45 **O107** Characterization of host plant resistance to herbivores through high-throughput phenotyping. Argelia Lorence<sup>1</sup>, **Fiona L. Goggin** (fgoggin@uark.edu)<sup>2</sup>, and Alisa Huffaker<sup>3</sup>, <sup>1</sup>Arkansas State Univ., Jonesboro, AR, <sup>2</sup>Univ. of Arkansas, Fayetteville, AR, <sup>3</sup>Univ. of California, La Jolla, CA
- 10:00 **O108** Characterization of brown planthopper resistance genes in rice. **Guangcun He** (gche@whu.edu.cn), Wuhan Univ., Wuhan, China
- 10:15 **BREAK**
- 10:30 **O109** Unraveling whitefly resistance mechanisms in cabbage. **Colette Broekgaarden** (c.broekgaarden@uu.nl)<sup>1,2</sup>, Koen Pelgrom<sup>2</sup>, Roeland E. Voorrips<sup>2</sup>, and Ben Vosman<sup>2</sup>, <sup>1</sup>Utrecht Univ., Utrecht, Netherlands, <sup>2</sup>Wageningen Univ. and Research Centre, Wageningen, Netherlands
- 10:45 **O110** Finding that needle in the haystack: Targeting SNPs to a marker-deficient region of wheat chromosome containing an important Hessian fly-resistance gene. **Christie E. Williams** (cwilliams@purdue.edu)<sup>1,2</sup>, Subhashree Subramanyam<sup>2</sup>, Jill A. Nemacheck<sup>1</sup>, Xiangye Xiao<sup>2</sup>, and Melissa McDonald<sup>2</sup>, <sup>1</sup>USDA - ARS, West Lafayette, IN, <sup>2</sup>Purdue Univ., West Lafayette, IN
- 11:00 **O111** Aphid-host interactions: Effectors and resistance protein activation. **Isgouhi Kaloshian** (isgouhi.kaloshian@ucr.edu)<sup>1</sup>, Ritu Chaudhary<sup>1</sup>, Hagop Atamian<sup>1</sup>, Frank Takken<sup>2</sup> and Hsuan-Chieh Peng<sup>1</sup>, <sup>1</sup>Univ. of California, Riverside, CA, <sup>2</sup>Swammerdam Institute for Life Sciences, Amsterdam, Netherlands
- 11:15 **O112** Discovery of effector proteins that suppress host plant resistance to aphids, from the genome of the green peach aphid. **Sam Mugford** (sam.mugford@jic.ac.uk)<sup>1</sup>, Claire Drury<sup>1</sup>, Yazhou Chen<sup>1</sup>, Tom Mathers<sup>2</sup>, Cock Van Oosterhout<sup>3</sup>, David Swarbreck<sup>2</sup>, and Saskia A. Hogenhout<sup>1</sup>, <sup>1</sup>The John Innes Centre, Norwich, United Kingdom, <sup>2</sup>The Genome Analysis Centre, Norwich, United Kingdom, <sup>3</sup>Univ. of East Anglia, Norwich, United Kingdom

### Symposium: Sustainable Agriculture through Ecological Pest Management

#### Room W222 A (Convention Center)

**Moderators and Organizers:** Abdul Hakeem<sup>1</sup> and Gregory J. Wiggins<sup>2</sup>, <sup>1</sup>Texas A&M Univ., Lubbock, TX, <sup>2</sup>Univ. of Tennessee, Knoxville, TN

- 9:15 **O113** Climate-smart push-pull: A conservation agriculture technology for food security and environmental sustainability in Africa. **Zeyaur Khan** (zkhan@icipe.org)<sup>1</sup>, Charles Midega<sup>1</sup>, Jimmy Pittchar<sup>1</sup>, Alice Murage<sup>1</sup>, and John Pickett<sup>2</sup>, <sup>1</sup>International Centre of Insect Physiology and Ecology, Nairobi, Kenya, <sup>2</sup>Rothamsted Research, Harpenden, United Kingdom
- 9:45 **O114** Ecologically-based pest management on the U.S. Central High Plains: Structuring a better environment for conservation biology to work in sugar beet. Jeffrey Bradshaw<sup>1</sup>, **R. J. Pretorius** (rjpretor@cut.ac.za)<sup>2</sup>, and Gary Hein<sup>2</sup>, <sup>1</sup>Univ. of Nebraska, Scottsbluff, NE, <sup>2</sup>Univ. of Nebraska, Lincoln, NE
- 10:00 **O115** Mulch affects arthropod assemblage associated with field crops grown under conservation agricultural practices in North America. **Ariel Rivers** (arielrivers@psu.edu)<sup>1</sup>, Mary Barbercheck<sup>1</sup>, Tijana Stancic<sup>2</sup>, Bram Govaerts<sup>2</sup>, and Nele Verhulst<sup>2</sup>, <sup>1</sup>Pennsylvania State Univ., University Park, PA, <sup>2</sup>International Maize and Wheat Improvement Center, El Batán, Mexico
- 10:15 **BREAK**
- 10:30 **O116** Insect-related concerns for sustainable, small-scale agriculture in the tropics. **Timothy Motis** (tmotis@echonet.org)<sup>1</sup> and Abram Bicksler<sup>2</sup>, <sup>1</sup>ECHO, Inc., Fort Myers, FL, <sup>2</sup>ECHO, Inc., Chiang Mai, Thailand
- 10:45 **O117** Ecological methods of insect pest management in Texas High Plains cotton. **Abdul Hakeem** (ahakeem@vols.utk.edu) and Megha N. Parajulee, Texas A&M AgriLife Research, Lubbock, TX
- 11:00 **O118** Biological control as an ecologically-based pest management technique in forest systems. **Gregory J. Wiggins** (wiggybug@utk.edu), Jerome F. Grant, and Paris L. Lambdin, Univ. of Tennessee, Knoxville, TN
- 11:15 **Discussion**

### Symposium: Zoophytophagous Arthropods in Biological Control (IOBC)

#### Room W331 D (Convention Center)

**Moderators and Organizers:** Josep Jaques<sup>1</sup> and Alberto Urbaneja<sup>2</sup>, <sup>1</sup>Univ. Jaume I, Castelló de la Plana, Spain, <sup>2</sup>Valencian Institute of Agricultural Research, Moncada, Spain

- 9:15 **O119** Increasing resilience of pepper crops by exploiting zoophytophagy. **Alberto Urbaneja** (aurbaneja@ivia.es)<sup>1</sup>, Sarra Bouagga<sup>1</sup>, Josep Jaques<sup>2</sup>, Víctor Flors<sup>2</sup>, and Meritxell Pérez-Hedo<sup>2</sup>, <sup>1</sup>Valencian Institute of Agricultural Research, Moncada, Spain, <sup>2</sup>Univ. Jaume I, Castelló de la Plana, Spain
- 9:30 **O120** New South American mirid predators attack important lepidopteran pests and whiteflies, but also the host plant. **Vanda Bueno** (vhpbuono@den.ufla.br)<sup>1</sup> and Joop van Lenteren<sup>2,3</sup>, <sup>1</sup>Federal Univ. of Lavras,



- Lavras, Brazil, <sup>2</sup>Univ. of São Paulo, Piracicaba, Brazil, <sup>3</sup>Wageningen Univ. and Research Centre, Wageningen, Netherlands
- 9:45 **0121** Beyond predation: Plant-mediated effects of the zoophytophagous predator *Macrolophus pygmaeus* on its herbivorous prey. **Maria Pappas** (mpappa@agro.duth.gr)<sup>1</sup>, Anke Steppuhn<sup>2</sup>, Chara Kyriakaki<sup>1</sup>, Chrysa Mersina<sup>1</sup>, Nicole M. van Dam<sup>3</sup>, and Georgios Broufas<sup>1</sup>, <sup>1</sup>Democritus Univ. of Thrace, Orestiada, Greece, <sup>2</sup>Freie Univ., Berlin, Germany, <sup>3</sup>German Centre for Integrative Biodiversity Research, Leipzig, Germany
- 10:00 **0122** Below ground-above ground interactions: Effects of root fungi on zoophytophagous predators of tomato pests. **Cristina Castañé** (cristina.castane@irta.es)<sup>1</sup>, Juliana Duran<sup>2</sup>, Amelia Camprubi<sup>1</sup>, and Donatella Battaglia<sup>2</sup>, <sup>1</sup>IRTA, Cabriels, Spain, <sup>2</sup>Univ. of Della Basilicata, Potenza, Italy
- 10:15 BREAK**
- 10:30 **0123** Zoophytophagy in tomato may contribute to improve current IPM programs. **Meritxell Pérez-Hedo** (meritxell\_p@hotmail.com)<sup>1</sup>, Josep Jaques<sup>1</sup>, Víctor Flors<sup>1</sup>, and Alberto Urbaneja<sup>2</sup>, <sup>1</sup>Univ. Jaume I, Castelló de la Plana, Spain, <sup>2</sup>Valencian Institute of Agricultural Research, Moncada, Spain
- 10:45 **0124** Zoophytophagy in insect predators: Implications for rearing. **Patrick De Clercq** (patrick.declercq@ugent.be), Ghent Univ., Ghent, Belgium
- 11:00 **0125** Alternative host plants for the management of the omnivorous mirid *Nesidiocoris tenuis*. **Lucia Zappalà** (lzappala@unict.it), Mario Naselli, Giovanna Tropea-Garzia, Antonio Biondi, and Gaetano Siscaro, Univ. of Catania, Catania, Italy
- 11:15 **0126** Reproduction of *Nesidiocoris tenuis* on *Bemisia tabaci*, *Thrips palmi*, and banker plants. **Eizi Yano** (yano@nara.kindai.ac.jp)<sup>1</sup>, Junichiro Abe<sup>2</sup>, Miku Nakauchi<sup>1</sup>, and Shun Hosaka<sup>1</sup>, <sup>1</sup>Kinki Univ., Nara, Japan, <sup>2</sup>NARO Western Region Agricultural Research Center, Fukuyama, Japan
- 11:30 **0127** Can plant-feeding omnivorous Phytoseiidae induce plant defensive responses of interest for biological control? **Josep Jaques** (josep.jaques@uji.es), Joaquín Cruz-Miralles, and Meritxell Pérez-Hedo, Univ. Jaume I, Castelló de la Plana, Spain

## Symposium: Engineering Beneficial Traits into Insects Using Novel Gene Drive Systems

### Room W414 B (Convention Center)

**Moderators and Organizers:** Zach Adelman<sup>1</sup> and Chun-Hong Chen<sup>2</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>Institute of Molecular and Genomic Medicine, Zhunan, Taiwan

- 9:15 **0128** The mutagenic chain reaction: A potent drive system for dispersing effector transgenes in insect populations. **Ethan Bier** (ebier@ucsd.edu), Univ. of California, La Jolla, CA

- 9:45 **0129** Gene drive: What is possible at the population level with currently-available molecular components? **John Marshall** (john.marshall@berkeley.edu), Univ. of California, Berkeley, CA
- 10:15 BREAK**
- 10:30 **0130** Creating an insect synthetic population to fight dengue fever. **Chun-Hong Chen** (chunhong@nhri.org.tw), Institute of Molecular and Genomic Medicine, Zhunan, Taiwan
- 10:45 **0131** Engineering invasive Y chromosomes for mosquito control. **Philipp Papathanos** (p.papathanos@gmail.com), Univ. of Perugia, Perugia, Italy
- 11:00 **0132** Insect biotechnology for eco-friendly pest control. **Marc Schetelig** (marc.schetelig@ime.fraunhofer.de), Fraunhofer Institute for Molecular Biology and Applied Ecology, Gießen, Germany
- 11:15 **0133** Development of an underdominance-based gene drive system for mosquitoes. **Omar Akbari** (omar.akbari@ucr.edu), Univ. of California, Riverside, CA
- 11:30 **0134** Regulation and containment of gene drive systems in arthropods. **Zach Adelman** (zachadel@vt.edu), Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 11:45 **Panel Discussion**

## Symposium: Vector Development and Reproduction

### Room W414 A (Convention Center)

**Moderators and Organizers:** Molly Duman Scheel<sup>1</sup> and Flaminia Catteruccia<sup>2</sup>, <sup>1</sup>Indiana Univ. School of Medicine, South Bend, IN, <sup>2</sup>Harvard School of Public Health, Boston, MA

- 9:15 **0135** Molecular basis of mating and reproduction in *Anopheles gambiae*. **Flaminia Catteruccia** (fcatter@hsph.harvard.edu), Harvard School of Public Health, Boston, MA
- 9:30 **0136** How to be a supportive mother: Mechanisms underlying tsetse fly adenotrophic viviparity. **Joshua Benoit** (benoitja@ucmail.uc.edu), Univ. of Cincinnati, Cincinnati, OH
- 9:45 **0137** Regulatory genomics of vector insects. **Marc Halfon** (mshalfon@buffalo.edu), Univ. at Buffalo, Buffalo, NY
- 10:00 **0138** Engineered chromosome translocations as a high threshold, reversible, gene-driven system. **Bruce A. Hay** (haybruce@caltech.edu), Anna Buchman, Omar Akbari, John Marshall, and Tobin Ivy, California Institute of Technology, Pasadena, CA
- 10:15 BREAK**
- 10:30 **0139** siRNA larvicides for control of vector mosquitoes. **Molly Duman Scheel** (mscheel@nd.edu)<sup>1,2</sup>, Keshava Mysore<sup>1,2</sup>, Longhua Sun<sup>2</sup>, Elizabeth Harper<sup>1</sup>, and David Severson<sup>1,2</sup>, <sup>1</sup>Indiana Univ. School of Medicine, South Bend, IN, <sup>2</sup>Univ. of Notre Dame, South Bend, IN
- 10:45 **0140** Tyrosine detoxification is an essential trait in life history of blood-feeding insects. **Pedro Lagerblad de Oliveira** (pedro@bioqmed.ufrj.br), Federal Univ. of Rio de Janeiro, Rio de Janeiro, Brazil

- 11:00 **0141** Quantitative genetics of circadian rhythm activity on female blood feeding and male swarming behaviors in *Culex pipiens*. **David Severson** (severson.1@nd.edu)<sup>1</sup>, Paul Hickner<sup>1</sup>, Diane Lovin<sup>1</sup>, Joanne Cunningham<sup>1</sup>, Dave Chadee<sup>2</sup>, and Akio Mori<sup>1</sup>, <sup>1</sup>Univ. of Notre Dame, South Bend, IN, <sup>2</sup>Univ. of the West Indies, St. Augustine, Trinidad and Tobago
- 11:15 **0142** The trade-off between immunity and reproduction. Julien Pompon<sup>1</sup> and **Elena Levashina** (levashina@mpiib-berlin.mpg.de)<sup>2,3</sup>, <sup>1</sup>Univ. of Strasbourg, Strasbourg, France, <sup>2</sup>Max Planck Institute for Infection Biology, Berlin, Germany, <sup>3</sup>Germany

## Symposium: Zika Virus

### Chapin Theater (Convention Center)

**Moderators and Organizers:** Constância Ayres<sup>1</sup> and Adriana Costero<sup>2</sup>, <sup>1</sup>Oswaldo Cruz Foundation, Recife, Brazil, <sup>2</sup>National Institutes of Health, Bethesda, MD

- 9:15 **0143** Epidemiology of microcephaly in Brazil. **Celina Martelli** (turchicm@gmail.com), Institute of Tropical Pathology and Public Health, Goiás, Brazil
- 9:30 **0144** Zika virus in the Americas: 2015 to the present. **Stephen Higgs** (shiggs@k-state.edu), Kansas State Univ., Manhattan, KS
- 9:45 **0145** Zika virus history, spread, and potential for sexual transmission. **Brian D. Foy** (bdfoy1@gmail.com), Colorado State Univ., Fort Collins, CO
- 10:00 **0146** Tracking the incrimination of *Aedes aegypti* as a Zika virus vector. **Constância Ayres** (tans@cpqam.fiocruz.br), Oswaldo Cruz Foundation, Recife, Brazil

### 10:15 BREAK

- 10:30 **0147** Dynamics of Zika virus replication in *Aedes aegypti* and *Culex quinquefasciatus*. **Duschinka Guedes** (duschinka@gmail.com), Oswaldo Cruz Foundation, Recife, Brazil
- 10:45 **0148** *Wolbachia* as an arbovirus biocontrol strategy in Brazil. **Luciano Moreira** (lmoreira2008@gmail.com), Oswaldo Cruz Foundation, Belo Horizonte, Brazil
- 11:00 **0149** Genetic approaches for controlling transmission of mosquito-borne arboviruses. **Anthony James** (aajames@uci.edu), Univ. of California, Irvine, CA
- 11:15 **Discussion**

## Symposium: Neuronal Correlates of Odorant Valence in Insects

### Room W331 B (Convention Center)

**Moderators and Organizers:** Markus Knaden and Silke Sachse, Max Planck Institute for Chemical Ecology, Jena, Germany

- 9:15 **0150** Linking brain activity to odor-guided behavior in *Manduca sexta*. **Sonja Bisch-Knaden** (sbisch-knaden@ice.mpg.de), Ajinkya Dahake, Silke Sachse, and Bill Hansson, Max Planck Institute for Chemical Ecology, Jena, Germany
- 9:45 **0151** Mushroom body output neurons encode the valence and guide memory-based action selection in *Drosophila*. **Yoshinori Aso** (asoy@janelia.hhmi.org) and Gerald Rubin, The Howard Hughes Medical Institute, Ashburn, VA

### 10:15 BREAK

- 10:30 **0152** Learned valence in larval *Drosophila*. Bertram Gerber and **Michael Schleyer** (michael.schleyer@lin-magdeburg.de), Leibniz Institute for Neurobiology, Magdeburg, Germany
- 10:45 **0153** Plastic control of pheromone sensitivity increases male courtship performance. **Aki Ejima** (aki@mail.ecc.u-tokyo.ac.jp) and Kazushige Touhara, The Univ. of Tokyo, Tokyo, Japan
- 11:00 **0154** Neural representation of social pheromones in the dual olfactory pathway of the honey bee. Julie Carcaud<sup>1</sup>, Martin Giurfa<sup>2</sup>, and **Jean-Christophe Sandoz** (jean-christophe.sandoz@egce.cnrs-gif.fr)<sup>1</sup>, <sup>1</sup>National Center for Scientific Research, Gif sur Yvette, France, <sup>2</sup>National Center for Scientific Research, Toulouse, France
- 11:15 **0155** Encoding and processing of odor valence in the *Drosophila* brain. Amelie Baschwitz, Ahmed Mohamed, Veit Grabe, Bill Hansson, and **Silke Sachse** (ssachse@ice.mpg.de), Max Planck Institute for Chemical Ecology, Jena, Germany

## Symposium: Stick Insect Research in the Era of Genomics: Exploring the Evolution of a Mesodiverse Insect Order

### Room W414 D (Convention Center)

**Moderators and Organizers:** Sven Bradler<sup>1</sup> and Thomas R. Buckley<sup>2</sup>, <sup>1</sup>Georg August Univ., Göttingen, Germany, <sup>2</sup>Landcare Research, Auckland, New Zealand

- 9:15 **0156** Ecological genomics of speciation in *Timema* stick insects. Patrik Nosil<sup>1</sup>, Zachariah Gompert<sup>1</sup>, and **Victor Soria-Carrasco** (victor.soria.carrasco@gmail.com)<sup>2</sup>, <sup>1</sup>Univ. of Sheffield, Sheffield, United Kingdom, <sup>2</sup>Univ. of Boulder, Boulder, CO
- 9:45 **0157** Convergent gene expression changes across independent transitions to asexuality: Insights from stick insects. **Tanja Schwander** (tanja.schwander@unil.ch), Jens Bast, and Kirsten Jalvingh, Univ. of Lausanne, Lausanne, Switzerland
- 10:00 **0158** Phasmatodea phylogenomics: New insights on the relationships of stick and leaf insects. **Sabrina Simon** (sabrina.simon@wur.nl)<sup>1</sup>, Paul B. Frandsen<sup>2</sup>, Thomas R. Buckley<sup>3</sup>, Ryuichiro Machida<sup>4</sup>, Shalin Liu<sup>5</sup>, Xin Zhou<sup>5</sup>, Benjamin Wipfler<sup>6</sup>, and Sven Bradler<sup>7</sup>, <sup>1</sup>Wageningen Univ. and Research Centre, Wageningen, Netherlands, <sup>2</sup>Smithsonian Institution, Herndon, VA, <sup>3</sup>Landcare Research, Auckland, New Zealand, <sup>4</sup>Univ. of Tsukuba, Nagano, Japan, <sup>5</sup>BGI, Shenzhen, China, <sup>6</sup>Friedrich Schiller Univ., Jena, Germany, <sup>7</sup>Georg August Univ., Göttingen, Germany

### 10:15 BREAK

- 10:30 **0159** The evolution of phasmid oviposition techniques and a convergent ant mutualism between stick insects and angiosperms. **Michael F. Whiting** (michael\_whiting@byu.edu)<sup>1</sup>, James A. Robertson<sup>2</sup>, and Sven Bradler<sup>3</sup>, <sup>1</sup>Brigham Young Univ., Provo, UT, <sup>2</sup>Univ. of Arizona, Tucson, AZ, <sup>3</sup>Georg August Univ., Göttingen, Germany



- 10:45 **0160** Adaptation and speciation in the New Zealand stick insect *Clitarchus hookeri* (Phasmatodea). **Thomas R. Buckley** (buckleyt@landcareresearch.co.nz)<sup>1</sup>, Richard D. Newcomb<sup>2</sup>, Howard Ross<sup>3</sup>, Sven Bradler<sup>4</sup>, and Shelley Myers<sup>5</sup>, <sup>1</sup>Landcare Research, Auckland, New Zealand, <sup>2</sup>The New Zealand Institute for Plant & Food Research, Ltd., Auckland, New Zealand, <sup>3</sup>Univ. of Auckland, Auckland, New Zealand, <sup>4</sup>Georg August Univ., Göttingen, Germany, <sup>5</sup>Clemson Univ., Clemson, SC
- 11:00 **0161** Origin of the Malagasy stick insects and convergent adaptive radiations of Phasmatodea in geographic isolation. **Julia Goldberg** (jule.goldberg@gmail.com) and Sven Bradler, Georg August Univ., Göttingen, Germany
- 11:15 **0162** Single origin of the Mascarene stick insects reveals ancient radiation on sunken islands. **Sven Bradler** (sbradle@gwdg.de)<sup>1</sup> and Thomas R. Buckley<sup>2</sup>, <sup>1</sup>Georg August Univ., Göttingen, Germany, <sup>2</sup>Landcare Research, Auckland, New Zealand
- 11:30 **0163** Stem-group stick insects found in the Eocene, much younger than expected. S. Bruce Archibald<sup>1</sup>, Olivier Bethoux<sup>2</sup>, and **Sven Bradler** (sbradle@gwdg.de)<sup>3</sup>, <sup>1</sup>Simon Fraser Univ., Burnaby, BC, Canada, <sup>2</sup>National Museum of Natural History, Paris, France, <sup>3</sup>Georg August Univ., Göttingen, Germany
- 11:45 **0164** Multiple processes drive wing size diversity in stick insects. **Yu Zeng** (dreavoniz@berkeley.edu) and Robert Dudley, Univ. of California, Berkeley, CA
- 12:00 **0165** Fast synchrotron X-ray imaging of stick insects. **Thomas van de Kamp** (thomas.vandekamp@kit.edu)<sup>1</sup>, Tomy dos Santos Rolo<sup>1</sup>, Janes Odar<sup>1</sup>, Tilo Baumbach<sup>1</sup>, Hartmut Greven<sup>2</sup>, and Sven Bradler<sup>3</sup>, <sup>1</sup>Karlsruhe Institute of Technology, Eggenstein-Leopoldshafen, Germany, <sup>2</sup>Heinrich Heine Univ., Düsseldorf, Germany, <sup>3</sup>Georg August Univ., Göttingen, Germany

### Symposium: Photoperiodic Induction of Diapause and Seasonal Morphs

#### Room W340 B (Convention Center)

**Moderators and Organizers:** Daniel Hahn<sup>1</sup> and Shin Goto<sup>2</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Osaka City Univ., Osaka, Japan

- 9:15 **0166** The path from perception of photoperiod to generation of the diapause phenotype. **David Denlinger** (denlinger.1@osu.edu)<sup>1</sup>, Megan E. Meuti<sup>1</sup>, and Cheolho Sim<sup>2</sup>, <sup>1</sup>The Ohio State Univ., Columbus, OH, <sup>2</sup>Baylor Univ., Waco, TX
- 9:30 **0167** Connection of circadian and photoperiodic clocks in the linden bug, *Pyrrhocoris apterus*. **Lenka Pivarciova** (chodakova@entu.cas.cz), Joanna Kotwica-Rolinska, and David Dolezel, Czech Academy of Sciences, České Budějovice, Czech Republic
- 9:45 **0168** Neuronal circuitry for control of seasonal diapause in the blow fly *Protophormia terraenovae*. **Sakiko Shiga** (shigask@sci.osaka-cu.ac.jp), Osaka City Univ., Osaka, Japan
- 10:00 **0169** Photoperiodic control of phenotypic plasticity: Are dopamine and insulin pathways involved in the seasonal change of reproductive mode in aphids?

Gaël Le Trionnaire, Sylvie Hudaverdian, Jean-Pierre Gauthier, Nathalie Leterme, and **Denis Tagu** (denis.tagu@rennes.inra.fr), INRA, Le Rheu, France

#### 10:15 BREAK

- 10:30 **0170** Carotenoids and diapause in the twospotted spider mite: Lessons from an albino mutant. **Astrid Bryon** (astrid.bryon@ugent.be)<sup>1</sup>, Andre Kurlovs<sup>2</sup>, Luc Tirry<sup>1</sup>, Richard Clark<sup>2</sup>, and Thomas Van Leeuwen<sup>1</sup>, <sup>1</sup>Ghent Univ., Ghent, Belgium, <sup>2</sup>Univ. of Utah, Salt Lake City, UT
- 10:45 **0171** The evolution of diapause and alternative developmental pathways in temperate butterflies. **Karl Gotthard** (karl.gotthard@zoologi.su.se), Stockholm Univ., Stockholm, Sweden
- 11:00 **0172** The role of diapause for the evolution of voltinism: Molecular evidence from European corn borer moths. **Erik Dopman** (erik.dopman@tufts.edu), Tufts Univ., Medford, MA
- 11:15 **0173** Genomic diversity in the maintenance and termination of diapause. **William Bradshaw** (bradshaw@uoregon.edu) and Christina Holzapfel, Univ. of Oregon, Eugene, OR
- 11:30 **0174** The (non)conserved diapause transcriptome: What we have learned from molecular natural history of the diapause responses across insect species. **Gregory Ragland** (gragland@ksu.edu) and Edwina Dowle, Kansas State Univ., Manhattan, KS
- 11:45 **0175** Presentation withdrawn

### Undergraduate Student Oral Competition: Frontiers in Entomology

#### Room W240 A (Convention Center)

**Moderators:** Richard Brown<sup>1</sup>, Nico Franz<sup>2</sup>, and Rodrigo Diaz<sup>3</sup>, <sup>1</sup>Mississippi Entomological Museum, Mississippi State, MS, <sup>2</sup>Arizona State Univ., Tempe, AZ, <sup>3</sup>Louisiana State Univ., Baton Rouge, LA

- 9:15 **0176** Body slamming and bolt-back behavior: Characterizing an embiopteran's (*Antipaluria urichi*) bizarre backwards run. **Erin Kelly** (etaylorkelly2@gmail.com)<sup>1</sup>, Thomas Libby<sup>2</sup>, and Janice S. Edgerly<sup>1</sup>, <sup>1</sup>Santa Clara Univ., Santa Clara, CA, <sup>2</sup>Univ. of California, Berkeley, CA
- 9:30 **0177** Management of aphid populations in daylily crops using green lacewings (*Chrysoperla rufilabris*). **Bret Nash** (bret2012@tamu.edu), Texas A&M Univ., College Station, TX
- 9:45 **0178** Species composition and population biology of pollinators in a restored grassland community. **Flint Devine** (rebecca.devine@und.edu)<sup>1</sup>, Tiffany Huwe<sup>1</sup>, Leslie Yellow Hammer<sup>1</sup>, Sami Swartz<sup>1</sup>, Rebecca B. Simmons<sup>1</sup>, Mia Park<sup>2</sup>, Brett Goodwin<sup>1</sup>, and Kathryn Yurkonis<sup>1</sup>, <sup>1</sup>Univ. of North Dakota, Grand Forks, ND, <sup>2</sup>Cornell Univ., Ithaca, NY
- 10:00 **0179** The effects of honey bee (*Apis mellifera*) queen insemination volume on colony growth. **Alexandria Payne** (alexnpayne@gmail.com)<sup>1</sup> and Juliana Rangel<sup>2</sup>, <sup>1</sup>Texas A&M Univ., Spring, TX, <sup>2</sup>Texas A&M Univ., College Station, TX

## 10:15 BREAK

10:30 **0180** The cost of color: Investigating pigmentation as a bioindicator of bee stress. **Daniel Snellings** (das5885@psu.edu) and Heather M. Hines, Pennsylvania State Univ., University Park, PA

10:45 **0181** Feeling those vibes: How do caterpillars sense plant-borne vibrations? **Conrado A. Rosi-Denadai** (conradodenadai@cmail.carleton.ca)<sup>1,2</sup>, Raul Narciso C. Guedes<sup>1</sup>, and Jayne Yack<sup>2</sup>, <sup>1</sup>Federal Univ. of Viçosa, Viçosa, Brazil, <sup>2</sup>Carleton Univ., Ottawa, ON, Canada

### Graduate Student Oral Competition: Apidology, Sericulture, and Social Insects: Honey Bees I

#### Room W230 B (Convention Center)

**Moderators:** Ana Velez<sup>1</sup> and Juan Luis Jurat-Fuentes<sup>2</sup>, <sup>1</sup>Univ. of Nebraska, Lincoln, NE, <sup>2</sup>Univ. of Tennessee, Knoxville, TN

9:15 **0182** The effects of lifelong nutrition on honey bee cognition. **Keziah Katz** (kdkatz@rams.colostate.edu) and Dhruva Naug, Colorado State Univ., Fort Collins, CO

9:30 **0183** Learning of floral preference by bees in the absence of nectar rewards. **Avery Russell** (averyrussell@email.arizona.edu), Univ. of Arizona, Tucson, AZ

9:45 **0184** How can honey bees (*Apis mellifera*) optimize the fitness trade-off between drone production and swarming? **Natalie Lemanski** (natalie.lemanski@rutgers.edu)<sup>1</sup> and Nina Fefferman<sup>1,2</sup>, <sup>1</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, <sup>2</sup>Rutgers, The State Univ. of New Jersey, Piscataway, NJ

10:00 **0185** Acetylcholinesterase 1 expression level is associated with brood rearing status in the honey bee. Young-Ho Kim<sup>1</sup>, Ju Hyeon Kim<sup>2</sup>, **Kyungmun Kim** (kkamboosi@snu.ac.kr)<sup>3</sup>, and Si Hyeock Lee<sup>3</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>Univ. of Massachusetts, Amherst, MA, <sup>3</sup>Seoul National Univ., Seoul, South Korea

## 10:15 BREAK

10:30 **0186** Emergency queen selection in honey bees (*Apis mellifera*). **James Withrow** (jmwithro@ncsu.edu) and David Tarpy, North Carolina State Univ., Raleigh, NC

10:45 **0187** Chemical manipulation of honey bee behavior. **Nicholas Larson** (nlarson@vt.edu)<sup>1</sup>, Carlyle C. Brewster<sup>1</sup>, Uli Bernier<sup>2</sup>, Jeffrey Bloomquist<sup>3</sup>, and Troy D. Anderson<sup>1</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>USDA - ARS, Gainesville, FL, <sup>3</sup>Univ. of Florida, Gainesville, FL

11:00 **0188** Larval and adult pollen diets affect honey bee worker response to the queen. **Alexander Walton** (awalton@iastate.edu), Adam Dolezal, and Amy L. Toth, Iowa State Univ., Ames, IA

11:15 **0189** Honey bee sociometry: Tracking honey bee colonies and their nest contents from swarm until death. **Michael Smith** (mils453@cornell.edu), Cornell Univ., Ithaca, NY

11:30 **0190** Does the source colony affect the survival rate of honey bee (*Apis mellifera*) larvae that are reared *in vitro*? **Ashley Mortensen** (mortensena@ufl.edu) and James Ellis, Univ. of Florida, Gainesville, FL

11:45 **0191** The negative effects of in-hive miticides and agrochemicals on honey bee (*Apis mellifera*) drones. **Adrian Fisher II** (solifuge9378@tamu.edu) and Juliana Rangel, Texas A&M Univ., College Station, TX

12:00 **0192** Laboratory and field treatments of atrazine elicit oxidative stress responses in bees. **Jennifer Williams** (jdub12@vt.edu), Richard D. Fell, Carlyle C. Brewster, and Troy D. Anderson, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

12:15 **0193** Elucidating the effects of real world pesticide load and diet variety on honey bee health. **Andrew Garavito** (agaravit@terpmail.umd.edu) and Dennis vanEngelsdorp, Univ. of Maryland, College Park, MD

12:30 **0194** Managing reproduction in workers: The primer and releaser effects of tergal gland secretions in honeybee workers. **Olabimpe Okosun** (bimpe.okosun@gmail.com), Abdullahi Yusuf, Robin Crewe, and Christian Pirk, Univ. of Pretoria, Pretoria, South Africa

### Graduate Student Oral Competition: Apidology, Sericulture, and Social Insects: Termites

#### Room W231 C (Convention Center)

**Moderators:** Justin Talley<sup>1</sup> and Edward Vargo<sup>2</sup>, <sup>1</sup>Oklahoma State Univ., Stillwater, OK, <sup>2</sup>Texas A&M Univ., College Station, TX

9:15 **0195** Policing behavior resolves reproductive conflict in the Eastern subterranean termite, *Reticulitermes flavipes*. **Jordan Hampton** (jdha238@uky.edu), Kenneth F. Haynes, Xuguo Zhou, and Qian Sun, Univ. of Kentucky, Lexington, KY

9:30 **0196** Efficient antioxidative defense system contributing to longevity in the subterranean termite *Reticulitermes speratus*. **Eisuke Tasaki** (s015gm@yamaguchi-u.ac.jp)<sup>1,2</sup>, Kazuya Kobayashi<sup>3</sup>, Kenji Matsuura<sup>3</sup>, and Yoshihito Iuchi<sup>2</sup>, <sup>1</sup>Tottori Univ., Yamaguchi, Japan, <sup>2</sup>Yamaguchi Univ., Yamaguchi, Japan, <sup>3</sup>Kyoto Univ., Kyoto, Japan

9:45 **0197** Inter- and intraspecific interactions in subterranean termites, *Reticulitermes* (Isoptera: Rhinotermitidae). **Mark Janowiecki** (janowiecki@tamu.edu) and Edward Vargo, Texas A&M Univ., College Station, TX

10:00 **0198** The Asian subterranean termite, *Coptotermes gestroi*, baited with insect growth regulators in extended foraging arenas. **Lucas Carnohan** (carnohan@ufl.edu) and Nan-Yao Su, Univ. of Florida, Davie, FL

## 10:15 BREAK

10:30 **0199** Chemical mediation of queen and king recognition in subterranean termites (*Reticulitermes flavipes*). **Colin Funaro** (cffunaro@ncsu.edu)<sup>1</sup>, Coby Schal<sup>1</sup>, and Edward Vargo<sup>2</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>Texas A&M Univ., College Station, TX

10:45 **0200** Genomic correlates to kin recognition and invasiveness in a subterranean termite. **Tian Wu** (twu54@uwo.ca) and Graham Thompson, Univ. of Western Ontario, London, ON, Canada



- 11:00 **0201** Caste-specific and sex-specific expression of chemoreceptor genes in a termite. **Yuki Mitaka** (ymitaka@kais.kyoto-u.ac.jp)<sup>1</sup>, Kazuya Kobayashi<sup>1</sup>, Alexander Mikheyev<sup>2</sup>, Mandy Tin<sup>2</sup>, Yutaka Watanabe<sup>2</sup>, and Kenji Matsuura<sup>1</sup>, <sup>1</sup>Kyoto Univ., Kyoto, Japan, <sup>2</sup>Okinawa Institute of Science and Technology, Onna, Japan
- 11:15 **0202** Intraspecific variation of termite shelter-tube structures: Building mechanism and its organization in their society. **Nobuaki Mizumoto** (nobuaki.mzmt@gmail.com), Kazuya Kobayashi, and Kenji Matsuura, Kyoto Univ., Kyoto, Japan
- 11:30 **0203** Double amount DNA in queen fat body cells: Reproductive division of labor and endoreduplication in termites. **Tomonari Nozaki** (nozaki.tomonari.38v@st.kyoto-u.ac.jp) and Kenji Matsuura, Kyoto Univ., Kyoto, Japan

### Graduate Student Oral Competition: Biological Control and Insect Pathology: Entomopathogens and Weed Biocontrol

#### Room W231 A (Convention Center)

**Moderators:** John Diaz-Montano<sup>1</sup> and Naresh Duggal<sup>2</sup>,

<sup>1</sup>Colombian Corporation for Agricultural Research, Rionegro, Colombia, <sup>2</sup>Santa Clara County, San Jose, CA

- 9:15 **0204** Infectious disease of *Enterococcus mundtii* in silkworm, *Bombyx mori*. **Daniel Nwibo** (nwibodaniel@st.com) and Kazuhisa Sekimizu, The Univ. of Tokyo, Tokyo, Japan
- 9:30 **0205** Biological control of *Meligethes aeneus* beetles with entomopathogenic fungi — the tricky path to an efficient formulation. **Deborah Kaiser** (deborah.kaiser@agroscope.admin.ch)<sup>1</sup>, Sven Bacher<sup>2</sup>, and Giselher Grabenweger<sup>1</sup>, <sup>1</sup>Agroscope, Zürich, Switzerland, <sup>2</sup>Univ. of Fribourg, Fribourg, Switzerland
- 9:45 **0206** Identification of entomopathogenic fungi from west central Nebraska and pathogenicity against the western corn rootworm. **Camila Oliveira-Hofman** (coliveirahofman@gmail.com)<sup>1</sup>, Anthony Adesemoye<sup>2</sup>, Lance Meinke<sup>1</sup>, and Julie Peterson<sup>2</sup>, <sup>1</sup>Univ. of Nebraska, Lincoln, NE, <sup>2</sup>Univ. of Nebraska, North Platte, NE
- 10:00 **0207** The genetic basis for variation in resistance to fungal infection in *Drosophila melanogaster*. **Jonathan Wang** (jonwang@umd.edu), Hsiao-Ling Lu, and Raymond J. St. Leger, Univ. of Maryland, College Park, MD
- 10:15 **BREAK**
- 10:30 **0208** Can entomopathogenic fungi induce plant defenses to suppress soybean aphid? **Eric H. Clifton** (eclifton@iastate.edu), Erin W. Hodgson, and Aaron J. Gassmann, Iowa State Univ., Ames, IA
- 10:45 **0209** The efficacy of entomopathogenic nematodes (genera *Steinernema* and *Heterorhabditis*) collected in the United Kingdom as a potential biocontrol for vector and nuisance biting hematophagous insects. **Sandra Edmunds** (s.hughes-crean@2011.ljmu.ac.uk), Robbie Rae, and Craig Wilding, Liverpool John Moores Univ., Liverpool, United Kingdom

- 11:00 **0210** The role of pathogen diversity on the evolution of resistance in an insect. **Leon Yu Zheng Li** (leonl@sfu.ca) and Jenny Cory, Simon Fraser Univ., Burnaby, BC, Canada
- 11:15 **0211** RNA-seq transcriptome analysis of *Bombyx mori* cells infected with *B. mori* nucleopolyhedrovirus (NPV) and *Autographa californica* multiple NPV. **Rina Hamajima** (q2u\_q1@yahoo.co.jp)<sup>1</sup>, Masanao Sato<sup>2</sup>, Michihiro Kobayashi<sup>1</sup>, and Motoko Ikeda<sup>1</sup>, <sup>1</sup>Nagoya Univ., Nagoya, Japan, <sup>2</sup>Keio Univ., Yamagata, Japan
- 11:30 **0212** Phenology of the biological control agent of Dalmatian toadflax, *Mecinus janthiniformis* (Curculionidae: Coleoptera), in Utah. **Samantha Willden** (samwillden@gmail.com) and Edward W. Evans, Utah State Univ., Logan, UT
- 11:45 **0213** Under cover: An evaluation of artificial weevil refugia for improving biological control of giant salvinia in the United States. **Lori Moshman** (lmoshman@agcenter.lsu.edu) and Rodrigo Diaz, Louisiana State Univ., Baton Rouge, LA
- 12:00 **0214** Supercooling point, mortality at low temperatures, and chill coma recovery time of adult *Cyrtobagous salviniae* (Coleoptera: Curculionidae). **Alana Russell** (aruss45@lsu.edu), Seth Johnson, and Rodrigo Diaz, Louisiana State Univ., Baton Rouge, LA

### Graduate Student Oral Competition: Biological Control and Insect Pathology: Predators

#### Room W240 C (Convention Center)

**Moderators:** Louis E. N. Jackai<sup>1</sup> and Paul Robbins<sup>2</sup>, <sup>1</sup>North Carolina A&T State Univ., Greensboro, NC, <sup>2</sup>Cornell Univ., Geneva, NY

- 9:15 **0215** Effects of abiotic conditions on interactions among three predators of *Tetranychus urticae* (Acarina: Tetranychidae). **Pablo Urbaneja-Bernat** (paurbaneja@gmail.com)<sup>1</sup>, Marta Montserrat<sup>2</sup>, and Josep Jaques<sup>1</sup>, <sup>1</sup>Univ. Jaume I, Castellón de la Plana, Spain, <sup>2</sup>Institute of Mediterranean and Subtropical Horticulture, Algarrobo-Costa, Spain
- 9:30 **0216** Intraspecific competition of *Galendromus flumenis* (Acari: Phytoseiidae) on Banks grass mite. **Fatemeh Ganjisaffar** (fatemeh.ganjisaffar@email.ucr.edu) and Thomas M. Perring, Univ. of California, Riverside, CA
- 9:45 **0217** Field collections and habitat surveys of *Tetanocera elata* (Diptera: Sciomyzidae) to develop sustainable slug pest management in Ireland. **Allison Bistline-East** (a.bistline-east@nuigalway.ie) and Michael J. Gormally, National Univ. of Ireland, Galway, Ireland
- 10:00 **0218** Manipulation of natural enemy behavior to enhance their ecosystem services in agricultural crops. **Jordano Salamanca** (jordanosalamanca@gmail.com)<sup>1</sup>, Cesar Rodriguez-Saona<sup>2</sup>, and Brigida Souza<sup>1</sup>, <sup>1</sup>Federal Univ. of Lavras, Lavras, Brazil, <sup>2</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ
- 10:15 **BREAK**

- 10:30 **0219** Molecular identification of arthropod predators of cucumber beetles. **Molly Dieterich Mabin** (dieterich.9@osu.edu)<sup>1</sup>, Celeste Welty<sup>1</sup>, and Mary Gardiner<sup>2</sup>, <sup>1</sup>The Ohio State Univ., Columbus, OH, <sup>2</sup>The Ohio State Univ., Wooster, OH
- 10:45 **0220** Species composition and seasonality of the natural enemies of sugarcane aphid (*Melanaphis sacchari*) on susceptible and resistant sorghum. **Erin Maxson** (elmaxson@gmail.com)<sup>1</sup>, Michael Brewer<sup>2</sup>, and James Woolley<sup>1</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Texas A&M AgriLife Research, Corpus Christi, TX
- 11:00 **0221** Natural enemies of western bean cutworm, *Striacosta albicosta*, in maize agroecosystems in western Nebraska. **Westen Archibald** (westen.archibald@gmail.com)<sup>1</sup>, Robert Wright<sup>1</sup> and Julie Peterson<sup>2</sup>, <sup>1</sup>Univ. of Nebraska, Lincoln, NE, <sup>2</sup>Univ. of Nebraska, North Platte, NE
- 11:15 **0222** Do latitudinal gradients in arthropod predation pressure hold in simplified agroecosystems? **Hannah Gray** (grayx379@umn.edu) and David A. Andow, Univ. of Minnesota, St. Paul, MN
- 11:30 **0223** Influence of food supplementation during overwintering on the survival of *Hippodamia convergens* adults. **Nathan Mercer** (nhmercer13@gmail.com), John Obrycki, and Ric Bessin, Univ. of Kentucky, Lexington, KY
- 11:45 **0224** Relative importance of habitat management and plant quality on herbivore choice, consumptive and non-consumptive effects. **Margaret Lund** (lundmar6@msu.edu) and Zsafia Szendrei, Michigan State Univ., East Lansing, MI
- 12:00 **0225** Multi-scale land use effects on ant predation in agroecosystems. **Hannah J. Penn** (hannahjpenn@gmail.com) and James Harwood, Univ. of Kentucky, Lexington, KY

### Graduate Student Oral Competition: Ecology and Population Dynamics: Behavior

#### Room W240 D (Convention Center)

**Moderators:** Anders Huseeth<sup>1</sup> and Murugesan Rangasamy<sup>2</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>Dow AgroSciences, Indianapolis, IN

- 9:15 **0226** Both spring warmth and winter chilling can affect spring phenology of butterflies. **Sandra Stålhandske** (sandra.stalhandske@zoologi.su.se), Karl Gotthard, and Olof Leimar, Stockholm Univ., Stockholm, Sweden
- 9:30 **0227** Seasonal effects on the morphology and reproductive behavior of *Narnia femorata* (Hemiptera: Coreidae). **Lauren Cirino** (lacirino@ufl.edu) and Christine W. Miller, Univ. of Florida, Gainesville, FL
- 9:45 **0228** Active pollen feeding and frequent flower visit by a stonefly species in *Corylopsis gotoana* (Hamamelidaceae). **Akira Wong Sato** (ws.akira@gmail.com) and Makoto Kato, Kyoto Univ., Kyoto, Japan
- 10:00 **0229** Interactions between thermoregulatory behavior and color plasticity in pipevine swallowtail (*Battus philenor*) caterpillars: Causes and consequences. **Matthew Nielsen** (nielsenm@email.arizona.edu) and Daniel Papaj, Univ. of Arizona, Tucson, AZ

### 10:15 BREAK

- 10:30 **0230** *Parasitodiplogaster* (Nematoda: Diplogastridae) infection of male fig wasps: Consequences for mutualism and coexistence. **Justin Van Goor** (jvangoor@iastate.edu) and John D. Nason, Iowa State Univ., Ames, IA
- 10:45 **0231** Examining bird-insect food webs to improve avian conservation efforts. **Ashley C. Kennedy** (kennedy@udel.edu) and Douglas W. Tallamy, Univ. of Delaware, Newark, DE
- 11:00 **0232** Do multimodal warning signals have an effect on decision making? A glimpse into jumping spider (Araneae: Salticidae) psychology. **Michael Vickers** (michaelvickers@ufl.edu) and Lisa Taylor, Univ. of Florida, Gainesville, FL
- 11:15 **0233** Individual specialization in the black and yellow mud dauber, *Sceliphron caementarium*, and implications for newly introduced spider species. **Erin Powell** (erinpowell@ufl.edu) and Lisa Taylor, Univ. of Florida, Gainesville, FL
- 11:30 **0234** Identifying floral hosts of cerambycid beetles using palynology. **Alexander Hazel** (xhazel@illinois.edu) and Lawrence M. Hanks<sup>2</sup>, <sup>1</sup>Univ. of Illinois, Champaign, IL, <sup>2</sup>Univ. of Illinois, Urbana, IL
- 11:45 **0235** If you can't stand the heat: A temperature-driven shift in soil detritivore community dynamics could hold significant consequences for carbon flux and nutrient cycling in temperate forest ecosystems. **Eric Moore** (eamoore@bgsu.edu) and Shannon Pelini, Bowling Green State Univ., Bowling Green, OH
- 12:00 **0236** Effects of forest disturbance on the movement of ground-dwelling invertebrates. **Kayla I. Perry** (perry.1864@osu.edu)<sup>1</sup>, Kimberly F. Wallin<sup>2,3</sup>, John Wenzel<sup>4</sup>, and Daniel Herms<sup>1</sup>, <sup>1</sup>The Ohio State Univ., Wooster, OH, <sup>2</sup>Univ. of Vermont, Burlington, VT, <sup>3</sup>USDA - Forest Service, Burlington, VT, <sup>4</sup>Carnegie Museum of Natural History, Rector, PA
- 12:15 **0237** Evaluating ecological landscape design as a tool for managing pests on urban trees. **Sarah Parsons** (separson@ncsu.edu) and Steven Frank, North Carolina State Univ., Raleigh, NC

### Graduate Student Oral Competition: Insect Immunology

#### Room W232 A (Convention Center)

**Moderator:** Aaron Gross, Univ. of Florida, Gainesville, FL

- 9:15 **0238** The toll pathway modulated *Beauveria bassiana* infection in *Anopheles gambiae*. **Victoria Davidson** (victorea@ksu.edu) and Kristin Michel, Kansas State Univ., Manhattan, KS
- 9:30 **0239** Immune responses within tobacco hornworms (*Manduca sexta*) following consumption of *Solanum carolinense* trichomes. **Alexandra Serpi** (alex.serpi@psu.edu) and Andrew Stephenson, Pennsylvania State Univ., University Park, PA
- 9:45 **0240** Characterization and evolutionary implications of a recently acquired symbiotic poxvirus in parasitoid wasps. **Kelsey Coffman** (kcoffman@uga.edu) and Gaelen Burke, Univ. of Georgia, Athens, GA





10:00 **0241** Immune priming of the Asian citrus psyllid (*Diaphorina citri*). **Alex Arp** (aarp@ufl.edu) and Kirsten Pelz-Stelinski, Univ. of Florida, Lake Alfred, FL

### 10:15 BREAK

10:30 **0242** Genome-wide analysis of selection in immune genes within and among butterfly populations. **Naomi Keehnen** (naomi.keehnen@zoologi.su.se), Jason Hill, Sören Nylin, and Christopher Wheat, Stockholm Univ., Stockholm, Sweden

10:45 **0243** Pathogen-induced paternal effects in a social insect. **Erin Cole** (cole.eri@husky.neu.edu)<sup>1</sup>, Rebeca B. Rosengaus<sup>1</sup>, Graham Thompson<sup>2</sup>, and Jessica Empringham<sup>2</sup>, <sup>1</sup>Northeastern Univ., Boston, MA, <sup>2</sup>Univ. of Western Ontario, London, ON, Canada

11:00 **0244** Monarch butterfly-microbe interactions and their implications for disease resistance. **Erica Harris** (evharri@emory.edu), Nicole Gerardo, and Jacobus C. De Roode, Emory Univ., Atlanta, GA

11:15 **0245** Ecoimmunology of *Manduca sexta*: Therapeutic effects of plant chemistry on the immune response as a mediator of tritrophic interactions. **Michael Garvey** (garveyem@purdue.edu)<sup>1</sup>, Curtis Creighton<sup>2</sup>, and Ian Kaplan<sup>1</sup>, <sup>1</sup>Purdue Univ., West Lafayette, IN, <sup>2</sup>Purdue Univ., Hammond, IN

## Graduate Student Oral Competition: Invasive and Exotic Entomology: Drosophilids

### Room W240 B (Convention Center)

**Moderators:** Matthew Buffington<sup>1</sup> and Anastasia Cooper<sup>2</sup>, <sup>1</sup>USDA - ARS, Washington, DC, <sup>2</sup>Kansas State Univ., Manhattan, KS

9:15 **0246** Effect of abiotic factors on circadian rhythms, biology, and behavior of *Drosophila suzukii* (Diptera: Drosophilidae). **Richard Evans** (revans90@uga.edu) and Ashfaq Sial, Univ. of Georgia, Athens, GA

9:30 **0247** Incorporation of yeast species into bait sprays for control of *Drosophila suzukii*. **Alix Whitener** (alix.crilly@wsu.edu)<sup>1</sup>, Boyd Mori<sup>2</sup>, Paul Becher<sup>2</sup>, Peter Witzgall<sup>2</sup>, and Elizabeth H. Beers<sup>1</sup>, <sup>1</sup>Washington State Univ., Wenatchee, WA, <sup>2</sup>Swedish Univ. of Agricultural Sciences, Alnarp, Sweden

9:45 **0248** Attractiveness of different baits to *Drosophila suzukii* of different reproductive states. **Kyoo Park** (parkk@oregonstate.edu)<sup>1</sup>, Vaughn Walton<sup>1</sup>, Jana Lee<sup>2</sup>, and Adam Cave<sup>2</sup>, <sup>1</sup>Oregon State Univ., Corvallis, OR, <sup>2</sup>USDA - ARS, Corvallis, OR

10:00 **0249** Investigating wild flora for viable hosts of *Drosophila suzukii* (Diptera: Drosophilidae) in the southeastern U.S. **Joshua Grant** (joshua.grant25@uga.edu) and Ashfaq Sial, Univ. of Georgia, Athens, GA

### 10:15 BREAK

10:30 **0250** An exploration into pesticide resistance in spotted wing drosophila, *Drosophila suzukii*. **Grace Sward** (sward023@umn.edu) and Christopher R. Phillips, Univ. of Minnesota, St. Paul, MN

10:45 **0251** Improving the efficiency of monitoring tools for spotted wing drosophila, *Drosophila suzukii*. **Danielle Kirkpatrick** (kirkpa42@msu.edu), Larry Gut, and James R. Miller, Michigan State Univ., East Lansing, MI

11:00 **0252** Monitoring and exclusion of *Drosophila suzukii* on fruit crops and wild hosts. **Lizabeth Herrera** (lrherrer@email.uark.edu), Don Johnson, and Barbara Lewis, Univ. of Arkansas, Fayetteville, AR

11:15 **0253** Susceptibility of selected boreal fruits and berries to the invasive pest spotted wing drosophila (*Drosophila suzukii*). **Catherine Little** (clittle@mun.ca)<sup>1,2</sup>, Tom Chapman<sup>1</sup>, Debra Moreau<sup>3</sup>, and Kirk Hillier<sup>2</sup>, <sup>1</sup>Memorial Univ. of Newfoundland, St. John's, NF, Canada, <sup>2</sup>Acadia Univ., Wolfville, NS, Canada, <sup>3</sup>Agriculture and Agri-Food Canada, Kentville, NS, Canada

11:30 **0254** Interspecific competition between *Zaprionus indianus* and *Drosophila suzukii* in Virginia vineyards. **Meredith Shrader** (mcassell@vt.edu) and Douglas G. Pfeiffer, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

11:45 **0255** Seeing spots in the southwest: What have we learned about spotted wing drosophila, *Drosophila suzukii* (Drosophilidae: Matsumura), in Oklahoma? **Haley Butler** (haley.butler@okstate.edu), Jackie Lee, and Eric Rebek, Oklahoma State Univ., Stillwater, OK

12:00 **0256** Rebuilding raspberry IPM programs after invasion by spotted wing drosophila. **Heather Leach** (leachhea@msu.edu), Eric Hanson, Josh Moses, Steven VanTimmeren, and Rufus Isaacs, Michigan State Univ., East Lansing, MI

12:15 **0257** Survey of *Zaprionus indianus* in Florida and oviposition behavior in berries. **Lindsay Iglesias** (liglesias@ufl.edu) and Oscar Liburd, Univ. of Florida, Gainesville, FL

## Graduate Student Oral Competition: Medical and Veterinary Entomology: Ticks

### Room W232 B (Convention Center)

**Moderators:** Ben Mans<sup>1</sup> and Clifford Keil<sup>2</sup>, <sup>1</sup>Agricultural Research Council, Onderstepoort, South Africa, <sup>2</sup>Pontifical Catholic Univ., Quito, Ecuador

9:15 **0258** The prevalence of *Anaplasma phagocytophilum*, *Babesia microti*, and *Borrelia burgdorferi* in *Ixodes scapularis* and small mammals from two Provincial Parks in Manitoba, Canada. **Zach Polk** (polkzc25@gmail.com) and Kateryn Rochon, Univ. of Manitoba, Winnipeg, MB, Canada

9:30 **0259** Impact of saturation deficit on the diel questing patterns of the blacklegged tick (*Ixodes scapularis*) in laboratory and field studies. **Xia Lee** (xlee1@wisc.edu), Univ. of Wisconsin, Madison, WI

9:45 **0260** Regional discoveries of the ticks parasitizing Tennessee beef cattle. **David Theuret** (dtheuret@vols.utk.edu), David Paulson, and Rebecca Trout Fryxell, Univ. of Tennessee, Knoxville, TN

10:00 **0261** Laboratory studies of host-seeking behavior in colonized nymphal *Amblyomma maculatum* Koch ticks (Acari: Ixodidae). **José Portugal III** (jsp281@msstate.edu), Robert Wills, and Jerome Goddard, Mississippi State Univ., Mississippi State, MS

10:15 **BREAK**

10:30 **0262** *Ixodes scapularis* tick saliva proteins sequentially secreted every 24h during blood feeding. **Tae Kim** (taekim009@gmail.com)<sup>1</sup>, Lucas Tirloni<sup>2</sup>, Antônio Pinto<sup>3</sup>, James Moresco<sup>4</sup>, John Yates III<sup>4</sup>, Itabajara Vaz<sup>2</sup>, and Albert Mulenga<sup>1</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Federal Univ. of Rio Grande, Porto Alegre, Brazil, <sup>3</sup>Pontifical Catholic Univ., Porto Alegre, Brazil, <sup>4</sup>The Scripps Research Institute, La Jolla, CA

10:45 **0263** Ticks vs. the host immune system: A tug of war. **Mariam Bakshi** (mbakshi@cvm.tamu.edu), Tae Kim, Željko Radulović, Lindsay Porter, Waithaka Mwangi, and Albert Mulenga, Texas A&M Univ., College Station, TX

11:00 **0264** Population genetic structure of the blacklegged tick (*Ixodes scapularis*) questing at different heights. **Mackenzie Tietjen** (kenzietietjen@tamu.edu)<sup>1</sup>, Maria Esteve-Gassent<sup>1</sup>, Ivan Castro-Arellano<sup>2</sup>, Andrew Li<sup>3</sup>, and Raul F. Medina<sup>1</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Texas State Univ., San Marcos, TX, <sup>3</sup>USDA - ARS, Beltsville, MD

11:15 **0265** Sex specific expression of ionotropic and gustatory receptors in the Haller's organ of *Ixodes scapularis* ticks (Acari: Ixodidae). **Tanya Josek** (tanyajosek@gmail.com), Hugh M. Robertson, Marianne Alleyne, Brian F. Allan, and Kimberly K. O. Walden, Univ. of Illinois, Champaign, IL

11:30 **0266** Fluorescent properties of ticks (family Ixodidae). **Dakota Shade** (das09780@ucmo.edu), Univ. of Central Missouri, Warrensburg, MO

11:45 **0267** The salivary gland transcriptome of the causative agent of spring lamb paralysis, *Rhipicephalus eversti eversti*. **Ronel Pienaar** (volschenkr@arc.agric.za)<sup>1</sup>, Minique de Castro<sup>1,2,3</sup>, Daniel De Klerk<sup>1</sup>, Abdalla Latif<sup>1</sup>, and Ben Mans<sup>1,2,4</sup>, <sup>1</sup>Agricultural Research Council, Onderstepoort, South Africa, <sup>2</sup>Univ. of South Africa, Pretoria, South Africa, <sup>3</sup>Agricultural Research Council, Pretoria, South Africa, <sup>4</sup>Univ. of Pretoria, Pretoria, South Africa

**Graduate Student Oral Competition: Urban Entomology in a Changing Environment: Biting Pests**

**Room W232 C (Convention Center)**

**Moderators:** Alvaro Romero<sup>1</sup> and Heather Jordan<sup>2</sup>, <sup>1</sup>New Mexico State Univ., Las Cruces, NM, <sup>2</sup>Mississippi State Univ., Mississippi State, MS

9:15 **0268** Effect of collection time and hunger level on the behavioral response to lures in the common bed bug, *Cimex lectularius*. **Desen Wang** (wds830706@163.com)<sup>1,2</sup>, <sup>1</sup>South China Agricultural Univ., Guangzhou, China, <sup>2</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ

9:30 **0269** Reproductive compatibility and aggregation fidelity among populations and host-associated lineages of bed bugs, *Cimex lectularius*. **Zachary DeVries** (zcdvrie@ncsu.edu)<sup>1</sup>, Russell Mick<sup>1</sup>, Ondrej Balvin<sup>2</sup>, and Coby Schal<sup>1</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>Czech Univ. of Life Sciences, Prague, Czech Republic

9:45 **0270** Evaluation of ingestible pesticides on bed bugs, *Cimex lectularius*. **Angela Sierras** (ajsierra@ncsu.edu) and Coby Schal, North Carolina State Univ., Raleigh, NC

10:00 **0271** The molecular basis of odorant reception in the common bed bug. **Feng Liu** (fzl0009@auburn.edu) and Nannan Liu, Auburn Univ., Auburn, AL

10:15 **BREAK**

10:30 **0272** Is the vector competence of the common bed bug, *Cimex lectularius* L., influenced by their microbiome and endosymbiotic activity? **Michael Fisher** (mlfische2@ncsu.edu), Wes Watson, and Coby Schal, North Carolina State Univ., Raleigh, NC

10:45 **0273** Turning a good bug bad: Comparative analysis of salivary proteins and symbioses in blood-feeding kissing bugs (Reduviidae: Triatominae) and their predatory relatives. **Eric Gordon** (erg55@cornell.edu) and Christiane Weirauch, Univ. of California, Riverside, CA

11:00 **0274** Short-range responses of the kissing bug, *Triatoma rubida*, to heat, moisture, and CO<sub>2</sub>. **Andres Indacochea** (aindacoc@nmsu.edu) and Alvaro Romero, New Mexico State Univ., Las Cruces, NM

**Contributed Papers: Agricultural and Forest Entomology: Behavioral and Chemical Ecology**

**Room W224 F (Convention Center)**

**Moderators:** R. Andrew Hayes<sup>1</sup> and Brett Blaauw<sup>2</sup>, <sup>1</sup>Univ. of the Sunshine Coast, Sippy Downs, Australia, <sup>2</sup>Rutgers, The State Univ. of New Jersey, Bridgeton, NJ

9:15 **0275** Assessment of beetle diversity, community composition, and potential threats to forestry using kairomone-baited traps at a landscape scale. **Sarai Olivier-Espejel** (sarai.olivier@fabu.up.ac.za), Brett Hurley, and Jeff Garnas, Univ. of Pretoria, Pretoria, South Africa

9:30 **0276** When stink bugs react: Host stimuli and the brown marmorated stink bug. **Brett Blaauw** (blaauw@aesop.rutgers.edu)<sup>1</sup>, Cesar Rodriguez<sup>2</sup>, George C. Hamilton<sup>3</sup>, and Anne Nielsen<sup>1</sup>, <sup>1</sup>Rutgers, The State Univ. of New Jersey, Bridgeton, NJ, <sup>2</sup>Rutgers, The State Univ. of New Jersey, Chatsworth, NJ, <sup>3</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ

9:45 **0277** *Krüppel* homolog 1 (*Kr-h1*) mediates juvenile hormone action during metamorphosis of the oriental fruit fly, *Bactrocera dorsalis*. Ya-Li Li, Hong Liu, Dong Wei, Jin-Jun Wang, and **Wei Dou** (weidou9000@yahoo.com), Southwest Univ., Chongqing, China

10:00 **0278** The nest provisioning behavior of the wasp *Cerceris fumipennis*. **Ellie McCabe** (ellieannmccabe@gmail.com) and Donald Chandler, Univ. of New Hampshire, Durham, NH

10:15 **BREAK**

10:30 **0279** Predicting potential suitability areas of *Eucryptorrhynchus chinensis* (Olivier) in the world. **Ji Yingchao** (Yingchao2015@bjfu.edu.cn), Beijing Forestry Univ., Beijing, China



- 10:45 **0280** Acoustical communication in the remarkable cicada *Subpsaltria yangi* Chen. **Cong Wei** (congwei@nwsuaf.edu.cn) and Changqing Luo, Northwest A&F Univ., Yangling, China
- 11:00 **0281** Perturbation of a veterinary anthelmintic compromises multifunctional benefits provided by diverse dung beetle assemblages. **Paul Manning** (paul.manning@zoo.ox.ac.uk)<sup>1,2</sup>, Owen Lewis<sup>1</sup>, Sarah Beynon<sup>2</sup>, and Eleanor Slade<sup>1</sup>, <sup>1</sup>Univ. of Oxford, Oxford, United Kingdom, <sup>2</sup>Dr. Beynon's Bug Farm, St. Davids, United Kingdom
- 11:15 **0282** Characterizing an Asian longhorned beetle (*Anoplophora glabripennis*) establishment event in an invaded suburban landscape. **Helen Hull-Sanders** (hhullanders@gmail.com)<sup>1</sup> and R. Talbot Trotter<sup>2</sup>, <sup>1</sup>Stevens Institute of Technology, Hoboken, NJ, <sup>2</sup>USDA - Forest Service, Hamden, CT
- 11:30 **0283** Measuring oviposition preference and survival of an invasive stem borer (Lepidoptera: Crambidae) on conventional and bioenergy crops. **Matthew VanWeelden** (mvanweel1@ufl.edu)<sup>1</sup>, Blake E. Wilson<sup>2</sup>, Julien M. Beuzelin<sup>3</sup>, Thomas E. Reagan<sup>3</sup>, and M. O. Way<sup>4</sup>, <sup>1</sup>Univ. of Florida, Belle Glade, FL, <sup>2</sup>Louisiana State Univ. AgCenter, Baton Rouge, LA, <sup>3</sup>Louisiana State Univ., Baton Rouge, LA, <sup>4</sup>Texas A&M AgriLife Extension Service, Beaumont, TX
- 11:45 **0284** Multi-trophic association of olive fruit, yeasts, and olive fruit fly (*Bactrocera oleae* Gmel.) with possible implications for pest management. **Elda Vitanovic** (elda@krs.hr)<sup>1</sup>, Kyria Boundy-Mills<sup>2</sup>, Hannah Burrack<sup>3</sup>, Frank Zalom<sup>2</sup>, and Jeffrey Aldrich<sup>4</sup>, <sup>1</sup>Institute for Adriatic Crops and Karst Reclamation, Split, Croatia, <sup>2</sup>Univ. of California, Davis, CA, <sup>3</sup>North Carolina State Univ., Raleigh, NC, <sup>4</sup>Jeffrey R. Aldrich Consulting, LLC, Santa Cruz, CA
- 12:00 **0285** Variation in spatial scale of competing polydomous twig-nesting ants in coffee agroecosystems. **Kate Mathis** (kmathis@email.arizona.edu)<sup>1</sup>, Santiago Ramirez<sup>2</sup>, and Stacy M. Philpott<sup>3</sup>, <sup>1</sup>Univ. of Arizona, Tucson, AZ, <sup>2</sup>Univ. of California, Davis, CA, <sup>3</sup>Univ. of California, Santa Cruz, CA
- 12:15 **0286** Effect of starvation on digestive enzymes of male *H. serrata* Fab. (Coleoptera: Scarabaeidae). **Sakharam Patil** (drsbpatil5576@yahoo.co.in), Savitribai Phule Pune Univ., Rajgurunagar, India
- 12:30 **0287** Ecology and behavior of brown marmorated stink bug (*Halyomorpha halys*) at the interface between fruit orchards and woodlands in the mid-Atlantic, USA. **Christopher Bergh** (cbergh@vt.edu)<sup>1</sup>, Angelita Acebes-Doria<sup>1</sup>, and Tracy C. Leskey<sup>2</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Winchester, VA, <sup>2</sup>USDA - ARS, Kearneysville, WV
- 12:45 **0288** The optimal sex pheromone release rate for trapping the codling moth *Cydia pomonella* (Lepidoptera: Tortricidae) in the field. **Jing Xu** (xujing@ioz.ac.cn) and Runzhi Zhang, Chinese Academy of Sciences, Beijing, China
- 1:00 **0289** Optimizing generic cerambycid pheromone lures for Australian biosecurity and biodiversity monitoring. **R. Andrew Hayes** (rhayes@usc.edu.au)<sup>1</sup>, Helen Nahrung<sup>1</sup>, Manon Griffiths<sup>2</sup>, Pieter Arnold<sup>3</sup>, Lawrence M. Hanks<sup>4</sup>, and Jocelyn G. Millar<sup>5</sup>, <sup>1</sup>Univ. of the Sunshine Coast, Sippy Downs, Australia, <sup>2</sup>Dept. of Agriculture and Fisheries, Dutton Park, Australia, <sup>3</sup>Univ. of Queensland, St. Lucia, Australia, <sup>4</sup>Univ. of Illinois, Urbana, IL, <sup>5</sup>Univ. of California, Riverside, CA

## Contributed Papers: Biological Control and Insect Pathology: Nematodes, Fungi, and Bt

### Room W225 A (Convention Center)

**Moderators:** Timothy Johnson<sup>1</sup>, Gabriela Lankin-Vega<sup>2</sup>, and Javad Karimi<sup>3</sup>, <sup>1</sup>Marrone Bio Innovations, Inc., Danville, PA, <sup>2</sup>Univ. of Chile, Santiago, Chile, <sup>3</sup>Ferdowsi Univ., Mashhad, Iran

9:15 **0290** Research on entomopathogenic *Steinernema* and *Heterorhabditis* nematodes for biological control of chive gnat (*Bradysia odoriphaga*, Yang and Zhang) in China. **Xun Yan** (yanxun@gdei.gd.cn) and Richou Han, Guangdong Academy of Agricultural Sciences, Guangzhou, China

9:30 **0291** Development of two novel microbes for management of insects, mites, and plant parasitic nematodes in North and Central America and Europe.

**Timothy Johnson** (tjohnson@marronebio.com)<sup>1</sup>, Melissa O'Neal<sup>1</sup>, Bielinski Santos<sup>1</sup>, Nicholas Vandervort<sup>2</sup>, Cole Pearson<sup>1</sup>, and Pamela G. Marrone<sup>1</sup>, <sup>1</sup>Marrone Bio Innovations, Inc., Davis, CA, <sup>2</sup>Marrone Bio Innovations, Inc., Cresco, IA

9:45 **0292** *Steinernema* sp. isolate Lican Ray: A good candidate for biological control of cutworms, *Agrotis* sp. **Gabriela Lankin-Vega** (glankin@uchile.cl), Giselle Vidal, Patricia Flores, Geraldine Allende, Eliana Burgos, Andrea Alvarado, Javier Ramirez, and Erwin Aballay, Univ. of Chile, Santiago, Chile

10:00 **0293** Field efficacy of entomopathogenic nematodes against the leopard moth borer, *Zeuzera pyrina* L. (Lepidoptera: Cossidae). **Elham Salari** (salari.elham@stu-mail.um.ac.ir)<sup>1</sup>, Javad Karimi<sup>1</sup>, Hussein Sadeghi-Nameghi<sup>1</sup>, and Majid Fasihi Harandi<sup>2</sup>, <sup>1</sup>Ferdowsi Univ., Mashhad, Iran, <sup>2</sup>Kerman Univ. of Medical Sciences, Kerman, Iran

### 10:15 BREAK

10:30 **0294** Controlling pests in open field eggplant grown in Florida with predatory mites and *Metarhizium anisopliae*. **Barry C. Kostyk** (bkostyk@ufl.edu) and Philip A. Stansly, Univ. of Florida, Immokalee, FL

10:45 **0295** Additive or synergistic interactions between bifenthrin and an emulsifiable formulation of *Beauveria bassiana* against insecticide-resistant annual bluegrass weevil, *Listronotus maculicollis*. **Shaohui Wu** (sw687@rci.rutgers.edu), Olga Kostromytska, and Albrecht M. Koppenhöfer, Rutgers, The State Univ. of New Jersey, New Brunswick, NJ



- 11:00 **0296** Field testing of a novel system for dissemination of an entomopathogenic fungus, *Isaria fumosorosea*, to control the Asian citrus psyllid, *Diaphorina citri*, on residential citrus. **Andrew Chow** (andrew.chow@tamuk.edu)<sup>1</sup>, Joseph Patt<sup>2</sup>, and Mamoudou Setamou<sup>1</sup>, <sup>1</sup>Texas A&M Univ., Weslaco, TX, <sup>2</sup>USDA - ARS, Ft. Pierce, FL
- 11:15 **0297** Development of insect pathogen fungi *Beauveria bassiana* (Balsamo) Vuillemin (Ascomycota: Hypocreales) as endophytic fungi and effect on plant growth of upland rice. **Rina Racmawati** (rina\_rachmawati@yahoo.com), Rizal Rianfauzi, Toto Himawan, and Sri Karindah, Univ. of Brawijaya, Malang, Indonesia
- 11:30 **0298** The role of starvation on the synergy between a fungal pathogen and a pesticide. **Joanna Fisher** (jjf236@cornell.edu), Louela Castrillo, and Ann E. Hajek, Cornell Univ., Ithaca, NY
- 11:45 **0299** Insecticidal activities of *Beauveria bassiana* and *Metarhizium* spp. against larval and adult housefly, *Musca domestica* L. Raliat Oyerinde, **Olalekan Soyelu** (jlekan2001@yahoo.co.uk) and Babajide Odu, Obafemi Awolowo Univ., Ile-Ife, Nigeria
- 12:00 **0300** Entomopathogen fungi as biological control of macadamia felted coccid (*Eriococcus ironsidei*) in Hawaii. **Rosemary Gutierrez** (gr6@hawaii.edu)<sup>1</sup> and Mark Wright<sup>2</sup>, <sup>1</sup>Univ. of Hawai'i, Hilo, HI, <sup>2</sup>Univ. of Hawai'i, Honolulu, HI
- 12:15 **0301** Expression of CryIFa-toxin receptors during development of fall armyworm, *Spodoptera frugiperda*. **Heba Abdelgaffar** (habdelga@utk.edu), Lucas Hietala, Shivangi Patel, and Juan Luis Jurat-Fuentes, Univ. of Tennessee, Knoxville, TN
- 12:30 **0302** Research on *Varroa destructor* and viruses of honeybees. **Yi Zhang** (zy3001@163.com), Xun Yan, and Richou Han, Guangdong Academy of Agricultural Sciences, Guangzhou, China

**Contributed Papers: Biological Control and Insect Pathology: Unique Studies I**

**Room W224 D (Convention Center)**

**Moderators:** Keith Stokes<sup>1</sup> and John Charles<sup>2</sup>, <sup>1</sup>USDA - ARS, Albany, CA, <sup>2</sup>The New Zealand Institute for Plant & Food Research, Ltd., Auckland, New Zealand

- 9:15 **0303** A meta-analytic comparison of biological control and natural top-down regulation. **Keith Stokes** (keith.stokes@ars.usda.gov)<sup>1</sup>, Peter Stiling<sup>2</sup>, and Paul Pratt<sup>1</sup>, <sup>1</sup>USDA - ARS, Albany, CA, <sup>2</sup>Univ. of South Florida, Tampa, FL
- 9:30 **0304** Classical and augmentative biological control in host-rich and host-poor environments. **Ernest Delfosse** (delfosse@cns.msu.edu)<sup>1</sup> and Paul Ode<sup>2</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>Colorado State Univ., Fort Collins, CO
- 9:45 **0305** Biological control of the brown marmorated stink bug, *Halyomorpha halys* (Hemiptera: Pentatomidae), using *Euthyrhynchus floridanus* (Hemiptera: Pentatomidae). **Julio Medal** (julio.medal@freshfromflorida.com), Florida Dept. of Agriculture and Consumer Services, Gainesville, FL

- 10:00 **0306** Do ecological sieves narrow the field host range of a classical biological control agent candidate for the brown marmorated stink bug? **Paul Botch** (botchpau@msu.edu) and Ernest Delfosse, Michigan State Univ., East Lansing, MI

**10:15 BREAK**

- 10:30 **0307** Preemptive assessment of the biosafety of a classical biocontrol agent: Responses of *Trissolcus japonicus* to New Zealand's native Pentatomidae prior to the arrival of BMSB. **John Charles** (john.charles@plantandfood.co.nz), Robin Gardner-Gee, Sophie Hunt, Frances MacDonald, and Vicky Davis, The New Zealand Institute for Plant & Food Research, Ltd., Auckland, New Zealand
- 10:45 **0308** Mass rearing of *Spalgis epius* (Lepidoptera: Lycaenidae), a candidate biocontrol agent of mealybugs (Hemiptera: Pseudococcidae). **Melally Giddegowda Venkatesha** (venkatmelally@gmail.com), Bangalore Univ., Bangalore, India
- 11:00 **0309** Population fluctuation of Bagrada bug (*Bagrada hilaris*) and its natural enemies in Saltillo, Mexico. **Reyna Torres-Acosta** (rita\_taz84@hotmail.com)<sup>1</sup>, Veronica Hernandez-Hernandez<sup>1</sup>, Richard Humber<sup>2</sup>, Oscar E. Rosales-Escobar<sup>1</sup>, and Sergio Sanchez-Peña<sup>1</sup>, <sup>1</sup>Antonio Narro Agrarian Autonomous Univ., Saltillo, Mexico, <sup>2</sup>USDA - ARS, Ithaca, NY
- 11:15 **0310** Predator effectiveness and their roles in controlling thrips on lettuce under hydroponic cultivation. **Sopon Uraichuen** (sopon.u@ku.ac.th) and Rattigan Submok, Kasetsart Univ., Nakhon Pathom, Thailand
- 11:30 **0311** Predatory thrips complex in northern Thailand. **Samaporn Saengyot** (sama\_mju@yahoo.com), MaeJo Univ., San Sai, Thailand
- 11:45 **0312** Using parasitoid data from the native range to predict attack in the invaded range. **Gregory S. Wheeler** (greg.wheeler@ars.usda.gov)<sup>1</sup> and Fernando Mc Kay<sup>2</sup>, <sup>1</sup>USDA - ARS, Ft. Lauderdale, FL, <sup>2</sup>FuEDEI, Buenos Aires, Argentina
- 12:00 **0313** Potential Indian anthocorid predators – an overview. **Chandish Ballal** (ballalchandish@gmail.com)<sup>1</sup>, Kazutaka Yamada<sup>2</sup>, and Richa Varshney<sup>1</sup>, <sup>1</sup>National Bureau of Agricultural Insect Resources, Bangalore, India, <sup>2</sup>Tokushima Prefectural Museum, Tokushima, Japan

**Contributed Papers: Ecology and Population Dynamics: Sampling**

**West Hall F3 (WF3) (Convention Center)**

**Moderators:** Christopher G. Adams<sup>1</sup> and Ellen Yerger<sup>2</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>Indiana Univ. of Pennsylvania, Indiana, PA

- 9:15 **0314** The life history, behavior, and conservation of the tiger spiketail dragonfly (*Cordulegaster erronea* Hagen) in New Jersey with notes on radiotelemetry studies. **David Moskowitz** (dmoskowitz@ecolsciencs.com), Rutgers, The State Univ. of New Jersey, Rockaway, NJ



- 9:30 **0315** Using ectoparasites to demonstrate population dynamics. **M. D. Meyer** (michael.meyer@cnu.edu), Kelsey Ekholm, Joseph Danielson, and Richard Sherwin, Christopher Newport Univ., Newport News, VA
- 9:45 **0316** Automatic detection and counting of rice planthoppers in paddy fields by image processing methods. **Qing Yao** (q-yao@126.com)<sup>1</sup>, Zheng Wang<sup>1</sup>, Guote Chen<sup>1</sup>, Jiang Tang<sup>2</sup>, and Baojun Yang<sup>2</sup>, <sup>1</sup>Zhejiang Sci-Tech Univ., Hangzhou, China, <sup>2</sup>China National Rice Research Institute, Hangzhou, China
- 10:00 **0317** A sampling program for the white mango scale *Aulacaspis tubercularis* Newstead (Hemiptera: Diaspididae). **Mario A. Urias-López** (urias.marioalfonso@inifap.gob.mx)<sup>1</sup>, Urbano Nava-Camberos<sup>2</sup> and Luis M. Hernández-Fuentes<sup>3</sup>, <sup>1</sup>National Institute of Forest Research, Agriculture and Livestock, Santiago Ixcuintla, Mexico, <sup>2</sup>Juarez Univ. of the State of Durango, Gómez Palacio, Mexico, <sup>3</sup>INIFAP, Santiago Ixcuintla, Mexico
- 10:15 BREAK**
- 10:30 **0318** Presentation withdrawn
- 10:45 **0319** Trapping of biological random walkers Part 1: Predictions for single-trap, multiple-release outcomes based on computer simulations. James Miller<sup>1</sup>, Paul A. Weston<sup>2</sup>, Christopher Adams<sup>1</sup>, Jeffrey Schenker<sup>1</sup>, and **Peter S. McGhee** (mcghee@msu.edu)<sup>1</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>Charles Sturt Univ., Wagga Wagga, Australia
- 11:00 **0320** Trapping of biological random walkers Part 2: Field results of single-trap, multiple-release experiments with codling moth, *Cydia pomonella*. **Christopher G. Adams** (adamsch@msu.edu), Larry Gut, Jeffrey Schenker, and James R. Miller, Michigan State Univ., East Lansing, MI
- 11:15 **0321** Trapping of biological random walkers Part 3: Two-dimensional heat equation as the foundation for translating catch number into absolute pest density. James R. Miller, **Jeffrey Schenker** (jeffrey@math.msu.edu), and Christopher G. Adams, Michigan State Univ., East Lansing, MI
- 11:30 **0322** A method to determine leaf area eaten by insect herbivores, with novel software that computes missing leaf portions. **Ellen Yerger** (ellen.yerger@iup.edu) and H. Edward Donley, Indiana Univ. of Pennsylvania, Indiana, PA
- 11:45 **0323** Visualizing age-specific daily activity levels and cohort survival in *D. melanogaster*: A minute-by-minute analysis. **Congwei Yu** (cowyu@ucdavis.edu)<sup>1</sup>, Sarah Silverman<sup>2</sup>, Xiongkui He<sup>1</sup>, Ed Lewis<sup>2</sup>, and James R. Carey<sup>2</sup>, <sup>1</sup>China Agricultural Univ., Beijing, China, <sup>2</sup>Univ. of California, Davis, CA

### Contributed Papers: Entomological Effects of Global Warming in Agriculture and Medical Entomology

#### Room W314 A (Convention Center)

**Moderators:** Joon-Ho Lee<sup>1</sup>, Byju N. Govindan<sup>2</sup>, and Osama Seidahmed<sup>3</sup>, <sup>1</sup>Seoul National Univ., Seoul, South Korea, <sup>2</sup>Washington State Univ., Pullman, WA, <sup>3</sup>Massachusetts Institute of Technology, Cambridge, MA

- 9:15 **0324** A mechanistic model for dengue under the coexistence of *Aedes aegypti* and *Aedes albopictus* in endemic areas. **Osama Seidahmed** (omekki@mit.edu) and Elfatih Eltahir, Massachusetts Institute of Technology, Cambridge, MA
- 9:30 **0325** *Cotesia vestalis* (Haliday) reduced basal and plastic responses to temperature may compromise efficacy of *Plutella xylostella* (L.) biological control under climate change. **Honest Machekano** (honest.machekano@studentmail.biust.ac.bw) and Casper Nyamukondiwa, Botswana International Univ. of Science and Technology, Palapye, Botswana
- 9:45 **0326** Predicting climate change impacts on the phenology of the bean bug *Riptortus pedestris* using simulation models in Korea. Hyoseok Lee, Hyoeun Kim, and **Joon-Ho Lee** (jh7lee@snu.ac.kr), Seoul National Univ., Seoul, South Korea
- 10:00 **0327** CLIMEX based potential distribution of *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) under climate change. **Vaddi Sridhar** (vsridhar@ihr.res.in)<sup>1</sup>, L. S. Vinesh<sup>2</sup>, M. Jayashankar<sup>2</sup>, and R. Ashokan<sup>2</sup>, <sup>1</sup>Indian Institute of Horticultural Research, Bangalore, India, <sup>2</sup>Indian Council of Agricultural Research, Bangalore, India
- 10:15 BREAK**
- 10:30 **0328** Simulated effects of CO<sub>2</sub> and warming on cereal leaf beetle (*Oulema melanopus*) induced crop loss on winter wheat in the Pacific Northwest USA. **Byju N. Govindan** (ngbyju@gmail.com)<sup>1</sup>, Sanford D. Eigenbrode<sup>2</sup>, and Claudio Stockle<sup>1</sup>, <sup>1</sup>Washington State Univ., Pullman, WA, <sup>2</sup>Univ. of Idaho, Moscow, ID

### Contributed Papers: Entomology Around the World

#### Room W224 A (Convention Center)

**Moderators:** Nannan Liu and Ming Li, Auburn Univ., Auburn, AL

- 9:15 **0329** Cold disinfestation for fruit flies – 100 years of research, regulation, and trade. **Caitano De Lima** (cpfdelima@hotmail.com)<sup>1</sup> and Joanne Wilson<sup>2</sup>, <sup>1</sup>AgHort Solutions, Perth, Australia, <sup>2</sup>Ministry for Primary Industries, Wellington, New Zealand
- 9:30 **0330** National moth week: A growing global event. **John Cambridge** (john.cambridge000@gmail.com)<sup>1</sup>, David Moskowit<sup>2</sup>, and George C. Hamilton<sup>1</sup>, <sup>1</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, <sup>2</sup>Rutgers, The State Univ. of New Jersey, Rockaway, NJ
- 9:45 **0331** Beetles, bugs, and butterflies – reflections on 25 years of bug camp. **Steven Murphree** (steve.murphree@belmont.edu), Belmont Univ., Nashville, TN
- 10:00 **0332** Eating larvae of *Pachymerus nucleorum* (Coleoptera: Chrysomelidae): An endangered traditional practice in the north of Tocantins, Brazil. **Vivian Sandoval Gómez** (vivian.sandoval@gmail.com) and Virginia Sousa Soares, Federal Univ. of Tocantins, Araguaína, Brazil
- 10:15 BREAK**

- 10:30 **0333** Insects and the public: Engagement, education, and outreach. **Luke Tilley** (luke@royensoc.co.uk), Royal Entomological Society, St. Albans, United Kingdom
- 10:45 **0334** Ecological engineering for rice insect pest management via biodiversity technology – approaches for up-scaling. **Zeng-Rong Zhu** (zrzhu2005@sina.com)<sup>1</sup>, Kong Luen Heong<sup>1,2</sup>, Monina Escalada<sup>3</sup>, and Jiaan Cheng<sup>1</sup>, <sup>1</sup>Zhejiang Univ., Hangzhou, China, <sup>2</sup>CABI, Selangor, Malaysia, <sup>3</sup>Visayas State Univ., Baybay City, Philippines
- 11:00 **0335** Early detection of pink bollworm (*Pectinophora gossypiella* (Saunders)) using remote sensing technologies. **Mona Yones** (monayones@yahoo.com)<sup>1</sup>, Hassan Dahi<sup>2</sup>, Eslam Farag<sup>2</sup>, Walaa Gamil<sup>2</sup>, and Mohamed Aboelghar<sup>2</sup>, <sup>1</sup>National Authority for Remote Sensing and Space Sciences, Cairo, Egypt, <sup>2</sup>Cairo Univ., Cairo, Egypt
- 11:15 **0336** Progress in developing an international grand challenge agenda for global entomology programming. **Phillip G. Mulder** (phil.mulder@okstate.edu)<sup>1</sup>, C. David Gammel<sup>2</sup>, Frank Zalom<sup>3</sup>, and Grayson Brown<sup>4</sup>, <sup>1</sup>Oklahoma State Univ., Stillwater, OK, <sup>2</sup>Entomological Society of America, Annapolis, MD, <sup>3</sup>Univ. of California, Davis, CA, <sup>4</sup>Univ. of Kentucky, Lexington, KY
- 11:30 **0337** Taxonomic review of the tribe Eucosmini (Lepidoptera: Tortricidae) in the Korean peninsula. Bong-Kyu Byun and **Da-Som Kim** (n4311@hanmail.net), Hannam Univ., Daejeon, South Korea
- 11:45 **0338** Vinsectos: A survey of insects depicted on wine labels. **Jack Jenkins** (jackjenkins@qwestoffice.net), Pacific BioControl Corporation, Litchfield, AZ
- 12:00 **0339** Presentation withdrawn
- 12:15 **0340** Presentation withdrawn
- 12:30 **0341** Biogeography of hyperdiverse flightless weevils reflects the complex geological history of the Sunda Arc revealed through biogeographic model selection. **Matthew Van Dam** (matthewhvandam@gmail.com), Bavarian State Collection of Zoology, Munich, Germany
- 10:00 **0345** World's first automated mass digitization line for pinned insects. **Hannu Saarenmaa** (hannu.saarenmaa@uef.fi), Janne Karppinen, Riitta Tegelberg, and Zhengzhe Wu, Univ. of Eastern Finland, Joensuu, Finland
- 10:15 **BREAK**
- 10:30 **0346** Quantifying insect movement and behavior. **Michael Guidi** (michael.guidi@noldus.com), Noldus Information Technology, Asheville, NC
- 10:45 **0347** Quantifying functional diversity of insect communities. **Jeffrey Holland** (jdholland@purdue.edu) and Ashley Kissick, Purdue Univ., West Lafayette, IN
- 11:00 **0348** Effects of radio transmitter attachment on flying insects: A case study using *Bombus terrestris*. **Brian Cutting** (brian.cutting@plantandfood.co.nz)<sup>1</sup>, Lisa Evans<sup>1</sup>, Ashleigh Weatherall<sup>2</sup>, Anita Pearson<sup>2</sup>, Nadège Goëbau<sup>3</sup>, and David Pattemore<sup>1</sup>, <sup>1</sup>The New Zealand Institute for Plant & Food Research, Ltd., Hamilton, New Zealand, <sup>2</sup>Univ. of Waikato, Hamilton, New Zealand, <sup>3</sup>Agrocampus-Ouest, Rennes, France
- 11:15 **0349** DNA barcoding for the identification of North American Pyraustinae (Lepidoptera: Pyraloidea: Crambidae). **Zhaofu Yang** (zfy6511@gmail.com)<sup>1</sup>, Jean-François Landry<sup>2</sup>, Yalin Zhang<sup>1</sup>, and Paul Hebert<sup>3</sup>, <sup>1</sup>Northwest A&F Univ., Yangling, China, <sup>2</sup>Agriculture and Agri-Food Canada, Ottawa, ON, Canada, <sup>3</sup>Univ. of Guelph, Guelph, ON, Canada
- 11:30 **0350** Ode-omatic ID: A system for automatically identifying dragonflies and damselflies (Odonata) from wings. **William R. Kuhn** (willkuhn@vt.edu)<sup>1</sup>, Gareth Russell<sup>2</sup>, and Jessica Ware<sup>1</sup>, <sup>1</sup>Rutgers, The State Univ. of New Jersey, Newark, NJ, <sup>2</sup>New Jersey Institute of Technology, Newark, NJ
- 11:45 **0351** Exploiting plant DNA barcoding to determine nectar sources of Rift Valley fever, dengue, and malaria mosquito vectors. **Vincent Nyasembe** (vnyasembe@icipce.org), David Tchouassi, and Baldwyn Torto, International Centre of Insect Physiology and Ecology, Nairobi, Kenya
- 12:00 **0352** A tale of two datasets: Consilient approaches toward detailing the evolutionary history of ants (Hymenoptera: Formicidae). **Phillip Barden** (pbarden@amnh.org) and Jessica Ware, Rutgers, The State Univ. of New Jersey, Newark, NJ
- 12:15 **0353** Frontiers in live Strepsiptera collection: The *Elenchus koebelei* (Pierce) and *Triozocera mexicana* (Pierce) connection. **Marisano James** (mjajames@ucdavis.edu), Univ. of California, Davis, CA

### Contributed Papers: Frontiers in Entomology: Tools and Methods

#### Room W224 G (Convention Center)

**Moderators:** Nikos Papadopoulos<sup>1</sup> and Pierre Martin<sup>2</sup>, <sup>1</sup>Univ. of Thessaly, Nea Ionia, Greece, <sup>2</sup>CIRAD, Montpellier, France

- 9:15 **0342** Innovation under pressure: New tools and methods in systemic injection. Joseph Doccola and **Don Grosman** (dgrosman@arborjet.com), Arborjet, Inc., Woburn, MA
- 9:30 **0343** Knowledge management for a wonderful (computerized) world. **Pierre Martin** (pierre.martin@cirad.fr)<sup>1</sup>, Pierre Silvie<sup>2</sup> and François-Régis Goebel<sup>1</sup>, <sup>1</sup>CIRAD, Montpellier, France, <sup>2</sup>IRD/CIRAD, Montpellier, France
- 9:45 **0344** *Morpho* morphometrics: Shared ancestry and selection drive the evolution of wing size and shape in *Morpho* butterflies. **Vincent Debat** (debat@mnhn.fr), National Museum of Natural History, Paris, France

### Contributed Papers: Insect Chemical Ecology: Physiology

#### Room W224 B (Convention Center)

**Moderators:** Julien Pelletier<sup>1</sup> and Jing-Jiang Zhou<sup>2</sup>, <sup>1</sup>Keele Univ., Keele, United Kingdom, <sup>2</sup>Rothamsted Research, Harpenden, United Kingdom

- 9:15 **0354** Sublethal effects of larval exposure to phosphine on reproductive activities of *Liposcelis entomophila* (Enderlein). **Yujie Lu** (luyujie1971@163.com), Henan Univ. of Technology, Zhengzhou, China



- 9:30 **0355** Odorant receptor-based discovery of natural repellents of human lice. **Julien Pelletier** (j.pelletier@keele.ac.uk)<sup>1</sup>, Pingxi Xu<sup>2</sup>, Kyong Sup Yoon<sup>3</sup>, John M. Clark<sup>3</sup>, and Walter S. Leal<sup>2</sup>, <sup>1</sup>Keele Univ., Keele, United Kingdom, <sup>2</sup>Univ. of California, Davis, CA, <sup>3</sup>Univ. of Massachusetts, Amherst, MA
- 9:45 **0356** Effects of overexpressing individual lignin biosynthetic enzymes on feeding and growth of corn earworms (*Helicoverpa zea*) and fall armyworms (*Spodoptera frugiperda*). **Patrick Dowd** (patrick.dowd@ars.usda.gov)<sup>1</sup>, Thomas Clemente<sup>2</sup>, and Scott E. Sattler<sup>3</sup>, <sup>1</sup>USDA - ARS, Peoria, IL, <sup>2</sup>Univ. of Nebraska, Lincoln, NE, <sup>3</sup>USDA - ARS, Lincoln, NE
- 10:00 **0357** Crystal structures and binding dynamics of odorant-binding protein 3 from two aphid species *Megoura viciae* and *Nasonovia ribisnigri*. Tom Northey<sup>1</sup>, Herbert Venthur<sup>2</sup>, Filomena De Biasio<sup>3</sup>, Francois-Xavier Chauviac<sup>1</sup>, Ambrose Cole<sup>1</sup>, Karlos Ribeiro<sup>4</sup>, Gerarda Grossi<sup>3</sup>, Patrizia Falabella<sup>3</sup>, Lin Field<sup>4</sup>, Nicholas Keep<sup>1</sup>, and **Jing-Jiang Zhou** (jjing-jiang.zhou@rothamsted.ac.uk)<sup>4</sup>, <sup>1</sup>Univ. of London, London, United Kingdom, <sup>2</sup>Univ. of La Frontera, Temuco, Chile, <sup>3</sup>Univ. of Basilicata, Potenza, Italy, <sup>4</sup>Rothamsted Research, Harpenden, United Kingdom
- 10:15 BREAK**
- 10:30 **0358** Evolution of the frontal gland in termites (Isoptera) and its role in alarm communication. **Jan Sobotnik** (Sobotnik@seznam.cz)<sup>1</sup>, David Sillam-Dussès<sup>2,3</sup>, Jitka Pfliegerová<sup>1</sup>, Valeria Palma Onetto<sup>1</sup>, Barbora Krizkova<sup>1</sup>, Petr Stiblik<sup>1</sup>, František Jůna<sup>1</sup>, Kristýna Hořková<sup>1</sup>, Cecilia Dahlsjö<sup>1</sup>, and Thomas Bourguignon<sup>4</sup>, <sup>1</sup>Czech Univ. of Life Sciences, Prague, Czech Republic, <sup>2</sup>Univ. of Paris 13, Villetaneuse, France, <sup>3</sup>IRD, Bondy, France, <sup>4</sup>The Univ. of Sydney, Camperdown, Australia
- 10:45 **0359** The sexy smell of sickness: Establishing a link between metabolic, immune, and pheromone pathways in *Drosophila*. **Ian Keeseey** (ikeeseey@ice.mpg.de)<sup>1</sup>, Sarah Koerte<sup>1</sup>, Nicolas Buchon<sup>2</sup>, Markus Knaden<sup>1</sup>, and Bill Hansson<sup>1</sup>, <sup>1</sup>Max Planck Institute for Chemical Ecology, Jena, Germany, <sup>2</sup>Cornell Univ., Ithaca, NY
- 11:00 **0360** Function of pheromone binding proteins in olfactory recognition of two sympatric *Dendrolimus*. **Sufang Zhang** (zhangsf@caf.ac.cn), Xiangbo Kong, Hongbin Wang, and Zhen Zhang, Chinese Academy of Forestry, Beijing, China
- 11:15 **0361** Electrophysiological and behavioral responses of tomato-potato psyllid, *Bactericera cockerelli*, to olfactory and visual stimuli. **Kye Chung Park** (kpark@plantandfood.co.nz), The New Zealand Institute for Plant & Food Research, Ltd., Christchurch, New Zealand
- 11:30 **0362** Analysis of polar cuticular lipids and their roles in semiochemical signaling. **Robert Renthal** (robert.renthall@utsa.edu), The Univ. of Texas, San Antonio, TX
- 11:45 **0363** Candidate chemosensory protein genes in whitefly *Bemisia tabaci* by transcriptome analysis. Ran Wang, Cheng Qu, **Fengqi Li** (pandit@163.com), and Chen Luo, Beijing Academy of Agriculture and Forestry Sciences, Beijing, China

- 12:00 **0364** Lock-in amplified gas chromatography – electroantennography implemented using a Deans switch. **Andrew Myrick** (ajm25@psu.edu) and Thomas C. Baker, Pennsylvania State Univ., University Park, PA
- 12:15 **0365** Linking ecological adaptations in olfaction-based reproductive behaviors in a phytophagous and a bloodsucking insect species. **Muhammad Binyameen** (mbinyameen@bzu.edu.pk)<sup>1</sup>, Sarfraz Shad<sup>1</sup>, Raheel Qadeer<sup>1</sup>, Muhammad Khan<sup>1</sup>, Rizwan Shah<sup>1</sup>, Muhammad Imran<sup>1</sup>, Mehboob Alam<sup>1</sup>, Qasim Ali<sup>1</sup>, Shahid Majeed<sup>2</sup>, and Zahid Sarwar<sup>1</sup>, <sup>1</sup>Bahauddin Zakariya Univ., Multan, Pakistan, <sup>2</sup>Univ. of Agriculture, Faisalabad, Pakistan

## Contributed Papers: Insect Chemical Ecology: Plant Protection

### West Hall F1 (WF1) (Convention Center)

- Moderators:** Amanuel Tamiru Abamo<sup>1</sup> and Joseph Patt<sup>2</sup>, <sup>1</sup>International Centre of Insect Physiology and Ecology, Mbita, Kenya, <sup>2</sup>USDA - ARS, Ft. Pierce, FL
- 9:15 **0366** Effects of exogenous application of methyl jasmonate on foliar volatile emission in sweet orange (*Citrus sinensis*) and aggregation behavior of Asian citrus psyllid (*Diaphorina citri*). **Joseph Patt** (joseph.patt@ars.usda.gov), Paul S. Robbins, Rocco Alessandro, and Greg McCollum, USDA - ARS, Ft. Pierce, FL
- 9:30 **0367** Plant signalling: Opportunities for management of cereal stemborers in sub-Saharan Africa. **Tigist Tolosa** (ttolosa@icipi.org)<sup>1,2</sup>, Charles Midega<sup>1</sup>, Johnnie van den Berg<sup>2</sup>, Michael Birkett<sup>3</sup>, Christine Woodcock<sup>3</sup>, Toby Bruce<sup>3</sup>, John Pickett<sup>3</sup>, and Zeyaur Khan<sup>1</sup>, <sup>1</sup>International Centre of Insect Physiology and Ecology, Nairobi, Kenya, <sup>2</sup>North-West Univ., Potchefstroom, South Africa, <sup>3</sup>Rothamsted Research, Harpenden, United Kingdom
- 9:45 **0368** Efforts to identify the major sex pheromone component of the mushroom sciarid fly, *Lycoriella ingenua*. **Stefanos Andreadis** (ssa18@psu.edu)<sup>1</sup>, Kevin Cloonan<sup>1</sup>, Andrew Myrick<sup>1</sup>, Haibin Chen<sup>2</sup>, and Thomas C. Baker<sup>1</sup>, <sup>1</sup>Pennsylvania State Univ., University Park, PA, <sup>2</sup>Wenzhou Medical Univ., Wenzhou, China
- 10:00 **0369** Repellency of phylogenetically diverse plant odors to *Contarinia nasturtii* (Diptera: Cecidomyiidae). **Chase Stratton** (castratt@uvm.edu)<sup>1</sup>, Cesar Rodriguez-Saona<sup>2</sup>, Elisabeth Hodgdon<sup>1</sup>, and Yolanda Chen<sup>1</sup>, <sup>1</sup>Univ. of Vermont, Burlington, VT, <sup>2</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ
- 10:15 BREAK**
- 10:30 **0370** Sulcatone and sulcatol as pheromone components of cerambycid beetles in the subfamily Lamiinae. **Linnea R. Meier** (linrmeier@gmail.com)<sup>1</sup>, Judy A. Mongold-Diers<sup>1</sup>, Yunfan Zou<sup>2</sup>, Jocelyn G. Millar<sup>2</sup>, and Lawrence M. Hanks<sup>3</sup>, <sup>1</sup>Univ. of Illinois, Champaign, IL, <sup>2</sup>Univ. of California, Riverside, CA, <sup>3</sup>Univ. of Illinois, Urbana, IL

- 10:45 **0371** Triterpenoids as determinants of birch chemical defense against gypsy moth (*Lymantria dispar*). Irina Belousova<sup>1</sup>, Elena Chernyak<sup>2</sup>, Sergey Morozov<sup>2</sup>, and **Vyacheslav Martemyanov** (martemyanov79@yahoo.com)<sup>1</sup>, <sup>1</sup>Institute of Systematics and Ecology of Animals, Novosibirsk, Russia, <sup>2</sup>Novosibirsk Institute of Organic Chemistry, Novosibirsk, Russia
- 11:00 **0372** Laboratory and field assessment of candidate pheromone blends for mating disruption of the swede midge, *Contarinia nasturtii* (Diptera: Cecidomyiidae). **Elisabeth Hodgdon** (ehodgdon@uvm.edu)<sup>1</sup>, Rebecca Hallett<sup>2</sup> and Yolanda Chen<sup>1</sup>, <sup>1</sup>Univ. of Vermont, Burlington, VT, <sup>2</sup>Univ. of Guelph, Guelph, ON, Canada
- 11:15 **0373** Two noctuid herbivores exhibit species-specific differences in survival, body development, muscle gene expression, and adult flight capacity in response to variation in host plant induced defenses. **Scott Portman** (slportman37@gmail.com)<sup>1</sup>, Michelle Peiffer<sup>2</sup>, Gary Felton<sup>2</sup>, and James H. Marden<sup>2</sup>, <sup>1</sup>Montana State Univ., Conrad, MT, <sup>2</sup>Pennsylvania State Univ., University Park, PA
- 11:30 **0374** Role of caterpillar saliva in mediating transcripts encoding proteins for synthesis of plant secondary metabolites. **Ching-Wen Tan** (czt5069@psu.edu), Michelle Peiffer, and Gary Felton, Pennsylvania State Univ., University Park, PA
- 11:45 **0375** A rocky road to success – the sex pheromone of *Dendrolimus pini*. Dorota Staszek<sup>1</sup>, Krzysztof Rudzinski<sup>1</sup>, **Lidia Sukovata** (lsoukovata@ibles.waw.pl)<sup>2</sup>, Monika Asztemborska<sup>1</sup>, Rafal Szmigielski<sup>1</sup>, Piotr Wawrzyniak<sup>1</sup>, Marek Cieslak<sup>1</sup>, Andrzej Kolk<sup>2</sup>, and Jerzy Raczek<sup>1</sup>, <sup>1</sup>Institute of Physical Chemistry, Warsaw, Poland, <sup>2</sup>Forest Research Institute, Raszyn, Poland
- 12:00 **0376** A maize landrace with a novel indirect defense signaling trait possesses a strongly inducible (*E*)-caryophyllene synthase gene. **Amanuel Tamiru** (atamiru@icipe.org)<sup>1</sup>, Annett Richter<sup>2</sup>, Toby Bruce<sup>3</sup>, Christine Woodcock<sup>3</sup>, John Pickett<sup>3</sup>, Segenet Kelemu<sup>1</sup>, Jörg Degenhardt<sup>2</sup>, and Zeyaur Khan<sup>1</sup>, <sup>1</sup>International Centre of Insect Physiology and Ecology, Nairobi, Kenya, <sup>2</sup>Martin Luther Univ., Halle, Germany, <sup>3</sup>Rothamsted Research, Harpenden, United Kingdom

### Contributed Papers: Insect Immunology: Molecular

#### Room W315 A (Convention Center)

**Moderators:** Germain Chevignon<sup>1</sup> and Fleur Ponton<sup>2</sup>, <sup>1</sup>Univ. of Georgia, Athens, GA, <sup>2</sup>Macquarie Univ., Marsfield, Australia

- 9:15 **0377** *In vitro* transcriptomic analyses of the aphid's secondary symbiont, *Hamiltonella defensa*. **Germain Chevignon** (gchevign@uga.edu), Kerry M. Oliver, and Michael Strand, Univ. of Georgia, Athens, GA
- 9:30 **0378** Transferrin-1 as an immune protein in *Manduca sexta* and *Drosophila melanogaster*. **Maureen Gorman** (mgorman@ksu.edu), Lisa Brummett, and Michael Kanost, Kansas State Univ., Manhattan, KS
- 9:45 **0379** Mutualism meltdown between intracellular symbiotic bacteria and whitefly under high temperature stress. **Hong-Wei Shan** (hwshan2008@163.com),

Wen-Hao Deng, Min-Jing Zhang, Zhen Zhang, Shu-Sheng Liu, and Yin-Quan Liu, Zhejiang Univ., Hangzhou, China

- 10:00 **0380** Regulation of antimicrobial genes via insulin-like signaling pathway in silkworm, *Bombyx mori*. **Xiao-Juan Deng** (dengxj@scau.edu.cn), South China Agricultural Univ., Guangzhou, China

#### 10:15 BREAK

- 10:30 **0381** Regulation and function of thioester-containing proteins in the *Drosophila* immune response against the pathogen *Photobacterium*. **Ioannis Eleftherianos** (ioannise@gwu.edu), The George Washington Univ., Washington, DC
- 10:45 **0382** Transcriptional inhibition of BmToll9-1 by dsRNA in the silkworm larval midgut. **Jisheng Liu** (jisheng.liu@gzhu.edu.cn)<sup>1</sup>, Wenli Liao<sup>1</sup>, Guy Smagghe<sup>2</sup>, and Luc Swevers<sup>3</sup>, <sup>1</sup>Guangzhou Univ., Guangzhou, China, <sup>2</sup>Ghent Univ., Ghent, Belgium, <sup>3</sup>Institute of Biosciences & Applications, Athens, Greece
- 11:00 **0383** Toward understanding the molecular and structural basis of the initiation of a serine protease cascade for insect immune responses. **Daisuke Takahashi**, Brandon Garcia, Brian Geisbrecht, and Michael Kanost (kanost@ksu.edu), Kansas State Univ., Manhattan, KS
- 11:15 **0384** Molecular changes in *Manduca sexta* accompanying enhanced immune competency across generations. **Wendy Smith** (w.smith@neu.edu), Rebeca B. Rosengaus, Steve Vollmer, and Chuck Roesel, Northeastern Univ., Boston, MA
- 11:30 **0385** The molecular basis of nutrient exchange in the whitefly symbiosis with two intracellular bacteria. **Junbo Luan** (jl2957@cornell.edu)<sup>1</sup>, Wenbo Chen<sup>1</sup>, Daniel Hasegawa<sup>1</sup>, Alvin M. Simmons<sup>2</sup>, Kai-Shu Ling<sup>2</sup>, William Wintermantel<sup>3</sup>, Zhangjun Fei<sup>1</sup>, Shu-Sheng Liu<sup>4</sup>, and Angela E. Douglas<sup>1</sup>, <sup>1</sup>Cornell Univ., Ithaca, NY, <sup>2</sup>USDA - ARS, Charleston, SC, <sup>3</sup>USDA - ARS, Salinas, CA, <sup>4</sup>Zhejiang Univ., Hangzhou, China
- 11:45 **0386** Vaccination à la honey bees (*Apis mellifera*). **Dalial Freitak** (dalial.freitak@helsinki.fi)<sup>1</sup>, Heli Salmela<sup>1</sup>, and Gro V. Amdam<sup>2</sup>, <sup>1</sup>Univ. of Helsinki, Helsinki, Finland, <sup>2</sup>Arizona State Univ., Tempe, AZ
- 12:00 **0387** How nutrition affects immunity and resistance in *Drosophila melanogaster*. **Fleur Ponton** (fleur.ponton@sydney.edu.au), Macquarie Univ., Marsfield, Australia

### Contributed Papers: Insect-Plant Interactions in a Changing Climate: Abiotic Factors, Pollinators, and Pathogens

#### West Hall F4 (WF4) (Convention Center)

**Moderators:** Louis Nottingham<sup>1</sup> and Amanda Winters<sup>2</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>Bowling Green State Univ., Bowling Green, OH

- 9:15 **0388** Consequences of land-use intensification on insect pollinator diversity and pollination services. **Jamie Stavert** (jamie.stavert@gmail.com)<sup>1</sup>, Ignasi Bartomeus<sup>2</sup>, David Pattenmore<sup>3</sup>, Anne Gaskett<sup>1</sup>, and Jacqueline Beggs<sup>1</sup>, <sup>1</sup>Univ. of Auckland, Auckland,





- New Zealand, <sup>2</sup>Biological Station of Doñana, Sevilla, Spain, <sup>3</sup>The New Zealand Institute for Plant & Food Research, Ltd., Hamilton, New Zealand
- 9:30 **0389** Honeybee condition in urban ecosystems: Are cities hostile environments for insect pollinators? **Manuel Lequerica** (manuel.lequerica@sydney.edu.au), Paula Salonen, Tanya Latty, Caragh Threlfall, and Dieter Hochuli, The Univ. of Sydney, Sydney, Australia
- 9:45 **0390** Bee-flower interactions in relation to climate changes, foraging activity, and floral rewards of some Indian tree species. **Sunanda Dola** (drsunanda@gvptc.edu.in), Gayatri Vidya Parishad College for Degree and P. G. Courses, Visakhapatnam, India
- 10:00 **0391** Fungal endophyte can affect host selection behavior of cotton aphid (*Aphis gossypii*). **Wenqing Zhou** (alicia.wenqing@gmail.com)<sup>1</sup>, Janice Krumm<sup>2</sup>, James Starr<sup>1</sup>, and Gregory Sword<sup>1</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Widener Univ., Chester, PA
- 10:15 **BREAK**
- 10:30 **0392** Parthenium weed (*Parthenium hysterophorus* L.) associated phyllody phytoplasma and insect vector: A big threat for major agricultural crops. **Jam Ahmad** (jamnazire@yahoo.com) and Samina Ahmad, Univ. of Agriculture, Faisalabad, Pakistan
- 10:45 **0393** Assessing potential use of novel endophytes for insect pest control in tall fescue in Uruguay. **Ximena Cibils-Stewart** (xcibils@inia.org.uy)<sup>1</sup> and Alison Popay<sup>2</sup>, <sup>1</sup>National Institute of Agricultural Research, Colonia, Uruguay, <sup>2</sup>AgResearch, Ltd., Hamilton, New Zealand
- 11:00 **0394** Phytoplasma diseases in cassava. **Elizabeth Alvarez** (e.alvarez@cgiar.org), International Center for Tropical Agriculture, Cali, Colombia
- 11:15 **0395** Direct and indirect effects of predation and warming on herbivory and ecosystem processes. **Amanda Winters** (winteam@bgsu.edu) and Shannon Pelini, Bowling Green State Univ., Bowling Green, OH
- 11:30 **0396** Effect of atmospheric CO<sub>2</sub> rise on population size, development, and gene expression is different between populations of a seed beetle. **Midori Tuda** (tuda@grt.kyushu-u.ac.jp), Than Lin Aung, Than Htway Lwin, Kumiko Kagoshima, Kazuki Mori, and Kosuke Tashiro, Kyushu Univ., Fukuoka, Japan
- 11:45 **0397** Appearance of a new species increases community stability. **Zoltán László** (laszlozoltan@gmail.com)<sup>1</sup>, Hunor Prázmári<sup>1</sup>, Tünde-Ilona Kelemen<sup>1</sup>, Katalin Sólyom<sup>2</sup>, and Béla Tóthmérész<sup>3</sup>, <sup>1</sup>Babeş Bolyai Univ., Cluj-Napoca, Romania, <sup>2</sup>Univ. of Debrecen, Debrecen, Hungary, <sup>3</sup>MTA-DE, Debrecen, Hungary
- 12:00 **0398** Future climate: Its effects on insect vectors and spread of plant diseases. **Piotr Trebicki** (piotr.trebicki@ecodev.vic.gov.au)<sup>1</sup>, Rebecca Vandeger<sup>2</sup>, Nilsa A. Bosque-Pérez<sup>3</sup>, Kevin Powell<sup>4</sup>, Beatriz Dader<sup>5</sup>, Angela Freeman<sup>1</sup>, Alan Yen<sup>2</sup>, Glenn Fitzgerald<sup>1</sup>, and Jo Luck<sup>6</sup>, <sup>1</sup>Dept. of Economic Development, Horsham, Australia, <sup>2</sup>La Trobe Univ., Bundoora, Australia, <sup>3</sup>Univ. of Idaho, Moscow, ID, <sup>4</sup>Dept. of Economic Development, Rutherglen, Australia, <sup>5</sup>Institute of Agricultural Sciences, Madrid, Spain, <sup>6</sup>Plant Biosecurity Cooperative Research Centre, Bruce, Australia
- 12:15 **0399** Feared to forgotten: Did culture and climate subdue the Mexican bean beetle, *Epilachna varivestis*? **Louis Nottingham** (louisn@vt.edu) and Thomas P. Kuhar, Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 12:30 **0400** Elevated CO<sub>2</sub> condition reduces the cabbage foliage quality and allelochemicals that consequently affect the performance of the herbivorous insect *Spodoptera litura* (Fab.). **Pham Anh Tuan** (tuan.nipp@gmail.com), Teakwood Papitchaya, and Shaw-Yhi Hwang, National Chung Hsing Univ., Taichung, Taiwan
- 12:45 **0401** Effect of climatic factors on pest incidence in chickpea (*Cicer arietinum* L.) across different sowing dates. Pavani Thatikonda<sup>1</sup>, **Ramesh Babu** (tatinenir@yahoo.com)<sup>2</sup>, Hari Sharma<sup>3</sup>, and Radhika K.<sup>4</sup>, <sup>1</sup>Professor Jayashankar Telangana State Agricultural Univ., Khammam, India, <sup>2</sup>Acharya N. G. Ranga Agricultural Univ., Hyderabad, India, <sup>3</sup>Dr. YS Parmar Univ. of Horticulture & Forestry, Nauni, Solan, India, <sup>4</sup>Acharya N. G. Ranga Agricultural Univ., Guntur, India
- 1:00 **0402** Impacts of elevated atmospheric CO<sub>2</sub> and O<sub>3</sub> on canopy defoliation in a northern temperate forest system. **Richard L. Lindroth** (richard.lindroth@wisc.edu), John Couture, Timothy D. Meehan, and Eric Kruger, Univ. of Wisconsin, Madison, WI

### Contributed Papers: Integrated Pest Management and Sustainable Agriculture: Agronomic Crops

#### Room W230 A (Convention Center)

**Moderators:** Julien M. Beuzelin<sup>1</sup> and Luis Espino<sup>2</sup>, <sup>1</sup>Louisiana State Univ., Baton Rouge, LA, <sup>2</sup>Univ. of California Cooperative Extension, Colusa, CA

- 9:15 **0403** Effects of defoliation on Mississippi soybean yields. **Benjamin Thrash** (bct157@msstate.edu)<sup>1</sup>, Angus Catchot<sup>1</sup>, Jeff Gore<sup>2</sup>, Don Cook<sup>2</sup>, Fred Musser<sup>1</sup>, Trent Irby<sup>1</sup>, and Jason Krutz<sup>2</sup>, <sup>1</sup>Mississippi State Univ., Mississippi State, MS, <sup>2</sup>Mississippi State Univ., Stoneville, MS
- 9:30 **0404** Using remote sensing to improve the management of stink bugs in cotton in South Carolina. **Francis Reay-Jones** (freayjo@clemson.edu)<sup>1</sup>, Jeremy Greene<sup>2</sup>, Joe Maja<sup>2</sup>, and Phil Bauer<sup>3</sup>, <sup>1</sup>Clemson Univ., Florence, SC, <sup>2</sup>Clemson Univ., Blackville, SC, <sup>3</sup>USDA - ARS, Florence, SC
- 9:45 **0405** Effects of foliar-applied jasmonic acid and seed-applied imidacloprid on phytohormone expression and twospotted spider mite populations in cotton. **Sebe Brown** (sbrown@agcenter.lsu.edu)<sup>1</sup>, David Kerns<sup>1</sup> and Michael Stout<sup>2</sup>, <sup>1</sup>Louisiana State Univ., Winnsboro, LA, <sup>2</sup>Louisiana State Univ. AgCenter, Baton Rouge, LA
- 10:00 **0406** Phylogeography of a wheat pest (*Cephus cinctus*) revisited: Management implications. **Marie-Claude Bon** (mcbon@ars-ebcl.org)<sup>1</sup>, Vincent Lesieur<sup>1,2</sup>, Jean François Martin<sup>2</sup>, Kim A. Hoelmer<sup>3</sup>, David K. Weaver<sup>4</sup> and Terri Randolph<sup>5</sup>, <sup>1</sup>USDA - ARS, Montferrier-sur-Lez, France, <sup>2</sup>Biological Center for the Management of Populations, Montferrier-le-Lez, France, <sup>3</sup>USDA - ARS, Newark, DE, <sup>4</sup>Montana State Univ., Bozeman, MT, <sup>5</sup>Colorado State Univ., Fort Collins, CO

## 10:15 BREAK

10:30 **0407** Effectiveness of monoterpenes as grain protectants against *Sitophilus oryzae* in stored wheat. **Samir Abdelgaleil** (samirabdelgaleil@gmail.com) and Mona Saad, Alexandria Univ., Alexandria, Egypt

10:45 **0408** Nutritional ecology of slug populations in Mid-Atlantic no-till grain fields. **Marion Le Gall** (marionlegall314@gmail.com) and John Tooker, Pennsylvania State Univ., University Park, PA

11:00 **0409** Does landscape structure influence cereal leaf beetle populations through enhancing the abundance of its specific parasitoid *Tetrastichus julis* in wheat fields? **Arash Kheirodin** (kheiroda@myumanitoba.ca)<sup>1</sup>, Héctor A. Cárcamo<sup>2</sup>, and Alejandro Costamagna<sup>1</sup>, <sup>1</sup>Univ. of Manitoba, Winnipeg, MB, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Lethbridge, AB, Canada

11:15 **0410** A dynamic action threshold calculator for aphid management in cereal crops and its development into a mobile app. **Tyler Wist** (tyler.wist@agr.gc.ca)<sup>1</sup>, Chrystel Olivier<sup>1</sup>, Erl Svendsen<sup>1</sup>, John Gavloski<sup>2</sup>, Joan van Baaren<sup>3</sup>, and Owen Olfert<sup>1</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, Saskatoon, SK, Canada, <sup>2</sup>Manitoba Agriculture, Food and Rural Initiatives, Carman, MB, Canada, <sup>3</sup>Univ. of Rennes, Rennes, France

11:30 **0411** Interactive effects of soil silicon amendment and nitrogen fertilization on rice insect pest complex. **James Michael Villegas** (jamesvillegas12@gmail.com)<sup>1</sup>, M. O. Way<sup>2</sup>, and Michael Stout<sup>3</sup>, <sup>1</sup>Louisiana State Univ., Baton Rouge, LA, <sup>2</sup>Texas A&M Univ., Beaumont, TX, <sup>3</sup>Louisiana State Univ. AgCenter, Baton Rouge, LA

11:45 **0412** Developing a monitoring protocol using geostatistical Kriging to characterize the spatial distribution of tadpole shrimp (*Triops longicaudatus*) in California rice fields. **Joanna Bloese** (jbbloese@ucdavis.edu)<sup>1</sup>, Luis Espino<sup>2</sup>, Kevin Goding<sup>1</sup>, Stacey Rice<sup>1</sup>, and Larry Godfrey<sup>1</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>Univ. of California Cooperative Extension, Colusa, CA

12:00 **0413** Performance of Bt corn technologies in the Mid-South. **Don Cook** (dcook@drec.msstate.edu)<sup>1</sup>, Angus Catchot<sup>2</sup>, Nathan Little<sup>3</sup>, Nicholas Seiter<sup>4</sup>, Julien M. Beuzelin<sup>5</sup>, David Kerns<sup>6</sup>, Scott Stewart<sup>7</sup>, Gus Lorenz<sup>8</sup>, Larry Falconer<sup>1</sup>, and Jeff Gore<sup>1</sup>, <sup>1</sup>Mississippi State Univ., Stoneville, MS, <sup>2</sup>Mississippi State Univ., Mississippi State, MS, <sup>3</sup>USDA - ARS, Stoneville, MS, <sup>4</sup>Univ. of Arkansas, Monticello, AR, <sup>5</sup>Louisiana State Univ., Baton Rouge, LA, <sup>6</sup>Louisiana State Univ., Winnsboro, LA, <sup>7</sup>Univ. of Tennessee, Jackson, TN, <sup>8</sup>Univ. of Arkansas, Lonoke, AR

12:15 **0414** Effects of corn grown in organically and conventionally managed soil on *Ostrinia nubilalis* behavior and populations. **Rebecca Schmidt-Jeffris** (schmidt-jeffris@cornell.edu) and Brian A. Nault, Cornell Univ., Geneva, NY

12:30 **0415** Dow Agrosiences transgenic corn strategy and field efficacy. **Kevin Johnson** (kdjohnson@dow.com)<sup>1</sup>, Bradley W. Hopkins<sup>2</sup>, Laura Campbell<sup>3</sup>, and Dwain M. Rule<sup>2</sup>, <sup>1</sup>Dow AgroSciences, Danville, IL, <sup>2</sup>Dow AgroSciences, Indianapolis, IN, <sup>3</sup>Dow AgroSciences, Carbondale, IL

12:45 **0416** The reproductive ecology of female western corn rootworms (*Diabrotica virgifera virgifera* LeConte). **Sarah Hughson** (sahughson@gmail.com) and Joseph Spencer, Univ. of Illinois, Champaign, IL

### Contributed Papers: Integrated Pest Management and Sustainable Agriculture: Insecticides

#### Room W224 E (Convention Center)

**Moderators:** Alejandro Calixto<sup>1</sup>, Mahbuba Jahan<sup>2</sup>, and K. S. Islam<sup>2</sup>, <sup>1</sup>Dow AgroSciences, Wesley Chapel, FL, <sup>2</sup>Bangladesh Agricultural Univ., Mymensingh, Bangladesh

9:15 **0417** Impacts of novel insecticides to three opiine braconid parasitoids *Fopius arisanus* (Sonan), *Diachasmimorpha longicaudata* (Ashmead), and *Psytalia fletcheri* (Silvestri) based on adult mortality under foliar cover spray application. **Steven Souder** (steven.souder@ars.usda.gov)<sup>1,2</sup>, Jaime Pinero<sup>3</sup>, Trevor Smith<sup>4</sup>, and Roger Vargas<sup>1</sup>, <sup>1</sup>USDA - ARS, Hilo, HI, <sup>2</sup>Univ. of Hawai'i, Honolulu, HI, <sup>3</sup>Lincoln Univ., Jefferson City, MO, <sup>4</sup>Florida Dept. of Agriculture and Consumer Services, Gainesville, FL

9:30 **0418** Isoclast™ Active (Sulfoxaflor) for control of sap feeding insects in U.S. specialty crops. **Alejandro Calixto** (aalexto@dow.com)<sup>1</sup>, Melissa Willrich Siebert<sup>2</sup>, Alistair McKay<sup>3</sup>, C. Kuniyoshi<sup>4</sup>, Jesse M. Richardson<sup>5</sup>, and James P. Mueller<sup>6</sup>, <sup>1</sup>Dow AgroSciences, Wesley Chapel, FL, <sup>2</sup>Dow AgroSciences, Greenville, MS, <sup>3</sup>Dow AgroSciences, Clovis, CA, <sup>4</sup>Dow AgroSciences, Fresno, CA, <sup>5</sup>Dow AgroSciences, Hesperia, CA, <sup>6</sup>Dow AgroSciences, Brentwood, CA

9:45 **0419** Temporal profile of neonicotinoid concentrations in cotton, corn, and soybean resulting from insecticide seed treatments. **Adam Whalen** (daw153@msstate.edu)<sup>1</sup>, Angus Catchot<sup>1</sup>, Jeff Gore<sup>2</sup>, Scott Stewart<sup>3</sup>, Gus Lorenz<sup>4</sup>, Don Cook<sup>2</sup>, Fred Musser<sup>1</sup>, Jeffrey Harris<sup>5</sup>, and Natraj Krishnan<sup>1</sup>, <sup>1</sup>Mississippi State Univ., Mississippi State, MS, <sup>2</sup>Mississippi State Univ., Stoneville, MS, <sup>3</sup>Univ. of Tennessee, Jackson, TN, <sup>4</sup>Univ. of Arkansas, Lonoke, AR, <sup>5</sup>USDA - ARS, Baton Rouge, LA

10:00 **0420** Relative toxicity of some neonicotinoids insecticides and two common predators in controlling brown planthopper, *Nilaparvata lugens* (Stal). **Mahbuba Jahan** (jahan-bau@bau.edu.bd) and K. S. Islam, Bangladesh Agricultural Univ., Mymensingh, Bangladesh

## 10:15 BREAK

10:30 **0421** Effectiveness of insecticides against soybean stink bugs and side effects on *Telenomus podisi* and generalist predators. **Silvana Abbate** (silabbate@gmail.com)<sup>1</sup>, Adela Ribeiro<sup>1</sup>, Horacio Silva<sup>1</sup>, Oscar Bentancur<sup>1</sup>, and Enrique Castiglioni<sup>2</sup>, <sup>1</sup>Univ. of the Republic, Paysandú, Uruguay, <sup>2</sup>Univ. of the Republic, Rocha, Uruguay

10:45 **0422** Mode of action of triflumezopyrim (PyraXalt™): A novel mesoionic insecticide for control of planthoppers in rice. **Luis Teixeira** (luis.a.teixeira@dupont.com)<sup>1</sup>, Daniel Cordova<sup>1</sup>, Eric Benner<sup>1</sup>, Mark Schroeder<sup>1</sup>, Daniel Vincent<sup>1</sup>, Vineet Singh<sup>2</sup>, Caleb Holyoke<sup>1</sup>, Wenming Zhang<sup>1</sup>, and Thomas Pahutski<sup>1</sup>, <sup>1</sup>DuPont Crop Protection, Newark, DE, <sup>2</sup>DuPont, Vadodara, Gujarat, India



- 11:00 **0423** Triflumezopyrim (Pyrexalt™) — A new approach to rice plant hopper management in Asia Pacific. **Vineet Singh** (vineet.singh@dupont.com)<sup>1</sup>, Luis Teixeira<sup>2</sup>, Robert Leighty<sup>2</sup>, Daniel Vincent<sup>2</sup>, Daniel Cordova<sup>2</sup>, Rameshwar Rattan<sup>1</sup>, Gurulingappa Pampapathy<sup>3</sup>, Budi Irfan<sup>4</sup>, Iskandar Zulkarnain<sup>4</sup>, Pan Ya-Fei<sup>5</sup>, Haidern Zheng<sup>6</sup>, Quang Nguyen<sup>7</sup>, Wen Wu<sup>8</sup>, Sanjay Sharma<sup>9</sup>, Daisuke Yanagisawa<sup>10</sup>, Haruya Ogawa<sup>10</sup>, and Ung Park<sup>11</sup>, <sup>1</sup>DuPont, Vadodara, India, <sup>2</sup>DuPont Crop Protection, Newark, DE, <sup>3</sup>DuPont, Bangalore, India, <sup>4</sup>DuPont Agricultural Products, Jakarta, Indonesia, <sup>5</sup>DuPont China Holding Company, Ltd., Shanghai, China, <sup>6</sup>DuPont China Holding Company, Ltd., Wuhan, China, <sup>7</sup>DuPont Vietnam Limited, Ho Chi Minh City, Viet Nam, <sup>8</sup>DuPont China Holding Company, Ltd., Beijing, China, <sup>9</sup>DuPont, Gurgaon, India, <sup>10</sup>DuPont Kabushiki Kaisha, Tokyo, Japan, <sup>11</sup>DuPont, Seoul, South Korea
- 11:15 **0424** Effects of Nealta® miticide on beneficial mites. **Katherine Walker** (katherine.walker@basf.com)<sup>1</sup>, Surendra Dara<sup>2</sup>, and Anna Howell<sup>3</sup>, <sup>1</sup>BASF, Research Triangle Park, NC, <sup>2</sup>Univ. of California, San Luis Obispo, CA, <sup>3</sup>Univ. of California, Ventura, CA
- 11:30 **0425** Nealta® miticide knows the good from the bad and the ugly. **Christa Ellers-Kirk** (christa.kirk@basf.com), Steve Broschious, Teresia Nyoike, Rianna Guethling, and Daniel O'Byrne, BASF, Research Triangle Park, NC
- 11:45 **0426** Nealta® miticide, a novel mode of action for spider mite control. **Anil Menon** (anil.menon@basf.com) and William Baxter, BASF, Research Triangle Park, NC
- 12:00 **0427** BASF Insecticides: A growing portfolio for North America and beyond. **Rebecca Willis** (rebecca.willis@basf.com), Daniel O'Byrne, Tommy Wofford, H. Alejandro Arevalo, Mark Peacock, and Christa Ellers-Kirk, BASF, Research Triangle Park, NC
- 12:15 **0428** Inscalis™: A new insecticide for piercing-sucking pest management. **Joe Stout** (joseph.stout@basf.com)<sup>1</sup>, Teresia Nyoike<sup>2</sup>, Tommy Wofford<sup>1</sup>, Christa Ellers-Kirk<sup>1</sup>, and H. Alejandro Arevalo<sup>1</sup>, <sup>1</sup>BASF, Research Triangle Park, NC, <sup>2</sup>Univ. of Florida, Gainesville, FL
- 12:30 **0429** Sivanto Prime: Protecting sorghum and alfalfa from sugarcane aphid and blue alfalfa aphid while preserving beneficial insects. **Amanda Beaudoin** (amanda.beaudoin@bayer.com) and Frank Rittemann, Bayer CropScience, Research Triangle Park, NC
- 12:45 **0430** Sivanto Prime: Protecting fruit and vegetable crops through a flexible fit in IPM programs. Amanda Beaudoin, **Adrian Duehl** (adrian.duehl@bayer.com), and Frank Rittemann, Bayer CropScience, Research Triangle Park, NC
- 1:00 **0431** Evaluation of insecticides and horticultural oils against scale insects in blueberries. **Bal Gautam** (bkgautam@uga.edu), Brian Little, and Ashfaq Sial, Univ. of Georgia, Athens, GA

## Contributed Papers: Medical and Veterinary Entomology: *Anopheles* Vectors of Malaria

### West Hall F2 (WF2) (Convention Center)

**Moderators:** Shune Oliver<sup>1</sup> and Brandyce St. Laurent<sup>2</sup>, <sup>1</sup>Wits Research Institute for Malaria, Johannesburg, South Africa, <sup>2</sup>National Institutes of Health, Rockville, MD

- 9:15 **0432** The effects of heavy metal pollution on the life history and expression of insecticide resistance in the major malaria vector *Anopheles arabiensis* (Diptera: Culicidae). **Shune Oliver** (shuneo@nicd.ac.za)<sup>1,2</sup> and Basil Brooke<sup>1</sup>, <sup>1</sup>Wits Research Institute for Malaria, Johannesburg, South Africa, <sup>2</sup>National Institute for Communicable Diseases, Johannesburg, South Africa
- 9:30 **0433** Size doesn't matter: Why using mosquito wing length and body size as a proxy for vector competence doesn't work under variable conditions. **Lillian Shapiro** (llmjacobs23@gmail.com), Rachel Thomas, and Matthew B. Thomas, Pennsylvania State Univ., University Park, PA
- 9:45 **0434** Adaptation to an inducible tissue-specific cell death system in the malaria vector, *Anopheles stephensi*: A case of the salivary gland. **Daisuke Yamamoto** (daisukey@jichi.ac.jp)<sup>1</sup>, Megumi Sumitani<sup>2</sup>, Katsumi Kasashima<sup>1</sup>, Hideki Sezutsu<sup>2</sup>, and Hiroyuki Matsuoka<sup>1</sup>, <sup>1</sup>Jichi Medical Univ., Shimotsuke, Japan, <sup>2</sup>National Institute of Agrobiological Sciences, Tsukuba, Japan
- 10:00 **0435** A case for employing functional education in the management of malaria in Ghana. Andreas Kudom and **Benjamin Mensah** (bmensah@ucc.edu.gh), Univ. of Cape Coast, Cape Coast, Ghana
- 10:15 **BREAK**
- 10:30 **0436** Increasing outdoor host seeking in *Anopheles gambiae* s.l. over six years of vector control on Bioko Island. **Jacob Meyers** (jacob.i.meyers@gmail.com)<sup>1</sup>, Sharmila Pathikonda<sup>1</sup>, Zachary Popkin-Hall<sup>1</sup>, Matthew Medeiros<sup>1</sup>, Godwin Fuseini<sup>2</sup>, Abrahan Matias<sup>3</sup>, Guillermo Garcia<sup>3</sup>, Hans J Overgaard<sup>4</sup>, Vani Kulkarni<sup>1</sup>, Vamsi Reddy<sup>1</sup>, Christopher Schwabe<sup>2</sup>, Jo Lines<sup>5</sup>, Immo Kleinschmidt<sup>5</sup>, and Michel A. Slotman<sup>1</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Medical Care Development International, Silver Spring, MD, <sup>3</sup>Medical Care Development International, Malabo, Equatorial Guinea, <sup>4</sup>Norwegian Univ. of Life Sciences, Ås, Norway, <sup>5</sup>London School of Hygiene and Tropical Medicine, London, United Kingdom
- 10:45 **0437** Delivery of insecticidal wall lining by community-based teams: Installation methods and acceptability in Bomi County, Liberia. Tuwuyor Belleh<sup>1</sup>, **Jonas Ecke** (j\_ecke@yahoo.com)<sup>2</sup>, David Giesbrecht<sup>3</sup>, Julie Pontarollo<sup>1</sup>, Oliver Pratt<sup>4</sup>, Victor Koko<sup>4</sup>, Sajid Kemal<sup>1</sup>, Richard Allan<sup>5</sup>, and Levi Hinneh<sup>4</sup>, <sup>1</sup>The Mentor Initiative, Monrovia, Liberia, <sup>2</sup>Purdue Univ., West Lafayette, IN, <sup>3</sup>Univ. of Manitoba, Winnipeg, MB, Canada, <sup>4</sup>National Malaria Control Program Liberia, Monrovia, Liberia, <sup>5</sup>The Mentor Initiative, Crawley, United Kingdom
- 11:00 **0438** Cow-baited tents as a tool to monitor and control malaria vectors in Cambodia. **Brandyce St. Laurent** (brandyce.stlaurent@nih.gov), National Institutes of Health, Rockville, MD

- 11:15 **0439** Examination of the Nrf2 regulatory network in the Asian malaria mosquito, *Anopheles stephensi*. AEM Rubayet Elahi<sup>1</sup>, Rebekah Ward<sup>2</sup>, Hayden Roys<sup>2</sup>, Sinthia Jahan<sup>2</sup>, and **Helen Benes** (beneshelen@uams.edu)<sup>2</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>Univ. of Arkansas, Little Rock, AR
- 11:30 **0440** Assessing the ecological risks of a hypothetical escape of genetically modified mosquitoes (*Anopheles gambiae*) from African insectaries. **Keith Hayes** (keith.hayes@csiro.au)<sup>1</sup>, David Peel<sup>1</sup>, Jessica Ford<sup>1</sup>, Geoffrey Hosack<sup>1</sup>, Anders Goncalves da Silva<sup>2</sup>, Jeffrey Dambacher<sup>1</sup>, Scott Foster<sup>1</sup>, Ronald Thresher<sup>1</sup>, Scott Ferson<sup>3</sup>, Nigel Beebe<sup>4</sup>, Simon Barry<sup>1</sup>, and Paul de Barro<sup>5</sup>, <sup>1</sup>CSIRO, Hobart, Australia, <sup>2</sup>Monash Univ., Melbourne, Australia, <sup>3</sup>Applied Biomathematics, Setauket, NY, <sup>4</sup>Univ. of Queensland, Brisbane, Australia, <sup>5</sup>CSIRO, Brisbane, Australia
- 11:45 **0441** Distribution and abundance of *Anopheles* larvae in Toro Local Government Area, Bauchi State, Northeast Nigeria. **Akwashiki Ombugadu** (akwash24@gmail.com)<sup>1,2</sup>, Luka Isah<sup>3</sup>, Nannim Nanvyat<sup>1</sup>, Mahanan Mafuyai<sup>1</sup>, and Hasley Njila<sup>1</sup>, <sup>1</sup>Entomological Society of Nigeria, Abuja, Nigeria, <sup>2</sup>Ecological Society of Nigeria, Jos, Nigeria, <sup>3</sup>Univ. of Jos, Jos, Nigeria
- 12:00 **0442** Presentation withdrawn
- 12:15 **0443** Impact of mass drug administration on the transmission of *Plasmodium falciparum* along the Thai-Myanmar border. **Victor Chaumeau** (victor.chaumeau@ird.fr)<sup>1,2</sup>, Phabele Phatharakokordbun<sup>3</sup>, Nithipa Kwansomboon<sup>4</sup>, Céline Montazeau<sup>1</sup>, Bénédicte Fustec<sup>1</sup>, Selma Metanne<sup>1</sup>, Chiara Andolina<sup>5</sup>, Phubeth Ya-Umphani<sup>1</sup>, Dominique Cerqueira<sup>3</sup>, Theeraphap Chareonviriyaphap<sup>4</sup>, Gilles Delmas<sup>3</sup>, François Nosten<sup>3</sup>, and Vincent Corbel<sup>1</sup>, <sup>1</sup>Institute of Research for Development, Montpellier, France, <sup>2</sup>Centre Hospitalier Univ., Montpellier, France, <sup>3</sup>Shoklo Malaria Research Unit, Mae Sot, Thailand, <sup>4</sup>Kasetsart Univ., Bangkok, Thailand, <sup>5</sup>Shoklo Malaria Research Unit, Bangkok, Thailand

### Contributed Papers: Medical and Veterinary Entomology: Forensic Entomology

#### Room W224 H (Convention Center)

**Moderators:** Kim Hung<sup>1</sup>, Sibyl Bucheli<sup>2</sup>, and Neal Haskell<sup>3</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>Sam Houston State Univ., Huntsville, TX, <sup>3</sup>Forensic Entomology Investigations, Rensselaer, IN

- 9:15 **0444** Responses of three filth fly families (Calliphoridae, Muscidae, and Sarcophagidae) to different odors. **Kim Hung** (kyhung@ncsu.edu), Steven Denning, Wes Watson, and Michael Reiskind, North Carolina State Univ., Raleigh, NC
- 9:30 **0445** Fly-bacteria interactions on human cadavers during decomposition. **Sibyl Bucheli** (bucheli@shsu.edu), Keli King, Lauren Smith, Daniel Haarmann, Raymond Berry, and Aaron Lynne, Sam Houston State Univ., Huntsville, TX
- 9:45 **0446** Factors affecting diurnal flight and oviposition activity of blow flies (Diptera: Calliphoridae) in Indiana. **Neal Haskell** (blowfly@technologist.com), Forensic Entomology Investigations, Rensselaer, IN

- 10:00 **0447** Nocturnal oviposition in forensically important flies (Diptera: Calliphoridae) in South Africa. **Kirstin Williams** (kirstin.williams@durban.gov.za)<sup>1</sup> and Martin Villet<sup>2</sup>, <sup>1</sup>Durban Natural Science Museum, Durban, South Africa, <sup>2</sup>Rhodes Univ., Grahamstown, South Africa
- 10:15 **BREAK**
- 10:30 **0448** Human myiasis in rural South Africa. **Simon Kuria** (kkuria@wsu.ac.za)<sup>1</sup>, Howard Kingu<sup>1</sup>, Adupa Dhaffala<sup>1</sup>, and Martin Villet<sup>2</sup>, <sup>1</sup>Walter Sisulu Univ., Mthatha, South Africa, <sup>2</sup>Rhodes Univ., Grahamstown, South Africa
- 10:45 **0449** Using micro-computed tomography in forensic entomology: A novel, non-destructive method for aging blow fly pupae. **Daniel Martín-Vega** (danielmvega@gmail.com)<sup>1</sup>, Thomas Simonsen<sup>2</sup>, and Martin Hall<sup>1</sup>, <sup>1</sup>The Natural History Museum, London, United Kingdom, <sup>2</sup>Natural History Museum, Aarhus, Denmark
- 11:00 **0450** Bacterial diversity and location within the internal organs of the blowfly *Lucilia sericata* (Meigen). **Natalie Gasz** (ngasz@deakin.edu.au) and Michelle Harvey, Deakin Univ. Australia, Geelong, Australia
- 11:15 **0451** Presentation withdrawn

### Contributed Papers: Stored Products Entomology: Novel Strategies I

#### Room W224 C (Convention Center)

**Moderators:** Nazife Eroglu<sup>1</sup>, Olajumoke Alabi<sup>2</sup>, and Muhammad Saeed<sup>3</sup>, <sup>1</sup>Turkish Scientific and Technological Research Council of Turkey, Kocaeli, Turkey, <sup>2</sup>Univ. of Ibadan, Ibadan, Nigeria, <sup>3</sup>Univ. of Haripur, Haripur, Pakistan

- 9:15 **0452** Potency of *Citrus paradisi* rind essential oil against the maize weevil, *Sitophilus zeamais*. Olufisayo Aina and **Olajumoke Alabi** (jmkalabi@yahoo.com), Univ. of Ibadan, Ibadan, Nigeria
- 9:30 **0453** Effect of powder preparation of clove, ginger, garad, and galangal on the infestation of chickpea grains caused by adult cow pea weevil, *Callosobruchus maculatus*. **Faiza Salah** (faizaruba@yahoo.com), Univ. of Gezira, Wad Medani, Sudan
- 9:45 **0454** Potent Indian medicinal plant *Ixora coccinea* L. for the effective management of *Sitophilus oryzae* L. **P. Lakshmi Soujanya** (soujanyak.scientist@gmail.com)<sup>1</sup>, J. C. Sekhar<sup>1</sup>, Pradyumn Kumar<sup>2</sup>, V. Dhanalaxmi<sup>3</sup>, P. Sravanthi<sup>3</sup>, and U. V. Mallavadhani<sup>3</sup>, <sup>1</sup>Indian Council of Agricultural Research, Hyderabad, India, <sup>2</sup>Indian Council of Agricultural Research, New Delhi, India, <sup>3</sup>Council of Scientific and Industrial Research, Secunderabad, India
- 10:00 **0455** Insecticidal potential of *Detia* Diatomaceous Earth (DDE) against *Lasioderma serricorni* (Fabricius) (Coleoptera: Anobiidae). **Muhammad Saeed** (drsaeedhu@gmail.com)<sup>1</sup>, Abid Farid<sup>1</sup>, Sher Aslam Khan<sup>1</sup>, Muhammad Liaquat<sup>1</sup>, Naushad Ali<sup>1</sup>, Usman Shakir<sup>1</sup>, Imtiaz Ali Khan<sup>2</sup>, Tahir Badshah<sup>1</sup>, Ayub Khan<sup>1</sup>, Zia ur Rehman<sup>1</sup>, and Shah Masaud Khan<sup>1</sup>, <sup>1</sup>Univ. of Haripur, Haripur, Pakistan, <sup>2</sup>Univ. of Agriculture, Peshawar, Pakistan

10:15 **BREAK**



- 10:30 **0456** Effect of grain types on the insecticidal efficacy of *Beauveria bassiana* (Balsamo) Vuillemin mixed with diatomaceous earth against four field strains of *Rhyzopertha dominica* (F.). **Tahira Riasat** (tahirariasat@yahoo.com), Government College Univ., Faisalabad, Pakistan
- 10:45 **0457** Toxicity of Turkish zeolites (Clinoptilolite) combined with food grade silico aerogel against adults of *Tribolium confusum* on malting barley. **Nazife Eroglu** (nazifeeroglu@hotmail.com)<sup>1</sup> and Mevlut Emekci<sup>2</sup>, <sup>1</sup>Turkish Scientific and Technological Research Council of Turkey, Kocaeli, Turkey, <sup>2</sup>Ankara Univ., Ankara, Turkey
- 11:00 **0458** Evaluation of deltamethrin (KObiol) against major storage insect species. **Kimondo Mutambuki** (mutambukikimo@yahoo.com)<sup>1</sup>, John Mbugua<sup>1</sup>, and Christopher Ngatia<sup>2</sup>, <sup>1</sup>Kenya Agricultural and Livestock Research Organization, Nairobi, Kenya, <sup>2</sup>Kenya
- 11:15 **0459** Toxic effect of mixtures of selected fixed oils and synthetic insecticides on the control of maize weevil *Sitophilus zeamais* (Motschulsky). **Samuel Babarinde** (sababarinde@lautech.edu.ng)<sup>1</sup>, Oladele Olaniran<sup>1</sup>, Adeola Odewole<sup>1</sup>, Adetayo Adeleye<sup>1</sup>, and Ebenezer Esan<sup>2</sup>, <sup>1</sup>Ladoke Akintola Univ. of Technology, Ogbomosho, Nigeria, <sup>2</sup>Obafemi Awolowo Univ., Ibadan, Nigeria
- 11:30 **0460** Bioefficacy of phytosanitary irradiation against the various ontogenic stages of the solenopsis mealybug, *Phenacoccus solenopsis* (Homoptera: Pseudococcidae). **Mahtab Zarin** (mahtabzarin1@yahoo.co.in), Ranjana Seth, and Rakesh Kumar Seth, Univ. of Delhi, New Delhi, India
- 11:45 **0461** Biology and bio-intensive management of *Callosobruchus theobromae* Linnaeus (Coleoptera: Bruchidae). **D. R. Thakur** (drdr4@rediffmail.com), Himachal Pradesh Univ., Shimla, India
- 12:00 **0462** Potential of microwave irradiation on the postharvest control of cowpea weevil and the proximate composition of cowpea seeds. **Christopher Echereobia** (echereobia@yahoo.com)<sup>1</sup>, Elechi Asawalam<sup>2</sup>, Kingsley Emeasor<sup>2</sup>, and Kitherian Sahayaraj<sup>3</sup>, <sup>1</sup>Federal Univ. of Technology, Owerri, Nigeria, <sup>2</sup>Michael Okpara Univ. of Agriculture, Umuahia, Nigeria, <sup>3</sup>St. Xavier's College, Palayamkottai, India
- 12:15 **0463** Integrated release of predatory anthorcid *Xylocoris flavipes* (Reuter) and a parasitoid *Bracon hebetor* Say against three moth pests of stored grains. **Tripti Gupta** (tripti123gupta@gmail.com), Pest Control India Pvt., Ltd., Bangalore, India
- 12:30 **0464** Bioinsecticidal effect of *Ailanthus excelsa* Roxb. bark against *Tribolium castaneum* (Herbst) (Coleoptera: Tenebrionidae). **Imamoddin Ustad** (imamoddin\_94@yahoo.com)<sup>1</sup> and Anilkumar Pardeshi<sup>2</sup>, <sup>1</sup>Marathwada Univ., Aurangabad, IN, India, <sup>2</sup>M. S. P. Mandal's Deogiri College, Aurangabad, India

## Contributed Papers: Urban Entomology in a Changing Environment: Bed Bugs, Cockroaches, and Flies

### Room W331 A (Convention Center)

**Moderators:** Shujuan Li<sup>1</sup>, Eric Benson<sup>2</sup>, and Katlyn Amos<sup>3</sup>, <sup>1</sup>Univ. of Arizona, Maricopa, AZ, <sup>2</sup>Clemson Univ., Clemson, SC, <sup>3</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA

- 9:15 **0465** Life quality impacts of bed bug (*Cimex lectularius* L.) infestations. **Shujuan Li** (lisj@cals.arizona.edu)<sup>1</sup>, Dawn Gouge<sup>1</sup>, Al Fournier<sup>1</sup>, Tim Stock<sup>2</sup>, Alvaro Romero<sup>3</sup>, Shaku Nair<sup>1</sup>, Carrie Foss<sup>4</sup>, Ruth Kerzee<sup>5</sup>, David Stone<sup>2</sup>, Megan Dunn<sup>6</sup>, and Deborah Young<sup>7</sup>, <sup>1</sup>Univ. of Arizona, Maricopa, AZ, <sup>2</sup>Oregon State Univ., Corvallis, OR, <sup>3</sup>New Mexico State Univ., Las Cruces, NM, <sup>4</sup>Washington State Univ., Puyallup, WA, <sup>5</sup>Midwest Pesticide Action Center, Chicago, IL, <sup>6</sup>Northwest Center for Alternatives to Pesticides, Eugene, OR, <sup>7</sup>Colorado State Univ., Fort Collins, CO
- 9:30 **0466** Proactive, inspection-based bed bug management programs demonstrate efficacy and savings in California's multi-unit housing environments. **Andrew Sutherland** (amsutherland@ucanr.edu)<sup>1</sup>, Dong-Hwan Choe<sup>2</sup>, and Vernard Lewis<sup>3</sup>, <sup>1</sup>Univ. of California Cooperative Extension, Hayward, CA, <sup>2</sup>Univ. of California, Riverside, CA, <sup>3</sup>Univ. of California, Richmond, CA
- 9:45 **0467** The use of proteomics in creating a new detection method for the common bed bug, *Cimex lectularius*. **Natasha Gordon** (ngordon@airmidhealthgroup.com)<sup>1</sup>, Luke O'Shaughnessy<sup>1</sup>, David Fitzpatrick<sup>2</sup>, Sean Doyle<sup>2</sup>, and Bruce Mitchell<sup>1</sup>, <sup>1</sup>Airmid Healthgroup, Ltd., Dublin, Ireland, <sup>2</sup>Maynooth Univ., Kildare, Ireland
- 10:00 **0468** Bed bug egg hatch rate and nymph survival using four commercially-available insecticides applied as direct sprays. Kevin Hinson, **Eric Benson** (ebenson@clemson.edu), Patricia Zungoli, William Bridges, and Brittany Ellis, Clemson Univ., Clemson, SC
- 10:15 BREAK**
- 10:30 **0469** Vacuuming bed bugs from naturally and artificially infested furniture. **Karen M. Vail** (kvail@utk.edu), Jennifer G. Chandler, John Glafenhein, and Rachel Harmon, Univ. of Tennessee, Knoxville, TN
- 10:45 **0470** Extreme pesticide use in response to bed bugs (*Cimex lectularius*) and German cockroach (*Blattella germanica*) infestations. **Dawn Gouge** (dhgouge@cals.arizona.edu)<sup>1</sup>, Shujuan Li<sup>1</sup>, Shaku Nair<sup>1</sup>, Michael Wierda<sup>1</sup>, Kevin Drake<sup>2</sup>, Tim Stock<sup>3</sup>, and Al Fournier<sup>1</sup>, <sup>1</sup>Univ. of Arizona, Maricopa, AZ, <sup>2</sup>Arizona Dept. of Agriculture, Phoenix, AZ, <sup>3</sup>Oregon State Univ., Corvallis, OR
- 11:00 **0471** Use of time-lapse photography (GoPro™ Cameras; GoPro, Inc., San Mateo, CA) to evaluate attractiveness of a novel fly bait in the field. **Katlyn Amos** (kamos@vt.edu)<sup>1</sup>, Dini Miller<sup>1</sup>, Molly L. Stedfast<sup>1</sup>, and Nicola T. Gallagher<sup>2</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>Syngenta, Greensboro, NC

- 11:15 **0472** Novel house fly (*Musca domestica*) bioassay for assessing an early onset of behavioral change from bait intoxication. **David L. Cox** (david.cox@syngenta.com)<sup>1</sup> and Bob Cartwright<sup>2</sup>, <sup>1</sup>Syngenta Crop Protection, Madera, CA, <sup>2</sup>Syngenta Crop Protection, Greensboro, NC
- 11:30 **0473** Remote monitoring of urban insect pests. **Neil Spomer** (naspomer@dow.com)<sup>1</sup>, Joe DeMark<sup>2</sup>, and Ameya D. Gondhalekar<sup>3</sup>, <sup>1</sup>Dow AgroSciences, Indianapolis, IN, <sup>2</sup>Dow AgroSciences, Fayetteville, AR, <sup>3</sup>Purdue Univ., West Lafayette, IN
- 11:45 **0474** Mechanisms of the reduced cuticular penetration contributing high insecticide resistance in the common bed bug, *Cimex lectularius* L. **Reina Koganemaru** (rkoganemaru@gmail.com)<sup>1</sup>, W. Ray<sup>2</sup>, Richard Helm<sup>2</sup>, Zach Adelman<sup>2</sup>, and Dini Miller<sup>2</sup>, <sup>1</sup>Sumitomo Chemical Co., Ltd., Takarazuka, Japan, <sup>2</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 12:00 **0475** Using microsatellite markers and social network analysis to understand the dispersal of bed bugs in a multiunit dwelling. **Alexis M. Barbarin** (alexis\_barbarin@ncsu.edu)<sup>1</sup>, Edward Vargo<sup>2</sup>, and Coby Schal<sup>1</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>Texas A&M Univ., College Station, TX
- 12:15 **0476** Testing insecticide deployment strategies for German cockroach (*Blattella germanica* (L.)) resistance management. **Mahsa Fardisi** (mfardisi@purdue.edu), Michael Scharf, and Ameya D. Gondhalekar, Purdue Univ., West Lafayette, IN

**Contributed Papers: Arthropod Vectors of Animal and Plant Disease: Insect Endosymbionts and Microbiota**

**Room W314 A (Convention Center)**

**Moderators:** Hagus Tarno<sup>1</sup>, Harpreet Raina<sup>2</sup>, and Vince Martinson<sup>3</sup>, <sup>1</sup>Univ. of Brawijaya, Malang, Indonesia, <sup>2</sup>Univ. of Delhi, New Delhi, India, <sup>3</sup>Univ. of Rochester, Rochester, NY

- 11:00 **0477** Understanding the role of bacterial endosymbionts in transmission of tomato yellow leaf curl virus disease by *Bemisia tabaci*. **Harpreet Raina** (hsraina007@gmail.com), Sonam Popli, and Raman Rajagopal, Univ. of Delhi, New Delhi, India
- 11:15 **0478** Ecological characterization of bacterial endosymbionts in field populations of the Asian citrus psyllid (*Diaphorina citri* Kuwayama). **Chia-Ching Chu** (merquisie@hotmail.com)<sup>1</sup>, Torrence Gill<sup>1</sup>, Mark Hoffmann<sup>2</sup>, and Kirsten S. Pelz-Stelinski<sup>1</sup>, <sup>1</sup>Univ. of Florida, Lake Alfred, FL, <sup>2</sup>Univ. of California, Salinas, CA
- 11:30 **0479** Microbial community associated with ambrosia beetle (*Euplatypus parallelus*) on sonokembang (*Pterocarpus indicus*) in Malang. **Hagus Tarno** (h\_gustarno@ub.ac.id), Erfan Septia, and Luqman Aini, Univ. of Brawijaya, Malang, Indonesia
- 11:45 **0480** Peptidoglycan Recognition Protein (PGRP) expression in the Asian citrus psyllid (*Diaphorina citri* Kuwayama) and implications for immune response to gram-negative bacteria. **Torrence Gill** (gilltorrence@hotmail.com), Alex Arp, and Kirsten Pelz-Stelinski, Univ. of Florida, Lake Alfred, FL

- 12:00 **0481** The structure of gut communities in wild *Drosophila*. **Vince Martinson** (v.martinson@rochester.edu)<sup>1</sup>, Angela Douglas<sup>2</sup>, and John Jaenike<sup>1</sup>, <sup>1</sup>Univ. of Rochester, Rochester, NY, <sup>2</sup>Cornell Univ., Ithaca, NY
- 12:15 **0482** Fungi associated with the grey-brown stinkbug (*Coenomorpha nervosa* Dallas) in pecan orchards in South Africa. **Vaughn Swart** (swartvr@ufs.ac.za)<sup>1</sup>, Gert Marais<sup>1</sup>, and Jaco Saaiman<sup>2</sup>, <sup>1</sup>Univ. of the Free State, Bloemfontein, South Africa, <sup>2</sup>Rijk Zwaan South Africa (Pty.), Ltd., Krugersdorp, South Africa

**Monday, September 26, 2016 • AFTERNOON**

**Symposium: Pest Shifting, Invasive Species, and Resistance Development in Key Growing Areas of the World and the Need for New Technology to Manage Insect Pests**

**Room W314 B (Convention Center)**

**Moderators and Organizers:** Melissa Siebert<sup>1</sup> and Luis E. Gomez<sup>2</sup>, <sup>1</sup>Dow AgroSciences, Greenville, MS, <sup>2</sup>Dow AgroSciences, Indianapolis, IN

*This symposium is generously sponsored by Dow AgroSciences.*



- 1:30 **0483** Case study 1: From introduction to IPM – history of the invasion of spotted wing drosophila (*Drosophila suzukii*) in the western United States. **David R. Haviland** (dhaviland@ucdavis.edu)<sup>1</sup>, Robert A. Van Steenwyk<sup>2</sup>, Elizabeth Beers<sup>3</sup>, Vaughn Walton<sup>4</sup>, and Jana Lee<sup>5</sup>, <sup>1</sup>Univ. of California Cooperative Extension, Bakersfield, CA, <sup>2</sup>Univ. of California, Berkeley, CA, <sup>3</sup>Washington State Univ., Wenatchee, WA, <sup>4</sup>Oregon State Univ., Corvallis, OR, <sup>5</sup>USDA - ARS, Corvallis, OR
- 2:00 **0484** Case study 2: Sugarcane aphid on grain sorghum. **David L. Kerns** (dkerns@agcenter.lsu.edu)<sup>1</sup>, Michael Brewer<sup>2</sup>, Robert Bowling<sup>3</sup>, and Mayra Aviles Gonzalez<sup>4</sup>, <sup>1</sup>Louisiana State Univ., Winnsboro, LA, <sup>2</sup>Texas A&M AgriLife Research, Corpus Christi, TX, <sup>3</sup>Texas A&M AgriLife Extension Service, Corpus Christi, TX, <sup>4</sup>Autonomous Univ. of Sinaloa, Costa Rica, Mexico
- 2:15 **0485** Case study 3: *Tuta absoluta* – field management and history of the invasion in southern Europe. **Antonio Monserrat** (antonio.monserrat@carm.es)<sup>1</sup>, M. Andreu Ortin<sup>2</sup>, and A. Castano Villar<sup>2</sup>, <sup>1</sup>IMIDA, La Alberca-Murcia, Spain, <sup>2</sup>Ministry of Agriculture and Water of the Region of Murcia, Murcia, Spain
- 2:30 **0486** Case study 4: *Tuta absoluta* – insecticide resistance management of this invasive species. **Pablo Bielza** (pablo.bielza@upct.es), Lidia Garcia-Vidal, and M. Martinez-Aguirre, Polytechnic Univ., Cartagena, Spain
- 2:45 **0487** Case study 5: *Helicoverpa armigera* – field management and history of invasion in Brazil. Paulo Degrande<sup>1</sup> and **Celso Omoto** (celso.omoto@usp.br)<sup>2</sup>, <sup>1</sup>Federal Univ. of Grande Dourados, Dourados, Brazil, <sup>2</sup>Univ. of São Paulo, Piracicaba, Brazil



MONDAY



- 3:00 BREAK**
- 3:15 **0488** Case study 6: Managing neonicotinoid target site resistant *Myzus persicae* (Sulzer) and *Aphis gossypii* Glover in Europe and South Korea. **Maria Torne** (mtorne@dow.com)<sup>1</sup>, Luis E. Gomez<sup>2</sup>, Imre Mezei<sup>3</sup>, Raquel Abad Moyano<sup>1</sup>, Jee Yi<sup>4</sup>, and Pablo Bielza<sup>5</sup>, <sup>1</sup>Dow AgroSciences, Madrid, Spain, <sup>2</sup>Dow AgroSciences, Indianapolis, IN, <sup>3</sup>Dow AgroSciences, Budapest, Hungary, <sup>4</sup>Dow AgroSciences, Seoul, South Korea, <sup>5</sup>Polytechnic Univ., Cartagena, Spain
- 3:30 **0489** Case study 7: Sweet potato whitefly (*Bemisia tabaci*) in high value crops from Central America and Mexico. **Mariana Lastres Schindler** (lorenalastres@yahoo.es)<sup>1</sup>, Mayra Aviles Gonzalez<sup>2</sup>, Eswin Castañeda<sup>3</sup>, and Leonel Aviles<sup>4</sup>, <sup>1</sup>Independent Consultant, Choluteca, Honduras, <sup>2</sup>Autonomous Univ. of Sinaloa, Costa Rica, Mexico, <sup>3</sup>Dow AgroSciences, Mixco, Guatemala, <sup>4</sup>Dow AgroSciences, Culiacan, Mexico
- 3:45 **0490** Case study 8: Managing the challenges of the Asian citrus psyllid, *Diaphorina citri*, vector of the Huanglongbing in Florida citrus: A mix of conventional and non-conventional approaches. **Harold Browning** (hwbr@citrusrdf.org), Univ. of Florida, Lake Alfred, FL
- 4:00 **0491** Emergency use authorizations – how regulators can help growers. **Nick Simmons** (nsimmons2@dow.com)<sup>1</sup>, Paulo Milanezi<sup>2</sup>, Valdirene Reno<sup>2</sup>, Sheridawn Schoeman<sup>3</sup>, and Jamey Thomas<sup>1</sup>, <sup>1</sup>Dow AgroSciences, Indianapolis, IN, <sup>2</sup>Dow AgroSciences, São Paulo, Brazil, <sup>3</sup>Dow AgroSciences, Hitchin, United Kingdom
- 4:15 **0492** Pooling global resources to address regulatory requirements for managing emerging insect pests: A global approach for minor uses. **Daniel Kunkel** (kunkel@aesop.rutgers.edu), Keith Dorschner, Bill Barney, and Jerry Baron, IR-4 Project, Princeton, NJ
- 2:30 **0497** Spotted lanternfly, *Lycorma delicatula* (Hemiptera: Fulgoridae). **Lawrence Barringer** (lbarringer@pa.gov), Bureau of Plant Industry, Harrisburg, PA
- 2:45 **0498** Mountain pine beetle, *Dendroctonus ponderosae* (Coleoptera: Curculionidae). **Christopher J. Fettig** (cfettig@fs.fed.us), USDA - Forest Service, Davis, CA
- 3:00 BREAK**
- 3:15 **0499** European spruce bark beetle, *Ips typographus* (Coleoptera: Curculionidae). **Martin Schroeder** (martin.schroeder@slu.se)<sup>1</sup> and Bjørn Økland<sup>2</sup>, <sup>1</sup>Swedish Univ. of Agricultural Sciences, Uppsala, Sweden, <sup>2</sup>Norwegian Institute of Bioeconomy Research, Ås, Norway
- 3:30 **0500** Four-eyed fir bark beetle, *Polygraphus proximus* (Coleoptera: Curculionidae). **Ivan Kerchev** (ikea86@mail.ru), Russian Academy of Sciences, Tomsk, Russia
- 3:45 **0501** Pine sawyer beetle, *Monochamus galloprovincialis* (Coleoptera: Cerambycidae). **Géraldine Roux** (geraldine.roux@orleans.inra.fr), Julien Haran, Alain Roques, and Christelle Robinet, INRA, Orléans, France
- 4:00 **0502** Western conifer seed bug, *Leptoglossus occidentalis* (Hemiptera: Coreidae). **Marie-Anne Auger-Rozenberg** (marie-anne.auger-rozenberg@orleans.inra.fr)<sup>1</sup>, Vincent Lesieur<sup>2</sup>, Ana Farinha<sup>3</sup>, and Alain Roques<sup>1</sup>, <sup>1</sup>INRA, Orléans, France, <sup>2</sup>USDA - ARS, Montferrier-sur-Lez, France, <sup>3</sup>Univ. of Lisbon, Lisbon, Portugal
- 4:15 **0503** Citrus longhorned beetle, *Anoplophora chinensis* (Coleoptera: Cerambycidae). **Jacob D. Wickham** (wickham@iccas.ac.cn), Chinese Academy of Sciences, Zhongguancun, China
- 4:30 **0504** Bronze birch borer, *Agrilus anxius* (Coleoptera: Buprestidae). **Claire E. Rutledge** (claire.rutledge@ct.gov), Connecticut Agricultural Experiment Station, New Haven, CT
- SD0505** Asian longhorned beetle, *Anoplophora glabripennis* (Coleoptera: Cerambycidae). **Maya Nehme** (mnehme@lri-lb.org)<sup>1</sup>, Peter S. Meng<sup>2</sup>, Kelli Hoover<sup>2</sup>, and Melody A. Keena<sup>3</sup>, <sup>1</sup>American Univ., Beirut, Lebanon, <sup>2</sup>Pennsylvania State Univ., University Park, PA, <sup>3</sup>USDA - Forest Service, Hamden, CT
- SD0506** Gypsy moth, *Lymantria dispar* (Lepidoptera: Erebidae). **Steve Munson** (smunson@fs.fed.us)<sup>1</sup>, Victor Mastro<sup>2</sup>, and William Wesela<sup>3</sup>, <sup>1</sup>USDA - Forest Service, Ogden, UT, <sup>2</sup>USDA - APHIS, Buzzards Bay, MA, <sup>3</sup>USDA - APHIS, Riverdale, MD
- SD0507** Namangan longhorned beetle, *Xylotrechus namanganensis* (Coleoptera: Cerambycidae). **Adil Sattar** (adl1968@126.com), Xinjiang Agricultural Univ., Urumqi, China
- SD0508** Sirex wood wasp, *Sirex noctilio* (Hymenoptera: Siricidae). **Stephanie Sopow** (stephanie.sopow@scionresearch.com)<sup>1</sup>, Cecilia Romo<sup>2</sup>, and John Bain<sup>3</sup>, <sup>1</sup>Scion, Rotorua, New Zealand, <sup>2</sup>Scion, Christchurch, New Zealand, <sup>3</sup>Springfield Associates, Rotorua, New Zealand
- 4:45 **Discussion and Poster Session**

## Symposium: Profiles of Forest Pests Ready to Cross Borders and Invade New Areas

### Room W224 A (Convention Center)

**Moderators and Organizers:** Melody A. Keena<sup>1</sup>, Alain Roques<sup>2</sup>, and Yuri Baranchikov<sup>3</sup>, <sup>1</sup>USDA - Forest Service, Hamden, CT, <sup>2</sup>INRA, Orléans, France, <sup>3</sup>Siberian Branch of Russian Academy of Sciences, Krasnoyarsk, Russia

- 1:30 **0493** Nun moth, *Lymantria monacha* (Lepidoptera: Erebidae). **Melody A. Keena** (mkeena@fs.fed.us), USDA - Forest Service, Hamden, CT
- 1:45 **0494** Siberian moth, *Dendrolimus sibiricus* (Lepidoptera: Lasiocampidae). **Yuri Baranchikov** (baranchikov\_yuri@yahoo.com), Siberian Branch of Russian Academy of Sciences, Krasnoyarsk, Russia
- 2:00 **0495** Pine processionary moth, *Thaumetopoea pityocampa* (Lepidoptera: Notodontidae). **Alain Roques** (alain.roques@orleans.inra.fr), Jérôme Rousselet, and Christelle Robinet, INRA, Orléans, France
- 2:15 **0496** Emerald ash borer, *Agrilus planipennis* (Coleoptera: Buprestidae). **Therese Poland** (tpoland@fs.fed.us)<sup>1</sup>, Deborah G. McCullough<sup>2</sup>, and Leah S. Bauer<sup>1</sup>, <sup>1</sup>USDA - Forest Service, Lansing, MI, <sup>2</sup>Michigan State Univ., East Lansing, MI

## Symposium: Insights into the Biology of Wild and Managed Native Bees

## Room W224 C (Convention Center)

**Moderators and Organizers:** Hollis Woodard<sup>1</sup>, Quinn McFrederick<sup>1</sup>, and Theresa L. Pitts-Singer<sup>2</sup>, <sup>1</sup>Univ. of California, Riverside, CA, <sup>2</sup>USDA - ARS, Logan, UT

- 1:30 **0509** Pesticide impacts on bees: From individual behaviour to pollination services. **Nigel E. Raine** (nraine@uoguelph.ca)<sup>1</sup>, Gemma Baron<sup>2</sup>, Richard Gill<sup>3</sup>, Karen Smith<sup>2</sup>, and Dara Stanley<sup>2,4</sup>, <sup>1</sup>Univ. of Guelph, Guelph, ON, Canada, <sup>2</sup>Royal Holloway, Univ. of London, Egham, United Kingdom, <sup>3</sup>Imperial College London, Ascot, United Kingdom, <sup>4</sup>National Univ. of Ireland, Galway, Ireland
- 1:45 **0510** Bee foraging patterns across dynamic resource landscapes. **Shalene Jha** (sjha@austin.utexas.edu) and Nathaniel Pope, The Univ. of Texas, Austin, TX
- 2:00 **0511** Understanding land-use drivers of pollinator community composition in an agricultural landscape. **Sarah Cusser** (sarah.cusser@gmail.com) and Shalene Jha, The Univ. of Texas, Austin, TX
- 2:15 **0512** Mason bee pollination in Switzerland – Recent successes and future challenges. **Claudio Sedivy** (c.sedivy@wildbieneundpartner.ch), Wildbiene + Partner, Ltd., Switzerland
- 2:30 **0513** Temperature effects on the development and emergence of *Osmia* bees: Implications for their management as orchard pollinators. **Jordi Bosch** (jordi.bosch@uab.es)<sup>1</sup>, William Kemp<sup>2</sup>, and Fabio Sgolastra<sup>3</sup>, <sup>1</sup>Autonomous Univ. of Barcelona, Bellaterra, Spain, <sup>2</sup>USDA - ARS, Fargo, ND, <sup>3</sup>Univ. of Bologna, Bologna, Italy
- 2:45 **0514** Dietary pollen needs of adult female solitary bees for reproduction. **James H. Cane** (jim.cane@ars.usda.gov), USDA - ARS, Logan, UT
- 3:00 BREAK**
- 3:15 **0515** Potential use of Brazilian native bees for crop pollination. **Breno Freitas** (freitas@ufc.br), Federal Univ. of Ceará, Fortaleza, Brazil
- 3:30 **0516** Pollinating California almonds with *Osmia lignaria*, the blue orchard bee. **Theresa L. Pitts-Singer** (theresa.pitts-singer@ars.usda.gov), USDA - ARS, Logan, UT
- 3:45 **0517** Bee community restoration and maintenance: Assessing differences in nesting to better understand bee diversity. **Alexandra Harmon-Threatt** (aht@illinois.edu), Univ. of Illinois, Champaign, IL
- 4:00 **0518** Measuring partner choice in plant – pollinator networks: Separating “rewiring” and “fidelity” from chance with a null model approach. **Mark Genung** (mark.a.genung@rutgers.edu), Rachael Winfree, and Molly MacLeod, Rutgers, The State Univ. of New Jersey, New Brunswick, NJ
- 4:15 **0519** Evaluating native perennial flowering strips for enhancing native bees and pollination services on farmlands in Montana. **Casey Delphia** (casey.delphia@montana.edu), Laura Burkle, and Kevin O’Neill, Montana State Univ., Bozeman, MT

- 4:30 **0520** Red Listing America’s bumble bees: Status and trends among *Bombus* spp. in the Western Hemisphere. **Rich Hatfield** (rich@xerces.org)<sup>1</sup>, Sheila R. Colla<sup>2</sup>, Sarina Jepsen<sup>1</sup>, Leif Richardson<sup>3</sup>, Robbin W. Thorp<sup>4</sup>, Paul Williams<sup>5</sup>, Marina Arbetman<sup>6</sup>, Michelle A. Duennes<sup>7</sup>, Natalia Escobedo-Kenefic<sup>8</sup>, Elaine Evans<sup>9</sup>, Sarah Foltz-Jordan<sup>1</sup>, Aline Martins<sup>10</sup>, Oscar Martínez<sup>11</sup>, Jorge Merida<sup>11</sup>, Jose Montalva<sup>12</sup>, Carolina Morales<sup>13</sup>, Esteban Pineda<sup>11</sup>, Claus Rasmussen<sup>14</sup>, Philippe Sagot<sup>11</sup>, Yamila Sasal<sup>13</sup>, Remy Vandame<sup>11</sup>, and Soledad Villamil<sup>15</sup>, <sup>1</sup>The Xerces Society for Invertebrate Conservation, Portland, OR, <sup>2</sup>York Univ., Toronto, ON, Canada, <sup>3</sup>Univ. of Vermont, Burlington, VT, <sup>4</sup>Univ. of California, Davis, CA, <sup>5</sup>The Natural History Museum, London, United Kingdom, <sup>6</sup>National Univ. of Comahue, Neuquén, Argentina, <sup>7</sup>Univ. of California, Riverside, CA, <sup>8</sup>San Carlos Univ. of Guatemala, Guatemala, <sup>9</sup>Univ. of Minnesota, St. Paul, MN, <sup>10</sup>Federal Univ. of Paraná, Brazil, <sup>11</sup>The College of the Southern Border, San Cristóbal de las Casas, Mexico, <sup>12</sup>Salvemos Nuestro Abejorro, Chile, <sup>13</sup>National Univ. of Comahue, Argentina, <sup>14</sup>Aarhus Univ., Aarhus, Denmark, <sup>15</sup>National Univ. of Sur, BahíasBlanca, Argentina
- 4:45 **0521** Effects of urbanization on pathogens levels and immune function of native bees. **Margarita López-Uribe** (mmlopezu@ncsu.edu), Rob R. Dunn, Steven Frank, and David Tarpay, North Carolina State Univ., Raleigh, NC
- 5:00 **0522** Seasonal patterns of resource abundance and parasitism influence bumblebee (*Bombus impatiens*) colony success. **Rosemary Malfi** (rlmalfi@ucdavis.edu)<sup>1</sup>, Jonathan Walter<sup>2</sup>, and T'ai Roulston<sup>3</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>Virginia Commonwealth Univ., Richmond, VA, <sup>3</sup>Univ. of Virginia, Boyce, VA
- 5:15 **0523** Genetic susceptibility of wild bees to parasite infection? **Peter Graystock** (peter@graystock.info)<sup>1</sup>, Quinn McFrederick<sup>1</sup>, Claire Carvell<sup>2</sup>, Andrew Bourke<sup>3</sup>, Matt Heard<sup>2</sup>, Mark Beaumont<sup>4</sup>, and Seirian Sumner<sup>4</sup>, <sup>1</sup>Univ. of California, Riverside, CA, <sup>2</sup>National Environment Research Council, Oxfordshire, United Kingdom, <sup>3</sup>Univ. of East Anglia, Norwich, United Kingdom, <sup>4</sup>Univ. of Bristol, Bristol, United Kingdom

## Symposium: In Honor of Past ESA President Donald L. McLean: Electropenetrography (EPG) Without Borders: Plant Pathogen Vector Research Inspiring Novel Animal Disease Studies

## West Hall F3 (WF3) (Convention Center)

**Moderators and Organizers:** Elaine Backus<sup>1</sup> and Andrew Li<sup>2</sup>, <sup>1</sup>USDA - ARS, Parlier, CA, <sup>2</sup>USDA - ARS, Beltsville, MD

- 1:30 **0524** How electropenetrography (EPG) can benefit animal-disease vector research: Overview of EPG history, principles, and applications. **Elaine Backus** (elaine.backus@ars.usda.gov), USDA - ARS, Parlier, CA
- 2:00 **0525** Identifying the mechanism of transmission of *Xylella fastidiosa* by sharpshooters via EPG research. **Holly Shugart** (hshugart@ufl.edu)<sup>1</sup> and Elaine Backus<sup>2</sup>, <sup>1</sup>Univ. of Florida, Lake Alfred, FL, <sup>2</sup>USDA - ARS, Parlier, CA





- 2:15 **0526** Aphid feeding activities linked to non-circulative virus transmission. **Jeffrey A. Davis** (jeffdavis@agcenter.lsu.edu)<sup>1</sup>, Everlyne Wosula<sup>2</sup>, and Christopher Clark<sup>3</sup>, <sup>1</sup>Louisiana State Univ. AgCenter, Baton Rouge, LA, <sup>2</sup>Univ. of Nebraska, Lincoln, NE, <sup>3</sup>Louisiana State Univ., Baton Rouge, LA
- 2:30 **0527** Sand fly feeding physiology and potential for breakthroughs using electropenetrography. **Justin Talley** (justin.talley@okstate.edu) and Astri Wayadande, Oklahoma State Univ., Stillwater, OK
- 2:45 **0528** Modification of thrips feeding behaviors by tomato spotted wilt virus. **Diane E. Ullman** (deullman@ucdavis.edu) and Candice Stafford-Banks, Univ. of California, Davis, CA
- SD0529** A2EPG: New pattern recognition software for rapid analysis of electropenetrograms to study stylet probing behavior of aphids. **Francisco Adasme-Carreño** (francisco.adasme@gmail.com), Camila Muñoz-Gutierrez, Josselyn Salinas-Cornejo, and Claudio Ramirez, Univ. of Talca, Talca, Chile
- SD0530** Laser surgery of cornicles of the brown citrus aphid, *Toxoptera citricida* (Kirk), alters their fitness and stylet probing behavior. **Serine Alfaress** (serine@ufl.edu), Timothy Ebert, Michael Rogers, and Nabil Killiny, Univ. of Florida, Lake Alfred, FL
- SD0531** Methods of correlating electropenetrography waveform data to hemipteran probing behavior and pathogen transmission. **Eldesouky Ammar** (eldammar@hotmail.com)<sup>1</sup>, Holly Shugart<sup>2</sup>, Michael Rogers<sup>2</sup>, David Hall<sup>1</sup>, and Robert Shatters<sup>1</sup>, <sup>1</sup>USDA - ARS, Ft. Pierce, FL, <sup>2</sup>Univ. of Florida, Lake Alfred, FL
- SD0532** Below-ground sweet potato storage root herbivory by *Cylas formicarius* alters above-ground *Myzus persicae* stylet probing behavior and population dynamics. **Jie Chen** (jchen31@lsu.edu), Jeffrey Davis, Julien Beuzelin, and Michael Stout, Louisiana State Univ. AgCenter, Baton Rouge, LA
- SD0533** Capabilities of the new "Universal" AC-DC monitor for electropenetrography (EPG). **Andrew Dowell** (andygator3@gmail.com)<sup>1</sup>, Elaine Backus<sup>2</sup>, Felix Cervantes<sup>2</sup>, Jane Todd<sup>3</sup>, and Margaret (Peg) Redinbaugh<sup>3</sup>, <sup>1</sup>EPG Technologies, Inc., Gainesville, FL, <sup>2</sup>USDA - ARS, Parlier, CA, <sup>3</sup>USDA - ARS, Wooster, OH
- SD0534** High applied voltage during electropenetrography has no effect on stylet probing in *Diaphorina citri* (Hemiptera: Liviidae): Should we be surprised? **Timothy Ebert** (tebert@ufl.edu) and Michael Rogers, Univ. of Florida, Lake Alfred, FL
- SD0535** Evaluation of novel aphid resistance genes in black raspberry using electropenetrography. Danielle Lightle<sup>1</sup>, Michael Dossett<sup>2</sup>, Chad Finn<sup>3</sup> and **Jana Lee** (jana.lee@ars.usda.gov)<sup>3</sup>, <sup>1</sup>Univ. of California, Orland, CA, <sup>2</sup>Agriculture and Agri-Food Canada, Agassiz, BC, Canada, <sup>3</sup>USDA - ARS, Corvallis, OR
- SD0536** Assessing the effects of temperature on stylet probing behaviors of the potato psyllid, *Bactericera cockerelli*, and transmission of '*Candidatus Liberibacter solanacearum*', using EPG technology. **Tariq Mustafa** (tariq.mustafa@wsu.edu), Christian Carlos, and Joseph Munyaneza, USDA - ARS, Wapato, WA
- SD0537** EPG as a tool to unravel the unusual stylet penetration behavior of a galling aphid. **Sophie Pointeau** (sophie.pointeau@laposte.net)<sup>1</sup>, France Dardeau<sup>1</sup>, Stephanie Bankhead-Dronnet<sup>1</sup>, Anas Cherqui<sup>2</sup>, François Lieutier<sup>1</sup>, Arnaud Ameline<sup>2</sup>, and Aurelien Salle<sup>1</sup>, <sup>1</sup>Univ. of Orléans, Orléans, France, <sup>2</sup>Univ. of Picardie Jules Verne, Amiens, France
- SD0538** Stylet probing behaviors of the invasive kudzu bug, *Megacopta cribraria*, using electropenetrography. **Francesca Stubbins** (sstubbi@clemson.edu)<sup>1</sup>, Paula Mitchell<sup>2</sup>, Francis Reay-Jones<sup>3</sup>, and Jeremy Greene<sup>1</sup>, <sup>1</sup>Clemson Univ., Blackville, SC, <sup>2</sup>Winthrop Univ., Rock Hill, SC, <sup>3</sup>Clemson Univ., Florence, SC
- SD0539** Electropenetrography of leafhoppers (Hemiptera: Cicadellidae) feeding on cultivated grapevines. **Charles Vincent** (charles.vincent@agr.gc.ca)<sup>1</sup>, Philippe Giordanengo<sup>2</sup>, Pierre Lemoyné<sup>1</sup>, Chrystel Olivier<sup>3</sup>, Jacques Lasnier<sup>4</sup>, Yves Mauffette<sup>5</sup>, and Julien Saguez<sup>6</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, Saint-Jean-sur-Richelieu, QC, Canada, <sup>2</sup>Univ. of Picardie Jules Verne, Amiens, France, <sup>3</sup>Agriculture and Agri-Food Canada, Saskatoon, SK, Canada, <sup>4</sup>Ag-Cord, Inc., Granby, QC, Canada, <sup>5</sup>Univ. of Québec, Montréal, QC, Canada, <sup>6</sup>Entomological Society of Québec, Saint-Jean-sur-Richelieu, QC, Canada
- 3:00 BREAK & POSTER SESSION**
- 3:15 **0540** Biting the hand that feeds you: Mosquito stylet-probing behavior revealed by EPG. **Astri Wayadande** (a.wayadande@okstate.edu) and Bruce Noden, Oklahoma State Univ., Stillwater, OK
- 3:30 **0541** Characterization of *Lygus* spp. feeding behavior on cotton using EPG and histology. **Felix Cervantes** (felix.cervantes@ars.usda.gov), USDA - ARS, Parlier, CA
- 3:45 **0542** EPG (electropenetrography) studies with neotropical pentatomids: Waveforms and feeding sites. **Tiago Lucini** (tiago\_lucini@hotmail.com)<sup>1</sup> and Antônio Panizzi<sup>2</sup>, <sup>1</sup>Federal Univ. of Paraná, Curitiba, Brazil, <sup>2</sup>National Wheat Research Center, Passo Fundo, Brazil
- 4:00 **0543** Chemical ecology of virus-infected Brassicaceae and impact on aphid vector feeding and colonization. **Arnaud Ameline** (arnaud.ameline@u-picardie.fr), Quentin Chesnais, D. Halter, Q. Fouche, Anas Cherqui, Aude Couty, P. Hugueney, V. Ziegler Graff, and Veronique Brault, Univ. of Picardie Jules Verne, Amiens, France
- 4:15 **0544** EPG applications in studies of chemical ecology and interactions among *Bemisia tabaci*, *Cucurbit chlorotic yellows virus*, and cucumber. **Feng-Ming Yan** (fmyan@henau.edu.cn), Jing-Jing Li, Shao-Hua Lu, Xue-Li Wang, and Xiang-Zhi Liang, Henan Agricultural Univ., Zhengzhou, China
- 4:30 **0545** EPG as a tool for improving management of an insect-associated plant pathogen: Asian citrus psyllid and huanglongbing. **Michael Rogers** (mrgrs@ufl.edu)<sup>1</sup>, Timothy Ebert<sup>1</sup>, and Rosana Serikawa<sup>2</sup>, <sup>1</sup>Univ. of Florida, Lake Alfred, FL, <sup>2</sup>DuPont do Brazil S.A., Ferro, Brazil
- 4:45 **0546** Use of EMG, EPG, and *in vitro* tick feeding systems to study mechanisms of blood feeding and effects of acaricides and pharmacological agents on blood feeding in ixodid ticks. **Andrew Li** (andrew.li@ars.usda.gov), USDA - ARS, Beltsville, MD
- 5:00 **Panel Discussion**

**Symposium: Biodiversity, Distribution, Behavior, and Activity of Forensically Important Entomofauna and Microbiota in Different Ecoregions**

**Room W224 D (Convention Center)**

**Moderators and Organizers:** M. Denise Gemmellaro, Rutgers, The State Univ. of New Jersey, New Brunswick, NJ

- 1:30 **0547** Diversity and seasonality of entomofauna succession on decomposing pigs (*Sus scrofa* Linn.) in two biogeoclimatic zones of Nigeria. **Isaac Adeyemi** (winitel@yahoo.co.uk), River State Univ. of Science and Technology, Port Harcourt, Nigeria
- 1:45 **0548** A comparison of blow fly abundance and oviposition on carrion exposed in woodlots and cornfields? **Rebecca Stock** (becajstock@yahoo.co.uk), Saint Joseph's College, Rensselaer, IN
- 2:00 **0549** Seasonal and geographic variation in biodiversity of forensically important blowflies (Diptera: Calliphoridae) in New Jersey, USA. **Lauren M. Weidner** (laurenmweidner@gmail.com), Purdue Univ., West Lafayette, IN
- 2:15 **0550** First survey of forensically important insects in Sicily with a particular focus on volcanic caves. **M. Denise Gemmellaro** (denise.gemmellaro@rutgers.edu)<sup>1</sup>, Claudia Maria Sollami<sup>2</sup>, Carmelo Bucolo<sup>3</sup>, Elisa Musumeci<sup>3</sup>, and Lauren M. Weidner<sup>4</sup>, <sup>1</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, <sup>2</sup>Univ. Consortium, Caltanissetta, Italy, <sup>3</sup>Gruppo Grotte Catania del Club Alpino Italiano Sezione dell'Etna, Catania, Italy, <sup>4</sup>Purdue Univ., West Lafayette, IN
- 2:30 **0551** Effect of temperature on development of *Lucilia sericata* (Meigen) (Diptera: Calliphoridae) and its forensic application in Korea. **Sang Shin** (shinfr@nate.com), Ji Hye Park, Su Jeong Jeon, Kwang Soo Ko, and Seong Hwan Park, Korea Univ., Seoul, South Korea
- 2:45 **0552** Electrophysiological responses of *Chrysomya rufifacies* (Diptera: Calliphoridae) to active volatile organic compounds released by human decomposition. **Stephanie Kolodij** (helene.leblanc@uoit.ca) and Helene N. LeBlanc, Univ. of Ontario, Oshawa, ON, Canada
- 3:00 BREAK**
- 3:15 **0553** Interaction of abiotic and biotic mechanisms influence blow fly coexistence on carrion patches. **Sherah VanLaerhoven** (vanlaerh@uwindsor.ca), Vincenzo A. Pacheco, and Krystal R. Hans, Univ. of Windsor, Windsor, ON, Canada
- 3:30 **0554** Nested biodiversity: The importance of the insect microbiome in carrion food webs and implications for the forensic sciences. **Courtney Watherbee** (weath108@msu.edu), Jennifer L. Pechal, Courtney Larson, McKinley Brewer, and M. Eric Benbow, Michigan State Univ., East Lansing, MI
- 3:45 **0555** Megadiversity gets into the CSI room: Barcoding forensically important flies in Ecuador. **Emilia Moreno** (emiliamorenoc@gmail.com)<sup>1</sup>, David Donoso<sup>2</sup>, and Alvaro Barragán<sup>1</sup>, <sup>1</sup>Pontifical Catholic Univ., Quito, Ecuador, <sup>2</sup>Univ. of Cuenca, Cuenca, Ecuador

- 4:00 **0556** Molecular ecology in forensic entomology. **Meaghan Pimsler** (mlpimsler@gmail.com), Univ. of Alabama, Tuscaloosa, AL
- 4:15 **0557** Genetic variation in blow fly life history traits. **Aaron Tarone** (amtarone@ag.tamu.edu), Texas A&M Univ., College Station, TX
- 4:30 **0558** Blow fly genomics: Past, present, and future. **Christine Picard** (cpicard@iupui.edu), Indiana Univ.-Purdue Univ., Indianapolis, IN
- 4:45 **0559** Spatio-temporal and sampling effects on carrion insect communities: Considerations for generating a large forensic dataset. **Anne Perez** (aperez2@saintjoe.edu), Saint Joseph's College, Rensselaer, IN
- 5:00 **0560** The role of a PMI-prediction model in evaluating forensic entomology experimental design, the importance of covariates, and the utility of response variables for estimating time since death. **Jeffrey Wells** (jedwell@fiu.edu), Florida International Univ., Miami, FL

**Symposium: Building the Biodiversity Knowledge Graph for Insects - Components, Progress, and Challenges**

**West Hall F4 (WF4) (Convention Center)**

**Moderators and Organizers:** Nico Franz<sup>1</sup> and Katja C. Seltmann<sup>2</sup>, <sup>1</sup>Arizona State Univ., Tempe, AZ, <sup>2</sup>Univ. of California, Santa Barbara, CA

- 1:30 **0561** Towards a global virtual natural history collection: GBIF and access to entomological specimens. **Donald Hobern** (dhobern@gbif.org), Global Biodiversity Information Facility, Copenhagen, Denmark
- 1:45 **0562** Biodiversity informatics at the Instituto de Ciencias Naturales: Experiences and perspectives from a megadiverse Latin American country. **Lauren Raz** (lraz.icn@gmail.com), National Univ. of Colombia, Bogotá, Colombia
- 2:00 **0563** Entomological outputs from The Natural History Museum (NHM) digitization programme. **Vincent Smith** (vince@vsmith.info), The Natural History Museum, London, United Kingdom
- 2:15 **0564** Biodiversity storytelling through digitization: Highlighting institution-based research. **Vaughn Shirey** (vmshirey@gmail.com), Drexel Univ., Philadelphia, PA
- 2:30 **0565** Extracting linked open data from taxonomic publications. **Terry Catapano** (catapanoth@gmail.com), New York, NY
- 2:45 **0566** Mobilizing historical literature and specimen data to study host plant associations in weevils (Curculionoidea). **Guanyang Zhang** (guanyang.zhang@asu.edu), Natalia Rahman, Sean Noudali, and Nico Franz, Arizona State Univ., Tempe, AZ
- 3:00 BREAK**
- 3:15 **0567** TraitBank: An open digital repository for organism traits. **Katja Schulz** (schulzk@si.edu), Jennifer Hammock, and Sarah Miller, Smithsonian Institution National Museum of Natural History, Washington, DC



- 3:30 **0568** From catalogs to phenotypes: The evolution and current status of TaxonWorks with emphasis on its utility for entomologists. **Matthew J. Yoder** (diapriid@gmail.com), Univ. of Illinois, Champaign, IL
- 3:45 **0569** Addressing the name:meaning drift challenge in open-ended biodiversity information environments. **Nico Franz** (nico.franz@asu.edu)<sup>1</sup>, Salvatore S. Anzaldo<sup>1</sup>, Edward Gilbert<sup>1</sup>, Michael Andrew Jansen<sup>1</sup>, M. Andrew Johnston<sup>1</sup>, and Bertram Ludäscher<sup>2</sup>, <sup>1</sup>Arizona State Univ., Tempe, AZ, <sup>2</sup>Univ. of Illinois, Champaign, IL
- 4:00 **0570** Genomic tools for all entomologists: aTRAM and its use in insect phylogenomics. **Julie Allen** (juliema@illinois.edu)<sup>1</sup>, Kevin P. Johnson<sup>1</sup>, and Bret M. Boyd<sup>2</sup>, <sup>1</sup>Univ. of Illinois, Champaign, IL, <sup>2</sup>Univ. of Florida, Gainesville, FL
- 4:15 **0571** Natural history collections in support of conservation and ecological restoration. **Katja C. Seltmann** (seltmann@ccber.ucsb.edu), Lisa Stratton, and Mireia Beas-Moix, Univ. of California, Santa Barbara, CA
- 4:30 **0572** Exploring patterns of darkling beetle distributions in the genus *Eleodes* (Coleoptera: Tenebrionidae), from the specimen up. **M. Andrew Johnston** (ajohnston@asu.edu) and Edward Gilbert, Arizona State Univ., Tempe, AZ
- 4:45 **Discussion**
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- Symposium: Data without Borders: Collecting, Digitizing, Using, and Re-using Biological Specimen Data**
- Room W224 E (Convention Center)**
- Moderators and Organizers:** Deborah Paul<sup>1</sup>, Pamela Soltis<sup>2,3</sup>, Paul Flemons<sup>4</sup>, and Nicole Fisher<sup>5</sup>, <sup>1</sup>Integrated Digitized Biological Collections (iDigBio), Tallahassee, FL, <sup>2</sup>Integrated Digitized Biological Collections (iDigBio), Gainesville, FL, <sup>3</sup>Univ. of Florida, Gainesville, FL, <sup>4</sup>Atlas of Living Australia, Sydney, Australia, <sup>5</sup>Australian National Insect Collection, Canberra, Australia
- 1:30 **0573** Specimen data in integrated biodiversity research. **Pamela Soltis** (psoltis@flmnh.ufl.edu), Integrated Digitized Biological Collections (iDigBio), Gainesville, FL
- 1:45 **0574** Like blood from that stone we always hear about: A quest to extract meaningful data from historical grasshopper specimens. **Derek Woller** (asilid@gmail.com) and Hojun Song, Texas A&M Univ., College Station, TX
- 2:00 **0575** Acquisition, management, and analysis of historical and contemporary data to discern legacy effects of ecological extinction on insect biodiversity. **Robert Kula** (robert.kula@ars.usda.gov)<sup>1</sup>, John Lill<sup>2</sup>, Eugenio Nearn<sup>3</sup>, and Harmony Dalgleish<sup>4</sup>, <sup>1</sup>USDA - ARS, Washington, DC, <sup>2</sup>The George Washington Univ., Washington, DC, <sup>3</sup>Purdue Univ., West Lafayette, IN, <sup>4</sup>College of William and Mary, Williamsburg, VA
- 2:15 **0576** Using digital natural history collection specimen data to investigate the future of bee conservation. **Jonathan Koch** (jonathan.b.koch@gmail.com)<sup>1</sup>, Joan M. Meiners<sup>2</sup>, and Amber D. Tripodi<sup>3</sup>, <sup>1</sup>Univ. of Hawai'i, Hilo, HI, <sup>2</sup>Univ. of Florida, Gainesville, FL, <sup>3</sup>USDA - ARS, Logan, UT
- 2:30 **0577** Viewing specimen data through the prism of collection events: Benefits of a collecting event first approach. **Sarah Schmits** (scschmits@ku.edu) and Andrew Short, Univ. of Kansas, Lawrence, KS
- 2:45 **0578** The usefulness of DNA-barcoding databases for routine taxonomic research and identification of Lepidoptera. **Andrei Sourakov** (asourakov@flmnh.ufl.edu), Univ. of Florida, Gainesville, FL
- 3:00 BREAK**
- 3:15 **0579** The intersection of data domains underlying insect systematics: Case studies in parasitic Hymenoptera. **Norman Johnson** (johnson.2@osu.edu), The Ohio State Univ., Columbus, OH
- 3:30 **0580** Preventing bugs in data analysis: Data skills to improve the reliability and effectiveness of entomological research. **Tracy Teal** (tkteal@datacarpentry.org), Univ. of California, Davis, CA
- 3:45 **0581** Developing best practices for data management across all stages of the data life cycle. **Amber Budden** (aebudden@dataone.unm.edu), DataONE, Albuquerque, NM
- 4:00 **0582** Data capture methodologies in digitisation of bee pollinators. **Nicole Fisher** (nicole.fisher@csiro.au), Australian National Insect Collection, Canberra, Australia
- 4:15 **0583** Arthropod collection digitization and networking across the new world. **Neil Cobb** (neil.cobb@nau.edu)<sup>1</sup>, Edward Gilbert<sup>2</sup>, Nico Franz<sup>2</sup> and Katja C. Seltmann<sup>3</sup>, <sup>1</sup>Northern Arizona Univ., Flagstaff, AZ, <sup>2</sup>Arizona State Univ., Tempe, AZ, <sup>3</sup>Univ. of California, Santa Barbara, CA
- 4:30 **0584** Database before you label – the key to a digitized collections future. **Derek S. Sikes** (dssikes@alaska.edu), Univ. of Alaska, Fairbanks, AK
- 4:45 **0585** Troubleshooting industrial insect digitisation. **Vladimir Blagoderov** (vlab@nhm.ac.uk) and Laurence Livermore, The Natural History Museum, London, United Kingdom
- 5:00 **0586** DAMmed if you do or don't: Life cycles of digital assets. **Lawrence Gall** (lawrence.gall@yale.edu), Yale Univ., New Haven, CT
- 5:15 **0587** Involving undergraduates in the digital community: Leveraging collections preservation, research, and outreach through a network of natural history collections clubs. **Kari Harris** (kari.panhorst@smail.astate.edu), Arkansas State Univ., Jonesboro, AR

## Symposium: From Diet Breadth to Diversification: Understanding Host Shifts in Phytophagous Insects

### Room W340 B (Convention Center)

**Moderators and Organizers:** Peri Mason<sup>1</sup>, Angela Smilanich<sup>2</sup>, and M. Deane Bowers<sup>1</sup>, <sup>1</sup>Univ. of Colorado, Boulder, CO, <sup>2</sup>Univ. of Nevada, Reno, NV

- 1:30 **0588** Phytophagous insects: Adaptation, constraint, and diversity. **Douglas J. Futuyma** (douglas.futuyma@stonybrook.edu), Stony Brook Univ., Stony Brook, NY
- 2:00 **0589** Ecological factors promoting host shifts in the silver-spotted skipper. **Martha Weiss** (weissm@georgetown.edu)<sup>1</sup>, John Lill<sup>2</sup>, and Eric Lind<sup>3</sup>, <sup>1</sup>Georgetown Univ., Washington, DC, <sup>2</sup>The George Washington Univ., Washington, DC, <sup>3</sup>Univ. of Minnesota, St. Paul, MN
- 2:15 **0590** Insects do not colonize Latin binomials: Exploring contingency, intraspecific variation, and multi-species interactions with *Lycaeides melissa* (Lepidoptera: Lycaenidae) and Great Basin host plants. **Matthew L. Forister** (mforister@unr.edu)<sup>1</sup>, Joshua Harrison<sup>1</sup>, Su'ad Yoon<sup>1</sup>, Alex Buerkle<sup>2</sup>, James A. Fordyce<sup>3</sup>, Zachariah Gompert<sup>2</sup>, Lauren Lucas<sup>4</sup>, and Chris Nice<sup>5</sup>, <sup>1</sup>Univ. of Nevada, Reno, NV, <sup>2</sup>Univ. of Wyoming, Laramie, WY, <sup>3</sup>Univ. of Tennessee, Knoxville, TN, <sup>4</sup>Utah State Univ., Logan, UT, <sup>5</sup>Texas State Univ., San Marcos, TX
- 2:30 **0591** Host range expansion and the insect immune response. **Angela Smilanich** (asmilanich@unr.edu)<sup>1</sup>, Peri Mason<sup>2</sup>, Carmen Mo<sup>1</sup>, Nadya Muchoney<sup>1</sup>, Tara Langus<sup>1</sup>, Su'ad Yoon<sup>1</sup>, and M. Deane Bowers<sup>2</sup>, <sup>1</sup>Univ. of Nevada, Reno, NV, <sup>2</sup>Univ. of Colorado, Boulder, CO
- 2:45 **0592** Do gut microbiota mediate host shifts in leaf-feeding caterpillars? **Tobin Hammer** (tobin.hammer@colorado.edu), Univ. of Colorado, Boulder, CO
- 3:00 **BREAK**
- 3:15 **0593** Host shifts and the geographic mosaic of coevolution. **Timothy P. Craig** (tcraig@d.umn.edu), Univ. of Minnesota, Duluth, MN
- 3:30 **0594** Predicting novel interactions between plants and herbivorous insects. **Ian S. Pearse** (ianspearse@gmail.com)<sup>1</sup> and Florian Altermatt<sup>2</sup>, <sup>1</sup>Illinois Natural History Survey, Champaign, IL, <sup>2</sup>Eawag, Dübendorf, Switzerland
- 3:45 **0595** Resolving the parasite paradox: Ecological fitting facilitates host switching in sloppy fitness space. **Salvatore Agosta** (sagosta@vcu.edu), Virginia Commonwealth Univ., Richmond, VA
- 4:00 **0596** Does variation in host traits promote host shifting and diversification in goldenrod-insect communities? **Chandra Moffat** (chandra.moffat@gmail.com) and Stephen Heard, Univ. of New Brunswick, Fredericton, NB, Canada
- 4:15 **0597** The plastic bridge hypothesis: Does plant plasticity promote host shifts in phytophagous insects? **Peri Mason** (peri.mason@colorado.edu), Univ. of Colorado, Boulder, CO

- 4:30 **0598** Host use evolves and affects taxonomic diversification differently across plant-feeding insects. **Nate Hardy** (nbhardy@gmail.com), Auburn Univ., Auburn, AL
- 4:45 **0599** Repeatability of host-associated genetic divergence in plant-feeding insects. **Tommi Nyman** (tommi.nyman@uef.fi)<sup>1</sup>, Sanna Leppänen<sup>1</sup>, Kaisa Värri<sup>2</sup>, and Tobias Malm<sup>3</sup>, <sup>1</sup>Univ. of Eastern Finland, Joensuu, Finland, <sup>2</sup>Univ. of Eastern Finland, Kuopio, Finland, <sup>3</sup>Swedish Museum of Natural History, Stockholm, Sweden
- 5:00 **0600** Host breadth, host shifts, and herbivore diversification. **James Fordyce** (battusboy@gmail.com)<sup>1</sup> and Christopher Hamm<sup>2</sup>, <sup>1</sup>Univ. of Tennessee, Knoxville, TN, <sup>2</sup>Univ. of Kansas, Lawrence, KS
- 5:15 **0601** What is host range? **Niklas Janz** (niklas.janz@zoologi.su.se), Stockholm Univ., Stockholm, Sweden

## Symposium: Biological Control of the Invasive Brown Marmorated Stink Bug, *Halyomorpha halys*, by Exotic and Native Parasitoids and Predators: A Global Perspective

### Room W315 A (Convention Center)

**Moderators and Organizers:** Paula Shrewsbury<sup>1</sup> and Tim Haye<sup>2</sup>, <sup>1</sup>Univ. of Maryland, College Park, MD, <sup>2</sup>CABI, Delémont, Switzerland

- 1:30 **Panel Discussion: An introduction to *Halyomorpha halys*, an invasive global pest**
- 1:45 **0602** Systematics of holarctic *Trissolcus* Ashmead, natural enemies of BMSB. **Elijah Talamas** (elijah.talamas@ars.usda.gov)<sup>1</sup>, Matthew L. Buffington<sup>1</sup>, Norman Johnson<sup>2</sup>, and Marie-Claude Bon<sup>3</sup>, <sup>1</sup>USDA - ARS, Washington, DC, <sup>2</sup>The Ohio State Univ., Columbus, OH, <sup>3</sup>USDA - ARS, Montferrier-sur-Lez, France
- 2:00 **0603** Survey and impact of native natural enemies on the invasive brown marmorated stink bug, *Halyomorpha halys*, in ornamental nurseries in the eastern United States. **Paula Shrewsbury** (pshrewsbury@umd.edu), Ashley L. Jones, Cerruti Hooks, Michael J. Raupp, and David E. Jennings, Univ. of Maryland, College Park, MD
- 2:15 **0604** Impact of native natural enemies on brown marmorated stink bug in eastern U.S. tree fruit and vegetable ecosystems. **James F. Walgenbach** (jim\_walgenbach@ncsu.edu) and Emily Ogburn, North Carolina State Univ., Mills River, NC
- 2:30 **0605** A survey of native parasitoids of *Halyomorpha halys* in Northern Italy and Switzerland. **Elena Costi** (costi.elena@yahoo.it)<sup>1</sup>, Lara Maistrello<sup>1</sup>, Marco Pansa<sup>2</sup>, Tim Haye<sup>3</sup>, and Luciana Tavella<sup>2</sup>, <sup>1</sup>University of Modena and Reggio Emilia, Reggio Emilia, Italy, <sup>2</sup>Univ. of Torino, Grugliasco, Italy, <sup>3</sup>CABI, Delémont, Switzerland
- 2:45 **0606** *Halyomorpha halys* as an evolutionary trap: Implications for biological control. **Paul Abram** (paul-abram@hotmail.com)<sup>1</sup>, Tara Garipey<sup>2</sup>, Tim Haye<sup>3</sup>, Victor Burte<sup>4</sup>, Guy Boivin<sup>5</sup>, and Jacques Brodeur<sup>1</sup>, <sup>1</sup>Univ. of Montréal, Montréal, QC, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, London, ON, Canada, <sup>3</sup>CABI, Delémont, Switzerland, <sup>4</sup>Sophia Institute of Agrobiotechnology, Sophia Antipolis, France, <sup>5</sup>Agriculture and Agri-Food Canada, Québec, QC, Canada



- 3:00 BREAK**
- 3:15 0607** Competitive interactions of native and exotic parasitoids on *Halyomorpha halys* host eggs. **Joanna Konopka** (jkonopk@uwo.ca)<sup>1</sup>, Tim Haye<sup>2</sup>, Tara Garipey<sup>3</sup>, Danny Poinapen<sup>1</sup>, David Holdsworth<sup>1</sup>, and Jeremy McNeil<sup>1</sup>, <sup>1</sup>Western Univ., London, ON, Canada, <sup>2</sup>CABI, Delémont, Switzerland, <sup>3</sup>Agriculture and Agri-Food Canada, London, ON, Canada
- 3:30 0608** What lies beyond traditional host range testing: Host choice behavior in *Trissolcus japonicus* (Hymenoptera: Scelionidae), a classical biological control agent of *Halyomorpha halys*. **Christine Dieckhoff** (christine.dieckhoff@ars.usda.gov), Kathy Tatman, and Kim A. Hoelmer, USDA - ARS, Newark, DE
- 3:45 0609** Biological control of brown marmorated stink bug in California: Status and prospects. **Ricky Lara** (jlara007@ucr.edu)<sup>1</sup>, Mark S. Hoddle<sup>1</sup>, and Charles H. Pickett<sup>2</sup>, <sup>1</sup>Univ. of California, Riverside, CA, <sup>2</sup>California Dept. of Food and Agriculture, Sacramento, CA
- 4:00 0610** Habitat specialization of exotic and native parasitoids: Complexity in biocontrol of a polyphagous, mobile host. **Megan Herlihy** (megan.herlihy@ars.usda.gov)<sup>1</sup>, Elijah Talamas<sup>2</sup>, and Donald Weber<sup>1</sup>, <sup>1</sup>USDA - ARS, Beltsville, MD, <sup>2</sup>USDA - ARS, Washington, DC
- 4:15 0611** Using gut content analysis to identify predators of *Halyomorpha halys*. **John Pote** (pote30@gmail.com)<sup>1</sup>, Anne Nielsen<sup>1</sup>, and Dina M. Fonseca<sup>2</sup>, <sup>1</sup>Rutgers, The State Univ. of New Jersey, Bridgeton, NJ, <sup>2</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ
- 2:45 0617** The genetics of biocontrol agents in the age of omics. **Richard Stouthamer** (richard.stouthamer@ucr.edu), Univ. of California, Riverside, CA
- 3:00 BREAK**
- 3:15 0618** Economic value of biological control in integrated pest management. **George Frisvold** (frisvold@cals.arizona.edu)<sup>1</sup>, Steven Naranjo<sup>2</sup>, and Peter Ellsworth<sup>3</sup>, <sup>1</sup>Univ. of Arizona, Tucson, AZ, <sup>2</sup>USDA - ARS, Maricopa, AZ, <sup>3</sup>Univ. of Arizona, Maricopa, AZ
- 3:30 0619** Accounting for rapid evolution in weed biocontrol agents: A step towards increasing predictability. **Linda Buergi** (buergil@onid.oregonstate.edu)<sup>1</sup>, Peter McEvoy<sup>1</sup>, and Evrim Karacetin<sup>2</sup>, <sup>1</sup>Oregon State Univ., Corvallis, OR, <sup>2</sup>Erciyes Univ., Kayseri, Turkey
- 3:45 0620** Trading biodiversity for pest problems: The role of complex communities in reducing pests. **Jonathan Lundgren** (jgl.entomology@gmail.com)<sup>1</sup> and Scott Fausti<sup>2</sup>, <sup>1</sup>Ecdysis Foundation, Estelline, SD, <sup>2</sup>South Dakota State Univ., Brookings, SD
- 4:00 0621** Future directions in biological control. Jacques Brodeur<sup>1</sup>, Russell Messing<sup>2</sup> and **Barbara Barratt** (barbara.barratt@agresearch.co.nz)<sup>3</sup>, <sup>1</sup>Univ. of Montréal, Montréal, QC, Canada, <sup>2</sup>Univ. of Hawai'i, Kapaa, HI, <sup>3</sup>AgResearch Ltd, Mosgiel, New Zealand

### Symposium: Status and Prospects for Biological Control in the 21<sup>st</sup> Century (IOBC)

#### Room W232 A (Convention Center)

**Moderators and Organizers:** Russell Messing<sup>1</sup> and Jacques Brodeur<sup>2</sup>, <sup>1</sup>Univ. of Hawai'i, Kapaa, HI, <sup>2</sup>Univ. of Montréal, Montréal, QC, Canada

- 1:30 0612** Public perception and the loss of biocontrol cachet. **Mark Wright** (markwrig@hawaii.edu)<sup>1</sup> and Russell Messing<sup>2</sup>, <sup>1</sup>Univ. of Hawai'i, Honolulu, HI, <sup>2</sup>Univ. of Hawai'i, Kapaa, HI
- 1:45 0613** Biological control in a historical context: Shifting paradigms in classical biological control. **George Heimpel** (heimp001@umn.edu), Univ. of Minnesota, St. Paul, MN
- 2:00 0614** Classical biological control successes and socio-economic impact: A brief history and outlook to the future. **Ulrich Kuhlmann** (u.kuhlmann@cabi.org)<sup>1</sup> and Matthew Cock<sup>2</sup>, <sup>1</sup>CABI, Delémont, Switzerland, <sup>2</sup>CABI, Wallingford, United Kingdom
- 2:15 0615** Augmentative biological control: We can do much better! **Joop van Lenteren** (joop.vanlenteren@wur.nl), Wageningen Univ. and Research Centre, Wageningen, Netherlands
- 2:30 0616** Biological control as a conservation tool in the Everglades. **Ellen C. Lake** (ellen.lake@ars.usda.gov)<sup>1</sup>, Melissa Smith<sup>1</sup>, Hillary Cooley<sup>2</sup>, LeRoy Rodgers<sup>3</sup>, and Philip Tipping<sup>1</sup>, <sup>1</sup>USDA - ARS, Ft. Lauderdale, FL, <sup>2</sup>National Park Service, Homestead, FL, <sup>3</sup>South Florida Water Management District, West Palm Beach, FL

#### Room W330 C (Convention Center)

**Moderators and Organizers:** Robert Mensah<sup>1</sup>, Lewis Wilson<sup>2</sup>, and Megha N. Parajulee<sup>3</sup>, <sup>1</sup>New South Wales Dept. of Primary Industries, Narrabri, Australia, <sup>2</sup>CSIRO, Narrabri, Australia, <sup>3</sup>Texas A&M AgriLife Research, Lubbock, TX

- 1:30 0622** Integrated pest management in Ethiopia: Development and use of a supplementary food spray to manage pests and beneficial insects on conventional cotton crops. **Tadesse Amera** (atadesse2002@yahoo.com)<sup>1</sup>, Robert Mensah<sup>2</sup>, and Atalo Belay<sup>3</sup>, <sup>1</sup>Swedish Univ. of Agricultural Sciences, Uppsala, Sweden, <sup>2</sup>New South Wales Dept. of Primary Industries, Narrabri, Australia, <sup>3</sup>Pesticide Action Nexus Association, Addis Ababa, Ethiopia
- 1:45 0623** Biosafety of transgenic crops to the non-target arthropods. **Hari Sharma** (vcuhf@yahoo.com), Dr. YS Parmar Univ. of Horticulture & Forestry, Nauni, Solan, India
- 2:00 0624** Cotton pest management in Bt cotton system in northern China. **Feng Ge** (gef@ioz.ac.cn)<sup>1</sup>, Fang Ouyang<sup>1</sup>, and Xingyuan Men<sup>2</sup>, <sup>1</sup>Chinese Academy of Sciences, Beijing, China, <sup>2</sup>Shandong Academy of Agricultural Sciences, Jinan, China
- 2:15 0625** Revised targets and tools in IPM for insect pests of cotton in India. **Shashikant Udikeri** (ssudikeri@rediffmail.com), Indian Ministry of Agriculture, Bangalore, India

- 2:30 **0626** Cotton IPM in the Texas High Plains: Host-plant mediated management system. **Megha N. Parajulee** (m-parajulee@tamu.edu), Texas A&M AgriLife Research, Lubbock, TX
- 2:45 **0627** IPM in cotton cropping systems: Development and exploitation of a new semiochemical product for cotton IPM. **Robert Mensah** (robert.mensah@dpi.nsw.gov.au)<sup>1</sup>, David Leach<sup>2</sup>, Alison Young<sup>1</sup>, and Nick Watts<sup>3</sup>, <sup>1</sup>New South Wales Dept. of Primary Industries, Narrabri, Australia, <sup>2</sup>Southern Cross Univ., Lismore, Australia, <sup>3</sup>Growth Agriculture Pty, Ltd., Wee Waa, Australia
- 3:00 BREAK**
- 3:15 **0628** Strategies to manage emergent pests in GM-cotton: A case study with *Nezara viridula*. **Simone Heimoana** (simone.heimoaana@csiro.au), CSIRO, Narrabri, Australia
- 3:30 **0629** EPG investigation of feeding behavioral response of cotton aphid, *Aphis gossypii* (Glover), to elevated CO<sub>2</sub>. **Fajun Chen** (fajunchen@njau.edu.cn)<sup>1</sup>, Shoulin Jiang<sup>1</sup>, Guijun Wan<sup>1</sup>, and Megha N. Parajulee<sup>2</sup>, <sup>1</sup>Nanjing Agricultural Univ., Nanjing, China, <sup>2</sup>Texas A&M AgriLife Research, Lubbock, TX
- 3:45 **0630** Habitat management and biological control in Bt cotton. **Fang Ouyang** (ouyangf@ioz.ac.cn)<sup>1</sup>, Quanfeng Yang<sup>1</sup>, and Yongsheng Zhang<sup>2</sup>, <sup>1</sup>Chinese Academy of Sciences, Beijing, China, <sup>2</sup>Hunan Agricultural Univ., Changsha, China
- 4:00 **0631** Integrated regional thrips management in southwestern United States cotton. **Robert Bowling** (robert.bowling@ag.tamu.edu)<sup>1</sup>, Megha N. Parajulee<sup>2</sup>, and Michael Brewer<sup>3</sup>, <sup>1</sup>Texas A&M AgriLife Extension Service, Corpus Christi, TX, <sup>2</sup>Texas A&M AgriLife Research, Lubbock, TX, <sup>3</sup>Texas A&M AgriLife Research, Corpus Christi, TX

### Symposium: Population Consequences of Pest Management Tactics on Non-Target Species

#### Room W222 A (Convention Center)

**Moderator and Organizer:** David A. Andow, Univ. of Minnesota, St. Paul, MN

- 1:30 **Introduction**
- 1:45 **0632** Source, movement, and exposure levels for neonics in a maize/soybean/wheat-dominated ecosystem. **Arthur W. Schaafsma** (aschaafs@uoguelph.ca)<sup>1</sup>, Victor Limay-Rios<sup>1</sup>, Yingen Xue<sup>1</sup>, Jocelyn L. Smith<sup>1</sup>, Luis Forero<sup>1</sup>, and Tracey Baute<sup>2</sup>, <sup>1</sup>Univ. of Guelph, Ridgetown, ON, Canada, <sup>2</sup>Ontario Ministry of Agriculture, Food and Rural Affairs, Ridgetown, ON, Canada
- 2:00 **0633** Neonicotinoid insecticides alter plant defenses and drive changes in arthropod communities in crop plants. **Ada Szczepaniec** (ada.szczepaniec@ag.tamu.edu)<sup>1</sup>, Jason Wulff<sup>2</sup>, and Micky Eubanks<sup>2</sup>, <sup>1</sup>Texas A&M Univ., Amarillo, TX, <sup>2</sup>Texas A&M Univ., College Station, TX

- 2:15 **0634** Transfer of entomotoxins to non-target insect eggs and potential population and community effects. **Debora Pires Paula** (debora.pires@embrapa.br), Embrapa Cenargen, Brasília, Brazil
- 2:30 **0635** Mirid outbreaks associated with Bt cotton in China. **Yanhui Lu** (yhlu@ippcaas.cn) and Kongming Wu, Chinese Academy of Agricultural Sciences, Beijing, China
- 2:45 **0636** The role of biotic interactions in non-target pest outbreaks in transgenic Bt cotton. **Adam Zeilinger** (arz@berkeley.edu)<sup>1</sup>, Dawn Olson<sup>2</sup>, and David A. Andow<sup>3</sup>, <sup>1</sup>Univ. of California, Berkeley, CA, <sup>2</sup>USDA - ARS, Tifton, GA, <sup>3</sup>Univ. of Minnesota, St. Paul, MN
- 3:00 BREAK**
- 3:15 **0637** Southeastern USA Regional landscape patterns and population dynamics of the stink bug *Euchistus servus*. **Dawn Olson** (dawn.olson@ars.usda.gov)<sup>1</sup>, Kristina Prescott<sup>2</sup>, Adam Zeilinger<sup>3</sup>, Suqin Hou<sup>4</sup>, Alisa Coffin<sup>1</sup>, John Ruberson<sup>5</sup>, and David A. Andow<sup>2</sup>, <sup>1</sup>USDA - ARS, Tifton, GA, <sup>2</sup>Univ. of Minnesota, St. Paul, MN, <sup>3</sup>Univ. of California, Berkeley, CA, <sup>4</sup>Harvard Univ., Boston, MA, <sup>5</sup>Kansas State Univ., Manhattan, KS
- 3:30 **0638** Population dynamics of stink bugs in landscapes with Bt cotton. **David A. Andow** (dandow@umn.edu)<sup>1</sup>, Dawn Olson<sup>2</sup>, and John Ruberson<sup>3</sup>, <sup>1</sup>Univ. of Minnesota, St. Paul, MN, <sup>2</sup>USDA - ARS, Tifton, GA, <sup>3</sup>Kansas State Univ., Manhattan, KS
- 3:45 **0639** Population modeling to estimate the viability of endangered butterflies exposed to stress. **John Stark** (starkj@wsu.edu)<sup>1</sup>, Catherine Johnson<sup>2</sup>, and Xuedong Chen<sup>3</sup>, <sup>1</sup>Washington State Univ., Puyallup, WA, <sup>2</sup>U.S. Fish and Wildlife Service, Sacramento, CA, <sup>3</sup>Univ. of Florida, Lake Alfred, FL
- 4:00 **0640** Non-target effects of neonicotinoid insecticides on honey bee (*Apis mellifera* L.) and bumble bee (*Bombus impatiens* Cresson) queens and colony development. **Judy Wu-Smart** (jwu-smart@unl.edu)<sup>1</sup> and Marla Spivak<sup>2</sup>, <sup>1</sup>Univ. of Nebraska, Lincoln, NE, <sup>2</sup>Univ. of Minnesota, St. Paul, MN
- 4:15 **0641** Impact of cropping systems on bee community and colony fitness in water-limited agroecosystems. **Fabian Menalled** (menalled@montana.edu), Subodh Adhikari, Laura Burkle, Kevin O'Neill, and David K. Weaver, Montana State Univ., Bozeman, MT
- 4:30 **0642** Cascading effects of neonicotinoids on biological control in a soil food chain. **Margaret Douglas** (mrd276@psu.edu) and John Tooker, Pennsylvania State Univ., University Park, PA
- 4:45 **0643** Life history approach to the protection of ecosystem services. **John Banks** (jebanks@csumb.edu)<sup>1</sup>, Azmy Ackleh<sup>2</sup>, Roger Vargas<sup>3</sup>, and John Stark<sup>4</sup>, <sup>1</sup>California State Univ., Seaside, CA, <sup>2</sup>Univ. of Louisiana, Lafayette, LA, <sup>3</sup>USDA - ARS, Hilo, HI, <sup>4</sup>Washington State Univ., Puyallup, WA



**Symposium: Entomology Around the World: Past, Present, and Future Challenges**

**Room W240 A (Convention Center)**

**Moderators and Organizers:** Michelle Samuel-Foo<sup>1</sup>, Mamoudou Setamou<sup>2</sup>, Simon Zebelo<sup>3</sup>, and Joseph Munyaneza<sup>4</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Texas A&M Univ., Weslaco, TX, <sup>3</sup>Auburn Univ., Auburn, AL, <sup>4</sup>USDA - ARS, Wapato, WA

- 1:30 **0644** From biocontrol to precision-IPM in Africa: Challenges and opportunities. **Manuele Tamo** (m.tamo@cgiar.org)<sup>1</sup>, Barry R. Pittendrigh<sup>2</sup>, Saber Miresmailli<sup>3</sup>, Victor Font<sup>2</sup>, Ben Blalock<sup>2</sup>, Elie Dannon<sup>1</sup>, Benjamin Datinon<sup>1</sup>, Michael Agyekum<sup>4</sup>, Cynthia Donavan<sup>4</sup>, and Eustache Biauou<sup>5</sup>, <sup>1</sup>International Institute of Tropical Agriculture, Cotonou, Benin, <sup>2</sup>Univ. of Illinois, Champaign, IL, <sup>3</sup>Ecoation Innovative Solutions, Inc., North Vancouver, BC, Canada, <sup>4</sup>Michigan State Univ., East Lansing, MI, <sup>5</sup>INRA, Cotonou, Benin
- 2:00 **0645** Psyllids and *Liberibacter*: An emerging and global challenge for the tree fruit and vegetable industry. **Joseph Munyaneza** (joseph.munyaneza@ars.usda.gov)<sup>1</sup> and Mamoudou Setamou<sup>2</sup>, <sup>1</sup>USDA - ARS, Wapato, WA, <sup>2</sup>Texas A&M Univ., Weslaco, TX
- 2:30 **0646** The IR-4 Project and Agriculture and Agri-Food Canada: Working together to serve specialty crops across borders. Michelle Samuel-Foo<sup>1</sup>, Shirley Archambault<sup>2</sup>, and **Tamika Garrick** (tgarrick09@ufl.edu)<sup>1</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Agriculture and Agri-Food Canada, Gatineau, QC, Canada
- 2:45 **0647** Fruit fly biological control in the Pacific and technology transfer to Africa. **Luc Leblanc** (leblanc@ctahr.hawaii.edu)<sup>1</sup>, Ernest Harris<sup>2</sup>, Kemo Badji<sup>3</sup>, and Roger Vargas<sup>2</sup>, <sup>1</sup>Univ. of Idaho, Moscow, ID, <sup>2</sup>USDA - ARS, Hilo, HI, <sup>3</sup>Crop Protection Directorate, Dakar, Senegal
- 3:00 **BREAK**
- 3:15 **0648** Applying quantitative ecology and integrated management on smallholders' farms: An example of maize stores in the Republic of Benin. **William Meikle** (william.meikle@ars.usda.gov)<sup>1</sup>, Niels Holst<sup>2</sup>, and Richard Markham<sup>3</sup>, <sup>1</sup>USDA - ARS, Tucson, AZ, <sup>2</sup>Aarhus Univ., Slagelse, Denmark, <sup>3</sup>Australian Centre for International Agricultural Research, Bruce, Australia
- 3:30 **0649** Malaria and kwashiorkor: Working with western culture scientists. **Florence Dunkel** (fdunkel@montana.edu)<sup>1</sup> and Sarah Halvorson<sup>2</sup>, <sup>1</sup>Montana State Univ., Bozeman, MT, <sup>2</sup>Univ. of Montana, Missoula, MT
- 3:45 **0650** New threats to soybeans in the Americas from Old World bollworm. **Fikru Haile** (fikru.haile@pioneer.com), DuPont Pioneer, Johnston, IA
- 4:00 **0651** Pest management of major invasive pest species: Varroa mite and scale insects in the Caribbean islands. **Lambert Kanga** (lambert.kanga@famuedu.edu)<sup>1</sup>, Walker A. Jones<sup>2</sup>, and James Rish<sup>3</sup>, <sup>1</sup>Florida A&M Univ., Tallahassee, FL, <sup>2</sup>USDA - ARS, Stoneville, MS, <sup>3</sup>Tupelo Honey, Inc., Wewahatchka, FL

**Symposium: Global Status, Acceptance, and Challenges of GM Crops**

**Room W224 H (Convention Center)**

**Moderators and Organizers:** Murugesan Rangasamy<sup>1</sup>, Nandi Nagaraj<sup>1</sup>, and Srinivas Parimi<sup>2</sup>, <sup>1</sup>Dow AgroSciences, Indianapolis, IN, <sup>2</sup>Mahyco, Jalna, India

*This symposium is generously sponsored by the CropLife International Plant Biotech Product Stewardship Project Team and Excellence Through Stewardship.*



- 1:30 **0652** Relevance of biotech crops in enhancing global food security in the face of anticipated global climate change. **Channapatna Prakash** (prakash@mytu.tuskegee.edu), Tuskegee Univ., Tuskegee, AL
- 1:45 **0653** Genetically modified crops: An African perspective. **Jennifer Thomson** (jennifer.thomson@uct.ac.za), Univ. of Cape Town, Rondebosch, South Africa
- 2:00 **0654** Biosafety regulatory framework for genetically modified organisms in Brazil. **Alda Lerayer** (alda.lerayer@gmail.com) and Marcelo Moraes, Council for Information on Biotechnology, São Paulo, Brazil
- 2:15 **0655** The role of biotechnology and new breeding technologies for global food security. **Maurice Moloney** (gifs.director@usask.ca), Global Institute for Food Security, Saskatoon, SK, Canada
- 2:30 **0656** Plant transgenic technology, regulatory environment, and public response – Indian experience in the last three decades. **S. Raghavendra Rao** (srraodbt@yahoo.com)<sup>1</sup> and V. Siva Reddy<sup>2</sup>, <sup>1</sup>National Certification System for Tissue Culture Raised Plants, New Delhi, India, <sup>2</sup>Regional Centre of Biotechnology, New Delhi, India
- 2:45 **0657** Experience with GM IR Crops in Argentina. Martin Lema<sup>1,2</sup>, Agustina Whelan<sup>1,2</sup>, and **Patricia Gramuglia** (pgramuglia@magyp.gob.ar)<sup>1</sup>, <sup>1</sup>Ministry of AgroIndustry, Buenos Aires, Argentina, <sup>2</sup>National Univ. of Quilmes, Buenos Aires, Argentina
- 3:00 **BREAK**
- 3:15 **0658** GM technologies for staple crops in Africa – the case of R&D in Uganda regulations and public perceptions. **Andrew Kiggundu** (akiggundu@gmail.com), National Agricultural Research Organisation, Kampala, Uganda
- 3:30 **0659** Talking to a concerned public about genetic engineering. **Kevin Folta** (kfolta@ufl.edu), Univ. of Florida, Gainesville, FL
- 3:45 **0660** Status, acceptance, challenges of GM crops – China perspective. **Zhihong Lang** (langzhihong@caas.cn), Jie Zhang, and Dafang Huang, Chinese Academy of Agricultural Sciences, Beijing, China
- 4:00 **0661** Stewarding GM crops for product integrity, durability, and acceptance. **Chris Holdgreve** (choldgreve@ets.bio), Excellence Through Stewardship, Washington, DC

## Symposium: Where are the Six Legs of Advanced Entomology Publishing Taking Us?

Room W224 F (Convention Center)

**Moderators and Organizers:** Frank Krell<sup>1</sup> and Lyubomir Penev<sup>2</sup>,  
<sup>1</sup>Denver Museum of Nature and Science, Denver, CO, <sup>2</sup>Bulgarian Academy of Sciences and Pensoft Publishers, Sofia, Bulgaria

- 1:30 **0662** New opportunities and trends in scholarly publishing. Michiel Thijssen<sup>1</sup>, Frank Krell<sup>2</sup>, and **Marti Huetink** (huetink@brill.com)<sup>1</sup>, <sup>1</sup>Brill, Leiden, Netherlands, <sup>2</sup>Denver Museum of Nature and Science, Denver, CO
- 1:45 **0663** How to get your paper published – from a publisher's perspective. **Violeta Ribarska** (vribarsk@wiley.com)<sup>1</sup> and Lin Field<sup>2</sup>, <sup>1</sup>Wiley, Oxford, United Kingdom, <sup>2</sup>Rothamsted Research, Harpenden, United Kingdom
- 2:00 **0664** Journal choice in a crowded world. **Fiona Williams** (fiona.williams@oup.com)<sup>1</sup>, Matthew Jozwiak<sup>2</sup>, Ian Sherman<sup>3</sup>, and Lauren Godwin<sup>1</sup>, <sup>1</sup>Oxford Univ. Press USA, Cary, NC, <sup>2</sup>Oxford Univ. Press USA, New York, NY, <sup>3</sup>Oxford Univ. Press, Oxford, United Kingdom
- 2:15 **0665** Adding value in journal publishing: Your paper is more than a paper at Springer. **Zuzana Bernhart** (zuzana.bernhart@springer.com), Springer Science + Business Media B.V., Dordrecht, Netherlands
- 2:30 **0666** Open Science: A publishing perspective from PLOS. **Catriona MacCallum** (cmacallum@plos.org), PLOS, Cambridge, United Kingdom
- 2:45 **0667** How PeerJ improves the publishing process and author experience. **Peter Binfield** (pete@peerj.com), PeerJ, Inc., Corte Madera, CA
- 3:00 BREAK**
- 3:15 **0668** Invertebrate Systematics: Current and future directions of a phylogenetics journal with a global perspective. **Jennifer Forster** (jenny.foster@csiro.au)<sup>1</sup> and Andrew Austin<sup>2</sup>, <sup>1</sup>CSIRO, Clayton, Australia, <sup>2</sup>Univ. of Adelaide, Adelaide, Australia
- 3:30 **0669** Zootaxa: A mega-journal for biodiversity discovery and publication. **Zhi-Qiang Zhang** (zhangz@landcareresearch.co.nz), Landcare Research, Auckland, New Zealand
- 3:45 **0670** ZooBank and the publishing world. **Richard Pyle** (deepreef@bishopmuseum.org), Bishop Museum, Honolulu, HI
- 4:00 **0671** Biodiversity publishing becomes part of the research process: Integrated narrative and data publication in the ARPHA platform. **Lyubomir Penev** (penev@pensoft.net), Bulgarian Academy of Sciences and Pensoft Publishers, Sofia, Bulgaria
- 4:15 **0672** Legal and ethical reasons for free and open biodiversity information. **Willi Egloff** (egloff\_bader@bluewin.ch) and Donat Agosti, Plazi GmbH, Bern, Switzerland

## Symposium: An Emerging Food Supply: Edible Insects

Room W230 B (Convention Center)

**Moderator and Organizer:** Marianne Shockley, Univ. of Georgia, Athens, GA

- 1:30 **0673** Transparency in the fledgling insects for food and feed industry: How open source philosophy could sink or save the entomophagy movement. **Robert Allen** (rna@aspirefg.com), Aspire, Buda, TX
- 1:45 **0674** Why don't we eat bugs in Western culture: The anthropology perspective. **Julie Lesnik** (julie.lesnik@gmail.com), Wayne State Univ., Detroit, MI
- 2:00 **0675** The greatest opportunities to drive forward entomophagy. **Kaison Tanabe** (kaisontanabe@gmail.com), EntoBento, San Diego, CA
- 2:15 **0676** Entomophagy in Thailand and beyond: Rearing practices of *Acheta domesticus* and *Teloe gryllus testaceus* in Thailand, a model for entomophagy education presented to western audiences, identifying needed improvements in entomophagy education. **Kiah Brash** (kiah.brasch@gmail.com), Rustle Up Some Grub, Minneapolis, MN; Univ. of Minnesota, Minneapolis, MN
- 2:30 **0677** Mainstreaming edible insects: The next steps. **Kevin Bachhuber** (kevin@bigcricketfarms.com), Big Cricket Farms, Youngstown, OH
- 2:45 **0678** Bring insexy back: Hopping cricket bars into the mainstream. **Patrick Crowley** (pat@chapul.com), Chapul, Salt Lake City, UT
- 3:00 BREAK**
- 3:15 **0679** Health safety and nutritional value of black soldier flies driven-feed. **Marwa Abdel Hamid Shumo** (mshummo@hotmail.com), Univ. of Bonn, Bonn, Germany
- 3:30 **0680** Entomophagy from a humanities perspective. **David Gracer** (david\_gracer@hotmail.com), Community College of Rhode Island, Warwick, RI
- 3:45 **0681** Advances in the scaling of human grade edible insect farming. **Jarrod Goldin** (jarrod@entomofarms.com), Entomo Farms, Norwood, ON, Canada
- 4:00 **0682** Insect allergy? No, not from bites and stings this time. **Louis N. Sorkin** (sorkin@amnh.org), American Museum of Natural History, New York, NY
- 4:15 **0683** Cultural and economic uses of insects in Oaxaca, Mexico. **Marianne Shockley** (entomolo@uga.edu)<sup>1</sup>, Alicia Fonseca Muñoz<sup>2</sup>, Liliana Robles Bautista<sup>3</sup>, Paulina Alejandra Flores Rios<sup>2</sup>, Jeffery K. Tomberlin<sup>4</sup>, and Rafael Perez Pacheco<sup>2</sup>, <sup>1</sup>Univ. of Georgia, Athens, GA, <sup>2</sup>National Polytechnic Institute, Oaxaca, Mexico, <sup>3</sup>Benito Juárez Autonomous Univ., Oaxaca, Mexico, <sup>4</sup>Texas A&M Univ., College Station, TX
- 4:30 **Discussion**
- 4:45 **Tasting**





## Symposium: In the Light of Morphometrics: Frontiers in Ecology and Evolution of Insect Morphology

### Room W314 A (Convention Center)

**Moderators and Organizers:** Kazuo Takahashi<sup>1</sup>, Chris Klingenberg<sup>2</sup>, and Haruki Tatsuta<sup>3</sup>, <sup>1</sup>Okayama Univ., Okayama, Japan, <sup>2</sup>The Univ. of Manchester, Manchester, United Kingdom, <sup>3</sup>Univ. of the Ryukyus, Nishihara, Japan

- 1:30 **0684** Insect morphometrics: New developments and applications. **Chris Klingenberg** (cpk@manchester.ac.uk), The Univ. of Manchester, Manchester, United Kingdom
- 2:00 **0685** Hidden biodiversity in hoverflies assessed by wing geometric morphometrics: Conservation implications. **Vesna Milankov** (vesna.milankov@dbe.uns.ac.rs), Jasmina Ludoški, Ljubinka Francuski, and Marko Djuracic, Univ. of Novi Sad, Novi Sad, Serbia
- 2:15 **0686** Inferring phylogenetic origins of dimorphic sexual trait in a beetle *Oedemera sexualis*. **Haruki Tatsuta** (htatsuta@agr.u-ryukyu.ac.jp)<sup>1</sup>, Wataru Ogasa<sup>1</sup>, Daisuke Satomi<sup>2</sup>, Shin-ichi Kudo<sup>3</sup>, and Chiharu Koshio<sup>3</sup>, <sup>1</sup>Univ. of the Ryukyus, Nishihara, Japan, <sup>2</sup>Kobe Univ., Kobe, Japan, <sup>3</sup>Naruto Univ. of Education, Naruto, Japan
- 2:30 **0687** Detecting divergent sexual selection operating upon divergent genital morphologies. **Yasuoki Takami** (takami@people.kobe-u.ac.jp) and Sogo Takahashi, Kobe Univ., Kobe, Japan
- 2:45 **0688** Ecological adaptation and morphological divergence in the snail feeding carabid beetle *Damaster blaptoides*. **Junji Konuma** (junji.konuma@sci.toho-u.ac.jp), Toho Univ., Chiba, Japan
- 3:00 BREAK**
- 3:15 **0689** Through the looking-glass: Morphological diversity pattern of ants is reflected in the sympatric ant-mimicking spiders or not? **Yoshiaki Hashimoto** (yoshiaki@hitohaku.jp), Univ. of Hyogo Museum of Nature and Human Activities, Sanda, Japan
- 3:30 **0690** On the importance of shape in a ménage à trois among an orchid, a female bee, and a male bee. **Yannick Staedler** (yannick.staedler@univie.ac.at)<sup>1</sup>, Jürg Schönenberger<sup>1</sup>, Philipp Schlüter<sup>2</sup>, Susanne Pamperl<sup>1</sup>, and Sara Manafzadeh<sup>2</sup>, <sup>1</sup>Univ. of Vienna, Vienna, Austria, <sup>2</sup>Univ. of Zürich, Zürich, Switzerland
- 3:45 **0691** Interspecific variation of wing asymmetry in Syrphidae. **Adam Tofilski** (rotofilsk@cyf-kr.edu.pl), Agricultural Univ. of Krakow, Krakow, Poland
- 4:00 **0692** HSP90 as a global genetic modulator for male genital morphology in *Drosophila melanogaster*. **Kazuo Takahashi** (kaz\_tak@cc.okayama-u.ac.jp)<sup>1</sup> and Hiroyoshi Iwata<sup>2</sup>, <sup>1</sup>Okayama Univ., Okayama, Japan, <sup>2</sup>The Univ. of Tokyo, Tokyo, Japan
- 4:15 **0693** Morphometrics meets network theory: Modularity and the origin of camouflage patterns of butterfly and moth wings. **Takao Suzuki** (homaresuzuki@gmail.com), National Institute of Agrobiological Sciences, Tsukuba, Japan

- 4:30 **0694** Understanding the evolution of *Drosophila* wing shape: An integrative approach using geometric morphometrics. **Hugo Benitez** (hugobenitez@gmail.com)<sup>1</sup> and Chris Klingenberg<sup>2</sup>, <sup>1</sup>Univ. of Tarapacá, Arica, Chile, <sup>2</sup>The Univ. of Manchester, Manchester, United Kingdom
- 4:45 **0695** Quantitative morphological study of Scarabaeoidea. **Xing-Ke Yang** (yangxk@ioz.ac.cn) and Ming Bai, Chinese Academy of Sciences, Beijing, China
- 5:00 **0696** Landmarks, semilandmarks, and outlines in medical entomology. **Jean-Pierre Dujardin** (dujardinbe@gmail.com), IRD, Montpellier, France

## Symposium: What Constitutes Responsible Field Release of Transgenic Insects?

### Room W414 C (Convention Center)

**Moderator and Organizer:** Fred Gould, North Carolina State Univ., Raleigh, NC

- 1:30 **0697** Creating a responsible development pathway for mosquitoes with engineered drive. **Stephanie James** (sjames@fnih.org), Foundation for the National Institutes of Health, Bethesda, MD
- 1:45 **0698** Engineered and natural gene drives: Examining the risks. **Jason Rasgon** (jlr54@psu.edu), Pennsylvania State Univ., University Park, PA
- 2:00 **0699** Anticipatory governance of gene drive systems. **Jennifer Kuzma** (jkuzma@ncsu.edu), North Carolina State Univ., Raleigh, NC
- 2:15 **0700** Pre-release engagement with the public: The case of *Aedes aegypti*. **Beth Ranson** (branson@keysmosquito.org) and Michael Doyle, Florida Keys Mosquito Control District, Key West, FL
- 2:30 **0701** Diverse approaches for public engagement. **Jason Delborne** (jadelbor@ncsu.edu), North Carolina State Univ., Raleigh, NC
- 2:45 **0702** Towards responsible field testing of transgenic new world screwworm fly in Panama. **Carolina Concha** (carolacmcl@yahoo.com), Smithsonian Tropical Research Institute, Panama City, Panama
- 3:00 BREAK**
- 3:15 **0703** An African perspective on release of engineered *Anopheles*. **Mamadou Coulibaly** (doudou@icermali.org), Malaria Research and Training Center, Bamako, Mali
- 3:30 **0704** The Brazilian experience with Projecto *Aedes* Transgenico. **Margareth Capurro** (mcapurro@icb.usp.br), Univ. of São Paulo, São Paulo, Brazil
- 3:45 **Discussion**

## Symposium: Workshop on Gene Editing Technologies

### Room W414 A (Convention Center)

**Moderators and Organizers:** Anjiang Tan<sup>1</sup> and Subba Reddy Palli<sup>2</sup>, <sup>1</sup>Chinese Academy of Sciences, Shanghai, China, <sup>2</sup>Univ. of Kentucky, Lexington, KY

- 1:30 **0705** A primer on genome editing technologies and their use in insects. **Nicholas M. Teets** (n.teets@ufl.edu), Univ. of Kentucky, Lexington, KY

- 2:00 **0706** Development of genome editing tools and their applications in the silkworm, *Bombyx mori*. **Hideki Sezutsu** (hsezutsu@affrc.go.jp), National Institute of Agrobiological Sciences, Tsukuba, Japan
- 2:30 **0707** Genetic control of Lepidoptera using genome editing tools. **Yong Ping Huang** (yphuang@sibs.ac.cn), Chinese Academy of Sciences, Shanghai, China
- 2:45 **0708** Genome editing in the cricket *Gryllus bimaculatus*. **Taro Mito** (mito.taro@tokushima-u.ac.jp), Tokushima Univ., Tokushima, Japan
- 3:00 BREAK**
- 3:15 **0709** Blocking malaria transmission with genetically engineered symbiotic bacteria from vector mosquitoes. **Sibao Wang** (sibaowang@sibs.ac.cn), Shanghai Institute of Plant Physiology and Ecology, Shanghai, China
- 3:30 **0710** Functional genomic analysis of *Ras*-promoted silk production. **Li Ma** (lima@gmail.com), Chinese Academy of Sciences, Shanghai, China
- 3:45 **0711** Sex regulation of *Bombyx mori* by editing doublesex. **Jun Xu** (xujun@sibs.ac.cn)<sup>1</sup>, Anthony James<sup>2</sup>, Yongping Huang<sup>1</sup>, and Anjiang Tan<sup>1</sup>, <sup>1</sup>Chinese Academy of Sciences, Shanghai, China, <sup>2</sup>Univ. of California, Irvine, CA
- 4:00 **0712** Mutation of an imaginal disc-derived wing morphogenesis gene in *Bombyx mori*. **Muwang Li** (mwli@just.edu.cn), Xiaojing Liu, and Chengxiang Hou, Jiangsu Univ. of Science and Technology, Zhenjiang, China
- 4:15 **0713** Applications of transgenesis and genome editing in lepidopteran functional genomics. **Anjiang Tan** (ajtan01@sibs.ac.cn)<sup>1</sup>, Taichu Wang<sup>2</sup>, and Baosheng Zeng<sup>3</sup>, <sup>1</sup>Shanghai Institute of Plant Physiology and Ecology, Shanghai, China, <sup>2</sup>Anhui Academy of Agricultural Science, Hefei, China, <sup>3</sup>Chinese Academy of Sciences, Shanghai, China

### Symposium: Novel Contributions of Chemical Ecology to Global IPM

#### Room W223 A (Convention Center)

**Moderators and Organizers:** Baldwyn Torto<sup>1</sup> and Christian Borgemeister<sup>2</sup>, <sup>1</sup>International Centre of Insect Physiology and Ecology, Nairobi, Kenya, <sup>2</sup>Univ. of Bonn, Bonn, Germany

- 1:30 **0714** Potential of chemical ecology for application in IPM. **James H. Tumlinson** (jht2@psu.edu), Pennsylvania State Univ., University Park, PA
- 2:00 **0715** Role of leguminous plants in sandfly chemical ecology. **David Tchouassi** (dtchouassi@icipe.org)<sup>1</sup>, Julia Wanjiru<sup>1</sup>, Christian Borgemeister<sup>2</sup>, and Baldwyn Torto<sup>1</sup>, <sup>1</sup>International Centre of Insect Physiology and Ecology, Nairobi, Kenya, <sup>2</sup>Univ. of Bonn, Bonn, Germany
- 2:15 **0716** Below ground chemical ecology and IPM. **Hans T. Alborn** (hans.alborn@ars.usda.gov), USDA - ARS, Gainesville, FL

- 2:30 **0717** Choices have consequences for a specialist spider mite attracted to edible nightshades. **Lucy Murungi** (lucykananu@yahoo.com) and Baldwyn Torto, International Centre of Insect Physiology and Ecology, Nairobi, Kenya
- 2:45 **0718** Chemical communication in the Chilean leafroller species *Proeulia auraria* and *P. triquetra*. **Jan Bergmann** (bergmann05@gmail.com)<sup>1</sup>, Maria Fernanda Flores<sup>2</sup>, Alda Romero<sup>3</sup>, M. Oyarzun<sup>4</sup>, and Tania Zaviezo<sup>5</sup>, <sup>1</sup>Pontifical Catholic Univ., Valparaiso, Chile, <sup>2</sup>Institute of Chemistry, Valparaiso, Chile, <sup>3</sup>Catholic Univ. of Chile, Santiago, Chile, <sup>4</sup>Pontifical Catholic Univ., Vicuña Mackenna, Chile, <sup>5</sup>Pontifical Catholic Univ., Santiago, Chile
- 3:00 BREAK**
- 3:15 **0719** Presentation withdrawn
- 3:30 **0720** Chemical ecology of leaf miners in east Africa. **Komi Fiaboe** (kfiaboe@icipe.org)<sup>1</sup>, Caroline Foba<sup>1</sup>, Komivi Akutse<sup>1</sup>, Samuel Muchemi<sup>1</sup>, Lucy Murungi<sup>1</sup>, Robert Musundire<sup>2</sup>, Ayuka Fombong<sup>1</sup>, David Tchouassi<sup>1</sup>, Sunday Ekesi<sup>1</sup>, and Baldwyn Torto<sup>1</sup>, <sup>1</sup>International Centre of Insect Physiology and Ecology, Nairobi, Kenya, <sup>2</sup>Chinhoyi Univ. of Technology, Chinhoyi, Zimbabwe
- 3:45 **0721** Contribution of chemical ecology towards developing IPM strategies for vegetable legumes and brassicas in tropical Asia. **Srinivasan Ramasamy** (srini.ramasamy@worldveg.org)<sup>1</sup> and Krm Bhanu<sup>2</sup>, <sup>1</sup>AVRDC-The World Vegetable Center, Tainan, Taiwan, <sup>2</sup>Biocontrol Research Laboratories, Mumbai, India

### Symposium: Sex and Drugs and Bee Control: The Chemical Ecology of Pollination

#### Room W224 B (Convention Center)

**Moderators and Organizers:** Lynn S. Adler<sup>1</sup>, Phil Stevenson<sup>2</sup>, and Rebecca E. Irwin<sup>3</sup>, <sup>1</sup>Univ. of Massachusetts, Amherst, MA, <sup>2</sup>Royal Botanic Gardens, Surrey, United Kingdom, <sup>3</sup>Dartmouth College, Hanover, NH

- 1:30 **0722** How it takes honey to make a honey bee – and pollen and nectar to make a pollinator. **May R. Berenbaum** (maybe@illinois.edu), Univ. of Illinois, Champaign, IL
- 2:00 **0723** Chemical information structuring the plant interaction network. **André Kessler** (ak357@cornell.edu), Cornell Univ., Ithaca, NY
- 2:15 **0724** Connecting floral advertisement and reward: Probing the hidden chemistry of nectar. Robert Raguso and **Geoffrey Broadhead** (gtb49@cornell.edu), Cornell Univ., Ithaca, NY
- 2:30 **0725** Scented sweets: Exploring the multifaceted roles of nectar volatiles. **Amy Parachnowitsch** (amy.parachnowitsch@ebc.uu.se)<sup>1</sup>, Rosie Burdon<sup>1</sup>, Robert Gegear<sup>2</sup>, Robert Junker<sup>3</sup>, André Kessler<sup>4</sup>, and Robert Raguso<sup>4</sup>, <sup>1</sup>Uppsala Univ., Uppsala, Sweden, <sup>2</sup>Worcester Polytechnic Institute, Worcester, MA, <sup>3</sup>Univ. of Salzburg, Salzburg, Austria, <sup>4</sup>Cornell Univ., Ithaca, NY



- 2:45 **0726** From orchids to monkeyflowers: How floral volatiles shape pollinator behavior. **Kelsey Byers** (kelsey.byers@systbot.uzh.ch)<sup>1</sup>, H. Bradshaw Jr.<sup>2</sup>, Jeff Riffell<sup>2</sup>, Roman Kellenberger<sup>1</sup>, and Philipp Schlüter<sup>1</sup>, <sup>1</sup>Univ. of Zürich, Zürich, Switzerland, <sup>2</sup>Univ. of Washington, Seattle, WA
- 3:00 **BREAK**
- 3:15 **0727** How pollen affects learning in bees. **Natalie Hempel de Ibarra** (n.hempel@exeter.ac.uk)<sup>1</sup> and Elizabeth Nicholls<sup>2</sup>, <sup>1</sup>Univ. of Exeter, Exeter, United Kingdom, <sup>2</sup>Univ. of Sussex, Sussex, United Kingdom
- 3:30 **0728** Mycorrhizal fungi alter floral traits important to pollination, bee fitness, and crop yield. **Leif Richardson** (leifr7@gmail.com), Alison Brody, and Taylor Ricketts, Univ. of Vermont, Burlington, VT
- 3:45 **0729** Floral scent mimicry by a pollinator-vectored plant pathogen. **Scott McArt** (shm33@cornell.edu)<sup>1</sup>, Timothy Miles<sup>2</sup>, Cesar Rodriguez<sup>3</sup>, Annamiek Schilder<sup>4</sup>, Lynn S. Adler<sup>5</sup>, and Matthew Grieshop<sup>4</sup>, <sup>1</sup>Cornell Univ., Ithaca, NY, <sup>2</sup>California State Univ., Seaside, CA, <sup>3</sup>Rutgers, The State Univ. of New Jersey, Chatsworth, NJ, <sup>4</sup>Michigan State Univ., East Lansing, MI, <sup>5</sup>Univ. of Massachusetts, Amherst, MA
- 4:00 **0730** Specialist flowers face a trade-off between rewarding pollinators and defense against nectar robbery. **Phil Stevenson** (p.stevenson@kew.org)<sup>1</sup>, S. Barlow<sup>1</sup>, Sebastien Kessler<sup>2</sup>, Geraldine A. Wright<sup>2</sup>, Marta Barberis<sup>2</sup>, and Iain Farrell<sup>1</sup>, <sup>1</sup>Royal Botanic Gardens, Surrey, United Kingdom, <sup>2</sup>Newcastle Univ., Newcastle upon Tyne, United Kingdom
- 4:15 **0731** Nicotine and the honey bee. **Susan Nicolson** (swnicolson@zoology.up.ac.za)<sup>1</sup> and Ezette Durand<sup>2</sup>, <sup>1</sup>Univ. of Pretoria, Hatfield, South Africa, <sup>2</sup>Univ. of Pretoria, Pretoria, South Africa
- 4:30 **0732** Sipping from a poisoned chalice: How do plant drugs, toxins, and pesticides in nectar affect bee behaviour? **Geraldine A. Wright** (jeri.wright@newcastle.ac.uk), Newcastle Univ., Newcastle upon Tyne, United Kingdom
- 4:45 **0733** Pharmacy bee hive – use of natural drugs to increase pollinator health. **Silvio Erler** (erler.silvio@gmail.com), Martin Luther Univ., Halle, Germany
- 5:00 **0734** The self-medicating bee? Impacts of nectar secondary compounds on bee foraging and disease **Rebecca E. Irwin** (reirwin@ncsu.edu)<sup>1</sup>, Dash Donnelly<sup>1</sup>, Leif Richardson<sup>2</sup>, Phil Stevenson<sup>3</sup>, and Lynn S. Adler<sup>4</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>Univ. of Vermont, Burlington, VT, <sup>3</sup>Univ. of Greenwich, Kent, United Kingdom, <sup>4</sup>Univ. of Massachusetts, Amherst, MA
- 5:15 **0735** Getting sick and getting healthy: The impact of plant species on *Crithidia* infection in bumble bees. **Lynn S. Adler** (lsadler@ent.umass.edu)<sup>1</sup>, Philip Stevenson<sup>2</sup>, and Rebecca E. Irwin<sup>3</sup>, <sup>1</sup>Univ. of Massachusetts, Amherst, MA, <sup>2</sup>Univ. of Greenwich, Chatham, United Kingdom, <sup>3</sup>North Carolina State Univ., Raleigh, NC

## Symposium: Social Insect Pathobiology

### Room W224 G (Convention Center)

**Moderators and Organizers:** Rebeca B. Rosengaus<sup>1</sup> and Elke Genersch<sup>2</sup>, <sup>1</sup>Northeastern Univ., Boston, MA, <sup>2</sup>Institute for Bee Research, Hohen Neuendorf, Germany

- 1:30 **0736** Worms that sterilize queens: Dynamics and mechanisms. **Mark Brown** (mark.brown@rhul.ac.uk), Royal Holloway, Univ. of London, Egham, United Kingdom
- 1:45 **0737** Fungal pathogen adaptations in social insects – Pandora's Box. **Annette Bruun Jensen** (abj@plen.ku.dk), Univ. of Copenhagen, Copenhagen, Denmark
- 2:00 **0738** Pathobiology of *Paenibacillus larvae*, a deadly bacterial pathogen of honey bees (*Apis mellifera*). **Elke Genersch** (elke.genersch@hu-berlin.de), Institute for Bee Research, Hohen Neuendorf, Germany; Freie Univ., Berlin, Germany
- 2:15 **0739** Zombie ants: Precise manipulation of social insect behavior by a microbe. David Hughes and **Colleen Mangold** (cav154@psu.edu), Pennsylvania State Univ., University Park, PA
- 2:30 **0740** Immunocompetence in a social wasp: A special tool for testing ecological and evolutionary hypotheses. **Fabio Manfredini** (fmanfredini79@gmail.com), Pennsylvania State Univ., University Park, PA
- 2:45 **0741** Pathogen-induced transgenerational effects in termites. **Rebeca B. Rosengaus** (r.rosengaus@neu.edu)<sup>1</sup>, Erin Cole<sup>1</sup>, and Graham Thompson<sup>2</sup>, <sup>1</sup>Northeastern Univ., Boston, MA, <sup>2</sup>Univ. of Western Ontario, London, ON, Canada
- 3:00 **BREAK**
- 3:15 **0742** Royal decree: Gene expression in transgenerationally immune primed bumblebee workers mimics a primary immune response. Ben Sadd<sup>1</sup>, **Seth M. Barribeau** (barribeaus14@ecu.edu)<sup>2</sup>, and Paul Schmid-Hempel<sup>3</sup>, <sup>1</sup>Illinois State Univ., Normal, IL, <sup>2</sup>East Carolina Univ., Greenville, NC, <sup>3</sup>ETH Zürich, Zürich, Switzerland
- 3:30 **0743** Honey bee social immunity: Resin collection. **Marla Spivak** (spiva001@umn.edu)<sup>1</sup>, Renata Borba<sup>1</sup>, and Michael Wilson<sup>2</sup>, <sup>1</sup>Univ. of Minnesota, St. Paul, MN, <sup>2</sup>Univ. of Minnesota, Minneapolis, MN
- 3:45 **0744** Benefits and costs of social immunization in ants. Matthias Konrad and **Sylvia Cremer** (sylvia.cremer@ist.ac.at), Institute of Science and Technology Austria, Klosterneuburg, Austria
- 4:00 **0745** Defending the hive: Social mechanisms complement individual immunity in honey bees. **Michael Simone-Finstrom** (michael.simonefinstrom@ars.usda.gov), USDA - ARS, Baton Rouge, LA

## Symposium: The Biochemical Signaling Interface Between Invaders and Their Insect Hosts

## Room W330 A (Convention Center)

**Moderators and Organizers:** Qisheng Song<sup>1</sup>, David W. Stanley<sup>2</sup>, Yonggyun Kim<sup>3</sup>, and Gongyin Ye<sup>4</sup>, <sup>1</sup>Univ. of Missouri, Columbia, MO, <sup>2</sup>USDA - ARS, Columbia, MO, <sup>3</sup>Andong National Univ., Andong, South Korea, <sup>4</sup>Zhejiang Univ., Hangzhou, China

- 1:30 **0746** Eicosanoid signaling in insect immunity. **David W. Stanley** (stanleyd@missouri.edu)<sup>1</sup>, Lei Zhang<sup>2</sup>, Cynthia Goodman<sup>1</sup>, and Joseph Ringbauer<sup>1</sup>, <sup>1</sup>USDA - ARS, Columbia, MO, <sup>2</sup>Chinese Academy of Agricultural Sciences, Beijing, China
- 1:45 **0747** Eicosanoid signaling involved in expression of NADPH-dependent oxidase in insect cellular immunity. **Youngjin Park** (happy2pyj@gmail.com)<sup>1</sup>, David Stanley<sup>2</sup>, and Yonggyun Kim<sup>1</sup>, <sup>1</sup>Andong National Univ., Andong, South Korea, <sup>2</sup>USDA - ARS, Columbia, MO
- 2:00 **0748** Molecular and functional characterization of a prostaglandin E<sub>2</sub> synthase in the blacklegged tick, *Ixodes scapularis* Say. **Joshua R. Urban** (josurb@ksu.edu) and Yoonseong Park, Kansas State Univ., Manhattan, KS
- 2:15 **0749** Immunity function against the entomopathogenic fungi *Beauveria bassiana* by insect molting fluids. **Jie Zhang** (zhangjie01@sibs.ac.cn), Bing Yang, Jingmin Guan, Qiaoli Zhang, and Erjun Ling, Chinese Academy of Sciences, Shanghai, China
- 2:30 **0750** High throughput profiling of the cotton bollworm, *Helicoverpa armigera*, immunotranscriptome. **Zhen Zou** (zouzhen@ioz.ac.cn), Chinese Academy of Sciences, Beijing, China
- 2:45 **0751** Immunity during insect development: Endocrine regulation. **Qisheng Song** (songq@missouri.edu), Hongwei Zhang, and Shengzhang Dong, Univ. of Missouri, Columbia, MO
- 3:00 BREAK**
- 3:15 **0752** Bursicon homodimer actions in the immune response of *Helicoverpa armigera*. Mengfang Du<sup>1</sup>, Xiaoguang Liu<sup>1</sup>, Xinming Yin<sup>1</sup>, Qisheng Song<sup>2</sup>, and **Shiheng An** (anshiheng@aliyun.com)<sup>1</sup>, <sup>1</sup>Henan Agriculture Univ., Zhengzhou, China, <sup>2</sup>Univ. of Missouri, Columbia, MO
- 3:30 **0753** Effects of the endoparasitoid *Cotesia chilonis* parasitism, venom, and calyx fluid on immunity of its host *Chilo suppressalis* larvae. **Qi Fang** (fangqi@zju.edu.cn), Ziwen Teng, Gang Xu, Shiyu Gan, Xuan Chen, and Gongyin Ye, Zhejiang Univ., Hangzhou, China
- 3:45 **0754** A venom serpin isoform from *Pteromalus puparum* suppresses the host prephenoloxidase cascade by forming complexes with host hemolymph proteinases. **Zhichao Yan** (yan\_zc@126.com)<sup>1</sup>, Qi Fang<sup>1</sup>, Lei Wang<sup>2</sup>, Yu Zhu<sup>1</sup>, and Gongyin Ye<sup>1</sup>, <sup>1</sup>Zhejiang Univ., Hangzhou, China, <sup>2</sup>Anhui Agricultural Univ., Hefei, China

## Symposium: Deciphering Complex Signaling Mechanisms in Insect-Plant Interactions

## West Hall F1 (WF1) (Convention Center)

**Moderator and Organizer:** Joe Louis, Univ. of Nebraska, Lincoln, NE

- 1:30 **0755** Herbivory-induced calcium signaling in the activation of plant defense. **Axel Mithöfer** (amithoefer@ice.mpg.de), Max Planck Institute for Chemical Ecology, Jena, Germany
- 1:45 **0756** Influence of plant fatty acid desaturases on plant-aphid interactions. **Fiona L. Goggin** (fgoggin@uark.edu), Univ. of Arkansas, Fayetteville, AR
- 2:00 **0757** Stone cells and the conifer defense syndrome. **Justin G. A. Whitehill** (whiteh5@msl.ubc.ca), The Univ. of British Columbia, Vancouver, BC, Canada
- 2:15 **0758** Signalling pathways and plant defence mechanisms to aphids. **Karam Singh** (karam.singh@csiro.au), CSIRO, Floreat, Australia
- 2:30 **0759** An herbivore-induced plant volatile functions as a direct defense and within-plant priming signal. **Matthias Erb** (matthias.erb@ips.unibe.ch), Univ. of Bern, Bern, Switzerland
- 2:45 **0760** The mechanism in the adaption of *Spodoptera litura* to its new host plant. **Sichun Zheng** (sczheng62@126.com), South China Normal Univ., Guangzhou, China
- 3:00 BREAK**
- 3:15 **0761** "Omic" approaches to decipher plant defense mechanisms against insect pests. **Joe Louis** (joelouis@unl.edu), Univ. of Nebraska, Lincoln, NE
- 3:30 **0762** Genetic uncoupling of growth-defense tradeoffs in plant interactions with insect herbivores. **Gregg A. Howe** (howeg@msu.edu), Michigan State Univ., East Lansing, MI
- 3:45 **0763** Regulation of plant defense against the polyphagous green peach aphid. **Jyoti Shah** (shah@unt.edu), Univ. of North Texas, Denton, TX
- 4:00 **0764** Identifying genes that underlie whitefly resistance in cassava. **Linda Walling** (linda.walling@ucr.edu), Univ. of California, Riverside, CA
- 4:15 **0765** Mediation of plant perception of herbivory by the third trophic level. **Gary Felton** (gwf10@psu.edu), Pennsylvania State Univ., University Park, PA
- 4:30 **0766** Manipulation of plant metabolism by proteins and small molecules in aphid saliva. **Georg Jander** (jander@cornell.edu), Boyce Thompson Institute for Plant Research, Ithaca, NY
- 4:45 **0767** Herbivory, local adaptation, and population genetics of invasive weed *Solanum elaeagnifolium* (Solanaceae). **Rupesh Kariyat** (rupesh.kariyat@usys.ethz.ch), ETH Zürich, Zürich, Switzerland

## Symposium: Integrated Pest Management Components and Packages for Tropical Crops

## Room W331 D (Convention Center)

**Moderators and Organizers:** Rangaswamy R. Muniappan<sup>1</sup> and Short Heinrichs<sup>2</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>IAPPS, Lincoln, NE



- 1:30 **0768** The role of IPM in USAID's feed the future initiative. **John Bowman** (jobowman@usaid.gov), USAID Bureau for Food Security, Washington, DC
- 1:45 **0769** Integrated pest management of chickpea leaf miner, *Liriomyza cicerina* (Rondani). **L. Ali** (l.ali@cgiar.org)<sup>1</sup>, Mustapha El Bouhssini<sup>2</sup>, and A. Sabraoui<sup>1</sup>, <sup>1</sup>International Center for Agriculture Research in the Dry Areas, Rabat, Morocco, <sup>2</sup>International Center for Agriculture Research in the Dry Areas, Aleppo, Syria
- 2:00 **0770** Integrated pest management strategy of red palm weevil, *Rhynchophorus ferrugineus* Olivier, in the Near East and north African region. **Shoki Aldobai** (shoki.aldobai@fao.org)<sup>1</sup> and J. R. Faleiro<sup>2</sup>, <sup>1</sup>Food and Agriculture Organization of the United Nations, Cairo, Egypt, <sup>2</sup>Food and Agriculture Organization of the United Nations, Al-Hassa, Saudi Arabia
- 2:15 **0771** Towards development of a parasitoid cottage industry in the Sahel for biological control of the millet head miner. **N. Ba** (ba@gmail.com)<sup>1</sup>, Ibrahim Baoua<sup>2</sup>, A. Kabore<sup>3</sup>, Laouali Amadou<sup>4</sup>, L. Karimoune<sup>1</sup>, H. Salha<sup>1</sup>, L. Dabire<sup>5</sup>, Rangaswamy R. Muniappan<sup>6</sup>, and George Norton<sup>6</sup>, <sup>1</sup>International Crops Research Institute for the Semi-Arid Tropics, Niger, Niger, <sup>2</sup>Univ. of Maradi, Niger, Niger, <sup>3</sup>INERA, Burkina Faso, Burkina Faso, <sup>4</sup>National Institute of Agronomy Research in Niger, Maradi, Niger, <sup>5</sup>INERA, Niger, Niger, <sup>6</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 2:30 **0772** Management of *Eriophyes dimocarpi* on Longan in Vietnam using safe and biological approaches. **Tran Thi My Hanh** (hoavn2003@gmail.com), Nguyen Thi Thoa, and Nguyen Hoa, Southern Horticultural Research Institute, Ho Chi Minh, Vietnam
- 2:45 **0773** An integrated pest management (IPM) strategy to manage bean pod borer (*Maruca vitrata*) on yard-long bean in southeast Asia. **Sopana Yule** (sopana.yule@worldveg.org)<sup>1</sup>, Ramasamy Srinivasan<sup>2</sup>, Vu Hai<sup>3</sup>, and Khodsimouang Soukhavong<sup>4</sup>, <sup>1</sup>AVRDC-The World Vegetable Center, Kamphaeng Saen, Thailand, <sup>2</sup>AVRDC-The World Vegetable Center, Shanhua, Taiwan, <sup>3</sup>Vietnam Academy of Agricultural Sciences, Thanh Tri, Vietnam, <sup>4</sup>Dept. of Agriculture, Vientiane, Laos
- 3:00 BREAK**
- 3:15 **0774** Biological control: A non-obvious option for managing insect pests in cowpea. **Elie Dannon** (e.dannon@cgiar.org)<sup>1</sup>, Benjamin Datinon<sup>1</sup>, Ramasamy Srinivasan<sup>2</sup>, Joelle Toffa<sup>1</sup>, David Arodokoun<sup>3</sup>, Barry R. Pittendrigh<sup>4</sup>, and Manuele Tamo<sup>1</sup>, <sup>1</sup>International Institute of Tropical Agriculture, Cotonou, Benin, <sup>2</sup>AVRDC-The World Vegetable Center, Shanhua, Taiwan, <sup>3</sup>INRA, Cotonou, Benin, <sup>4</sup>Univ. of Illinois, Champaign, IL
- 3:30 **0775** IPM as a strategic approach for management of virus diseases in vegetable crops in the tropics. **Naidu Rayapati** (naidu.rayapati@wsu.edu), Washington State Univ., Prosser, WA
- 3:45 **0776** Pest management in rain-fed crops in the semi-arid tropics: Prospects and problems. **Sumit Vashisth** (raentomology@cgiar.org)<sup>1</sup>, Jaba Jagdish<sup>2</sup>, and Hari Sharma<sup>2</sup>, <sup>1</sup>International Crops Research Institute for the Semi-Arid Tropics, Patancheru, India, <sup>2</sup> Dr. YS Parmar Univ. of Horticulture & Forestry, Nauni, Solan, India
- 4:00 **0777** Reducing insect pest vulnerabilities in rice value chain using ecologically-based IPM strategy. **Buyung Hadi** (b.hadi@irri.org), Josie Catindig, Silvia Villareal, and Charles Garcia, International Rice Research Institute, Metro Manila, Philippines
- 4:15 **0778** Presentation withdrawn
- 4:30 **0779** Development and dissemination of vegetable integrated pest management (IPM) practices and packages in Nepal. **Sulav Paudel** (spaudel111@gmail.com)<sup>1</sup>, Rangaswamy R. Muniappan<sup>2</sup>, and Edwin Rajotte<sup>3</sup>, <sup>1</sup>IDE Nepal, Kathmandu, Nepal, <sup>2</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>3</sup>Pennsylvania State Univ., University Park, PA
- 4:45 **Discussion**
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- Symposium: True Bugs (Heteroptera) from the Neotropics: Advances on Basic and Applied Research**
- Room W230 C (Convention Center)**
- Moderators and Organizers:** Antônio Panizzi<sup>1,2</sup> and Jocelia Grazia<sup>3</sup>, <sup>1</sup>National Wheat Research Center, Passo Fundo, Brazil, <sup>2</sup>Embrapa Trigo, Passo Fundo, Brazil, <sup>3</sup>Federal Univ. of Rio Grande do Sul, Porto Alegre, Brazil
- 1:30 **0780** The family Aradidae – Taxonomy, diversity, and distribution in the neotropical region. **Ernst Heiss** (aradus@aon.at), Trioler Country Museum, Innsbruck, Austria
- 1:45 **0781** Diversity, classification, and evolution of neotropical stink bugs (Hemiptera: Pentatomoidea) associated with cultivated plants. **Cristiano Schwertner** (acrosternum@yahoo.com.br)<sup>1</sup> and Jocelia Grazia<sup>2</sup>, <sup>1</sup>Federal Univ. of São Paulo, Diadema, Brazil, <sup>2</sup>Federal Univ. of Rio Grande do Sul, Porto Alegre, Brazil
- 2:00 **0782** Shield bugs in the new world: An update on the knowledge of the neotropical Scutelleridae. **Joe Eger** (jeeger@dow.com)<sup>1</sup>, Aline Barcellos<sup>2</sup>, and Luciana Weiler<sup>3</sup>, <sup>1</sup>Dow AgroSciences, Tampa, FL, <sup>2</sup>Zoobotanical Foundation, Porto Alegre, Brazil, <sup>3</sup>Federal Univ. of Rio Grande do Sul, Porto Alegre, Brazil
- 2:15 **0783** The status of Heteroptera research in Latin America. **Dimitri Forero** (forero-i@javeriana.edu.co), Pontifical Xavierian Univ., Bogotá, Colombia
- 2:30 **0784** First insights into the phylogenetic relationships of the *Euschistus*-group. **Kim Barão** (kbarao@yahoo.com.br), Federal Univ. of Rio Grande do Sul, Porto Alegre, Brazil
- 2:45 **0785** Aquatic bugs (Heteroptera: Gerromorpha & Nepomorpha) from the neotropics. **Felipe Moreira** (felipe.moreira@ioc.fiocruz.br), Oswaldo Cruz Foundation, Rio de Janeiro, Brazil
- 3:00 BREAK**

- 3:15 **0786** Seasonal occurrence, host plants, and morphological and physiological changes of the redbanded stink bug, *Piezodorus guildinii* (Westwood) (Heteroptera: Pentatomidae) in Uruguay. **María Zerbino** (szerbino@inia.org.uy)<sup>1</sup>, Antônio Panizzi<sup>2</sup>, and Nora Altier<sup>1</sup>, <sup>1</sup>National Institute of Agricultural Investigations, Colonia, Uruguay, <sup>2</sup>National Wheat Research Center, Passo Fundo, Brazil
- 3:30 **0787** Pheromone strategies to manage neotropical stink bugs and its natural enemies in arable crops: An *Euschistus heros* model. **Miguel Borges** (miguel.borges@embrapa.br), Embrapa Genetic Resources and Biotechnology, Brasília, Brazil
- 3:45 **0788** Stink bug sheath, saliva, and cell rupture feeding as cause of host injury. **Antônio Panizzi** (antonio.panizzi@embrapa.br)<sup>1</sup> and Tiago Lucini<sup>2</sup>, <sup>1</sup>Embrapa Wheat, Passo Fundo, Brazil, <sup>2</sup>Federal Univ. of Paraná, Curitiba, Brazil
- 4:00 **0789** The potential risk losses caused by *Dichelops melacanthus* (Dallas) to maize in the neotropics. Ivan Cruz<sup>1</sup> and **Antônio Panizzi** (antonio.panizzi@embrapa.br)<sup>2</sup>, <sup>1</sup>Embrapa Corn and Sorghum, Sete Lagoas, Brazil, <sup>2</sup>Embrapa Trigo, Passo Fundo, Brazil
- 4:15 **0790** The bronze bug, *Thaumastocoris peregrinus* Carpintero & Dellapé (Hemiptera: Thaumastocoridae): Challenging *Eucalyptus* plantations in the Neotropics. **Carlos Wilcken** (cwilcken@fca.unesp.br), São Paulo State Univ., Botucatu, Brazil
- 4:30 **0791** Role of endosymbionts and potential applications on neotropical true bug's management. **Simone Prado** (simone.prado@embrapa.br), Embrapa Environment, Jaguariúna, Brazil
- 4:45 **0792** Geographical and temporal variability of stink bug susceptibility to insecticides in Brazil. **Daniel Sosa-Gómez** (daniel.sosa-gomez@embrapa.br)<sup>1</sup> and Patricia Husch<sup>2</sup>, <sup>1</sup>Embrapa Soy, Londrina, Brazil, <sup>2</sup>Federal Univ. of Paraná, Curitiba, Brazil
- 5:00 **0793** Neotropical stink bugs and biological control. **Walker A. Jones** (walker.jones@ars.usda.gov), USDA - ARS, Stoneville, MS

### Symposium: Wireworm and Click Beetle Management: IPM Toolbox for the 21<sup>st</sup> Century

#### Room W331 C (Convention Center)

**Moderators and Organizers:** Bob Vernon<sup>1</sup> and Anuar Morales-Rodriguez<sup>2</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, Agassiz, BC, Canada, <sup>2</sup>Univ. of California, Riverside, CA

- 1:30 **0794** Wireworm management using trap crops. **Ashish Adhikari** (ashish.adhikari@msu.montana.edu)<sup>1</sup>, Gadi V. P. Reddy<sup>1</sup>, and Bob Vernon<sup>2</sup>, <sup>1</sup>Montana State Univ., Conrad, MT, <sup>2</sup>Agriculture and Agri-Food Canada, Agassiz, BC, Canada
- 1:45 **0795** Biology, ecology, and control of wireworms (Coleoptera: Elateridae) in cereal crops. **Ivan Milosavljevic** (ivan.milosavljevic@email.wsu.edu)<sup>1</sup>, Aaron Esser<sup>2</sup>, and David Crowder<sup>1</sup>, <sup>1</sup>Washington State Univ., Pullman, WA, <sup>2</sup>Washington State Univ., Ritzville, WA

- 2:00 **0796** Characterizing the molecular biology of *Limonius californicus* and its application to pest management. **Kevin Wanner** (kwanner@montana.edu), Montana State Univ., Bozeman, MT
- 2:15 **0797** Cultural control of wireworms an alternative management strategy. **Anuar Morales-Rodriguez** (am434@cornell.edu), Univ. of California, Riverside, CA
- 2:30 **0798** The effect of conservation agriculture on *Agriotes* spp. populations: First results of the life+ project helpsoil. **Lorenzo Furlan** (lorenzo.furlan@venetoagricoltura.org), Veneto Agricoltura, Legnaro, Italy
- 2:45 **0799** Smells good but claims your life: An attract and kill strategy for wireworm control in potato. **Stefan Vidal** (svidal@gwdg.de), Georg August Univ., Göttingen, Germany
- 3:00 **BREAK**
- 3:15 **0800** Timing of application of *Metarhizium brunneum* against wireworms in Swiss crop rotation schemes. **Giselher Grabenweger** (giselher.grabenweger@agroscope.admin.ch), Agroscope, Zürich, Switzerland
- 3:30 **0801** Toward a comprehensive strategy for wireworm biocontrol. **Todd Kabaluk** (todd.kabaluk@agr.gc.ca), Agriculture and Agri-Food Canada, Agassiz, BC, Canada
- 3:45 **0802** Click beetle IPM. **Bob Vernon** (vernonbs@agr.gc.ca) and Wim van Herk, Agriculture and Agri-Food Canada, Agassiz, BC, Canada
- 4:00 **0803** Wireworms in potatoes: Management strategies and more. **Christine Noronha** (christine.noronha@agr.gc.ca), Agriculture and Agri-Food Canada, Charlottetown, PEI, Canada
- 4:15 **0804** Challenges of controlling wireworms with insecticides in potatoes in the mid-Atlantic U.S. **John D. Aigner** (daigner@vt.edu) and Thomas P. Kuhar, Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 4:30 **0805** Integrated control of wireworms in Florida sugarcane. Ronald H. Cherry and **Michael Karounos** (wompum@ufl.edu), Univ. of Florida, Belle Glade, FL

### Symposium: Scarabs without Borders: Lessons from a Century of Invasions

#### Room W222 B (Convention Center)

**Moderators and Organizers:** Trevor Jackson<sup>1</sup> and Michael G. Klein<sup>2</sup>, <sup>1</sup>AgResearch, Ltd., Christchurch, New Zealand, <sup>2</sup>The Ohio State Univ., Heber, AZ

- 1:30 **0806** Scarabs without borders: Where are they now? **Trevor Jackson** (trevor.jackson@agresearch.co.nz), AgResearch, Ltd., Christchurch, New Zealand
- 1:45 **0807** Scarab Central resources at the University of Nebraska: We have what you need, and you collect what we want. **Brett C. Ratcliffe** (bratcliffe@unl.edu), Univ. of Nebraska, Lincoln, NE
- 2:00 **0808** The Japanese beetle: Still bugging us 100 years later. **Michael G. Klein** (klein.10@osu.edu), The Ohio State Univ., Heber, AZ



- 2:15 **0809** Introduction of exotic Scarabaeine dung beetle species to southwestern Australia: Winners and losers after 35 years. **James Ridsdill-Smith** (james.ridsdell-smith@csiro.au)<sup>1</sup>, John Matthiessen<sup>2</sup>, David Cousins<sup>3</sup>, and Robert Emery<sup>3</sup>, <sup>1</sup>Univ. of Western Australia, Perth, Australia, <sup>2</sup>CSIRO, Perth, Australia, <sup>3</sup>Dept. of Agriculture and Food, South Perth, Australia
- 2:30 **0810** Continental shifts — African black beetle (*Heteronychus arator*) invades Australasia. **Alison Popay** (alison.popay@agresearch.co.nz) and Warren King, AgResearch, Ltd., Hamilton, New Zealand
- 2:45 **0811** The rhinoceros beetle invasion of Guam: An unprecedented disaster. **Aubrey Moore** (amoore@uguam.uog.edu)<sup>1</sup>, Roland Quitugua<sup>1</sup>, Trevor Jackson<sup>2</sup>, Sean Marshall<sup>2</sup>, and Matthew Siderhurst<sup>3</sup>, <sup>1</sup>Univ. of Guam, Mangilao, Guam, <sup>2</sup>AgResearch, Ltd., Christchurch, New Zealand, <sup>3</sup>Eastern Mennonite Univ., Harrisonburg, VA
- 3:00 BREAK**
- 3:15 **0812** Detection of an invasive biotype of *Oryctes rhinoceros* (L.) in the Pacific. **Sean Marshall** (sean.marshall@agresearch.co.nz)<sup>1</sup>, Maclean Vaqalo<sup>2</sup>, Aubrey Moore<sup>3</sup>, Roland Quitugua<sup>3</sup>, and Trevor Jackson<sup>1</sup>, <sup>1</sup>AgResearch, Ltd., Christchurch, New Zealand, <sup>2</sup>Secretariat of the Pacific Community, Suva, Fiji, <sup>3</sup>Univ. of Guam, Mangilao, Guam
- 3:30 **0813** Control of rhinoceros beetle in endemic outbreak areas. **Ramle Moslim** (ramle@mpob.gov.my) and Norman Kamarudin, Malaysian Palm Oil Board, Kuala Lumpur, Malaysia
- 3:45 **0814** Tools to combat beetles threatening the Hawaiian Islands. **Mary Liz Jameson** (maryliz.jameson@gmail.com), Joshua Dunlap, and Emmy Engasser, Wichita State Univ., Wichita, KS
- 4:00 **0815** Semiochemistry of scarabs: A European perspective. **Jozsef Vuts** (jozsef.vuts@rothamstead.ac.uk)<sup>1</sup>, Christine Woodcock<sup>1</sup>, Zoltan Imrei<sup>2</sup>, John Pickett<sup>1</sup>, Mike Birkett<sup>1</sup>, and Miklos Toth<sup>2</sup>, <sup>1</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>2</sup>Plant Protection Institute, Budapest, Hungary
- 4:15 **0816** Chemical controls used to manage invasive and native scarab pests of turf and ornamentals in the United States. **David Shetlar** (shetlar.l@osu.edu), The Ohio State Univ., Columbus, OH
- 4:30 **0817** Management of scarabs in the regulated urban environment. **Michael Brownbridge** (michael.brownbridge@vinelandresearch.com), Vineland Research and Innovation Centre, Vineland Station, ON, Canada
- 4:45 **0818** Management of pest scarabs in Mexico. **Miguel Najera Rincon** (minaj47@hotmail.com)<sup>1,2</sup>, Trevor Jackson<sup>3</sup>, Guadalupe Zitlalpopoca Hernandez<sup>2</sup>, and John Larsen<sup>2</sup>, <sup>1</sup>INIFAP, Uruapan, Mexico, <sup>2</sup>National Autonomous Univ. of México, Morelia, Mexico, <sup>3</sup>AgResearch, Ltd., Christchurch, New Zealand
- 5:00 **0819** *Phyllophaga* pheromones and sex attractants: Juggling the many species. **Paul S. Robbins** (paul.robbins@ars.usda.gov), USDA - ARS, Ft. Pierce, FL
- SD0820** Management of pest scarabs in Japan. **Shin Asano** (sangaku@abs.agr.hokudai.ac.jp)<sup>1</sup> and Kazuhiro Iiyama<sup>2</sup>, <sup>1</sup>Hokkaido Univ., Sapporo, Japan, <sup>2</sup>Kyushu Univ., Fukuoka, Japan
- SD0821** An eradication program for rhinoceros beetle in Hawai'i. **Darcy Oishi** (darcy.e.oishi@hawaii.gov), Division of Plant Industry, Honolulu, HI
- SD0822** Comparing the challenges and successes of Japanese beetle (*Popillia japonica* Newman 1841) mitigation in two western North American states (Oregon and Utah). **Clint Burfitt** (clintburfitt@hotmail.com)<sup>1</sup>, Diana Kearns<sup>1</sup>, Alan Mudge<sup>1</sup>, and Kristopher Watson<sup>2</sup>, <sup>1</sup>Oregon Dept. of Agriculture, Salem, OR, <sup>2</sup>Utah Dept. of Agriculture and Food, Salt Lake City, UT
- SD0823** Detoxification enzymes in Japanese beetle adults and larvae: Prospects for management and eradication. **David Held** (dwh0004@auburn.edu), Adekunle Adesanya, and Nannan Liu, Auburn Univ., Auburn, AL
- SD0824** Presentation withdrawn
- SD0825** Lures and traps for NE Chinese scarab pests. **Ri-zhao Chen** (bobob1972@163.com)<sup>1</sup> and Michael G. Klein<sup>2</sup>, <sup>1</sup>Jilin Agricultural Univ., Changchun, China, <sup>2</sup>The Ohio State Univ., Heber, AZ
- SD0826** Insecticides and bio-pesticides for scarab quarantine use in nurseries: Potential and reality. **Jason B. Oliver** (joliver@tnstate.edu)<sup>1</sup>, Karla Adesso<sup>1</sup>, Christopher Ranger<sup>2</sup>, Michael E. Reding<sup>2</sup>, and Michael G. Klein<sup>3</sup>, <sup>1</sup>Tennessee State Univ., McMinnville, TN, <sup>2</sup>USDA - ARS, Wooster, OH, <sup>3</sup>The Ohio State Univ., Heber, AZ
- SD0827** Eradication of Japanese beetle from Palisade, Colorado. **Bob Hammon** (bob.hammon@mesacounty.us), Colorado State Univ., Grand Junction, CO
- SD0828** Japanese beetle: The California experience. **Jason Leathers** (jason.leathers@cdfa.ca.gov) and Kevin Hoffman, California Dept. of Food and Agriculture, Sacramento, CA
- 5:15 **Poster Session**
- 
- Symposium: Innovative Strategies of Mosquito Control**
- Room W331 A (Convention Center)**
- Moderators and Organizers:** Stephen Dobson<sup>1</sup> and Roberto Barrera<sup>2</sup>, <sup>1</sup>Univ. of Kentucky, Lexington, KY, <sup>2</sup>Centers for Disease Control and Prevention, San Juan, PR
- 1:30 **0829** Innovation: The hall of mirrors in mosquito control. **Daniel A. Strickman** (dan.strickman@gatesfoundation.org), Bill and Melinda Gates Foundation, Seattle, WA
- 1:45 **0830** Evaluation of combined strategies for controlling mosquito-borne diseases. **Alun L. Lloyd** (alun\_lloyd@ncsu.edu)<sup>1</sup>, Kenichi Okamoto<sup>2</sup>, and Fred Gould<sup>1</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>Yale Univ., New Haven, CT
- 2:00 **0831** Integrating vaccines and vector control for dengue prevention. **Thomas W. Scott** (twscott@ucdavis.edu), Univ. of California, Davis, CA

- 2:15 **0832** Novel malaria and NTD vector control insecticides and tools: Crossing the finish line. **Nick Hamon** (nick.hamon@ivcc.com)<sup>1</sup>, Sarah Rees<sup>1</sup>, David Malone<sup>1</sup>, and Daniel A. Strickman<sup>2</sup>, <sup>1</sup>IVCC, Liverpool, United Kingdom, <sup>2</sup>USDA - ARS, Beltsville, MD
- 2:30 **0833** Insecticide-treated house screens to reduce infestations of dengue vectors. **Pablo Manrique-Saïde** (pablo\_manrique2000@hotmail.com), Autonomous Univ. of Yucatán, Merida, Mexico
- 2:45 **0834** Electrostatic netting as an insecticide-resistance breaking tool for malaria vector control. Bart Knols and **Marit Farenhorst** (marit@in2care.org), In2Care B.V., Wageningen, Netherlands
- 3:00 **BREAK**
- 3:15 **0835** Control of container *Aedes* mosquito vectors using trapping devices. **Roberto Barrera** (amz9@cdc.gov), Veronica Acevedo, Gilberto Felix, Ryan Hemme, Jesus Vazquez, Jorge Munoz, and Manuel Amador, Centers for Disease Control and Prevention, San Juan, PR
- 3:30 **0836** Advancing a paradigm: Spatial repellents for control of vector-borne disease. **Nicole L. Achee** (nachee@nd.edu), Univ. of Notre Dame, South Bend, IN
- 3:45 **0837** New methods for improving the impacts of larvicides and adulticides. **Greg Devine** (greg.devine@qimrberghofer.edu.au), QIMR Berghofer Medical Research Institute, Herston, Australia
- 4:00 **0838** Male mosquitoes as vehicles for insecticide. **Corey L. Breisfoard** (cbreisfoard@mosquitomate.com), MosquitoMate, Inc., Lexington, KY
- 4:15 **0839** R&D activities of the Joint FAO/IAEA Insect Pest Control Laboratory toward sterile insect technique (SIT)-based population control of mosquito species. **Jeremie Gilles** (j.gilles@iaea.org)<sup>1</sup>, Rosemary Lees<sup>2</sup>, and Kostas Bourtzis<sup>2</sup>, <sup>1</sup>Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, Seibersdorf, Austria, <sup>2</sup>International Atomic Energy Agency, Vienna, Austria
- 4:30 **0840** Comparing transgenic mosquito technique and SIT mosquito programs. Danilo Carvalho and **André Costa-da-Silva** (alcosta@icb.usp.br), Univ. of São Paulo, São Paulo, Brazil
- 4:45 **0841** Developing a *Wolbachia*-based strategy to control dengue in China. **Zhiyong Xi** (xizy@msu.edu), Michigan State Univ., East Lansing, MI
- 5:00 **0842** A bacterium in the fight against dengue. **Luciano Moreira** (luciano@cpqrr.fiocruz.br), Oswaldo Cruz Foundation, Belo Horizonte, Brazil
- 5:15 **0843** *Wolbachia* biopesticide regulation and application in the USA. **Stephen Dobson** (sdobson@uky.edu), Univ. of Kentucky, Lexington, KY

### Symposium: Vector-Borne Diseases of Livestock

#### Room W331 B (Convention Center)

**Moderators and Organizers:** D. Scott McVey<sup>1</sup> and Roman Kucheryavenko<sup>2</sup>, <sup>1</sup>USDA - ARS, Manhattan, KS, <sup>2</sup>National Scientific Center, Kharkiv, Ukraine

- 1:30 **0844** African swine fever in Ukraine: History of eradication, present, and prospects. **Roman Kucheryavenko** (rkucheryavenko@ukr.net), National Scientific Center, Kharkiv, Ukraine
- 2:00 **0845** *Ornithodoros verrucosus* in Ukraine: Evaluating regional presence and its possible impact on the epidemiology of African swine fever. **Filatov Serhii** (filatovmidge@gmail.com), National Scientific Center, Kharkiv, Ukraine
- 2:15 **0846** Equine piroplasmiasis and associated tick vectors. **Glen Scoles** (scoles@vetmed.wsu.edu), USDA - ARS, Pullman, WA
- 2:30 **0847** Dynamic of tick and bovine babesiosis in central Brazil in a world of potential climatic changes. **Renato Andreotti** (renato.andreotti@embrapa.br), Brazilian Agricultural Research Corporation, Campo Grande, Brazil
- 2:45 **0848** The population genetics of potential Rift Valley fever mosquito vectors in the United States. **Lee Cohnstaedt** (lee.cohnstaedt@ars.usda.gov) and Phillip Schumm, USDA - ARS, Manhattan, KS
- 3:00 **BREAK**
- 3:15 **0849** Strategies used in the control and management of Rift Valley fever in Africa. **Phelix Majiwa** (majiwap@arc.agric.za)<sup>1,2</sup> and Robert Maluleke<sup>1</sup>, <sup>1</sup>Agricultural Research Council, Onderstepoort, South Africa, <sup>2</sup>Univ. of Pretoria, Onderstepoort, South Africa
- 3:30 **0850** *Culicoides*: The controller of orbivirus transmission. **Barbara Drolet** (barbara.drolet@ars.usda.gov), Christopher Lehiy, Lindsey Reister, Mark Ruder, and D. Scott McVey, USDA - ARS, Manhattan, KS
- 3:45 **0851** Predictive biology and control strategies for vector-borne diseases of livestock. **D. Scott McVey** (scott.mcvey@ars.usda.gov), Barbara Drolet, and Lee Cohnstaedt, USDA - ARS, Manhattan, KS

### Symposium: Evolution and Biology of Chalcidoidea: Integrating Genomics, Fossils, Microbiomes, and Natural History

#### Room W340 A (Convention Center)

**Moderators and Organizers:** James Woolley<sup>1</sup>, John M. Heraty<sup>2</sup>, and Astrid Cruaud<sup>3</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Univ. of California, Riverside, CA, <sup>3</sup>INRA, Montferrier-sur-Lez, France

- 1:30 **0852** Fossil chalcidoid wasps and the history of megadiversity. **Lars Krogmann** (lars.krogmann@smns-bw.de)<sup>1</sup>, Ralph Peters<sup>2</sup>, Roger A. Burks<sup>3</sup>, and John M. Heraty<sup>3</sup>, <sup>1</sup>State Museum of Natural History, Stuttgart, Germany, <sup>2</sup>Alexander Koenig Zoological Research Museum, Bonn, Germany, <sup>3</sup>Univ. of California, Riverside, CA
- 1:45 **0853** The most ancestral genus of Mymaridae, with comments on generic relationships and evolution within the family. **John Huber** (john.huber@agr.gc.ca), Natural Resources Canada, Ottawa, ON, Canada
- 2:00 **0854** Phylogenomics, genomics, and our understanding of Chalcidoidea evolution. **Ralph Peters** (ralph\_peters@hotmail.com), Alexander Koenig Zoological Research Museum, Bonn, Germany





- 2:15 **0855** There is more than one way to jump: Eupelmidae, Encyrtidae, and the interplay between phylogenomics and morphology. **James Woolley** (jimwoolley@tamu.edu), Texas A&M Univ., College Station, TX
- 2:30 **0856** Figs and wasps arm-in-arm: An 80 million year walk in the jungle. **Jean-Yves Rasplus** (rasplus@supagro.inra.fr) and Astrid Cruaud, INRA, Montferrier-sur-Lez, France
- 2:45 **0857** Unjumbling the jumbled trichogrammatids: NGS to the rescue. **Astrid Cruaud** (cruaud@supagro.inra.fr)<sup>1</sup>, Geraldine Bout<sup>2</sup>, Guenaëlle Genson<sup>1</sup>, and Jean-Yves Rasplus<sup>1</sup>, <sup>1</sup>INRA, Montferrier-sur-Lez, France, <sup>2</sup>INRA, Sophia Antipolis, France
- 3:00 BREAK**
- 3:15 **0858** What exactly is an aphelinid anyway? **Andrew Polaszek** (a.polaszek@nhm.ac.uk), The Natural History Museum, London, United Kingdom
- 3:30 **0859** The role of the symbiont *Cardinium* in shaping the ecology and evolution of *Encarsia*. **Marco Gebiola** (marco.gebiola@gmail.com)<sup>1</sup>, Suzanne E. Kelly<sup>1</sup>, Peter Hammerstein<sup>2</sup>, Massimo Giorgini<sup>3</sup>, and Martha Hunter<sup>1</sup>, <sup>1</sup>Univ. of Arizona, Tucson, AZ, <sup>2</sup>Humboldt Univ., Berlin, Germany, <sup>3</sup>National Research Council of Italy, Portici, Italy
- 3:45 **0860** Genomics and adaptation in *Wolbachia*, an obligate reproductive parasite in *Trichogramma* wasps. **Amelia Lindsey** (alind005@ucr.edu)<sup>1</sup>, John H. Werren<sup>2</sup>, Stephen Richards<sup>3</sup>, and Richard Stouthamer<sup>1</sup>, <sup>1</sup>Univ. of California, Riverside, CA, <sup>2</sup>Univ. of Rochester, Rochester, NY, <sup>3</sup>Baylor College of Medicine, Houston, TX
- 4:00 **0861** Genetics and genomics of *Aphelinus* – keeping ahead in the parasitism race. **Keith R. Hopper** (khopper@udel.edu), USDA - ARS, Newark, DE
- 4:15 **0862** Morphometrics and the description of cryptic species in the Chalcidoidea. **Hannes Baur** (baur.hannes@gmail.com), Natural History Museum of the Civic Community, Bern, Switzerland
- 4:30 **0863** Immature development of Chalcidoidea: Trends, functional ecology, and comparison with other parasitoids. **Alex Gumovsky** (entedon@gmail.com)<sup>1,2</sup>, <sup>1</sup>National Academy of Sciences of Ukraine, Kiev, Ukraine, <sup>2</sup>Univ. of the Witwatersrand, Johannesburg, South Africa
- 4:45 **0864** Insights into Eurytomidae and Chalcididae: What does the future hold? **Michael Gates** (michael.gates@ars.usda.gov), USDA - ARS, Washington, DC
- 5:00 **0865** Unraveling the ant parasitic Eucharitidae – taxonomic and biological approaches. **John M. Heraty** (john.heraty@ucr.edu)<sup>1</sup>, Jason Mottern<sup>2</sup>, Roger A. Burks<sup>1</sup>, Ralph Peters<sup>3</sup>, Alan Lemmon<sup>4</sup>, Emily Lemmon<sup>4</sup>, and D. Darling<sup>5</sup>, <sup>1</sup>Univ. of California, Riverside, CA, <sup>2</sup>USDA - ARS, Washington, DC, <sup>3</sup>Alexander Koenig Zoological Research Museum, Bonn, Germany, <sup>4</sup>Florida State Univ., Tallahassee, FL, <sup>5</sup>Royal Ontario Museum, Toronto, ON, Canada
- 5:15 **0866** Biological control in the 21<sup>st</sup> century – do chalcids still count? **Erica Kistner** (erica.kistner@ucr.edu) and Mark S. Hoddle, Univ. of California, Riverside, CA

## Symposium: Recent Advances in Heteropteran (Hemiptera) Systematics and Evolution

### Room W231 C (Convention Center)

**Moderators and Organizers:** Thomas J. Henry<sup>1</sup> and Wenjun Bu<sup>2</sup>, <sup>1</sup>USDA - ARS, Washington, DC, <sup>2</sup>Nankai Univ., Tianjin, China

- 1:30 **0867** Species biodiversity can be overestimated using a fixed threshold: Insights from DNA barcoding of the genus *Cletus* (Hemiptera: Coreidae) and COI data from phylogeographical studies. **Haiguang Zhang** (haiguangzhang123@163.com)<sup>1</sup>, Minhua Lv<sup>1</sup>, Wenbo Yi<sup>1</sup>, Weibing Zhu<sup>2</sup>, and Wenjun Bu<sup>1</sup>, <sup>1</sup>Nankai Univ., Tianjin, China, <sup>2</sup>Chinese Academy of Sciences, Shanghai, China
- 1:45 **0868** Millipede assassin bugs (Heteroptera: Reduviidae: Ectrichodiinae) show off: Evolution of aposematic coloration and extreme sexual dimorphism. **Michael Forthman** (mfort001@ucr.edu), Univ. of California, Riverside, CA
- 2:00 **0869** Sea-level fluctuation and host-plant habitat requirements influence the Pleistocene history of the invasive species *Amphiareus obscuriceps* (Hemiptera: Anthocoridae): Inferences from molecular phylogeography and ecological niche modeling. **Danli Zhang** (danlizhang2012@163.com)<sup>1</sup>, Zhen Ye<sup>1</sup>, Kazutaka Yamada<sup>2</sup>, Yahui Zhen<sup>1</sup>, Chenguang Zheng<sup>1</sup>, and Wenjun Bu<sup>1</sup>, <sup>1</sup>Nankai Univ., Tianjin, China, <sup>2</sup>Tokushima Prefectural Museum, Tokushima, Japan
- 2:15 **0870** From leaf litter to canopy: Uncovering the biodiversity of Dipsocoromorpha. **Christiane Weirauch** (christiane.weirauch@ucr.edu), Rochelle Hoey-Chamberlain, Alexander Knyshev, Stephanie Leon, and Sarah Frankenberg, Univ. of California, Riverside, CA
- 2:30 **0871** The classification of the Pentatomidae (Hemiptera: Heteroptera): Past, present, and future. **David Rider** (david.rider@ndsu.edu)<sup>1</sup> and Cristiano Schwertner<sup>2</sup>, <sup>1</sup>North Dakota State Univ., Fargo, ND, <sup>2</sup>Federal Univ. of São Paulo, Diadema, Brazil
- 2:45 **0872** The origin and evolution of the Tingidae (Hemiptera: Heteroptera). **Eric Guilbert** (guilbert@mnhn.fr)<sup>1</sup> and Marcus Guidoti<sup>2</sup>, <sup>1</sup>National Museum of Natural History, Paris, France, <sup>2</sup>Federal Univ. of Rio Grande de Sul, Porto Alegre, Brazil
- 3:00 BREAK**
- 3:15 **0873** Phylogeny and tribal assessment of the Isometopinae (Hemiptera: Miridae) and discussion of their relationship with the Cylapinae, including "Psallopini". **Thomas Henry** (thomas.henry@ars.usda.gov)<sup>1</sup> and Andrzej Wolski<sup>2</sup>, <sup>1</sup>USDA - ARS, Washington, DC, <sup>2</sup>Opole Univ., Opole, Poland
- 3:30 **0874** Presentation withdrawn
- 3:45 **0875** Phylogeny and character evolution in Eccritotarsini (Heteroptera: Bryocorinae). **Fedor Konstantinov** (fkonstantinov@gmail.com)<sup>1</sup> and Anna Namyatova<sup>2</sup>, <sup>1</sup>St. Petersburg State Univ., St. Petersburg, Russia, <sup>2</sup>Univ. of New South Wales, Sydney, Australia

- 4:00 **0876** From pretarsi to purines: How knowledge of relationships in the Phylinae, based on new and novel synapomorphies, have changed. **Katrina Menard** (kmenard@ou.edu)<sup>1</sup> and Randall T. Schuh<sup>2</sup>, <sup>1</sup>Sam Noble Oklahoma Museum of Natural History, Norman, OK, <sup>2</sup>American Museum of Natural History, New York, NY
- 4:15 **0877** Geographical isolation and Pleistocene climate fluctuations as motors in speciation: Case study on mountain stream insects of the genus *Pseudovelia* (Hemiptera: Veliidae). **Zhen Ye** (yezhen1987331@163.com)<sup>1</sup>, Pingping Chen<sup>2</sup>, and Wenjun Bu<sup>1</sup>, <sup>1</sup>Nankai Univ., Tianjin, China, <sup>2</sup>Naturalis Biodiversity Center, Leiden, Netherlands

### Symposium: Systematics, Biogeography, and Ecology of Cerambycidae and Buprestidae

#### Room W231 A (Convention Center)

**Moderators and Organizers:** Eugenio Nearns<sup>1</sup> and Ann M. Ray<sup>2</sup>, <sup>1</sup>Purdue Univ., West Lafayette, IN, <sup>2</sup>Xavier Univ., Cincinnati, OH

- 1:30 **0878** Crepuscular cerambycids favor trees with moist wood. **Amy Berkov** (berkov@sci.ccny.cuny.edu)<sup>1</sup>, Christina Torres<sup>1</sup>, Héctor Barrios<sup>2</sup>, and Sara Pinzon-Navarro<sup>3</sup>, <sup>1</sup>City College of New York, New York, NY, <sup>2</sup>Univ. of Panamá, Panama City, Panama, <sup>3</sup>Smithsonian Tropical Research Institute, Panama City, Panama
- 1:45 **0879** Cladistic analysis of the tribe Eburiini Blanchard 1945 (Cerambycidae, Cerambycinae). **Juan Pablo Botero** (jp\_bot@yahoo.com) and Marcela Monné, Federal Univ. of Rio de Janeiro, Rio de Janeiro, Brazil
- 2:00 **0880** Cladistic analysis of the genus *Cosmisoma* Audinet-Serville, 1834 (Cerambycidae, Cerambycinae). **Allan Carelli Aragão** (allancarelli@hotmail.com) and Marcela Monné, Federal Univ. of Rio de Janeiro, Rio de Janeiro, Brazil
- 2:15 **0881** Isolation by adaptation in *Monochamus clamator*: Host plants as a selective pressure. **Patrick Gorring** (psg7@cornell.edu) and Brian Ferrell, Harvard Univ., Cambridge, MA
- 2:30 **0882** Phylogenomic data resolve the enigmatic higher-level phylogeny of longhorned beetles (Coleoptera: Cerambycidae). **Stephanie Haddad** (stephanyhaddad@gmail.com)<sup>1</sup>, Seungwan Shin<sup>2</sup>, Alan Lemmon<sup>3</sup>, Emily Lemmon<sup>3</sup>, and Duane D. McKenna<sup>1</sup>, <sup>1</sup>Univ. of Memphis, Memphis, TN, <sup>2</sup>North Carolina State Univ., Raleigh, NC, <sup>3</sup>Florida State Univ., Tallahassee, FL
- 2:45 **0883** West meets East: How do tropical beetles disperse across Beringia? Evolutionary origin of *Callipogon relictus* and allied species (Cerambycidae: Prioninae) in the rainforests of the new and old worlds. **Sang Kim** (sikim@g.harvard.edu) and Brian Ferrell, Harvard Univ., Cambridge, MA
- 3:00 **BREAK**
- 3:15 **0884** Community structure of cerambycid beetles in a forest mosaic on the Osa Peninsula, Costa Rica. **Lin Li** (lincarrieli@gmail.com)<sup>1</sup>, Reinaldo Aguilar<sup>2</sup>, and Amy Berkov<sup>1</sup>, <sup>1</sup>City College of New York, New York, NY, <sup>2</sup>Los Charcos de Osa, Rincon de Osa, Costa Rica

- 3:30 **0885** BuprestidID: An interactive tool for the identification of the metallic wood-boring beetles (Coleoptera: Buprestidae). **Gavin Martin** (gmartin33@live.com)<sup>1</sup>, Nathan Lord<sup>1</sup>, Seth M. Bybee<sup>1</sup>, and Charles L Bellamy<sup>2</sup>, <sup>1</sup>Brigham Young Univ., Provo, UT, <sup>2</sup>California Dept. of Food and Agriculture, Sacramento, CA
- 3:45 **0886** Taxonomic catalog of the fauna of Brazil – families Buprestidae and Cerambycidae. **Marcela Monné** (mlmonne2@gmail.com) and Miguel Monné, Federal Univ. of Rio de Janeiro, Rio de Janeiro, Brazil
- 4:00 **0887** Longicorn ID: A tool for identification of larval Cerambycidae. **Eugenio Nearns** (gino@nearns.com)<sup>1</sup>, Nathan Lord<sup>2</sup>, Steve Lingafelter<sup>3</sup>, Antonio Santos-Silva<sup>4</sup>, Kelly Miller<sup>5</sup>, and Jennifer Zaspel<sup>1</sup>, <sup>1</sup>Purdue Univ., West Lafayette, IN, <sup>2</sup>Brigham Young Univ., Provo, UT, <sup>3</sup>USDA - ARS, Washington, DC, <sup>4</sup>Univ. of São Paulo, São Paulo, Brazil, <sup>5</sup>Univ. of New Mexico, Albuquerque, NM
- 4:15 **0888** Cerambycidae in the tropical dry forest of western Mexico. Felipe Noguera, **Nayeli Gutiérrez** (pinedaaa@gmail.com), and Cisteil Pérez-Hernández, National Autonomous Univ. of México, Mexico City, Mexico
- 4:30 **0889** Isolation and identification of a male-produced attractant pheromone for the invasive velvet long-horned beetle, *Trichoferus campestris* (Cerambycinae: Hesperophanini). **Ann M. Ray** (raya6@xavier.edu)<sup>1</sup>, Joseph Francese<sup>2</sup>, Yunfan Zou<sup>3</sup>, Kristopher Watson<sup>4</sup>, Jocelyn G. Millar<sup>3</sup>, Damon Crook<sup>2</sup>, and Baode Wang<sup>2</sup>, <sup>1</sup>Xavier Univ., Cincinnati, OH, <sup>2</sup>USDA - APHIS, Buzzards Bay, MA, <sup>3</sup>Univ. of California, Riverside, CA, <sup>4</sup>Utah Dept. of Agriculture and Food, Salt Lake City, UT
- 4:45 **0890** Phylogeny of Polyrrhaphidini and their placement among the Lamiinae (Coleoptera: Cerambycidae). **Diego de Santana Souza** (diegosantanasouza@hotmail.com)<sup>1</sup>, Luciane Marinoni<sup>1</sup>, Marcela Monné<sup>2</sup>, and Jesús Gómez-Zurita<sup>3</sup>, <sup>1</sup>Federal Univ. of Paraná, Curitiba, Brazil, <sup>2</sup>Federal Univ. of Rio de Janeiro, Rio de Janeiro, Brazil, <sup>3</sup>Pompeu Fabra Univ., Barcelona, Spain
- 5:00 **0891** A simple method for observing female genitalia with inflation for Cerambycidae. **Junsuke Yamasako** (mesoxmesosa@hotmail.com), The Univ. of Tokyo, Tokyo, Japan

### Symposium: Bt Mode of Action, Resistance Mechanisms, and Global Patterns

#### Room W230 D (Convention Center)

- Moderators and Organizers:** Alejandra Bravo and Mario Soberón, National Autonomous Univ. of México, Cuernavaca, Mexico
- 1:30 **0892** Global patterns of field-evolved resistance to Bt crops: Successes and failures. **Bruce Tabashnik** (brucet@ag.arizona.edu) and Yves Carriere, Univ. of Arizona, Tucson, AZ
- 1:45 **0893** The status or resistance of maize stem borers to Bt maize in South Africa. **Johnnie Van der Berg** (johnnie.vandenberg@nwu.ac.za)<sup>1</sup>, Annemie Erasmus<sup>2</sup>, and Hannalene du Plessis<sup>1</sup>, <sup>1</sup>North-West Univ., Potchefstroom, South Africa, <sup>2</sup>Agricultural Research Council, Potchefstroom, South Africa



- 2:00 **0894** Resistance monitoring to Bt maize: The case of Spain after 17 years of cultivation. **Gema Farinos** (gpfarinos@cib.csic.es), Center of Biological Research, Madrid, Spain
- 2:15 **0895** Insect resistance to Bt toxins in Brazil and Latin America. **Rose Monnerat** (rose.monnerat@embrapa.br), Embrapa Genetic Resources and Biotechnology, Brasilia, Brazil
- 2:30 **0896** Mode of action of Bt 3d-Cry toxins and use of genetically modified toxins to counter pest resistance. **Mario Soberón** (mario@ibt.unam.mx) and Alejandra Bravo, National Autonomous Univ. of México, Cuernavaca, Mexico
- 2:45 **0897** Mode of action of Vip3 proteins. **Juan Ferre** (juan.ferre@uv.es), Univ. of Valencia, Valencia, Spain
- 3:00 BREAK**
- 3:15 **0898** The expanding role of ABC proteins in Cry toxin mode of action. **David G. Heckel** (heckel@ice.mpg.de), Max Planck Institute for Chemical Ecology, Jena, Germany
- 3:30 **0899** Resistance to *Bacillus thuringiensis* Cry toxins in the cabbage looper, *Trichoplusia ni*. **Ping Wang** (pingwang@cornell.edu), Cornell Univ., Geneva, NY
- 3:45 **0900** Resistance to Cry1Ac and Cry2Ab in the pink bollworm, *Pectinophora gossypiella*. **Jeffrey A. Fabrick** (jeff.fabrick@ars.usda.gov), USDA - ARS, Maricopa, AZ
- 4:00 **0901** Molecular characterization of resistance to Bt corn in *Spodoptera frugiperda*. **Juan Luis Jurat-Fuentes** (jurat@utk.edu), Univ. of Tennessee, Knoxville, TN
- 4:15 **0902** Bt resistance in fall armyworm: Diversity in cross-resistance, inheritance, and fitness costs. **Fangneng Huang** (fhunag@agcenter.lsu.edu), Louisiana State Univ., Baton Rouge, LA
- 4:30 **0903** Considering amino acid sequence similarity of toxins for development of sustainable Bt crop pyramids. **Yves Carriere** (ycarriere@ag.arizona.edu)<sup>1</sup>, Neil Crickmore<sup>2</sup>, and Bruce Tabashnik<sup>1</sup>, <sup>1</sup>Univ. of Arizona, Tucson, AZ, <sup>2</sup>Univ. of Sussex, Brighton, United Kingdom
- 4:45 **0904** Interaction between chafer and Bt, a story of insects environmental adaptation. **Changlong Shu** (clshu@ippcaas.cn) and Jie Zhang, Chinese Academy of Agricultural Sciences, Beijing, China
- 5:00 **0905** Emerging resistance to Bt crops in Latin America prompts new implementation paradigm for IRM. **Timothy J. Dennehy** (timothy.dennehy@bayer.com), Univ. of Arizona, Tucson, AZ
- 5:15 **0906** Farm level aspects of IRM, IPM connections. **William Hutchison** (hutch002@umn.edu), Univ. of Minnesota, St. Paul, MN

## Symposium: The Physiological Ecology of Insect Flight: From Millisecond Escape to Long-Distance Migration

### Room W414 B (Convention Center)

**Moderators and Organizers:** Robert Dudley<sup>1</sup> and Jason Chapman<sup>2</sup>, <sup>1</sup>Univ. of California, Berkeley, CA, <sup>2</sup>Rothamsted Research, Harpenden, United Kingdom

- 1:30 **0907** Sensory motor integration in the flight system of *Drosophila*. **Michael Dickinson** (flyman@caltech.edu), California Institute of Technology, Pasadena, CA
- 1:45 **0908** Catching the breeze: How flying insects sense airflow. **Sanjay Sane** (sane@ncbs.res.in)<sup>1</sup>, Taruni Roy<sup>2</sup>, and Dinesh Natesan<sup>3</sup>, <sup>1</sup>National Centre for Biological Sciences, Bangalore, India, <sup>2</sup>National Center for Biological Sciences, Bangalore, India, <sup>3</sup>Neurobiology, Bangalore, India
- 2:00 **0909** Evasive maneuvers in freely flying fruit flies consist of rapid visually-directed banked turns. **Florian Muijires** (florian.muijires@wur.nl), Wageningen Univ. and Research Centre, Wageningen, Netherlands
- 2:15 **0910** Predator versus prey: Biomechanics, behavior, and strategy during aerial predation in dragonflies. **Stacey Combes** (sacombes@ucdavis.edu), Univ. of California, Davis, CA
- 2:30 **0911** Hawkmoth flight in unsteady flows. **Ty Hedrick** (thedrick@bio.unc.edu), Univ. of North Carolina, Chapel Hill, NC
- 2:45 **0912** Bumblebee flight across a 9000m simulated elevational gradient. **Michael E. Dillon** (michael.dillon@uwyo.edu)<sup>1</sup> and Robert Dudley<sup>2</sup>, <sup>1</sup>Univ. of Wyoming, Laramie, WY, <sup>2</sup>Univ. of California, Berkeley, CA
- 3:00 BREAK**
- 3:15 **0913** Ants in the atmosphere: Colony founding, mating, and dispersal in ant queens. **Jackson Helms** (jackson.a.helms-1@ou.edu), Univ. of Oklahoma, Norman, OK
- 3:30 **0914** Using stable isotopic tools to track insect origins and movements at continental scales. **Keith Hobson** (khobson6@uwo.ca), Univ. of Western Ontario, London, ON, Canada
- 3:45 **0915** Wind drift compensation in a suite of migratory neotropical Lepidoptera. **Robert Dudley** (wings@socrates.berkeley.edu)<sup>1</sup> and Robert B. Srygley<sup>2</sup>, <sup>1</sup>Univ. of California, Berkeley, CA, <sup>2</sup>USDA - ARS, Sidney, MT
- 4:00 **0916** Monarch butterflies are not true navigators. **Henrik Mouritsen** (henrik.mouritsen@uni-oldenburg.de)<sup>1</sup>, Rachael Derbyshire<sup>2</sup>, Julia Stalleicken<sup>1</sup>, Ole Mouritsen<sup>3</sup>, Barrie Frost<sup>4</sup>, and Ryan Norris<sup>2</sup>, <sup>1</sup>Univ. of Oldenburg, Oldenburg, Germany, <sup>2</sup>Univ. of Guelph, Guelph, ON, Canada, <sup>3</sup>Aalborg Univ., Aalborg, Denmark, <sup>4</sup>Queen's Univ., Kingston, ON, Canada
- 4:15 **0917** Monarchs as a model system for studying animal migration and infectious diseases. **Sonia Altizer** (saltizer@uga.edu), Univ. of Georgia, Athens, GA
- 4:30 **0918** Radar observations of locust flight capability, and implications for locust management. **V. Alistair Drake** (a.drake@adfa.edu.au), Univ. of New South Wales, Canberra, Australia

- 4:45 **0919** Doppler weather radar detects emigratory flights of beet armyworms, *Spodoptera exigua*, during a major pest outbreak. **John Westbrook** (john.westbrook@ars.usda.gov) and Ritchie Eyster, USDA - ARS, College Station, TX
- 5:00 **0920** From worms in the fields to moth DNA – a history of *Spodoptera frugiperda* migration in North America. **Robert L. Meagher** (rob.meagher@ars.usda.gov)<sup>1</sup>, Rodney N. Nagoshi<sup>1</sup>, Shelby J. Fleischer<sup>2</sup>, and John Westbrook<sup>3</sup>, <sup>1</sup>USDA - ARS, Gainesville, FL, <sup>2</sup>Pennsylvania State Univ., University Park, PA, <sup>3</sup>USDA - ARS, College Station, TX
- 5:15 **0921** Go with the flow? Wind selectivity and orientation in high-flying insect migrants. **Jason Chapman** (jason.chapman@rothamsted.ac.uk), Rothamsted Research, Harpenden, United Kingdom

### Symposium: Emerging Technologies for Successful Applications of dsRNA to Reduce Pests and Pathogens in Agriculture

#### West Hall F2 (WF2) (Convention Center)

**Moderators and Organizers:** William Moar<sup>1</sup> and Wayne B. Hunter<sup>2</sup>, <sup>1</sup>Monsanto Company, St. Louis, MO, <sup>2</sup>USDA - ARS, Ft. Pierce, FL

- 1:30 **0922** RNAi-mediated insect pest management: Challenges and opportunities. **James A. Baum** (james.a.baum@monsanto.com), Monsanto Company, Chesterfield, MO
- 2:00 **0923** Parental RNA interference of genes involved in embryonic development of the western corn rootworm, *Diabrotica virgifera virgifera*. **Ana Vélez** (anamaria.velez@gmail.com)<sup>1</sup>, Elane Fishilevich<sup>2</sup>, Kenneth Narva<sup>2</sup>, and Blair Siegfried<sup>3</sup>, <sup>1</sup>Univ. of Nebraska, Lincoln, NE, <sup>2</sup>Dow AgroSciences, Indianapolis, IN, <sup>3</sup>Univ. of Florida, Gainesville, FL
- 2:15 **0924** Advances to development of non-transgenic RNAi control strategies for insects. **Eduardo de Andrade** (eduardo.andrade@embrapa.br)<sup>1</sup>, Wayne B. Hunter<sup>2</sup>, and Vitor de Andrade<sup>3</sup>, <sup>1</sup>Embrapa Labex, Fort Pierce, FL, <sup>2</sup>USDA - ARS, Ft. Pierce, FL, <sup>3</sup>Westwood High School, Ft. Pierce, FL
- 2:30 **0925** Emerging biopesticides to control insect pests in urban environments. **Saikat Kumar Ghosh** (saikat.ghosh@ars.usda.gov) and Dawn Gundersen-Rindal, USDA - ARS, Beltsville, MD
- 2:45 **0926** Control of pests of canola using RNA interference technologies. **Suresh Desai** (beesuresh@gmail.com)<sup>1</sup>, Aditi Singh<sup>1</sup>, Chris Anderson<sup>2</sup>, James A. Baum<sup>3</sup>, Michael Crawford<sup>4</sup>, Mark Belmonte<sup>1</sup>, and Steve Whyard<sup>1</sup>, <sup>1</sup>Univ. of Manitoba, Winnipeg, MB, Canada, <sup>2</sup>Monsanto Canada, Winnipeg, MB, Canada, <sup>3</sup>Monsanto Company, Chesterfield, MO, <sup>4</sup>Monsanto Company, St. Louis, MO
- 3:00 **BREAK**
- 3:15 **0927** Topical RNAi in citrus tree crops to control hemipteran pests. **Wayne B. Hunter** (wayne.hunter@ars.usda.gov) and Eduardo de Andrade, USDA - ARS, Ft. Pierce, FL

- 3:30 **0928** Large scale RNA production for RNAi applications in broad acre agriculture. **Patrick McLaughlin** (patrick.mclaughlin@apsellc.com), Yulia Korshunova, John Kilmer, and Juan Arhancet, APSE, Inc., St. Louis, MO
- 3:45 **0929** Gene silencing of herbivorous insects by host plant chloroplast genome modification. **Sher Khan** (skhan@ice.mpg.de)<sup>1</sup>, Jiang Zhang<sup>2</sup>, Ralph Bock<sup>2</sup>, and David Heckel<sup>1</sup>, <sup>1</sup>Max Planck Institute for Chemical Ecology, Jena, Germany, <sup>2</sup>Max Planck Institute, Potsdam-Golm, Germany
- 4:00 **0930** Environmental risk management of RNAi pesticides: Sustainable process design through bioinformatics and community curation. **Alexie Papanicolaou** (a.papanicolaou@uws.edu.au)<sup>1</sup>, Brad Coates<sup>2</sup>, Kent S. Shelby<sup>3</sup>, Wayne B. Hunter<sup>4</sup>, Jay Evans<sup>5</sup>, and James Cook<sup>6</sup>, <sup>1</sup>Western Sydney Univ., Sydney, Australia, <sup>2</sup>USDA - ARS, Ames, IA, <sup>3</sup>USDA - ARS, Columbia, MO, <sup>4</sup>USDA - ARS, Ft. Pierce, FL, <sup>5</sup>USDA - ARS, Beltsville, MD, <sup>6</sup>Hawkesbury Institute for the Environment, Richmond, Australia
- 4:15 **0931** Ecological risk assessment for an RNAi plant incorporated protectant: Framework, analysis, and approach. Pamela Bachman<sup>1</sup>, Joshua Fischer<sup>2</sup>, Jennifer Fridley<sup>1</sup>, **Peter Jensen** (peter.d.jensen@monsanto.com)<sup>1</sup>, Geoffrey Mueller<sup>1</sup>, Jianguo Tan<sup>1</sup>, Joshua Uffman<sup>1</sup> and Fatima Zapata<sup>1</sup>, <sup>1</sup>Monsanto Company, St. Louis, MO, <sup>2</sup>Monsanto Company, Creve Coeur, MO
- 4:30 **0932** Environmental safety assessment considerations for plants expressing novel insecticidal RNAi traits in Canada. **Andrea Hitchon** (andrea.hitchon@inspection.gc.ca), Cecile Girard and Sarah G. Davis, Canadian Food Inspection Agency, Ottawa, ON, Canada
- 4:45 **0933** SmartStax PRO: The first commercial transgenic crop expressing insecticidal dsRNA for the control of corn rootworm. **Sean Evans** (spevan@monsanto.com)<sup>1</sup>, Joshua Bynum<sup>1</sup>, Matthew Carroll<sup>1</sup>, Thomas Clark<sup>2</sup>, Ronald Flannagan<sup>2</sup>, Graham P. Head<sup>1</sup>, William Moar<sup>1</sup>, Paula A. Price<sup>1</sup>, Gerrit Segers<sup>2</sup>, Alan Willse<sup>1</sup>, and Heidi Windler<sup>2</sup>, <sup>1</sup>Monsanto Company, St. Louis, MO, <sup>2</sup>Monsanto Company, Chesterfield, MO
- 5:00 **0934** The potential of RNAi-based pest control in the African sweet potato weevil, *Cylas puncticolis* (Coleoptera, Brentidae). **Katterinne Prentice** (katterinne.prenticemuro@ugent.be)<sup>1</sup>, Olivier Christiaens<sup>1</sup>, Ine Pertry<sup>2</sup>, Ana Bailey<sup>3</sup>, Chuck Niblett<sup>3</sup>, Godelieve Gheysen<sup>1</sup>, Marc Ghislain<sup>4</sup>, and Guy Smaghe<sup>1</sup>, <sup>1</sup>Ghent Univ., Ghent, Belgium, <sup>2</sup>Vlaams Institute for Biotechnology, Ghent, Belgium, <sup>3</sup>Venganza, Inc., Florida, FL, <sup>4</sup>International Potato Center, Nairobi, Kenya

### Symposium: The Khapra Beetle: A Potential Invasive Species

#### Room W315 B (Convention Center)

**Moderators and Organizers:** Frank Arthur<sup>1</sup> and Joel Perez-Mendoza<sup>2</sup>, <sup>1</sup>USDA - ARS, Manhattan, KS, <sup>2</sup>USDA - APHIS, Laredo, TX

- 1:30 **0935** Fluctuation of interceptions of *Trogoderma granarium* in foods coming to the USA from abroad: A 30-year data analysis. **Joel Perez-Mendoza** (joel.perez-mendoza@aphis.usda.gov), USDA - APHIS, Laredo, TX



- 1:45 **0936** Recognition and identification training: The foundation of an effective *Trogoderma granarium* exclusion program. **Charles Brodel** (charles.brodel@aphis.usda.gov), USDA - APHIS, Miami, FL
- 2:00 **0937** Measures to prevent the introduction of khapra beetle to México. **Francisco Corral** (fjwong@guayacan.uson.mx), Univ. of Sonora, Sonora, Mexico
- 2:15 **0938** Survey of *Trogoderma granarium* in Spain and Greece. **Jordi Riudavets** (jordi.riudavets@irta.cat)<sup>1</sup> and Christos Athanassiou<sup>2</sup>, <sup>1</sup>IRTA, Barcelona, Spain, <sup>2</sup>Univ. of Thessaly, Nea Ionia, Greece
- 2:30 **0939** Current status and proposed research for khapra beetle in Argentina. **Micaela Buteler** (butelermica@gmail.com), CONICET, Mendoza, Argentina
- 2:45 **0940** Molecular identification of *Trogoderma granarium* and phylogenetic analysis of US *Trogoderma*. **Rachel Olsen** (olsonrl@r.umn.edu)<sup>1</sup>, Norman Barr<sup>2</sup>, Roxanne Farris<sup>2</sup>, and Anthony I. Cognato<sup>3</sup>, <sup>1</sup>Univ. of Minnesota, Rochester, MN, <sup>2</sup>USDA - APHIS, Edinburg, TX, <sup>3</sup>Michigan State Univ., East Lansing, MI
- 3:00 BREAK**
- 3:15 **0941** How fumigation efficacy relates to diapause, dose, and temperature. **Scott W. Myers** (scott.w.myers@aphis.usda.gov), USDA - APHIS, Buzzards Bay, MA
- 3:30 **0942** Evaluation of novel insecticides for control of khapra beetle, *Trogoderma granarium* Everts (Coleoptera: Dermestidae). **Mukti Ghimire** (mukti.n.ghimire@aphis.usda.gov)<sup>1</sup>, Frank Arthur<sup>2</sup>, Scott W. Myers<sup>1</sup>, and Thomas Phillips<sup>3</sup>, <sup>1</sup>USDA - APHIS, Buzzards Bay, MA, <sup>2</sup>USDA - ARS, Manhattan, KS, <sup>3</sup>Kansas State Univ., Manhattan, KS
- 3:45 **0943** Using *Trogoderma variabile* as a surrogate species for *T. granarium* to establish susceptibility to insecticides. **Frank Arthur** (frank.arthur@ars.usda.gov), USDA - ARS, Manhattan, KS
- 4:00 **0944** Controlling *Trogoderma granarium* with extreme temperatures. **Diana Wilches** (diana\_wico2@hotmail.com)<sup>1</sup>, Robert Laird<sup>2</sup>, Kevin Floate<sup>1</sup>, and Paul Fields<sup>3</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, Lethbridge, AB, Canada, <sup>2</sup>Univ. of Lethbridge, Lethbridge, AB, Canada, <sup>3</sup>Agriculture and Agri-Food Canada, Winnipeg, MB, Canada
- 2:00 **0947** Coleopteran exotic insects into the Republic of Korea: Comparing border interception and incursion from 1996 to 2014. **Lee Wonhoon** (wonhoon80@korea.kr), Animal and Plant Quarantine Agency, Gyeonggi-do, South Korea
- 2:15 **0948** Digestion mechanisms of wood degrading arthropods operating in the marine intertidal and subtidal zones. **Simon Cragg** (simon.cragg@port.ac.uk), Univ. of Portsmouth, Portsmouth, United Kingdom
- 2:30 **0949** Beetles and drywood termites: A hazard to buildings in southern Europe. **Lina Nunes** (linanunes@Inec.pt), National Laboratory for Civil Engineering, Lisbon, Portugal
- 2:45 **0950** Deathwatch beetle, *Euvrietta peltata* (*Xyletinus peltatus*), structural infestation in Griffin, Georgia, USA. **Daniel R. Suiter** (dsuiter@uga.edu), Univ. of Georgia, Griffin, GA
- 3:00 BREAK**
- 3:15 **0951** Termite-associated nematode fauna in relation to their host/carrier termite habitat. **Natsumi Kanzaki** (nkanzaki@ffpri.affrc.go.jp), Forestry and Forest Products Research Institute, Tsukuba, Japan
- 3:30 **0952** Molecular identification of invasive drywood wood boring species using frass and fecal pellets by loop-mediated isothermal amplification and nested PCR assays. **Tatsuya Ide** (idet@affrc.go.jp), Forestry and Forest Products Research Institute, Tsukuba, Japan
- 3:45 **0953** Evaluation of non-contact AE sensor for termite detection. **Wakako Ohmura** (murasan@ffpri.affrc.go.jp), Forestry and Forest Products Research Institute, Tsukuba, Japan
- 4:00 **0954** Nondestructive evaluation of larval development and feeding and pupal ecdysis of the bamboo powderpost beetle, *Dinoderus minutus*, using X-ray CT and acoustic emission monitoring. **Hiroki Watanabe** (watanabe@h3news1.kais.kyoto-u.ac.jp), Kyoto Univ., Kyoto, Japan
- 4:15 **0955** The fusion of incipient colonies in the drywood termite *Incisitermes minor*. **S. Khoiril Himmi** (himmi@rish.kyoto-u.ac.jp), Kyoto Univ., Uji, Japan
- 4:30 **0956** Drywood insect pests: An Asian perspective. **Tsuyoshi Yoshimura** (tsuyoshi@rish.kyoto-u.ac.jp), Kyoto Univ., Uji, Japan

## Symposium: A Global Perspective on Insect Pests of Wood Products

### Room W230 A (Convention Center)

**Moderators and Organizers:** Vernard Lewis<sup>1</sup> and Brian Forschler<sup>2</sup>, <sup>1</sup>Univ. of California, Richmond, CA, <sup>2</sup>Univ. of Georgia, Athens, GA

- 1:30 **0945** Wood borers in structural timber – European regulations for their control and can TTIP (European Commission) comply? **Rudy Plarre** (ruediger.plarre@bam.de), Federal Institute for Materials Research and Testing, Berlin, Germany
- 1:45 **0946** Innovative wood treatments with hybrid inorganic-organic polymers and a proposal for drywood termites standard testing protocol. **Lara Maistrello** (lara.maistrello@unimore.it), University of Modena and Reggio Emilia, Modena, Italy

## Symposium: How Human Activities Shape the Global Distribution of Insects

### Room W414 D (Convention Center)

**Moderators and Organizers:** Chin-Cheng Yang<sup>1</sup>, Chow-Yang Lee<sup>2</sup>, and Andrew Suarez<sup>3</sup>, <sup>1</sup>Kyoto Univ., Uji, Japan, <sup>2</sup>Univ. of Science, Penang, Malaysia, <sup>3</sup>Univ. of Illinois, Champaign, IL

- 1:30 **0957** The reemergence of bed bugs as a global menace from a population genetic perspective. **Warren Booth** (warren-booth@utulsa.edu)<sup>1</sup>, Coby Schal<sup>2</sup>, and Edward Vargo<sup>3</sup>, <sup>1</sup>The Univ. of Tulsa, Tulsa, OK, <sup>2</sup>North Carolina State Univ., Raleigh, NC, <sup>3</sup>Texas A&M Univ., College Station, TX

- 1:45 **0958** Global invasion of *Aedes aegypti* mosquitoes, an important vector of human diseases. **Andrea Gloria-Soria** (andrea.gloria-soria@yale.edu) and Jeffrey R. Powell, Yale Univ., New Haven, CT
- 2:00 **0959** Invasion of the BLTs: Patterns and mechanisms of the geographic expansion of Lyme disease in the midwestern U.S. **Brian F. Allan** (ballan@illinois.edu)<sup>1</sup>, Natalie Pawlikowski<sup>1</sup>, Allison Gardner<sup>1</sup>, Sarah Hamer<sup>2</sup>, Graham J. Hickling<sup>3</sup>, James Miller<sup>1</sup>, Anna Schotthoefer<sup>4</sup>, and Jean Tsao<sup>5</sup>, <sup>1</sup>Univ. of Illinois, Champaign, IL, <sup>2</sup>Texas A&M Univ., College Station, TX, <sup>3</sup>Univ. of Tennessee, Knoxville, TN, <sup>4</sup>Marshfield Clinic Research Foundation, Marshfield, WI, <sup>5</sup>Michigan State Univ., East Lansing, MI
- 2:15 **0960** Phylogeography of the fungus-growing termite *Macrotermes gilvus* and insight into open-vegetation dispersal corridors in Pleistocene southeast Asia. **Veera Singham** (veerasingham@usm.my), Ahmad Sofiman Othman, and Chow-Yang Lee, Univ. of Science, Penang, Malaysia
- 2:30 **0961** Reconstructing the global invasion routes of the cabbage white butterfly using citizen science assisted genomics. **DeWayne Shoemaker** (dewayne.shoemaker@ars.usda.gov) and Sean Ryan, USDA - ARS, Gainesville, FL
- 2:45 **0962** Phylogeography of the invasive longhorn crazy ant, *Paratrechina longicornis*. **Shu-Ping Tseng** (d03632001@ntu.edu.tw)<sup>1</sup>, James Wetterer<sup>2</sup>, Sylvain Hugel<sup>3</sup>, Chow-Yang Lee<sup>4</sup>, Andrew Suarez<sup>5</sup>, DeWayne Shoemaker<sup>6</sup>, En-Cheng Yang<sup>1</sup>, and Chin-Cheng Yang<sup>7</sup>, <sup>1</sup>National Taiwan Univ., Taipei, Taiwan, <sup>2</sup>Florida Atlantic Univ., Jupiter, FL, <sup>3</sup>Univ. of Strasbourg, René Descartes, France, <sup>4</sup>Univ. of Science, Penang, Malaysia, <sup>5</sup>Univ. of Illinois, Champaign, IL, <sup>6</sup>USDA - ARS, Gainesville, FL, <sup>7</sup>Kyoto Univ., Uji, Japan
- 3:00 BREAK**
- 3:15 **0963** Factors associated with colonization success of tropical invasive ants at mid-high altitude. **Chin-Cheng Yang** (ccyangistheman@ntu.edu.tw)<sup>1</sup>, Shu-Ping Tseng<sup>2</sup>, Yi-Ming Weng<sup>2</sup>, and Han-Chih Ho<sup>2</sup>, <sup>1</sup>Kyoto Univ., Uji, Japan, <sup>2</sup>National Taiwan Univ., Taipei, Taiwan
- 3:30 **0964** Distribution of exotic ants is associated with land-use along a meridional provincial highway in western Taiwan. **Chung-Chi Lin** (cclin@cc.ncue.edu.tw), National Changhua Univ. of Education, Changhua, Taiwan
- 3:45 **0965** Insight into human-mediated jump dispersal of insects: A synthesis. **Andrew Suarez** (avsuar@life.illinois.edu), Univ. of Illinois, Champaign, IL
- 1:45 **0967** Impact assessment of *Laricobius nigrinus* (Coleoptera: Derodontidae), a predator of hemlock woolly adelgid. **Ariel Heminger** (arielrh@vt.edu)<sup>1</sup>, Albert E. Mayfield III<sup>2</sup>, Joseph Elkinton<sup>3</sup>, Gregory J. Wiggins<sup>4</sup>, Jerome F. Grant<sup>4</sup>, Jeff Lombardo<sup>5</sup>, Thomas McAvoy<sup>1</sup>, Andrew Tait<sup>6</sup>, Bryan Mudder<sup>2</sup>, and Scott Salom<sup>1</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>USDA - Forest Service, Asheville, NC, <sup>3</sup>Univ. of Massachusetts, Amherst, MA, <sup>4</sup>Univ. of Tennessee, Knoxville, TN, <sup>5</sup>Dartmouth College, Hanover, NH, <sup>6</sup>North Carolina State Univ., Asheville, NC
- 2:00 **0968** Establishment, dispersal, and impact of *Laricobius osakensis* Montgomery and Shiyake (Coleoptera: Derodontidae), as biological control agent of the hemlock woolly adelgid, *Adelges tsugae* Annand. **Ashley Toland** (ashleyat@vt.edu) and Scott Salom, Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 2:15 **0969** Phenology and synchrony of *Scymnus coniferarum* (Coleoptera: Coccinellidae) and its host hemlock woolly adelgid (Hemiptera: Adelgidae) in Tacoma, Washington. **Molly Darr** (mdarr@vt.edu)<sup>1</sup>, Scott Salom<sup>1</sup>, Thomas McAvoy<sup>1</sup>, Richard C. McDonald<sup>2</sup>, and Rachel Brooks<sup>3</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>Symbiont Biological Pest Management, Sugar Grove, NC, <sup>3</sup>Thurston County Washington, Olympia, WA
- 2:30 **0970** Evaluating a potential area-wide IPM strategy for managing hemlock woolly adelgid in the eastern United States. **Kenton Sumpter** (skenton7@vt.edu)<sup>1</sup>, Scott Salom<sup>1</sup>, Carlyle C. Brewster<sup>1</sup>, Troy D. Anderson<sup>1</sup>, Albert E. Mayfield III<sup>2</sup>, and Thomas McAvoy<sup>1</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>USDA - Forest Service, Asheville, NC
- 2:45 **0971** Impact of host defenses induced by hemlock woolly adelgid (*Adelges tsugae*) feeding on a native lepidopteran. **Mary Mallinger** (mallinger.mary@gmail.com)<sup>1</sup>, Robert Schaeffer<sup>2</sup>, and Evan L. Preisser<sup>1</sup>, <sup>1</sup>Univ. of Rhode Island, Kingston, RI, <sup>2</sup>Tufts Univ., Medford, MA
- 3:00 BREAK**
- 3:15 **0972** Seasonal phenology of the pine bark adelgid, *Pineus strobi* (Hemiptera: Adelgidae), in southwestern Virginia. **Holly Wantuch** (wholly3@vt.edu), Scott Salom, and Thomas P. Kuhar, Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 3:30 **0973** Scale insect and pathogen colonization patterns on ailing white pine. **Thomas D. Whitney** (thomas.whitney@uga.edu)<sup>1</sup>, Kamal Gandhi<sup>1</sup>, Brittany Barnes<sup>1</sup>, Michelle Cram<sup>2</sup>, Arya Aghdasi<sup>1</sup>, and Jiangming Yao<sup>1,3</sup>, <sup>1</sup>Univ. of Georgia, Athens, GA, <sup>2</sup>USDA - Forest Service, Athens, GA, <sup>3</sup>Guangxi Univ., Nanning, China
- 3:45 **0974** Herbivore-induced delays in conifer phenology are exacerbated by climate change. **Claire Wilson** (wilsonc@uri.edu)<sup>1</sup>, Robert Schaeffer<sup>2</sup>, Colin M. Orians<sup>2</sup>, and Evan L. Preisser<sup>1</sup>, <sup>1</sup>Univ. of Rhode Island, Kingston, RI, <sup>2</sup>Tufts Univ., Medford, MA
- 4:00 **0975** Development of mycangia in ambrosia beetles in relation to symbionts and ontogeny. **You Li** (yourreason@hotmail.com)<sup>1</sup>, Jiri Hulcr<sup>1</sup>, Siqin Ge<sup>2</sup>, and Yongying Ruan<sup>2</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Chinese Academy of Sciences, Beijing, China

### Graduate Student Oral Competition: Agricultural and Forest Entomology: Forest Pests

#### Room W232 C (Convention Center)

**Moderators:** Paul Borth<sup>1</sup> and Michael Fisher<sup>2</sup>, <sup>1</sup>Paul W. Borth Consulting, Zionsville, IN, <sup>2</sup>North Carolina State Univ., Cary, NC

- 1:30 **0966** Patterns of host preference of the invasive *Glycaspis brimblecombei* Moore (Hemiptera: Psyllidae). **Samantha Bush** (samantha.bush@fabi.up.ac.za), Bernard Slippers, and Brett Hurley, Univ. of Pretoria, Pretoria, South Africa



- 4:15 **0976** Enhanced detection of *Pityophthorus juglandis*, the primary vector of thousand cankers disease. **Bridget Blood** (bblood@purdue.edu)<sup>1</sup>, Denita Hadziabdic<sup>2</sup>, William Klingeman<sup>2</sup>, and Matthew Ginzel<sup>1</sup>, <sup>1</sup>Purdue Univ., West Lafayette, IN, <sup>2</sup>Univ. of Tennessee, Knoxville, TN
- 4:30 **0977** Thousand cankers disease: Scolytine beetles and phoretic fungal pathogens associated with symptomatic eastern black walnut (*Juglans nigra*). **Tyler Stewart** (stewar23@purdue.edu)<sup>1</sup>, Margaret McDermott-Kubeczko<sup>2</sup>, Jennifer Juzwik<sup>3</sup>, and Matthew Ginzel<sup>1</sup>, <sup>1</sup>Purdue Univ., West Lafayette, IN, <sup>2</sup>Univ. of Minnesota, St. Paul, MN, <sup>3</sup>USDA - Forest Service, St. Paul, MN
- 4:45 **0978** A survey of the parasitic Hymenoptera of larch casebearer in Minnesota. **Allastacia Gebauer** (gebau005@umn.edu) and Brian Aukema, Univ. of Minnesota, St. Paul, MN
- 5:00 **0979** The unique role of Cerambycids associated with spreading sap-stain fungi in a native Australian sclerophyll forest. **Stephen Seaton** (s.seaton@murdoch.edu.au), Giles Hardy, and Bernard Dell, Murdoch Univ., Melbourne, Australia
- 2:30 **0984** Evaluation of *Oebalus pugnax* impact on varying stages of rice development. **Aaron Cato** (ajcato@uark.edu)<sup>1</sup>, Gus Lorenz<sup>2</sup>, and Jarrod T. Hardke<sup>3</sup>, <sup>1</sup>Univ. of Arkansas, Fayetteville, AR, <sup>2</sup>Univ. of Arkansas, Lonoke, AR, <sup>3</sup>Univ. of Arkansas, Stuttgart, AR
- 2:45 **0985** Efficacy of chemigation for managing stink bugs. **Xing Wei** (xingwei@uga.edu), Michael Toews, Phillip M. Roberts, and Wes Porter, Univ. of Georgia, Tifton, GA
- 3:00 **BREAK**
- 3:15 **0986** Feeding behavior of the stink bug *Bagrada hilaris* is changed by the electrical signals applied during EPG recordings. **Edmar Tuelher** (edmar.tuelher@ufv.br)<sup>1</sup>, Tiago Lucini<sup>2</sup>, Felix Cervantes<sup>3</sup>, and Elaine Backus<sup>3</sup>, <sup>1</sup>Federal Univ. of Viçosa, Viçosa, Brazil, <sup>2</sup>Federal Univ. of Paraná, Curitiba, Brazil, <sup>3</sup>USDA - ARS, Parlier, CA
- 3:30 **0987** Cold tolerance and overwintering behavior of kudzu bugs (*Megacopta cribraria*) at its northern limit. **Jessica Grant** (grantji@umd.edu) and William O. Lamp, Univ. of Maryland, College Park, MD
- 3:45 **0988** Enhanced monitoring and management strategies for *Megacopta cribraria* in soybeans. **Anthony Greene** (adg2@clemson.edu)<sup>1</sup>, Jeremy Greene<sup>1</sup>, Francis Reay-Jones<sup>2</sup>, and Francesca Stubbins<sup>1</sup>, <sup>1</sup>Clemson Univ., Blackville, SC, <sup>2</sup>Clemson Univ., Florence, SC
- 4:00 **0989** Edge effects of *Halyomorpha halys* (Stål), brown marmorated stink bug, in southeastern row crops. **Whitney Hadden** (wthadden@uga.edu)<sup>1</sup>, James F. Walgenbach<sup>2</sup>, and Michael Toews<sup>1</sup>, <sup>1</sup>Univ. of Georgia, Tifton, GA, <sup>2</sup>North Carolina State Univ., Mills River, NC
- 4:15 **0990** Influence of elevation on dispersal behavior of brown marmorated stink bug (*Halyomorpha halys*) seeking overwintering sites. **John Cullum** (john29@vt.edu)<sup>1</sup>, Christopher Bergh<sup>1</sup>, Michael J. Raupp<sup>2</sup>, Paula M. Shrewsbury<sup>2</sup>, P. Dilip Venugopal<sup>3</sup>, Holly Martinson<sup>2</sup>, and Tracy C. Leskey<sup>4</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Winchester, VA, <sup>2</sup>Univ. of Maryland, College Park, MD, <sup>3</sup>U.S. Environmental Protection Agency, Washington, DC, <sup>4</sup>USDA - ARS, Kearneysville, WV
- 4:30 **0991** Optimizing attract-and-kill technology for harlequin bug, *Murgantia histrionica* (Hahn). **Anthony S. DiMeglio** (tonydimeglio@gmail.com)<sup>1</sup>, Thomas P. Kuhar<sup>1</sup>, and Donald Weber<sup>2</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>USDA - ARS, Beltsville, MD
- 4:45 **0992** Anatomical damage in cotton squares by nymphal *Lygus lineolaris* in relation to EPG-recorded feeding behavior. **Eeva Sharma** (eevasharma@mail.fresnostate.edu)<sup>1</sup>, Felix Cervantes<sup>2</sup>, Elaine Backus<sup>2</sup>, and John Bushoven<sup>1</sup>, <sup>1</sup>California State Univ., Fresno, CA, <sup>2</sup>USDA - ARS, Parlier, CA

### Graduate Student Oral Competition: Agricultural and Forest Entomology: Hemipteran Pests

#### Room W232 B (Convention Center)

**Moderators:** Jon M. Babcock<sup>1</sup> and Louis Nottingham<sup>2</sup>, <sup>1</sup>Dow AgroSciences, Indianapolis, IN, <sup>2</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA

- 1:30 **0980** Reduced caterpillar damage benefits the plant bug *Lygus hesperus* on Bt cotton. **Michael Eisenring** (michael.eisenring@agroscope.admin.ch)<sup>1</sup>, Steven Naranjo<sup>2</sup>, Joe Hull<sup>2</sup>, Steffen Hagenbucher<sup>1</sup>, Angelique Abbott<sup>2</sup>, Michael Meissle<sup>1</sup>, and Jörg Romeis<sup>1</sup>, <sup>1</sup>Agroscope, Zürich, Switzerland, <sup>2</sup>USDA - ARS, Maricopa, AZ
- 1:45 **0981** Comparing boll injury and EILs for species of a boll-feeding sucking bug complex (Hemiptera: Miridae and Pentatomidae) on South Texas cotton. **James Glover** (james.glover@tamu.edu)<sup>1,2</sup>, Michael Brewer<sup>1</sup>, and Gregory Sword<sup>2</sup>, <sup>1</sup>Texas A&M AgriLife Research, Corpus Christi, TX, <sup>2</sup>Texas A&M Univ., College Station, TX
- 2:00 **0982** Spatial relationships of plant bugs in large scale cotton operations: Do edge and ecotone matter? **Isaac Esquivel** (iesqu002@tamu.edu)<sup>1</sup>, Michael Brewer<sup>2</sup>, and Robert Coulson<sup>1</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Texas A&M AgriLife Research, Corpus Christi, TX
- 2:15 **0983** The ecology and economics of an emergent pest, the brown stink bug (*Euschistus servus*), in an established cotton IPM program. **Lydia Brown** (lbrown@cals.arizona.edu)<sup>1</sup>, Peter Ellsworth<sup>1</sup>, Steven Naranjo<sup>2</sup>, Michael Toews<sup>3</sup>, and George Frisvold<sup>4</sup>, <sup>1</sup>Univ. of Arizona, Maricopa, AZ, <sup>2</sup>USDA - ARS, Maricopa, AZ, <sup>3</sup>Univ. of Georgia, Tifton, GA, <sup>4</sup>Univ. of Arizona, Tucson, AZ

**Graduate Student Oral Competition: Biodiversity, Biogeography, and Conservation of Arthropods: Diversity****Room W223 B (Convention Center)**

**Moderators:** Ainsley Seago<sup>1</sup> and Raul F. Medina<sup>2</sup>, <sup>1</sup>Univ. of California, Berkeley, CA, <sup>2</sup>Texas A&M Univ., College Station, TX

- 1:30 **0993** Assessment of bee diversity using citizen science protocols. **Lisa Mason** (lisa.mason@colostate.edu) and Arathi Seshadri, Colorado State Univ., Fort Collins, CO
- 1:45 **0994** Revitalizing urban vacant land for pollinator communities. **MaLisa Spring** (malisa.spring@gmail.com) and Mary Gardiner, The Ohio State Univ., Wooster, OH
- 2:00 **0995** Urban landscape heterogeneity influences green space value for cavity nesting bees and wasps. **Katherine Todd** (todd.489@osu.edu) and Mary Gardiner, The Ohio State Univ., Wooster, OH
- 2:15 **0996** Fire diversity promotes plant-pollinator community diversity. **Lauren Ponisio** (lponisio@berkeley.edu), Univ. of California, Berkeley, CA
- 2:30 **0997** Ground-dwelling insect responses to prescribed rangeland fire. **Britt Smith** (britt.smith@ttu.edu), Brad Dabbert, and Robin M. Verble-Pearson, Texas Tech Univ., Lubbock, TX
- 2:45 **0998** Assessment of forest arthropod diversity through metabarcoding. **Sarah Meierotto** (s.meierotto@uky.edu) and Michael J. Sharkey, Univ. of Kentucky, Lexington, KY
- 3:00 **BREAK**
- 3:15 **0999** Reorganization of taxonomic, functional, and phylogenetic ant biodiversity after conversion to rubber plantation. **Cong Liu** (cong.liu0514@gmail.com)<sup>1</sup>, Benoit Guénard<sup>2</sup>, Benjamin Blanchard<sup>3</sup>, Yan-Qiong Peng<sup>4</sup>, and Evan Economo<sup>1</sup>, <sup>1</sup>Okinawa Institute of Science and Technology, Onna, Japan, <sup>2</sup>Univ. of Hong Kong, Hong Kong, China, <sup>3</sup>The Field Museum of Natural History, Chicago, IL, <sup>4</sup>Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences, Kunming, China
- 3:30 **1000** New species of armored scale insects (Hemiptera: Diaspididae) described from New Caledonia. **Fredericka Hamilton** (fbh0006@auburn.edu), Mayrolin García Morales, Nicholas Christodoulides, and Nate Hardy, Auburn Univ., Auburn, AL
- 3:45 **1001** Speciation patterns of beetles in the highlands of Ecuador. **Sofia Muñoz-Tobar** (smunoz@clemson.edu), Clemson Univ., Clemson, SC
- 4:00 **1002** Phylogeography of *Synuchus dubius* (Coleoptera: Carabidae) in Arizona's Madrean Sky Island Archipelago. **Alan Yanahan** (yanahan@email.arizona.edu) and Wendy Moore, Univ. of Arizona, Tucson, AZ
- 4:15 **1003** Defense mechanisms of *Pachyrhynchus* weevils. **Lu-Yi Wang** (lu200120012011@gmail.com)<sup>1</sup>, Chung-Ping Lin<sup>1</sup>, and Wen-San Huang<sup>2</sup>, <sup>1</sup>National Taiwan Normal Univ., Taipei, Taiwan, <sup>2</sup>National Museum of Natural Science, Taichung, Taiwan

- 4:30 **1004** Investigating the effects of plant diversity on insect diversity and soil health in a corn production system. **Claire LaCanne** (celacanne@gmail.com)<sup>1</sup> and Jonathan Lundgren<sup>2</sup>, <sup>1</sup>South Dakota State Univ., Brookings, SD, <sup>2</sup>Ecdysis Foundation, Estelline, SD
- 4:45 **1005** Arthropod biodiversity estimates for three native subalpine plant species on Hawaii's Maunakea Volcano. **Heather Stever** (hstever@hawaii.edu), Jesse A. Eiben, and Marleena Sheffield, Univ. of Hawai'i, Hilo, HI
- 5:00 **1006** Relative density variability over the past 15 years of *Nysius wekiuicola*, an endemic seed bug of conservation concern on the summit of the Maunakea volcano, Hawaii. **Jessica Kirkpatrick** (jakirkpa@hawaii.edu) and Jesse A. Eiben, Univ. of Hawai'i, Hilo, HI
- 5:15 **1007** Species diversity and phenology of predators of sucking pest complex in mulberry ecosystems of Eastern India. **Lalitha Natarajan** (lalitha.nm@gmail.com)<sup>1,2</sup>, Manne Santhakumar<sup>3</sup>, Nirmal Kumar Sundaramurthy<sup>1</sup>, and Kanika Trivedy<sup>1</sup>, <sup>1</sup>Central Sericultural Research & Training Institute, Berhampore, India, <sup>2</sup>Visva-Bharati Univ., Santiniketan, India, <sup>3</sup>Shivaji Univ., Kohlapur, India

**Graduate Student Oral Competition: Insect-Plant Interactions in a Changing Climate****Room W240 B (Convention Center)**

**Moderators:** Jessica Kansman<sup>1</sup> and Joshua Benoit<sup>2</sup>, <sup>1</sup>Univ. of Missouri, Columbia, MO, <sup>2</sup>Univ. of Cincinnati, Cincinnati, OH

- 1:30 **1008** Effects of two climate change factors, elevated temperature and water stress, on the rice brown planthopper, *Nilaparvata lugens* (Stål). **Ye Tan** (tanye0722@126.com) and Zeng-Rong Zhu, Zhejiang Univ., Hangzhou, China
- 1:45 **1009** The performance of a plant-herbivore-parasitoid food-web under climate change scenarios. **Sandra Flores-Mejia** (sandra.flores-mejia.1@ulaval.ca), Valérie Fournier, and Conrad Cloutier, Univ. Laval, Québec City, QC, Canada
- 2:00 **1010** Influence of bioclimatic variables on the distribution of coffee berry borer, *Hypothenemus hampei* (Ferrari) (Coleoptera: Curculionidae) in coffee in Puerto Rico. Jose Garcia, **Jose Carlos V. Rodrigues** (jose\_carlos@mac.com), Yobana Mariño, and Paul Bayman, Univ. of Puerto Rico, San Juan, PR
- 2:15 **1011** Do biotic components of healthy soils increase plant resistance to herbivores? **Elizabeth Rowen** (epr5119@psu.edu) and John Tooker, Pennsylvania State Univ., University Park, PA
- 2:30 **1012** Enhancement of web-builder spider populations in eggplant fields by surrounding flowering plants. **Elsaid Elnabawy** (said19832007@yahoo.com)<sup>1,2</sup>, Katsuo Tsuda<sup>1</sup>, and Yositaka Sakamaki<sup>1</sup>, <sup>1</sup>Kagoshima Univ., Korimoto, Japan, <sup>2</sup>Kafrelsheikh Univ., Kafr el-Sheikh, Egypt
- 2:45 **1013** Disruption of ecosystem function through spread of an invasive ant (*Wasmannia auropunctata*) in a tropical biodiversity hotspot. **Maureen Cateine** (maureen.cateine@ird.fr) and Hervé Jourdan, Institute of Research for Development, Nouméa, New Caledonia





- 3:00 BREAK**
- 3:15 1014** Urban forest fragments: Potential refugia to mitigate the effects of urban warming. **Lawrence Long** (lclong2@ncsu.edu) and Steven Frank, North Carolina State Univ., Raleigh, NC
- 3:30 1015** How do impervious surface and surrounding vegetation affect pest colonization rates of urban trees? **Kristi Backe** (kbacke@ncsu.edu) and Steven Frank, North Carolina State Univ., Raleigh, NC
- 3:45 1016** Aquatic insect larvae are major players in mediating lakes' carbon-sequestering capacities in the warming world. **Viktor Baranov** (baranov@igb-berlin.de)<sup>1</sup>, Stefan Krause<sup>2</sup>, and Joerg Lewandowski<sup>1</sup>, <sup>1</sup>Leibniz Institute of Freshwater Ecology and Inland Fisheries, Berlin, Germany, <sup>2</sup>Univ. of Birmingham, Birmingham, United Kingdom
- 4:00 1017** Gene expression analysis and validation for potential marker genes of mycorrhizal rice plants in response to feeding with fall armyworm, *Spodoptera frugiperda*. **Lina Bernaola** (lbernaola@agcenter.lsu.edu)<sup>1</sup> and Michael Stout<sup>2</sup>, <sup>1</sup>Louisiana State Univ., Baton Rouge, LA, <sup>2</sup>Louisiana State Univ. AgCenter, Baton Rouge, LA
- 4:15 1018** Influence of fatty acid desaturation on photosynthesis and aphid resistance in tomato. **Janithri Wickramanayake** (janithriwick@gmail.com), Junhuan Xu, and Fiona L. Goggin, Univ. of Arkansas, Fayetteville, AR
- 4:30 1019** The influence of drought stress on bird cherry-oat aphid (*Rhopalosiphum padi* (L.)) host-plant utilization, emigration, and feeding behavior: Implications for pathogen transmission in wheat. **Jessica Kansman** (jtkp8b@missouri.edu) and Debbie Finke, Univ. of Missouri, Columbia, MO
- 4:45 1020** Maize defense responses to phloem sap-sucking corn leaf aphid. **Suresh Varsani** (ssvarsani@gmail.com), Saumik Basu, and Joe Louis, Univ. of Nebraska, Lincoln, NE
- 5:00 1021** Methylation as a driving factor of biotypification and increased virulence in aphids. **Kelly Breeds** (breedskelly@gmail.com) and A. M. Botha, Stellenbosch Univ., Stellenbosch, South Africa
- 1:45 1023** Farming practices can affect the kudzu bug, an invasive soybean pest in the US. **Alejandro Del Pozo** (aidelpoz@ncsu.edu)<sup>1</sup>, Dominic Reisig<sup>2</sup>, Jack Bacheler<sup>1</sup>, and Chris Reberg-Horton<sup>1</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>North Carolina State Univ., Plymouth, NC
- 2:00 1024** Field evaluation of potential trap crops for managing kudzu bug, *Megacopta cribraria* in soybean production. **Blessing Ademokoya** (bfa0003@auburn.edu), Rammohan Rao Balusu, and Henry Fadamiro, Auburn Univ., Auburn, AL
- 2:15 1025** Spatial distribution of *Megacopta cribraria* egg masses and parasitism by *Paratelenomus saccharalis* in soybean. **Ian Knight** (ianak@uga.edu) and Michael Toews, Univ. of Georgia, Tifton, GA
- 2:30 1026** Cover crop residues and their effects on pest beetle populations in vegetables. **Peter Coffey** (peterlcoffey@gmail.com) and Cerruti Hooks, Univ. of Maryland, College Park, MD
- 2:45 1027** Identification of unique volatile compounds associated with repelling whiteflies (Hemiptera: Aleyrodidae) in desert watermelon (*Citrullus colocynthis*). **Bobbie Blake** (bblake238@gmail.com)<sup>1</sup>, Alvin M. Simmons<sup>1</sup>, Gloria McCutcheon<sup>2</sup>, Michael Walla<sup>3</sup>, Mihail Kantor<sup>2</sup>, and Amnon Levi<sup>1</sup>, <sup>1</sup>USDA - ARS, Charleston, SC, <sup>2</sup>Claffin Univ., Orangeburg, SC, <sup>3</sup>Univ. of South Carolina, Columbia, SC
- 3:00 BREAK**
- 3:15 1028** Native perennial plants to attract natural enemies. **Dan Gibson** (gibso124@msu.edu) and Douglas A. Landis, Michigan State Univ., East Lansing, MI
- 3:30 1029** Local and landscape-scale diversity interact to shape herbivore communities in *Brassica oleracea* crops. **Lauren Snyder** (lds97@cornell.edu) and Alison Power, Cornell Univ., Ithaca, NY
- 3:45 1030** Effects of red clover living mulch on arthropod communities and cucurbit yield. **Hanna Kahl** (hkahl@umd.edu) and Cerruti Hooks, Univ. of Maryland, College Park, MD
- 4:00 1031** The effect of introducing wildflower strips in apple orchards on pollination and pest regulation services. **Megan Mckerchar** (m.mckerchar@worc.ac.uk)<sup>1</sup>, Michelle Fountain<sup>2</sup>, Simon Potts<sup>3</sup>, and Duncan Westbury<sup>1</sup>, <sup>1</sup>Univ. of Worcester, Worcester, United Kingdom, <sup>2</sup>East Malling Research, Kent, United Kingdom, <sup>3</sup>Reading Univ., Reading, United Kingdom
- 4:15 1032** Do prairie plantings alter the community structure and function of insect communities in agroecosystems? **Eric Middleton** (middl145@umn.edu)<sup>1</sup> and Christopher R. Philips<sup>2</sup>, <sup>1</sup>Univ. of Minnesota, Minneapolis, MN, <sup>2</sup>Univ. of Minnesota, St. Paul, MN
- 4:30 1033** The influence of planting date on the occurrence of insect pest in Mississippi soybean. **Nicholas R. Bateman** (nbateman@entomology.msstate.edu)<sup>1</sup>, Angus Catchot<sup>1</sup>, Jeff Gore<sup>2</sup>, Don Cook<sup>2</sup>, Fred Musser<sup>1</sup>, and Trent Irby<sup>1</sup>, <sup>1</sup>Mississippi State Univ., Mississippi State, MS, <sup>2</sup>Mississippi State Univ., Stoneville, MS

## Graduate Student Oral Competition: Integrated Pest Management and Sustainable Agriculture: Landscape Systems

### Room W240 C (Convention Center)

**Moderators:** Von Kaster<sup>1</sup> and Rayda Krell<sup>2</sup>, <sup>1</sup>Syngenta Seeds, Slater, IA, <sup>2</sup>Rayda K. Krell, LLC, Entomological and Agricultural Communications, Ridgefield, CT

- 1:30 1022** Impact of farmscaping on stink bug density over corn. **Arun Babu** (ababu2@ncsu.edu)<sup>1</sup>, Dominic Reisig<sup>2</sup>, Wesley Everman<sup>1</sup>, Ronnie Heiniger<sup>2</sup>, and James F. Walgenbach<sup>3</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>North Carolina State Univ., Plymouth, NC, <sup>3</sup>North Carolina State Univ., Mills River, NC

- 4:45 **1034** Management of corn earworm and fall armyworm in grain sorghum. **Chris Dobbins** (cdobbins@drec.msstate.edu)<sup>1</sup>, Jeff Gore<sup>1</sup>, Angus Catchot<sup>2</sup>, Don Cook<sup>1</sup>, Fred Musser<sup>2</sup>, and Joel Moor<sup>1</sup>, <sup>1</sup>Mississippi State Univ., Stoneville, MS, <sup>2</sup>Mississippi State Univ., Mississippi State, MS
- 5:00 **1035** Improving crop pest management using qualitative data networks. **Nancy Bostick** (nbostick@uga.edu)<sup>1</sup>, Jason M. Schmidt<sup>1</sup>, C. T. Barger<sup>1</sup>, Tim Brenneman<sup>1</sup>, Albert Culbreath<sup>1</sup>, G. David Buntin<sup>2</sup>, Joseph LaForest<sup>1</sup>, and Michael Toews<sup>1</sup>, <sup>1</sup>Univ. of Georgia, Tifton, GA, <sup>2</sup>Univ. of Georgia, Griffin, GA

### Graduate Student Oral Competition: Morphology, Systematics, and Phylogeny: Flies, Lepidopterans, and Others

#### Room W240 D (Convention Center)

**Moderators:** John Leavengood<sup>1</sup> and Paul Goldstein<sup>2</sup>, <sup>1</sup>USDA - APHIS, Pharr, TX, <sup>2</sup>USDA - ARS, Washington, DC

- 1:30 **1036** Bryophyte-feeders in the midst of carnivores: Long-term association between rhagionid flies (Diptera: Rhagionidae) and liverworts. **Yume Imada** (imayume.ac@gmail.com) and Makoto Kato, Kyoto Univ., Kyoto, Japan
- 1:45 **1037** Ecological and phylogenetic diversification of multidimensional niches in predatory *Lasiopogon* robber flies (Diptera: Asilidae). **Tristan McKnight** (trismckn@umich.edu) and Lacey Knowles, Univ. of Michigan, Ann Arbor, MI
- 2:00 **1038** The *Rudolfina* problem – a Neotropical explosion of a monobasic Palaearctic genus (Diptera: Sphaeroceridae: Limosininae). **Steven Paiero** (steve.paiero@gmail.com) and Stephen Marshall, Univ. of Guelph, Guelph, ON, Canada
- 2:15 **1039** A world review of the generic and species concepts of the subtribe Criorhinina (Diptera: Syrphidae). **Kevin Moran** (kevinmoran88@comcast.net)<sup>1</sup> and Jeffrey Skevington<sup>2</sup>, <sup>1</sup>Carleton Univ., Ottawa, ON, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Ottawa, ON, Canada
- 2:30 **1040** Exploring the relationship between diet breadth and the extraordinary morphological diversity of *Acronicta* larvae through the lens of a molecular phylogeny (Lepidoptera: Noctuidae: Acronictinae). **Brigitte Zacharczenko** (brigitte.zacharczenko@uconn.edu) and David L. Wagner, Univ. of Connecticut, Storrs, CT
- 2:45 **1041** To speak or be silent: Body size affects defensive sound production in caterpillars. **Melanie Scallion** (melanie.scallion@gmail.com), Amanda Dookie, Veronica Bura, and Jayne Yack, Carleton Univ., Ottawa, ON, Canada
- 3:00 BREAK**
- 3:15 **1042** Preliminary next-gen phylogeny of *Philodoria* (Lepidoptera: Gracillariidae), the endangered leaf miners of Hawaii. **Christopher Johns** (johns.chris.a@ufl.edu), Univ. of Florida, Gainesville, FL

- 3:30 **1043** Proposed phylogeny of Noctuini (Noctuoidea: Noctuidae: Noctuinae) using four molecular markers. **Melissa S. Sisson** (melissa.sisson@und.edu), Matthew J. Flom, Janna L. Mabey, and Rebecca B. Simmons, Univ. of North Dakota, Grand Forks, ND
- 3:45 **1044** Phylogeny, evolution of lichenivory, and chemical sequestration in the lichen moth genus *Hypoprepia* (Hübner) (Lepidoptera: Erebiidae: Arctiinae: Lithosiini). **Timothy Anderson** (ander472@purdue.edu) and Jennifer Zaspel, Purdue Univ., West Lafayette, IN
- 4:00 **1045** Thinking out of (species) bounds: Phylogenetic incongruities in the butterfly genus *Speyeria* show widespread interspecific introgression. **Erin Campbell** (eocampbe@ualberta.ca) and Felix Sperling, Univ. of Alberta, Edmonton, AB, Canada
- 4:15 **1046** Anchored phylogenomics recovers a robust phylogeny of Erebiinae (Lepidoptera: Noctuoidea: Erebiidae). Jesse Breinholt, Akito Y. Kawahara, and **Nicholas Homziak** (nhomziak@ufl.edu), Univ. of Florida, Gainesville, FL
- 4:30 **1047** Phylogenomic analysis, using anchored enrichment, reveals the evolutionary history of sensory structures in emerald moths (Lepidoptera: Geometridae: Geometrinae). **David Plotkin** (dplotkin@ufl.edu) and Akito Kawahara, Univ. of Florida, Gainesville, FL

### Contributed Papers: Agricultural and Forest Entomology: Forest Insects, Pollinators, Systematics, and Remote Sensing

#### Chapin Theater (Convention Center)

**Moderators:** John Adamczyk<sup>1</sup> and Alana Pindar<sup>2</sup>, <sup>1</sup>USDA - ARS, Poplarville, MS, <sup>2</sup>Univ. of Guelph, Guelph, ON, Canada

- 1:30 **1048** Interactions between two invasive insect species co-occurring on non-native pine trees. **Mesfin Wondafrash Gossa** (mesfin.gossa@fabi.up.ac.za)<sup>1,2</sup>, Bernard Slippers<sup>1</sup>, Jeff Garnas<sup>1</sup>, and Brett Hurley<sup>1</sup>, <sup>1</sup>Univ. of Pretoria, Pretoria, South Africa, <sup>2</sup>Haramaya Univ., Dire Dawa, Ethiopia
- 1:45 **1049** Evaluation of trunk injections for the control of invasive ambrosia beetles in California avocados. **Frank J. Byrne** (frank.byrne@ucr.edu), Akif Eskalen, and Joseph G. Morse, Univ. of California, Riverside, CA
- 2:00 **1050** Detecting and quantifying the patterns and occurrence of the sixspined engraver beetle (*Ips calligraphus*) that colonize Mediterranean pines in low elevations of the Sonoran Desert in Tucson. **Peter Warren** (plwarren@cals.arizona.edu), Univ. of Arizona, Tucson, AZ
- 2:15 **1051** Oviposition height preferences and diurnal flight patterns of *Monochamus titillator* and *M. carolinensis* in the Ozark National Forest. **Jake Bodart** (jwbodart@email.uark.edu), Larry D. Galligan, and Fred M. Stephen, Univ. of Arkansas, Fayetteville, AR
- 2:30 **1052** SPLAT Verb: A semiochemical-based strategy for managing *Dendroctonus ponderosae*, the mountain pine beetle, at the individual pine and small stand level. Christopher J. Fettig<sup>1</sup>, Robert A. Progar<sup>2</sup>, Lia Spiegel<sup>2</sup>, Steve Munson<sup>3</sup>, Anna Hermosillo<sup>4</sup>, Kavita Sharma<sup>4</sup>, William Urrutia<sup>4</sup>, Rodrigo Oliveira da Silva<sup>4</sup>,



- Carmem Bernardi<sup>4</sup>, **Jonathan Rico** (jonathan.r@iscatech.com)<sup>4</sup>, Jesse Saroli<sup>4</sup>, Kim Spencer<sup>4</sup>, and Agenor Mafra-Neto<sup>4</sup>, <sup>1</sup>USDA - Forest Service, Davis, CA, <sup>2</sup>USDA - Forest Service, La Grande, OR, <sup>3</sup>USDA - Forest Service, Ogden, UT, <sup>4</sup>ISCA Technologies, Inc., Riverside, CA
- 2:45 **1053** Termites (Isoptera): Friend or foe? **Cecilia Dahlsjö** (c.dahlsjo@gmail.com)<sup>1</sup>, Thomas Bourguignon<sup>2</sup>, Jan Sobotnik<sup>1</sup>, Jana Jaklova<sup>1</sup>, Petr Stiblik<sup>1</sup>, Matej Zidek<sup>1</sup>, and Juan Wicman<sup>3</sup>, <sup>1</sup>Czech Univ. of Life Sciences, Prague, Czech Republic, <sup>2</sup>The Univ. of Sydney, Camperdown, Australia, <sup>3</sup>National Univ. of Ucayali, Pucallpa, Peru
- 3:00 **BREAK**
- 3:15 **1054** The influence and implications of row crop agriculture on the exposure of honey bees (*Apis mellifera*) to pesticides. **Scott Stewart** (sdstewart@utk.edu)<sup>1</sup>, Mohamed Alburaki<sup>1</sup>, Gus Lorenz<sup>2</sup>, Don Johnson<sup>3</sup>, Jon Zawislak<sup>4</sup>, and John Adamczyk<sup>5</sup>, <sup>1</sup>Univ. of Tennessee, Jackson, TN, <sup>2</sup>Univ. of Arkansas, Lonoke, AR, <sup>3</sup>Univ. of Arkansas, Fayetteville, AR, <sup>4</sup>Univ. of Arkansas, Little Rock, AR, <sup>5</sup>USDA - ARS, Poplarville, MS
- 3:30 **1055** Prioritizing spatial investment in pollinator conservation practices in farmland to support crop pollination and honey bee health. **Yajun Zhang** (angyeizhang@gmail.com), Jason Gibbs, Meghan Milbrath, Douglas A. Landis, and Rufus Isaacs, Michigan State Univ., East Lansing, MI
- 3:45 **1056** Foraging activity and colony development of *Bombus impatiens* on three potential surrogate plants for use in semi-field pesticide toxicity studies with bumble bees. **Angela Gradish** (agradish@uoguelph.ca)<sup>1</sup>, Cynthia Scott-Dupree<sup>1</sup>, and Chris Cutler<sup>2</sup>, <sup>1</sup>Univ. of Guelph, Guelph, ON, Canada, <sup>2</sup>Dalhousie Univ., Truro, NS, Canada
- 4:00 **1057** Native pollinators in Ontario agriculture. **Alana Pindar** (apindar@uoguelph.ca)<sup>1</sup> and Nigel E. Raine<sup>2</sup>, <sup>1</sup>Univ. of Guelph, Guelph, ON, Canada, <sup>2</sup>Royal Holloway, Univ. of London, Egham, United Kingdom
- 4:15 **1058** Molecular methods for the identification of *Autographa gamma* (Linnaeus). **Luke Tembrock** (tembrock@colostate.edu)<sup>1</sup>, Todd Gilligan<sup>2</sup>, Norman Barr<sup>3</sup>, and Roxanne Farris<sup>3</sup>, <sup>1</sup>Colorado State Univ., Fort Collins, CO, <sup>2</sup>USDA - APHIS, Fort Collins, CO, <sup>3</sup>USDA - APHIS, Edinburg, TX
- 4:30 **1059** Resolving host-parasitoid food webs in an outbreak species using high-throughput metabarcoding approach. **Stefaniya Kamenova** (stefaniya.kamenova@gmail.com)<sup>1</sup>, Veronique Martel<sup>2</sup>, Robert Johns<sup>3</sup>, Eldon Eveleigh<sup>3</sup>, and M. Alex Smith<sup>1</sup>, <sup>1</sup>Univ. of Guelph, Guelph, ON, Canada, <sup>2</sup>Natural Resources Canada, Québec City, QC, Canada, <sup>3</sup>Natural Resources Canada, Fredericton, NB, Canada
- 4:45 **1060** Molecular-based initiatives to support the identification of *Helicoverpa armigera* (Hübner) in the New World. **Todd Gilligan** (todd.m.gilligan@aphis.usda.gov)<sup>1</sup>, Luke Tembrock<sup>2</sup>, Norman Barr<sup>3</sup>, and Roxanne Farris<sup>3</sup>, <sup>1</sup>USDA - APHIS, Fort Collins, CO, <sup>2</sup>Colorado State Univ., Fort Collins, CO, <sup>3</sup>USDA - APHIS, Edinburg, TX
- 5:00 **1061** A taxonomic study of subfamilies Scardiinae and Nemapogoninae (Lepidoptera: Tineidae) from Japan. **Yohei Osada** (borbocinnara53@hotmail.com)<sup>1</sup>, Makoto Sakai<sup>2</sup>, Shin-ichi Yoshimatsu<sup>3</sup>, Guo-Hua Huang<sup>4</sup>, and Toshiya Hirowatari<sup>1</sup>, <sup>1</sup>Kyushu Univ., Fukuoka, Japan, <sup>2</sup>Kyosei-Kagaku, Ibaraki, Japan, <sup>3</sup>National Institute for Agro-Environmental Sciences, Tsukuba, Japan, <sup>4</sup>Hunan Agricultural Univ., Changsha, China
- 5:15 **1062** Enhanced early detection tools using remote sensing and GIS data fusion techniques. **Ryan Hanavan** (rhanavan@fs.fed.us)<sup>1</sup>, Bruce Cook<sup>2</sup>, Lawrence Corp<sup>3</sup>, Rich Hallett<sup>1</sup>, and Jen Pontius<sup>4</sup>, <sup>1</sup>USDA - Forest Service, Durham, NH, <sup>2</sup>National Aeronautics and Space Administration, Greenbelt, MD, <sup>3</sup>Sigma Space Corporation, Greenbelt, MD, <sup>4</sup>Univ. of Vermont, Burlington, VT

## Contributed Papers: Agricultural and Forest Entomology: Integrated Pest Management, Host-Plant Interactions, and Transgenic Crops

### Room W225 B (Convention Center)

**Moderators:** Jeremy Greene<sup>1</sup> and Jürgen Gross<sup>2</sup>, <sup>1</sup>Clemson Univ., Blackville, SC, <sup>2</sup>Julius Kühn Institute, Dossenheim, Germany

- 1:30 **1063** Location of *Helicoverpa zea* larval instars on determinate and indeterminate soybean. **Dominic Reisig** (dominic\_reisig@ncsu.edu)<sup>1</sup>, Don Cook<sup>2</sup>, Jeremy Greene<sup>3</sup>, Michael Caprio<sup>4</sup>, Fred Musser<sup>4</sup>, and Francis Reay-Jones<sup>5</sup>, <sup>1</sup>North Carolina State Univ., Plymouth, NC, <sup>2</sup>Mississippi State Univ., Stoneville, MS, <sup>3</sup>Clemson Univ., Blackville, SC, <sup>4</sup>Mississippi State Univ., Mississippi State, MS, <sup>5</sup>Clemson Univ., Florence, SC
- 1:45 **1064** Effect of planting date on populations of thrips in cotton in South Carolina. **Jeremy Greene** (greene4@clemson.edu)<sup>1</sup> and Francis Reay-Jones<sup>2</sup>, <sup>1</sup>Clemson Univ., Blackville, SC, <sup>2</sup>Clemson Univ., Florence, SC
- 2:00 **1065** Several varieties of the coconut leaf beetles *Brontispa longissima* Gestro (Coleoptera: Chrysomelidae) at North Celebes and East Java, Indonesia. **Sri Karindah** (skarindah@yahoo.com)<sup>1</sup>, Novalisa Lumentut<sup>2</sup>, Ika Indriawati<sup>1</sup>, Retno Puspitarini<sup>1</sup>, and Lilik Sulistyowati<sup>1</sup>, <sup>1</sup>Univ. of Brawijaya, Malang, Indonesia, <sup>2</sup>Indonesia Palmae Research Institute, Manado, Indonesia
- 2:15 **1066** Adaptation of the brown planthopper, *Nilaparvata lugens* (Stål), to resistant rice varieties. **Jedeliza B. Ferrater** (jferrater@irrialumni.org)<sup>1</sup>, Peter W. de Jong<sup>2</sup>, Marcel Dicke<sup>2</sup>, and Finbarr G. Horgan<sup>3</sup>, <sup>1</sup>East-West Seed Company, San Rafael, Philippines, <sup>2</sup>Wageningen Univ. and Research Centre, Wageningen, Netherlands, <sup>3</sup>International Rice Research Institute, Metro Manila, Philippines
- 2:30 **1067** Species diversity and abundance of cereal stem borer natural enemies and associated host plants in Botswana. **Reyard Mutamiswa** (reyard.mutamiswa@studentmail.biust.ac.bw) and Casper Nyamukondiwa, Botswana International Univ. of Science and Technology, Palapye, Botswana
- 2:45 **1068** Innovative control strategies for phytoplasma disease vectors by attractive and repellent allelochemicals. **Jürgen Gross** (juergen.gross@jki.bund.de)<sup>1</sup>, Jannicke Gallinger<sup>1</sup>, Margit Rid<sup>1</sup>, and Cornelia Dippel<sup>2</sup>, <sup>1</sup>Julius Kühn Institute, Dossenheim, Germany, <sup>2</sup>IS Insect Services GmbH, Berlin, Germany

## 3:00 BREAK

- 3:15 **1069** Apple orchard protection from codling moth (*Cydia pomonella*) using an attract-and-kill trap. **Benjamin Jaffe** (jaffebd@gmail.com) and Peter J. Landolt, USDA - ARS, Wapato, WA
- 3:30 **1070** Plants outside the field matter: Interactions between *Bagrada hilaris* and non-crop hosts. **Ian M. Grettenberger** (iangrett@gmail.com)<sup>1</sup>, Jhalendra Rijal<sup>2</sup>, Larry Godfrey<sup>1</sup>, and Shimat V. Joseph<sup>3</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>Univ. of California Cooperative Extension, Modesto, CA, <sup>3</sup>Univ. of California Cooperative Extension, Salinas, CA
- 3:45 **1071** Host plant resistance to sunflower insect pests in North America. **Jarrad Prasifka** (jarrad.prasifka@ars.usda.gov), USDA - ARS, Fargo, ND
- 4:00 **1072** Improve control of navel orangeworm (*Amyelois transitella*) in pistachios and almonds by increasing application efficiency, insecticide choice, and spray timing. **Joel Siegel** (joel.siegel@ars.usda.gov)<sup>1</sup>, Mark Demkovich<sup>2</sup>, and Matt Strmiska<sup>3</sup>, <sup>1</sup>USDA - ARS, Parlier, CA, <sup>2</sup>Univ. of Illinois, Champaign, IL, <sup>3</sup>Qualified Applicator Specialists, Fresno, CA
- 4:15 **1073** Dieback of cocoa (*Theobroma cacao* L.) plant tissues caused by the brown cocoa mirid, *Sahlbergella singularis* Haglund (Hemiptera: Miridae), and associated pathogenic fungi. **Joseph Anikwe** (jachuks@yahoo.com)<sup>1</sup> and Henry Otuonye<sup>2</sup>, <sup>1</sup>Univ. of Lagos, Lagos, Nigeria, <sup>2</sup>Cocoa Research Institute of Nigeria, Ibadan, Nigeria
- 4:30 **1074** Efficacy of transgenic corn hybrids producing *Bacillus thuringiensis* proteins against natural infestations of *Eoreuma loftini* (Lepidoptera: Crambidae) in Louisiana. **Julien M. Beuzelin** (jbeuzelin@agcenter.lsu.edu)<sup>1</sup>, Blake E. Wilson<sup>2</sup>, Matt T. VanWeelden<sup>3</sup>, and Allan T. Showler<sup>4</sup>, <sup>1</sup>Louisiana State Univ. AgCenter, Alexandria, LA, <sup>2</sup>Louisiana State Univ. AgCenter, Baton Rouge, LA, <sup>3</sup>Univ. of Florida, Belle Glade, FL, <sup>4</sup>USDA - ARS, Kerrville, TX
- 4:45 **1075** Tolerance response of cotton bollworm (*Helicoverpa armigera*) to Cry expressing Bt cotton. **Muhammad Asam Riaz** (asam.riaz@uos.edu.pk)<sup>1</sup>, Saba Tehseen<sup>1</sup>, Mohsin Raza<sup>1</sup>, Muhammad Usman<sup>1</sup>, Muhammad Zeeshan Majeed<sup>1</sup>, Muhammad Afzal<sup>1</sup>, and Sohail Ahmed<sup>2</sup>, <sup>1</sup>Univ. of Sargodha, Sargodha, Pakistan, <sup>2</sup>Univ. of Agriculture, Faisalabad, Pakistan
- 5:00 **1076** Effect of some local plant extracts against whitefly on Bt cotton. **Muhammad Asrar** (asraragri@gmail.com)<sup>1</sup>, Khuram Zia<sup>2</sup> and Kashif Ali<sup>1</sup>, <sup>1</sup>Government College Univ., Faisalabad, Pakistan, <sup>2</sup>Univ. of Agriculture, Faisalabad, Pakistan
- 5:15 **1077** Integrative taxonomy of SE-Asian and Oceanic tephritid fruit flies. **Mark Schutze** (m.schutze@qut.edu.au)<sup>1,2</sup>, Matthew Krosch<sup>1,2</sup>, Jane Royer<sup>2,3</sup>, Nicholas Woods<sup>2,4</sup>, Rod Turner<sup>2,4</sup>, Melanie Bottrill<sup>2,4</sup>, Bill Woods<sup>2,5</sup>, Ian Lacey<sup>2,5</sup>, Jacinta McMahon<sup>1,2</sup>, Francesca Strutt<sup>1,2</sup>, and Stephen Cameron<sup>2</sup>, <sup>1</sup>Queensland Univ. of Technology, Brisbane, Australia, <sup>2</sup>Plant Biosecurity Cooperative Research Centre, Bruce, Australia, <sup>3</sup>Queensland Dept. of Agriculture and Fisheries, Brisbane, Australia, <sup>4</sup>Plant Health Australia, Deakin, Australia, <sup>5</sup>Dept. of Agriculture and Food, South Perth, Australia

## Contributed Papers: Genetics and Evolutionary Entomology: Populations and Spatial Diversity

## Room W330 B (Convention Center)

**Moderators:** Ariel Toloza<sup>1</sup> and Olav Rueppell<sup>2</sup>, <sup>1</sup>CONICET, Villa Martelli, Argentina, <sup>2</sup>Univ. of North Carolina, Greensboro, NC

- 1:30 **1078** Diversity of sociality in the desert ant (genus *Cataglyphis*). **Tali Reiner Brodetski** (talireiner@gmail.com)<sup>1</sup>, Serge Aron<sup>2</sup>, and Abraham Hefetz<sup>1</sup>, <sup>1</sup>Tel Aviv Univ., Tel Aviv, Israel, <sup>2</sup>Free Univ. of Brussels, Brussels, Belgium
- 1:45 **1079** Identification of the geographic origin of invasive Asian gypsy moth (*Lymantria dispar asiatica* and *L. d. japonica*) using ddRAD sequencing. **Yunke Wu** (yw578@cornell.edu)<sup>1,2</sup>, John Molongoski<sup>1</sup>, David Lance<sup>1</sup>, Steven Bogdanowicz<sup>2</sup>, and Richard Harrison<sup>2</sup>, <sup>1</sup>USDA - APHIS, Buzzards Bay, MA, <sup>2</sup>Cornell Univ., Ithaca, NY
- 2:00 **1080** Population genetic structure and environmental heterogeneities of honey bee (*Apis mellifera* L.) populations in South Africa. **Amin Eimanifar** (amineimanifar@ufl.edu), Tao Zhang, and James D. Ellis, Univ. of Florida, Gainesville, FL
- 2:15 **1081** New insights into the extraordinary diversity of *Serratia symbiotica*: A tritrophic point of view. **Inès Pons Guillouard** (ines.pons@uclouvain.be), François Renoz, Valentin Pierson, Abdelmounaim Errachid, Christine Noël, and Thierry Hance, Catholic Univ. of Louvain, Louvain-la-Neuve, Belgium
- 2:30 **1082** Population genetic analysis in human head lice: Comparison between microsatellite and insecticide resistance markers. **Ariel Toloza** (atoloza@conicet.gov.ar)<sup>1</sup>, David Reed<sup>2</sup>, Maria Picollo<sup>3</sup>, and Marina Asuncion<sup>2</sup>, <sup>1</sup>CONICET, Villa Martelli, Argentina, <sup>2</sup>Univ. of Florida, Gainesville, FL, <sup>3</sup>Center of Insecticides and Pest Research, Villa Martelli, Argentina
- 2:45 **1083** Phenotypic variation and aposematic signaling in an arctiid moth (*Utetheisa ornatrix*). **Richard Gawne** (richard.gawne@duke.edu) and Fred Nijhout, Duke Univ., Durham, NC
- 3:00 BREAK
- 3:15 **1084** Mitochondrial phylogenomics and high-altitude adaptation in the New World buckeye butterflies (Genus *Junonia*). **Jeffrey Marcus** (marcus@cc.umanitoba.ca), Univ. of Manitoba, Winnipeg, MB, Canada
- 3:30 **1085** Presentation withdrawn
- 3:45 **1086** Presentation withdrawn
- 4:00 **1087** Strong community structuring of defensive heritable symbionts is shaped by context-dependent transmission rates. **Jacob Russell** (jar337@drexel.edu)<sup>1</sup>, Andrew H. Smith<sup>1</sup>, Kerry M. Oliver<sup>2</sup>, and Danielle Rock<sup>1</sup>, <sup>1</sup>Drexel Univ., Philadelphia, PA, <sup>2</sup>Univ. of Georgia, Athens, GA
- 4:15 **1088** Characterization of *Protophormia*, *Lucilia*, and *Chrysomya* species based on taxonomic and multigene approaches. **Muhammad Qureshi** (qureshienv@yahoo.com), Government College Univ., Lahore, Pakistan



- 4:30 **1089** Genetic and morphological changes underlying speciation in leaf-cutter ants. **Mauricio Bacci** (mbacci@rc.unesp.br)<sup>1</sup>, Cynara Rodovalho<sup>2</sup>, Milene Ferro<sup>3</sup>, Sérgio Kakazu<sup>3</sup>, Cintia Bezerra<sup>3</sup>, and Christian Rabeling<sup>4</sup>, <sup>1</sup>São Paulo State Univ., São Paulo, Brazil, <sup>2</sup>Oswaldo Cruz Foundation, Rio de Janeiro, Brazil, <sup>3</sup>São Paulo State Univ., Rio Claro, Brazil, <sup>4</sup>Univ. of Rochester, Rochester, NY
- 4:45 **1090** Anthropocene reversals of anophelism and malaria. **Graham White** (grahambwhite@hotmail.com), USDA - ARS, Gainesville, FL
- 5:00 **1091** Ant-fungal inter-genomic epistasis and the fitness of ants and their domesticated fungus. **Katrin Kellner** (antkatrina@gmail.com)<sup>1,2</sup>, Ulrich G. Mueller<sup>1</sup>, and Timothy A. Linksvayer<sup>3</sup>, <sup>1</sup>The Univ. of Texas, Austin, TX, <sup>2</sup>The Univ. of Texas, Tyler, TX, <sup>3</sup>Univ. of Pennsylvania, Philadelphia, PA

### Contributed Papers: Integrated Pest Management and Sustainable Agriculture: Fruits and Vegetables

#### Room W231 B (Convention Center)

**Moderators:** Linnet Gohole<sup>1</sup> and Elena Rhodes<sup>2</sup>, <sup>1</sup>Univ. of Eldoret, Eldoret, Kenya, <sup>2</sup>Univ. of Florida, Gainesville, FL

- 1:30 **1092** Ecological trends of fruit flies (Family: Tephritidae) on table grapes along multiple gradients of the Lower Orange River, Northern Cape. **Tanya Smit** (tanyasmit175@gmail.com), Schalk van der Merwe Louw, and Vaughn Swart, Univ. of the Free State, Bloemfontein, South Africa
- 1:45 **1093** Broad mite (*Polyphagotarsonemus latus*) spread, biology, and management tactics for blackberry. **Jessica LeFors** (lefors@uark.edu) and Don Johnson, Univ. of Arkansas, Fayetteville, AR
- 2:00 **1094** The agapanthus gall midge – determining biology and control of a newly described pest. **Hayley Jones** (hayleyjones@rhs.org.uk)<sup>1</sup>, Jude Bennison<sup>2</sup>, Andrew Salisbury<sup>1</sup>, Anna M. Platoni<sup>1</sup>, and Gerard R. G. Clover<sup>1</sup>, <sup>1</sup>Royal Horticultural Society, Surrey, United Kingdom, <sup>2</sup>ADAS UK, Ltd., Cambridge, United Kingdom
- 2:15 **1095** Economic injury level and economic threshold in IPM for strawberries. **Sergei Popov** (sergei\_ya\_popov@mail.ru), Russian Timiryazev State Agrarian Univ., Moscow, Russia
- 2:30 **1096** The interactive influence of *Drosophila suzukii* and *D. melanogaster* on sour rot outbreaks in grapevine. Antoine Rombaut<sup>1</sup>, Robin Guilhot<sup>1</sup>, Anne Xuéreb<sup>1</sup>, Patricia Gibert<sup>2</sup>, and **Simon Fellous** (simon.fellous@supagro.inra.fr)<sup>1</sup>, <sup>1</sup>INRA, Montferrier-sur-Lez, France, <sup>2</sup>Claude Bernard University Lyon 1, Villeurbanne, France
- 2:45 **1097** Surveys for spotted wing drosophila, *Drosophila suzukii*, in strawberries and other small fruits in Alachua Co., Florida. **Elena Rhodes** (erhodes@ufl.edu) and Oscar Liburd, Univ. of Florida, Gainesville, FL
- 3:00 BREAK**
- 3:15 **1098** Foraging ecology of the invasive spotted wing drosophila in raspberry plantings. **Kevin Rice** (ricekevinb@gmail.com) and Tracy C. Leskey, USDA - ARS, Kearneysville, WV

- 3:30 **1099** Studying specificity of aphid species in commercial strawberry fields in Atlantic Canada and identifying potential aphid vectors of viruses associated with strawberry decline. **Debra Moreau** (debra.moreau@agr.gc.ca)<sup>1</sup>, Peggy Dixon<sup>2</sup>, and Robert Footitt<sup>3</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, Kentville, NS, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, St. John's, NF, Canada, <sup>3</sup>Agriculture and Agri-Food Canada, Ottawa, ON, Canada
- 3:45 **1100** A molecular mechanism for jasmonic acid synthesis involved in whitefly-begomovirus-plant interactions. **Ping Li** (liping6434@126.com), Yue Hong, Juan-Juan Zhao, and Shu-Sheng Liu, Zhejiang Univ., Hangzhou, China
- 4:00 **1101** Pest monitoring and population models in greenhouses: A next step in biological control. Rob Moerkens<sup>1</sup>, **Vincent Sluydts** (sluydts@gmail.com)<sup>2</sup>, Els Berckmoes<sup>3</sup>, Sanne Van Gool<sup>1</sup>, Amber Tilley<sup>3</sup>, and Herwig Leirs<sup>2</sup>, <sup>1</sup>Research Center Hoogstraten, Hoogstraten, Belgium, <sup>2</sup>Univ. of Antwerp, Antwerp, Belgium, <sup>3</sup>Research Station for Vegetable Production, Sint-Katelijne-Waver, Belgium
- 4:15 **1102** Plant pearl bodies mediate trophic interactions in an okra crop system. **Akanksha Singh** (ga46jim@mytum.de)<sup>1</sup>, Veronika Mayer<sup>2</sup>, Sharon Zytynska<sup>1</sup>, and Wolfgang Weisser<sup>1</sup>, <sup>1</sup>Technical Univ., Freising, Germany, <sup>2</sup>Univ. of Vienna, Vienna, Austria
- 4:30 **1103** Recommendations for management of the swede midge, *Contarinia nasturtii*, in organic crucifer production. **Braden Evans** (bevans02@uoguelph.ca) and Rebecca Hallett, Univ. of Guelph, Guelph, ON, Canada
- 4:45 **1104** Composition and abundance of insect pests of African indigenous vegetables in western Kenya. **Linnet Gohole** (lgohole@gmail.com)<sup>1</sup>, Silvia Omasaja<sup>1</sup>, and John Stephen Yaninek<sup>2</sup>, <sup>1</sup>Univ. of Eldoret, Eldoret, Kenya, <sup>2</sup>Purdue Univ., West Lafayette, IN
- 5:00 **1105** Monitoring aphids and potato virus Y in seed and commercial potato fields in Oregon. **Sudep Bag** (sudeep.bag@oregonstate.edu)<sup>1</sup>, Silvia Rondon<sup>1</sup>, Kenneth E. Frost<sup>1</sup>, Darrin Walenta<sup>2</sup>, and Brian Charlton<sup>3</sup>, <sup>1</sup>Oregon State Univ., Hermiston, OR, <sup>2</sup>Oregon State Univ., La Grande, OR, <sup>3</sup>Oregon State Univ. Extension Service, Klamath Falls, OR

### Contributed Papers: Integrated Pest Management and Sustainable Agriculture: IPM Programs

#### Room W225 A (Convention Center)

**Moderators:** Cerruti Hooks<sup>1</sup> and Dakshina Seal<sup>2</sup>, <sup>1</sup>Univ. of Maryland, College Park, MD, <sup>2</sup>Univ. of Florida, Homestead, FL

- 1:30 **1106** Integrated pest management of the western tarnished plant bug (*Lygus hesperus*) in California strawberries. **Surendra Dara** (skdara@ucanr.edu), Univ. of California Cooperative Extension, San Luis Obispo, CA
- 1:45 **1107** Using strip tillage and living mulches to build an ecologically based pest management program. **Cerruti Hooks** (crrhooks@umd.edu), Alan Leslie, and Guihua Chen, Univ. of Maryland, College Park, MD

- 2:00 **1108** Overcoming barriers to IPM adoption in flue-cured tobacco. **Jeremy Slone** (jdslone@ncsu.edu) and Hannah Burrack, North Carolina State Univ., Raleigh, NC
- 2:15 **1109** Partnerships in extension: An argument for public and private cooperation. **Marc Fisher** (mlfisher@dow.com)<sup>1</sup>, Rayda Krell<sup>2</sup>, and Kevin Steffey<sup>1</sup>, <sup>1</sup>Dow AgroSciences, Indianapolis, IN, <sup>2</sup>Rayda K. Krell, LLC, Entomological and Agricultural Communications, Ridgefield, CT
- 2:30 **1110** The global marketplace is driving and documenting sustainable improvements in health and environmental outcomes through IPM and other best practices: Entomologists have opportunities to participate! **Thomas Green** (ipmworks@ipminstitute.org), Matthew Doyle Olson, Ariel Larson, Emily Ciesielski, Chloe Nelson, Erika Nickels, Peter Werts, Thomas Bernard, Patrick Shannon-Hughes, Daniel Skolnik, Justin Leatherwood, Natalie Kaner, Kelly Adams, and Matt Neff, IPM Institute of North America, Madison, WI
- 2:45 **1111** Alternative pest management strategies for specialty crops. **Amanda Buchanan** (alynn@msu.edu)<sup>1</sup>, Jason M. Schmidt<sup>2</sup>, Matthew Grieshop<sup>1</sup>, and Zsofia Szendrei<sup>1</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>Univ. of Georgia, Tifton, GA
- 3:00 BREAK**
- 3:15 **1112** An integrated approach for management of pepper weevil, *Anthonomus eugeni* Cano (Coleoptera: Curculionidae). **Dakshina Seal** (dseal3@ufl.edu), Mohammad Razzak, and Catherine Sabines, Univ. of Florida, Homestead, FL
- 3:30 **1113** Integrated pest management and sustainable agriculture – a moving feast of challenges for northern Australian grain/pulse industries. **Elizabeth Williams** (liz.williams@daf.qld.gov.au)<sup>1</sup>, Hugh Brier<sup>1</sup>, and Melina Miles<sup>2</sup>, <sup>1</sup>Queensland Dept. of Agriculture and Fisheries, Kingaroy, Australia, <sup>2</sup>Queensland Dept. of Agriculture and Fisheries, Toowoomba, Australia
- 3:45 **1114** *Tuta absoluta* in Belgian greenhouses: Evolution towards a season-long IPM control strategy. Els Berckmoes<sup>1</sup>, Hans Casteels<sup>2</sup>, Raf De Vis<sup>1</sup>, **Rob Moerkens** (rob.moerkens@proefcentrum.be)<sup>3</sup>, Amber Tilley<sup>1</sup>, Luc Tirry<sup>4</sup>, Veerle Van Damme<sup>4,5</sup>, and Lieve Wittemans<sup>1</sup>, <sup>1</sup>Proefstation voor de Groenteteelt, Sint-Katelijne-Waver, Belgium, <sup>2</sup>Instituut for Agricultural and Fisheries Research, Merelbeke, Belgium, <sup>3</sup>Research Center Hoogstraten, Hoogstraten, Belgium, <sup>4</sup>Ghent Univ., Ghent, Belgium, <sup>5</sup>Institute for Agricultural and Fisheries Research, Merelbeke, Belgium
- 4:00 **1115** The long and challenging road for adopting some pest management concepts in sub-Saharan countries. **Pierre Silvie** (pierre.silvie@cirad.fr), IRD/CIRAD, Montpellier, France
- 4:15 **1116** Alfalfa pest management in the irrigated desert of the southwest: Challenges and opportunities. **Ayman Mostafa** (ayman@cals.arizona.edu), Univ. of Arizona, Phoenix, AZ
- 4:30 **1117** The pest status of carob moth, *Ectomelois ceratoniae* Zeller, on citrus in South Africa: Developing an integrated pest management program. **Sean Thackeray** (sean.thacks@gmail.com)<sup>1</sup>, Wayne Kirkman<sup>1,2</sup>, Sean Moore<sup>1,2</sup>, and Martin Hill<sup>1</sup>, <sup>1</sup>Rhodes Univ., Grahamstown, South Africa, <sup>2</sup>Citrus Research International, Port Elizabeth, South Africa
- 4:45 **1118** Integrated pest management of *Oryctes monoceros*, *Rhynchophorus phoenicis*, and *Latoia viridissima* in Okomu oil palm plantation, Nigeria. **Charles Aisagbonhi** (iziegb@gmail.com)<sup>1</sup>, Billy Ghansah<sup>2</sup>, Victor Adaigbe<sup>1</sup>, Thomas Aneni<sup>1</sup>, Minister Irorere<sup>2</sup>, and Glory Ohwevwwo<sup>2</sup>, <sup>1</sup>Nigerian Institute for Oil Palm Research, Benin City, Nigeria, <sup>2</sup>Okomu Oil Palm Company, Benin City, Nigeria

# Join us at the Student Reception

TUESDAY SEPTEMBER 27 • 7:30 PM



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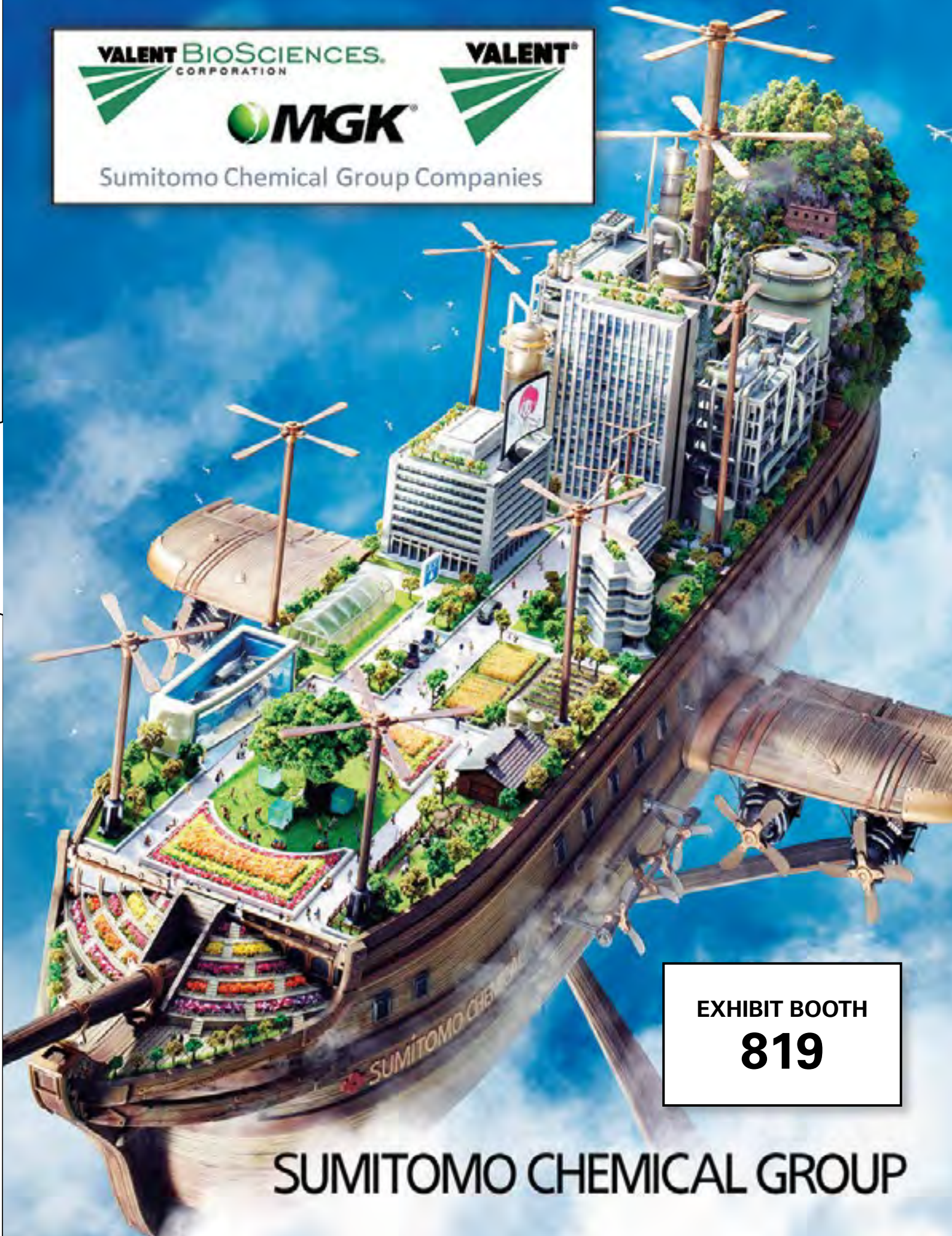


EXHIBIT BOOTH

**819**

**SUMITOMO CHEMICAL GROUP**



Tuesday, September 27, 2016 • Morning

Plenary Presentation Featuring  
Dr. Baldwin Torto

Chapin Theater (Convention Center)

**Moderators and Organizers:** Walter S. Leal<sup>1</sup>, Alvin M. Simmons<sup>2</sup>, and Catherine Loudon<sup>3</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>USDA - ARS, Charleston, SC, <sup>3</sup>Univ. of California, Irvine, CA

- 8:00 **1119** Introduction of the Plenary Speaker. **Catherine Loudon** (cloudon@uci.edu), Univ. of California, Irvine, CA
- 8:05 **1120** Rift Valley Fever in East Africa: Three frontiers, one purpose. **Baldwyn Torto** (btorto@icipe.org), International Centre of Insect Physiology and Ecology, Nairobi, Kenya

Plenary Presentation Featuring  
Dr. Carolina Barillas-Mury

Valencia Room (Convention Center)

**Moderators and Organizers:** Walter S. Leal<sup>1</sup>, Alvin M. Simmons<sup>2</sup>, and Anthony James<sup>3</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>USDA - ARS, Charleston, SC, <sup>3</sup>Univ. of California, Irvine, CA

- 8:00 **1121** Introduction of the Plenary Speaker. **Anthony James** (aajames@uci.edu), Univ. of California, Irvine, CA
- 8:05 **1122** Mosquito immunity and the invisible parasite: Implications for global malaria transmission. **Carolina Barillas-Mury** (cbarillas@niaid.nih.gov), National Institutes of Health, Bethesda, MD

Undergraduate Student Poster Competition:  
Medical and Veterinary Entomology

West Hall C (Convention Center)

- D3266** Dissemination of *Ehrlichia chaffeensis* using an artificial membrane feeding system. **Paige Allen** (paige.allen@eagles.usm.edu)<sup>1</sup>, Tais Saito<sup>2</sup>, Rebekah Bullard<sup>1</sup>, Jaclyn Williams<sup>1</sup>, and Shahid Karim<sup>1</sup>, <sup>1</sup>Univ. of Southern Mississippi, Hattiesburg, MS, <sup>2</sup>The Univ. of Texas, Galveston, TX
- D3267** Zoonotic diseases in dengue negative samples from Nuevo Leon State, Mexico. **Martha Lopez** (martha\_a\_a@hotmail.com), Iram Rodriguez, Adriana Flores, Zinnia Molina-Garza, and Gutsavo Ponce-Garcia, Autonomus Univ. of Nuevo León, San Nicolas de los Garza, Mexico
- D3268** Presentation withdrawn
- D3269** Epigenetic effects in the African malaria mosquito *Anopheles coluzzii*. **Kerry Maguschak** (mkerry14@vt.edu), Atashi Sharma and Igor Sharakhov, Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- D3270** Zika virus infection and dissemination within South Texas mosquito vectors. **Brenda Hernandez Barron** (brenda.hernandezbarron01@utrgv.edu), John Thomas, and Christopher Vitek, The Univ. of Texas, Edinburg, TX

- D3271** Report of chikungunya virus in wild populations of *Aedes aegypti* L. from San Marcos, Guerrero, Mexico. **Iram Rodriguez** (iramrodriguez@gmail.com)<sup>1</sup>, Martha Lopez<sup>1</sup>, Adriana Flores<sup>1</sup>, Felipe Dzul<sup>2</sup>, and Gutsavo Ponce-Garcia<sup>1</sup>, <sup>1</sup>Autonomus Univ. of Nuevo León, San Nicolas de los Garza, Mexico, <sup>2</sup>Secretary of Health of Guerrero, Acapulco, Mexico
- D3272** Effect of wound depth on decomposition rate and species composition of carrion-feeding Diptera. **Holly Munro** (hlmunr8021@ung.edu), Melissa Parks, and Evan Lampert, Univ. of North Georgia, Oakwood, GA
- D3273** Flesh-eating beetle (*Dermestes maculatus*) life history traits depend on meat type and rotting duration. **Stephanie Olson** (solson\_01@arcadia.edu), Karen Scott, and Tobias Landberg, Arcadia Univ., Glenside, PA
- D3274** Effects of decomposition of carrion on surrounding arthropod populations and soil nutrient content. **Samantha Sawyer** (s1sawyer@student.bridgew.edu) and Christopher Bloch, Bridgewater State Univ., Bridgewater, MA
- D3275** Expression and dsRNA knockdown of aquaporins AaAQP3a and AaAQP3b in the Malpighian tubules of the larval disease vector, *Aedes aegypti*. **Lidiya Misyura** (lidiyam@my.yorku.ca) and Andrew Donini, York Univ., Toronto, ON, Canada
- D3276** Diapause regulation in the flesh fly (*Sarcophaga bullata*) by histone acetylase transferases and histone deacetylases. **Robin Bautista Jimenez** (bautista-jimenez.1@osu.edu), Julie Reynolds, and David L. Denlinger, The Ohio State Univ., Columbus, OH
- D3277** SkitoSnack: The development of an artificial blood meal replacement for mosquito culture. **Hae-Na Chung** (ichung@nmsu.edu), Stacy D. Rodriguez, Kristina Gonzales, and Immo Hansen, New Mexico State Univ., Las Cruces, NM

Undergraduate Student Poster Competition:  
Morphology, Systematics, and Phylogeny

West Hall C (Convention Center)

- D3278** Preliminary analysis on the dispersal route of *Tabanus bromius* L., 1758 (Diptera: Tabanidae) in Turkey. **Sumeyra Sanal Demirci** (sumeyrasanal@gmail.com)<sup>1</sup>, Ali Kilic<sup>1</sup>, and Serap Mutun<sup>2</sup>, <sup>1</sup>Anadolu Univ., Eskisehir, Turkey, <sup>2</sup>Abant Izzet Baysal Univ., Bolu, Turkey
- D3279** Investigating cryptic species of *Chlorochroa uhleri* Stål (Hemiptera: Pentatomidae), a green stink bug. **Ryan Torres** (rtorres28@ucmerced.edu)<sup>1</sup>, Bradley Higbee<sup>2</sup>, and Andrea Joyce<sup>1</sup>, <sup>1</sup>Univ. of California, Merced, CA, <sup>2</sup>Wonderful Orchards, Shafter, CA
- D3280** Biogeographical and phylogenetic relationships among the South American Acanthosomatidae: A first approach. **Mariom Carvajal** (mariom.carvajal@gmail.com), Eduardo Faundez, and David Rider, North Dakota State Univ., Fargo, ND



TUESDAY

# ANNOUNCING

## INSECT SYSTEMATICS AND DIVERSITY



**ESA's newest  
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publication  
in 2017!**

**Dr. Sydney A. Cameron and Dr. James B. Whitfield from the University of Illinois will serve as co-editors-in-chief.**

ISD will publish original research on systematics, evolution, and biodiversity of insects and related arthropods. The journal will welcome integrative studies incorporating comparative and functional morphology, conservation, behavior, taxonomy, molecular phylogenetics, paleobiology, natural history, and articles that utilize novel technologies or data types or describe emerging methods of research. It will be online-only, enabling publication of papers in a variety of lengths, from short communications, to reviews of current topics, to revisions of up to 200 pages.

**ESA members are exempt from page charges.**

- D3281** Recent origin and expansion of the Neotropical ant *Neoponera villosa* (Formicidae: Ponerinae). **Marilyn Mendoza** (tzutujam@gmail.com)<sup>1</sup>, Chantal Poteaux<sup>2</sup>, Andrea Jiménez<sup>1</sup>, and Alejandro Zaldivar-Riverón<sup>1</sup>, <sup>1</sup>National Autonomous Univ. of México, México, Mexico, <sup>2</sup>Univ. of Paris 13, Villetaneuse, France
- D3282** Comparison of a molecular and morphological phylogeny in the quill mite family Syringophilidae. **Suzanne Pinar** (spinar@mail.sfsu.edu) and Greg Spicer, San Francisco State Univ., San Francisco, CA
- D3283** Phylogeography of *Ligia* isopods in South Africa. **Taylor Greenan** (taylogreenan@gmail.com) and Carlos Santamaria, Univ. of South Florida, Sarasota, FL
- D3284** *Tylos* isopods in the Indo-Pacific: Are there any cryptic species? **Bryn Austin** (brynaustin@mail.usf.edu) and Carlos Santamaria, Univ. of South Florida, Sarasota, FL
- D3285** Cryptic biodiversity of *Ligia* isopods in Vanuatu, a remote archipelago in the Pacific. **Sharla Rafferty** (srafferty@mail.usf.edu) and Carlos Santamaria, Univ. of South Florida, Sarasota, FL
- D3286** Syrphidae composition and seasonal abundance at mid-elevation site in Utah. **Tyson Terry** (tysonjerry@gmail.com) and C. Riley Nelson, Brigham Young Univ., Provo, UT

### Graduate Student Poster Competition: Acarology and Stored Products

#### West Hall C (Convention Center)

- D3287** Mechanisms of resistance to mite growth regulators in the twospotted spider mite, *Tetranychus urticae*. **Adekunle Adesanya** (adekunle.adesanya@wsu.edu)<sup>1</sup>, Fang (Rose) Zhu<sup>1</sup>, Douglas Walsh<sup>2</sup>, and Laura C. Lavine<sup>1</sup>, <sup>1</sup>Washington State Univ., Pullman, WA, <sup>2</sup>Washington State Univ., Prosser, WA
- D3288** Temperature-dependent development of *Amblyseius eharai* (Acari: Phytoseiidae). **Young-gyun Park** (insect1141@snu.ac.kr) and Joon-Ho Lee, Seoul National Univ., Seoul, South Korea
- D3289** In silico genome directed investigation of the *Dermatophagoides pteronyssinus* proteomic response to desiccation. **Rose Waldron** (waldronroses@gmail.com)<sup>1,2,3</sup>, Natasha Gordon<sup>2</sup>, Sean Doyle<sup>1</sup>, and David Fitzpatrick<sup>1</sup>, <sup>1</sup>Maynooth Univ., Kildare, Ireland, <sup>2</sup>Airmid Healthgroup, Ltd., Dublin, Ireland, <sup>3</sup>The Irish Research Council, Dublin, Ireland
- D3290** Assessment of wheat curl mite virulence to wheat genotypes and distribution of mite-vector viruses in the north central United States. **Luaay Khalaf** (luaay\_kalani@yahoo.com)<sup>1</sup>, Wen-Po Chuang<sup>2</sup>, Lina Aguirre-Rojas<sup>1</sup>, Alicia Timm<sup>3</sup>, and C. Michael Smith<sup>1</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>National Taiwan Univ., Taipei, Taiwan, <sup>3</sup>Univ. of Cincinnati, Cincinnati, OH
- D3291** Development and validation of sequential sampling plans for the ham mite, *Tyrophagus putrescentiae* (Shrank) (Acari: Acaridae), on dry-cured ham. **Barbara Amoah** (bamoah@ksu.edu)<sup>1</sup>, Subramanyam Bhadriraju<sup>1</sup>, David Hagstrum<sup>1</sup>, M. Wes Schilling<sup>2</sup>, and Thomas Phillips<sup>1</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>Mississippi State Univ., Mississippi State, MS

- D3292** Survival of stored-product psocids (Psocoptera: Liposcelididae) at 43% relative humidity. **Abena Ocran** (abena.ocran@okstate.edu), George Opit, Kandara Shakya, and Sandipa G. Gautam, Oklahoma State Univ., Stillwater, OK
- D3293** Presentation withdrawn
- D3294** Efficacy of the deltamethrin-incorporated ZeroFly<sup>®</sup> storage bag against stored-product insects. **Sulochana Paudyal** (sulochana.paudyal@okstate.edu)<sup>1</sup>, George Opit<sup>1</sup>, Enoch A. Osekre<sup>2</sup>, Naomi Manu<sup>3</sup>, James Danso<sup>3</sup>, and Kandara Shakya<sup>1</sup>, <sup>1</sup>Oklahoma State Univ., Stillwater, OK, <sup>2</sup>Kwame Nkrumah Univ. of Science and Technology, Kumasi, Ghana, <sup>3</sup>Northern Arizona Univ., Kumasi, Ghana

### Graduate Student Poster Competition: Arthropod Vectors of Animal and Plant Disease

#### West Hall C (Convention Center)

- D3295** Environmental and socioeconomic factors associated with human cases of West Nile virus. **Eunis Hernandez** (ehernandez83@ucmerced.edu), Karen Cedano, and Andrea Joyce, Univ. of California, Merced, CA
- D3296** How does hybridisation influence life-history parameters and dispersal in *Culex pipiens* mosquitoes? Simon Carpenter<sup>1</sup>, Christopher Sanders<sup>1</sup>, Mary Cameron<sup>2</sup>, Anthony Wilson<sup>1</sup>, and **Christopher Gamble** (chris.gamble@pirbright.ac.uk)<sup>1,2</sup>, <sup>1</sup>The Pirbright Institute, Woking, United Kingdom, <sup>2</sup>London School of Hygiene and Tropical Medicine, London, United Kingdom
- D3297** Species composition and insecticide susceptibility of malaria vectors in two regions in Mauritania. **Mohamed Aly Ould Lemrabott** (mohamedalylemrabott@yahoo.fr)<sup>1</sup>, Aichetou Mint Mohamed Lemine<sup>1,2</sup>, Mohamed Salem Ould Ahmedou Salem<sup>3</sup>, Khadijetou Mint Lekweiry<sup>3</sup>, Khyarhoum Ould Brahim<sup>1</sup>, Mohamed Ouldabdallahi<sup>1</sup>, Leonardo Basco<sup>4</sup>, Hervé Boegreau<sup>5</sup>, Ousmane Faye<sup>2</sup>, Frédéric Simard<sup>6</sup>, Ali Ould Mohamed Salem Boukhary<sup>3</sup>, and Driss Belghyti<sup>7</sup>, <sup>1</sup>Genomes Unit of Research and Media, Nouakchott, Mauritania, <sup>2</sup>Univ. Cheikh Anta Diop, Dakar, Senegal, <sup>3</sup>Univ. of Science and Medical Technology, Nouakchott, Mauritania, <sup>4</sup>Reserch Institute for Development, Marseille, France, <sup>5</sup>Institute of Army Biomedical Research, Paris, France, <sup>6</sup>Research Institute for Development, Montpellier, France, <sup>7</sup>Univ. Ibn Tofail, Kénitra, Morocco
- D3298** Potential vectors of heartworm (*Dirofilaria immitis*) in Arkansas and development of models to predict seasonal transmission for high risk states in the U.S. **Sofija Todorovic** (sofija.todorovi@smail.astate.edu) and Tanja McKay, Arkansas State Univ., Jonesboro, AR
- D3299** Presentation withdrawn
- D3300** What is 'fitness'? Defining fitness and appropriate proxies for mosquitoes that transmit human malaria. **Johanna Ohm** (Jro182@psu.edu)<sup>1</sup>, Lauren Cator<sup>2</sup>, William Nelson<sup>3</sup>, Andrew Read<sup>1</sup>, and Matthew B. Thomas<sup>1</sup>, <sup>1</sup>Pennsylvania State Univ., University Park, PA, <sup>2</sup>Imperial College London, London, United Kingdom, <sup>3</sup>Queen's Univ., Kingston, ON, Canada



- D3301** The Hydra Effect: Controlling mosquito populations as a labor of Hercules, overcompensatory response to additional mortality as an effect of behavioral change. **Kristina McIntire** (kmmcint@ilstu.edu) and Steven Juliano, Illinois State Univ., Normal, IL
- D3302** Ecology and coexistence of *Anopheles* larvae in aquatic habitats in Mazandaran Province, northern Iran. **Seyed Hassan Nikookar** (nikookar\_84@yahoo.com), Ahmadali Enayati, Mahmoud Fazeli-Dinan, and Seyyed Payman Ziapour, Mazandaran Univ. of Medical Sciences, Sari, Iran
- D3303** Visualisation and quantification of bluetongue virus in *Culicoides* biting midges. **Alice Muntzer** (alice.muntzer@pirbright.ac.uk)<sup>1</sup>, Andrew Shaw<sup>2</sup>, Gillian Pullinger<sup>1</sup>, Peter Mertens<sup>1</sup>, Pippa Hawes<sup>1</sup>, Massimo Palmarini<sup>2</sup>, and Anthony Wilson<sup>1</sup>, <sup>1</sup>The Pirbright Institute, Woking, United Kingdom, <sup>2</sup>Univ. of Glasgow, Glasgow, United Kingdom
- D3304** Approaches to controlling *Culicoides* biting midges in the United Kingdom using vector-proof housing and immunological approaches targeting salivary proteins. **Laura Tugwell** (laura.tugwell@pirbright.ac.uk)<sup>1,2</sup>, Alison Blackwell<sup>3</sup>, Maria Montoya<sup>1</sup>, Karin Darpe<sup>1,2</sup>, and Simon Carpenter<sup>1</sup>, <sup>1</sup>The Pirbright Institute, Woking, United Kingdom, <sup>2</sup>Univ. of Surrey, Guildford, United Kingdom, <sup>3</sup>APS Biocontrol, Ltd., Dundee, United Kingdom
- D3305** Black fly species (Diptera: Simuliidae) occurring in Mississippi. **Tina Nations** (tina.nations@msdh.ms.gov) and Jerome Goddard, Mississippi State Univ., Mississippi State, MS

### Graduate Student Poster Competition: Insect Immunology

#### West Hall C (Convention Center)

- D3306** Characterization of virulence factors in the fatal honey bee disease American foulbrood. **Julia Ebeling** (julia.ebeling@hu-berlin.de)<sup>1</sup>, Daniel Krska<sup>2</sup>, Ravikiran Ravulapalli<sup>2</sup>, Lena Poppinga<sup>1</sup>, Anne Fünfhaus<sup>1</sup>, A. Rod Merrill<sup>2</sup>, and Elke Genersch<sup>1</sup>, <sup>1</sup>Institute for Bee Research, Hohen Neuendorf, Germany, <sup>2</sup>Univ. of Guelph, Guelph, ON, Canada
- D3307** Functional characterization of *Manduca sexta* peptidoglycan recognition protein-5. **Mansi Gulati** (mansi.gulati@okstate.edu), Yang Wang, and Haobo Jiang, Oklahoma State Univ., Stillwater, OK
- D3308** The *Xenorhabdus nematophila* serine protease inhibitor ecotin is necessary for virulence in lepidopteran larvae. **Ángel Casanova-Torres** (amcasanova@wisc.edu) and Heidi Goodrich-Blair, Univ. of Wisconsin, Madison, WI
- D3309** The immune gene expression and pyrethroid resistance in house flies, *Musca domestica*. **Zhou Chen** (zcc0012@auburn.edu) and Nannan Liu, Auburn Univ., Auburn, AL
- D3310** Evolution of immune priming favored by the low cost of the secondary immune response in the mealworm beetle, *Tenebrio molitor*. **Julien Dhinaut** (julien.dhinaut@u-bourgogne.fr), Manon Chogne, and Yannick Moret, Univ. of Bourgogne, Dijon, France

- D3311** Characterization of hemolymph protease-1 and its function in the phenoloxidase cascade in tobacco hornworm, *Manduca sexta*. **Yan He** (yanhe@okstate.edu), Haobo Jiang, Fan Yang, and Yang Wang, Oklahoma State Univ., Stillwater, OK
- D3312** Functions of stress responsive peptides and their activation in *Anopheles gambiae*. **Krishna Bhattarai** (krishna.bhattarai@okstate.edu), Xiaolong Cao, and Haobo Jiang, Oklahoma State Univ., Stillwater, OK
- D3313** Host plant effects on buckeye (*Junonia coenia*) survival and immunity during infection with the *Junonia coenia* densovirus. **Carmen Mo** (carmen@nevada.unr.edu)<sup>1</sup>, M. Deane Bowers<sup>2</sup>, Peri Mason<sup>2</sup>, Mike Teglas<sup>1</sup>, Jennifer Hsueh<sup>1</sup>, Craig Dodson<sup>1</sup>, and Angela Smilanich<sup>1</sup>, <sup>1</sup>Univ. of Nevada, Reno, NV, <sup>2</sup>Univ. of Colorado, Boulder, CO
- D3314** Pathogen and parasitoid loads in wild populations of Baltimore checkerspot (*Euphydryas phaeton*) vary depending on host plant availability. **Nadya Muchoney** (nmuchoney@nevada.unr.edu)<sup>1</sup>, Angela Smilanich<sup>1</sup>, Peri Mason<sup>2</sup>, Mike Teglas<sup>1</sup>, Jennifer Hsueh<sup>1</sup>, Samantha Feeny<sup>1</sup>, and M. Deane Bowers<sup>2</sup>, <sup>1</sup>Univ. of Nevada, Reno, NV, <sup>2</sup>Univ. of Colorado, Boulder, CO
- D3315** Input neuronal pathways for photoperiodism in the bean bug, *Riptortus pedestris*. **Jili Xi** (xijier1001@gmail.com) and Sakiko Shiga, Osaka City Univ., Osaka, Japan
- D3316** The molecular cross-talk in a unique parasitic manipulation strategy. **Maayan Kaiser** (kaiserm@post.bgu.ac.il)<sup>1</sup>, Ryan Arvidson<sup>2</sup>, Michael E. Adams<sup>2</sup>, and Frederic Libersat<sup>1</sup>, <sup>1</sup>Ben-Gurion Univ. of the Negev, Beersheva, Israel, <sup>2</sup>Univ. of California, Riverside, CA

### Graduate Student Poster Competition: Integrated Pest Management and Sustainable Agriculture: Management Tactics

#### West Hall C (Convention Center)

- D3317** Landscape effects on flea beetles and their natural enemies in the Canadian Prairies. **Thais Silva Guimaraes** (silvagtf@myumanitoba.ca)<sup>1</sup>, Tharshinidevy Nagalingam<sup>1</sup>, Jennifer Otani<sup>2</sup>, Héctor A. Cárcamo<sup>3</sup>, Tyler Wist<sup>4</sup>, John Gavloski<sup>5</sup>, and Alejandro Costamagna<sup>1</sup>, <sup>1</sup>Univ. of Manitoba, Winnipeg, MB, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Beaverlodge, AB, Canada, <sup>3</sup>Agriculture and Agri-Food Canada, Lethbridge, AB, Canada, <sup>4</sup>Agriculture and Agri-Food Canada, Saskatoon, SK, Canada, <sup>5</sup>Manitoba Agriculture, Food and Rural Initiatives, Carman, MB, Canada
- D3318** Plant species diversity facilitates behavioral interactions that lead to enhanced herbivore suppression. **Kathryn Ingerslew** (ksiggc@mail.missouri.edu) and Debbie Finke, Univ. of Missouri, Columbia, MO
- D3319** *Melittia cucurbitae* (squash vine borer) attraction to zucchini as a trap crop. **Mike McFarland** (mcfarland.447@osu.edu) and Celeste Welty, The Ohio State Univ., Columbus, OH
- D3320** Attractiveness of seven insectary plants to natural enemies of insect pests in a vegetable cropping system. **Binita Shrestha** (bswc2@mail.missouri.edu)<sup>1</sup>, Debbie Finke<sup>1</sup>, and Jaime Pinero<sup>2</sup>, <sup>1</sup>Univ. of Missouri, Columbia, MO, <sup>2</sup>Lincoln Univ., Jefferson City, MO



- D3321** Incidence of red maple tree insect pests in cover crop and non-cover crop production plots. **Sujan Dawadi** (dawadisujan01@gmail.com)<sup>1</sup>, Karla Adesso<sup>2</sup>, Jason B. Oliver<sup>2</sup>, and Manoj Pandey<sup>1</sup>, <sup>1</sup>Tennessee State Univ., Nashville, TN, <sup>2</sup>Tennessee State Univ., McMinnville, TN
- D3322** Plant growth promoting rhizobacteria treatment reduce oviposition by European corn borer on maize. **Joseph Disi** (jod0003@auburn.edu)<sup>1</sup>, Simon Zebelo<sup>2</sup>, Joseph Kloepper<sup>1</sup>, and Henry Fadamiro<sup>1</sup>, <sup>1</sup>Auburn Univ., Auburn, AL, <sup>2</sup>Univ. of Maryland, Princess Anne, MD
- D3323** The effect of plant hormone treatment of seeds on whole-plant tolerance to insects. **Mengqi Zhang** (zhangmengqi614@gmail.com)<sup>1</sup>, Phyllis Weintraub<sup>2</sup>, Joshua Klein<sup>3</sup>, and Shimon Rachmilevitch<sup>1</sup>, <sup>1</sup>Ben-Gurion Univ. of the Negev, Sede Boker, Israel, <sup>2</sup>Agricultural Research Organisation, Gilat, Israel, <sup>3</sup>Agricultural Research Organisation, Bet-Dagan, Israel
- D3324** Presentation withdrawn
- D3325** Volatiles of *Murraya koenigii* involved on the process of the host selection behavior of the psyllid *Diaphorina citri* Kuwayama (Hemiptera: Liviidae). **Vitor Beloti** (vitorbeloti@usp.br), Franciele dos Santos, Gustavo Alves, José Mauricio Bento, and Pedro Yamamoto, Univ. of São Paulo, Piracicaba, Brazil
- D3326** Oil and soap for armored and soft scales: Pathway to success or slippery slope toward failure? **Carlos Quesada** (cquesand@purdue.edu) and Clifford Sadof, Purdue Univ., West Lafayette, IN
- D3332** Lack of fitness costs associated with *Bacillus thuringiensis* Cry2Ab2 resistance in the fall armyworm, *Spodoptera frugiperda* (J.E. Smith). **Binod Acharya** (bacharya@agcenter.lsu.edu)<sup>1</sup>, Graham P. Head<sup>2</sup>, Paula A. Price<sup>2</sup>, and Fangneng Huang<sup>1</sup>, <sup>1</sup>Louisiana State Univ., Baton Rouge, LA, <sup>2</sup>Monsanto Company, St. Louis, MO
- D3333** Transcriptome assembly and differential analysis of resistant and susceptible western corn rootworm, *Diabrotica virgifera virgifera* LeConte, responses to eCry3.1Ab transgenic corn. **Zixiao Zhao** (zxzhao5@gmail.com)<sup>1</sup>, Lisa Meihls<sup>2</sup>, Kent S. Shelby<sup>2</sup>, Christine Elsik<sup>1</sup>, Thomas A. Coudron<sup>2</sup>, and Bruce Hibbard<sup>2</sup>, <sup>1</sup>Univ. of Missouri, Columbia, MO, <sup>2</sup>USDA - ARS, Columbia, MO
- D3334** Efficacy of insecticides for control of brown marmorated stink bug (*Halyomorpha halys* Stål) nymphs in Ontario. **Kaelyn Hunter** (khunter@mail.uoguelph.ca)<sup>1</sup>, Angela Gradish<sup>1</sup>, Hannah Fraser<sup>2</sup>, Tara Gariepy<sup>3</sup>, and Cynthia Scott-Dupree<sup>1</sup>, <sup>1</sup>Univ. of Guelph, Guelph, ON, Canada, <sup>2</sup>Ontario Ministry of Agriculture, Food and Rural Affairs, Vineland, ON, Canada, <sup>3</sup>Agriculture and Agri-Food Canada, London, ON, Canada
- D3335** Differential susceptibility of *Riptortus pedestris* (Hemiptera: Alydidae) and its two egg parasitoids to flonicamid. **Naresh Dangi** (frennaresh1@gmail.com) and Un Taek Lim, Andong National Univ., Andong, South Korea
- D3336** Determinants of host use in tachinid parasitoids of stink bugs. **Matthew Duncan** (duncan.89@wright.edu) and John O. Stireman III, Wright State Univ., Dayton, OH
- D3337** Diamide resistance conferred by target-site mutations in the ryanodine receptor of *Plutella xylostella*. **Ewan Richardson** (ewan.richardson@rothamsted.ac.uk)<sup>1</sup>, Bartek Troczka<sup>1</sup>, T.G. Emyr Davies<sup>1</sup>, Martin Williamson<sup>1</sup>, Christopher George<sup>2</sup>, Alan Williams<sup>2</sup>, Melanie Scharwey<sup>3</sup>, and Ralf Nauen<sup>3</sup>, <sup>1</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>2</sup>Cardiff Univ., Cardiff, United Kingdom, <sup>3</sup>Bayer CropScience, Monheim, Germany

### Graduate Student Poster Competition: Integrated Pest Management and Sustainable Agriculture: Pest Physiology

#### West Hall C (Convention Center)

- D3327** Expression of *Rorippa indica* defensin in *Brassica juncea* enhances tolerance against *Lipaphis erysimi*. **Poulami Sarkar** (poulamisarkarbt@gmail.com) and Samir Sikdar, Bose Institute, Kolkata, India
- D3328** Effect of temperature on growth and development of sugarcane aphid on sorghum. **Philip Hinson** (philison2@gmail.com) and Bonnie Pendleton, West Texas A&M Univ., Canyon, TX
- D3329** How orchard soil, nutrition, natural enemies, management, and grower perceptions relate to woolly apple aphid (*Eriosoma lanigerum*) problems. **Robert Orpet** (robert.orpet@wsu.edu)<sup>1</sup>, Elizabeth H. Beers<sup>1</sup>, John Reganold<sup>2</sup>, Jessica Goldberger<sup>2</sup>, Vincent Jones<sup>1</sup>, and David Crowder<sup>2</sup>, <sup>1</sup>Washington State Univ., Wenatchee, WA, <sup>2</sup>Washington State Univ., Pullman, WA
- D3330** Detecting corn rootworm (*Diabrotica* spp.) resistance development to Bt-RW traits: Root injury vs. beetle emergence. **Edwin Benkert** (benke017@umn.edu), Trisha Leaf, and Ken Ostlie, Univ. of Minnesota, St. Paul, MN
- D3331** Dominance of Cry1-resistant fall armyworm in different planting patterns of non-Bt and Bt corn. **Ying Niu** (yniu@agcenter.lsu.edu), Binod Acharya, and Fangneng Huang, Louisiana State Univ., Baton Rouge, LA

### Graduate Student Poster Competition: Medical and Veterinary Entomology

#### West Hall C (Convention Center)

- D3338** A survey of the relative abundance of mosquitoes in their preferred breeding microhabitats of refuse dumps in Owerri, Imo state, Nigeria. **Chidinma Ikpeama** (chidinmaikpeama2015@gmail.com), Imo State Univ., Owerri, Nigeria
- D3339** How different detritus types and access to detritus affect performance and nutrient stoichiometry of *Aedes albopictus* and *Culex quinquefasciatus*. **James Deerman** (james.deerman@eagles.usm.edu) and Donald Yee, Univ. of Southern Mississippi, Hattiesburg, MS
- D3340** Molecular detection for zoonotic bacteria from ticks (Acari: Ixodidae) in Georgia, USA. **Sarah Duong** (sd03094@georgiasouthern.edu) and Quentin Q. Fang, Georgia Southern Univ., Statesboro, GA



- D3341** Relationship between ixodid tick fauna and its host animals in Kanagawa Prefecture, Japan, evaluated by reverse line blot assay. **Tomomi Sato** (entomol@meiji.ac.jp)<sup>1</sup>, Haruhiko Isawa<sup>2</sup>, Ryosuke Fujita<sup>2,3</sup>, Kentaro Itokawa<sup>2,3</sup>, Toshihiko Hayashi<sup>2</sup>, Takeo Yamauchi<sup>4</sup>, Mamoru Watanabe<sup>2</sup>, Kyo Itoyama<sup>1</sup>, and Kyoko Sawabe<sup>2</sup>, <sup>1</sup>Meiji Univ., Kanagawa, Japan, <sup>2</sup>National Institute of Infectious Diseases, Tokyo, Japan, <sup>3</sup>Japan Agency for Medical Research and Development, Tokyo, Japan, <sup>4</sup>Univ. of Hyogo, Hyogo, Japan
- D3342** *Rickettsia parkeri* modulates tick superoxide dismutases to survive within the tick vector. **Gary Crispell** (gary.crispell@eagles.usm.edu), Khemraj Budachetri, and Shahid Karim, Univ. of Southern Mississippi, Hattiesburg, MS
- D3343** Investigation of pathogen prevalence and ecological determinants of questing density among lone star ticks in east-central Alabama. **Xiaodi Wang** (xzw0039@tigermail.auburn.edu) and Derrick Mathias, Auburn Univ., Auburn, AL
- D3344** Procurement and persistence of GFP-expressing *Escherichia coli* and *Salmonella typhimurium* in male and female house flies exposed to cattle manure. **Jessica Thomson** (jessiel@ksu.edu)<sup>1</sup>, Ludek Zurek<sup>1</sup>, and Dana Nayduch<sup>2</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>USDA - ARS, Manhattan, KS
- D3345** Investigation of correlation between German cockroach (*Blattella germanica*) and medically important pathogens in urban area. **Xueyang Fan** (xf24@njit.edu), New Jersey Institute of Technology, Newark, NJ

### Graduate Student Poster Competition: Morphology, Systematics, and Phylogeny: Flies, Hemiptera, and Lepidoptera

#### West Hall C (Convention Center)

- D3346** Molecular systematics and new species of nearctic *Androprosopa* Mik (Diptera: Thaumaleidae). **Robert J. Pivar** (rpivar@vols.utk.edu)<sup>1</sup>, John Moulton<sup>1</sup>, and Bradley Sinclair<sup>2</sup>, <sup>1</sup>Univ. of Tennessee, Knoxville, TN, <sup>2</sup>Canadian Food Inspection Agency, Ottawa, ON, Canada
- D3347** Systematic and taxonomic revision of Scandinavian Empidoidea (Insecta: Diptera), with emphasis on the Swedish diversity of Empididae and Hybotidae. **Emma Wahlberg** (emma.wahlberg@nrm.se)<sup>1,2</sup>, <sup>1</sup>Swedish Museum of Natural History, Stockholm, Sweden, <sup>2</sup>Univ. of Stockholm, Stockholm, Sweden
- D3348** Flies that don't fly: The impact of the *wingless* mutation *wg*' on the thorax morphology of *Drosophila melanogaster*. **Benjamin Fabian** (benjamin.fabian@uni-jena.de) and Katharina Schneeberg, Friedrich Schiller Univ., Jena, Germany
- D3349** Molecular phylogenetics of North American *Rhagoletis* (Diptera: Tephritidae): Monophyly and species group relationships of nearctic taxa. **Daniel Hulbert** (hulbertd@msu.edu) and James Smith, Michigan State Univ., East Lansing, MI

- D3350** Comparative genome analysis of sap-feeding insects of the order Hemiptera. **Rebecca Corkill** (rebecca.corkill@jic.ac.uk)<sup>1</sup>, Sam Mugford<sup>2</sup>, Neil Morrison<sup>3</sup>, and Saskia A. Hogenhout<sup>2</sup>, <sup>1</sup>The John Innes Centre, Norfolk, United Kingdom, <sup>2</sup>The John Innes Centre, Norwich, United Kingdom, <sup>3</sup>Oxitec, Ltd., Abingdon, United Kingdom
- D3351** The genus *Poecilotoma* Dallas, 1851 (Hemiptera: Heteroptera) in Western Australia. **Eduardo Faundez** (ed.faundez@gmail.com) and David Rider, North Dakota State Univ., Fargo, ND
- D3352** Population structure of glasshouse whitefly, *Trialeurodes vaporariorum* (West.), and molecular identification of their symbionts in the UK. **Ali Kareem** (a.a.kareem@newcastle.ac.uk), Gordon Port, and Kirsten Wolff, Newcastle Univ., Newcastle upon Tyne, United Kingdom
- D3353** Exploring COI variation in Ecuadorian *Hermeuptychia* butterflies: The first step in an integrative approach to resolving species limits in this widely distributed and cryptic genus. **Denise Tan** (denisetsh@ufl.edu) and Keith R. Willmott, Univ. of Florida, Gainesville, FL
- D3354** A preliminary phylogeny of *Eudocima* based on morphological data (Lepidoptera: Erebidae: Calpinae). **Crystal Klem** (cklem@purdue.edu)<sup>1</sup>, Alberto Zilli<sup>2</sup>, and Jennifer Zaspel<sup>1</sup>, <sup>1</sup>Purdue Univ., West Lafayette, IN, <sup>2</sup>The Natural History Museum, London, United Kingdom

### Graduate Student Poster Competition: Morphology, Systematics, and Phylogeny: Springtails, Beetles, and Hymenoptera

#### West Hall C (Convention Center)

- D3355** Taxonomic review of the family Onychiuridae (Poduromorpha: Collembola) from the Korean Peninsula. **Inae Lee** (annarium@gmail.com) and Kyung-Hwa Park, Chonbuk National Univ., Jeonju, South Korea
- D3356** Taxonomic revision of the genus *Macrohylota* (Coleoptera: Silvanidae). **Takahiro Yoshida** (yoshida\_toritoma@yahoo.co.jp) and Toshiya Hirowatari, Kyushu Univ., Fukuoka, Japan
- D3357** A preliminary phylogeny of *Edrotes* LeConte (Coleoptera: Tenebrionidae). **Christopher Wirth** (christophercwirth@gmail.com), Northern Arizona Univ., Flagstaff, AZ
- D3358** Reconstructing the patterns of diversification in the Neotropical montane bess beetles (Passalidae: Proculini). **Cristian Beza-Beza** (cfbeza@memphis.edu) and Duane D. McKenna, Univ. of Memphis, Memphis, TN
- D3359** Presentation withdrawn
- D3360** Sibling species of *Chrysis ignita* complex: Molecular, morphological, and trophic differentiation of North European species and description of new species (Hymenoptera: Chrysididae). **Svetlana Orlovskyye** (s.orlovskyye@gmail.com)<sup>1</sup>, Eduardas Budrys<sup>1,2</sup>, and Anna Budriene<sup>1</sup>, <sup>1</sup>Nature Research Centre, Vilnius, Lithuania, <sup>2</sup>Vilnius Univ., Vilnius, Lithuania
- D3361** A revision of the genus *Pristicerus* Gravenhorst from Japan (Hymenoptera: Ichneumonidae). **Namiki Kikuchi** (namikikikuchi@gmail.com)<sup>1</sup> and Kazuhiko Konishi<sup>2</sup>, <sup>1</sup>Hokkaido Univ., Sapporo, Japan, <sup>2</sup>Ehime Univ., Matsuyama, Japan



**D3362** Taxonomic study of Japanese Teleasini (Hymenoptera: Platygastridae). **Yoto Komeda** (kome123k123@gmail.com)<sup>1</sup>, Toshiharu Mita<sup>1</sup>, and Kenzo Yamagishi<sup>2</sup>, <sup>1</sup>Kyushu Univ., Fukuoka, Japan, <sup>2</sup>Meijo Univ., Nagoya, Japan

### Graduate Student Poster Competition: Physiology and Biochemistry: Moths and Mosquitoes

#### West Hall C (Convention Center)

- D3363** *Bombyx mori* superoxide dismutase 1 and 2 play a role as metamorphosis initiator. **Yosui Nojima** (yosui.nojima@gmail.com)<sup>1</sup>, Katsuhiko Ito<sup>1</sup>, Hidemasa Bono<sup>2</sup>, Takeshi Yokoyama<sup>1</sup>, and Hiroko Tabunoki<sup>1</sup>, <sup>1</sup>Tokyo Univ. of Agriculture and Technology, Fuchu, Japan, <sup>2</sup>Database Center for Life Science, Mishima, Japan
- D3364** *BmorP1ip*, a novel candidate gene involved in juvenile hormone biosynthesis in *Bombyx mori*. **Yuri Homma** (yuri.1116.gf@icloud.com)<sup>1</sup>, Tetsuro Shinoda<sup>2</sup>, Hiroaki Noda<sup>2</sup>, Kazuei Mita<sup>2</sup>, Yuki Nakamura<sup>2</sup>, Toshiki Namiki<sup>2</sup>, and Toru Togawa<sup>1</sup>, <sup>1</sup>Nihon Univ., Tokyo, Japan, <sup>2</sup>National Institute of Agrobiological Sciences, Tsukuba, Japan
- D3365** Synthesis of complex-type N-glycans on recombinant proteins produced by silkworm-baculovirus expression system. **Daisuke Morokuma** (d.morokuma@agr.kyushu-u.ac.jp), Hiroaki Mon, JaeMan Lee, and Takahiro Kusakabe, Kyushu Univ., Fukuoka, Japan
- D3366** Ingestion of protein, but not gut distention, triggers vitellogenesis in *Aedes aegypti*. **Ruby Harrison** (reh21923@uga.edu), Michael Strand, and Mark R. Brown, Univ. of Georgia, Athens, GA
- D3367** Cholesterol localization and ecdysteroidogenesis in the mosquito *Aedes aegypti*. **David A. McKinney** (dmckinn7@uga.edu), Michael Strand, and Mark R. Brown, Univ. of Georgia, Athens, GA
- D3368** Yeast digestion in *Aedes aegypti* larvae. **Raquel Souza** (raqsouzarj@gmail.com)<sup>1</sup>, Hector Diaz-Albiter<sup>1</sup>, Vivian Dillon<sup>2</sup>, Rod Dillon<sup>3</sup>, and Fernando Genta<sup>1</sup>, <sup>1</sup>Oswaldo Cruz Foundation, Rio de Janeiro, Brazil, <sup>2</sup>Univ. of Liverpool, Liverpool, United Kingdom, <sup>3</sup>Lancaster Univ., Lancaster, United Kingdom
- D3369** Identification of proteins interacting physically with the *Aedes aegypti* slimfast (CAT3) amino acid transporter. **Lavesh Bhatia** (lvb1790@nmsu.edu), Hitoshi Tsujimoto, and Immo Hansen, New Mexico State Univ., Las Cruces, NM
- D3370** The role of specific ammonia transporters in ammonia excretion in the blood feeding female mosquito, *Aedes aegypti*. **Andrea Durant** (adurant@yorku.ca) and Andrew Donini, York Univ., Toronto, ON, Canada

### Graduate Student Poster Competition: Physiology and Biochemistry: Physiology

#### West Hall C (Convention Center)

**D3371** Insect saliva as the first line of defense against plant defenses. **Loren Rivera Vega** (lrv181@psu.edu) and Gary Felton, Pennsylvania State Univ., University Park, PA

**D3372** Blue light injures insect cells and kills insect organisms. **Shun Onodera** (sprv8tc9@yahoo.co.jp)<sup>1</sup>, Kazuki Shibuya<sup>1,2</sup>, Kei Suzuki<sup>1</sup>, Hisashi Aso<sup>1</sup>, and Masatoshi Hori<sup>1</sup>, <sup>1</sup>Tohoku Univ., Sendai, Japan, <sup>2</sup>Japan Society for the Promotion of Science, Tokyo, Japan

**D3373** Mechanisms of drought-induced rapid cold-hardening in larvae of the goldenrod gall fly, *Eurosta solidaginis*. **J. D. Gantz** (gantzd@miamioh.edu), Shu-Xia Yi, and Richard E. Lee, Miami Univ., Oxford, OH

**D3374** Characterization of physiological role of potassium ion channels in the arthropod salivary gland. **Zhilin Li** (zhilin.li@agcenter.lsu.edu) and Daniel R. Swale, Louisiana State Univ., Baton Rouge, LA

**D3375** Transposon mutagenesis of gut symbiont *Burkholderia* identified lipoprotein mutant resistant to host salivary gland of bean bug, *Riptortus pedestris*. **Ho Am Jang** (jha0209@naver.com), Eun Sil Seo, Jun Beom Lee, and Bok-Luel Lee, Pusan National Univ., Busan, South Korea

**D3376** The role of PEPCK in insect diapause, development, and stress response. **Drew Spacht** (spacht.2@osu.edu)<sup>1</sup>, Nicholas M. Teets<sup>2</sup>, and David L. Denlinger<sup>1</sup>, <sup>1</sup>The Ohio State Univ., Columbus, OH, <sup>2</sup>Univ. of Kentucky, Lexington, KY

**D3377** The *Toxoneuron nigriceps* polydnavirus ANK1 protein induces apoptosis in insect S2 cells and *Heliothis virescens* hemocytes by interacting with Alix protein. **Rosanna Salvia** (r.salvia@unibas.it)<sup>1</sup>, Gerarda Grossi<sup>1</sup>, Simona Laurino<sup>1</sup>, Pietro Pucci<sup>2</sup>, Angela Amoresano<sup>2</sup>, Heiko Vogel<sup>3</sup>, S. Bradleigh Vinson<sup>4</sup>, Carmen Scieuzo<sup>1</sup>, Marisa Nardiello<sup>1</sup>, Andrea Scala<sup>1</sup>, Marta Petrone<sup>1</sup>, Sabino A. Bufo<sup>1</sup>, and Patrizia Falabella<sup>1</sup>, <sup>1</sup>Univ. of Basilicata, Potenza, Italy, <sup>2</sup>CEINGE-Biotecnologie Avanzate, Napoli, Italy, <sup>3</sup>Max Planck Institute for Chemical Ecology, Jena, Germany, <sup>4</sup>Texas A&M Univ., College Station, TX

**D3378** Regulation of ecdysteroidogenesis and development in *Heliothis virescens* (Lepidoptera: Noctuidae) by the target of rapamycin TOR. **Carmen Scieuzo** (carmen.scieuzo@gmail.com)<sup>1</sup>, Marisa Nardiello<sup>1</sup>, Rosanna Salvia<sup>1</sup>, Simona Laurino<sup>1</sup>, Gerarda Grossi<sup>1</sup>, Marta Petrone<sup>1</sup>, Andrea Scala<sup>1</sup>, Marco Pezzi<sup>2</sup>, S. Bradleigh Vinson<sup>3</sup>, Heiko Vogel<sup>4</sup>, Sabino A. Bufo<sup>1</sup>, and Patrizia Falabella<sup>1</sup>, <sup>1</sup>Univ. of Basilicata, Potenza, Italy, <sup>2</sup>Univ. of Ferrara, Ferrara, Italy, <sup>3</sup>Texas A&M Univ., College Station, TX, <sup>4</sup>Max Planck Institute for Chemical Ecology, Jena, Germany

### Poster Session 2: Acarology

#### West Hall C (Convention Center)

**D3379** *Ferritin* gene exon/intron structure of the American dog tick, *Dermacentor variabilis*. **Quentin Q. Fang** (qfang@GeorgiaSouthern.edu) and Dana Sylvestre, Georgia Southern Univ., Statesboro, GA

**D3380** Physiological and molecular mechanisms underpinning winter-related stress in the American dog tick, *Dermacentor variabilis*. **Andrew Rosendale** (rosendaw@ucmail.uc.edu) and Joshua Benoit, Univ. of Cincinnati, Cincinnati, OH



- D3381** Glutathione *S*-transferase is associated with acequinocyl and bifenthrin resistance of twospotted mite, *Tetranychus usticae* (Acari: Tetranychidae). Gil-Hah Kim, Hyun-Na Koo, Hyun Kyung Kim, Woosong Cho, and **Wonjin Kang** (kwonjin1134@naver.com), Chungbuk National Univ., Cheongju, South Korea
- D3382** Precise molecular diagnostics for miticide resistance in *Tetranychus urticae* on hops. **Mariany Morales** (mariany.morales@wsu.edu)<sup>1</sup>, Adekunle Adesanya<sup>1</sup>, Bianca Mendoza<sup>1</sup>, Christina Nguyen<sup>1</sup>, Laura C. Lavine<sup>1</sup>, Douglas Walsh<sup>2</sup>, and Fang (Rose) Zhu<sup>1</sup>, <sup>1</sup>Washington State Univ., Pullman, WA, <sup>2</sup>Washington State Univ., Prosser, WA
- D3383** Effects of two commercial neem-based insecticides on *Amblyomma americanum*: Repellency, mortality, and reproduction. **Allan Showler** (allan.showler@ars.usda.gov), USDA - ARS, Kerrville, TX
- D3384** Adaptations of the mouthparts in *Dermanyssina* (Acari: Mesostigmata) from predatorism to parasitism. **Antonella Di Palma** (antonella.dipalma@unifg.it), Univ. of Foggia, Foggia, Italy

## Poster Session 2: Bioinformatics and Comparative Genomics of Arthropods

### West Hall C (Convention Center)

- D3385** The i5k Workspace@NAL: New content, new tools, and new insights. **Monica F. Poelchau** (monica.poelchau@ars.usda.gov)<sup>1</sup>, Mei-Ju Chen<sup>2</sup>, Yu-Yu Lin<sup>2</sup>, Gary Moore<sup>3</sup>, Vijaya Tsavataapalli<sup>3</sup>, and Christopher Childers<sup>3</sup>, <sup>1</sup>USDA - ARS, Fort Collins, CO, <sup>2</sup>National Taiwan Univ., Taipei, Taiwan, <sup>3</sup>USDA - ARS, Beltsville, MD
- D3386** *Euroglyphus maynei* genome with comparison to the scabies mite. Dean Rider, Marjorie Morgan, and **Larry G. Arlian** (larry.arlian@wright.edu), Wright State Univ., Dayton, OH
- D3387** Ion Torrent PGM and Illumina HiSeq analysis of the metagenome of *Dermacentor variabilis* (Ixodidae). **Gregory A. Dasch** (GDasch@cdc.gov), T. Brian Shirey, Maria L. Zambrano, Mili Sheth, Zachary C. Holmes, and Amanda J. Williams-Newkirk, Centers for Disease Control and Prevention, Atlanta, GA
- D3388** Integrated modeling of protein-coding genes in the *Manduca sexta* genome using RNA-seq data from the biochemical model insect. **Xiaolong Cao** (xiaolong.cao@okstate.edu) and Haobo Jiang, Oklahoma State Univ., Stillwater, OK
- D3389** miRNAs in multiple developmental stages in western corn rootworm (*Diabrotica virgifera virgifera*) revealed by deep sequencing. **Haichuan Wang** (hwang4@unl.edu)<sup>1</sup>, Kan Liu<sup>1</sup>, Chi Zhang<sup>1</sup>, Arnubio Valencia J<sup>2</sup>, Newton Carneiro<sup>3</sup>, and Blair Siegfried<sup>4</sup>, <sup>1</sup>Univ. of Nebraska, Lincoln, NE, <sup>2</sup>Univ. of Caldas, Manizales, Colombia, <sup>3</sup>Embrapa Maze and Sorgham, Sete Lagoas, Brazil, <sup>4</sup>Univ. of Florida, Gainesville, FL
- D3390** Comparative whole transcriptome analysis of *Locusta migratoria* revealed differences in long-non-coding RNAs between segregation and gregarious phase locusts. **Young Ho Koh** (kohyh@hallym.ac.kr)<sup>1,2</sup>, Phuong Nguyen<sup>1,2</sup>, Kwan-Seok Lee<sup>3</sup>, Jin Kyo Jung<sup>4</sup>, and

A-Young Kim<sup>1</sup>, <sup>1</sup>Hallym Univ., Anyang, South Korea, <sup>2</sup>Hallym Univ., Chuncheon, South Korea, <sup>3</sup>National Academy of Agricultural Science, Suwon, South Korea, <sup>4</sup>National Institute of Crop Science, Suwon, South Korea

- D3391** *De novo* transcriptome assembly of the screwworm fly, *Cochliomyia hominivorax* (Diptera: Calliphoridae): Perspectives for the identification of chemosensory genes and potential microRNAs targets. **Daniel Paulo** (daniel.f.paulo@gmail.com)<sup>1</sup>, Ana Junqueira<sup>2</sup>, and Ana Azeredo-Espin<sup>1</sup>, <sup>1</sup>Univ. of Campinas, Campinas, Brazil, <sup>2</sup>Nanyang Technological Univ., Singapore, Singapore
- D3392** Gene regulatory networks applied to transcriptome data to detect differences in adaptation to herbivory of two *Spodoptera frugiperda* strains focusing on peptidases. **Natalia Murad** (nataliafmurad@gmail.com)<sup>1</sup>, Karina Silva-Brandão<sup>2</sup>, and Marcelo Brandão<sup>3</sup>, <sup>1</sup>Univ. of Campinas, Campinas, Brazil, <sup>2</sup>Univ. of São Paulo, Piracicaba, Brazil, <sup>3</sup>Univ. of Alberta, Edmonton, AB, Canada
- D3393** Transcriptomic analysis of odor processing genes in *Leptinotarsa decemlineata*. **Bianca Mendoza** (chimi.mendoza@wsu.edu)<sup>1</sup>, Adekunle Adesanya<sup>1</sup>, Haichuan Wang<sup>2</sup>, Mariany Morales<sup>1</sup>, Laura C. Lavine<sup>1</sup>, Douglas Walsh<sup>3</sup>, and Fang (Rose) Zhu<sup>1</sup>, <sup>1</sup>Washington State Univ., Pullman, WA, <sup>2</sup>Univ. of Nebraska, Lincoln, NE, <sup>3</sup>Washington State Univ., Prosser, WA
- D3394** O-GlcNAcPRED: A sensitive predictor to capture protein O-GlcNAcylation sites. **Cangzhi Jia** (cangzhijia@dlmu.edu.cn)<sup>1</sup> and Tian Liu<sup>2</sup>, <sup>1</sup>Dalian Maritime Univ., Dalian, China, <sup>2</sup>Dalian Univ. of Technology, Dalian, China

## Poster Session 2: Biological Control and Insect Pathology

### West Hall C (Convention Center)

- D3395** Presentation withdrawn
- D3396** Challenges to mass-rearing predators of hemlock woolly adelgid. **James Parkman** (jparkman@utk.edu), Univ. of Tennessee, Knoxville, TN
- D3397** Developing locally adapted factories for the mass production of entomopathogenic nematodes as biocontrol agents against soil insect pests. Hongmei Li<sup>1</sup>, Jinghua Chen<sup>2</sup>, Franz Bollhalder<sup>3</sup>, Ri Un Sil<sup>4</sup>, Kyong Man Son<sup>4</sup>, Song Il Kang<sup>5</sup>, Joelle Kajuga<sup>6</sup>, Bancy Waweru<sup>6</sup>, Richou Han<sup>7</sup>, Yan Xun<sup>8</sup>, Xuehong Qui<sup>8</sup>, Keith A. Holmes<sup>9</sup>, **Michael Zellner** (michael.zellner@lfl.bayern.de)<sup>10</sup>, and Stefan Toepfer<sup>11</sup>, <sup>1</sup>CABI, Beijing, China, <sup>2</sup>Lvbenyuan Biotech Company Ltd, Guangzhou, China, <sup>3</sup>Andermatt Biocontrol AG, Grossdietwil, Switzerland, <sup>4</sup>Ministry of Agriculture, Pyongyang, North Korea, <sup>5</sup>Academy of Agricultural Sciences, Pyongyang, North Korea, <sup>6</sup>Rwanda Agriculture Board, Huye, Rwanda, <sup>7</sup>Guangdong Academy of Agricultural Sciences, Guangzhou, China, <sup>8</sup>Guangdong Institute of Applied Biological Resources, Guangzhou, China, <sup>9</sup>CABI, Delémont, Switzerland, <sup>10</sup>Bavarian State Research Centre for Agriculture, Freising, Germany, <sup>11</sup>Chinese Ministry of Agriculture, Beijing, China





- D3398** Longevity of adults of the parasitoid *Cotesia flavipes* (Hymenoptera: Braconidae) from Brazilian biofactories. **Alessandra Marieli Vacari** (amvacari@gmail.com)<sup>1</sup>, Vanessa Fabiola Pereira Carvalho<sup>1</sup>, Lauany Santos<sup>2</sup>, Thamiris Sipriano<sup>1</sup>, Rafael Ferreira Santos<sup>1</sup>, and Sergio Antonio De Bortoli<sup>1</sup>, <sup>1</sup>São Paulo State Univ., Jaboticabal, Brazil, <sup>2</sup>Univ. of São Paulo, Ituverava, Brazil
- D3399** Quality control of *Cotesia flavipes* (Hymenoptera: Braconidae) from different Brazilian biofactories. **Rafael Ferreira Santos** (rsdosantos.rs@gmail.com)<sup>1</sup>, Caroline De Bortoli<sup>1</sup>, Josy Santos<sup>2</sup>, Alessandra Marieli Vacari<sup>1</sup>, Thamiris Sipriano<sup>1</sup>, and Sergio Antonio De Bortoli<sup>1</sup>, <sup>1</sup>São Paulo State Univ., Jaboticabal, Brazil, <sup>2</sup>Usina São Martinho, Pradópolis, Brazil
- D3400** Presentation withdrawn
- D3401** *Termitoloemus marshalli* (Diptera: Calliphoridae), a potential biocontrol agent of mound building termites, *Odontotermes* spp. (Isoptera: Termitidae) in India. **Sudhir Singh** (sudhirs@icfre.org), Forest Research Institute, Dehradun, India
- D3402** Notes on Northwestern Europe greenhouse pests and biological control. **Janpiet Kaas** (biopre@xs4all.nl), Bio Pre Biological Crop Protection, Aalsmeer, Netherlands
- D3403** Toxicity of commercial pesticides on the green lacewing, *Chrysoperla carnea* (Neuroptera: Chrysopidae). **YoungSu Lee** (allexton74@gmail.com)<sup>1</sup>, HyunJu Lee<sup>1</sup>, JaeWoon Chung<sup>1</sup>, HeeA Lee<sup>1</sup>, and Byeong-Ryeol Choi<sup>2</sup>, <sup>1</sup>Gyeonggi Agricultural Research and Extension Services, Hwasung, South Korea, <sup>2</sup>National Institute of Agricultural Science and Technology, Suwon, South Korea
- D3404** Molecular identification and functional response of *Mononeda marginata* (Coleoptera: Coccinellidae) to *Hansenia pulverulenta* nymphs (Hemiptera: Flatidae) found in coffee, *Coffea* spp., growing areas of Hidalgo, Mexico. **Joana Meyer** (joanameyerflores@gmail.com) and Samuel Ramirez, Autonomus Univ. of Chapingo, Chapingo, Mexico
- D3405** Flat bark beetle predators of the scolytine pest coffee berry borer in Hawaii coffee. **Peter Follett** (peter.follett@ars.usda.gov)<sup>1</sup>, Andrea Kawabata<sup>2</sup>, and Eva Brill<sup>1</sup>, <sup>1</sup>USDA - ARS, Hilo, HI, <sup>2</sup>Univ. of Hawai'i, Kealahakua, HI
- D3406** Habitat modification for *Ostrinia nubilalis* IPM in New Jersey peppers. **George C. Condon** (george.condon@rutgers.edu) and George C. Hamilton, Rutgers, The State Univ. of New Jersey, New Brunswick, NJ
- D3407** Searching behavior of *Coccinella undecimpunctata* (Coleoptera: Coccinellidae) and its parasitoid, *Tetrastichus coccinellae* (Hymenoptera: Eulophidae). **Mona El-Mandarawy** (melmandarawy@gmail.com), Plant Protection Research Institute, Giza, Egypt
- D3408** Conservation biological control of the pear pest *Cacopsylla pyricola* (Homoptera: Psyllidae). **Kaushalya G. Amarasekare** (kaushalya2641@yahoo.com)<sup>1</sup> and Peter Shearer<sup>2</sup>, <sup>1</sup>Tennessee State Univ., Nashville, TN, <sup>2</sup>Oregon State Univ., Hood River, OR
- D3409** Functional characterization of a chemosensory protein in a natural predator, *Chrysopa pallens*, indicates involvement of the protein in prey location. **Chenxi Liu** (liuchenxi@caas.cn), Juan Wang, and Hongyin Chen, Chinese Academy of Agricultural Sciences, Beijing, China
- D3410** Biological control based strategies to manage privet whitefly, *Aleurotrachelus trachoides*, in Florida. **Antonio Francis** (antonio.francis@freshfromflorida.com)<sup>1</sup>, Muhammad Ahmed<sup>2</sup>, Vivek Kumar<sup>3</sup>, Lance Osborne<sup>3</sup>, and Cindy L. McKenzie<sup>4</sup>, <sup>1</sup>Florida Dept. of Agriculture and Consumer Services, Apopka, FL, <sup>2</sup>Univ. of Florida, Homestead, FL, <sup>3</sup>Univ. of Florida, Apopka, FL, <sup>4</sup>USDA - ARS, Ft. Pierce, FL
- D3411** Identification of potential predators of the western corn rootworm in maize fields of west central Nebraska. **Vinicius Suárez Victor** (vins\_victor@hotmail.com)<sup>1</sup>, Camila Oliveira-Hofman<sup>2</sup>, Kayla A. Mollet<sup>1</sup>, and Julie Peterson<sup>1</sup>, <sup>1</sup>Univ. of Nebraska, North Platte, NE, <sup>2</sup>Univ. of Nebraska, Lincoln, NE
- D3412** Demographic parameters of parasitoid wasp, *Eretmocerus delhiensis*, on greenhouse whitefly, *Trialeurodes vaporariorum*. **Jafar Ebrahimifard** (jafar.ebrahimi@ut.ac.ir), Arsalan Jamshidnia, and Hossien Allahyari, Univ. of Tehran, Tehran, Iran
- D3413** Thermal requirements of different biotypes of *Telenomus podisi* (Hymenoptera: Platygastridae) in *Oebalus insularis* (Heteroptera: Pentatomidae) eggs. **Bruno Zachrisson** (bazsalam@gmail.com), Pedro Osorio, Onesio Martinez, and Guadalupe Gutierrez, Agricultural Research Institution of Panama, Panama, Panama
- D3414** Biocontrol of the exotic invasive heteropteran, *Halyomorpha halys* in mid-Atlantic USA ornamental landscapes assessed by sentinel egg mass: Negligible impact by native parasitoids and predators. Mary Cornelius<sup>1</sup>, Christine Dieckhoff<sup>2</sup>, Kim A. Hoelmer<sup>2</sup>, Mark Payton<sup>3</sup>, Richard Olsen<sup>4</sup>, and **Matthew Greenstone** (matt.greenstone@ars.usda.gov)<sup>1</sup>, <sup>1</sup>USDA - ARS, Beltsville, MD, <sup>2</sup>USDA - ARS, Newark, DE, <sup>3</sup>Oklahoma State Univ., Stillwater, OK, <sup>4</sup>USDA - ARS, Washington, DC
- D3415** Saving wiliwili trees in Hawaii from the Erythrina gall wasp, *Quadrastichus erythrinae*, with a eurytomid parasitoid, *Eurytoma erythrinae*. **Juliana A. Yalemara** (juliana.a.yalemara@hawaii.gov), Renato C. Bautista, and Mohsen Ramadan, Hawaii Dept. of Agriculture, Honolulu, HI
- D3416** Efficacy of biological control of Asian citrus psyllid in South Texas during 2016. Daniel Flores<sup>1</sup>, Rupert Santos<sup>1</sup>, Mayra Rangel<sup>2</sup>, Gilbert Salazar<sup>2</sup>, Nicholas Soto<sup>2</sup>, Abel Villarreal<sup>3</sup>, Ariel Miranda<sup>4</sup>, Jose Urbalejo<sup>5</sup>, Sergio Sanchez<sup>5</sup>, **Christopher Vitek** (christopher.vitek@utrgv.edu)<sup>2</sup>, and Matt A. Ciomperlik<sup>1</sup>, <sup>1</sup>USDA - APHIS, Edinburg, TX, <sup>2</sup>The Univ. of Texas, Edinburg, TX, <sup>3</sup>Texas Citrus Pest and Disease Management Corporation, Edinburg, TX, <sup>4</sup>USDA - APHIS, Reynosa, Mexico, <sup>5</sup>USDA - APHIS, Tijuana, Mexico
- D3417** Natural incidence of biological control agents on tarnished plant bugs adults and nymphs from wild host in the Delta. **Maribel Portilla** (maribel.portilla@ars.usda.gov), Randall Luttrell, and Katherine Parys, USDA - ARS, Stoneville, MS



- D3418** Variations in reproductive biology and diapause of two species of egg parasitoids (Hymenoptera: Encyrtidae): Implications for biocontrol of the emerald ash borer. **Kristi Larson** (klarson@udel.edu)<sup>1,2</sup> and Jian Duan<sup>1</sup>, <sup>1</sup>USDA - ARS, Newark, DE, <sup>2</sup>Univ. of Massachusetts, Amherst, MA
- D3419** Parasitism efficacy of three strains of *Cotesia flavipes* from Brazilian biofactories. Thamiris Sipriano<sup>1</sup>, **Caroline De Bortoli** (carubortoli@yahoo.com.br)<sup>1</sup>, Lauany Santos<sup>2</sup>, Rafael Ferreira Santos<sup>1</sup>, Alessandra Marieli Vacari<sup>1</sup>, and Sergio Antonio De Bortoli<sup>1</sup>, <sup>1</sup>São Paulo State Univ., Jaboticabal, Brazil, <sup>2</sup>Univ. of São Paulo, Ituverava, Brazil
- D3420** Flight activity of the parasitoid *Cotesia flavipes* (Hymenoptera: Braconidae) in different temperatures. Thamiris Sipriano<sup>1</sup>, Lauany Santos<sup>2</sup>, Rafael Ferreira Santos<sup>1</sup>, Tais Lavagnini<sup>3</sup>, Alessandra Marieli Vacari<sup>1</sup>, and **Sergio Antonio De Bortoli** (bortoli@fcav.unesp.br)<sup>1</sup>, <sup>1</sup>São Paulo State Univ., Jaboticabal, Brazil, <sup>2</sup>Univ. of São Paulo, Ituverava, Brazil, <sup>3</sup>Usina São Francisco, Sertãozinho, Brazil
- D3421** Potential for integration of classical and conservation biological control of the olive fruit fly. **Livy Williams** (livy.williams@ars.usda.gov)<sup>1</sup>, Pauline Deschodt<sup>2</sup>, Olivia Pointurier<sup>2</sup>, Michelangelo La Spina<sup>3</sup>, and Arnaud Blanchet<sup>3</sup>, <sup>1</sup>USDA - ARS, Charleston, SC, <sup>2</sup>Montpellier SupAgro, Montpellier, France, <sup>3</sup>USDA - ARS, Montpellier, France
- D3422** Crop seeding manipulation affects densities of the alfalfa weevil, *Hypera postica*, and its introduced parasitoid, *Bathyleptes anurus*. **Kengo Nakahira** (nakahira@agr.kyushu-u.ac.jp), Shun-ichiro Iwase, and Masami Takagi, Kyushu Univ., Fukuoka, Japan
- D3423** Perspectives of *Liriomyza* biological control in Brazil. **Tiago Costa-Lima** (tiago.lima@embrapa.br)<sup>1</sup>, Valmir Costa<sup>2</sup>, Marcone César Chagas<sup>3</sup>, and José R. P. Parra<sup>4</sup>, <sup>1</sup>Brazilian Agricultural Research Corporation, Petrolina, Brazil, <sup>2</sup>Biological Institute, Campinas, Brazil, <sup>3</sup>Agricultural Research Company of Rio Grande do Norte, Parnamirim, Brazil, <sup>4</sup>Univ. of São Paulo, Piracicaba, Brazil
- D3424** Introduction, pre- and post-release monitoring of the parasitoid *Tamarixia radiata* Pakistan strain (Hymenoptera: Eulophidae) against *Diaphorina citri* (Hemiptera: Psyllidae) in Puerto Rico. **Lesly Colon** (lesly.colon6@gmail.com)<sup>1</sup>, Ronald D. Weeks<sup>2</sup>, Aixa Ramirez<sup>1</sup>, and Daniel Sosa<sup>1</sup>, <sup>1</sup>Dept. of Agriculture of Puerto Rico, San Juan, PR, <sup>2</sup>USDA - APHIS, Raleigh, NC
- D3425** *Diaeretiella rapae* parasitism on cabbage aphid in field cages at Saltillo, Mexico. **Francisco Lopez-Monzon** (flopezmonzon@yahoo.com.mx), Reyna Torres-Acosta, Diego Camacho-Ponce, and Sergio Sanchez-Peña, Antonio Narro Agrarian Autonomous Univ., Saltillo, Mexico
- D3426** Influence of host quality and temperature on the biology of *Diaeretiella rapae* (Hymenoptera: Braconidae). Monique Souza<sup>1</sup> and **Marcus Sampaio** (mvsampaio@iciag.ufu.br)<sup>2</sup>, <sup>1</sup>Louisiana State Univ., Baton Rouge, LA, <sup>2</sup>Federal Univ. of Uberlândia, Uberlândia, Brazil
- D3427** Identification of *Helicoverpa armigera* nucleopolyhedrovirus in Brazil. **Victor Hugo Da Costa** (victorhugodc@yahoom.com.br)<sup>1</sup>, Marcus Soares<sup>2</sup>, Francisco Andrés Rodríguez-Dimate<sup>3</sup>, José Zanoncio<sup>4</sup>, and Fernando Valicente<sup>5</sup>, <sup>1</sup>Federal Univ. of Lavras, Lavras, Brazil, <sup>2</sup>Federal Univ. of Vales do Jequitinhonha e Mucuri, Diamantina, Brazil, <sup>3</sup>Federal Univ. of Viçosa, Sete Lagoas, Brazil, <sup>4</sup>Federal Univ. of Viçosa, Viçosa, Brazil, <sup>5</sup>Embrapa, Sete Lagoas, Brazil
- D3428** Comparative whole genome analysis of nucleopolyhedroviruses infecting saturniid silkworms by next-generation sequencing. **Jun Kobayashi** (koba-jun@yamaguchi-u.ac.jp)<sup>1</sup>, Kuni Sasaki<sup>2</sup>, Zenta Kajiura<sup>3</sup>, and Keiko Kadono-Okuda<sup>4</sup>, <sup>1</sup>Yamaguchi Univ., Yamaguchi, Japan, <sup>2</sup>Tottori Univ., Yamaguchi, Japan, <sup>3</sup>Shinshu Univ., Ueda, Japan, <sup>4</sup>National Institute of Agrobiological Sciences, Tsukuba, Japan
- D3429** *In vivo* production, speed of kill and insecticidal activity of selected isolates of the alphabaculovirus isolated from *Agrotis ipsilon*. **Robert W. Behle** (robert.behle@ars.usda.gov)<sup>1</sup> and Robert L. Harrison<sup>2</sup>, <sup>1</sup>USDA - ARS, Peoria, IL, <sup>2</sup>USDA - ARS, Beltsville, MD
- D3430** Combined impacts of viral pathogens and pesticides on bumble bee health. **Diana Cox-Foster** (diana.cox-foster@ars.usda.gov)<sup>1</sup>, Courtney Eddington<sup>2</sup>, and Edwin Rajotte<sup>2</sup>, <sup>1</sup>USDA - ARS, Logan, UT, <sup>2</sup>Pennsylvania State Univ., University Park, PA
- D3431** Virulence fails to increase following artificial host shift of sigma virus to *Drosophila simulans*. **Luis F. Matos** (lmatos@ewu.edu)<sup>1</sup>, Jérémie Brusini<sup>2</sup>, and Marta Wayne<sup>3</sup>, <sup>1</sup>Eastern Washington Univ., Cheney, WA, <sup>2</sup>Univ. of California, Santa Cruz, CA, <sup>3</sup>Univ. of Florida, Gainesville, FL
- D3432** Development of an efficacious, practical, UV protectant formulation for entomopathogenic fungi. **Stefan T. Jaronski** (stefan.jaronski@ars.usda.gov)<sup>1</sup>, Katherine Rodgers<sup>2</sup>, and Steve Miller<sup>2</sup>, <sup>1</sup>USDA - ARS, Sidney, MT, <sup>2</sup>Ecopesticides International, Sante Fe, NM
- D3433** Effect of *Beauveria bassiana* on population parameters of *Bactrocera dorsalis*. **Zhiping Pan** (zhipingpan@126.com), Guangdong Academy of Agricultural Sciences, Guangzhou, China
- D3434** Quantification, molecular identification, and virulence of endemic *Beauveria bassiana* populations within kudzu soils. **Erika Niland** (e.niland@wingate.edu)<sup>1</sup> and Wayne Gardner<sup>2</sup>, <sup>1</sup>Wingate Univ., Wingate, NC, <sup>2</sup>Univ. of Georgia, Griffin, GA
- D3435** The effect of *Beauveria bassiana* formulation on *Ips avulsus* and *Dendroctonus frontalis* bark beetles in a loblolly pine bolt assay. **Rabiu Olatinwo** (rolatinwo@fs.fed.us), Steven Walters, and Brian Strom, USDA - Forest Service, Pineville, LA
- D3436** *Metarhizium anisopliae* and *Beauveria bassiana* as a pathogens of *Frankliniella invasor* (Thysanoptera: Thripidae), a pest of mango flowers. **Ricardo Toledo-Hernández** (rtoledo@ecosur.edu.mx), José Ortiz, and Daniel Sánchez-Guillén, College of the Southern Border, Tapachula, Mexico



- D3437** Genetic and epizootiological characterization of naturally-occurring strains of *Beauveria* isolated from coffee berry borer on Hawaii Island. Louela Castrillo<sup>1</sup>, **Stephen Wraight** (steve.wraight@ars.usda.gov)<sup>2</sup>, Tracie Matsumoto<sup>3</sup>, and Lisa Keith<sup>3</sup>, <sup>1</sup>Cornell Univ., Ithaca, NY, <sup>2</sup>USDA - ARS, Ithaca, NY, <sup>3</sup>USDA - ARS, Hilo, HI
- D3438** *Nomuraea rileyi* (Hypocreales: Clavicipitaceae) has potential for biological control of *Helicoverpa armigera* (Lepidoptera: Noctuidae) in Brazil. **Marcus Soares** (marcussoares@yahoo.com.br)<sup>1</sup>, Victor Hugo Da Costa<sup>2</sup>, José Zanuncio<sup>3</sup>, and Fernando Valicente<sup>4</sup>, <sup>1</sup>Federal Univ. of Vales do Jequitinhonha e Mucuri, Diamantina, Brazil, <sup>2</sup>Federal Univ. of Lavras, Lavras, Brazil, <sup>3</sup>Federal Univ. of Viçosa, Viçosa, Brazil, <sup>4</sup>Embrapa, Sete Lagoas, Brazil
- D3439** Commercial formulation of acaropathogenic fungus, *Metarhizium anisopliae*, as a possible biocontrol tool for cattle fever ticks. **Jason Tidwell** (jason.tidwell@ars.usda.gov)<sup>1</sup>, Don Thomas<sup>1</sup>, and Adalberto A. Pérez de León<sup>2</sup>, <sup>1</sup>USDA - ARS, Edinburg, TX, <sup>2</sup>USDA - ARS, Kerrville, TX
- D3440** Production of oxalic acid in submerged culture of *Aspergillus niger* F22 strain. **Sang Il Lee** (lsill@wikim.re.kr, haewoong@wikim.re.kr)<sup>1</sup>, Keon Jin Lee<sup>1</sup>, Sanghyun Ha<sup>1</sup>, Hyun Jung Gwak<sup>1</sup>, Ae Ri Han<sup>1</sup>, Ho Hyun Chun<sup>1</sup>, Young Bae Chung<sup>1</sup>, Hyeong Hwan Kim<sup>2</sup>, Jin-Cheol Kim<sup>3</sup>, Teak Soo Shin<sup>4</sup>, and Hae Woong Park<sup>1</sup>, <sup>1</sup>World Institute of Kimchi, Gwangju, South Korea, <sup>2</sup>National Institute of Horticultural and Herbal Science, Wanju, South Korea, <sup>3</sup>Chonnam National Univ., Gwangju, South Korea, <sup>4</sup>Dongbu Advanced Research Institute, Nonsan, South Korea
- D3441** Analysis of amino acids with crystal proteins of *Bacillus thuringiensis* CAB565 and CAB566 strains. **You-Kyoung Lee** (dlbrud119@hanmail.net), Na-Young Jin, Jun-Hack Jeon, Yu-Seop Kim, Bo-Ram Lee, Hee Ji Kim, Young-Nam Youn, and Yong-Man Yu, Chungnam National Univ., Daejeon, South Korea
- D3442** *Bacillus thuringiensis* serovar *aizawai* spray-dried formulations on the insecticidal effect of strain CAB566. **Tae-Wan Kim** (jxforever1@naver.com)<sup>1</sup>, Tae-Hwan Kim<sup>1</sup>, Young-Nam Youn<sup>2</sup>, and Yong-Man Yu<sup>2</sup>, <sup>1</sup>WooGene B & G Co., Ltd, Gyeonggi, South Korea, <sup>2</sup>Chungnam National Univ., Daejeon, South Korea
- D3443** Phylogenetic analysis of insecticidal *Chromobacterium*. **Michael B. Blackburn** (mike.blackburn@ars.usda.gov), Daniel Kuhar, Michael Sparks, Robert R. Farrar, and Dawn E. Gundersen-Rindal, USDA - ARS, Beltsville, MD
- D3444** Insecticidal activity of new isolates of *Chromobacterium* spp. **Robert R. Farrar** (robert.farrar@ars.usda.gov) and Michael B. Blackburn, USDA - ARS, Beltsville, MD
- D3445** Host-level molecular responses to *Chromobacterium subtsugae* infection in a lepidopteran. **Michael Sparks** (michael.sparks@ars.usda.gov), Daniel Kuhar, Robert Farrar, Michael B. Blackburn, and Dawn E. Gundersen-Rindal, USDA - ARS, Beltsville, MD
- D3446** Leap™: A new dual-action, biorational pesticide for plant disease management and insect control. **Russell Eldridge** (russell.eldridge@valentbiosciences.com)<sup>1</sup>, Craig Campbell<sup>2</sup>, Gregory Clarke<sup>2</sup>, Fred Marmor<sup>2</sup>, Rick Hopkins<sup>2</sup>, Max Villalobos<sup>3</sup>, and Bala Devisetty<sup>1</sup>, <sup>1</sup>Valent BioSciences Corporation, Libertyville, IL, <sup>2</sup>Valent U.S.A., Walnut Creek, CA, <sup>3</sup>Sumitomo Chemical Latin America, São Paulo, Brazil
- D3447** Association between *Bacillus thuringiensis* and *Eugenia uniflora* essential oil on *Alphitobius diaperinus* (Coleoptera: Tenebrionidae). **Everton Lozano** (evertonloz@gmail.com)<sup>1</sup>, Carla Pegorini<sup>1</sup>, Michele Potrich<sup>1</sup>, Jackeline Lima<sup>1</sup>, Rodrigo Maciel<sup>1</sup>, Jucelaine Haas<sup>1</sup>, and Gislayne Vilas Boas<sup>2</sup>, <sup>1</sup>Federal Technology Univ. of Paraná, Dois Vizinhos, Brazil, <sup>2</sup>State Univ. of Londrina, Londrina, Brazil
- D3448** Enhancing biological control of the sugarcane borer in Brazil by using *Bacillus thuringiensis* and conserving naturally occurring predators. Odair Aparecido Fernandes<sup>1</sup>, Andrea Varella<sup>2</sup>, Lidiane Pavani<sup>1</sup>, Marcelo Lontro Júnior<sup>1</sup>, Luan dos Santos<sup>1</sup>, **Éllen Carbognin** (carbognin@hotmail.com)<sup>1</sup>, Rodrigo Rodrigues<sup>3</sup>, and Diogo Togni<sup>3</sup>, <sup>1</sup>São Paulo State Univ., Jaboticabal, Brazil, <sup>2</sup>Montana State Univ., Bozeman, MT, <sup>3</sup>Sumitomo Chemical of Brazil, São Paulo, Brazil
- D3449** Patch allocation manipulation by *Wolbachia* in a parasitic wasp. Hossein Kishani Farahani<sup>1</sup>, Ahmad Ashouri<sup>1</sup>, **Yasaman Moghaddasi** (ymoghaddasi@ut.ac.ir)<sup>1</sup>, Lucy Alford<sup>2</sup>, Jean-Sebastien Pierre<sup>2</sup>, and Joan van Baaren<sup>2</sup>, <sup>1</sup>Univ. of Tehran, Karaj, Iran, <sup>2</sup>Univ. of Rennes, Rennes, France
- D3450** Assessment of the efficacy and synergism of entomopathogenic organisms associated with *Zonocerus variegatus*. **Funmilola Omoya** (fomoya@yahoo.com), Federal Univ. of Technology, Akure, Nigeria
- D3451** Survey of *Nosema* spp. in central Texas native bees and feral honey bees, *Apis mellifera*. Forrest Mitchell<sup>1</sup>, **Cherilyn Porter** (cherilyn.porter@go.tarleton.edu)<sup>2</sup>, and Jeff Brady<sup>1</sup>, <sup>1</sup>Texas A&M Univ., Stephenville, TX, <sup>2</sup>Tarleton State Univ., Stephenville, TX
- D3452** Compatibility of *Steinernema feltiae* (Rhabditida: Steinernematida) and *Heterorhabditis* sp. (Rhabditida: Heterorhabditidae) with ciantraniliprole insecticide for the coffee berry borer control. Bruna Guide<sup>1</sup>, **Pedro Neves** (pedroneves@uel.br)<sup>1</sup>, Matheus Campaner<sup>1</sup>, Thiago Fernandes<sup>1</sup>, and Viviane Alves<sup>2</sup>, <sup>1</sup>State Univ. of Londrina, Londrina, Brazil, <sup>2</sup>State Univ. of Northern Paraná, Cornélio Procópio, Brazil
- D3453** Preferred portal of entry of entomopathogenic nematodes (Steinernematidae, Heterorhabditidae) during the infection process. **Alexandra Roder** (alexandra2310@email.arizona.edu) and S. Patricia Stock, Univ. of Arizona, Tucson, AZ
- D3454** Biological control potential of Korean entomopathogenic nematode isolates against the cabbageworm, *Pieris rapae* (Lepidoptera: Pieridae). **Hae Woong Park** (haewoong@wikim.re.kr)<sup>1</sup>, Hyeong Hwan Kim<sup>2</sup>, Dong Hwan Kim<sup>2</sup>, Myoung Rae Cho<sup>2</sup>, Jin-Cheol Kim<sup>3</sup>, Teak Soo Shin<sup>4</sup>, Sang Il Lee<sup>1</sup>, and Jung Beom Yoon<sup>2</sup>, <sup>1</sup>World Institute of Kimchi, Gwangju, South Korea, <sup>2</sup>National Institute of Horticultural and Herbal Science, Wanju, South Korea, <sup>3</sup>Chonnam National Univ., Gwangju, South Korea, <sup>4</sup>Dongbu Advanced Research Institute, Nonsan, South Korea



- D3455** Pathogenicity of *Steinernema braziliense* (Rhabditida: Steinernematidae) to Eucalyptus snout beetle, *Gonipterus platensis* (Coleoptera: Curculionidae). **Silvia Wilcken** (srenata@fca.unesp.br)<sup>1</sup>, Andressa Brida<sup>1</sup>, Murici Candelaria<sup>1</sup>, Luiz Leite<sup>2</sup>, José Zanuncio<sup>3</sup>, and Carlos Wilcken<sup>1</sup>, <sup>1</sup>São Paulo State Univ., Botucatu, Brazil, <sup>2</sup>Biological Institute, Campinas, Brazil, <sup>3</sup>Federal Univ. of Viçosa, Viçosa, Brazil
- D3456** Successful commercial use of entomopathogenic nematodes: Two case studies. **Shaun Berry** (shaun.berry@basf.com)<sup>1</sup>, Mark Peacock<sup>1</sup>, Gareth Martin<sup>2</sup>, and Piet van Boven<sup>3</sup>, <sup>1</sup>BASF, Research Triangle Park, NC, <sup>2</sup>BASF, Littlehampton, United Kingdom, <sup>3</sup>BASF, Arnhem, Netherlands
- D3457** Mapping and identification of entomopathogenic fungi associated with *Thaumastocoris peregrinus* (Hemiptera: Thaumastocoridae) in *Eucalyptus* plantations. **Everton Soliman** (everton\_pires@hotmail.com)<sup>1</sup>, Ana Firmino<sup>2</sup>, Natalia Souza<sup>3</sup>, Thaise Karla Dias<sup>4</sup>, Edival Angelo Zauza<sup>1</sup>, and Carlos Wilcken<sup>3</sup>, <sup>1</sup>Suzano Pulp and Paper, Itapetininga, Brazil, <sup>2</sup>São Paulo State Univ., Dracena, Brazil, <sup>3</sup>São Paulo State Univ., Botucatu, Brazil, <sup>4</sup>Federal Univ. of Mato Grosso, Sinop, Brazil
- D3458** Diapause in *Aprostola asclepiadis* (Lepidoptera: Noctuidae) may make for an ineffective weed biological control agent. **Lindsey Milbrath** (lindsey.milbrath@ars.usda.gov) and Jeromy Biazzo, USDA - ARS, Ithaca, NY
- D3459** Assessment of the diversity of *Aphthona* flea beetles for biological control of leafy spurge on the prairies. **Kevin Floate** (kevin.floate@agr.gc.ca)<sup>1</sup>, Rob Bouchier<sup>1</sup>, Paul Coghlin<sup>1</sup>, Bev Dunlop<sup>2</sup>, Dustin Ostrander<sup>3</sup>, and Laurent LeSage (deceased)<sup>4</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, Lethbridge, AB, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Brandon, MB, Canada, <sup>3</sup>Agriculture and Agri-Food Canada, Swift Current, SK, Canada, <sup>4</sup>Agriculture and Agri-Food Canada, Ottawa, ON, Canada
- D3460** Release of the planthopper *Megamelus scutellaris* for biological control of water hyacinth in northern California. **Patrick J. Moran** (patrick.moran@ars.usda.gov)<sup>1</sup> and Michael Pitcairn<sup>2</sup>, <sup>1</sup>USDA - ARS, Albany, CA, <sup>2</sup>California Dept. of Food and Agriculture, Sacramento, CA
- D3461** The role of Musotiminae stem borers as potential biological control agents of the climbing fern, *Lygodium microphyllum*, in Florida USA. **Matthew Purcell** (matthew.purcell@csiro.au)<sup>1</sup>, Jeff Makinson<sup>1</sup>, Ryan Zonneveld<sup>1</sup>, Bradley Brown<sup>1</sup>, Elizabeth Mattison<sup>2</sup>, and Paul Pratt<sup>3</sup>, <sup>1</sup>CSIRO, Brisbane, Australia, <sup>2</sup>USDA - ARS, Ft. Lauderdale, FL, <sup>3</sup>USDA - ARS, Albany, CA
- D3462** Evaluating the flight activity of the Comstock mealybug, *Pseudococcus comstocki*, using sex pheromone. **Min Gyu Cho** (inception12@nate.com), Chungnam National Univ., Daejeon, South Korea
- D3463** Regulation of invasive tree-of-heaven, *Ailanthus altissima*, by its native pest, *Eligma narcissus*, from Asia to Europe. **Gene-Sheng Tung** (gall@tfri.gov.tw) and Te-Pin Chang, Taiwan Forestry Research Institute, Taipei, Taiwan
- D3464** Does timing of release matter in early establishment of a galling insect for yellow toadflax biocontrol? **Rosemarie De Clerck-Floate** (rosemarie.declerck-floate@agr.gc.ca), Agriculture and Agri-Food Canada, Lethbridge, AB, Canada
- D3465** Diversity of *Encarsia* spp. (Hymenoptera: Aphelinidae) and their hosts on different plant species. **Antonio Busoli** (acbusoli@fcav.unesp.br) and Roseli Pessoa, São Paulo State Univ., Jaboticabal, Brazil
- D3466** Effects of the psyllid *Arytinnis hakani* on the invasive weed French broom, *Genista monspessulana*, in relation to plant size. **Brian Hogg** (brian.hogg@ars.usda.gov)<sup>1</sup>, Patrick J. Moran<sup>1</sup>, and Lincoln Smith<sup>2</sup>, <sup>1</sup>USDA - ARS, Albany, CA, <sup>2</sup>USDA - ARS, Montferrier-sur-Lez, France
- D3467** Eriophyid mites in weed biological control programs: A review of their host plant specialization and behavior. **Biljana Vidovic** (magud@agrif.bg.ac.rs)<sup>1</sup>, Massimo Cristofaro<sup>2</sup>, Enrico de Lillo<sup>3</sup>, Harriet Hinz<sup>4</sup>, Francesca Marini<sup>5</sup>, Radmila Petanović<sup>1</sup>, Brian G. Rector<sup>6</sup>, Urs Schaffner<sup>4</sup>, Sauro Simoni<sup>7</sup>, Anna Skoracka<sup>8</sup>, and Lincoln Smith<sup>9</sup>, <sup>1</sup>Univ. of Belgrade, Belgrade, Serbia, <sup>2</sup>ENEA, Rome, Italy, <sup>3</sup>Univ. of Bari, Bari, Italy, <sup>4</sup>CABI, Delémont, Switzerland, <sup>5</sup>Biotechnology and Biological Control Agency, Rome, Italy, <sup>6</sup>USDA - ARS, Reno, NV, <sup>7</sup>CREA, Florence, Italy, <sup>8</sup>Adam Mickiewicz Univ., Poznan, Poland, <sup>9</sup>USDA - ARS, Montferrier-sur-Lez, France
- D3468** Fundamental host range of *Leptoxypha hospita* (Hemiptera: Tingidae), a potential biological control agent of Chinese privet. **James Hanula** (jim.hanula@gmail.com)<sup>1</sup>, Scott Horn<sup>1</sup>, S. Kristine Braman<sup>2</sup>, Cera Jones<sup>3</sup>, and Jianghua Sun<sup>4</sup>, <sup>1</sup>USDA - Forest Service, Athens, GA, <sup>2</sup>Univ. of Georgia, Griffin, GA, <sup>3</sup>Univ. of Georgia, Athens, GA, <sup>4</sup>Chinese Academy of Sciences, Beijing, China
- D3469** Engineering transgenic resistance to the four serotypes of dengue virus in *Aedes aegypti*. **Velmurugan Balaraman** (balaramanv@missouri.edu)<sup>1</sup>, Jinyin Lin<sup>1</sup>, Asher Kantor<sup>1</sup>, Hannah Gerlt<sup>1</sup>, and Alexander Franz<sup>2</sup>, <sup>1</sup>Univ. of Missouri, Columbia, MO, <sup>2</sup>Colorado State Univ., Fort Collins, CO
- D3470** Midgut infection and dissemination of chikungunya virus in *Aedes aegypti*, a detailed analysis. **Shengzhang Dong** (dongs@missouri.edu)<sup>1</sup>, Asher Kantor<sup>1</sup>, Jinyin Lin<sup>1</sup>, Rollic Clem<sup>2</sup>, Lorena Passarelli<sup>2</sup>, and Alexander Franz<sup>1</sup>, <sup>1</sup>Univ. of Missouri, Columbia, MO, <sup>2</sup>Kansas State Univ., Manhattan, KS

## Poster Session 2: Ecology and Population Dynamics

### West Hall C (Convention Center)

- D3471** Comparing probing and feeding behavior of *Bemisia tabaci* (Hemiptera: Aleyrodidae) on tomato plants injected RNAi of *Bemisia tabaci*. Ji-Hyun Min, Jeong Hee Kim, Yong-Man Yu, and **Young-Nam Youn** (youngnam@cnu.ac.kr), Chungnam National Univ., Daejeon, South Korea
- D3472** A short-term exposure to predation affects body elemental content and geotaxis response in *Drosophila melanogaster*. **Indrikis Krams** (indrikis.krams@ut.ee), Tatjana Krama, Giedrius Trakimas, and Ronalds Krams, Daugavpils Univ., Daugavpils, Latvia



- D3473** Age-related differences in behaviour in the desert locust, *Schistocerca gregaria*. **Rien De Keyser** (rdk7@leicester.ac.uk), Univ. of Leicester, Leicester, United Kingdom
- D3474** Seasonal variability in the lipids of fall armyworm. **Mirian Hay-Roe** (mmmhr@ufl.edu)<sup>1</sup>, Rodney N. Nagoshi<sup>2</sup>, and Robert L. Meagher<sup>2</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>USDA - ARS, Gainesville, FL
- D3475** Assessing the flight capabilities of Asian longhorned beetle, *Anoplophora glabripennis* (Coleoptera: Cerambycidae), with computerized flight mills. **Vanessa Lopez** (lopezv@xavier.edu)<sup>1</sup>, Mark S. Hoddle<sup>2</sup>, Joseph Francese<sup>3</sup>, and Ann M. Ray<sup>1</sup>, <sup>1</sup>Xavier Univ., Cincinnati, OH, <sup>2</sup>Univ. of California, Riverside, CA, <sup>3</sup>USDA - APHIS, Buzzards Bay, MA
- D3476** The effect of plant diversity and seasonality on spider community in the tropical dry forest of the Sierra de Huautla Biosphere Reserve, Mexico. **Miguel Menéndez-Acuña** (menendezmigue@gmail.com), Gabriel Flores-Franco, and Efraín Tovar-Sánchez, Autonomous State Univ. of Morelos, Cuernavaca, Mexico
- D3477** Modeling interactions between macroparasites (wasp and fly) and microparasites (*Escovopsis* sp.) within primitive fungus-growing ants (*Apterostigma* sp.) system. **Cely González** (celytg20@gmail.com) and Hermógenes Fernández-Marín, Institute of Research and Scientific Services of Alta Tecnología, Panama, Panama
- D3478** Fungal pathogens diversity on the fungus growing ants *Atta colombica*, *Acromyrmex echinator*, *Trachymyrmex zeteki* and *Apterostigma* spp. (Hymenoptera: Formicidae) of Panama. **Yuliana Christopher** (yulianachristopher83@gmail.com) and Hermógenes Fernández-Marín, Institute of Research and Scientific Services of Alta Tecnología, Panama, Panama
- D3479** Oviposition site selection by *Arhopala bazalus* (Lepidoptera: Lycaenidae). **Yukari Mochioka** (sunrise\_01745@jcom.home.ne.jp), Motoaki Kinoshita, Hidezumi Ohashi, and Makoto Tokuda, Saga Univ., Saga, Japan
- D3480** Tetrastichinae wasps (Hymenoptera: Eulophidae) associated with *Stenodiplosis* Reuter (Diptera: Cecidomyiidae) in eastern South Dakota. **Juan Manuel Perilla López** (perillalopez.2@wright.edu)<sup>1,2</sup>, Paul J. Johnson<sup>2</sup>, Zoya Yefremova<sup>3</sup>, and Arvid Boe<sup>2</sup>, <sup>1</sup>Wright State Univ., Dayton, OH, <sup>2</sup>South Dakota State Univ., Brookings, SD, <sup>3</sup>Tel Aviv Univ., Tel Aviv, Israel
- D3481** Ecology and evolution of *Asphondylia borrichiae*. **Anthony Rossi** (arossi@unf.edu)<sup>1</sup>, and Keith Stokes<sup>2</sup>, <sup>1</sup>Univ. of North Florida, Jacksonville, FL, <sup>2</sup>USDA - ARS, Albany, CA
- D3482** Potential consequences of the exploitation of ant-acacia mutualisms by orb-weaver spiders. Anna Ledin and **John D. Styrsky** (styrsky.j@lynchburg.edu), Lynchburg College, Lynchburg, VA
- D3483** Ant foraging pattern influenced by the variation in the attractiveness of extrafloral nectaries. **Eduardo Calixto Soares** (calixtos.edu@gmail.com)<sup>1</sup>, Denise Lange<sup>2</sup>, and Kleber Del-Claro<sup>2</sup>, <sup>1</sup>Univ. of São Paulo, Uberlândia, Brazil, <sup>2</sup>Federal Univ. of Uberlândia, Uberlândia, Brazil
- D3484** Influence of four fall host plants on overwintering populations of *Lygus lineolaris*. **Katherine Parys** (katherine.parys@ars.usda.gov) and Gordon Snodgrass, USDA - ARS, Stoneville, MS
- D3485** Presentation withdrawn
- D3486** Pheromone trapping as a monitoring tool of brown stink bug, *Euschistus servus*, movement within cotton fields. **Vonny Barlow** (vbarlow@ucanr.edu), Univ. of California, Blythe, CA
- D3487** Spatial and temporal variation population in commercial flower crops of *Frankliniella occidentalis*. **Jhon Avellaneda** (ecologia@unimilitar.edu.co), Daniel Rodriguez, Stephanie Numa, and Marco Diaz Tapias, Nueva Granada Military University, Cajica, Colombia
- D3488** Spatial variability in infestations of coffee berry borer, *Hypothenemus hampei* (Ferrari), in commercial coffee orchards of Hawaii Island. **Ishakh Pulakkatu-Thodi** (ishakpt@gmail.com)<sup>1</sup>, Rosemary Gutierrez<sup>2</sup>, and Mark Wright<sup>1</sup>, <sup>1</sup>Univ. of Hawai'i, Honolulu, HI, <sup>2</sup>Univ. of Hawai'i, Hilo, HI
- D3489** Multi-species spatio-temporal patterns of oviposition in fruits of *Schoepfia schreberi* J. F. Gmel. (Olacaceae). **Maurilio Lopez** (maulopez@uv.mx)<sup>1</sup>, Efrén Dominguez<sup>2</sup>, and Francisco Diaz-Fleischer<sup>1</sup>, <sup>1</sup>Univ. of Veracruzana, Xalapa, Mexico, <sup>2</sup>Inbioteca Univ. of Veracruzana, Xalapa, Mexico
- D3490** Parthenogenesis of leafhopper, *Arboridia okamotoi*, caused by *Wolbachia*? Takuya Kurahashi, Shun Kumashiro, **Satoshi Kamitani** (kamitani@agr.kyushu-u.ac.jp) and Naomichi Ohara, Kyushu Univ., Fukuoka, Japan
- D3491** Parameter estimation for a temperature-dependent development model and an oviposition model of turnip aphid, *Lipaphis erysimi* Kaltentbach, on cabbage. **Soon Hwa Kwon** (shkwon@jejunu.ac.kr), Sung Oh Oh, and Dong-Soon Kim, Jeju National Univ., Jeju, South Korea

## Poster Session 2: Entomological Effects of Global Warming in Agriculture and Medical Entomology

### West Hall C (Convention Center)

- D3492** Effects of climate change on the efficiency of *Bacillus thuringiensis*. **Naiema Gorashi** (naiemaeltayeb@yahoo.com), National Centre for Research, Khartoum, Sudan
- D3493** Highly efficient site-specific mutagenesis in malaria mosquitoes. **Ming Li** (ming.li@ucr.edu) and Bradley White, Univ. of California, Riverside, CA
- D3494** Establishment and changes in the distribution of the leafminer fly, *Liriomyza huidobrensis* (Blanchard), in response to climate change forecast through spatial phenology modeling and GIS risk mapping. **Norma Mujica** (nmujica@cgiar.org), Jürgen Kroschel, and Pablo Carhuapoma, International Potato Center, Lima, Peru



Poster Session 2: Insect-Plant Interactions in a Changing Climate

West Hall C (Convention Center)

- D3495** Spatial synchrony analysis for the convergence of the distribution model of the pests and the crop. **Jung-Joon Park** (jungpark@gnu.ac.kr)<sup>1</sup>, Dong-Soon Kim<sup>2</sup>, and Kijong Cho<sup>3</sup>, <sup>1</sup>Gyeongsang National Univ., Jinju, South Korea, <sup>2</sup>Jeju National Univ., Cheju, South Korea, <sup>3</sup>Korea Univ., Seoul, South Korea
- D3496** A six-year study of bee (Apoidea) diversity and abundance in Georgia apple orchards during significantly different apple bloom periods. **Mark Schlueter** (mschluet@ggc.edu) and Nicholas Stewart, Georgia Gwinnett College, Lawrenceville, GA
- D3497** *Xylocopa varipuncta* and *X. virginica virginica* (Apidae) pierce nectarless *Hemerocallis* (Xanthorrhoeaceae) flowers from which *X. varipuncta* obtains cell fluid. **Edward Barrows** (barrowse@georgetown.edu), Georgetown Univ., Washington, DC
- D3498** Development of some molecular and biochemical markers associated with tolerance to insect attacks in sugar beet, *Beta vulgaris*. Ibrahim El-Hawary<sup>1</sup>, Aysam Fayed<sup>2</sup>, **Sobhy Hamed** (sobhy\_hamed@yahoo.com)<sup>1</sup>, Ahmed Bassyouny<sup>3</sup>, and Nahed N. A. El-Mahalawy<sup>4</sup>, <sup>1</sup>Tanta Univ., Tanta, Egypt, <sup>2</sup>Univ. of Sadat City, Sadat City, Egypt, <sup>3</sup>Sugar Crops Research Institute, Sakha, Egypt, <sup>4</sup>Agricultural Research Center, Sakha, Egypt
- D3499** A study on the host plant and the oviposition of *Ricania shantungensi* (Hemiptera: Ricaniidae) in Jeonbuk Province, Korea. **Su-Ji Jang** (jsjfeel88@korea.kr), Jeollabuk-do Agricultural Research and Extension Services, Iksan, South Korea
- D3500** Functional relationships between geometrid larval density, crown defoliation, NDVI, and accumulated tree damage in a subarctic birch forest. **Malin Ek** (malin.ek@uit.no)<sup>1</sup>, Jane Jepsen<sup>2</sup>, Ole-Petter Vindstad<sup>1</sup>, and Rolf Ims<sup>1</sup>, <sup>1</sup>Arctic Univ. of Norway, Tromsø, Norway, <sup>2</sup>Norwegian Institute for Nature Research, Tromsø, Norway
- D3501** Effects of white cabbage and broccoli hybrids on the life history traits of the cabbage moth, *Mamestra brassicae* (Lepidoptera: Noctuidae). **Tatiana Popova** (popovatatiana2016@yandex.ru) and Zieu Hoang, Russian Timiryazev State Agrarian Univ., Moscow, Russia
- D3502** Cotton fleahopper, *Pseudatomoscelis seriatus*, omnivory. **Loriann Garcia** (lgarcia@austincollege.edu), Austin College, Sherman, TX
- D3503** Transcriptome responses in maize-western corn rootworm interaction: A two-way approach. **Saumik Basu** (saumbios@gmail.com) and Joe Louis, Univ. of Nebraska, Lincoln, NE
- D3504** Multivariate analysis to assess potential oviposition and larval preferences of Monarch butterflies, *Danaus plexippus*, on roadside milkweeds. **Royce Bitzer** (mariposa@iastate.edu)<sup>1</sup>, Teresa Blader<sup>1</sup>, Sue Blodgett<sup>1</sup>, and Richard Hellmich<sup>2</sup>, <sup>1</sup>Iowa State Univ., Ames, IA, <sup>2</sup>USDA - ARS, Ames, IA

- D3505** Greenhouse whitefly, *Trialeurodes vaporariorum* (Hemiptera: Aleyrodidae), interaction and the water stress effect. **Jaime Verdugo** (jverdugo@utalca.cl)<sup>1</sup>, Francisca González-Klenner<sup>2</sup>, Marta Albornoz<sup>3</sup>, Germán Ávila-Sakar<sup>4</sup>, and Eugenio López L.<sup>2</sup>, <sup>1</sup>Univ. of Talca, Talca, Chile, <sup>2</sup>Pontifical Catholic Univ., Quillota, Chile, <sup>3</sup>Regional Center of Innovative Horticulture of Valparaiso, Quillota, Chile, <sup>4</sup>Univ. of Winnipeg, Winnipeg, MB, Canada
- D3506** Host specialization of bryophagous insect: Analysis of key factors. **Petr Pyszko** (pyszko.petr@gmail.com), Katerina Kuravova, Sarka Grucmanova, Martin Sigut, Petr Kocarek, Vitezslav Plasek, and Pavel Drozd, Univ. of Ostrava, Ostrava, Czech Republic

Symposium: Avocados, Blueberries, and Olives: Pests of Small Fruit in Florida

Room W223 A (Convention Center)

**Moderators and Organizers:** Jennifer Gillett-Kaufman<sup>1</sup> and Sandra A. Allan<sup>2</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>USDA - ARS, Gainesville, FL

- 9:15 **1123** Presentation withdrawn
- 9:30 **1124** Overview of key pests and potential invasive species in Florida blueberries. **Oscar Liburd** (oeliburd@ufl.edu), Univ. of Florida, Gainesville, FL
- 9:45 **1125** Pests and fungal organisms identified on olives (*Olea europaea*) in Florida. **Morgan Byron** (maconn00@ufl.edu)<sup>1</sup>, Jennifer Gillett-Kaufman<sup>1</sup>, and Sandra A. Allan<sup>2</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>USDA - ARS, Gainesville, FL
- 10:00 **1126** Avocado pests in Florida: Not what you expected. **Octavio Menocal** (omenocal@ufl.edu)<sup>1</sup>, Rita E. Duncan<sup>1</sup>, Jonathan H. Crane<sup>1</sup>, Randy Ploetz<sup>1</sup>, Paul E. Kendra<sup>2</sup>, and Daniel Carrillo<sup>1</sup>, <sup>1</sup>Univ. of Florida, Homestead, FL, <sup>2</sup>USDA - ARS, Miami, FL
- 10:15 BREAK**
- 10:30 **1127** Caribbean fruit fly (Diptera: Tephritidae) and small fruit in Florida. **Nancy D. Epsky** (nancy.epsky@ars.usda.gov) and Paul E. Kendra, USDA - ARS, Miami, FL
- 10:45 **1128** Strawberry pests in Florida: Learning from the past and predicting future pest problems. **Justin Renkema** (justin.renkema@ufl.edu), Univ. of Florida, Wimauma, FL
- 11:00 **1129** Management of native and introduced pollinators of small fruit in Florida. **Charles Stuhl** (charles.stuhl@ars.usda.gov), USDA - ARS, Gainesville, FL
- 11:15 **1130** Scale pests of small fruit in Florida: Native, introduced, and potential pests of concern. **Ian Stocks** (ian.stocks@freshfromflorida.com), Florida Dept. of Agriculture and Consumer Services, Gainesville, FL
- 11:30 **1131** Citrus pests on olives in Florida: Should we be worried? Sandy Allan<sup>1</sup> and **Jennifer Gillett-Kaufman** (gillett@ufl.edu)<sup>2</sup>, <sup>1</sup>USDA - ARS, Gainesville, FL, <sup>2</sup>Univ. of Florida, Gainesville, FL
- 11:45 **1132** Drones and strawberry production: New directions for Florida small fruit pest scouting. **Christopher Crockett** (crockettcd@ufl.edu), Univ. of Florida, Gainesville, FL



## Symposium: Innovative Responses to the Global Homogenization of Plantation Pests

### Room W331 D (Convention Center)

**Moderators and Organizers:** Brett Hurley<sup>1</sup>, Timothy Paine<sup>2</sup>, and Simon Lawson<sup>3</sup>, <sup>1</sup>Univ. of Pretoria, Pretoria, South Africa, <sup>2</sup>Univ. of California, Riverside, CA, <sup>3</sup>Univ. of the Sunshine Coast, Sippy Downs, Australia

- 9:15 **1133** Integrated approaches for managing forestry pests: Risks and benefits. **Timothy Paine** (timothy.paine@ucr.edu), Univ. of California, Riverside, CA
- 9:45 **1134** New technologies for surveying forest insect pests. **Andrea Battisti** (andrea.battisti@unipd.it), Univ. of Padova, Legnaro, Italy
- 10:00 **1135** Impact of cryptic diversity and misidentifications in managing invasions. **Jeff Garnas** (jeff.garnas@up.ac.za), Michael Wingfield, and Bernard Slippers, Univ. of Pretoria, Pretoria, South Africa
- 10:15 BREAK**
- 10:30 **1136** Biological control of eucalypt pests: Benefits of diverse collaboration. **Simon Lawson** (slawson@usc.edu.au)<sup>1</sup>, Manon Griffiths<sup>2</sup>, Helen Nahrung<sup>1</sup>, and Madaline Healey<sup>1</sup>, <sup>1</sup>Univ. of the Sunshine Coast, Sippy Downs, Australia, <sup>2</sup>Dept. of Agriculture and Fisheries, Dutton Park, Australia
- 10:45 **1137** Use of chemical and visual cues for plantation pest surveillance and monitoring. **Gonzalo Martinez** (gmartinez@tb.inia.org.uy) and Demian Gomez, National Institute of Agricultural Research, Tacuarembó, Uruguay
- 11:00 **1138** Microbial agents as endophytes to protect plants. **Thu Pham** (phamquangthu@vafs.gov.vn), Dinh Vu, and Binh Le, Vietnamese Academy of Forest Sciences, Hanoi, Vietnam

## Symposium: Spruce Budworm Genomics: From Basic Science to Outbreak Management

### Room W340 A (Convention Center)

**Moderator and Organizer:** Michel Cosson, Natural Resources Canada, Québec City, QC, Canada

- 9:15 **1139** Getting through the winter without protective clothing: Insights from the spruce budworm genome. Daniel Doucet<sup>1</sup>, Catherine Béliveau<sup>2</sup>, Brian Boyle<sup>3</sup>, Jérôme Laroche<sup>3</sup>, Ken Dewar<sup>4</sup>, Nikoleta Juretic<sup>4</sup>, Jessica Wasserscheid<sup>4</sup>, Lisa Lumley<sup>5</sup>, Felix Sperling<sup>6</sup>, Roger Levesque<sup>3</sup>, and **Michel Cosson** (michel.cosson@canada.ca)<sup>2,3</sup>, <sup>1</sup>Natural Resources Canada, Sault Ste. Marie, ON, Canada, <sup>2</sup>Natural Resources Canada, Québec City, QC, Canada, <sup>3</sup>Univ. Laval, Québec City, QC, Canada, <sup>4</sup>McGill Univ., Montréal, QC, Canada, <sup>5</sup>Royal Alberta Museum, Edmonton, AB, Canada, <sup>6</sup>Univ. of Alberta, Edmonton, AB, Canada
- 9:30 **1140** The spruce budworm transcriptome and its use in identifying the molecular and endocrine correlates of early instar diapause. **Marcelo Brandão** (brandao.marcelo@gmail.com)<sup>1,2</sup>, Catherine Béliveau<sup>3</sup>, Brian Boyle<sup>4</sup>, Daniel Doucet<sup>5</sup>, Fayuan Wen<sup>5</sup>,

Lisa Lumley<sup>3,4,6</sup>, Felix Sperling<sup>2</sup>, Nikoleta Juretic<sup>7</sup>, Ken Dewar<sup>7</sup>, Roger Levesque<sup>4</sup>, and Michel Cosson<sup>3,4</sup>, <sup>1</sup>Univ. of Campinas, Campinas, Brazil, <sup>2</sup>Univ. of Alberta, Edmonton, AB, Canada, <sup>3</sup>Natural Resources Canada, Québec City, QC, Canada, <sup>4</sup>Univ. Laval, Québec City, QC, Canada, <sup>5</sup>Natural Resources Canada, Sault Ste. Marie, ON, Canada, <sup>6</sup>Royal Alberta Museum, Edmonton, AB, Canada, <sup>7</sup>McGill Univ., Montréal, QC, Canada

- 9:45 **1141** A genotyping-by-sequencing (GBS) linkage map for *Choristoneura fumiferana* and assessment of its synteny with the *Bombyx* genome. **Sandrine Picq** (sandrine.picq@gmail.com)<sup>1,2</sup>, Jérôme Laroche<sup>1</sup>, Lisa Lumley<sup>1,2,3</sup>, Bryan Brunet<sup>4</sup>, Esther Pouliot<sup>2</sup>, Brian Boyle<sup>1</sup>, Felix Sperling<sup>4</sup>, Roger Levesque<sup>1</sup>, and Michel Cosson<sup>1,2</sup>, <sup>1</sup>Univ. Laval, Québec City, QC, Canada, <sup>2</sup>Natural Resources Canada, Québec City, QC, Canada, <sup>3</sup>Royal Alberta Museum, Edmonton, AB, Canada, <sup>4</sup>Univ. of Alberta, Edmonton, AB, Canada
- 10:00 **1142** Population genetic structure of the spruce budworm (*Choristoneura fumiferana*) across North America: Are SNP markers valuable for the detection of migrants? **Lisa Lumley** (lisa.lumley@hotmail.com)<sup>1,2,3</sup>, Esther Pouliot<sup>2</sup>, Gwylim Blackburn<sup>4</sup>, Bryan Brunet<sup>4</sup>, Brian Boyle<sup>3</sup>, Felix Sperling<sup>4</sup>, and Michel Cosson<sup>2,3</sup>, <sup>1</sup>Royal Alberta Museum, Edmonton, AB, Canada, <sup>2</sup>Natural Resources Canada, Québec City, QC, Canada, <sup>3</sup>Univ. Laval, Québec City, QC, Canada, <sup>4</sup>Univ. of Alberta, Edmonton, AB, Canada

### 10:15 BREAK

- 10:30 **1143** Phylogeny and species delimitation of the spruce budworm group: A historical perspective. **Felix Sperling** (felix.sperling@ualberta.ca)<sup>1</sup>, Julian Dupuis<sup>1</sup>, Giovanni Fagua<sup>1</sup>, Bryan Brunet<sup>1</sup>, Gwylim Blackburn<sup>1</sup>, Heather Leibel<sup>1</sup>, Lisa Lumley<sup>2,3,4</sup>, Brian Boyle<sup>2</sup>, Roger Levesque<sup>2</sup>, and Michel Cosson<sup>2,4</sup>, <sup>1</sup>Univ. of Alberta, Edmonton, AB, Canada, <sup>2</sup>Univ. Laval, Québec City, QC, Canada, <sup>3</sup>Royal Alberta Museum, Edmonton, AB, Canada, <sup>4</sup>Natural Resources Canada, Québec City, QC, Canada

- 10:45 **1144** Divergence with gene flow among incipient *Choristoneura* species: A landscape genomic comparative analysis. **Gwylim Blackburn** (gwylim.blackburn@gmail.com)<sup>1</sup>, Bryan Brunet<sup>1</sup>, Lisa Lumley<sup>2,3,4</sup>, Kevin Muirhead<sup>1</sup>, and Felix Sperling<sup>1</sup>, <sup>1</sup>Univ. of Alberta, Edmonton, AB, Canada, <sup>2</sup>Univ. Laval, Québec City, QC, Canada, <sup>3</sup>Royal Alberta Museum, Edmonton, AB, Canada, <sup>4</sup>Natural Resources Canada, Québec City, QC, Canada

- 11:00 **1145** Using spatial genomics to distinguish drivers of outbreak synchrony in an irruptive forest insect pest. **Patrick James** (patrick.ma.james@gmail.com)<sup>1</sup>, Colin Garroway<sup>1</sup>, Bryan Brunet<sup>2</sup>, Michel Cosson<sup>3,4</sup>, Robert Johns<sup>5</sup>, and Lisa Lumley<sup>3,4,6</sup>, <sup>1</sup>Univ. of Montréal, Montréal, QC, Canada, <sup>2</sup>Univ. of Alberta, Edmonton, AB, Canada, <sup>3</sup>Univ. Laval, Québec City, QC, Canada, <sup>4</sup>Natural Resources Canada, Québec City, QC, Canada, <sup>5</sup>Natural Resources Canada, Fredericton, NB, Canada, <sup>6</sup>Royal Alberta Museum, Edmonton, AB, Canada



**Symposium: Biocontrol and Induced Plant Defences: A Tale of Three Trophic Levels**

**Room W230 C (Convention Center)**

**Moderators and Organizers:** Geoff Gurr<sup>1</sup> and Olivia Reynolds<sup>2</sup>,  
<sup>1</sup>Charles Sturt Univ., Orange, Australia, <sup>2</sup>New South Wales Dept. of Primary Industries, Menangle, Australia

- 9:15 **1146** Plant defence induction and priming for conservation biological control of phytophagous insect pests by parasitoids. **John Pickett** (john.pickett@rothamsted.ac.uk), Rothamsted Research, Harpenden, United Kingdom
- 9:45 **1147** Mycorrhiza-induced plant defense and mediated tritrophic interactions. **Rensen Zeng** (rszeng@scau.edu.cn) and YuanYuan Song, Fujian Agriculture and Forestry Univ., Fuzhou, China
- 10:15 BREAK**
- 10:30 **1148** Enhancing biological control of a root pest: Responses of entomopathogenic nematodes to chemical defenses of the western corn rootworm. **Angela Koehler** (angela.koehler@unine.ch)<sup>1</sup>, Christelle Robert<sup>2</sup>, Matthias Erb<sup>2</sup>, and Ted Turlings<sup>1</sup>, <sup>1</sup>Univ. of Neuchâtel, Neuchâtel, Switzerland, <sup>2</sup>Univ. of Bern, Bern, Switzerland
- 10:45 **1149** Silicon-augmented resistance of plants: Bi- and tri-trophic effects. **Olivia Reynolds** (olivia.reynolds@dpi.nsw.gov.au)<sup>1</sup> and Geoffrey Gurr<sup>2,3</sup>, <sup>1</sup>New South Wales Dept. of Primary Industries, Menangle, Australia, <sup>2</sup>Fujian Agriculture & Forestry Univ., Fuzhou, China, <sup>3</sup>Charles Sturt Univ., Orange, Australia
- 11:00 **1150** Volatile-mediated tritrophic interactions and biological control. **Jian Liu** (liujianwh@gmail.com)<sup>1</sup>, Olivia Reynolds<sup>2</sup>, Pengjun Zhang<sup>3</sup>, Liwei Han<sup>1</sup>, Jinhong Wu<sup>1</sup>, Rensen Zeng<sup>1</sup>, and Geoffrey Gurr<sup>1,4</sup>, <sup>1</sup>Fujian Agriculture & Forestry Univ., Fuzhou, China, <sup>2</sup>New South Wales Dept. of Primary Industries, Menangle, Australia, <sup>3</sup>Jiliang Univ., Hangzhou, China, <sup>4</sup>Charles Sturt Univ., Orange, Australia
- 11:15 **1151** Chemistry of the invasive weed *Echium plantagineum*: Effects on arthropods. **Saiful Z. Jamil** (sfzaimi@gmail.com)<sup>1</sup>, Leslie A. Weston<sup>2</sup>, Paul A. Weston<sup>2</sup>, and Geoffrey Gurr<sup>1</sup>, <sup>1</sup>Charles Sturt Univ., Orange, Australia, <sup>2</sup>Charles Sturt Univ., Wagga Wagga, Australia
- 11:30 **1152** Co-occurring herbivore guilds compromise aphid biocontrol: Evidence from natural and true field experiments. **Carmen K. Blubaugh** (carmen.blubaugh@wsu.edu) and William E. Snyder, Washington State Univ., Pullman, WA

**Symposium: Parasitoid Assemblages in Agroecosystems: Environmental Drivers Affecting Biocontrol**

**Room W231 A (Convention Center)**

**Moderators and Organizers:** Blas Lavandero<sup>1</sup> and Michael Traugott<sup>2</sup>, <sup>1</sup>Univ. of Talca, Talca, Chile, <sup>2</sup>Univ. of Innsbruck, Innsbruck, Austria

- 9:15 **1153** Effect of management and landscape context on the interactions between predators and parasitoids in wheat fields. **Blas Lavandero** (blavandero@utalca.cl)<sup>1</sup>, Sebastián Ortiz-Martínez<sup>1</sup>, and Lucie Raymond<sup>2</sup>, <sup>1</sup>Univ. of Talca, Talca, Chile, <sup>2</sup>French National Centre for Science, Paris, France
- 9:30 **1154** Influence of landscape complexity on trophic interactions among primary and secondary parasitoids of the English grain aphid. **Sebastián Ortiz-Martínez** (sebastianortizmartinez@gmail.com) and Blas Lavandero, Univ. of Talca, Talca, Chile
- 9:45 **1155** Understanding effects of fertilization management on aphid-parasitoid-endosymbiont networks. **Oskar Rubbmark** (oskar.rubbmark@uibk.ac.at)<sup>1</sup>, Zhengpei Ye<sup>1</sup>, Ines Vollhardt<sup>2</sup>, Daniela Sint<sup>1</sup>, Romina Reinpold<sup>1</sup>, Nadia Parth<sup>1</sup>, and Michael Traugott<sup>1</sup>, <sup>1</sup>Univ. of Innsbruck, Innsbruck, Austria, <sup>2</sup>Georg August Univ., Göttingen, Germany
- 10:00 **1156** Disentangling aphid food webs gives the key to biologically control *Aphis spiraecola* in citrus. **Alejandro Tena** (atena@ivia.es), Francesc Gómez-Marco, and Alberto Urbaneja, Valenciano Institute of Agrarian Research, Moncada, Spain
- 10:15 BREAK**
- 10:30 **1157** Parasitoid interactions from crop and non-crop resources. **Manuel Plantegenest** (manuel.plantegenest@agrocampus-ouest.fr)<sup>1</sup> and Stéphane Derocles<sup>2</sup>, <sup>1</sup>Agrocampus-Ouest, Rennes, France, <sup>2</sup>Univ. of Rennes, Rennes, France
- 10:45 **1158** Keeping pest populations lower for longer: Connecting farms and natural systems. **Vesna Gagic** (vesna.gagic@slu.se)<sup>1</sup> and Nancy Schellhorn<sup>2</sup>, <sup>1</sup>CSIRO, Brisbane, Australia, <sup>2</sup>CSIRO, Dutton Park, Australia
- 11:00 **1159** Ecological filters driving life-history traits in a guild of insect parasitoids. **Joan van Baaren** (joan.van-baaren@univ-rennes1.fr)<sup>1</sup>, Yannick Outreman<sup>2</sup>, Thiago Oliveira Andrade<sup>1</sup>, Philippe Louâpre<sup>3</sup>, and Cyrille Violle<sup>4</sup>, <sup>1</sup>Univ. of Rennes, Rennes, France, <sup>2</sup>Agrocampus-Ouest, Rennes, France, <sup>3</sup>Univ. of Bourgogne, Dijon, France, <sup>4</sup>National Center for Scientific Research, Montpellier, France
- 11:15 **1160** Physiological status of parasitoids affecting host selection. **Maria Velasco Hernández** (totli23@hotmail.com)<sup>1</sup>, Nicolas Desneux<sup>2</sup>, and Ricardo Ramirez-Romero<sup>3</sup>, <sup>1</sup>Univ. of Guadalajara, Jalisco, Mexico, <sup>2</sup>INRA, Sophia Antipolis, France, <sup>3</sup>Central Univ. of Biological Science and Agriculture, Guadalajara, Mexico
- 11:30 **1161** Parasitoid host range, establishment success, and biological control efficacy. **Joe Kaser** (kaser008@umn.edu) and George Heimpel, Univ. of Minnesota, St. Paul, MN



TUESDAY



- 11:45 **1162** An innovative isotopic method to track the exploitation of trophic resources by parasitoids in the field. **Bruno Jaloux** (bruno.jaloux@agrocampus-ouest.fr)<sup>1</sup> and Manuel Plantegenest<sup>2</sup>, <sup>1</sup>Agrocampus-Ouest, Angers, France, <sup>2</sup>Agrocampus-Ouest, Rennes, France
- 12:00 **1163** Assessing parasitoid assemblages in agro-ecosystems: What do molecular approaches offer? **Michael Traugott** (michael.traugott@uibk.ac.at)<sup>1</sup>, Zhengpei Ye<sup>1</sup>, and Ines Vollhardt<sup>2</sup>, <sup>1</sup>Univ. of Innsbruck, Innsbruck, Austria, <sup>2</sup>Georg August Univ., Göttingen, Germany

### Symposium: Climate Change: Preventing the Spread of Invasive Species in Agriculture

#### Room W230 A (Convention Center)

**Moderators and Organizers:** Alvin M. Simmons<sup>1</sup>, Andrew Cuthbertson<sup>2</sup>, and Jesusa C. Legaspi<sup>3</sup>, <sup>1</sup>USDA - ARS, Charleston, SC, <sup>2</sup>Fera Science Ltd., York, United Kingdom, <sup>3</sup>USDA - ARS, Tallahassee, FL

- 9:15 **1164** Modeling the effects of climate on the infestation patterns of a migratory crop pest insect. **Rodney N. Nagoshi** (rodney.nagoshi@ars.usda.gov)<sup>1</sup>, John Westbrook<sup>2</sup>, Robert L. Meagher<sup>1</sup>, and Shelby J. Fleischer<sup>3</sup>, <sup>1</sup>USDA - ARS, Gainesville, FL, <sup>2</sup>USDA - ARS, College Station, TX, <sup>3</sup>Pennsylvania State Univ., University Park, PA
- 9:30 **1165** *Bemisia tabaci* – preventing a global pest from establishing in the UK. **Andrew G. S. Cuthbertson** (andrew.cuthbertson@fera.co.uk), Fera Science, Ltd., York, United Kingdom
- 9:45 **1166** Comparison of temperature effects on three *Bemisia tabaci* parasitoids. Zhan He<sup>1</sup>, Fang Dang<sup>1</sup>, Ze-Yun Fan<sup>1</sup>, Andrew G. S. Cuthbertson<sup>2</sup>, Shun-Xiang Ren<sup>1</sup>, and **Bao-Li Qiu** (baileyqiu@scau.edu.cn)<sup>1</sup>, <sup>1</sup>South China Agricultural Univ., Guangdong, China, <sup>2</sup>Fera Science Ltd., York, United Kingdom
- 10:00 **1167** Agent-based model for simulation of Asian citrus psyllid spread across different landscapes. **Weiqi Luo** (weiqi.luo@ars.usda.gov) and Tim Gottwald, USDA - ARS, Ft. Pierce, FL
- 10:15 BREAK**
- 10:30 **1168** Climate changes and biological pest control: From tri-trophic interactions to geographical distribution. **Moshe Coll** (moshe.coll@mail.huji.ac.il)<sup>1</sup>, Tarryn Schuldiner-Harpaz<sup>1</sup>, and Lesley Hughes<sup>2</sup>, <sup>1</sup>The Hebrew Univ., Rehovot, Israel, <sup>2</sup>Macquarie Univ., Sydney, Australia
- 10:45 **1169** Insect-proofing Fortress Ireland. **Archie Murchie** (archie.murchie@afbini.gov.uk)<sup>1</sup>, Stephen Jess<sup>1</sup>, and Rachel Wisdom<sup>2</sup>, <sup>1</sup>Agri-Food and Biosciences Institute, Belfast, United Kingdom, <sup>2</sup>Dept. of Agriculture, Food and the Marine, Kildare, Ireland
- 11:00 **1170** Effect of climate change on *Bemisia tabaci* in southeast USA. **Alvin M. Simmons** (alvin.simmons@ars.usda.gov), USDA - ARS, Charleston, SC

### Symposium: Entomological Issues Beyond Borders: Challenges and Opportunities for Sustainable Solutions

#### West Hall F3 (WF3) (Convention Center)

**Moderators and Organizers:** Suhas Vyavhare<sup>1</sup>, M. O. Way<sup>2</sup>, Raul Medina<sup>3</sup>, and Juliana Rangel<sup>3</sup>, <sup>1</sup>Texas A&M AgriLife Research, Beaumont, TX, <sup>2</sup>Texas A&M Univ., Beaumont, TX, <sup>3</sup>Texas A&M Univ., College Station, TX

- 9:15 **1171** Agricultural intensification, crop protection technology, and the challenge of resistance management. **George Kennedy** (george\_kennedy@ncsu.edu) and Anders Huseeth, North Carolina State Univ., Raleigh, NC
- 9:45 **1172** Prospects of egg-killing defensive traits for sustainable crop protection. **Antonino Cusumano** (cusumanoantonino@unipa.it)<sup>1</sup>, Stefano Colazza<sup>2</sup>, and Nina Fatouros<sup>3</sup>, <sup>1</sup>Wageningen Univ. and Research Centre, Wageningen, Netherlands, <sup>2</sup>Univ. of Palermo, Palermo, Italy, <sup>3</sup>Freie Univ., Berlin, Germany
- 10:00 **1173** The use of best management practices for optimizing sustainable corn rootworm management programs. **Shannon Morsello** (shannon.morsello@syngenta.com)<sup>1</sup> and Tony Burd<sup>2</sup>, <sup>1</sup>Syngenta, Greensboro, NC, <sup>2</sup>Syngenta Crop Protection, Research Triangle Park, NC
- 10:15 BREAK**
- 10:30 **1174** From Mexico, Switzerland, and the USA, the effects of early induction on the performance of the seeds and fruit predators, changing the physiological state of the seeds and fruits. **Johnattan Hernández-Cumplido** (johnattan.hernandez@unine.ch)<sup>1</sup>, Betty Berney<sup>2</sup>, and Cesar Rodriguez<sup>3</sup>, <sup>1</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, <sup>2</sup>Univ. of Neuchâtel, Neuchâtel, Switzerland, <sup>3</sup>Rutgers, The State Univ. of New Jersey, Chatsworth, NJ
- 10:45 **1175** *Nezara viridula* (L.) – an agricultural pest without borders. **Jesus F. Esquivel** (jesus.esquivel@ars.usda.gov)<sup>1</sup>, J. E. McPherson<sup>2</sup>, Jocelia Grazia<sup>3</sup>, Jeremy Greene<sup>4</sup>, Walker A. Jones<sup>5</sup>, Robert M. McPherson<sup>6</sup>, Dmitry Musolin<sup>7</sup>, Wolfgang Rabitsch<sup>8</sup>, Cristiano Schwertner<sup>9</sup>, and Michael Toews<sup>6</sup>, <sup>1</sup>USDA - ARS, College Station, TX, <sup>2</sup>Southern Illinois Univ., Carbondale, IL, <sup>3</sup>Federal Univ. of Rio Grande do Sul, Porto Alegre, Brazil, <sup>4</sup>Clemson Univ., Blackville, SC, <sup>5</sup>USDA - ARS, Stoneville, MS, <sup>6</sup>Univ. of Georgia, Tifton, GA, <sup>7</sup>Saint Petersburg State Forest Technical Univ., St. Petersburg, Russia, <sup>8</sup>Environmental Agency Austria, Vienna, Austria, <sup>9</sup>Federal Univ. of São Paulo, Diadema, Brazil
- 11:00 **1176** Invasive species, globalization, and climate change: Challenges and solutions? **George Roderick** (roderick@berkeley.edu), Univ. of California, Berkeley, CA
- 11:30 **1177** Pest management challenges in managed honey bees (*Apis mellifera*) in the southern United States. Lauren Ward<sup>1</sup>, Juliana Rangel<sup>1</sup> and **Meghan Milbrath** (mpi@msu.edu)<sup>2</sup>, <sup>1</sup>Texas A&M University, College Station, TX, <sup>2</sup>Michigan State University, East Lansing, MI



11:45 **1178** Development of an early detection system for exotic honey bee species and novel pests. **Mark Dykes** (mdykes@tamu.edu)<sup>1</sup>, Mary Reed<sup>2</sup>, and Bill Baxter<sup>2</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Texas Apiary Inspection Service, College Station, TX

### Symposium: Microbial Modulation of Insect Immunity

#### Room W331 B (Convention Center)

**Moderators and Organizers:** Elizabeth McGraw<sup>1</sup> and Kerry M. Oliver<sup>2</sup>, <sup>1</sup>Monash Univ., Melbourne, Australia, <sup>2</sup>Univ. of Georgia, Athens, GA

9:15 **1179** Insects' little helpers: Symbiont-produced secondary metabolites for pathogen defense. **Martin Kaltenpoth** (mkaltenpoth@ice.mpg.de), Max Planck Institute for Chemical Ecology, Jena, Germany

9:45 **1180** Mechanism of symbiont-mediated defense against parasitic nematodes. **Steve J. Perlman** (stevep@uvic.ca) and Phineas Hamilton, Univ. of Victoria, Victoria, BC, Canada

#### 10:15 BREAK

10:30 **1181** Symbiont-based protection against parasitoids in aphids. **Kerry M. Oliver** (kmoliver@uga.edu), Stephanie Weldon, and Adam J. Martinez, Univ. of Georgia, Athens, GA

10:45 **1182** The impact of the bee gut microbiota on plant secondary compound conversion, and its potential role in modulating susceptibility to parasites. **Hauke Koch** (hauke.koch@utexas.edu), The Univ. of Texas, Austin, TX

11:00 **1183** Transcriptomics of the *Spiroplasma* defense against parasitoids of *Drosophila*. **Mariana Mateos** (mmateos@tamu.edu)<sup>1</sup>, Victor Higuera-Alvear<sup>2</sup>, and Esperanza Martinez-Romero<sup>2</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>National Autonomous Univ. of México, Cuernavaca, Mexico

11:15 **1184** On *Wolbachia*, immunity and pathogen blocking. **Elizabeth McGraw** (beth.mcgraw@monash.edu), Monash Univ., Melbourne, Australia

11:30 **1185** The bacterium *Wolbachia* exploits host innate immunity to establish a symbiotic relationship with the dengue vector mosquito *Aedes aegypti*. **Xiaoling Pan** (xpan@msu.edu)<sup>1</sup>, Andrew Pike<sup>1</sup>, Deepak Joshi<sup>1</sup>, Guowu Bian<sup>1</sup>, Michael McFadden<sup>1</sup>, Peng Lu<sup>1</sup>, Fengrui Zhang<sup>1</sup>, Xiao Liang<sup>1</sup>, Zhiyong Xi<sup>1</sup>, and Alexander Raikhel<sup>2</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>Univ. of California, Riverside, CA

### Symposium: Reproductive Interference and its Applications

#### Room W224 G (Convention Center)

**Moderators and Organizers:** Noriyuki Suzuki<sup>1</sup> and Norikuni Kumano<sup>2</sup>, <sup>1</sup>Univ. of California, Berkeley, CA, <sup>2</sup>Obihiro Univ. of Agriculture and Veterinary Medicine, Obihiro, Japan

9:15 **1186** Satyrization and satyrization-resistance in competitive displacements of invasive mosquito species. **Irka E. Bargielowski** (irka@ufl.edu), Univ. of Florida, Vero Beach, FL

9:30 **1187** Causes and consequences of reproductive interference between two closely related insect species. **Jennifer Hamel** (jhamel2@elon.edu)<sup>1</sup> and Christine W. Miller<sup>2</sup>, <sup>1</sup>Elon Univ., Elon, NC, <sup>2</sup>Univ. of Florida, Gainesville, FL

9:45 **1188** Conspecific sperm precedence does not work as a barrier against reproductive interference. **Noriyuki Suzuki** (fvgnoriyuki@gmail.com), Univ. of California, Berkeley, CA

10:00 **1189** Noisy neighbors can hamper the evolution of reproductive isolation by reinforcing selection. **Daniel Matute** (dmatute@email.unc.edu), Univ. of North Carolina, Chapel Hill, NC

#### 10:15 BREAK

10:30 **1190** Sperm marking using the trace element rubidium to improve the monitoring of the sterile sperm usage in the sterile insect technique. **Norikuni Kumano** (nrkumano@obihiro.ac.jp)<sup>1,2</sup>, Kiyohito Teruya<sup>2</sup>, Kaori Tsurui<sup>3</sup>, and Tetsuya Toyosato<sup>2,4</sup>, <sup>1</sup>Obihiro Univ. of Agriculture and Veterinary Medicine, Obihiro, Japan, <sup>2</sup>Okinawa Prefectural Plant Protection Center, Naha, Japan, <sup>3</sup>Univ. of the Ryukyus, Nishihara, Japan, <sup>4</sup>Ryukyu-Sankei Co. Ltd., Naha, Japan

10:45 **1191** Suppression and eradication of invasive pest species using reproductive interference with congeneric sterilized species. **Atsushi Honma** (honma.tetrix@gmail.com), Univ. of the Ryukyus, Okinawa, Japan

#### 11:00 Discussion

### Symposium: Unmanned Aerial Systems (Drones) for Precision Mosquito Control and Agricultural Use

#### Room W315 B (Convention Center)

**Moderators and Organizers:** Ary Faraji<sup>1</sup>, Randy Gaugler<sup>2</sup>, and Greg Williams<sup>3</sup>, <sup>1</sup>Salt Lake City Mosquito Abatement District, Salt Lake City, UT, <sup>2</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, <sup>3</sup>Hudson County Mosquito Control, Jersey City, NJ

9:15 **1192** Project PREMONITION: Autonomous systems for emerging infectious disease surveillance. **Ethan Jackson** (ejackson@microsoft.com)<sup>1</sup> and Douglas E. Norris<sup>2</sup>, <sup>1</sup>Microsoft, Redmond, WA, <sup>2</sup>Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

9:45 **1193** Unmanned aerial systems for vector surveillance and control. **Greg Williams** (gwilliams@hudsonregionalhealth.org)<sup>1</sup>, Randy Gaugler<sup>2</sup>, Ary Faraji<sup>3</sup>, and Scott Crans<sup>2</sup>, <sup>1</sup>Hudson County Mosquito Control, Jersey City, NJ, <sup>2</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, <sup>3</sup>Salt Lake City Mosquito Abatement District, Salt Lake City, UT

10:00 **1194** Optimizing surveillance protocols in cropping systems using unmanned aircraft systems. **Brian McCornack** (bmccornack@gmail.com) and Travis Balthazor, Kansas State Univ., Manhattan, KS

#### 10:15 BREAK



- 10:30 **1195** Remote scouting of insects in agricultural systems. **Ian MacRae** (imacrae@umn.edu)<sup>1</sup>, Robert Koch<sup>2</sup>, Tim Baker<sup>1</sup>, and Zach Marston<sup>3</sup>, <sup>1</sup>Univ. of Minnesota, Crookston, MN, <sup>2</sup>Minnesota Dept. of Agriculture, St. Paul, MN, <sup>3</sup>Univ. of Minnesota, St. Paul, MN
- 10:45 **1196** Remote piloted aircraft: Operational surveillance and application technology. **Bill Reynolds** (breynolds@leateam.com), Leading Edge Associates, Inc., Fletcher, NC

### Symposium: Genomic and Genetic Strategies Toward Integrated Pest Management

#### Room W315 A (Convention Center)

**Moderators and Organizers:** Fang (Rose) Zhu and Laura C. Lavine, Washington State Univ., Pullman, WA

- 9:15 **1197** Enabling technologies for next generation pest management. **Subba Reddy Palli** (rpalli@uky.edu), Univ. of Kentucky, Lexington, KY
- 9:30 **1198** Genome maps to complement genome sequence. **Susan Brown** (sjbrown@k-state.edu), Kansas State Univ., Manhattan, KS
- 9:45 **1199** Potential of RNAi-based transgenic maize for locust management. **Enbo Ma** (maenbo2003@sxu.edu.cn), Daqi Li, and Jianzhen Zhang, Shanxi Univ., Taiyuan, China
- 10:00 **1200** Insects and their viruses originated small RNAs as potential insecticidal molecules. **Raj Bhatnagar** (raj@icgeb.res.in), Bindiya Sachdev, and Naresh Arora, International Centre for Genetic Engineering and Biotechnology, New Delhi, India
- 10:15 BREAK**
- 10:30 **1201** Insecticide resistance: Impact, mechanisms, and research directions. **Nannan Liu** (liunann@auburn.edu), Auburn Univ., Auburn, AL
- 10:45 **1202** Use of RNAi to validate genes involved in insecticide tolerance as a proactive resistance monitoring strategy. **John Clark** (jclark@vasci.umass.edu), Univ. of Massachusetts, Amherst, MA
- 11:00 **1203** Interaction of *Anopheles* mosquito with a maternally inherited *Wolbachia* symbiont and its potential use in malaria control. **Deepak Joshi** (djoshi.email@yahoo.com), Zhiyong Xi, Xiaoling Pan, Michael McFadden, David Bevins, Xiao Liang, and Peng Lu, Michigan State Univ., East Lansing, MI
- 11:15 **1204** Termite translational genomics and development of pest management technology. **Michael E. Scharf** (mscharf@purdue.edu), Purdue Univ., West Lafayette, IN
- 11:30 **1205** Colony collapse in termites – disruption of social homeostasis using behavioral genomics toolsets. **Xuguo Zhou** (xuguozhou@uky.edu), Univ. of Kentucky, Lexington, KY
- 11:45 **1206** Different pathogenicities of Rice stripe virus from the insect vector and from viruliferous plants. **Feng Cui** (cuif@ioz.ac.cn), Wan Zhao, Pengcheng Yang, and Le Kang, Chinese Academy of Sciences, Beijing, China

### Symposium: Genetic Architecture of Species Differences

#### Room W414 B (Convention Center)

**Moderator and Organizer:** Jürgen Gadau, Arizona State Univ., Tempe, AZ

- 9:15 **1207** The genetics of male-female coevolution of communication behaviors. Kerry Shaw and **Mingzi Xu** (mx52@cornell.edu), Cornell University, Ithaca, NY
- 9:45 **1208** Transcriptional plasticity and host specific trade-offs in larval performance along the *Rhagoletis* speciation continuum. Gregory Ragland<sup>1,2</sup>, Kristin Almskaar<sup>3</sup>, Kim Vertacnik<sup>3,4</sup>, Harlan Gough<sup>3</sup>, Jeffrey Feder<sup>2</sup>, Daniel Hahn<sup>5</sup>, and **Dietmar Schwarz** (dietmar.schwarz@wwwu.edu)<sup>3</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>Univ. of Notre Dame, South Bend, IN, <sup>3</sup>Western Washington Univ., Bellingham, WA, <sup>4</sup>Univ. of Kentucky, Lexington, KY, <sup>5</sup>Univ. of Florida, Gainesville, FL
- 10:15 BREAK**
- 10:30 **1209** Aggression and allele specific expression in hybrid honey bees. **Joshua Gibson** (gibson85@purdue.edu)<sup>1</sup>, Greg Hunt<sup>1</sup>, Miguel E. Arechavaleta-Velasco<sup>2</sup>, and Jennifer M. Tsuruda<sup>3</sup>, <sup>1</sup>Purdue Univ., West Lafayette, IN, <sup>2</sup>National Institute of Forestry, Agriculture and Livestock, Ajuchitlan, Mexico, <sup>3</sup>Univ. of California, Davis, CA
- 10:45 **1210** The genetics of species differences in the *Drosophila virilis* group. **Yasir Ahmed** (yahmed2@ur.rochester.edu), Univ. of Rochester, Rochester, NY
- 11:00 **1211** Genetic differences between social parasites and their hosts. **Jürgen Gadau** (jgadau@asu.edu)<sup>1</sup>, Chris R. Smith<sup>2</sup>, Sara Helms Cahan<sup>3</sup>, Seán Brady<sup>4</sup>, Erich Bornberg-Bauer<sup>5</sup>, Martin Helmkampf<sup>1</sup>, Andrew Suarez<sup>6</sup>, and Alexander Mikhayev<sup>7</sup>, <sup>1</sup>Arizona State Univ., Tempe, AZ, <sup>2</sup>Earlham College, Richmond, IN, <sup>3</sup>Univ. of Vermont, Burlington, VT, <sup>4</sup>Smithsonian Institution National Museum of Natural History, Washington, DC, <sup>5</sup>Univ. of Münster, Münster, Germany, <sup>6</sup>Univ. of Illinois, Champaign, IL, <sup>7</sup>Okinawa Institute of Science and Technology, Onna, Japan
- 11:15 **1212** Recruitment and evolution of parasitoid wasp venoms. **Ellen Martinson** (e.martinson@rochester.edu), Univ. of Rochester, Rochester, NY

### Symposium: Cross-Continental Patterns of Chemical Communication Among Subcortical Insects

#### Room W330 A (Convention Center)

**Moderators and Organizers:** Kamal Gandhi<sup>1</sup>, Christiane Helbig<sup>2</sup>, and Michael Müller<sup>2</sup>, <sup>1</sup>Univ. of Georgia, Athens, GA, <sup>2</sup>Technical Univ., Tharandt, Germany

- 9:15 **1213** Multi-trophic semiochemical interactions within the pine beetle guild in the southern U.S. **Kamal Gandhi** (kjgandhi@uga.edu)<sup>1</sup>, Jenny Staeben<sup>1</sup>, Daniel Miller<sup>2</sup>, and John Nowak<sup>3</sup>, <sup>1</sup>Univ. of Georgia, Athens, GA, <sup>2</sup>USDA - Forest Service, Athens, GA, <sup>3</sup>USDA - Forest Service, Asheville, NC



- 9:45 **1214** Why is there so much variation among semiochemical systems of aggressive bark beetles? **Brian T. Sullivan** (briansullivan@fs.fed.us)<sup>1</sup>, Alicia Niño-Domínguez<sup>2</sup>, Amanda Grady<sup>3</sup>, Richard Hofstetter<sup>4</sup>, and Deepa Pureswaran<sup>5</sup>, <sup>1</sup>USDA - Forest Service, Pineville, LA, <sup>2</sup>College of the Southern Border, Tapachula, Mexico, <sup>3</sup>USDA - Forest Service, Flagstaff, AZ, <sup>4</sup>Northern Arizona Univ., Flagstaff, AZ, <sup>5</sup>Natural Resources Canada, Québec City, QC, Canada
- 10:00 **1215** Use of allochthonous kairomones for nature-based management of bark beetles. **Michael Müller** (michael.mueller@tu-dresden.de)<sup>1</sup> and Michael Wehnert<sup>2</sup>, <sup>1</sup>Technical Univ., Tharandt, Germany, <sup>2</sup>East German Society of Forest Planning mbH, Kesselsdorf, Germany
- 10:15 **BREAK**
- 10:30 **1216** Attraction of bark and woodboring insects to loblolly pines as based on tree health. **Christiane Helbig** (chr.helbig@web.de)<sup>1</sup>, David Coyle<sup>2</sup>, Kier Klepzig<sup>3</sup>, John Nowak<sup>3</sup>, and Kamal Gandhi<sup>2</sup>, <sup>1</sup>Technical Univ., Tharandt, Germany, <sup>2</sup>Univ. of Georgia, Athens, GA, <sup>3</sup>USDA - Forest Service, Asheville, NC
- 10:45 **1217** Modification of the action of semiochemicals by altered conditions due to climate change. **Stefan Schütz** (stefan.schuetz@forst.uni-goettingen.de), Georg August Univ., Göttingen, Germany
- 11:00 **Discussion**

### Symposium: Worldwide Use of Kairomones to Enhance Management of Tortricids in Fruit Crops: New Opportunities and New Problems

#### Room W330 C (Convention Center)

**Moderators and Organizers:** Alan L. Knight<sup>1</sup> and Peter Witzgall<sup>2</sup>, <sup>1</sup>USDA - ARS, Wapato, WA, <sup>2</sup>Swedish Univ. of Agricultural Sciences, Alnarp, Sweden

- 9:15 **1218** Codling moth and pear ester: The kairomone paradigm for pest management. **Douglas Light** (doug.light@ars.usda.gov), USDA - ARS, Albany, CA
- 9:30 **1219** Does acetic acid finally give us the focus for following female tortricids? **Alan L. Knight** (alan.knight@ars.usda.gov), USDA - ARS, Wapato, WA
- 9:45 **1220** Potential of herbivore-induced volatiles as attractants for leaf-feeding tortricids. **Valentino Giacomuzzi** (valentino.giacomuzzi@natec.unibz.it) and Sergio Angeli, Freie Univ., Bolzano, Italy
- 10:00 **1221** Boosting bisexual moth catches of oriental fruit moth in sex pheromone-treated orchards. **Eduardo Fuentes-Contreras** (efuentes@atalca.cl)<sup>1</sup>, Liliana Cichón<sup>2</sup>, Esteban Basoalto<sup>3</sup>, Wilson Barros-Parada<sup>1</sup>, and Alan L. Knight<sup>4</sup>, <sup>1</sup>Univ. of Talca, Talca, Chile, <sup>2</sup>INTA, General Roca, Argentina, <sup>3</sup>Austral Univ., Valdivia, Chile, <sup>4</sup>USDA - ARS, Wapato, WA

#### 10:15 BREAK

- 10:30 **1222** Plant and microbial volatiles as potential behaviour modifying chemicals for the grapevine moth, *Lobesia botrana*. **Marco Tasin** (marco.tasin@slu.se), Swedish Univ. of Agricultural Sciences, Alnarp, Sweden

- 10:45 **1223** Integrating kairomonal tools into a codling moth area-wide SIT program. **Gary Judd** (gary.judd@agr.gc.ca), Agriculture and Agri-Food Canada, Summerland, BC, Canada
- 11:00 **1224** Whole transcriptome analysis and functional characterization of chemosensory receptors in the codling moth, *Cydia pomonella*. **William B. Walker** (william.b.walker.iii@slu.se), Swedish Univ. of Agricultural Sciences, Alnarp, Sweden
- 11:15 **1225** Similarities of microbial and plant-based cues as tortricid attractants. **Peter Witzgall** (peter.witzgall@ice3.se), Swedish Univ. of Agricultural Sciences, Alnarp, Sweden

### Symposium: Wound Healing and Damage Signals in Insects

#### Room W330 B (Convention Center)

**Moderators and Organizers:** Ulrich Theopold<sup>1</sup> and Will Wood<sup>2</sup>, <sup>1</sup>Stockholm Univ., Stockholm, Sweden, <sup>2</sup>Univ. of Bristol, Bristol, United Kingdom

- 9:15 **1226** Epigenetic regulation of wound closure in *Drosophila* larvae. **Michael Galko** (mjgalko@mdanderson.org) and Aimee Anderson, The Univ. of Texas MD Anderson Cancer Center, Houston, TX
- 9:30 **1227** Taranis protects regenerating tissue from fate changes induced by the wound response in *Drosophila*. **Rachel Smith-Bolton** (rsbolton@illinois.edu) and Keaton Schuster, Univ. of Illinois, Champaign, IL
- 9:45 **1228** Epidermal wound response and *Drosophila* genetics. **Michelle Juarez** (mjuarez@med.cuny.edu), City College of New York, New York, NY
- 10:00 **1229** Basement membrane secretion, assembly, and fibrotic misassembly in *Drosophila melanogaster*. **Jose Pastor-Pareja** (jose.pastor@biomed.tsinghua.edu.cn), Tsinghua Univ., Beijing, China
- 10:15 **BREAK**
- 10:30 **1230** Presentation withdrawn
- 10:45 **1231** Blood cell migration during inflammation, wounding, and infection. **Will Wood** (w.wood@bristol.ac.uk), Univ. of Bristol, Bristol, United Kingdom
- 11:00 **1232** Nucleotide metabolism and danger signals. **Michal Zurovec** (zurovec@entu.cas.cz), Czech Academy of Sciences, České Budějovice, Czech Republic
- 11:15 **1233** The *Drosophila* chitinase-like protein IDGF3 is involved in protection against nematodes and wound healing. **Ulrich Theopold** (uli.theopold@su.se)<sup>1</sup>, Lucie Kucerova<sup>1</sup>, Badrul Arefin<sup>1</sup>, Michal Zurovec<sup>2</sup>, <sup>1</sup>Stockholm Univ., Stockholm, Sweden, <sup>2</sup>Czech Academy of Sciences, České Budějovice, Czech Republic



## Symposium: Insect-Plant Interactions in a Changing Arctic

### Room W224 F (Convention Center)

**Moderator and Organizer:** Ashley Asmus, The Univ. of Texas, Arlington, TX

- 9:15 **1234** Characterizing the responses and roles of mosquitoes in a rapidly changing Arctic. **Lauren E. Culler** (leculler@gmail.com)<sup>1</sup>, Toke Høye<sup>2</sup>, Alex Stendahl<sup>1</sup>, David Polashenski<sup>1</sup>, Angie Spickard<sup>1</sup>, Matthew Ayres<sup>1</sup>, and Ross Virginia<sup>1</sup>, <sup>1</sup>Dartmouth College, Hanover, NH, <sup>2</sup>Aarhus Univ., Rønde, Denmark
- 9:30 **1235** High spatial variation in terrestrial arthropod species diversity and composition near the Greenland ice cap. **Rikke Hansen** (rrh@bios.au.dk)<sup>1</sup>, Oskar Hansen<sup>1</sup>, Joseph Bowden<sup>1</sup>, Signe Normand<sup>1</sup>, Christian Bay<sup>1</sup>, Jesper Sørensen<sup>1</sup>, and Toke Høye<sup>2</sup>, <sup>1</sup>Aarhus Univ., Aarhus, Denmark, <sup>2</sup>Aarhus Univ., Rønde, Denmark
- 9:45 **1236** Plant reproduction and the role of pollinators near poleward range margins. **Christine Urbanowicz** (christine.m.urbanowicz.gr@dartmouth.edu)<sup>1</sup> and Rebecca E. Irwin<sup>2</sup>, <sup>1</sup>Dartmouth College, Hanover, NH, <sup>2</sup>North Carolina State Univ., Raleigh, NC
- 10:00 **1237** Arthropod food web collapse following an insect herbivore outbreak in Arctic tundra. **Ashley Asmus** (ashley.asmus@gmail.com)<sup>1</sup>, Rikke Hansen<sup>2</sup>, Oskar Hansen<sup>2</sup>, Katrine Raundrup<sup>2</sup>, Josephine Nymand<sup>3</sup>, and Peter Aastrup<sup>2</sup>, <sup>1</sup>The Univ. of Texas, Arlington, TX, <sup>2</sup>Aarhus Univ., Aarhus, Denmark, <sup>3</sup>Greenland Institute of Natural Resources, Nuuk, Greenland
- 10:15 BREAK**
- 10:30 **1238** High-Arctic butterflies become smaller with rising temperatures. **Joseph Bowden** (joey.bowden@gmail.com)<sup>1</sup>, Anne Eskildsen<sup>1</sup>, Rikke Hansen<sup>1</sup>, Kent Olsen<sup>1</sup>, Carolyn Kurler<sup>2</sup>, and Toke Høye<sup>3</sup>, <sup>1</sup>Aarhus Univ., Aarhus, Denmark, <sup>2</sup>Univ. of California, La Jolla, CA, <sup>3</sup>Aarhus Univ., Rønde, Denmark
- 10:45 **1239** Mobile arthropods link ecologically disparate habitats in Arctic ecosystems. **Jamin Dreyer** (jamin.dreyer@gmail.com)<sup>1</sup>, David Hoekman<sup>2</sup>, Claudio Gratton<sup>3</sup>, Hilary Bultman<sup>3</sup>, Ejgil Gravesen<sup>4</sup>, and James D. Harwood<sup>1</sup>, <sup>1</sup>Univ. of Kentucky, Lexington, KY, <sup>2</sup>Southern Nararene Univ., Bethany, OK, <sup>3</sup>Univ. of Wisconsin, Madison, WI, <sup>4</sup>Greenland Institute of Natural Resources, Nuuk, Greenland
- 11:00 **1240** History and future of the Kenelm W. Philip Lepidoptera Collection. **Kathryn Daly** (kmdaly@alaska.edu) and Derek S. Sikes, Univ. of Alaska, Fairbanks, AK
- 11:15 **1241** Measuring invertebrate herbivory in tundra. **Isabel Barrio** (icbarrio@gmail.com), Univ. of Iceland, Reykjavik, Iceland
- 11:30 **1242** Distributed experiments as the ultimate challenge for ecology and ecologists. **Tomas Roslin** (tomas.roslin@helsinki.fi)<sup>1,2</sup> and Bess Hardwick<sup>1</sup>, <sup>1</sup>Univ. of Helsinki, Helsinki, Finland, <sup>2</sup>Swedish Univ. of Agricultural Sciences, Uppsala, Sweden

## Symposium: Insect-Plant Interactions in a Changing Climate

### Room W222 A (Convention Center)

**Moderator and Organizer:** Bonnie Pendleton, West Texas A&M Univ., Canyon, TX

- 9:15 **1243** Climate change and crop production. **B. A. Stewart** (bstewart@wtamu.edu), West Texas A&M Univ., Canyon, TX
- 9:45 **1244** Temperature-dependent feeding behavior of *Halyomorpha halys* and implications for crop damage. **Nik G. Wiman** (nik.wiman@oregonstate.edu), Oregon State Univ., Aurora, OR
- 10:00 **1245** Lipid, phytohormone, and the resistance of wheat to Hessian fly under heat stress. **Lieceng Zhu** (lzhu@uncfsu.edu), Fayetteville State Univ., Fayetteville, NC
- 10:15 BREAK**
- 10:30 **1246** Interactions between drought stress and the use of neonicotinoids can lead to banks grass mite outbreaks in corn. Alice Ruckert and **Ricardo Ramirez** (ricardo.ramirez@usu.edu), Utah State Univ., Logan, UT
- 10:45 **1247** The effects of urbanization on insect herbivores and their street tree hosts. **Adam Dale** (agdale2@ncsu.edu) and Steven Frank, North Carolina State Univ., Raleigh, NC
- 11:00 **1248** Hot in the city: Insect pests and the future of warmer urban trees. **Emily K. Meineke** (ekmeinek@ncsu.edu), Elsa Youngsteadt, Rob R. Dunn, and Steven Frank, North Carolina State Univ., Raleigh, NC

## Symposium: Biological Control under Climate Change (IOBC)

### Room W222 B (Convention Center)

**Moderators and Organizers:** Jianqing Ding and Xinmin Lu, Chinese Academy of Sciences, Wuhan, China

- 9:15 **1249** Predicting the impacts of biological control agents under climate change. **Evan Siemann** (siemann@rice.edu)<sup>1</sup>, James Henriksen<sup>1</sup>, Xinmin Lu<sup>2</sup>, and Jianqing Ding<sup>2</sup>, <sup>1</sup>Rice Univ., Houston, TX, <sup>2</sup>Chinese Academy of Sciences, Wuhan, China
- 9:45 **1250** Conservation biological control of arthropod pests under a changing climate. **Klaus Birkhofer** (klaus.birkhofer@biol.lu.se), Lund Univ., Lund, Sweden
- 10:15 BREAK**
- 10:30 **1251** Potential benefits and risks of the ragweed beetle under climate change. **Heinz Müller-Schärer** (heinz.mueller@unifr.ch)<sup>1</sup>, Yan Sun<sup>1</sup>, Urs Schaffner<sup>2</sup>, and S.T.E. Lommen<sup>1</sup>, <sup>1</sup>Univ. of Fribourg, Fribourg, Switzerland, <sup>2</sup>CABI, Delémont, Switzerland
- 10:45 **1252** Climate warming increases non-target effects of a biocontrol agent on a native species. **Xinmin Lu** (lxm3412@wbpcas.cn)<sup>1</sup>, Jianqing Ding<sup>1</sup>, Evan Siemann<sup>2</sup>, Minyan He<sup>3</sup>, Hui Wei<sup>3</sup>, and Xu Shao<sup>3</sup>, <sup>1</sup>Chinese Academy of Sciences, Wuhan, China, <sup>2</sup>Rice Univ., Houston, TX, <sup>3</sup>Wuhan Botanical Garden, Chinese Academy of Sciences, Wuhan, China



- 11:00 **1253** Can forests take the heat? Managing pests and ecosystem services in a warming climate. **Steven D. Frank** (steven\_frank@ncsu.edu), North Carolina State Univ., Raleigh, NC
- 11:15 **1254** Demographic and population changes in insects under climate warming: Implications for biological control. **Chunshen Ma** (machunshen@caas.cn)<sup>1</sup> and Gang Ma<sup>2</sup>, <sup>1</sup>Institute of Plant Protection, Beijing, China, <sup>2</sup>Chinese Academy of Agricultural Sciences, Beijing, China
- 11:30 **1255** Quantifying the risk of synchronization loss between natural enemies and their hosts under climate change. **Guy Boivin** (boiving@agr.gc.ca)<sup>1</sup>, Jacques Brodeur<sup>2</sup>, and Gaétan Bourgeois<sup>3</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, Québec, QC, Canada, <sup>2</sup>Univ. of Montréal, Montréal, QC, Canada, <sup>3</sup>Agriculture and Agri-Food Canada, Saint-Jean-sur-Richelieu, QC, Canada
- 11:45 **1256** Climate change and biological control: The challenges for island nations. **Pip Gerard** (pip.gerard@agresearch.co.nz), AgResearch Ltd, Hamilton, New Zealand
- 12:00 **1257** Predicted European range of potential ragweed biocontrol agents. **Yan Sun** (yan.sun@unifr.ch)<sup>1</sup>, Heinz Müller-Schärer<sup>1</sup>, Brönnimann Olivier<sup>2</sup>, George Roderick<sup>3</sup>, and Alexander Poltavsky<sup>4</sup>, <sup>1</sup>Univ. of Fribourg, Fribourg, Switzerland, <sup>2</sup>Univ. of Lausanne, Lausanne, Switzerland, <sup>3</sup>Univ. of California, Berkeley, CA, <sup>4</sup>Southern Federal Univ., Russia
- 12:15 **1258** Thermal stress effects on herbivores and their predators: Implications for biological control. **Arnaud Sentis** (arnaud.sentis@gmail.com)<sup>1</sup>, Jacques Brodeur<sup>2</sup>, David S Boukal<sup>3</sup>, and Jean-Louis Hemptinne<sup>4</sup>, <sup>1</sup>Univ. of Toulouse, Toulouse, France, <sup>2</sup>Univ. of Montréal, Montréal, QC, Canada, <sup>3</sup>Univ. of South Bohemia, České Budějovice, Czech Republic, <sup>4</sup>Univ. of Toulouse, Castanet-Tolosan, France

### Symposium: Bt Crops and Best Management Practices: Influence on the Technology Durability

#### West Hall F1 (WF1) (Convention Center)

**Moderators and Organizers:** Antonio C. Santos and Dwain M. Rule, Dow AgroSciences, Indianapolis, IN

- 9:15 **1259** Bt crops and best management practices: Influence on the technology durability. **Antonio C. Santos** (acsantos1@dow.com), Dow AgroSciences, Indianapolis, IN
- 9:45 **1260** Corn rootworm management: Current status and best management practices implementation in North America. **Dwain M. Rule** (ddrule@dow.com), Dow AgroSciences, Indianapolis, IN
- 10:15 BREAK**
- 10:30 **1261** Bt soybean IPM in Brazil: Current and future implications for IRM on the main pests. **Renato A. de Carvalho** (renato.a.carvalho@monsanto.com)<sup>1</sup>, Patrick Dourado<sup>1</sup>, Samuel Martinelli<sup>2</sup>, and Graham P. Head<sup>2</sup>, <sup>1</sup>Monsanto of Brasil Ltda., São Paulo, Brazil, <sup>2</sup>Monsanto Company, St. Louis, MO

- 10:45 **1262** Resistance characterization of *Spodoptera frugiperda* (Lepidoptera: Noctuidae) to the Vip3Aa20 protein from *Bacillus thuringiensis* and its impact on IRM strategy. **Julio Fatoretto** (julio.fatoretto@syngenta.com)<sup>1</sup>, Oderlei Bernardi<sup>2</sup>, Daniel Bernardi<sup>2</sup>, Renato Horikoshi<sup>2</sup>, Daniela Okuma<sup>2</sup>, Leonardo Miraldo<sup>2</sup>, Tony Burd<sup>3</sup>, Fernanda Medeiros<sup>1</sup>, and Celso Omoto<sup>2</sup>, <sup>1</sup>Syngenta Crop Protection, São Paulo, Brazil, <sup>2</sup>Univ. of São Paulo, Piracicaba, Brazil, <sup>3</sup>Syngenta Crop Protection, Research Triangle Park, NC
- 11:00 **1263** Excellence through stewardship: Resistance management and the global industry commitment. **Boris A. Castro** (bacastro@dow.com)<sup>1</sup>, Nicholas Storer<sup>1</sup>, and Ana Correa<sup>2</sup>, <sup>1</sup>Dow AgroSciences, Indianapolis, IN, <sup>2</sup>Dow AgroSciences, Ribeirão Preto, Brazil
- 11:15 **1264** Bt cotton: Current and future products and implications on IRM. **Geraldo Papa** (gpapa@bio.feis.unesp.br), São Paulo State Univ., Ilha Solteira, Brazil

### Symposium: Challenges and Opportunities for Management of Western Corn Rootworm

#### Room W414 A (Convention Center)

**Moderators and Organizers:** Aaron Gassmann<sup>1</sup>, Lance Meinke<sup>2</sup>, and Matthew Carroll<sup>3</sup>, <sup>1</sup>Iowa State Univ., Ames, IA, <sup>2</sup>Univ. of Nebraska, Lincoln, NE, <sup>3</sup>Monsanto Company, St. Louis, MO

- 9:15 **1265** A former extension entomologist's look in the rear-view mirror at the potholes of western corn rootworm mismanagement: Will the road ahead be smoother? **Michael Gray** (megray@illinois.edu), Univ. of Illinois, Champaign, IL
- 9:45 **1266** Selection of resistance in western corn rootworm to Cry3Bb1, mCry3a, eCry3.1Ab, and Cry34/35Ab1 transgenic corn: Variations in traits in the laboratory and the field. **Bruce Hibbard** (bruce.hibbard@ars.usda.gov)<sup>1</sup>, Dalton Ludwick<sup>2</sup>, Lisa Meihs<sup>1</sup>, Jennifer Dietloff<sup>3</sup>, and Aaron Gassmann<sup>4</sup>, <sup>1</sup>USDA - ARS, Columbia, MO, <sup>2</sup>Univ. of Missouri, Columbia, MO, <sup>3</sup>Lock Haven Univ., Lock Haven, PA, <sup>4</sup>Iowa State Univ., Ames, IA
- 10:00 **1267** Field-evolved resistance to Bt maize by western corn rootworm. **Aaron J. Gassmann** (aaronjg@iastate.edu)<sup>1</sup>, Eric H. Clifton<sup>1</sup>, John Doudna<sup>1</sup>, Mike W. Dunbar<sup>2</sup>, Amanda Hoffmann<sup>1</sup>, David A. Ingber<sup>1</sup>, Siva R. K. Jakka<sup>1</sup>, Ryan S. Keweshan<sup>1</sup>, Kenneth E. Masloski<sup>1</sup>, Aubrey Paolino<sup>1</sup>, Jennifer L. Petzold-Maxwell<sup>1</sup>, Ram Shrestha<sup>1</sup>, and Coy St. Clair<sup>1</sup>, <sup>1</sup>Iowa State Univ., Ames, IA, <sup>2</sup>South Dakota State Univ., Brookings, SD
- 10:15 BREAK**
- 10:30 **1268** Evolution and mechanisms of rootworm resistance to Cry3Bb1 maize. **Nicholas Miller** (millern@uic.edu)<sup>1</sup>, Gérald Bermond<sup>1</sup>, Leslie Rault<sup>2</sup>, Haichuan Wang<sup>2</sup>, Blair Siegfried<sup>3</sup>, Lance Meinke<sup>2</sup>, Simon Baxter<sup>4</sup>, Aaron J. Gassmann<sup>5</sup>, and Bruce Hibbard<sup>6</sup>, <sup>1</sup>Univ. of Illinois, Chicago, IL, <sup>2</sup>Univ. of Nebraska, Lincoln, NE, <sup>3</sup>Univ. of Florida, Gainesville, FL, <sup>4</sup>Univ. of Adelaide, Adelaide, Australia, <sup>5</sup>Iowa State Univ., Ames, IA, <sup>6</sup>USDA - ARS, Columbia, MO



- 10:45 **1269** Evidence of pyrethroid resistance evolution in western corn rootworm populations from the western U.S. Corn Belt. **Lance Meinke** (lmeinke1@unl.edu)<sup>1</sup>, Adriano Pereira<sup>1</sup>, Dariane Souza<sup>1</sup>, John Wang<sup>1</sup>, Blair Siegfried<sup>2</sup>, Nicholas Miller<sup>3</sup>, Sarah Zukoff<sup>4</sup>, and Julie Peterson<sup>5</sup>, <sup>1</sup>Univ. of Nebraska, Lincoln, NE, <sup>2</sup>Univ. of Florida, Gainesville, FL, <sup>3</sup>Univ. of Illinois, Chicago, IL, <sup>4</sup>Kansas State Univ., Manhattan, KS, <sup>5</sup>Univ. of Nebraska, North Platte, NE
- 11:00 **1270** Optimizing the use of entomopathogenic nematodes for a better control of corn rootworm larvae. **Stefan Toepfer** (stoepfer@gmx.net)<sup>1</sup>, Ralf-Udo Ehlers<sup>2</sup>, Michael Zellner<sup>3</sup>, and Ulrich Kuhlmann<sup>4</sup>, <sup>1</sup>Chinese Ministry of Agriculture, Beijing, China, <sup>2</sup>e-nema, Schwentental, Germany, <sup>3</sup>Bavarian State Research Centre for Agriculture, Freising, Germany, <sup>4</sup>CABI, Delémont, Switzerland
- 11:15 **1271** To resist or not to resist? An insect dilemma serving western corn rootworm integrated pest management on Bt maize. **Ivan Hiltbold** (i.hiltbold@uws.edu.au)<sup>1</sup> and Bruce Hibbard<sup>2</sup>, <sup>1</sup>Univ. of Western Sydney, Penrith, Australia, <sup>2</sup>USDA - ARS, Columbia, MO
- 11:30 **1272** Novel application methods of beneficial organisms against *Diabrotica virgifera virgifera*. **Geoffrey Jaffuel** (geoffrey.jaffuel@unine.ch)<sup>1</sup>, Nicola Imperiali<sup>2</sup>, Christoph Keel<sup>3</sup>, Kent S. Shelby<sup>4</sup>, Bruce Hibbard<sup>4</sup>, Raquel Campos-Herrera<sup>5</sup>, and Ted Turlings<sup>1</sup>, <sup>1</sup>Univ. of Neuchâtel, Neuchâtel, Switzerland, <sup>2</sup>Univ. of Lausanne, Lausanne, Switzerland, <sup>3</sup>Agroscope, Zürich, Switzerland, <sup>4</sup>USDA - ARS, Columbia, MO, <sup>5</sup>Center for Biological Resources and Food Mediterranean, Faro, Portugal
- 11:45 **1273** Opportunities for integration: Perspectives on industry integrating resistance management into IPM. **Clinton D. Pilcher** (clint.pilcher@pioneer.com), J. Lindsey Flexner, and Amit Sethi, DuPont Pioneer, Johnston, IA
- 12:00 **1274** RNAi strategies to address corn rootworm control challenges. **William Moar** (william.moar@monsanto.com), Paula A. Price, Chitvan Khajuria, Sean Evans, Alan Willse, Matthew Carroll, and Graham P. Head, Monsanto Company, St. Louis, MO

### Symposium: Global Spread and Management of the South American Tomato Leafminer, *Tuta absoluta*

#### Room W224 H (Convention Center)

**Moderators and Organizers:** Amer Fayad<sup>1</sup> and Elvis Heinrichs<sup>2</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>Univ. of Nebraska, Lincoln, NE

- 9:15 **1275** *Tuta absoluta* programs in the IPM Innovation Lab. **Stephanie Parker** (sparker1@vt.edu)<sup>1</sup>, Elvis Heinrichs<sup>2</sup>, and Rangaswamy R. Muniappan<sup>1</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>Univ. of Nebraska, Lincoln, NE
- 9:30 **1276** Biology and spread of *Tuta absoluta*. Nicolas Desneux<sup>1</sup> and **Antonio Biondi** (antonio.biondi@unict.it)<sup>2</sup>, <sup>1</sup>INRA, Sophia Antipolis, France, <sup>2</sup>Univ. of California, Berkeley, CA

- 9:45 **1277** Monitoring the spread of *T. absoluta* using a multi-layered network based modeling framework. **Ahijin Adiga** (abhijin@vbi.vt.edu), Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 10:00 **1278** The role of human mobility and infrastructures in pest and disease modeling. **Madhav Marathe** (mumarathe@vbi.vt.edu), Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 10:15 **BREAK**
- 10:30 **1279** Status of current and proposed regulatory responses by USDA - APHIS to the threat of tomato leaf miner (*Tuta absoluta* Meyrick) invasion into the United States. **Joseph Vorgetts** (joseph.l.vorgetts@aphis.usda.gov)<sup>1</sup>, Julieta Brambila<sup>2</sup>, Devaiah A. Muruvanda<sup>1</sup>, and Amy L. Roda<sup>3</sup>, <sup>1</sup>USDA - APHIS, Riverdale, MD, <sup>2</sup>USDA - APHIS, Gainesville, FL, <sup>3</sup>USDA - APHIS, Miami, FL
- 10:45 **1280** *Tuta absoluta* in Central Asia. **Harry Bottenberg** (hbottenberg@usaid.gov), USAID, Washington, DC
- 11:00 **1281** *Tuta absoluta* in India. **R. Asokan** (r\_asokan@ihr.ernet.in)<sup>1</sup>, V. Sridhar<sup>1</sup>, S. Venugopalan<sup>1</sup>, and Yenumula. Prasad<sup>2</sup>, <sup>1</sup>Indian Institute of Horticultural Research, Bangalore, India, <sup>2</sup>Agricultural Technology Application Research Institute, Hyderabad, India
- 11:15 **1282** *Tuta absoluta* in North Africa and the Near East. **Homam Bekheet Homam** (homambekheet@gmail.com)<sup>1</sup> and Shoki Al-Dobaï<sup>2</sup>, <sup>1</sup>Plant Protection Research Institute, Giza, Egypt, <sup>2</sup>Food and Agriculture Organization of the United Nations, Cairo, Egypt
- 11:30 **1283** Invasion of the tomato leafminer, *Tuta absoluta*, in West Africa: Spatial dynamics, ecological niche, and potential for biological control. Thierry Brévault<sup>1</sup>, **Serigne Sylla** (syllaserigne2@gmail.com)<sup>2</sup>, and Karamoko Diarra<sup>2</sup>, <sup>1</sup>BIOPASS, Dakar, Senegal, <sup>2</sup>Univ. Cheikh Anta Diop, Dakar, Senegal
- 11:45 **1284** Management of *Tuta absoluta*. **Shakir Al-Zaidi** (shakir@russellipm.net), Russell IPM, Flintshire, United Kingdom

### Symposium: Chagas Disease: A Neglected Disease of Public Health Importance

#### Room W230 B (Convention Center)

**Moderators and Organizers:** Mustapha Debboun<sup>1</sup> and Shripat Kamble<sup>2</sup>, <sup>1</sup>Harris County Public Health & Environmental Services, Houston, TX, <sup>2</sup>Univ. of Nebraska, Lincoln, NE

- 9:15 **Introductory Remarks**
- 9:30 **1285** The challenges of controlling Chagas disease vectors where thriving sylvatic triatomine populations abound. **Claudia Nieto** (cn048511@ohio.edu)<sup>1</sup> and Mario Grijalva<sup>2</sup>, <sup>1</sup>Tropical Disease Institute, Athens, OH, <sup>2</sup>Pontifical Catholic Univ., Quito, Ecuador
- 9:45 **1286** A history of Chagas vectors in the United States: A public health perspective. **Ellen Dotson** (ebd6@cdc.gov), Gena Lawrence, and Susan Montgomery, Centers for Disease Control and Prevention, Atlanta, GA
- 10:00 **1287** Clinical manifestations of Chagas disease in the United States. **Melissa Garcia** (mmolan@bcm.edu), Baylor College of Medicine, Houston, TX



- 10:15 BREAK**
- 10:30 1288** Semi-sylvatic habitats: A key environment for Chagas disease amplification and bug reinfestation. **Gonzalo Vazquez-Prokopec** (gm vazqu@emory.edu), Emory Univ., Atlanta, GA
- 10:45 1289** Chagas disease in Texas: Targeted outreach and education for awareness with healthcare providers. **Paula Stigler Granados** (paula.e.stigler@uth.tmc.edu), The Univ. of Texas, San Antonio, TX
- 11:00 1290** Ecohealth interventions provide promise for the interruption of Chagas transmission in Central America. **Patricia Dorn** (dorn@loyno.edu)<sup>1</sup>, Dulce M. Bustamante<sup>2</sup>, Lori Stevens<sup>3</sup>, and M. Carlota Monroy<sup>4</sup>, <sup>1</sup>Loyola Univ., New Orleans, LA, <sup>2</sup>California Dept. of Public Health, Sacramento, CA, <sup>3</sup>Univ. of Vermont, Burlington, VT, <sup>4</sup>Univ. of San Carlos, Guatemala City, Guatemala
- 11:15 1291** Spatial analysis of triatomine vectors of Chagas disease in Texas. Rachel Curtis-Robles<sup>1</sup>, Sarah Hamer<sup>1</sup>, Sage Lane<sup>1</sup>, Michael Levy<sup>2</sup>, and **Gabriel Hamer** (ghamer@tamu.edu)<sup>1</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Univ. of Pennsylvania, Philadelphia, PA
- 11:30 1292** *Trypanosoma cruzi* infection prevalence and blood meal analysis in vectors of Chagas disease from rural peridomestic locations in Texas, 2013–2014, and from Houston, Texas, 2016. **Rodion Gorchakov** (rodion@bcm.edu)<sup>1</sup>, Lillian Trosclair<sup>1</sup>, Edward Wozniak<sup>2</sup>, Melissa Garcia<sup>3</sup>, Teresa Fera<sup>3</sup>, Sarah Gunter<sup>4</sup>, Mustapha Debboun<sup>5</sup>, and Kristy Murray<sup>1</sup>, <sup>1</sup>Baylor College of Medicine, Houston, TX, <sup>2</sup>Texas Dept. of State Health Services, Uvalde, TX, <sup>3</sup>The Univ. of Texas, Edinburg, TX, <sup>4</sup>The Univ. of Texas, Houston, TX, <sup>5</sup>Harris County Public Health & Environmental Services, Houston, TX

### Symposium: Mechanistic Insights into Mosquito-Parasite Interactions

#### Room W224 E (Convention Center)

**Moderators and Organizers:** Kristin Michel<sup>1</sup> and Michael Povelones<sup>2</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>Univ. of Pennsylvania, Philadelphia, PA

- 9:15 1293** The effects of type 2 diabetes on *Plasmodium* infection and transmission. **Nazzy Pakpour** (nazzy.pakpour@csueastbay.edu)<sup>1</sup> and Shirley Luckhart<sup>2</sup>, <sup>1</sup>California State Univ., Hayward, CA, <sup>2</sup>Univ. of California, Davis, CA
- 9:30 1294** The role of *Plasmodium falciparum* Pfs47 mediating evasion of the mosquito immune system and adaptation to different vectors. **Alvaro Molina Cruz** (alvaro.molina-cruz@nih.gov)<sup>1</sup>, Gaspar Canepa<sup>1</sup>, Noelle Pavlovic<sup>1</sup>, Jose Ramirez<sup>2</sup>, and Carolina Barillas-Mury<sup>2</sup>, <sup>1</sup>National Institute of Allergy and Infectious Diseases, Rockville, MD, <sup>2</sup>National Institutes of Health, Bethesda, WA
- 9:45 1295** Mosquito resistance to malaria parasites. **Stephanie Blandin** (sblandin@unistra.fr), Christopher Batram, Katharina Ehrhardt, Alice-Anne Goetz, Albert Bayibeki, Randy Clayton, Anais Vittu, Noemie Jelly, and Marie Staub, Inserm Anopheles Group, Strasbourg, France

- 10:00 1296** Specificity of complement-like pathway activation in *Anopheles gambiae*. **Michael Povelones** (mpove@vet.upenn.edu)<sup>1</sup>, Katie Farrant<sup>2</sup>, Valeria Reyes Ruiz<sup>1</sup>, and George Christophides<sup>2</sup>, <sup>1</sup>Univ. of Pennsylvania, Philadelphia, PA, <sup>2</sup>Imperial College London, London, United Kingdom

#### 10:15 BREAK

- 10:30 1297** The structure of *Anopheles gambiae* thioester-containing protein 1 and its role in the anti-*Plasmodium* immune response. **Richard Baxter** (richard.baxter@yale.edu), Yale Univ., New Haven, CT
- 10:45 1298** Structural and functional analysis of *Anopheles gambiae* prophenoloxidasases. **Haobo Jiang** (haobo.jiang@okstate.edu), Oklahoma State Univ., Stillwater, OK
- 11:00 1299** Structural analysis of SRPN6 provides insight into its anti-Plasmodial function. **David Meekins** (dmeekins@ksu.edu), Melissa Gulley, and Kristin Michel, Kansas State Univ., Manhattan, KS
- 11:15 1300** Mosquito hemocytes mediate late-phase immune responses that limit *Plasmodium* oocyst survival. **Ryan Smith** (smithr@iastate.edu), Iowa State Univ., Ames, IA

### Symposium: Opportunities and Challenges for Biological Control of Disease Vectors (IOBC)

#### Room W230 D (Convention Center)

**Moderators and Organizers:** Matthew B. Thomas<sup>1</sup> and Michael R. Strand<sup>2</sup>, <sup>1</sup>Pennsylvania State Univ., University Park, PA, <sup>2</sup>Univ. of Georgia, Athens, GA

- 9:15 1301** Perspectives on biocontrol of disease vectors. **Matthew B. Thomas** (mbt13@psu.edu), Pennsylvania State Univ., University Park, PA
- 9:30 1302** Modelling to support the biological control of disease vectors. **Charles Godfray** (charles.godfray@zoo.ox.ac.uk), Oxford Univ., Oxford, United Kingdom
- 9:45 1303** Parasites and pathogens beyond Bt. **James J. Becnel** (james.becnel@ars.usda.gov), USDA - ARS, Gainesville, FL
- 10:00 1304** Possibilities for novel control using symbionts and endoparasites. **Serap Aksoy** (serap.aksoy@yale.edu), Yale Univ., New Haven, CT
- 10:15 BREAK**
- 10:30 1305** Exploiting the slow speed of kill of entomopathogenic fungi. **Marit Farenhorst** (marit@in2care.org), In2Care B.V., Wageningen, Netherlands
- 10:45 1306** Mosquito natural enemies and biological control. **Michael R. Strand** (mrstrand@uga.edu), Univ. of Georgia, Athens, GA
- 11:00 1307** How lethal, nonlethal, and complex effects of predators and competitors may impact biological control of vectors. **Steven Juliano** (sajuliano@ilstu.edu), Illinois State Univ., Normal, IL
- 11:15 1308** Biological control of disease vectors on the landscape. **Bernard D. Roitberg** (roitberg@sfu.ca), Simon Fraser Univ., Burnaby, BC, Canada





11:30 **1309** The release of the yellow fever mosquito, *Aedes aegypti*, containing a naturally occurring strain of *Wolbachia pipientis* — a question of regulatory responsibility. **Paul DeBarro** (paul.debarro@csiro.au), CSIRO, Dutton Park, Australia

## Symposium: Repellents

### Room W224 D (Convention Center)

**Moderators and Organizers:** Nicole L. Achee<sup>1</sup> and Theeraphap Chareonviriyaphap<sup>2</sup>, <sup>1</sup>Univ. of Notre Dame, South Bend, IN, <sup>2</sup>Kasetsart Univ., Bangkok, Thailand

- 9:15 **1310** A critical path of development for repellents. **Kathryn Aultman** (kathryn.aultman@stelmaconsulting.com), Stelma Consulting LLC, Redmond, WA
- 9:30 **1311** Human and non-human approaches to testing repellent products for EPA registration. **Kevin Sweeney** (sweeney.kevin@epamail.epa.gov), U.S. Environmental Protection Agency, Washington, DC
- 9:45 **1312** Novel repellent chemical structures — driving the discovery of novel tools. **Maia Tsikolia** (maia.tsikolia@ars.usda.gov)<sup>1</sup>, Ulrich R. Bernier<sup>2</sup>, Natasha Agramonte<sup>1</sup>, Kenneth J. Linthicum<sup>2</sup>, Spyros E. Zographos<sup>3</sup>, Christina E. Drakou<sup>3</sup>, Patrick M. Guerin<sup>4</sup>, Thomas Krober<sup>4</sup>, and Jeffrey R. Bloomquist<sup>1</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>USDA - ARS, Gainesville, FL, <sup>3</sup>National Hellenic Research Foundation, Athens, Greece, <sup>4</sup>Univ. of Neuchâtel, Neuchâtel, Switzerland
- 10:00 **1313** An application of a smart-friendly, non-contact repellent assay system (NCRAS) for chemical screening. **Rungarun Tisgratog** (rungarun\_tis@hotmail.com), Kasetsart Univ., Bangkok, Thailand
- 10:15 BREAK**
- 10:30 **1314** Presentation withdrawn
- 10:45 **1315** Presentation withdrawn
- 11:00 **1316** Repellent and irritant effects of Kaffir lime (*Citrus hystrix*) leaf and peel essential oils against *Aedes aegypti* and *Anopheles minimus*. **Montathip Kongmee** (nokcool@hotmail.com), Kasetsart Univ., Nakhon Pathom, Thailand
- 11:15 **1317** Role of insecticide resistance in repellent bioefficacy. **Joseph Wagman** (joseph.m.wagman@gmail.com), Univ. of Notre Dame, Notre Dame, IN
- 11:30 **1318** Impact of repellents on vector life history traits. **John Grieco** (jgrieco@nd.edu), Univ. of Notre Dame, South Bend, IN
- 11:45 **1319** Mathematical modeling of repellents as a support tool for trial design, evaluation, and for public health rollout. **Alex Perkins** (taperkins@nd.edu), Univ. of Notre Dame, South Bend, IN
- 12:00 **1320** Outreach projects and malaria reduction collaborations that include repellents by SC Johnson, A Family Company. **Maude Meier** (mcmeier@scj.com), S. C. Johnson & Son, Racine, WI
- 12:15 **1321** Vector control intervention using biorepellent products and biomarkers to evaluate their effectiveness. **Theeraphap Chareonviriyaphap** (faasthc@ku.ac.th), Kasetsart Univ., Bangkok, Thailand

## Symposium: Recent Advances in the Study of the Neuropterida

### Room W331 C (Convention Center)

**Moderators and Organizers:** David E. Bowles<sup>1</sup>, Atilano Contreras-Ramos<sup>2</sup>, and John D. Oswald<sup>3</sup>, <sup>1</sup>U.S. National Park Service, Republic, MO, <sup>2</sup>National Autonomous Univ. of México, Mexico City, Mexico, <sup>3</sup>Texas A&M Univ., College Station, TX

- 9:15 **1322** An updated molecular phylogeny of the Neuropterida. **Shaun Winterton** (swinterton@cdfa.ca.gov), California Dept. of Food and Agriculture, Sacramento, CA
- 9:45 **1323** Taxonomic status of New World chrysopids (Neuroptera: Chrysopidae). **Catherine A. Tauber** (cat6@cornell.edu), Cornell Univ., Davis, CA
- 10:00 **1324** Advances in the systematics, morphology, and biology of the green lacewing genus *Leucochrysa*. **Gilberto Albuquerque** (gsa@uenf.br), State Univ. of Northern Rio de Janeiro, Campos, Brazil
- 10:15 BREAK**
- 10:30 **1325** Coniopterygidae associated to Mexican lime trees in Tecomán, Colima, Mexico. **Mariza A. Sarmiento-Cordero** (marizilla@hotmail.com)<sup>1</sup> and Atilano Contreras-Ramos<sup>2</sup>, <sup>1</sup>National Reference Center for Biological Control, Tecomán, Mexico, <sup>2</sup>National Autonomous Univ. of México, Mexico City, Mexico
- 10:45 **1326** Taxonomic review of the subtribe Periclystina (Myrmeleontidae: Dendroleontini). **Renato Machado** (rjpmachado@neo.tamu.edu), Texas A&M Univ., College Station, TX
- 11:00 **1327** Prospects for a revision of the genus *Myrmeleon* Linnaeus 1767 (Neuroptera: Myrmeleontidae) of North and Central America. **Roberto Lopez-Garcia** (exoddous@hotmail.com), National Autonomous Univ. of México, Mexico City, Mexico
- 11:15 **1328** Progress in the systematics of Myrmeleontiformia (antlions and allies) with a focus on Ascalaphidae (owlflies). **Joshua Jones** (doc.jones.research@gmail.com), Texas A&M Univ., College Station, TX
- 11:30 **1329** Diversity of Chrysopidae, Hemerobiidae, and Mantispidae of tropical dry forests of the Mexican Pacific. **Rodolfo Cancino-López** (tk\_57@hotmail.com) and Atilano Contreras-Ramos, National Autonomous Univ. of México, Mexico City, Mexico
- 11:45 **1330** Progress on work towards a global monograph of the Neuropterida. **John D. Oswald** (joswald@ag.tamu.edu), Texas A&M Univ., College Station, TX

## Symposium: Duplications, Deletions, and Other Mutations: Deciphering the Molecular Basis of Insecticide Resistance

### West Hall F2 (WF2) (Convention Center)

**Moderators and Organizers:** Jeffrey G. Scott<sup>1</sup> and Ralf Nauen<sup>2</sup>, <sup>1</sup>Cornell Univ., Ithaca, NY, <sup>2</sup>Bayer CropScience, Monheim, Germany

- 9:15 **1331** Metabolic and target site resistance to pyrethroids. **Shinji Kasai** (kasacin@nih.go.jp), National Institute of Infectious Diseases, Tokyo, Japan



- 9:45 **1332** Mutation and duplication of arthropod acetylcholinesterase: Insights into pesticide resistance and tolerance. **Si Hyeock Lee** (shlee22@snu.ac.kr), Seoul National Univ., Seoul, South Korea
- 10:00 **1333** nAChR mutations involved in insecticide resistance. **Thomas C. Sparks** (tcsparks@dow.com), Nick Wang, Gerald B. Watson, and Michael R. Loso, Dow AgroSciences, Indianapolis, IN
- 10:15 BREAK**
- 10:30 **1334** Multiple mechanisms for changing a target site. **Jeffrey G. Scott** (jgs5@cornell.edu)<sup>1</sup>, Haina Sun<sup>1,2</sup>, Khanh Tong<sup>1</sup>, and Shinji Kasai<sup>3</sup>, <sup>1</sup>Cornell Univ., Ithaca, NY, <sup>2</sup>Nanjing Agricultural Univ., Nanjing, China, <sup>3</sup>National Institute of Infectious Diseases, Tokyo, Japan
- 10:45 **1335** Mechanisms of diamide insecticide resistance with special reference to ryanodine receptor target-site mutations. **Ralf Nauen** (ralf.nauen@bayer.com)<sup>1</sup>, Denise Steinbach<sup>2</sup>, Daniela Okuma<sup>3</sup>, Oliver Gutbrod<sup>1</sup>, Chris Bass<sup>4</sup>, Emyr Davies<sup>5</sup>, Bartek Troczka<sup>5</sup>, Martin Williamson<sup>5</sup>, Emmanouil Roditakis<sup>6</sup>, Anastasia Tsagkarakou<sup>6</sup>, and John Vontas<sup>7</sup>, <sup>1</sup>Bayer CropScience, Monheim, Germany, <sup>2</sup>Martin Luther Univ., Halle, Germany, <sup>3</sup>Univ. of São Paulo, Piracicaba, Brazil, <sup>4</sup>Univ. of Exeter, Penryn, United Kingdom, <sup>5</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>6</sup>Hellenic Agricultural Organisation, Heraklion, Greece, <sup>7</sup>Univ. of Crete, Heraklion, Greece
- 11:00 **1336** Mutations in chitin synthase-1 (CHS-1) confer resistance to a range of structurally diverse acaricides and insecticides. **Thomas Van Leeuwen** (thomas.vanleeuwen@ugent.be)<sup>1,2</sup> and Richard Clark<sup>3</sup>, <sup>1</sup>Ghent Univ., Ghent, Belgium, <sup>2</sup>Univ. of Amsterdam, Amsterdam, Netherlands, <sup>3</sup>Univ. of Utah, Salt Lake City, UT
- 11:15 **1337** Metabolic resistance to natural and synthetic xenobiotics in the aphid *M. persicae*. **Chris Bass** (c.bass@exeter.ac.uk)<sup>1</sup>, Christoph Zimmer<sup>1</sup>, Bartek Troczka<sup>2</sup>, Kumar Singh<sup>1</sup>, Leonela Carabajal Paladino<sup>3</sup>, Petr Nguyen<sup>4</sup>, Frantisek Marec<sup>3</sup>, Martin Williamson<sup>2</sup>, and Ralf Nauen<sup>5</sup>, <sup>1</sup>Univ. of Exeter, Penryn, United Kingdom, <sup>2</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>3</sup>Czech Academy of Sciences, České Budějovice, Czech Republic, <sup>4</sup>Univ. of South Bohemia, České Budějovice, Czech Republic, <sup>5</sup>Bayer CropScience, Monheim, Germany
- 11:30 **1338** Evaluation of candidate insecticide resistance-associated genes and mutations via ectopic expression and CRISPR/Cas9-mediated genome modification in *Drosophila*. **John Vontas** (vontas@imbb.forth.gr)<sup>1,2</sup>, Rafaela Panteleri<sup>3</sup>, Iason Christou<sup>4</sup>, Athanasia Zampouka<sup>4</sup>, Stella Kounadi<sup>4</sup>, Maria Riga<sup>4</sup>, Yiannis Livadaras<sup>5</sup>, Thomas Van Leeuwen<sup>6</sup>, Ralf Nauen<sup>7</sup>, and Douris Vasalis<sup>5</sup>, <sup>1</sup>FORTH Institute of Molecular Biology and Biotechnology, Heraklio, Greece, <sup>2</sup>Agricultural Univ. of Athens, Athens, Greece, <sup>3</sup>Univ. of Crete, Heraklio, Greece, <sup>4</sup>Univ. of Crete, Crete, Greece, <sup>5</sup>National Institute of Molecular Biology and Biotechnology, Heraklion, Greece, <sup>6</sup>Ghent Univ., Ghent, Belgium, <sup>7</sup>Bayer CropScience, Monheim, Germany

- 11:45 **1339** Dissecting the molecular mechanisms of insecticide resistance in the brown planthopper, *Nilaparvata lugens*. **Christoph Zimmer** (c.zimmer@exeter.ac.uk)<sup>1</sup>, William Garrood<sup>2</sup>, Maxie Kohler<sup>3</sup>, Oliver Gutbrod<sup>3</sup>, Svend Matthiesen<sup>3</sup>, Emyr Davies<sup>2</sup>, Ralf Nauen<sup>3</sup>, and Chris Bass<sup>1</sup>, <sup>1</sup>Univ. of Exeter, Penryn, United Kingdom, <sup>2</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>3</sup>Bayer CropScience, Monheim am Rhein, Germany
- 12:00 **1340** Understanding molecular mechanisms of resistance to promote future resistance management strategies in the western corn rootworm, *Diabrotica virgifera virgifera*. **Blair Siegfried** (bsiegfried1@ufl.edu)<sup>1</sup>, Haichuan Wang<sup>2</sup>, Hong Chen<sup>3</sup>, and Brad Coates<sup>4</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Univ. of Nebraska, Lincoln, NE, <sup>3</sup>USDA - ARS, Lincoln, NE, <sup>4</sup>USDA - ARS, Ames, IA

### Symposium: From Molecules to Management: New Tools for Understanding Locust Swarms across Species and Research Disciplines

#### Room W331 A (Convention Center)

**Moderators and Organizers:** Arianne Cease and Stephen Rogers, Arizona State Univ., Tempe, AZ

- 9:15 **1341** Mechanisms of phase change in the Australian plague locust, *Chortoicetes terminifera*. **Stephen Rogers** (stvrgrs0@gmail.com)<sup>1</sup>, Stephen Simpson<sup>2</sup>, and Andrew B. Barron<sup>3</sup>, <sup>1</sup>Arizona State Univ., Tempe, AZ, <sup>2</sup>The Univ. of Sydney, Camperdown, Australia, <sup>3</sup>Macquarie Univ., Sydney, Australia
- 9:30 **1342** Molecular mechanisms underlying olfactory plasticity during phase transition in the migratory locust, *Locusta migratoria*. **Xianhui Wang** (wangxh@ioz.ac.cn), Zhifeng Wang, Wei Guo, Pengcheng Yang, and Le Kang, Chinese Academy of Sciences, Beijing, China
- 9:45 **1343** Locust migration in coupled natural human systems: Connecting soil nitrogen, outbreaks, livelihoods, and livestock markets. **Arianne Cease** (acease@asu.edu)<sup>1</sup>, James Elser<sup>1</sup>, Joleen Hadrich<sup>2</sup>, Brian Robinson<sup>3</sup>, Eli Fenichel<sup>4</sup>, and Jon Harrison<sup>1</sup>, <sup>1</sup>Arizona State Univ., Tempe, AZ, <sup>2</sup>Colorado State Univ., Fort Collins, CO, <sup>3</sup>McGill Univ., Montréal, QC, Canada, <sup>4</sup>Yale Univ., New Haven, CT
- 10:00 **1344** From individuals to mass migration in locust hopper bands. **Jerome Buhl** (jerome.buhl@adelaide.edu.au)<sup>1</sup>, Gregory Sword<sup>2</sup>, and Stephen Simpson<sup>3</sup>, <sup>1</sup>The Univ. of Adelaide, Adelaide, Australia, <sup>2</sup>Texas A&M Univ., College Station, TX, <sup>3</sup>The Univ. of Sydney, Camperdown, Australia
- 10:15 BREAK**
- 10:30 **1345** Emission patterns reveal that aromatic compounds are key metabolites associated with the phase changes in *Locusta migratoria*. **Jianing Wei** (weijn@ioz.ac.cn), Wenbo Shao, Xianhui Wang, and Le Kang, Chinese Academy of Sciences, Beijing, China
- 10:45 **1346** Mixed or specialized livestock grazing strategies: Which provides the greatest opportunity to mitigate locust outbreaks? **Joleen Hadrich** (joleen.hadrich@colostate.edu) and Anne Byrne, Colorado State Univ., Fort Collins, CO



- 11:00 **1347** Presentation withdrawn
- 11:15 **1348** Remote sensing in locust monitoring in Central Asia: Accomplishments and perspectives. **Alexandre Latchininsky** (latchini@uwyo.edu), Univ. of Wyoming, Laramie, WY
- 11:30 **1349** The locust liability: A case of stoichiometric externalities. **Kevin Berry** (kevin.berry@yale.edu)<sup>1</sup>, Arianne Cease<sup>2</sup>, Eli Fenichel<sup>1</sup>, and James Elser<sup>2</sup>, <sup>1</sup>Yale Univ., New Haven, CT, <sup>2</sup>Arizona State Univ., Tempe, AZ
- 11:45 **1350** Transgenerational inheritance of population crowding and the underlying epigenetic mechanisms in the migratory locust *Locusta migratoria*. **Bing Chen** (chenbing@ioz.ac.cn) and Le Kang, Chinese Academy of Sciences, Beijing, China
- 12:00 **1351** Grassland governance to mitigate locust outbreaks in China. **Brian Robinson** (brian.e.robinson@mcgill.ca), McGill Univ., Montréal, QC, Canada

## Symposium: Advances in Hermetic Storage for Smallholder Farms

### Room W224 A (Convention Center)

**Moderators and Organizers:** Dieudonne Baributsa, Jacob Ricker-Gilbert, and Scott Williams, Purdue Univ., West Lafayette, IN

This symposium is generously sponsored by the Purdue Improved Crop Storage (PICS3) Project, Purdue University.



- 9:15 **1352** Hermetic storage for food and seed. **Dieudonne Baributsa** (dbaribut@purdue.edu)<sup>1</sup> and Scott Williams<sup>2</sup>, <sup>1</sup>Purdue Improved Crop Storage Lab, West Lafayette, IN, <sup>2</sup>Purdue Univ., West Lafayette, IN
- 9:30 **1353** Farmers' incentives to adopt hermetic storage. Jacob Ricker-Gilbert and **Stacy Prieto** (mccoy20@purdue.edu), Purdue Univ., West Lafayette, IN
- 9:45 **1354** Hermetic storage: An important strategy for pest management in Portugal and Mozambique. Rafael Guenha<sup>1</sup> and **Maria Carvalho** (motiliac@isa.ulisboa.pt)<sup>2</sup>, <sup>1</sup>Eduardo Mondlane Univ., Maputo, Mozambique, <sup>2</sup>Univ. of Lisbon, Lisbon, Portugal
- 10:00 **1355** Improving the availability of hermetic technologies among farmers: The experience of PICS bags. **Jean Njiru** (jeannjiru@gmail.com)<sup>1</sup> and Dieudonne Baributsa<sup>2</sup>, <sup>1</sup>Purdue University, Nairobi, Kenya, <sup>2</sup>Purdue Univ., West Lafayette, IN

### 10:15 BREAK

### 10:30 Panel Discussion: The future of hermetic storage

- SD1356** Comparative effects of hypoxia on four grain storage insect pest species. **Antoine Sanon** (sanonant@yahoo.fr)<sup>1</sup>, Scott Williams<sup>2</sup>, L. Dabire<sup>3</sup>, and Larry Murdock<sup>2</sup>, <sup>1</sup>Univ. of Ouagadougou, Ouagadougou, Burkina Faso, <sup>2</sup>Purdue Univ., West Lafayette, IN, <sup>3</sup>INERA, Niger, Niger
- SD1357** Promoting PICS technology to smallholder farmers in Burkina Faso, the experience of Catholic Relief Service. **Adama Sienou** (adama.sienou@crs.org)<sup>1</sup>, Amidou Traore<sup>1</sup>, and Louise Sperling<sup>2</sup>, <sup>1</sup>Catholic Relief Service, Ouagadougou, Burkina Faso, <sup>2</sup>Catholic Relief Service, Baltimore, MD

- SD1358** Hermetic storage for controlling postharvest losses and aflatoxin poisoning. James Ng'ang'a<sup>1</sup>, Christopher Mutungi<sup>2</sup>, Samuel Imathiu<sup>3</sup>, and **Hippolyte Affognon** (haffognon@icipe.org)<sup>1</sup>, <sup>1</sup>International Centre of Insect Physiology and Ecology, Nairobi, Kenya, <sup>2</sup>Egerton Univ., Egerton, Kenya, <sup>3</sup>Jomo Kenyatta Univ. of Agriculture and Technology, Juja, Kenya
- SD1359** Seed viability and oxygen depletion rate of hermetically stored maize infested by *P. truncatus* (Horn) and *S. zeamais* (Mot). **Jacob Anankware** (anankware@yahoo.com)<sup>1</sup>, Martin Bornu-Ire<sup>2</sup>, and Daniel Obeng-Ofori<sup>2</sup>, <sup>1</sup>Kwame Nkrumah Univ. of Science and Technology, Kumasi, Ghana, <sup>2</sup>Univ. of Ghana, Accra, Ghana
- SD1360** Lessons mitigating post-harvest losses in Tanzania. **John Macharia** (jmacharia@agra.org) and Mellyne Ongango, Alliance for a Green Revolution in Africa, Nairobi, Kenya
- SD1361** Reproductive behavior and egg development of cowpea bruchids (*Callosobruchus maculatus*) under hypoxia. **Yan Yan** (yanyancau@hotmail.com)<sup>1</sup>, Scott Williams<sup>2</sup>, Dieudonne Baributsa<sup>3</sup>, and Larry Murdock<sup>2</sup>, <sup>1</sup>China Agricultural Univ., Beijing, China, <sup>2</sup>Purdue Univ., West Lafayette, IN, <sup>3</sup>Purdue Improved Crop Storage Lab, West Lafayette, IN
- SD1362** Presentation withdrawn
- SD1363** Bioacoustics of some post-harvest insect pests. **Anastasia Njoroge** (anjoroge@icipe.org)<sup>1</sup>, Hippolyte Affognon<sup>1</sup>, Christopher Mutungi<sup>2</sup>, Uwe Richter<sup>3</sup>, Oliver Hensel<sup>3</sup>, and Richard W. Mankin<sup>4</sup>, <sup>1</sup>International Centre of Insect Physiology and Ecology, Nairobi, Kenya, <sup>2</sup>Egerton Univ., Egerton, Kenya, <sup>3</sup>Univ. of Kassel, Witzenhausen, Germany, <sup>4</sup>USDA - ARS, Gainesville, FL
- SD1364** Implementing climate-smart dry chain technology for improving livelihoods of the maize farming community in Pakistan. **Irfan Afzal** (iafzal@uaf.edu.pk), Amir Bakhtavar, Muhammad Sagheer, and Ishfaq Muhammad, Univ. of Agriculture, Faisalabad, Pakistan
- SD1365** An improved hermetic storage bag for the control of boring insects that break the hermetic seal of current bags. Pierre Guillet<sup>1</sup>, **Hubert Coffi** (hubert@vectorhealth.com)<sup>2</sup>, and Johnson Odera<sup>2</sup>, <sup>1</sup>Atoz Textile Mills, Ltd., Arusha, Tanzania, <sup>2</sup>Africa Technical Research Center, Arusha, Tanzania
- SD1366** Evaluation of maize quality and aflatoxin contamination in some markets of Benin and Niger. Ousmane Bakoye<sup>1</sup>, **Ibrahim Baoua** (baoua.ibrahim@gmail.com)<sup>2</sup>, H. H. Seyni<sup>3</sup>, Laouali Amadou<sup>1</sup>, Dieudonne Baributsa<sup>4</sup>, and Larry Murdock<sup>4</sup>, <sup>1</sup>National Institute for Agricultural Research of Niger, Maradi, Niger, <sup>2</sup>Univ. of Maradi, Maradi, Niger, <sup>3</sup>Univ. Abdou Moumouni, Niamey, Niger, <sup>4</sup>Purdue Univ., West Lafayette, IN
- SD1367** Triple bagging for safe storage of chickpea and pigeonpea seeds at the farmers' level. **Hari Sudini** (h.sudini@cgjar.org), G. V. Rao, and C. H. Reddy, International Crops Research Institute for the Semi-Arid Tropics, Patancheru, India
- SD1368** Assessment of hermetic storage of maize under different environmental conditions. **Brett Lane** (lane31@purdue.edu) and Charles Woloshuk, Purdue Univ., West Lafayette, IN



- SD1369** Evaluation of sealed storage for the control of stored-grain insect pests. **Sam Cook** (cooks@ksu.edu)<sup>1</sup> and Dirk Maier<sup>2</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>Iowa State Univ., Ames, IA
- SD1370** Controlling weevils in stored maize by means of physical disturbance. Carl Bern, **Denis Bbosa** (dbbosa@iastate.edu), Thomas Brumm, Kurt Rosentrater, D. Raman, and Rashid Suleiman, Iowa State Univ., Ames, IA
- SD1371** Hermetic control of *Sitophilus zeamais* in stored maize in Ghana: Evidence from Purdue Improved Crops Storage (PICS) bags. **Isaac Nunoo** (nunooisaac88@gmail.com)<sup>1</sup>, Abigail Agyeiwaa Darkwa<sup>1</sup>, Anyebe Onu<sup>2</sup>, Abdoulaye Tahirou<sup>2</sup>, and Dieudonne Baributsa<sup>3</sup>, <sup>1</sup>Rural Education and Agriculture Development International, Kumasi, Ghana, <sup>2</sup>International Institute of Tropical Agriculture, Ibadan, Nigeria, <sup>3</sup>Purdue Univ., West Lafayette, IN
- 11:15 **Poster Session: Efforts to mitigate postharvest losses in developing countries**

### Symposium: Stored Product Entomology: Challenges that Transcend Borders

Room W224 B (Convention Center)

**Moderator and Organizer:** Brent Elliott, Canadian Grain Commission, Winnipeg, MB, Canada

- 9:15 **1372** Survey of pest management practices for rice mills in the U.S. **Tanja McKay** (tmckay@astate.edu)<sup>1</sup>, Luis Espino<sup>2</sup>, Frank Arthur<sup>3</sup>, James Campbell<sup>3</sup>, Lloyd T. Wilson<sup>4</sup>, Yubin Yang<sup>4</sup>, and Julien Beuzelin<sup>5</sup>, <sup>1</sup>Arkansas State Univ., Jonesboro, AR, <sup>2</sup>Univ. of California Cooperative Extension, Colusa, CA, <sup>3</sup>USDA - ARS, Manhattan, KS, <sup>4</sup>Texas A&M AgriLife Research, Beaumont, TX, <sup>5</sup>Louisiana State Univ. AgCenter, Baton Rouge, LA
- 9:30 **1373** Control of *Plodia interpunctella* infesting a chocolate factory: Combining mating disruption and the parasitoid *Habrobracon hebetor*. **Pasquale Trematerra** (trema@unimol.it), Univ. of Molise, Campobasso, Italy
- 9:45 **1374** Post-harvest losses – challenges of scaling new technologies. **Georgina V. Bingham** (gvb@vestergaard.com), Vestergaard Frandsen SA, Lausanne, Switzerland
- 10:00 **1375** Ecology of *Cryptolestes ferrugineus*: New findings using conventional and population genetic approaches into a pest of growing importance. **Greg Daghli** (greg.daghli@daf.qld.gov.au)<sup>1</sup>, Andrew Ridley<sup>2</sup>, Philip Burrill<sup>3</sup>, Gimme H. Walter<sup>4</sup>, Alicia Toon<sup>4</sup>, Joanne Holloway<sup>5</sup>, and Robert Emery<sup>6</sup>, <sup>1</sup>Queensland Dept. of Agriculture and Fisheries, Brisbane, Australia, <sup>2</sup>Dept. of Agriculture and Fisheries, Brisbane, Australia, <sup>3</sup>Dept. of Agriculture and Fisheries, Warwick, Australia, <sup>4</sup>Univ. of Queensland, Brisbane, Australia, <sup>5</sup>New South Wales Dept. of Primary Industries, Wagga Wagga, Australia, <sup>6</sup>Dept. of Agriculture and Food, South Perth, Australia
- 10:15 **BREAK**

- 10:30 **1376** Dust to weevils, weevils to dust: Diatomaceous earth, weevil water balance, and personality. **Raul Geddes** (guedes@ufv.br), Federal Univ. of Viçosa, Viçosa, Brazil
- 10:45 **1377** Susceptibility of various life stages of stored product insects to high concentration of ozone. **Rizana M. Mahroof** (rmahroof@scsu.edu), South Carolina State Univ., Orangeburg, SC
- 11:00 **1378** Efficacy of a high concentration of chlorine dioxide gas against laboratory and field strains of five stored product insect species. Xinyi E., Beibei Li, and **Bhadriraju Subramanyam** (sbhadrir@ksu.edu), Kansas State Univ., Manhattan, KS
- 11:15 **1379** The use of ozone to protect food and property. **Linda J. Mason** (lmason@purdue.edu), James Feston, Ameya D. Gondhalekar, and Mahsa Fardisi, Purdue Univ., West Lafayette, IN
- 11:30 **1380** Challenges facing fumigation of stored products and research for solutions. **Thomas Phillips** (twp1@ksu.edu), Kansas State Univ., Manhattan, KS

### Symposium: Advancements in Resistance and Aversion Management for Urban Pests

Room W224 C (Convention Center)

**Moderators and Organizers:** Jason Meyers<sup>1</sup> and Robert Hickman<sup>2</sup>, <sup>1</sup>BASF, Kansas City, MO, <sup>2</sup>BASF, Maitland, FL

- 9:15 **1381** Recent advances in German cockroach resistance management. **Ameya D. Gondhalekar** (ameyag@purdue.edu), Mahsa Fardisi, and Michael Scharf, Purdue Univ., West Lafayette, IN
- 9:30 **1382** Resistance issues affecting German cockroach bait performance. **Jules Silverman** (jules\_silverman@ncsu.edu), Alexander Ko, Kim Jensen, Ayako Katsumata, and Coby Schal, North Carolina State Univ., Raleigh, NC
- 9:45 **1383** Resistance and aversion management for urban mosquitoes. **Mark Paine** (mark.paine@lstmed.ac.uk), Liverpool School of Tropical Medicine, Liverpool, United Kingdom
- 10:00 **1384** Historical perspective: Aspects of resistance management in roaches and fleas. **William A. Donahue** (srl@clearwire.net), Sierra Research Laboratories, Modesto, CA
- 10:15 **BREAK**
- 10:30 **1385** Staying ahead of the curve: A manufacturer's perspective on resistance management. **Kenneth S. Brown** (kenneth.s.brown@basf.com)<sup>1</sup>, Clark Klein<sup>2</sup>, Vincent Salgado<sup>1</sup>, and Barbara Wedel<sup>2</sup>, <sup>1</sup>BASF, Research Triangle Park, NC, <sup>2</sup>BASF, Durham, NC
- 10:45 **1386** A successful protocol: Controlling resistant German cockroaches, *Blattella germanica* (Linnaeus), while avoiding resistance development. **Thomas Jarzynka** (tjarzynka@masseyservices.com), Massey Services, Inc., Orlando, FL
- 11:00 **1387** Mechanisms of insecticide resistance in the bed bug: Implications for resistance management. **Kenneth F. Haynes** (khaynes@uky.edu), Univ. of Kentucky, Lexington, KY



- 11:15 **1388** Understanding residual efficacy of insecticides on bed bugs: What does formulation and substrate have to do with it? **Alvaro Romero** (aromero2@nmsu.edu), New Mexico State Univ., Las Cruces, NM

### Undergraduate Student Oral Competition: Ecology and Population Dynamics

#### Room W231 C (Convention Center)

**Moderators:** Palaniswami MariSivaswami<sup>1</sup> and Heather J. McAuslane<sup>2</sup>, <sup>1</sup>ENTOMON, India, <sup>2</sup>Univ. of Florida, Gainesville, FL

- 9:15 **1389** *Mesocyclops edax* as the potential first intermediate host for *Gnathostoma turgidum*. **José Zazueta-Moreno** (marcialzazueta\_moreno@hotmail.com)<sup>1</sup>, Xochitl Galaviz-Rentería<sup>1</sup>, Edith Torres-Montoya<sup>1</sup>, Hlpolito Castillo Ureta<sup>1</sup>, Lorenzo Osuna-Martínez<sup>1</sup>, Héctor López-Moreno<sup>1</sup>, Ignacio Osuna Ramírez<sup>1</sup>, Gabriela Silva-Hidalgo<sup>1</sup>, Sylvia Diaz-Camacho<sup>1</sup>, Yukifumi Nawa<sup>2</sup>, and José Rendon Maldonado<sup>1</sup>, <sup>1</sup>Autonomous Univ. of Sinaloa, Culiacán, Mexico, <sup>2</sup>Khon Kaen Univ., Khon Kaen, Thailand
- 9:30 **1390** A novel trap for the continuous collection of carrion-feeding flies. **James Willett** (jrwo23@shsu.edu), Sibyl Bucheli, Michelle L. Lewis, and Natalie K. Lindgren, Sam Houston State Univ., Huntsville, TX
- 9:45 **1391** Flies as bioindicators of grazing pressures in Mongolia. **Rebecca Clement** (rebeclem@gmail.com) and C. Riley Nelson, Brigham Young Univ., Provo, UT
- 10:00 **1392** Evidence for transstadial carriage of bacteria across house fly (*Musca domestica* L.) life history. **Klara Zurek** (kzurek@ksu.edu)<sup>1</sup> and Dana Nayduch<sup>2</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>USDA - ARS, Manhattan, KS
- 10:15 BREAK**
- 10:30 **1393** Dung beetles' attendance based on the age differences of dung. **Etik Susanti** (etiksusanti53@gmail.com), Ardita Tri Anugrah Budaya, Dian Sartika, and R. C. Hidayat Soesilohadi, Gadjah Mada Univ., Yogyakarta, Indonesia
- 10:45 **1394** Identifying cocirculating hemoparasites in the West Nile Virus system. **Dayvion Adams** (ajadams968@tamu.edu), Matthew Medeiros, Andrew Golnar, and Gabriel Hamer, Texas A&M Univ., College Station, TX
- 11:00 **1395** Interspecific competition behavior and circadian rhythm of ground ants in the subtropical forest (Hymenoptera: Formicidae). **Chunhan Shih** (harry820902@gmail.com) and Chung-Chi Lin, National Changhua Univ. of Education, Changhua, Taiwan
- 11:15 **1396** When host color matters for egg parasitoids. **Mathilde Gaudreau** (mathilde.gaudreau@umontreal.ca), Paul Abram, and Jacques Brodeur, Univ. of Montréal, Montréal, QC, Canada

### Graduate Student Oral Competition: Apidology, Sericulture, and Social Insects: Ants

#### Room W240 B (Convention Center)

**Moderator:** Linda Hooper-Bui, Louisiana State Univ., Baton Rouge, LA

- 9:15 **1397** Keeping stock: Support for leaf-piles as buffering mechanisms in *Atta* colonies. **Courtney Rockenbach** (c.rockenbach@rutgers.edu)<sup>1</sup>, Chris Reid<sup>2</sup>, William Wcislo<sup>3</sup>, Cameron Currie<sup>4</sup>, and Simon Garnier<sup>5</sup>, <sup>1</sup>Rutgers, The State Univ. of New Jersey, Newark, NJ, <sup>2</sup>The Univ. of Sydney, Sydney, Australia, <sup>3</sup>Smithsonian Tropical Research Institute, Panama City, Panama, <sup>4</sup>Univ. of Wisconsin, Madison, WI, <sup>5</sup>New Jersey Institute of Technology, Newark, NJ
- 9:30 **1398** Relationship between surface object properties and sunlight exposure in nests of meat ants, *Iridomyrmex purpureus*. **Subash Ray** (rayk.subash@gmail.com)<sup>1</sup>, Chris Reid<sup>2</sup>, Tanya Latty<sup>2</sup>, Simon Garnier<sup>3</sup>, and Michael Holmes<sup>2</sup>, <sup>1</sup>Rutgers, The State Univ. of New Jersey, Newark, NJ, <sup>2</sup>The Univ. of Sydney, Sydney, Australia, <sup>3</sup>New Jersey Institute of Technology, Newark, NJ
- 9:45 **1399** How individuals play their part in collective choice in the seed harvester ant, *Pogonomyrmex californicus*. **Ioulia Bessalova** (ibespal@asu.edu) and Jennifer H. Fewell, Arizona State Univ., Tempe, AZ
- 10:00 **1400** Thermoregulatory responses to thermal clines: Bivouac function across the wide elevational range of a Neotropical army ant (Formicidae: Dorylinae: *Eciton burchellii parvispinum*). **Kaitlin Baudier** (kmb478@drexel.edu) and Sean O'Donnell, Drexel Univ., Philadelphia, PA
- 10:15 BREAK**
- 10:30 **1401** Do *Temnothorax rugatulus* (Hymenoptera: Formicidae) recruiters inform nestmates about the quality of the target? **John Cho** (john.cho@asu.edu) and Stephen C. Pratt, Arizona State Univ., Tempe, AZ
- 10:45 **1402** Colony personality links to plant health in the *Azteca-Cecropia* mutualism. **Peter Marting** (pmarting@asu.edu), Arizona State Univ., Tempe, AZ
- 11:00 **1403** Connectivity and nest site availability influence arboreal ant communities. **Benjamin Adams** (benjamin.adams@louisville.edu) and Stephen Yanoviak, Univ. of Louisville, Louisville, KY
- 11:15 **1404** Examining the microbiomes of two sympatric ants, *Trachymyrmex septentrionalis* and *T. turrifex*. **Mattea Allert** (mallert@patriots.uttyler.edu), Katrin Kellner, Kate Hertweck, and Jon Seal, The Univ. of Texas, Tyler, TX
- 11:30 **1405** Oogenesis and embryogenesis in fungus-gardening ants. **Chi-Chun Fang** (ccfang@utexas.edu) and Ulrich G. Mueller, The Univ. of Texas, Austin, TX
- 11:45 **1406** Ant assemblages and co-occurrence patterns in the swamp. **Xuan Chen** (chenxuan1128@gmail.com), Benjamin Adams, Alexander Sabo, Theresa Crupi, and Linda Hooper-Bui, Louisiana State Univ., Baton Rouge, LA



TUESDAY

Graduate Student Oral Competition: Apidology, Sericulture, and Social Insects: Honey Bees II

Room W240 A (Convention Center)

**Moderator:** Elizabeth Grafton-Cardwell, Univ. of California, Exeter, CA

- 9:15 **1407** Honey bee viruses in unexpected places. **Megan Colwell** (colwellm@myumanitoba.ca)<sup>1</sup>, Rob Currie<sup>1</sup>, and Stephen Pernal<sup>2</sup>, <sup>1</sup>Univ. of Manitoba, Winnipeg, MB, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Beaverlodge, AB, Canada
- 9:30 **1408** Plant assisted self-medication: Virus-challenged bees improve survival with caffeine nectar consumption. **Saundra A. Wheeler** (saundra\_wheeler22@yahoo.com)<sup>1</sup>, Diana Cox-Foster<sup>2</sup>, and Edwin Rajotte<sup>1</sup>, <sup>1</sup>Pennsylvania State Univ., University Park, PA, <sup>2</sup>USDA - ARS, Logan, UT
- 9:45 **1409** Host-pathogen interactions in the hive: A study of honey bee behavior during IAPV-infection. **Amy Geffre** (acgeffre@iastate.edu), Adam Dolezal, Bryony Bonning, and Amy L. Toth, Iowa State Univ., Ames, IA
- 10:00 **1410** Understanding pathogen dynamics in bee communities. **Briana Ezray** (bde125@psu.edu) and Heather M. Hines, Pennsylvania State Univ, University Park, PA
- 10:15 BREAK**
- 10:30 **1411** Pathogen transmission in plant-pollinator networks. **Laura Figueroa** (llf44@cornell.edu)<sup>1</sup>, Peter Graystock<sup>2</sup>, Heather Connelly<sup>1</sup>, Quinn McFrederick<sup>2</sup>, and Scott McArt<sup>1</sup>, <sup>1</sup>Cornell Univ., Ithaca, NY, <sup>2</sup>Univ. of California, Riverside, CA
- 10:45 **1412** Development of *Varroa destructor* *in vitro* rearing methods. **Cameron Jack** (cjack@ufl.edu) and James D. Ellis, Univ. of Florida, Gainesville, FL
- 11:00 **1413** An improved assay for determining deformed wing virus titres in the European honeybee (*Apis mellifera*) and *Varroa destructor*. **Emma Bradford** (r01elb14@abdn.ac.uk), Ewan Campbell, and Alan Bowman, Univ. of Aberdeen, Aberdeen, United Kingdom
- 11:15 **1414** Cues that contribute to triggering *Varroa*-sensitive hygiene behaviour in *Apis mellifera* colonies. **Seo Hyun Kim** (kimseohyun01@gmail.com)<sup>1</sup>, Fanny Mondet<sup>2</sup>, and Alison Mercer<sup>1</sup>, <sup>1</sup>Univ. of Otago, Dunedin, New Zealand, <sup>2</sup>INRA, Avignon, France
- 11:30 **1415** Interaction of the insecticide clothianidin and the parasitic mite *Varroa destructor* on honey bee (*Apis mellifera*) health. **Nuria Morfin-Ramirez** (nmorfin@uoguelph.ca), Ernesto Guzman, and Paul H. Goodwin, Univ. of Guelph, Guelph, ON, Canada

Graduate Student Oral Competition: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops: Bt Toxins

Room W240 D (Convention Center)

**Moderator:** Amanda Jacobson, Dow AgroSciences, Greenville, MS

- 9:15 **1416** Effects of transgenic corn hybrids expressing Bt toxins on the development and fecundity of *Helicoverpa zea*. **Thomas Bilbo** (bilbothomas@gmail.com)<sup>1</sup>, Francis Reay-Jones<sup>2</sup>, Jeremy Greene<sup>3</sup>, Dominic Reisig<sup>4</sup>, and Fred Musser<sup>5</sup>, <sup>1</sup>Clemson Univ., Clemson, SC, <sup>2</sup>Clemson Univ., Florence, SC, <sup>3</sup>Clemson Univ., Blackville, SC, <sup>4</sup>North Carolina State Univ., Plymouth, NC, <sup>5</sup>Mississippi State Univ., Mississippi State, MS
- 9:30 **1417** Bt susceptibility and oviposition preferences of fall armyworm (Lepidoptera: Noctuidae) host strains. **David Ingber** (ingber@udel.edu) and Charles Mason, Univ. of Delaware, Newark, DE
- 9:45 **1418** Susceptibility of the fall armyworm, *Spodoptera frugiperda* (Lepidoptera: Noctuidae), to Bt toxins and conventional pesticides among different populations in the US and Mexico. **Rebeca Gutierrez** (gutie131@msu.edu)<sup>1</sup>, David Mota-Sanchez<sup>1</sup>, Carlos A. Blanco<sup>2</sup>, and Mark E. Whalon<sup>1</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>USDA - APHIS, Riverdale, MD
- 10:00 **1419** Type of fitness cost influences the rate of evolution of resistance to transgenic Bt crops. **Sean Hackett** (sean.hackett@zoo.ox.ac.uk) and Michael Bonsall, Univ. of Oxford, Oxford, United Kingdom
- 10:15 BREAK**
- 10:30 **1420** Presentation withdrawn
- 10:45 **1421** Risk assessment for the non-target species *Drosophila melanogaster* – establishment of a test system and evaluation of the impacts of Bt toxins and GE plant material. **Simone Haller** (simone.haller@agroscope.admin.ch), Michael Meissle, and Jörg Romeis, Agroscope, Zürich, Switzerland
- 11:00 **1422** Abundance of western corn rootworm, injury to corn, and Bt resistance in local landscapes. **Coy St. Clair** (cstclair@iastate.edu)<sup>1</sup>, Graham P. Head<sup>2</sup>, and Aaron J. Gassmann<sup>1</sup>, <sup>1</sup>Iowa State Univ., Ames, IA, <sup>2</sup>Monsanto Company, St. Louis, MO
- 11:15 **1423** Spatial variation in western corn rootworm susceptibility to Bt corn events in Nebraska. **Jordan Reinders** (jordan.reinders3@gmail.com) and Lance Meinke, Univ. of Nebraska, Lincoln, NE
- 11:30 **1424** Does Cry3Bb1 resistance persist following removal from selection? **Dalton Ludwick** (dclmrd@mail.missouri.edu)<sup>1</sup>, Sarah Zukoff<sup>2</sup>, Lisa Meihls<sup>3</sup>, Man Huynh<sup>1</sup>, Ken Ostlie<sup>4</sup>, and Bruce Hibbard<sup>3</sup>, <sup>1</sup>Univ. of Missouri, Columbia, MO, <sup>2</sup>Kansas State Univ., Manhattan, KS, <sup>3</sup>USDA - ARS, Columbia, MO, <sup>4</sup>Univ. of Minnesota, St. Paul, MN
- 11:45 **1425** Testing western corn rootworm (Coleoptera: Chrysomelidae) for cross-resistance between Cry toxins and soil insecticides. **Kenneth E. Masloski** (masloski@iastate.edu), Joel R. Coats, and Aaron J. Gassmann, Iowa State Univ., Ames, IA



TUESDAY

12:00 **1426** Effect of transgenic corn hybrids and a soil insecticide on corn rootworm (Coleoptera: Chrysomelidae) beetle emergence in North Dakota. **Veronica Calles Torrez** (veronica.callestorre@nds.edu), Janet Knodel<sup>1</sup>, Mark A. Boetel<sup>1</sup>, Bryan French<sup>2</sup>, Billy Fuller<sup>3</sup>, and Joel Ransom<sup>1</sup>, <sup>1</sup>North Dakota State Univ., Fargo, ND, <sup>2</sup>USDA - ARS, Brookings, SD, <sup>3</sup>South Dakota State Univ., Brookings, SD

### Graduate Student Oral Competition: Genetics and Evolutionary Entomology: Behavior

Room W240 C (Convention Center)

**Moderator:** Jerome A. Hogsette, USDA - ARS, Gainesville, FL

9:15 **1427** Discovery of *Anopheles daciae* in the Moscow region of Russia. **Anastasia N. Naumenko** (naumenko@vt.edu)<sup>1</sup>, Mikhail Gordeev<sup>2</sup>, Igor Sharakhov<sup>1,3</sup>, and Maria Sharakhova<sup>1,3</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>Moscow Regional State Univ., Moscow, Russia, <sup>3</sup>Tomsk State Univ., Tomsk, Russia

9:30 **1428** *In vivo* functional genetic analysis of insecticide resistance in the malaria mosquito *Anopheles gambiae*. **Adriana Adolfi** (adriana.adolfi@lstm.ac.uk), Amy Lynd, Hilary Ranson, and Gareth Lycett, Liverpool School of Tropical Medicine, Liverpool, United Kingdom

9:45 **1429** Teasing apart the ovipositional responses of *Culex tarsalis* to semiochemicals associated with fish for use in vector control. **Adena Why** (awhy001@ucr.edu) and William E. Walton, Univ. of California, Riverside, CA

10:00 **1430** Mutual intra- and interspecific social parasitism between parapatric sister species of eusocial wasps and the process of its evolution. **Tatsuya Saga** (tatsuya.saga@gmail.com)<sup>1,2</sup>, Minoru Kanai<sup>3</sup>, Yasukazu Okada<sup>1</sup>, and Masakazu Shimada<sup>1</sup>, <sup>1</sup>The Univ. of Tokyo, Tokyo, Japan, <sup>2</sup>Gifu Prefectural Ogaki Sakura Senior High School, Ogaki, Japan, <sup>3</sup>Fujimi-Cho, Suwa-Gun, Japan

### 10:15 BREAK

10:30 **1431** The population genomics of primitively social paper wasps (*Polistes dominula*). **Kathleen Dogantzis** (kdogantzis@gmail.com)<sup>1</sup>, Amy Toth<sup>2</sup>, and Amro Zayed<sup>1</sup>, <sup>1</sup>York Univ., Toronto, ON, Canada, <sup>2</sup>Iowa State Univ., Ames, IA

10:45 **1432** Asymmetric hybrid dysgenesis in crosses of different host-food plant complex sources of the parasitic wasp, *Cotesia congregata*. **Justin Bredlau** (bredlauj@vcu.edu) and Karen Kester, Virginia Commonwealth Univ., Richmond, VA

11:00 **1433** From population to speciation: Evolution of the *Peristenus pallipes* (Hymenoptera: Braconidae) complex. **Miles Zhang** (yuanmeng.zhang@gmail.com)<sup>1</sup>, Diana Fernández<sup>2</sup>, and Barbara Sharanowski<sup>1</sup>, <sup>1</sup>Univ. of Central Florida, Orlando, FL, <sup>2</sup>Univ. of Lethbridge, Lethbridge, AB, Canada

11:15 **1434** Diversification of plant-feeding insects is positively correlated with natural enemy pressure. **Mayrolin Garcia Morales** (mzg0043@auburn.edu) and Nate Hardy, Auburn Univ., Auburn, AL

11:30 **1435** Understanding variation in molting hormone synthesis pathways through comparative genome analysis. **Caitlyn Perry** (c.perry2@student.unimelb.edu.au) and Charles Robin, The Univ. of Melbourne, Melbourne, Australia

11:45 **1436** Presentation withdrawn

12:00 **1437** Sugar feeding behaviour of male mosquitoes from sympatric, sibling species *Culex pipiens* and *Culex torrentium*. **Richard Halfpenny** (richard.halfpenny@research.staffs.ac.uk), Angela Priestman, John Dover, and Kevin Reiling, Staffordshire Univ., Stoke-on-Trent, United Kingdom

12:15 **1438** Delineation of the population genetic structure of *Culicoides imicola* in east and south Africa.

**Maria Onyango** (gorreti.m@gmail.com)<sup>1</sup>, George Ngondi<sup>2</sup>, Moses Ogugo<sup>2</sup>, Gert Venter<sup>3</sup>, Miguel Miranda<sup>4</sup>, Nohal Elissa<sup>5</sup>, Appolinaire Dijkeng<sup>2</sup>, Stephen Kemp<sup>2</sup>, Peter Walker<sup>1</sup>, and Jean-Bernard Duchemin<sup>1</sup>, <sup>1</sup>CSIRO, Geelong, Australia, <sup>2</sup>International Livestock Research Institute, Nairobi, Kenya, <sup>3</sup>Agricultural Research Council, Onderstepoort, South Africa, <sup>4</sup>Univ. of the Balearic Islands, Palma, Spain, <sup>5</sup>Pasteur Institute, Ambatofotsikely, Madagascar

### Graduate Student Oral Competition: Medical and Veterinary Entomology: Livestock Pests and Decomposers

Room W232 A (Convention Center)

**Moderator:** Nancy Hinkle, Univ. of Georgia, Athens, GA

9:15 **1439** What way did they go!? Examining the directional movement of house flies (*Musca domestica* L.) **Levi Zahn** (levi.zahn@ucr.edu) and Alec Gerry, Univ. of California, Riverside, CA

9:30 **1440** *Musca domestica* larvae used in poultry waste bioprocessing: Fate of *Escherichia coli* and *Salmonella* spp. **Nichelle Lomas** (nlomas@uoguelph.ca), Stephen A. Marshall, Marc Habash, and Youbin Zheng, Univ. of Guelph, Guelph, ON, Canada

9:45 **1441** Contact and fumigant toxicities of aliphatic methyl ketones to filth flies. **Jean Marcel Deguenon** (jdeguen@ncsu.edu), Jiwei Zhu, Anirudh Dhammi, Steven Denning, Michael Reiskind, Wes Watson, and R. Michael Roe, North Carolina State Univ., Raleigh, NC

10:00 **1442** Oviposition behavior of *Phormia regina* (Diptera: Calliphoridae) is mediated by temperature and the presence of other species. **Krystal R. Hans** (hansk@uwindsor.ca) and Sherah L. VanLaerhoven, Univ. of Windsor, Windsor, ON, Canada

### 10:15 BREAK

10:30 **1443** Seasonal effects on insect succession in carrion in northern California. **Alex Dedmon** (acdedmon@ucdavis.edu), Univ. of California, Davis, CA

10:45 **1444** Chemical, mechanical, and biological control of the lesser mealworm, *Alphitobius diaperinus* (Panzer) (Coleoptera: Tenebrionidae), in broiler houses. **Brent Phelan** (bphelan@uga.edu), Brian D. Fairchild, and Nancy Hinkle, Univ. of Georgia, Athens, GA



TUESDAY

- 11:00 **1445** Presentation withdrawn
- 11:15 **1446** The role of the emerging entotechnology sector to treat urban and rural organic wastes in attaining the 2022 landfilling ban policy of Québec, Canada. **Louise Hénault-Ethier** (louisehenaultethier@hotmail.com)<sup>1</sup>, Paula Cabrera<sup>1</sup>, Béatrice Lefebvre<sup>1</sup>, Sophie Taillefer<sup>2</sup>, Marie-Hélène Deschamps<sup>3</sup>, and Grant Vandenberg<sup>3</sup>, <sup>1</sup>Univ. of Québec, Montréal, QC, Canada, <sup>2</sup>Recyc-Québec, Montréal, QC, Canada, <sup>3</sup>Univ. Laval, Québec City, QC, Canada

### Graduate Student Oral Competition: Physiology and Biochemistry: Physiology

#### Room W232 B (Convention Center)

**Moderators:** Dov Borovsky<sup>1</sup> and Sherah VanLaerhoven<sup>2</sup>, <sup>1</sup>USDA - ARS, Fort Pierce, FL, <sup>2</sup>Univ. of Windsor, Windsor, ON, Canada

- 9:15 **1447** Silkworm ortholog of the *Drosophila* eye color gene, *brown*, controls riboflavin transport in Malpighian tubules. **Haokun Zhang** (zhanghaokun@ss.ab.a.u-tokyo.ac.jp), The Univ. of Tokyo, Tokyo, Japan
- 9:30 **1448** Functional study of two adenosine metabolic genes, *adgf-d* and *ada*, in *Drosophila melanogaster*. **Yu-Hsien Lin** (r99632012@gmail.com)<sup>1,2</sup>, Tomas Filip<sup>1,2</sup>, and Michal Zurovec<sup>1,2</sup>, <sup>1</sup>Univ. of South Bohemia, České Budějovice, Czech Republic, <sup>2</sup>Czech Academy of Sciences, České Budějovice, Czech Republic
- 9:45 **1449** Evolution, prey-specificity, and venom in assassin flies. **Charlotte Herbert** (ceherb11@gmail.com)<sup>1</sup> and Karl McKnight<sup>2</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>St. Lawrence Univ., Canton, NY
- 10:00 **1450** The molecular expression of aquaporins in the northern house mosquito, *Culex pipiens*. **Liu Yang** (yang.554@osu.edu) and Peter Piermarini, The Ohio State Univ., Wooster, OH
- 10:15 BREAK**
- 10:30 **1451** Roles of secreted salivary gland proteins of Hessian fly larvae *Mayetiola destructor* (Say) in insect physiology and plant interactions. **Zainab A. A. Al-jbory** (aliz@ksu.edu)<sup>1</sup>, Mustapha El-Bouhssini<sup>2</sup>, R. Jeff Whitworth<sup>1</sup>, and Ming-Shun Chen<sup>1,3</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>INRA, Rabat, Morocco, <sup>3</sup>USDA - ARS, Manhattan, KS
- 10:45 **1452** Endocrine basis for divergent life history timing between two host races of the apple maggot fly *Rhagoletis pomonella*. **Qinwen Xia** (qxia1989@ufl.edu)<sup>1</sup>, Thomas Powell<sup>1</sup>, Hans Alborn<sup>2</sup>, Jeffrey Feder<sup>3</sup>, Gregory Ragland<sup>4</sup>, and Daniel Hahn<sup>1</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>USDA - ARS, Gainesville, FL, <sup>3</sup>Univ. of Notre Dame, South Bend, IN, <sup>4</sup>Kansas State Univ., Manhattan, KS
- 11:00 **1453** Gap junctions and the mosquito blood meal. **Travis Calkins** (calkins.21@osu.edu) and Peter Piermarini, The Ohio State Univ., Wooster, OH
- 11:15 **1454** Anarchy in the honey bee colony: The genetic basis of worker sterility. **Isobel Ronai** (isobel.ronai@sydney.edu.au), Benjamin Oldroyd, Deborah Barton, and Vanina Vergoz, The Univ. of Sydney, Sydney, Australia

- 11:30 **1455** A pinch of salt for honey bees (*Apis mellifera*)? **Raquel Teixeira-Sousa** (r.teixeira-de-sousa@newcastle.ac.uk)<sup>1,2</sup> and Geraldine A. Wright<sup>1</sup>, <sup>1</sup>Newcastle Univ., Newcastle upon Tyne, United Kingdom, <sup>2</sup>Univ. of Porto, Porto, Portugal
- 11:45 **1456** Identifying genes involved in pheromone biosynthesis in *Neoclytus m. mucronatus* (Coleoptera: Cerambycidae) using a differential gene expression approach. **Gabriel Hughes** (ghughes@purdue.edu) and Matthew Ginzel, Purdue Univ., West Lafayette, IN
- 12:00 **1457** Comprehensive analysis of the venom gland transcriptome of the ectoparasitoid *Bracon hebetor*. **Atif Manzoor** (atif1903@yahoo.com)<sup>1</sup>, Bruce Webb<sup>2</sup>, Zain Ul Abidin<sup>1</sup>, and Hoor Shaina<sup>1</sup>, <sup>1</sup>Univ. of Agriculture, Faisalabad, Pakistan, <sup>2</sup>Univ. of Kentucky, Lexington, KY
- 12:15 **1458** Gene identification and physiological regulation of the *B*-oxidation pathway in *Rhodnius prolixus*. **Iron De Paula** (iron@bioqmed.ufrj.br), Daniela Arêdes, David Majerowicz, and Katia Gondim, Federal Univ. of Rio de Janeiro, Rio de Janeiro, Brazil

### Graduate Student Oral Competition: RNAi and Gene Expression Control in Insects

#### Room W232 C (Convention Center)

**Moderator:** Lia Marchwerle, Univ. of Nebraska, Lincoln, NE

- 9:15 **1459** Elucidating the molecular modes of action of juvenile hormone. **Joliene Lindholm** (lindholm.jr1@gmail.com)<sup>1</sup>, Jun Wang<sup>1</sup>, Anthony Orth<sup>2</sup>, D. Willis<sup>1</sup>, and Walter Goodman<sup>1</sup>, <sup>1</sup>Univ. of Wisconsin, Madison, WI, <sup>2</sup>Genomics Institute of the Novartis Research Foundation, San Diego, CA
- 9:30 **1460** An expedition in search of effective RNAi targets in aphids via comparative transcriptomics. **Amol Ghodke** (aghodke@student.unimelb.edu.au)<sup>1</sup>, Robert Good<sup>1</sup>, John Golz<sup>1</sup>, Derek Russell<sup>1</sup>, Owain R. Edwards<sup>2</sup>, Bernard Carroll<sup>3</sup>, and Charles Robin<sup>1</sup>, <sup>1</sup>The Univ. of Melbourne, Melbourne, Australia, <sup>2</sup>CSIRO, Wembley, Australia, <sup>3</sup>Univ. of Queensland, Brisbane, Australia
- 9:45 **1461** The sphingolipids pathway regulates the reproduction of the brown planthopper, *Nilaparvata lugens* (Stål), the most important insect pest of rice in Asia. **Xiaoxiao Shi** (shixiao6656@163.com) and Zeng-Rong Zhu, Zhejiang Univ., Hangzhou, China
- 10:00 **1462** An *in vivo* experimental analysis on the putative magnetic receptor Cry/MagR of the brown planthopper, *Nilaparvata lugens*. **Jingjing Xu** (xujingjing@mail.iese.ac.cn), Chinese Academy of Sciences, Beijing, China
- 10:15 BREAK**
- 10:30 **1463** Identification of potential target genes for RNAi-mediated control of the small hive beetle. **Steven Reyna** (smreyna@ncsu.edu) and Marcé Lorenzen, North Carolina State Univ., Raleigh, NC
- 10:45 **1464** The extent of RNAi in the arbovirus vector, *Culicoides sonorensis*. **Mary Mills** (mm02463@ksu.edu)<sup>1</sup>, Kristin Michel<sup>1</sup>, and Dana Nayduch<sup>2</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>USDA - ARS, Manhattan, KS





- 11:00 **1465** Enhancement of dengue virus replication in transgenic mosquitoes *Aedes aegypti* expressing anti-thioester containing protein 1 (TEP1) microRNA. **Chi-Chuan Li** (ligigi1026@gmail.com)<sup>1,2</sup>, <sup>1</sup>National Health Research Institutes, Miaoli, Taiwan, <sup>2</sup>National Tsing Hua Univ., Hsinchu, Taiwan
- 11:15 **1466** Challenges in developing RNAi as a method of mosquito control. **Paul Airs** (airs@wisc.edu) and Lyric Bartholomay, Univ. of Wisconsin, Madison, WI
- 11:30 **1467** Expression analysis and RNAi depletion of genes encoding *Amblyomma americanum* tick cement proteins. **Taylor Hollmann** (thollmann@cvm.tamu.edu), Zeljko Radulovic, Tae Kim, and Albert Mulenga, Texas A&M Univ., College Station, TX
- 11:45 **1468** Gene knockdown by RNA interference in the cat flea (*Ctenocephalides felis*): Utilising *de novo* transcriptome data for developing drug target identification strategies. **Catriona McIntosh** (r01chm14@abdn.ac.uk)<sup>1</sup>, Sophie Shaw<sup>1</sup>, Debra Woods<sup>2</sup>, Erich Zinser<sup>2</sup>, John Baird<sup>1</sup>, Ewan Campbell<sup>1</sup>, and Alan Bowman<sup>1</sup>, <sup>1</sup>Univ. of Aberdeen, Aberdeen, United Kingdom, <sup>2</sup>Zoetis, Kalamazoo, MI
- 12:00 **1469** Environmental fate of dsRNA in an aqueous system. **Colin Wong** (cwong1@iastate.edu), Vurtice Albright, and Joel R. Coats, Iowa State Univ., Ames, IA

### Contributed Papers: Apidology, Sericulture, and Social Insects: Physiology, Genetics, and Genomics

#### Room W314 A (Convention Center)

**Moderators:** Madeleine Beekman and Benjamin Oldroyd, The Univ. of Sydney, Sydney, Australia

- 9:15 **1470** Characterization of major royal jelly protein 1 and 2 of the western honey bee, *Apis mellifera*. **Anja Buttstedt** (anja.buttstedt@zoologie.uni-halle.de)<sup>1</sup>, and Carmen Muresan<sup>1,2</sup>, <sup>1</sup>Martin Luther Univ., Halle, Germany, <sup>2</sup>Univ. of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania
- 9:30 **1471** Presentation withdrawn
- 9:45 **1472** Nitrogen metabolism in an ancient nutritional symbiosis between *Cephalotes* ants and core gut bacteria. **Yi Hu** (yh332@drexel.edu)<sup>1</sup>, Jon G. Sanders<sup>2</sup>, Piotr Lukasiak<sup>1</sup>, Corrie Moreau<sup>3</sup>, and Jacob Russell<sup>1</sup>, <sup>1</sup>Drexel Univ., Philadelphia, PA, <sup>2</sup>Harvard Univ., Cambridge, MA, <sup>3</sup>The Field Museum of Natural History, Chicago, IL
- 10:00 **1473** Comparative genomics within the *Apis* genomes. **Olav Rueppell** (olav\_rueppell@uncg.edu) and Bertrand Fouks, Univ. of North Carolina, Greensboro, NC
- 10:15 BREAK**
- 10:30 **1474** Comparing brain development and neurochemistry in social and solitary individuals of the sweat bee *Megalopta genalis*. **Adam Smith** (adam\_smith@gwu.edu), The George Washington Univ., Washington, DC

- 10:45 **1475** *Varroa*, deformed wing virus, and virulence – using a naïve host to study the evolution of virulence of RNA viruses. Emily Remnant, Thomas Gillard, and **Madeleine Beekman** (madeleine.beekman@sydney.edu.au), The Univ. of Sydney, Sydney, Australia
- 11:00 **1476** Genetic architecture of the thelytokous phenotype in *Apis mellifera capensis*. **Benjamin Oldroyd** (benjamin.oldroyd@sydney.edu.au)<sup>1</sup>, Nadine Chapman<sup>1</sup>, Mike Allsopp<sup>2</sup>, and Madeleine Beekman<sup>1</sup>, <sup>1</sup>The Univ. of Sydney, Sydney, Australia, <sup>2</sup>Agricultural Research Council, Stellenbosch, South Africa
- 11:15 **1477** Evolution and caste plasticity of brain architecture in Neotropical Army Ants (Formicidae: Ecitoninae). **Sean O'Donnell** (so356@drexel.edu), Susan Bulova, Elisabeth Sulger, and Vishakha Hariawala, Drexel Univ., Philadelphia, PA
- 11:30 **1478** The population genetics of acaricide resistance in *Varroa destructor*. **Robin Moritz** (r.moritz@zoologie.uni-halle.de)<sup>1</sup>, Alexis Beaupaire<sup>1</sup>, and Klemens Krieger<sup>2</sup>, <sup>1</sup>Martin Luther Univ., Halle, Germany, <sup>2</sup>Bayer CropScience, Leverkusen, Germany
- 11:45 **1479** Effects of early developmental exposure on *Apis mellifera*. **Carlos Vega Meléndez** (cjvegame@uncg.edu), Univ. of North Carolina, Greensboro, NC
- 12:00 **1480** Insights from methylomic and transcriptomic analyses of lethal IAPV infection in honeybee pupae. **Hongmei Li-Byarlay** (hlibyar@ncsu.edu), North Carolina State Univ., Raleigh, NC
- 12:15 **1481** Honey bee RNA-mediated antiviral responses. Laura Brutscher, Katie Daughenbaugh, and **Michelle Flenniken** (michelleflenniken@gmail.com), Montana State Univ., Bozeman, MT

### Contributed Papers: Bioinformatics and Comparative Genomics of Arthropods: Genomes and Databases

#### Room W225 A (Convention Center)

**Moderators:** Nicholas M. Teets<sup>1</sup> and Alexie Papanicolaou<sup>2</sup>, <sup>1</sup>Univ. of Kentucky, Lexington, KY, <sup>2</sup>Hawkesbury Institute for the Environment, Richmond, Australia

- 9:15 **1482** The genome of whitefly, *Bemisia tabaci*, an important plant pest and virus vector. **Zhangjun Fei** (zf25@cornell.edu), Cornell Univ., Ithaca, NY
- 9:30 **1483** Genome assembly and annotation of the io moth, *Automeris io* (Lepidoptera: Saturniidae). **Deborah Triant** (dtriant@flmnh.ufl.edu), Vincent Ficarrota, Jesse Breinholt, Lei Xiao, Marianne Espeland, Andrei Sourakov, and Akito Kawahara, Univ. of Florida, Gainesville, FL
- 9:45 **1484** Making a genome work for you and the community. Hui-Jie Zhang<sup>1</sup> and **Alexie Papanicolaou** (a.papanicolaou@westernsydney.edu.au)<sup>2</sup>, <sup>1</sup>CSIRO, Black Mountain, Australia, <sup>2</sup>Hawkesbury Institute for the Environment, Richmond, Australia
- 10:00 **1485** Mitochondrial genomes in *Liposcelis*: Fragmentation with great gene rearrangement. **Dan Dan Wei** (weidandande@163.com), Jin-Jun Wang, and Wei Dou, Southwest Univ., Chongqing, China



10:15 BREAK

- 10:30 **1486** Genome assembly of the soybean aphid (*Aphis glycines*) via hybrid approach. **Jacob Wenger** (jawenger@csufresno.edu)<sup>1</sup>, Andrew Michel<sup>2</sup>, Fabrice Legeai<sup>3</sup>, Raman Bansal<sup>2</sup>, J. Spencer Johnston<sup>4</sup>, Vitor Pavinato<sup>2</sup>, Ashley Yates<sup>2</sup>, and Brian Cassone<sup>5</sup>, <sup>1</sup>California State Univ., Fresno, CA, <sup>2</sup>The Ohio State Univ., Wooster, OH, <sup>3</sup>INRA, Le Rheu, France, <sup>4</sup>Texas A&M Univ., College Station, TX, <sup>5</sup>Brandon Univ., Brandon, MB, Canada
- 10:45 **1487** InsectBase: A resource for insect genomes and transcriptomes. **Fei Li** (lifei18@zju.edu.cn), Zhejiang Univ., Hangzhou, China
- 11:00 **1488** Linking metagenomics and phylogenetics for the study of insect biodiversity. **Alfried Vogler** (a.vogler@imperial.ac.uk)<sup>1,2</sup>, <sup>1</sup>Imperial College London, London, United Kingdom, <sup>2</sup>The Natural History Museum, London, United Kingdom
- 11:15 **1489** Regulation of honey bee queen (*Apis mellifera*) reproductive changes. **Elina Nino** (elnino@ucdavis.edu), Univ. of California, Davis, CA
- 11:30 **1490** The impacts of feeding in a resistant tree on the Asian longhorned beetle (*Anoplophora glabripennis*) and its gut microbiota. **Erin Scully** (erin.scully@ars.usda.gov)<sup>1</sup>, Scott Geib<sup>2</sup>, and Kelli Hoover<sup>3</sup>, <sup>1</sup>USDA - ARS, Manhattan, KS, <sup>2</sup>USDA - ARS, Hilo, HI, <sup>3</sup>Pennsylvania State Univ., University Park, PA
- 11:45 **1491** HymenopteraMine: A data mining warehouse for genomes of ants, bees, and wasps. **Christine Elsik** (elsikc@missouri.edu), Aditi Tayal, Deepak Unni, Colin Diesh, Darren Hagen, Hung Nguyen, and Marianne Emery, Univ. of Missouri, Columbia, MO

Contributed Papers: Ecology and Population Dynamics: Power of Prediction

Room W314 B (Convention Center)

**Moderators:** Shelby J. Fleischer<sup>1</sup> and Andrew Kalyebi<sup>2</sup>, <sup>1</sup>Pennsylvania State Univ., University Park, PA, <sup>2</sup>NaCRRI, Kampala, Uganda

- 9:15 **1492** Plant trait variability and the performance of phytophagous insects: A meta-analysis. **William Wetzel** (wczetzel@cornell.edu)<sup>1</sup>, Heather Kharouba<sup>2</sup>, Moria Robinson<sup>3</sup>, Marcel Holyoak<sup>3</sup>, and Richard Karban<sup>3</sup>, <sup>1</sup>Cornell Univ., Ithaca, NY, <sup>2</sup>Univ. of Washington, Seattle, WA, <sup>3</sup>Univ. of California, Davis, CA
- 9:30 **1493** Phenology and dynamics of the invasive brown marmorated stink bug, *Halyomorpha halys*, as revealed in an agent-based model. **Shelby J. Fleischer** (sjf4@psu.edu)<sup>1</sup>, Anne Nielsen<sup>2</sup>, and Shi Chen<sup>3</sup>, <sup>1</sup>Pennsylvania State Univ., University Park, PA, <sup>2</sup>Rutgers, The State Univ. of New Jersey, Bridgeton, NJ, <sup>3</sup>North Carolina State Univ., Raleigh, NC
- 9:45 **1494** Modeling temperature-dependent development of pistachio psyllid, *Agonoscena pistaciae* (Hemiptera: Psyllidae). **Mohammad Reza Hassani** (mhassanim@gmail.com)<sup>1</sup> and Abbas Arbab<sup>2</sup>, <sup>1</sup>Islamic Azad Univ., Rafsanjan, Iran, <sup>2</sup>Islamic Azad Univ., Takestan, Iran

- 10:00 **1495** Slow down tiger! Rapid temporal genetic change of the Asian tiger mosquito in the Torres Strait Islands. **Andrew Maynard** (andrew.maynard@uqconnect.edu.au)<sup>1</sup>, Luke Ambrose<sup>1</sup>, Robert Cooper<sup>2</sup>, Joseph Davis<sup>3</sup>, Odwell Muzari<sup>3</sup>, George Hapgood<sup>3</sup>, Andrew van den Hurk<sup>4</sup>, Sonja Hall-Mendelin<sup>4</sup>, Jeomhee Hasty<sup>5</sup>, Tom Burkot<sup>6</sup>, Scott Ritchie<sup>7</sup>, Michael J. Bangs<sup>8</sup>, Lisa Reimer<sup>9</sup>, Charles Butafa<sup>10</sup>, Neil Lobo<sup>11</sup>, Din Syafruddin<sup>12</sup>, and Nigel Beebe<sup>1</sup>, <sup>1</sup>Univ. of Queensland, Brisbane, Australia, <sup>2</sup>Australian Army Malaria Institute, Brisbane, Australia, <sup>3</sup>Cairns and Hinterland Hospital and Health Service, Cairns, Australia, <sup>4</sup>Queensland Health Forensic and Scientific Services, Brisbane, Australia, <sup>5</sup>Hawai'i Dept. of Health, Honolulu, HI, <sup>6</sup>Centers for Disease Control and Prevention, Atlanta, GA, <sup>7</sup>James Cook Univ., Cairns, Australia, <sup>8</sup>Public Health & Malaria Control Freeport McMoRan Copper and Gold, Papua, Indonesia, <sup>9</sup>Liverpool School of Tropical Medicine, Liverpool, United Kingdom, <sup>10</sup>Ministry of Health, Honiara, Solomon Islands, <sup>11</sup>Univ. of Notre Dame, Notre Dame, IN, <sup>12</sup>Eijkman Institute for Molecular Biology, Jakarta, Indonesia

10:15 BREAK

- 10:30 **1496** Evidence for an epigenetic effect of kinship on fertility of flies (*Drosophila melanogaster*) induced by folic acid with reference to a possible similar mechanism in *Homo sapiens* at clinical dose levels. **Marshall Herbert** (mlherbert@aol.com), Pinellas County Public Health Dept., Largo, FL
- 10:45 **1497** Remarkable generation separation appears in extra-ordinary long-term surveillance records of a moth pest all across Japan. **Takehiko Yamanaka** (apple@affrc.go.jp)<sup>1</sup>, Yasushi Sato<sup>2</sup>, Ottar Bjornstad<sup>3</sup>, William Nelson<sup>4</sup>, and Jun Tabata<sup>1</sup>, <sup>1</sup>National Institute for Agro-Environmental Sciences, Tsukuba, Japan, <sup>2</sup>National Institute of Vegetable and Tea Science, Shimada, Japan, <sup>3</sup>Pennsylvania State Univ., University Park, PA, <sup>4</sup>Queen's Univ., Kingston, ON, Canada
- 11:00 **1498** TAPPAS: Modelling long-distance wind dispersal made easy. Rieks Van Klinken<sup>1</sup>, Peter Durr<sup>2</sup>, Kerryne Graham<sup>2</sup>, Duan Beckett<sup>3</sup>, Justin Freeman<sup>3</sup>, and **Dean Paini** (dean.paini@csiro.au)<sup>4</sup>, <sup>1</sup>CSIRO, Brisbane, Australia, <sup>2</sup>CSIRO, Geelong, Australia, <sup>3</sup>Australian Bureau of Meteorology, Melbourne, Australia, <sup>4</sup>CSIRO, Canberra, Australia
- 11:15 **1499** Impact of cassava genotypes on colonization of cassava by the whitefly, *Bemisia tabaci* (Hemiptera: Aleyrodidae). **Andrew Kalyebi** (akalyebi@yahoo.com)<sup>1</sup>, Sarina Macfadyen<sup>2</sup>, Cate Paull<sup>3</sup>, Paul de Barro<sup>3</sup>, and John Colvin<sup>4</sup>, <sup>1</sup>NaCRRI, Kampala, Uganda, <sup>2</sup>CSIRO, Canberra, Australia, <sup>3</sup>CSIRO, Brisbane, Australia, <sup>4</sup>Univ. of Greenwich, Chatham, United Kingdom
- 11:30 **1500** Detection of gene flow between Korean and Chinese population in *Laodelphax striatellus*. **Deok Ho Kwon** (jota486@snu.ac.kr)<sup>1</sup>, In-Hong Jeong<sup>2,3</sup>, Si-Woo Lee<sup>4</sup>, and Si Hyeock Lee<sup>1</sup>, <sup>1</sup>Seoul National Univ., Seoul, South Korea, <sup>2</sup>National Institute of Agricultural Sciences, Wanju, South Korea, <sup>3</sup>National Institute of Agricultural Sciences, Jeonju, South Korea, <sup>4</sup>National Institute of Agricultural Science and Technology, Suwon, South Korea



11:45 **1501** The cost of sex and *Wolbachia* infection in *Trichogramma kaykai* populations. **James Russell** (jrussell@ggc.edu), Michael Saum, Victoria Burgess, and Keval Bollavaram, Georgia Gwinnett College, Lawrenceville, GA

12:00 **1502** Presentation withdrawn

### Contributed Papers: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops

#### Room W414 C (Convention Center)

**Moderators:** Anders Huset<sup>1</sup> and Andrew Frewin<sup>2</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>Univ. of Guelph, Guelph, ON, Canada

9:15 **1503** Characterizing spatial distribution and host crop association of neonicotinoid resistant *Frankliniella fusca* (Thysanoptera: Thripidae) in the Southeastern United States. **Anders Huset** (ashuset@ncsu.edu)<sup>1</sup>, Thomas Chappell<sup>1</sup>, Anitha Chitturi<sup>2</sup>, Alana Jacobson<sup>2</sup>, and George G. Kennedy<sup>1</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>Auburn Univ., Auburn, AL

9:30 **1504** Modification in nAChR beta subunit is associated with imidacloprid resistance in *Aphis gossypii*. **Kim Juil** (forweek@korea.kr)<sup>1,2</sup>, Young Ho Koh<sup>3</sup>, Gil-Hah Kim<sup>4</sup>, Si-Hyeock Lee<sup>5</sup>, and Min Kwon<sup>2</sup>, <sup>1</sup>Max Planck Institute for Chemical Ecology, Jena, Germany, <sup>2</sup>National Institute of Crop Science, Pyeongchang, South Korea, <sup>3</sup>Hallym Univ., Chuncheon, South Korea, <sup>4</sup>Chungbuk National Univ., Cheongju, South Korea, <sup>5</sup>Seoul National Univ., Seoul, South Korea

9:45 **1505** Damage of cowpea mild mottle virus and incidence of *Bemisia tabaci* biotype B in transgenic common bean lines resistant to bean golden mosaic virus. **Eliane Quintela** (eliane.quintela@embrapa.br), Marcus Vinicius Santana, Thiago Souza, Josias Faria, and Maria José Peloso, Embrapa Rice and Beans, Santo Antônio de Goiás, Brazil

10:00 **1506** Presentation withdrawn

#### 10:15 BREAK

10:30 **1507** Insecticidal activity, cytotoxicity, and metabolism of lemongrass oil in larvae and a cell line of the cabbage looper, *Trichoplusia ni*. **Jun-hyung Tak** (saturnpg7@yahoo.com) and Murray B. Isman, The Univ. of British Columbia, Vancouver, BC, Canada

10:45 **1508** Mutation and transcriptional expression of nicotinic acetylcholine receptor subunit  $\alpha 6$  associated with spinosad resistance in *Rhyzopertha dominica*. **Mei-Er Chen** (meirchen@dragon.nchu.edu.tw) and Han-Tang Wang, National Chung Hsing Univ., Taichung, Taiwan

11:00 **1509** The nicotinic acetylcholine receptor gene family of the western flower thrips (*Frankliniella occidentalis*). **Qingjun Wu** (wuqingjun@caas.cn), Youjun Zhang, and Bingqing He, Chinese Academy of Agricultural Sciences, Beijing, China

11:15 **1510** Annual bluegrass weevil, *Lissonotus maculicollis* (Coleoptera: Curculionidae), insecticide resistance: Baseline susceptibility, cross-resistance patterns, and possible mechanisms. **Olga Kostromytska** (kolgaent@rci.rutgers.edu), Shaohui Wu, and Albrecht Koppenhöfer, Rutgers, The State Univ. of New Jersey, New Brunswick, NJ

11:30 **1511** Progress towards standardized risk assessment methodology for *Megachile rotundata*. **Andrew Frewin** (afrewin@uoguelph.ca), Cynthia Scott-Dupree, and Angela Gradish, Univ. of Guelph, Guelph, ON, Canada

11:45 **1512** Investigating mechanisms of resistance to acaricides in populations of the bee mite, *Varroa destructor*. **Joel González-Cabrera** (joel.gonzalez@uv.es)<sup>1,2</sup>, Sonia Rodríguez-Vargas<sup>2,3</sup>, T. G. Emyr Davies<sup>2</sup>, Lin Field<sup>2</sup>, Daniel Schmehl<sup>4,5</sup>, Klemens Krieger<sup>6</sup>, and Martin Williamson<sup>2</sup>, <sup>1</sup>Univ. of València, Burjassot, Spain, <sup>2</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>3</sup>Institute of Agricultural Chemistry and Food Technology, Paterna, Spain, <sup>4</sup>Bayer CropScience, Research Triangle Park, NC, <sup>5</sup>Univ. of Florida, Gainesville, FL, <sup>6</sup>Bayer CropScience, Leverkusen, Germany

12:00 **1513** Laboratory bioassays, baseline toxicity (LD50's), and field efficacy of spinosad on Colorado potato beetle (*Leptinotarsa decemlineata*) (Coleoptera: Chrysomelidae). **Philippos Ioannidis** (filioan@otenet.gr) and Anastasia Sachinoglou, Institute of Industrial and Fodder Crops, Volos, Greece

12:15 **1514** Modeling the potential for hot spot remediation to resistance in western corn rootworm (*Diabrotica virgifera virgifera* LeConte). **Jeannette Martinez** (martinez.jeannette@epa.gov)<sup>1</sup>, Nicholas Friedenberg<sup>2</sup>, and Michael Caprio<sup>3</sup>, <sup>1</sup>U.S. Environmental Protection Agency, Washington, DC, <sup>2</sup>Applied Biomathematics, Setauket, NY, <sup>3</sup>Mississippi State Univ., Mississippi State, MS

### Contributed Papers: Frontiers in Entomology: Uses and Symbiosis

#### Room W223 B (Convention Center)

**Moderators:** Mukti N. Ghimire<sup>1</sup> and Maria Pappas<sup>2</sup>, <sup>1</sup>USDA - APHIS, Buzzards Bay, MA, <sup>2</sup>Democritus Univ. of Thrace, Orestiada, Greece

9:15 **1515** Swapping symbionts: Consequences of bacterial partner replacement in a nested mealybug mutualism. **Stephanie Weldon** (s.r.weldon@gmail.com) and John McCutcheon, Univ. of Montana, Missoula, MT

9:30 **1516** The natural occurrence of aphid symbionts and effects of plant diversity. **Sharon Zytynska** (sharon.zytynska@tum.de) and Wolfgang Weisser, Technical Univ., Freising, Germany

9:45 **1517** Evolutionary shifts of symbiotic associates and their alkaloidal weaponry. **Rachelle Adams** (adams.1970@osu.edu)<sup>1</sup> and Tappey Jones<sup>2</sup>, <sup>1</sup>The Ohio State Univ., Columbus, OH, <sup>2</sup>Virginia Military Institute, Lexington, VA

10:00 **1518** Like honey bees, Mexican honey wasps are associated with unique bacterial species. **Jo-anne Holley** (jo.holley@utexas.edu) and Nancy Moran, The Univ. of Texas, Austin, TX



TUESDAY

10:15 BREAK

- 10:30 **1519** The effect of fertilization type on trophic interaction networks and pest control in cereal fields. **Daniela Sint** (daniela.sint@uibk.ac.at), Oskar Rubbmark, Lena Manzl, and Michael Traugott, Univ. of Innsbruck, Innsbruck, Austria
- 10:45 **1520** Use of carmine scale insects (*Margarodidae*: *Porphyrophora* spp.) in Eurasia: From the past to current time. **Roman Jashenko** (romajashenko@yahoo.com), Al-Farabi Kazakh National Univ., Almaty, Kazakhstan
- 11:00 **1521** IPM program in Texas: Role and relevance now and in the future. **Charles Allen** (ctallen@ag.tamu.edu), Texas A&M Univ., San Angelo, TX
- 11:15 **1522** Crop wild relatives as genetic resources for pollination and herbivore resistance. **Paul Egan** (paul.egan@slu.se)<sup>1</sup>, Anne Muola<sup>2</sup>, Daniela Weber<sup>1</sup>, Amy Parachnowitsch<sup>3</sup>, and Johan Stenberg<sup>1</sup>, <sup>1</sup>Swedish Univ. of Agricultural Sciences, Alnarp, Sweden, <sup>2</sup>Swedish Univ. of Agricultural Sciences, Uppsala, Sweden, <sup>3</sup>Evolutionary Biology Centre, Uppsala, Sweden
- 11:30 **1523** Promoting pollinator diversity in agriculture by planting specialty oilseed crops. **Matthew Thom** (matt.thom@ars.usda.gov)<sup>1</sup>, Carrie Eberle<sup>2</sup>, and Frank Forcella<sup>3</sup>, <sup>1</sup>USDA - ARS, Morris, MN, <sup>2</sup>Univ. of Wyoming, Laramie, WY
- 11:45 **1524** Multitrophic interactions in a lettuce crop covered with UV-absorbing nets. **Saioa Legarrea** (saioalegarrea@gmail.com)<sup>1</sup>, Eduardo Velazquez<sup>2</sup>, Elisa Viñuela<sup>3</sup>, and Alberto Fereres<sup>4</sup>, <sup>1</sup>Institute for Biodiversity and Ecosystem Dynamics, Amsterdam, Netherlands, <sup>2</sup>Intercultural Univ. of Chiapas, San Cristóbal de las Casas, Mexico, <sup>3</sup>Polytechnic Univ., Madrid, Spain, <sup>4</sup>Instituto de Ciencias Agrarias, Madrid, Spain
- 12:00 **1525** Functions of soil arthropods in reclaimed mine spoil ecosystem: A case study of the Kathara coalfield area of Jharkhand, India. **Braj Sinha** (b\_kishoresinha@yahoo.co.in) and Amita Hembrom, Ranchi Univ., Ranchi, India
- 12:15 **1526** Current knowledge of anhydrobiosis in the sleeping chironomid *Polypedilum vanderplanki*. **Takahiro Kikawada** (kikawada@affrc.go.jp)<sup>1</sup>, Richard Cornette<sup>1</sup>, and Oleg Gusev<sup>2</sup>, <sup>1</sup>National Institute of Agrobiological Sciences, Tsukuba, Japan, <sup>2</sup>RIKEN, Yokohama, Japan

Contributed Papers: Genetics and Evolutionary Entomology: Mating and Competition

Room W414 D (Convention Center)

**Moderators:** Omaththage P. Perera<sup>1</sup> and Marco Gebiola<sup>2</sup>, <sup>1</sup>USDA - ARS, Stoneville, MS, <sup>2</sup>Univ. of Arizona, Tucson, AZ

- 9:15 **1527** Cytogenetic characteristics of pseudococoids (Hemiptera: Coccoidea: Pseudococcidae) of Indian origin. **Sompalyam Ramakrishna** (srkbuz@gmail.com), Bangalore Univ., Bangalore, India

- 9:30 **1528** Interplay between rapid evolution of leaf beetle host use and arthropod community dynamics. **Shunsuke Utsumi** (utsumi@fsc.hokudai.ac.jp), Hokkaido Univ., Horokanai, Japan
- 9:45 **1529** Resistance of western corn rootworm to Cry3Bb1-expressing corn. **Lisa Meihs** (lisa.meihs@ars.usda.gov)<sup>1</sup>, Vered Tzin<sup>2</sup>, Bruce Hibbard<sup>1</sup>, and Georg Jander<sup>2</sup>, <sup>1</sup>USDA - ARS, Columbia, MO, <sup>2</sup>Boyce Thompson Institute for Plant Research, Ithaca, NY
- 10:00 **1530** QTL mapping of *white pupae* in a genetic sexing strain of melon fly, *Bactrocera cucurbitae* (Coquillett) (Diptera: Tephritidae), and applications for Sterile Insect Technique. **Sheina Sim** (ssim8@hawaii.edu) and Scott Geib, USDA - ARS, Hilo, HI

10:15 BREAK

- 10:30 **1531** Unorthodox reproductive strategies in *Cataglyphis* desert ants: Hybridizing lineages with genetic caste determination. **Hugo Darras** (hgdarras@gmail.com), Alexandre Kuhn, and Serge Aron, Free Univ. of Brussels, Brussels, Belgium
- 10:45 **1532** The genetic architecture of host races in the generalist aphid parasitoid *Aphidius ervi* Haliday (Hymenoptera: Braconidae). **Gabriel Ballesteros** (gballesteros@utalca.cl)<sup>1</sup>, Jürgen Gadau<sup>2</sup>, Fabrice Legeai<sup>3</sup>, Daniela Sepulveda<sup>1</sup>, Lucía Briones<sup>1</sup>, Blas Lavandero<sup>1</sup>, and Christian Figueroa<sup>1</sup>, <sup>1</sup>Univ. of Talca, Talca, Chile, <sup>2</sup>Arizona State Univ., Tempe, AZ, <sup>3</sup>INRA, Le Rheu, France
- 11:00 **1533** Presentation withdrawn
- 11:15 **1534** Aphid-specific expanded gene families are required for *Myzus persicae* colonisation of diverse plant species. **Yazhou Chen** (yazhou.chen@jic.ac.uk)<sup>1</sup>, Tom Mathers<sup>2</sup>, Sam Mugford<sup>1</sup>, Cock Van Oosterhout<sup>3</sup>, David Swarbreck<sup>2</sup>, and Saskia A. Hogenhout<sup>1</sup>, <sup>1</sup>The John Innes Centre, Norwich, United Kingdom, <sup>2</sup>The Genome Analysis Centre, Norwich, United Kingdom, <sup>3</sup>Univ. of East Anglia, Norwich, United Kingdom
- 11:30 **1535** Determining the role of selection and drift in reproductive character displacement causing rapid diversification of montane crickets. **Ismail Saglam** (iksaglam@hacettepe.edu.tr)<sup>1</sup>, Michael Miller<sup>2</sup>, Sean O'Rourke<sup>2</sup>, and Selim Caglar<sup>1</sup>, <sup>1</sup>Hacettepe Univ., Ankara, Turkey, <sup>2</sup>Univ. of California, Davis, CA
- 11:45 **1536** Promiscuous hosts and faithful cheaters: The role of mating systems in the evolution of obligate social parasitism. **Romain Dahan** (romain.a.dahan@gmail.com) and Christian Rabeling, Univ. of Rochester, Rochester, NY
- 12:00 **1537** Exploring sesquiterpenoid pheromone biosynthetic pathways in stink bugs (Pentatomidae). **Jason Lancaster** (jlancas7@vt.edu)<sup>1</sup>, Ashot Khrimian<sup>2</sup>, Dawn Gundersen-Rindal<sup>2</sup>, Donald Weber<sup>2</sup>, and Dorothea Tholl<sup>1</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>USDA - ARS, Beltsville, MD



12:15 **1538** Differential bracovirus gene expression among host-foodplant complex sources of the braconid parasitoid wasp, *Cotesia congregata*, likely reflects adaptations to host species and diet. **Karen Kester** (kmkester@vcu.edu)<sup>1</sup>, Justin Bredlau<sup>1</sup>, Daniel Kuhar<sup>2</sup>, and Dawn Gundersen-Rindal<sup>2</sup>, <sup>1</sup>Virginia Commonwealth Univ., Richmond, VA, <sup>2</sup>USDA - ARS, Beltsville, MD

### Contributed Papers: Insect Immunology: Environment

#### Room W231 B (Convention Center)

**Moderators:** Franziska Dickel<sup>1</sup> and Nathan Jones<sup>2</sup>, <sup>1</sup>Univ. of Jyväskylä, Jyväskylä, Finland, <sup>2</sup>The Univ. of Texas, Austin, TX

9:15 **1539** Immune defence in context – the missing piece. **Paul Schmid-Hempel** (psh@env.ethz.ch), ETH Zürich, Zürich, Switzerland

9:30 **1540** Microscopic analyses of larval *Aedes aegypti* reveal the essential role of gut microbiota in regulating growth and metabolism. **Luca Valzania** (valzania@uga.edu), Mark R. Brown, and Michael Strand, Univ. of Georgia, Athens, GA

9:45 **1541** Responses of *Galleria mellonella* immune system to ink injections and neem essential oil. **Maciej A. Pszczolkowski** (mpszczolkowski@missouristate.edu) and Katherine Haszcz, Missouri State Univ., Mountain Grove, MO

10:00 **1542** Mixed diets – the key to a healthy life? **Franziska Dickel** (franziska.dickel@jyu.fi)<sup>1</sup>, Johanna Mappes<sup>1</sup>, and Dalial Freitak<sup>2</sup>, <sup>1</sup>Univ. of Jyväskylä, Jyväskylä, Finland, <sup>2</sup>Univ. of Helsinki, Helsinki, Finland

#### 10:15 BREAK

10:30 **1543** Immune system and antimicrobial secretion use by the leaf cutting ants, *Atta* spp. (Formicidae: Attini), during a fungal infection. **Ernesto Bonadies** (ernestobonadies@hotmail.com)<sup>1,2</sup> and Hermógenes Fernández-Marín<sup>2</sup>, <sup>1</sup>Univ. of Panamá, Panama City, Panama, <sup>2</sup>Institute for Scientific Research and High Technology Services, Panama, Panama

10:45 **1544** Parasitoids, caste, social form, and immune investment in the red imported fire ant, *Solenopsis invicta*. **Nathan Jones** (insectnate.nj@gmail.com), Robert Plowes, and Lawrence E. Gilbert, The Univ. of Texas, Austin, TX

11:00 **1545** Bedbug cellular immunity. **William Hentley** (w.hentley@sheffield.ac.uk), Michael T. Siva-Jothy, and Sophie Evison, Univ. of Sheffield, Sheffield, United Kingdom

11:15 **1546** Evolution of host immune responses and parasitoid virulence in a spatial context. **Peter Hambäck** (peter.hamback@su.se)<sup>1</sup>, Lisa Fors<sup>1</sup>, Robert Markus<sup>2</sup>, and Ulrich Theopold<sup>1</sup>, <sup>1</sup>Stockholm Univ., Stockholm, Sweden, <sup>2</sup>Univ. of Nottingham, Nottingham, United Kingdom

11:30 **1547** Presentation withdrawn

11:45 **1548** Oral priming with *Bacillus thuringiensis* induces a shift in the immune response of *Tribolium castaneum*. **Barbara Milutinovic** (barbara.milutinovic@ist.ac.at)<sup>1</sup>, Jennifer Greenwood<sup>2</sup>, Robert Peuß<sup>2</sup>, Philip Rosenstiel<sup>3</sup>, Hinrich Schulenburg<sup>3</sup>, and Joachim Kurtz<sup>2</sup>, <sup>1</sup>Institute of Science and Technology Austria, Klosterneuburg, Austria, <sup>2</sup>Univ. of Münster, Münster, Germany, <sup>3</sup>Kiel Univ., Kiel, Germany

12:00 **1549** Collaboration between a soluble C-type lectin and calreticulin facilitates white spot syndrome virus infection in shrimp. Xian-Wei Wang, Yi-Hui Xu, Jin-Dong Xu, and **Jin-Xing Wang** (jxwang@sdu.edu.cn), Shandong Univ., Jinan, China

12:15 **1550** The effect of starvation on gypsy moth (*Lymantria dispar* L.) immune parameters and on activation of covert to overt form of nucleopolyhedrovirus. **Sergey Pavlushin** (sergey-pavlushin@mail.ru), Irina Belousova, Ekaterina Chertkova, Yuriy Ahanaev, and Viatcheslav Martemyanov, Institute of Systematics and Ecology of Animals, Novosibirsk, Russia

### Contributed Papers: Invasive and Exotic Entomology: Control and Tools

#### Room W340 B (Convention Center)

**Moderators:** Clifford Sadof<sup>1</sup> and Feng Zhang<sup>2</sup>, <sup>1</sup>Purdue Univ., West Lafayette, IN, <sup>2</sup>Chinese Academy of Agricultural Sciences, Beijing, China

9:15 **1551** A new host of the brown marmorated stink bug, *Halyomorpha halys*: Pest management lessons from studies on host phenology and pest dynamics on southern pea. **Beatrice Dingha** (bdingha@ncat.edu) and Louis E. N. Jackai, North Carolina A&T State Univ., Greensboro, NC

9:30 **1552** Coconut rhinoceros beetle (*Oryctes rhinoceros*) and its management effort on Oahu in Hawaii. **Zhiqiang Cheng** (cheng241@hawaii.edu)<sup>1</sup>, Matthew Kellar<sup>1</sup>, Arnold Hara<sup>2</sup>, and Roshan Manandhar<sup>1</sup>, <sup>1</sup>Univ. of Hawai'i, Honolulu, HI, <sup>2</sup>Univ. of Hawai'i, Hilo, HI

9:45 **1553** Biotype, plant virus, and insecticide resistance status of *Bemisia tabaci* populations in China. **Shaoli Wang** (wangshaoli@caas.cn), Yang Yang, and Youjun Zhang, Chinese Academy of Agricultural Sciences, Beijing, China

10:00 **1554** Is cold tolerance plasticity in *Epiphyas postvittana* (Lepidoptera: Tortricidae) related to variation in phosphoglucose isomerase? **Amy C. Morey** (morey041@umn.edu)<sup>1</sup> and Robert Venette<sup>2</sup>, <sup>1</sup>Univ. of Minnesota, St. Paul, MN, <sup>2</sup>USDA - Forest Service, St. Paul, MN

#### 10:15 BREAK

10:30 **1555** Influence of clementine cultivar on tolerance of *Ceratitis capitata* to cold treatment. **Elena Llacer** (ellacer@ivia.es)<sup>1</sup>, Miquel Alonso<sup>1</sup>, Josep Jaques<sup>2</sup>, and Alberto Urbaneja<sup>1</sup>, <sup>1</sup>Valencian Institute of Agricultural Research, Moncada, Spain, <sup>2</sup>Univ. Jaume I, Castelló de la Plana, Spain



- 10:45 **1556** Developing effective rootstock recommendations and disinfestation protocols for genetically diverse strains of grape phylloxera, *Daktulosphaira vitifoliae*. **Kevin Powell** (kevin.powell@ecodev.vic.gov.au), Dept. of Economic Development, Rutherglen, Australia
- 11:00 **1557** Tools for staging and managing the emerald ash borer in an urban forest. **Clifford S. Sadof** (csadof@purdue.edu), Matthew Ginzel, Gabriel Hughes, Adam Witte, and Donnie Peterson, Purdue Univ., West Lafayette, IN
- 11:15 **1558** Protocol for foreign exploration and field studies in the biological control of invasive weeds in the United States. Massimo Cristofaro<sup>1</sup>, **Matthew Augé** (matthew.auge@gmail.com)<sup>2</sup> and Francesca Marini<sup>2</sup>, <sup>1</sup>ENEA, Rome, Italy, <sup>2</sup>Biotechnology and Biological Control Agency, Rome, Italy
- 11:30 **1559** Genetic and behavioral differentiation between two closely related whitefly parasitoids. **Muhammad Ahmed** (zaheerento@gmail.com)<sup>1</sup>, Antonio Francis<sup>2</sup>, Gregory Evans<sup>3</sup>, Eric Rohrig<sup>4</sup>, Lance Osborne<sup>5</sup>, and Catharine M. Mannion<sup>1</sup>, <sup>1</sup>Univ. of Florida, Homestead, FL, <sup>2</sup>Florida Dept. of Agriculture and Consumer Services, Apopka, FL, <sup>3</sup>USDA - APHIS, Beltsville, MD, <sup>4</sup>Florida Dept. of Agriculture and Consumer Services, Gainesville, FL, <sup>5</sup>Univ. of Florida, Apopka, FL
- 11:45 **1560** Egg parasitoids of stink bugs infesting fruit trees in Japan, with special reference to the egg parasitoid guild of *Halyomorpha halys* (Hemiptera: Pentatomidae). **Kazunori Matsuo** (matsuosudachi@scs.kyushu-u.ac.jp)<sup>1</sup>, Marisa Tomita<sup>2</sup>, Tomohiro Honda<sup>3</sup>, Akihiko Takahashi<sup>4</sup>, Shunsuke Furihata<sup>5</sup>, Toshiharu Mita<sup>1</sup>, Ken Tabuchi<sup>4</sup>, Kyo Itoyama<sup>3</sup>, Masatoshi Toyama<sup>6</sup>, Norman Johnson<sup>7</sup>, and Yoshimi Hirose<sup>1</sup>, <sup>1</sup>Kyushu Univ., Fukuoka, Japan, <sup>2</sup>Tokyo Univ. of Agriculture, Kanagawa, Japan, <sup>3</sup>Meiji Univ., Kanagawa, Japan, <sup>4</sup>NARO Tohoku Agricultural Research Center, Iwate, Japan, <sup>5</sup>National Institute for Environmental Studies, Ibaraki, Japan, <sup>6</sup>NARO Institute of Fruit Tree Science, Hiroshima, Japan, <sup>7</sup>The Ohio State Univ., Columbus, OH
- 12:00 **1561** Potential classical biological control of spotted wing drosophila, *Drosophila suzukii* (Diptera: Drosophilidae), with parasitoids from China. **Feng Zhang** (f.zhang@cabi.org)<sup>1,2</sup>, Jinping Zhang<sup>1,2</sup>, Ren-Ya Liao<sup>2</sup>, Pierre Girod<sup>3</sup>, Marc Kenis<sup>3</sup>, Guo-Hua Chen<sup>4</sup>, Laureline Rossignaud<sup>3</sup>, Chun Xiao<sup>4</sup>, Tim Haye<sup>3</sup>, and Yi Yu<sup>5</sup>, <sup>1</sup>CABI, Beijing, China, <sup>2</sup>Chinese Academy of Agricultural Sciences, Beijing, China, <sup>3</sup>CABI, Delémont, Switzerland, <sup>4</sup>Yunnan Agricultural Univ., Kunming, China, <sup>5</sup>Shandong Academy of Agricultural Sciences, Jinan, China
- 12:15 **1562** The unusual dual reproductive strategy of *Lepidapion argentatum* (Col. Brentidae), a prospective biological control agent of French broom. **René Sforza** (rsforza@ars-ebcl.org)<sup>1</sup>, Elven Kerdellant<sup>1</sup>, and Thierry Thomann<sup>2</sup>, <sup>1</sup>USDA - ARS, Saint-Gély-du-Fesc, France, <sup>2</sup>CSIRO, Saint-Gély-du-Fesc, France

## Contributed Papers: Medical and Veterinary Entomology: Mosquito 'Omics and Biological Control

### Chapin Theater (Convention Center)

- Moderators:** Shavonn Whiten<sup>1</sup> and Heather Coatsworth<sup>2</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>Simon Fraser Univ., Burnaby, BC, Canada
- 9:15 **1563** Mosquito salivary gland architecture: Implications for disease transmission and vector control. **Michael Wells** (mwells24@jhmi.edu) and Deborah Andrew, Johns Hopkins Univ., Baltimore, MD
- 9:30 **1564** The adult *Aedes aegypti* midgut peritrophic matrix proteome: A novel approach to vector and vector-borne disease control. **Shavonn Whiten** (shavonnw@vt.edu)<sup>1,2</sup>, Zach Adelman<sup>3</sup>, Richard Helm<sup>1</sup>, and W. Ray<sup>1</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>Texas A&M Univ., College Station, TX, <sup>3</sup>Texas A&M Univ., College Station, TX
- 9:45 **1565** Characterization of two mosquito ortholog alpha-glucosidases that play a differential role in the susceptibility to *Lysinibacillus sphaericus* biolarvicides. Nathaly Nascimento, Ligia Ferreira, Tatiany Romão, Darleide Correia, Osvaldo de-Melo-Neto, and **Maria Helena Silva-Filha** (mhneves@cpqam.fiocruz.br), Oswaldo Cruz Foundation, Recife, Brazil
- 10:00 **1566** Larvicidal activities of indigenous *Bacillus thuringiensis* isolates and nematode symbiotic bacterial toxins against the mosquito vector *Culex pipiens* (Diptera: Culicidae). **Ashraf Ahmed** (aalii@ksu.edu.sa), Talat El-Kersh, and Tahany Ayaad, King Saud Univ., Riyadh, Saudi Arabia
- 10:15 BREAK**
- 10:30 **1567** Morphological and molecular characterization of a novel microsporidian parasite from the invasive Asian rock pool mosquito, *Aedes japonicus*. **Theodore Andreadis** (theodore.andreadis@ct.gov)<sup>1</sup>, Hiroyuki Takaoka<sup>2</sup>, Yasushi Otsuka<sup>3</sup>, and Charles Vossbrinck<sup>1</sup>, <sup>1</sup>Connecticut Agricultural Experiment Station, New Haven, CT, <sup>2</sup>Univ. of Malaya, Kuala Lumpur, Malaysia, <sup>3</sup>Oita Univ., Oita, Japan
- 10:45 **1568** Differential transcription profiles in *Aedes aegypti* in response to larvicide. **Liming Zhao** (lmzhao@ufl.edu), Univ. of Florida, Vero Beach, FL
- 11:00 **1569** Foraging strategies for the mosquito-parasitic nematodes *Romanomermis iyengari* and *Strelkovimermis spiculatus*. **Yanli Xu** (xyll@neigaehrb.ac.cn)<sup>1</sup>, Limin Dong<sup>2</sup>, Yi Wang<sup>3</sup>, and Randy Gaugler<sup>3</sup>, <sup>1</sup>Chinese Academy of Sciences, Harbin, China, <sup>2</sup>Northeast Agricultural Univ., Harbin, China, <sup>3</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ
- 11:15 **1570** From phenotype to genotype: Creating resistant *Aedes aegypti* to prevent dengue transmission. **Heather Coatsworth** (hcoatswo@sfu.ca)<sup>1</sup>, Paola Caicedo<sup>2</sup>, Geoff Winsor<sup>1</sup>, Clara Ocampo<sup>2</sup>, and Carl Lowenberger<sup>1</sup>, <sup>1</sup>Simon Fraser Univ., Burnaby, BC, Canada, <sup>2</sup>CIDEIM, Cali, Colombia



TUESDAY

- 11:30 **1571** Differential expression in dengue-infected *Aedes albopictus* reveals important genes for anti-dengue response. **Hitoshi Tsujimoto** (htsujimo@nmsu.edu)<sup>1</sup>, Nicolas Devitt<sup>2</sup>, Anitha Sundararajan<sup>2</sup>, Faye Schikey<sup>2</sup>, Kathryn Hanley<sup>1</sup>, and Immo Hansen<sup>1</sup>, <sup>1</sup>New Mexico State Univ., Las Cruces, NM, <sup>2</sup>National Center for Genome Resources, Santa Fe, NM
- 11:45 **1572** Proteomics informed by transcriptomics for characterising active transposable elements and genome annotation in *Aedes aegypti*. **Kevin Maringer** (kevin.maringer@mssm.edu)<sup>1</sup>, Ana Fernandez-Sesma<sup>1</sup>, David Matthews<sup>2</sup>, and Andrew Davidson<sup>2</sup>, <sup>1</sup>Icahn School of Medicine at Mount Sinai, New York, NY, <sup>2</sup>Univ. of Bristol, Bristol, United Kingdom
- 12:00 **1573** Studies on host behavior manipulation by the mosquito-parasitic nematode *Strelkovimermis spiculatus*. **Hana Haji AllahverdiPour** (hh375@rci.rutgers.edu)<sup>1,2</sup>, Yi Wang<sup>1</sup>, Reza Talaei-Hassanloui<sup>2</sup>, Javad Karimi<sup>3</sup>, and Randy Gaugler<sup>1</sup>, <sup>1</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, <sup>2</sup>Univ. of Tehran, Karaj, Iran, <sup>3</sup>Ferdowsi Univ., Mashhad, Iran
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- Contributed Papers: Morphology, Systematics, and Phylogeny: Myriapoda and Insecta**
- Room W225 B (Convention Center)**
- Moderators:** Gavin J. Svenson<sup>1</sup> and Megan M. Wilson<sup>2</sup>, <sup>1</sup>Cleveland Museum of Natural History, Cleveland, OH, <sup>2</sup>Rutgers, The State Univ. of New Jersey, Newark, NJ
- 9:15 **1574** A new dimension in documenting new species: High-detail imaging for myriapod taxonomy and first 3D cybertype of a new millipede species (Diplopoda, Myriapoda). **Nesrine Akkari** (nesrine.akkari@nhm-wien.ac.at)<sup>1</sup>, Henrik Enghoff<sup>2</sup>, and Brian Metscher<sup>3</sup>, <sup>1</sup>Natural History Museum, Vienna, Austria, <sup>2</sup>Natural History Museum, Copenhagen, Denmark, <sup>3</sup>Univ. of Vienna, Vienna, Austria
- 9:30 **1575** An illustrative approach to sexual isolation within giant helicopter damselflies (*Megaloprepus caerulatus*). **Megan M. Wilson** (meywilson@yahoo.com), Rutgers, The State Univ. of New Jersey, Newark, NJ
- 9:45 **1576** Holding on for dear life – the functional morphology of waterfall-dwelling damselflies in the Neotropics. **Christopher Beatty** (beattych@yahoo.com)<sup>1</sup>, Sebastian Büsse<sup>2</sup>, Melissa Sánchez Herrera<sup>1</sup>, and Stanislav Gorb<sup>3</sup>, <sup>1</sup>Rutgers, The State Univ. of New Jersey, Newark, NJ, <sup>2</sup>Christian Albrechts Univ. of Kiel, Kiel, Germany
- 10:00 **1577** Taxonomic significance of the epiphallus in the classification of Acridoidea and Pyrgomorpoidea (Orthoptera). **Mohd Usmani** (usmanikamil94@gmail.com) and Shahnila Usmani, Aligarh Muslim Univ., Aligarh, India
- 10:15 BREAK**
- 10:30 **1578** Phylogeny of *Stagmatoptera* Burmeister, 1838 (Insecta: Mantodea) based on morphological and molecular evidence. **Henrique Rodrigues** (hmrbio@gmail.com)<sup>1</sup> and Gavin J. Svenson<sup>2</sup>, <sup>1</sup>Case Western Reserve Univ., Cleveland, OH, <sup>2</sup>Cleveland Museum of Natural History, Cleveland, OH
- 10:45 **1579** Extreme sexual size dimorphism led to sex-dependent life modalities during the evolution of flower simulating mantises. **Gavin J. Svenson** (gsvenson@cmnh.org)<sup>1</sup>, Sydney Brannoch<sup>1,2</sup>, Henrique Rodrigues<sup>1,2</sup>, and Frank Wieland<sup>3</sup>, <sup>1</sup>Cleveland Museum of Natural History, Cleveland, OH, <sup>2</sup>Case Western Reserve Univ., Cleveland, OH, <sup>3</sup>Palatinate Museum of Natural History, Bad Dürkheim, Germany
- 11:00 **1580** Uncovering the evolutionary and morphological links between male and female praying mantis (Insecta: Mantodea) genitalia and mating behaviors. **Sydney Brannoch** (sbrannoch@case.edu) and Gavin J. Svenson, Cleveland Museum of Natural History, Cleveland, OH
- 11:15 **1581** Species diversity and phylogenetic analysis of termites (Isoptera) of the Western Ghats, India. **Kalleshwaraswamy Marulasiddappa** (kalleshwara@gmail.com)<sup>1</sup>, A. S. Vidyashree<sup>1</sup>, H. M. Mahadevaswamy<sup>2</sup>, R. Asokan<sup>2</sup>, Pavithra Basavanagoudappa<sup>1</sup>, and S. K. Adarsha<sup>1</sup>, <sup>1</sup>Univ. of Agricultural and Horticultural Sciences, Shivamogga, India, <sup>2</sup>Indian Institute of Horticultural Research, Bangalore, India
- 11:30 **1582** Phylogenetic analysis of the *Degeeriella* complex (Insecta: Phthiraptera): Paraphyletic genera suggest a history of intraordinal switching. **Therese A. Catanach** (tacatanach@tamu.edu)<sup>1</sup>, Veronica Pereyra<sup>2</sup>, M. P. Valim<sup>3</sup>, Kevin P. Johnson<sup>4</sup>, and Jason Weckstein<sup>1</sup>, <sup>1</sup>Drexel Univ., Philadelphia, PA, <sup>2</sup>National Univ. of Tucuman, Tucuman, Argentina, <sup>3</sup>Museum of Zoology of the University of São Paulo, São Paulo, Brazil, <sup>4</sup>Univ. of Illinois, Champaign, IL
- 11:45 **1583** The phylogeny of green lacewings (Neuroptera: Chrysopidae): Phylogenetic signal versus rapid radiation. **Ivonne Garzón** (ivonne.garzon@gmail.com)<sup>1</sup>, Laura Breitreuz<sup>2</sup>, Michael S. Engel<sup>2</sup>, and Shaun Winterton<sup>3</sup>, <sup>1</sup>Univ. of California, Sacramento, CA, <sup>2</sup>Univ. of Kansas, Lawrence, KS, <sup>3</sup>California Dept. of Food and Agriculture, Sacramento, CA
- 12:00 **1584** Morphological phylogeny of green lacewings (Neuroptera: Chrysopidae) with emphasis on a revised wing venation homology. **Laura Breitreuz** (l-breitreuz@ku.edu)<sup>1</sup>, Ivonne Garzón<sup>2</sup>, Shaun Winterton<sup>3</sup>, and Michael S. Engel<sup>1</sup>, <sup>1</sup>Univ. of Kansas, Lawrence, KS, <sup>2</sup>Univ. of California, Sacramento, CA, <sup>3</sup>California Dept. of Food and Agriculture, Sacramento, CA
- 12:15 **1585** Small survivors: Unexpected diversity of *Hyposmocoma* (Lepidoptera: Cosmopterigidae) moths on a pummeled Hawaiian island. **Matthew J. Medeiros** (matt.j.medeiros@gmail.com)<sup>1</sup>, William Haines<sup>2</sup>, Mia Carleton<sup>3</sup>, and Daniel Rubinoff<sup>2</sup>, <sup>1</sup>Univ. of California, Berkeley, CA, <sup>2</sup>Univ. of Hawai'i, Honolulu, HI, <sup>3</sup>Urban School of San Francisco, San Francisco, CA



Contributed Papers: RNAi and Gene Expression Control in Insects: Pest Management

West Hall F4 (WF4) (Convention Center)

Moderators: Kun Yan Zhu<sup>1</sup> and Xu Hu<sup>2</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>DuPont Pioneer, Johnston, IA

- 9:15 **1586** The multicopper oxidase gene family in the brown planthopper, *Nilaparvata lugens*. **Yuxuan Ye** (nhyyx37@yeah.net) and Chuan-Xi Zhang, Zhejiang Univ., Hangzhou, China
- 9:30 **1587** Transcriptome-wide screening and functional analysis of cuticular protein family with the R&R Consensus in the brown planthopper, *Nilaparvata lugens*. **Penglu Pan** (plpan@zju.edu.cn) and Chuan-Xi Zhang, Zhejiang Univ., Hangzhou, China
- 9:45 **1588** A salivary sheath protein essential for the interaction of the brown planthopper with rice plants. **Huang Haijian** (huanghaijian@zju.edu.cn), Yanyuan Bao, and Chuan-Xi Zhang, Zhejiang Univ., Hangzhou, China
- 10:00 **1589** Suppression of DHFR expression reduces growth and fecundity in the Asian corn borer, *Ostrinia furnacalis*. **Jun Yang** (junyang@dlut.edu.cn), Yuexin Xia, Mingbo Qu, and Qing Yang, Dalian Univ. of Technology, Dalian, China
- 10:15 **BREAK**
- 10:30 **1590** Discovery of midgut genes for the RNA interference control of corn rootworm. **Xu Hu** (xu.hu@pioneer.com)<sup>1</sup>, Nina Richtman<sup>1</sup>, Jian-Zhou Zhao<sup>1</sup>, Xiping Niu<sup>1</sup>, Lisa Procyk<sup>1</sup>, Meghan Oneal<sup>1</sup>, Bliss Kernodle<sup>1</sup>, Joe Steimel<sup>1</sup>, Virginia Crane<sup>1</sup>, Gary Sandahl<sup>1</sup>, Julie Ritland<sup>1</sup>, Albert Lu<sup>1</sup>, James Presnail<sup>2</sup>, and Gusui Wu<sup>1</sup>, <sup>1</sup>DuPont Pioneer, Johnston, IA, <sup>2</sup>Evogene, Inc., Saint Louis, MO
- 10:45 **1591** Identification and characterization of double stranded ribonucleases in *Diabrotica virgifera virgifera* (Coleoptera: Chrysomelidae) and *Ostrinia nubilalis* (Lepidoptera: Crambidae). **Anastasia Cooper** (anacooper@ksu.edu), Young Ho Kim, and Kun Yan Zhu, Kansas State Univ., Manhattan, KS
- 11:00 **1592** Transcriptomics-guided development of RNA interference strategies to manage whiteflies: A globally distributed vector of crop viruses. **Daniel Hasegawa** (daniel.k.hasegawa@gmail.com)<sup>1</sup>, Wenbo Chen<sup>2</sup>, Yi Zheng<sup>2</sup>, Navneet Kaur<sup>3</sup>, William Wintermantel<sup>3</sup>, Alvin M. Simmons<sup>4</sup>, Zhangjun Fei<sup>2</sup>, and Kai-Shu Ling<sup>4</sup>, <sup>1</sup>Cornell Univ., Charleston, SC, <sup>2</sup>Cornell Univ., Ithaca, NY, <sup>3</sup>USDA - ARS, Salinas, CA, <sup>4</sup>USDA - ARS, Charleston, SC
- 11:15 **1593** RNA interference mediated knockdown of *Serpin 2* reveals its function in antiviral activity and gut homeostasis in *Bombyx mori*. **Satyavathi Valluri** (vsatya@cdfd.org.in), R. M. Pavani, S. Srividya, K. Swethakumari, and S. Annapurna, Centre for DNA Fingerprinting and Diagnostics, Hyderabad, India

Tuesday, September 27, 2016 • Afternoon

Symposium: Bark and Ambrosia Beetles: Biology, Ecology, and Management

Room W414 C (Convention Center)

Moderators and Organizers: Fernando E. Vega<sup>1</sup>, Richard W. Hofstetter<sup>2</sup>, and Peter Biedermann<sup>3</sup>, <sup>1</sup>USDA - ARS, Beltsville, MD, <sup>2</sup>Northern Arizona Univ., Flagstaff, AZ, <sup>3</sup>Max Planck Institute for Chemical Ecology, Jena, Germany

- 1:30 **1594** Bark beetles and conifers: A system characterized by cross-scale interactions and thresholds. **Kenneth Raffa** (raffa@entomology.wisc.edu), Univ. of Wisconsin, Madison, WI
- 1:45 **1595** Conifer defense and resistance to bark beetles. **Paal Krokene** (krp@skogoglandskap.no), Norwegian Forest and Landscape Institute, Ås, Norway
- 2:00 **1596** Biology and ecology of the coffee berry borer, *Hypothenemus hampei*. **Fernando E. Vega** (fernando.vega@ars.usda.gov)<sup>1</sup> and Francisco Infante<sup>2</sup>, <sup>1</sup>USDA - ARS, Beltsville, MD, <sup>2</sup>College of the Southern Border, Tapachula, Mexico
- 2:15 **1597** What drives evolution of social behavior in bark and ambrosia beetles? **Peter Biedermann** (pbiedermann@ice.mpg.de), Max Planck Institute for Chemical Ecology, Jena, Germany
- 2:30 **1598** Monogamous single-parenting matriarchs and sterile daughter helpers in a eusocial ambrosia beetle inhabiting living *Eucalyptus* trees. Shannon Smith<sup>1</sup>, Deborah Kent<sup>1</sup>, Jacobus Boomsma<sup>2</sup>, Adam Stow<sup>3</sup>, Markus Riegler<sup>1</sup>, and **Robert Mueller** (r.mueller@westernsydney.edu.au)<sup>1</sup>, <sup>1</sup>Western Sydney Univ., Richmond, Australia, <sup>2</sup>Univ. of Copenhagen, Copenhagen, Denmark, <sup>3</sup>Macquarie Univ., Sydney, Australia
- 2:45 **1599** *Tomicus*, a particular genus of bark beetles. **François Lieutier** (francois.lieutier@univ-orleans.fr)<sup>1</sup>, Massimo Faccoli<sup>2</sup>, and Bo Långström<sup>3</sup>, <sup>1</sup>Univ. of Orléans, Orléans, France, <sup>2</sup>Dept. of Agronomy, Food, Natural Resources, Animals and Environment, Legnaro, Italy, <sup>3</sup>Swedish Univ. of Agricultural Sciences, Uppsala, Sweden
- 3:00 **BREAK**
- 3:15 **1600** Beetle acoustic communication affects microbial symbiotic associations. **Richard W. Hofstetter** (rich.hofstetter@nau.edu)<sup>1</sup>, David Dunn<sup>2</sup>, Brennan Copp<sup>1</sup>, Peter Herron<sup>1</sup>, and Nicholas C. Aflitto<sup>3</sup>, <sup>1</sup>Northern Arizona Univ., Flagstaff, AZ, <sup>2</sup>Univ. of California, Santa Cruz, CA, <sup>3</sup>Cornell Univ., Ithaca, NY
- 3:30 **1601** Economics and politics. **Jean-Claude Grégoire** (jcgregoi@ulb.ac.be), Free Univ. of Brussels, Brussels, Belgium



TUESDAY



## Symposium: Status of Worldwide Honey Bee Health and Its Impacts on Agriculture

### Chapin Theater (Convention Center)

**Moderators and Organizers:** Jeffrey Pettis<sup>1</sup>, Robyn Rose<sup>2</sup>, and Peter Neumann<sup>3</sup>, <sup>1</sup>USDA - ARS, Beltsville, MD, <sup>2</sup>USDA - APHIS, Riverdale, MD, <sup>3</sup>Univ. of Bern, Bern, Switzerland

- 1:30 **1602** Pandemic DWV and global decline in honey bee health. **Robert Paxton** (robert.paxton@zoologie.uni-halle.de), Martin Luther Univ., Halle, Germany
- 1:45 **1603** The role of honey bees in worldwide food security. **Jeffrey Pettis** (jeff.pettis@ars.usda.gov), USDA - ARS, Beltsville, MD
- 2:00 **1604** Beekeeping practices in Southeast Asia: Which bee to choose, *Apis mellifera* or *Apis cerana*? **Panuwan Chantawannakul** (panuwan@gmail.com), Chiang Mai Univ., Chiang Mai, Thailand
- 2:15 **1605** Honey bee health in Brazil: Impacts of pathogens on Africanized vs. European bees. **Erica Teixeira** (erica@apta.sp.gov.br), APTA Regional, Santa Cecilia, Brazil
- 2:30 **1606** Honey bee health and potential impacts on agriculture in Canada. **Marta Guarna** (marta.guarna@agr.gc.ca), Agriculture and Agri-Food Canada, Beaverlodge, AB, Canada
- 2:45 **1607** APHIS national bee survey and world trade in bees. **Robyn Rose** (robyn.i.rose@aphis.usda.gov), USDA - APHIS, Riverdale, MD
- 3:00 BREAK**
- 3:15 **1608** Next steps: Outreach and problem solving with beekeepers. **Dennis vanEngelsdorp** (dennis.vanengelsdorp@gmail.com), Univ. of Maryland, College Park, MD

## Symposium: Insect-transmitted Phytoviruses and Agricultural Pandemics: Current Scenarios and Sustainable Management

### Room W231 B (Convention Center)

**Moderators and Organizers:** Rajagopalbabu Srinivasan<sup>1</sup> and Juan Alvarez<sup>2</sup>, <sup>1</sup>Univ. of Georgia, Tifton, GA, <sup>2</sup>DuPont, Newark, DE

- 1:30 **1609** An introduction to globally important arthropod-transmitted plant viruses: A case study with thrips-transmitted tomato spotted wilt virus management in peanut in the southeastern United States. **Rajagopalbabu Srinivasan** (babusri@uga.edu), Anita Shrestha, Pin-Chu Lai, Kathleen Marasigan, Mark R. Abney, and Albert K. Culbreath, Univ. of Georgia, Tifton, GA
- 2:00 **1610** Management options for arthropod-transmitted plant viruses and limitations. **Juan Alvarez** (juan.m.alvarez@dupont.com)<sup>1</sup> and Rajagopalbabu Srinivasan<sup>2</sup>, <sup>1</sup>DuPont, Newark, DE, <sup>2</sup>Univ. of Georgia, Tifton, GA
- 2:15 **1611** Managing thrips-transmitted Iris yellow spot tospovirus outbreaks in onion: Lots of progress but challenges remain. **Hanu Pappu** (hrp@cahnrs.wsu.edu), Washington State Univ., Pullman, WA

- 2:30 **1612** Grower-driven data reveals first principles in the management of potato virus Y incidence in seed potato production. **Russell L. Groves** (groves@entomology.wisc.edu)<sup>1</sup>, Kenneth E. Frost<sup>2</sup>, and Amy Charkowski<sup>1</sup>, <sup>1</sup>Univ. of Wisconsin, Madison, WI, <sup>2</sup>Oregon State Univ., Hermiston, OR
- 2:45 **1613** Vector-virus interactions in maize agroecosystems in East Africa. **Margaret (Peg) Redinbaugh** (peg.redinbaugh@ars.usda.gov)<sup>1</sup> and Subramanian Sevgan<sup>2</sup>, <sup>1</sup>USDA - ARS, Wooster, OH, <sup>2</sup>International Centre of Insect Physiology and Ecology, Nairobi, Kenya
- 3:00 BREAK**
- 3:15 **1614** Emergence of whitefly complexes and associated plant viruses in China. Wang Xin-Ru, Wang Lan-Lan, Jun-Bo Luan, Shu-Sheng Liu and **Xiao-Wei Wang** (xiaowei\_wang@zju.edu.cn), Zhejiang Univ., Hangzhou, China
- 3:30 **1615** Pea aphid host races in the Pacific Northwest: Interactions with legume viruses and implications for virus incidence in pulse crops. **Sanford D. Eigenbrode** (sanforde@uidaho.edu)<sup>1</sup> and Thomas Davis<sup>2</sup>, <sup>1</sup>Univ. of Idaho, Moscow, ID, <sup>2</sup>California Polytechnic State Univ., San Luis Obispo, CA
- 3:45 **1616** Aphid and whitefly-transmitted viruses impacting cucurbits production in southwestern United States. **Steven J. Castle** (steven.castle@ars.usda.gov)<sup>1</sup> and John Palumbo<sup>2</sup>, <sup>1</sup>USDA - ARS, Maricopa, AZ, <sup>2</sup>Univ. of Arizona, Yuma, AZ
- 4:00 **1617** Development and dissemination of thrips and tospovirus management strategies for vegetable production systems of East Africa. **Subramanian Sevgan** (ssubramania@icipe.org)<sup>1</sup>, Jean Nguya Kalemba Maniania<sup>1</sup>, Johnson Nyasani<sup>1</sup>, S. Niassy<sup>1</sup>, AM. Muvea<sup>2</sup>, Rael Birithia<sup>1</sup>, Hanu Pappu<sup>3</sup>, Rainer Meyhoefer<sup>4</sup>, Gerald Moritz<sup>5</sup>, Henry Wainright<sup>6</sup>, and Sunday Ekesi<sup>1</sup>, <sup>1</sup>International Centre of Insect Physiology and Ecology, Nairobi, Kenya, <sup>2</sup>Jomo Kenyatta Univ. of Agriculture and Technology, Nairobi, Kenya, <sup>3</sup>Washington State Univ., Pullman, WA, <sup>4</sup>Leibniz Univ., Hannover, Germany, <sup>5</sup>Martin Luther Univ. Halle, Germany, <sup>6</sup>Real IPM Kenya, Nairobi, Kenya
- 4:15 **1618** Factors affecting aphid-luteovirus interactions in agricultural and non-managed ecosystems. **Laura Ingwell** (laura.ingwell@gmail.com)<sup>1</sup> and Nilisa A. Bosque-Pérez<sup>2</sup>, <sup>1</sup>Purdue Univ., West Lafayette, IN, <sup>2</sup>Univ. of Idaho, Moscow, ID

## Symposium: Advances in the Behavioral Ecology of Entomopathogenic Nematodes

### Room W315 B (Convention Center)

**Moderators and Organizers:** David Shapiro-Ilan<sup>1</sup> and Ed Lewis<sup>2</sup>, <sup>1</sup>USDA - ARS, Byron, GA, <sup>2</sup>Univ. of California, Davis, CA

- 1:30 **1619** Infection dynamics of entomopathogenic nematodes. **Ed Lewis** (eewis@ucdavis.edu)<sup>1</sup> and David Shapiro-Ilan<sup>2</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>USDA - ARS, Byron, GA



- 1:45 **1620** Group behavior in insect parasitic nematode dispersal. **Paul Schliekelman** (pdschlie@uga.edu)<sup>1</sup>, Ed Lewis<sup>2</sup>, and David Shapiro-Ilan<sup>3</sup>, <sup>1</sup>Univ. of Georgia, Athens, GA, <sup>2</sup>Univ. of California, Davis, CA, <sup>3</sup>USDA - ARS, Byron, GA
- 2:00 **1621** Chemical signaling. **Fatma Kaplan** (fkaplan@ufl.edu)<sup>1</sup>, David Shapiro-Ilan<sup>2</sup>, and Ed Lewis<sup>3</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>USDA - ARS, Byron, GA, <sup>3</sup>Univ. of California, Davis, CA
- 2:15 **1622** Survival mechanism of entomopathogenic nematodes. **Itamar Glazer** (glazerit@volcani.agri.gov.il), Agricultural Research Organisation, Bet-Dagan, Israel
- 2:30 **1623** Exploiting the chemical ecology of the rhizosphere for crop protection. Ted Turlings<sup>1</sup> and **Denis Willett** (dwillett@ufl.edu)<sup>2</sup>, <sup>1</sup>Univ. of Neuchâtel, Neuchâtel, Switzerland, <sup>2</sup>Univ. of Florida, Lake Alfred, FL
- 2:45 **1624** Biogeography and diversity of traits of entomopathogenic nematodes. Xun Yan and **Richou Han** (hanrc@gdei.gd.cn), Guangdong Academy of Agricultural Sciences, Guangzhou, China
- 3:00 BREAK**
- 3:15 **1625** Once upon a time in America: Soil food webs and biological control in citrus orchards. **Raquel Campos-Herrera** (rcherrera@ualg.pt)<sup>1</sup>, Fahiem El-Borai<sup>2</sup>, and Larry Duncan<sup>3</sup>, <sup>1</sup>Center for Biological Resources and Food Mediterranean, Faro, Portugal, <sup>2</sup>Zagazig Univ., Zagazig, Egypt, <sup>3</sup>Univ. of Florida, Lake Alfred, FL
- 3:30 **1626** Case study on host-pathogen relationships: *S. scarabaei* – turf system. **Albrecht Koppenhöfer** (koppenhofer@aesop.rutgers.edu), Rutgers, The State Univ. of New Jersey, New Brunswick, NJ
- 3:45 **1627** Fatal fighting among adult entomopathogenic nematodes. Annemie Zenner<sup>1</sup>, Kathryn O'Callaghan<sup>1</sup>, Apostolos Kapranas<sup>2</sup>, and **Christine Griffin** (christine.griffin@nuim.ie)<sup>1</sup>, <sup>1</sup>Maynooth Univ., Maynooth, Ireland, <sup>2</sup>Univ. of Maynooth, Kildare, Ireland
- 4:00 **1628** Case study: Ecology of entomopathogenic nematodes in tropical fruit systems. **Claudia Dolinski** (claudia.dolinski@censanet.com.br)<sup>1</sup> and Lilitiana Parente Ribeiro<sup>2</sup>, <sup>1</sup>State Univ. of Northern Rio de Janeiro, Rio de Janeiro, Brazil, <sup>2</sup>State University of Northern Rio de Janeiro, Campos dos Goytacazes, Brazil
- 4:15 **1629** Ecological influence of *Steinernema carpocapsae* on native soil arthropods and nematode communities in pistachio orchards. **Amanda Hodson** (akhodson@ucdavis.edu) and Ed Lewis, Univ. of California, Davis, CA
- 4:30 **1630** Entomopathogenic nematode dispersal, foraging, and infection strategies: Cruisers, ambushers, sprinters, and scouts. **Parwinder Grewal** (parwinder.grewal@utrgv.edu)<sup>1</sup> and Harit Bal<sup>2</sup>, <sup>1</sup>The Univ. of Texas, Edinberg, TX, <sup>2</sup>The Ohio State Univ., Wooster, OH
- 4:45 **1631** Nematodes as model systems in behavioral ecology. **Adler Dillman** (adler.dillman@ucr.edu) and Tiffany Baiocchi, Univ. of California, Riverside, CA

## Symposium: Rise or Demise? A Global Outlook on the Future of Classical Biological Weed Control

### West Hall F1 (WF1) (Convention Center)

**Moderators and Organizers:** Mark Schwarzlaender<sup>1</sup>, Hariet Hinz<sup>2</sup>, Cliff Moran<sup>3</sup>, and Ikju Park<sup>1</sup>, <sup>1</sup>Univ. of Idaho, Moscow, ID, <sup>2</sup>CABI, Delémont, Switzerland, <sup>3</sup>Univ. of Cape Town, Rondebosch, South Africa

- 1:30 **1632** How safe is weed biological control? A global review of direct non-target attack. **Hariet Hinz** (h.hinz@cabi.org)<sup>1</sup>, Mark Schwarzländer<sup>2</sup>, and Rachel Winston<sup>3</sup>, <sup>1</sup>CABI, Delémont, Switzerland, <sup>2</sup>Univ. of Idaho, Moscow, ID, <sup>3</sup>MIA Consulting, Shelley, ID
- 1:45 **1633** How specific can you get? Is the common reed, *Phragmites australis*, an anomaly? **Richard Casagrande** (casa@uri.edu)<sup>1</sup>, Bernd Blossey<sup>2</sup>, and Patrick Häfliger<sup>3</sup>, <sup>1</sup>Univ. of Rhode Island, Kingston, RI, <sup>2</sup>Cornell Univ., Ithaca, NY, <sup>3</sup>CABI, Delémont, Switzerland
- 2:00 **1634** 110 years of continually successful weed biological control in Australia. **Andy Sheppard** (andy.sheppard@csiro.au)<sup>1</sup>, Jim Cullen<sup>1</sup>, and Bill Palmer<sup>2</sup>, <sup>1</sup>CSIRO, Canberra, Australia, <sup>2</sup>Queensland Dept. of Agriculture and Fisheries, Brisbane, Australia
- 2:15 **1635** Minimizing non-target effects: Making biocontrol safer and more effective. **Quentin Paynter** (paynterq@landcareresearch.co.nz)<sup>1</sup>, Simon V. Fowler<sup>2</sup>, and Ronny Groenteman<sup>2</sup>, <sup>1</sup>Landcare Research, Auckland, New Zealand, <sup>2</sup>Landcare Research, Lincoln, New Zealand
- 2:30 **1636** Finding intraspecific information and precise origins of plant invasions: Current and upcoming molecular methods. **John Gaskin** (john.gaskin@ars.usda.gov), USDA - ARS, Sidney, MT
- 2:45 **1637** Cryptic species and biological control: A brave new world? **Massimo Cristofaro** (massimo.cristofaro.cas@enea.it)<sup>1</sup>, Marie-Claude Bon<sup>2</sup>, Lincoln Smith<sup>2</sup>, Alessio De Biase<sup>3</sup>, Radmila Petanović<sup>4</sup>, and Biljana Vidović<sup>4</sup>, <sup>1</sup>ENEA, Rome, Italy, <sup>2</sup>USDA - ARS, Montferrier-sur-Lez, France, <sup>3</sup>Univ. of Rome "La Sapienza", Rome, Italy, <sup>4</sup>Univ. of Belgrade, Belgrade, Serbia
- SD1638** Genomic approaches in weed biological control. Amanda Stahlke, **Mark Schwarzländer** (markschw@uidaho.edu), and Paul Hohenlohe, Univ. of Idaho, Moscow, ID
- SD1639** Biological control of silverleaf nightshade (*Solanum elaeagnifolium*), one of the worst alien invasive weeds of the Mediterranean basin. **Javid Kashefi** (jkashef@ars-ebcl.org)<sup>1</sup>, Marie-Claude Bon<sup>2</sup>, Gualbert Gbèhounou<sup>3</sup>, Ahmet Uludag<sup>4</sup>, Anastasia Lagopodi<sup>5</sup>, Mohamed Bouhache<sup>6</sup>, and Carl Bell<sup>7</sup>, <sup>1</sup>USDA - ARS, Thessaloniki, Greece, <sup>2</sup>USDA - ARS, Montferrier-sur-Lez, France, <sup>3</sup>Food and Agriculture Organization of the United Nations, Rome, Italy, <sup>4</sup>Çanakkale Onsekiz Mart Univ., Çanakkale, Turkey, <sup>5</sup>Aristotle Univ. of Thessaloniki, Thessaloniki, Greece, <sup>6</sup>Agricultural and Veterinary Institute Hassan II, Rabat, Morocco, <sup>7</sup>Univ. of California Cooperative Extension, Ventura, CA



- SD1640** Proposed adoption of classical biological control by the Convention of Biological Diversity for the management of invasive alien species in natural ecosystems. **Andy Sheppard**<sup>1</sup> and **Piero Genovesi** (piero.genovesi@isprambiente.it)<sup>2</sup>, <sup>1</sup>CSIRO, Canberra, Australia, <sup>2</sup>ISPRA, Rome, Italy
- SD1641** Incorporating olfactory cues into risk assessment of the root weevil, *Mogulones crucifer*, as a biocontrol agent of *Cynoglossum officinale*. **Basu Kafle** (kaf16134@vandals.uidaho.edu), Sanford D. Eigenbrode, and Mark Schwarzländer, Univ. of Idaho, Moscow, ID
- SD1642** Role of chemical, visual, and tactile cues in the host selection behavior of the weevil *Ceutorhynchus cardariae*, a potential biological control agent for *Lepidium draba*. **Jessica Rendon** (rend7937@vandals.uidaho.edu)<sup>1</sup>, Sanford D. Eigenbrode<sup>1</sup>, Harriet Hinz<sup>2</sup>, Urs Schaffner<sup>2</sup>, and Mark Schwarzländer<sup>1</sup>, <sup>1</sup>Univ. of Idaho, Moscow, ID, <sup>2</sup>CABI, Delémont, Switzerland
- 3:00 BREAK AND POSTER SESSION**
- 3:15 **1643** Community-based implementation is vital to the wide-scale success of weed biological control in South Africa. **Martin Hill** (m.hill@ru.ac.za), Julie Coetzee, Iain Patterson, Philip Weyl, Grant Martin, and Jackie Hill, Rhodes Univ., Grahamstown, South Africa
- 3:30 **1644** Simple citizen science monitoring programs generate a wealth of data to assess weed biocontrol effects. **Aaron Weed**<sup>1</sup> and **Mark Schwarzländer** (markschw@uidaho.edu)<sup>2</sup>, <sup>1</sup>U.S. National Park Service, Fredericksburg, VA, <sup>2</sup>Univ. of Idaho, Moscow, ID
- 3:45 **1645** Growing prospects for classical biological control of weeds in Europe. **Richard Shaw** (r.shaw@cabi.org), CABI, Egham, United Kingdom
- 4:00 **1646** *Tamarix* biocontrol in North America: Tracking success in the midst of controversy. **Dan Bean** (dan.bean@state.co.us)<sup>1</sup> and Tom Dudley<sup>2</sup>, <sup>1</sup>Colorado Dept. of Agriculture, Palisade, CO, <sup>2</sup>Univ. of California, Santa Barbara, CA
- 4:15 **1647** Weed biological control in California: Review of the past and prospects for the future. **Michael Pitcairn** (mike.pitcairn@cdfa.ca.gov), California Dept. of Food and Agriculture, Sacramento, CA
- 4:30 **1648** Classical biological control programs for exotic weeds in the western USA: Long-term assessment of weed management, nontarget effects, and economic and ecological impacts. **Rich Hansen** (richard.w.hansen@aphis.usda.gov), USDA - APHIS, Fort Collins, CO
- 4:45 **1649** Sleeping next to an elephant: Still keeping biological control in the management toolbox in Canada. **Rob Bouchier** (robert.bouchier@agr.gc.ca)<sup>1</sup>, Aaron Weed<sup>2</sup>, Lisa Tewksbury<sup>3</sup>, Naomi Cappuccino<sup>4</sup>, Sandy Smith<sup>5</sup>, Andre Gassmann<sup>6</sup>, and Richard Casagrande<sup>3</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, Lethbridge, AB, Canada, <sup>2</sup>U.S. National Park Service, Fredericksburg, VA, <sup>3</sup>Univ. of Rhode Island, Kingston, RI, <sup>4</sup>Carleton Univ., Ottawa, ON, Canada, <sup>5</sup>Univ. of Toronto, Toronto, ON, Canada, <sup>6</sup>CABI, Delémont, Switzerland

- 5:00 **1650** Pathogens continue to impress as weed biological control agents in Australia. **Louise Morin** (louise.morin@csiro.au), CSIRO, Canberra, Australia
- 5:15 **1651** Bimodal host-finding studies improve environmental safety assessments of a weed biocontrol candidate, the weevil *Mogulones borraginis* on *Cynoglossum officinale*. **Ikju Park** (park0563@vandals.uidaho.edu)<sup>1</sup>, Sanford D. Eigenbrode<sup>1</sup>, Harriet Hinz<sup>2</sup>, Urs Schaffner<sup>2</sup>, and Mark Schwarzländer<sup>1</sup>, <sup>1</sup>Univ. of Idaho, Moscow, ID, <sup>2</sup>CABI, Delémont, Switzerland

### Symposium: Arthropod Movement in Agro-Ecosystems: Linking Individual Behaviours and Population Patterns Across Spatio-Temporal Scales. Just What Does Emerge?

#### Room W330 B (Convention Center)

**Moderators and Organizers:** Hazel R. Parry, Cate Paull, and Nancy Schellhorn, CSIRO, Brisbane, Australia

- 1:30 **1652** Resource exploitation: The role of movement, oviposition, and the landscape context. **Nancy A. Schellhorn** (nancy.schellhorn@csiro.au), CSIRO, Dutton Park, Australia
- 1:45 **1653** Linking herbivore dispersal and population dynamics in complex landscapes. **Megan E. O'Rourke** (megorust@vt.edu)<sup>1</sup> and Katja Poveda<sup>2</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>Cornell Univ., Ithaca, NY
- 2:00 **1654** Factors affecting movement of arthropods that transmit plant pathogens and implications for pathogen spread. **David Crowder** (dcrowder@wsu.edu), Washington State Univ., Pullman, WA
- 2:15 **1655** Predicting biological control of cereal aphids across agricultural landscapes. **Mattias Jonsson** (mattias.jonsson@slu.se)<sup>1</sup>, Riccardo Bommarco<sup>1</sup>, Barbara Ekbom<sup>1</sup>, Henrik Smith<sup>2</sup>, Camilla Winqvist<sup>1</sup>, Berta Caballero-Lopez<sup>3</sup>, Jan Bengtsson<sup>1</sup>, and Ola Olsson<sup>2</sup>, <sup>1</sup>Swedish Univ. of Agricultural Sciences, Uppsala, Sweden, <sup>2</sup>Lund Univ., Lund, Sweden, <sup>3</sup>Natural History Museum, Barcelona, Spain
- 2:30 **1656** Piecing together patterns of western corn rootworm (*Diabrotica virgifera virgifera* LeConte) movement. **Joseph Spencer** (spencer1@illinois.edu) and Sarah Hughson, Univ. of Illinois, Champaign, IL
- 2:45 **1657** The interaction between migratory capacity and pathogen load in the fall armyworm, *Spodoptera frugiperda*. **Aislinn Pearson** (aislinn.pearson@rothamsted.ac.uk)<sup>1,2</sup>, Robert Graham<sup>3</sup>, Jason Lim<sup>2</sup>, Jason Chapman<sup>4</sup>, and Kenneth Wilson<sup>1</sup>, <sup>1</sup>Lancaster Univ., Lancaster, United Kingdom, <sup>2</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>3</sup>Harper Adams Univ., Newport, United Kingdom, <sup>4</sup>Univ. of Exeter, Penryn, United Kingdom
- 3:00 BREAK**
- 3:15 **1658** Genetic signatures underpinning long-distance movement in a global insect pest, *Helicoverpa armigera*. **Christopher Jones** (christopher.jones@rothamsted.ac.uk)<sup>1</sup>, Jason Lim<sup>1</sup>, Chris Bass<sup>2</sup>, and Jason Chapman<sup>1,2</sup>, <sup>1</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>2</sup>Univ. of Exeter, Penryn, United Kingdom



- 3:30 **1659** Linking *Helicoverpa* spp. moth behavior to landscape drivers: Implications for management. **Cate Paull** (cate.paull@csiro.au)<sup>1</sup>, Andrew Hulthen<sup>1</sup>, and Nancy A. Schellhorn<sup>2</sup>, <sup>1</sup>CSIRO, Brisbane, Australia, <sup>2</sup>CSIRO, Dutton Park, Australia
- 3:45 **1660** From models to management: Simulating *Helicoverpa* movement behaviour in complex landscapes and the implications for Bt resistance. **Hazel R. Parry** (hazel.parry@csiro.au)<sup>1</sup>, Cate Paull<sup>1</sup>, Myron Zalucki<sup>2</sup>, Anthony R. Ives<sup>3</sup>, and Nancy Schellhorn<sup>1</sup>, <sup>1</sup>CSIRO, Brisbane, Australia, <sup>2</sup>Univ. of Queensland, Brisbane, Australia, <sup>3</sup>Univ. of Wisconsin, Madison, WI
- 4:00 **1661** Intrinsic influences on establishment and dispersal success in fragmented landscapes: A spatially-explicit individual-based approach. **Audrey Lustig** (audrey.lustig@lincolnuni.ac.nz) and Susan Worner, Lincoln Univ., Canterbury, New Zealand
- 4:15 **1662** BEESCOUT: A BEEHAVE landscape module to determine the scouting success in bees. **Matthias Becher** (m.a.becher@exeter.ac.uk) and Juliet Osborne, Univ. of Exeter, Penryn, United Kingdom
- 4:45 **1663** Modelling monarch butterfly movement and egg-laying in a spatially-explicit Iowa, USA, landscape. **Tyler Grant** (tgrant@iastate.edu)<sup>1</sup>, Steven Bradbury<sup>1</sup>, Hazel R. Parry<sup>2</sup>, and Myron Zalucki<sup>3</sup>, <sup>1</sup>Iowa State Univ., Ames, IA, <sup>2</sup>CSIRO, Brisbane, Australia, <sup>3</sup>Univ. of Queensland, Brisbane, Australia

### Symposium: Arthropods and Decomposition

#### Room W224 E (Convention Center)

**Moderators and Organizers:** Michael D. Ulyshen<sup>1</sup> and Jennifer L. Pechal<sup>2</sup>, <sup>1</sup>USDA - Forest Service, Athens, GA, <sup>2</sup>Michigan State Univ., East Lansing, MI

- 1:30 **1664** Mapping brown food webs on biogeochemical gradients. **Michael Kaspari** (mkaspari@ou.edu), Univ. of Oklahoma, Norman, OK
- 1:45 **1665** Decomposition, thermal microclimates, and the consequences for ant biodiversity. **Terrence P. McGlynn** (terry.mcglynn@gmail.com) and Erica Parra, California State Univ., Carson, CA
- 2:00 **1666** Spatial and temporal variation in insect functional diversity effects on litter decomposition. **André Frainer** (andre.frainer@uit.no)<sup>1</sup> and Brendan McKie<sup>2</sup>, <sup>1</sup>Univ. of Tromsø The Arctic Univ. of Norway, Tromsø, Norway, <sup>2</sup>Swedish Univ. of Agricultural Sciences, Uppsala, Sweden
- 2:15 **1667** The role of insects in fine woody debris decomposition. **Allison Stoklosa** (amstok7@gmail.com)<sup>1</sup> and Michael D. Ulyshen<sup>2</sup>, <sup>1</sup>Drexel Univ., Philadelphia, PA, <sup>2</sup>USDA - Forest Service, Athens, GA
- 2:30 **1668** The role of insects and microbes for dead-wood decomposition relative to global climate gradients. **Sebastian Seibold** (sebastian-seibold@gmx.de), Technical Univ., Freising, Germany
- 2:45 **1669** The potential of insects to act as spore vectors. **Rannveig Jacobsen** (rannveig.jacobsen@nmbu.no)<sup>1</sup>, Tone Birkemoe<sup>1</sup>, Anne Sverdrup-Thygeson<sup>1</sup>, Håvard Kauserud<sup>2</sup>, and Synnøve Botnen<sup>2</sup>, <sup>1</sup>Norwegian Univ. of Life Sciences, Ås, Norway, <sup>2</sup>Univ. of Oslo, Oslo, Norway

### 3:00 BREAK

- 3:15 **1670** Patterns and implications of insect-accelerated wood loss in southeastern U.S. forests. **Michael Ulyshen** (mulyshen@hotmail.com)<sup>1</sup>, Sebastian Seibold<sup>2</sup>, Michael Strickland<sup>3</sup>, Allison Stoklosa<sup>4</sup>, and Scott Horn<sup>1</sup>, <sup>1</sup>USDA - Forest Service, Athens, GA, <sup>2</sup>Technical Univ., Freising, Germany, <sup>3</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>4</sup>Drexel Univ., Philadelphia, PA
- 3:30 **1671** Resource subsidy influence on necrobiome networks. **Jennifer L. Pechal** (pechalje@msu.edu) and M. Eric Benbow, Michigan State Univ., East Lansing, MI
- 3:45 **1672** The dynamic necrobiome: The interacting web of organisms associated with animal death and decomposition. **M. Eric Benbow** (benbow@msu.edu)<sup>1</sup>, Jennifer L. Pechal<sup>1</sup>, Philip Barton<sup>2</sup>, and Courtney R. Weatherbee<sup>1</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>The Australian National Univ., Canberra, Australia
- 4:00 **1673** Tri-trophic interactions mediating arthropod behavior on decomposing vertebrate carrion. **Jeffery K. Tomberlin** (jktomberlin@tamu.edu)<sup>1</sup>, Tawni L. Crippen<sup>2</sup>, and Jonathan A. Cammack<sup>1</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>USDA - ARS, College Station, TX
- 4:15 **1674** Rhizospheric C-cycling: Implications of soil microarthropods. **Michael Strickland** (strick77@vt.edu), Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 4:30 **1675** Impact of dissolved oxygen levels on marine taphonomy and faunal scavenging of pig carcasses submerged at a variety of depths and habitats in the Salish Sea. **Gail Anderson** (ganderso@sfu.ca) and Lynne Bell, Simon Fraser Univ., Burnaby, BC, Canada
- 4:45 **1676** Experimental citizen science: Measuring dung decomposition by arthropods. **Riikka Kaartinen** (riikka.kaartinen@slu.se)<sup>1</sup>, Bess Hardwick<sup>2</sup>, and Tomas Roslin<sup>2</sup>, <sup>1</sup>Swedish Univ. of Agricultural Sciences, Uppsala, Sweden, <sup>2</sup>Univ. of Helsinki, Helsinki, Finland
- 5:00 **1677** Species traits predict biodiversity dynamics at carrion resource patches. **Philip Barton** (philip.barton@anu.edu.au), The Australian National Univ., Canberra, Australia
- 5:15 **1678** Seek and hide: Burying beetles exploit and then suppress microbial semiochemicals. **Stephen Trumbo** (stephen.trumbo@uconn.edu)<sup>1</sup>, Charmaine Woodard Melvin<sup>2</sup>, and Paula K. B. Philbrick<sup>2</sup>, <sup>1</sup>Univ. of Connecticut, Waterbury, CT, <sup>2</sup>Texas Tech Univ., Lubbock, TX

### Symposium: Entomological Research in China: Major Progresses and Perspectives

#### Room W414 B (Convention Center)

**Moderators and Organizers:** Tong-Xian Liu<sup>1</sup> and Le Kang<sup>2</sup>, <sup>1</sup>Northwest A&F Univ., Yangling, China, <sup>2</sup>Chinese Academy of Sciences, Beijing, China

- 1:30 **1679** Current progress and perspectives of entomology in China. **Le Kang** (lkang@ioz.ac.cn), Chinese Academy of Sciences, Beijing, China



- 2:00 **1680** The functional genomics of the brown planthopper. **Chuan-Xi Zhang** (chxzhang@zju.edu.cn), Hai-Jun Xu, and Yanyuan Bao, Zhejiang Univ., Hangzhou, China
- 2:30 **1681** Further insight into reproductive incompatibility between putative cryptic species of the *Bemisia tabaci* whitefly complex. **Shu-Sheng Liu** (shshliu@zju.edu.cn), Zhejiang Univ., Hangzhou, China
- 2:45 **1682** Genomic and molecular features in fungi to interact with insects. **Chengshu Wang** (cswang@sibs.ac.cn), Chinese Academy of Sciences, Shanghai, China
- 3:00 BREAK**
- 3:15 **1683** What controls the pupal-specific expression of cuticle protein genes in the silkworm, *Bombyx mori*? **Qili Feng** (qlfeng@scnu.edu.cn), South China Normal Univ., Guangzhou, China
- 3:30 **1684** Juvenile hormone signaling in *Drosophila*. **Sheng Li** (lisheng01@sibs.ac.cn), Chinese Academy of Sciences, Shanghai, China
- 3:45 **1685** The peripheral pheromone olfactory systems in two moth species, *Helicoverpa armigera* and *Helicoverpa assulta*. **Chen-Zhu Wang** (czwang@ioz.ac.cn), Chinese Academy of Sciences, Beijing, China
- 4:00 **1686** Status evolution of insect pests in Bt cotton ecosystem of China. **Kongming Wu** (kmwu@ippcaas.cn), Chinese Academy of Agricultural Sciences, Beijing, China
- 4:15 **1687** Biology, ecology, and management of the diamondback moth in China. **Zhenyu Li** (zhenyu\_li@163.com)<sup>1</sup>, Xia Feng<sup>1</sup>, Shu-Sheng Liu<sup>2</sup>, Minsheng You<sup>3</sup>, and Michael J. Furlong<sup>4</sup>, <sup>1</sup>Guangdong Academy of Agricultural Sciences, Guangzhou, China, <sup>2</sup>Zhejiang Univ., Hangzhou, China, <sup>3</sup>Fujian Agriculture and Forestry Univ., Fuzhou, China, <sup>4</sup>Univ. of Queensland, Brisbane, Australia
- 4:30 **1688** Biological control of pest insects in protected environments in China: How far are we? **Tong-Xian Liu** (txliu@nwsuaf.edu.cn), Northwest A&F Univ., Yangling, China

### Symposium: Industrialization of Insects as a Food Ingredient

#### Room W222 A (Convention Center)

**Moderator and Organizer:** Florence Dunkel, Montana State Univ., Bozeman, MT

- 1:30 **1689** Perfect storm to nutritional security: Insects on the menu? **Sonny Ramaswamy** (sonny@nifa.usda.gov), USDA - NIFA, Washington, DC
- 2:00 **1690** Nutritional aspects of insects and the funding environment: SBIR grants and USDA - NIFA. **Jodi Williams** (jwilliams@nifa.usda.gov), USDA - ARS, Washington, DC
- 2:15 **1691** Current state of the art in insect mass rearing technologies and their potential application in insect farming. **Juan Morales-Ramos** (juan.moralesramos@ars.usda.gov) and M. Guadalupe Rojas, USDA - ARS, Stoneville, MS

- 2:30 **1692** Lessons from Thailand on industrializing insect ingredients. **Patrick Durst** (patrick.durst@fao.org), Food and Agriculture Organization of the United Nations, Bangkok, Thailand
- 2:45 **1693** Recognizing and alleviating the disgust factor. **Paul Rozin** (rozin@psych.upenn.edu), Univ. of Pennsylvania, Philadelphia, PA
- 3:00 BREAK**
- 3:15 **1694** Regulatory aspects of insects in food in the United States and Europe. **Palma Marone** (pamarone@verizon.net), Virginia Commonwealth Univ., Richmond, VA
- 3:30 **1695** Insects as food: History, culture, and modern use around the world. **Eraldo Costa-Neto** (eraldont@hotmail.com)<sup>1</sup> and Florence Dunkel<sup>2</sup>, <sup>1</sup>Feira de Santana State Univ., Feira de Santana, Brazil, <sup>2</sup>Montana State Univ., Bozeman, MT
- 3:45 **1696** Presentation withdrawn
- 4:00 **1697** The state of research on insects as food: A systematic review of the literature. **Charlotte Payne** (charlotte.payne@gmail.com)<sup>1</sup>, Joshua Evans<sup>2</sup>, Andrew Muller<sup>2</sup>, and Rebecca Roberts<sup>3</sup>, <sup>1</sup>Univ. of Cambridge, Cambridge, United Kingdom, <sup>2</sup>Nordic Food Lab, Frederiksberg, Denmark, <sup>3</sup>Humboldt Univ., Berlin, Germany
- 4:15 **1698** Food microbiological considerations for the insect-based food industry. **Douglas Marshall** (douglasmrshall@eurofinsus.com), Eurofins Microbiology Laboratories, Inc., Fort Collins, CO
- 4:30 **1699** Edible grasshoppers promoting collaboration in the Middle East. **Dror Tamir** (drorta@tzatzar.biz), Steak TzarTzar, Tnuvot, Israel
- 4:45 **1700** Considerations for development and commercialization of insect based foods. **George Cavender** (gcavender2@unl.edu), Univ. of Nebraska, Lincoln, NE

### Symposium: Insects and the Global Human Experience

#### Room W314 A (Convention Center)

**Moderator and Organizer:** Gene Kritsky, Mount St. Joseph Univ., Cincinnati, OH

- 1:30 **1701** Insects Incorporated: Cultural entomology connects all disciplines as an online resource. **Barrett Klein** (barrett@pupating.org), Univ. of Wisconsin, La Crosse, WI
- 1:45 **1702** Insects as examples of parallel mythology. **Ronald Cherry** (Pinesnpets@aol.com), Univ. of Florida, Belle Glade, FL
- 2:00 **1703** Beekeeping from antiquity through the Middle Ages. **Gene Kritsky** (cdarwin@aol.com), Mount St. Joseph Univ., Cincinnati, OH
- 2:15 **1704** What makes a don of Cambridge University and pioneer of the American prairie become a champion of Darwinism? **Carol Anelli** (anelli.7@osu.edu), The Ohio State Univ., Columbus, OH
- 2:30 **1705** Insects in Japanese tradition and culture. **Nan-Yao Su** (nysu@ufl.edu), Univ. of Florida, Davie, FL



2:45 **1706** Insects in Japanese and French art, ca. 1900. **Sandra Schachat** (schachatsr@si.edu), Mississippi State Univ., Mississippi State, MS

**3:00 BREAK**

3:15 **1707** Insectography: Insects in the world of fiction. **Erin Bauer** (ebauer2@unl.edu), Univ. of Nebraska, Lincoln, NE

3:30 **1708** The mother of entomology: 17th century artist and revolutionary, Maria Sybilla Merian. **Michelle A. Duennes** (mduennes@life.illinois.edu), Univ. of Illinois, Champaign, IL

3:45 **1709** Bugs and the blues: Insects as tricksters in early blues music. **Robert K. D. Peterson** (bpeterson@montana.edu), Montana State Univ., Bozeman, MT

4:00 **1710** For the record: The contribution of insects in popular music. **Stephen R. Clarke** (sclarke@fs.fed.us), USDA - Forest Service, Lufkin, TX

4:15 **1711** Entomoludology: Usage of insects in video games. **Matan Shelomi** (mshelomi@ice.mpg.de), Max Planck Institute for Chemical Ecology, Jena, Germany

4:30 **1712** Insects in fireworks. **Joseph R. Coelho** (coelh-jo@quincy.edu), Quincy Univ., Quincy, IL

4:45 **1713** Public perceptions of insect diversity: How many “bugs” might there be? **John Acorn** (jacorn@ualberta.ca), Univ. of Alberta, Edmonton, AB, Canada

3:30 **1721** Myrmecophily in xanthopygine rove beetles (Coleoptera: Staphylinidae). **Stylianos Chatzimanolis** (stylianos-chatzimanolis@utc.edu), Univ. of Tennessee, Chattanooga, TN

3:45 **1722** Myrmecophile chemo-evo-devo: Genetic architecture of the tergal gland, a preadaptation for social parasitism in aleocharine rove beetles. **Joseph Parker** (dibasic@gmail.com), Columbia Univ., New York, NY

4:00 **1723** Poorly known and possible myrmecophiles in the spider beetles and dung beetles: How rare can they be? **T. Keith Philips** (keith.philips@wku.edu), Western Kentucky Univ., Bowling Green, KY

**Symposium: Emerging Technologies for Tomorrow’s Collaborative Discoveries**

**West Hall F2 (WF2) (Convention Center)**

**Moderator and Organizer:** Tamra Lincoln, USDA - ARS, Columbia, MO

1:30 **1724** It’s a bird. It’s a plane. No, it’s weed biocontrol by drone. **Carey Minter** (carey.minter@ars.usda.gov)<sup>1</sup>, Thomas Spencer<sup>2</sup>, Victor Wilhelm<sup>2</sup>, Travis Barnett<sup>2</sup>, Michael Hensch<sup>2</sup>, and Philip Tipping<sup>1</sup>, <sup>1</sup>USDA - ARS, Ft. Lauderdale, FL, <sup>2</sup>U.S. Army Corps of Engineers, Jacksonville, FL

1:45 **1725** Natural history matters: Using 19th century techniques to solve 21st century pest problems. **Lauren M. Diepenbrock** (laurendiepenbrock@gmail.com), Katharine Swoboda-Bhattarai, and Hannah Burrack, North Carolina State Univ., Raleigh, NC

2:00 **1726** The genome-wide analysis of innate immunity in a pupal endoparasitoid wasp, *Pteromalus puparum*. **Lei Yang** (11316090@zju.edu.cn)<sup>1</sup>, Qi Fang<sup>1</sup>, Zhichao Yan<sup>1</sup>, Zhe Lin<sup>2</sup>, and Gongyin Ye<sup>1</sup>, <sup>1</sup>Zhejiang Univ., Hangzhou, China, <sup>2</sup>State Key Laboratory of Integrated Management of Pest Insects and Rodents, Beijing, China

2:15 **1727** Using the latest generation of harmonic radar and microtags to track the retention capacity of the invasive brown marmorated stink bug in vegetables and tree fruit augmented with semiochemicals. **William R. Morrison** (william.morrison@ars.usda.gov)<sup>1</sup>, Doo-Hyung Lee<sup>2</sup>, Bruce Colpitts<sup>3</sup>, Charles Vincent<sup>4</sup>, Gilles Boiteau<sup>5</sup>, and Tracy C. Leskey<sup>1</sup>, <sup>1</sup>USDA - ARS, Kearneysville, WV, <sup>2</sup>Gachon Univ., Seongnam, South Korea, <sup>3</sup>Univ. of New Brunswick, Fredericton, NB, Canada, <sup>4</sup>Agriculture and Agri-Food Canada, Saint-Jean-sur-Richelieu, QC, Canada, <sup>5</sup>Agriculture and Agri-Food Canada, Fredericton, NB, Canada

2:30 **1728** Insect research without the bug: Eicosanoid inhibition in cell culture. **Tamra Lincoln** (trealf@gmail.com)<sup>1</sup>, Cynthia Goodman<sup>1</sup>, Yaofa Li<sup>2</sup>, Kaile Zhou<sup>3</sup>, Joseph Ringbauer<sup>1</sup>, and David Stanley<sup>1</sup>, <sup>1</sup>USDA - ARS, Columbia, MO, <sup>2</sup>Hebei Academy of Agricultural and Forestry Sciences, Baoding, China, <sup>3</sup>Univ. of Missouri, Columbia, MO

2:45 **1729** Laser ablation tomography: High resolution imaging, 3D modeling, and quantitative analysis. **Benjamin Hall** (hall.benjamin@gmail.com), Brian Reinhardt, Andrew Yanders, Asheesh Lanba, and Josh Blosenski, L4iS, State College, PA

**Symposium: Biology and Evolution of Social Insect Symbionts**

**Room W240 D (Convention Center)**

**Moderators and Organizers:** Joseph Parker<sup>1</sup> and Christoph von Beeren<sup>2</sup>, <sup>1</sup>Columbia Univ., New York, NY, <sup>2</sup>The Rockefeller Univ., New York, NY

1:30 **1714** Multi-level mutualism: Interaction specificity in a community of ants, aphids, mealybugs, and bacteria. **Aniek Ivens** (aivens@rockefeller.edu), The Rockefeller Univ., New York, NY

1:45 **1715** Artificial selection on beneficial gut microbiomes of bees. **Ulrich G. Mueller** (umueller@mail.utexas.edu) and Rong Ma, The Univ. of Texas, Austin, TX

2:00 **1716** Host specificity in phorid parasitoids of ants. **Don Feener** (donald.feener@utah.edu), Univ. of Utah, Salt Lake City, UT

2:15 **1717** Biodiversity, life-history adaptations, and network structure of army ant-symbiont communities. **Christoph von Beeren** (cvonbeeren@mail.rockefeller.edu), The Rockefeller Univ., New York, NY

2:30 **1718** Systematics and diversification of the eucharitid ant parasitoids (Hymenoptera: Chalcidoidea). **Elizabeth Murray** (em573@cornell.edu), Cornell Univ., Ithaca, NY

2:45 **1719** Beetles breaking the ant acoustical code: New insights into a host-parasite relationship. **Andrea Di Giulio** (andrea.digiulio@uniroma3.it), Univ. of Roma Tre, Rome, Italy

**3:00 BREAK**

3:15 **1720** Molecular phylogeny of the flanged bombardier beetles (Carabidae: Pausinae). **Wendy Moore** (wmoore@arizona.edu), Univ. of Arizona, Tucson, AZ



**SD1730** Cuticle comparative analyses between endo- and ecto-parasitoids using electron microscopy and genomic approaches. **Jiale Wang** (jjalewang@zju.edu.cn), Qi Fang, Zhichao Yan, and Gongyin Ye, Zhejiang Univ., Hangzhou, China

**SD1731** Sex-biased expression of microRNAs in an endoparasitoid wasp, *Pteromalus puparum*. **Shan Xiao** (xiaoshan9401@126.com), Qi Fang, and Gongyin Ye, Zhejiang Univ., Hangzhou, China

**SD1732** Prostaglandin activity in established cell lines. **Kaile Zhou** (kailezhou1991@gmail.com)<sup>1</sup>, Cynthia Goodman<sup>2</sup>, Tamra Lincoln<sup>2</sup>, Yaofa Li<sup>3</sup>, Joseph Ringbauer<sup>2</sup>, and David Stanley<sup>2</sup>, <sup>1</sup>Univ. of Missouri, Columbia, MO, <sup>2</sup>USDA - ARS, Columbia, MO, <sup>3</sup>Hebei Academy of Agricultural and Forestry Sciences, Baoding, China

**SD1733** New kids on the block: Regulatory issues around emerging pests and emerging technologies. **Johanna Elsensohn** (jeelsens@ncsu.edu), Zachary Brown, and Hannah Burrack, North Carolina State Univ., Raleigh, NC

**3:00 BREAK AND POSTER SESSION**

3:15 **1734** Stable isotope labeling gives insight into strategies for managing resistance in western corn rootworm, *Diabrotica virgifera virgifera* LeConte. Sally Taylor and **Christian Krupke** (ckrupke@purdue.edu), Purdue Univ., West Lafayette, IN

3:30 **1735** Effectiveness of various entomopathogenic nematode species on the control of larval *Diabrotica virgifera virgifera* (Coleoptera: Chrysomelidae). **Ryan Winslow Geisert** (rwg5h8@mail.missouri.edu) and Thomas A. Coudron, USDA - ARS, Columbia, MO

3:45 **1736** Video evaluation, timelapse, and photo geolocation: Tools for integrating research and extension. **Anthony J. McMechan** (justin.mcmechan@gmail.com), Univ. of Nebraska, Lincoln, NE

2:30 **1740** Biodiversity services in agroecosystems. **Teja Tschardt** (ttschar@gwdg.de), Georg August Univ., Göttingen, Germany

2:45 **1741** Designing landscapes for multiple services. **Douglas A. Landis** (landisd@msu.edu), Michigan State Univ., East Lansing, MI

**3:00 BREAK**

3:15 **1742** Fruits of the insects – managing pollinator and predator communities for sustainable agriculture. **Riccardo Bommarco** (riccardo.bommarco@slu.se), Swedish Univ. of Agricultural Sciences, Uppsala, Sweden

3:30 **1743** Effects of land use and plant diversity on insect diversity and consequences for ecosystem functioning. **Wolfgang Weisser** (wolfgang.weisser@tum.de)<sup>1</sup>, Martin Grossner<sup>2</sup>, Nadja Simons<sup>2</sup>, Anne Ebeling<sup>3</sup>, Sebastian Meyer<sup>2</sup>, and Lionel Hertzog<sup>2</sup>, <sup>1</sup>Technical Univ., Freising, Germany, <sup>2</sup>Technical Univ., München, Germany, <sup>3</sup>Univ. of Jena, Jena, Germany

3:45 **1744** Landscape effects on pollination services. **Hisatomo Taki** (htaki@affrc.go.jp), Forestry and Forest Products Research Institute, Tsukuba, Japan

4:00 **1745** Deforestation and human disease. Amy Vittor<sup>1</sup> and **Nathan Burkett-Cadena** (nburkettcadena@ufl.edu)<sup>2</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Univ. of Florida, Vero Beach, FL

4:15 **1746** Climate change effects on insects and ecosystem services. **Chelse Prather** (cprather@radford.edu)<sup>1</sup> and Angela Laws<sup>2</sup>, <sup>1</sup>Radford Univ., Radford, VA, <sup>2</sup>Univ. of Houston, Houston, TX

4:30 **1747** Economic values of harvesting grasshoppers for food versus control. **Rene Cerritos** (renecerritos@gmail.com), National Autonomous Univ. of México, Mexico City, Mexico

4:45 **Reception**

**Symposium: Insect Effects on Ecosystem Services**

**Room W414 D (Convention Center)**

**Moderators and Organizers:** Timothy D. Schowalter<sup>1</sup> and Teja Tschardt<sup>2</sup>, <sup>1</sup>Louisiana State Univ., Baton Rouge, LA, <sup>2</sup>Georg August Univ., Göttingen, Germany



We greatly appreciate funding from the National Science Foundation Grant DEB-1565406 for travel support for international speakers, travel awards for graduate students and early career professionals and funding for the reception following this symposium.

1:30 **1737** Overview of insect effects on ecosystem services. **Timothy D. Schowalter** (tschowalter@agcenter.lsu.edu), Louisiana State Univ., Baton Rouge, LA

2:00 **1738** Grasshopper stimulation of grassland productivity. **Gary Belovsky** (belovsky.1@nd.edu) and Jennifer Slade, Univ. of Notre Dame, South Bend, IN

2:15 **1739** Ecosystem services of dung beetles in Australia. **Bernard Doube** (bernardo@internode.on.net), Dung Beetle Solutions, Bridgewater, Australia

**Room W225 A (Convention Center)**

**Moderators and Organizers:** William Moar<sup>1</sup> and Kenneth Narva<sup>2</sup>, <sup>1</sup>Monsanto Company, St. Louis, MO, <sup>2</sup>Dow AgroSciences, Indianapolis, IN

1:30 **1748** Novel pesticidal protein discovery: What's next in a post-next-gen sequencing world? **Kimberly Sampson** (kimberly.sampson@bayer.com), James Doroghazi, Elyse Rodgers-Vieira, Jessica Monserrate, and Jelena Zaitseva, Bayer CropScience, Morrisville, NC

1:45 **1749** Novel protein for corn rootworm control. **Yong Yin** (yong.yin@monsanto.com)<sup>1</sup>, David Bowen<sup>2</sup>, Catherine Chay<sup>1</sup>, Jason Milligan<sup>1</sup>, Gregory Bean<sup>1</sup>, Arlene Howe<sup>1</sup>, Stanislaw Flasiniski<sup>1</sup>, Renata Bolognesi<sup>2</sup>, and James Roberts<sup>2</sup>, <sup>1</sup>Monsanto Company, St. Louis, MO, <sup>2</sup>Monsanto Company, Chesterfield, MO

2:00 **1750** *Bacillus thuringiensis* insecticidal proteins for control of *Diabrotica virgifera virgifera*. **Kenneth Narva** (knarva@dow.com)<sup>1</sup>, Colin Berry<sup>2</sup>, Jean-Louis Schwartz<sup>3</sup>, Raffi Aroian<sup>4</sup>, and Vimbai Chikwana<sup>1</sup>,



TUESDAY

- <sup>1</sup>Dow AgroSciences, Indianapolis, IN, <sup>2</sup>Cardiff Univ., Cardiff, United Kingdom, <sup>3</sup>Univ. of Montréal, Montréal, QC, Canada, <sup>4</sup>Univ. of Massachusetts, Worcester, MA
- 2:15 **1751** Modification of a *Bacillus thuringiensis* toxin to target soybean aphid (*Aphis glycines*). **Biviana Flores-Escobar** (biviana@iastate.edu), Benjamin Diest, Maria Fernandez Luna, and Bryony Bonning, Iowa State Univ., Ames, IA
- 2:30 **1752** Continuous evolution of the *B. thuringiensis* toxin CryIAC can overcome Bt resistance in insects. Thomas Malvar<sup>1</sup>, Ahmed Badran<sup>2</sup>, **Victor Guzov** (victor.m.guzov@monsanto.com)<sup>3</sup>, Qing Huai<sup>4</sup>, Melissa Kemp<sup>4</sup>, Prashanth Vishwanath<sup>4</sup>, Wendy Kain<sup>5</sup>, Ping Wang<sup>5</sup>, Artem Evdokimov<sup>6</sup>, Farhad Moshiri<sup>4</sup>, Keith Turner<sup>4</sup>, and David Liu<sup>2</sup>, <sup>1</sup>Monsanto Company, North Stonington, CT, <sup>2</sup>Harvard Univ., Cambridge, MA, <sup>3</sup>Monsanto Company, Cambridge, MA, <sup>4</sup>Monsanto Company, Chesterfield, MO, <sup>5</sup>Cornell Univ., Geneva, NY, <sup>6</sup>HarkerBIO, LLC, Buffalo, NY
- 2:45 **1753** *Bacillus thuringiensis* toxin classification – the need for change? **Neil Crickmore** (n.crickmore@sussex.ac.uk), Univ. of Sussex, Brighton, United Kingdom
- 3:00 BREAK**
- 3:15 **1754** Highly efficacious recombinant bacterial larvicides for mosquito vector control based on endotoxins of *Bacillus thuringiensis* and *Lysinibacillus sphaericus*. **Brian Federici** (brian.federici@ucr.edu)<sup>1</sup>, Dennis Bedishi<sup>1</sup>, Hyun-Woo Park<sup>2</sup>, Robert Hice<sup>1</sup>, and Margaret Wirth<sup>1</sup>, <sup>1</sup>Univ. of California, Riverside, CA, <sup>2</sup>California Baptist Univ., Riverside, CA
- 3:30 **1755** Structural and functional characterization of a new corn rootworm active protein from a *Pseudomonas* strain. **Lu Liu** (lu.liu@pioneer.com)<sup>1</sup>, Jarred Oral<sup>1</sup>, James English<sup>1</sup>, Azalea Ong<sup>1</sup>, Ingrid Udranszky<sup>1</sup>, Brad Poland<sup>2</sup>, David Cerf<sup>1</sup>, Mark McDonald<sup>1</sup>, and Genhai Zhu<sup>1</sup>, <sup>1</sup>DuPont Pioneer, Hayward, CA, <sup>2</sup>DuPont Pioneer, Johnston, IA
- 3:45 **1756** Structural basis for a shared mode of action between a pair of corn rootworm actives from a *Bacillus thuringiensis* and a non-*Bacillus* bacterial source. **Nasser Yalpani** (nasser.yalpani@pioneer.com)<sup>1</sup>, Timothy M. Nowatzki<sup>1</sup>, Amit Sethi<sup>1</sup>, Brad Poland<sup>1</sup>, Jian-Zhou Zhao<sup>1</sup>, and Lu Liu<sup>2</sup>, <sup>1</sup>DuPont Pioneer, Johnston, IA, <sup>2</sup>DuPont Pioneer, Hayward, CA
- 4:00 **1757** The future of cystine-knot peptides in insecticide development. **Robert Kennedy** (rmkennedy@vestaron.com), Vestaron Corporation, Kalamazoo, MI
- 4:15 **1758** Preliminary ecological risk assessment of a new Bt protein (Cry51Aa2.834\_16) effective for controlling targeted sucking insect pests in cotton using laboratory and field data. Aqeel Ahmad, Peter Asiimwe, Pamela Bachman, Jennifer Fridley, **Peter Jensen** (peter.d.jensen@monsanto.com), Steven Levine, Jianguo Tan, and Joshua Uffman, Monsanto Company, St. Louis, MO
- 4:30 **1759** Use of species sensitivity distributions in the characterization of risk of novel insecticidal proteins to non-target organisms. **Chad Boeckman** (chad.boeckman@pioneer.com), DuPont Pioneer, Johnston, IA

- 4:45 **1760** Insect resistance management for next-generation insecticidal traits. **Miles Lepping** (mdlepping@dow.com) and Nicholas Storer, Dow AgroSciences, Indianapolis, IN

## Symposium: Evolution of Biological Clocks

### Room W224 C (Convention Center)

**Moderators and Organizers:** Astrid Groot<sup>1</sup> and Charalambos Kyriacou<sup>2</sup>, <sup>1</sup>Univ. of Amsterdam, Amsterdam, Netherlands, <sup>2</sup>Univ. of Leicester, Leicester, United Kingdom

- 1:30 **1761** Circadian clock control of the monarch butterfly seasonal migration. **Christine Merlin** (cmerlin@bio.tamu.edu), Texas A&M Univ., College Station, TX
- 2:00 **1762** Circatidal clock in the mangrove cricket. **Hideharu Numata** (numata@ethol.zool.kyoto-u.ac.jp), Kyoto Univ., Kyoto, Japan
- 2:30 **1763** From genome to function: Circadian and circalunar timing adaptations in the intertidal insect *Clunio marinus*. Tobias Kaiser and **Birgit Poehn** (birgit.poehn@univie.ac.at), Max F. Perutz Laboratories, Vienna, Austria
- 3:00 BREAK**
- 3:15 **1764** Evolution of timing in insects and crustacea. **Charalambos Kyriacou** (cpk@leicester.ac.uk), Univ. of Leicester, Leicester, United Kingdom
- 3:30 **1765** The linden bug, *Pyrrhocoris apterus*, a model for insect seasonality. **Marketa Hejnikova** (hejnikova@entu.cas.cz), Lenka Pivarciova, and David Dolezel, Czech Academy of Sciences, České Budějovice, Czech Republic
- 3:45 **1766** Observation of circadian behavior in the large black chafer, *Holotrichia parallela*. **Yuta Kawasaki** (utakwsk@sci.osaka-cu.ac.jp), Osaka City Univ., Osaka, Japan
- 4:00 **1767** Evolution of timing sexual behaviors in moths. **Astrid Groot** (a.t.groot@uva.nl), Univ. of Amsterdam, Amsterdam, Netherlands
- 4:15 **Panel Discussion**

## Symposium: Interactions Between the Insect Immune System and Parasites

### Room W331 D (Convention Center)

**Moderators and Organizers:** Michael R. Strand<sup>1</sup> and Francesco Pennacchio<sup>2</sup>, <sup>1</sup>Univ. of Georgia, Athens, GA, <sup>2</sup>Univ. of Napoli Federico II, Napoli, Italy

- 1:30 **1768** Genes and symbionts: The evolution of virus resistance in *Drosophila*. **Francis Jiggins** (fmj1001@cam.ac.uk), Chuan Cao, and Julien Martinez, Univ. of Cambridge, Cambridge, United Kingdom
- 1:45 **1769** *Wolbachia*-insect associations and antiviral immunity. **Karyn Johnson** (karynj@uq.edu.au), Aleksej Stevanovic, and Zhee Sheen Wong, Univ. of Queensland, St. Lucia, Australia
- 2:00 **1770** Innate immune response and parasite evasion in malaria vector mosquitoes. **George Christophides** (g.christophides@imperial.ac.uk), Imperial College London, London, United Kingdom





- 2:15 **1771** Host-virus interactions: Lessons from the model organism *Drosophila melanogaster*. **Jean-Luc Imler** (jl.imler@unistra.fr), National Centre for Scientific Research, Strasbourg, France
- 2:30 **1772** The regulation of humoral control immunity in mosquitoes. **Kristin Michel** (kmichel@ksu.edu), Victoria Davidson, Melissa Gulley, David Meekins, and Xin Zhang, Kansas State Univ., Manhattan, KS
- 2:45 **1773** Microbial community and redox homeostasis in the mosquito gut ecosystem. **Jiannong Xu** (jxu@nmsu.edu), New Mexico State Univ., Las Cruces, NM
- 3:00 BREAK**
- 3:15 **1774** Honey bee-parasite immune suppression by parasites and pathogens. **Francesco Pennacchio** (ibrahim@igb.cnr.it)<sup>1</sup> and Francesco Nazzi<sup>2</sup>, <sup>1</sup>Univ. of Napoli Federico II, Napoli, Italy, <sup>2</sup>Univ. of Udine, Udine, Italy
- 3:30 **1775** Nematodes and bacteria: Allies in the suppression of insect immune defenses. **Heidi Goodrich-Blair** (hgblair@bact.wisc.edu)<sup>1</sup>, Ángel Casanova-Torres<sup>1</sup>, Elisabeth Husa<sup>2</sup>, Helge Bode<sup>3</sup>, Adler Dillman<sup>4</sup>, Ionnis Eleftherianos<sup>5</sup>, Steve Forst<sup>6</sup>, and Jean-Marc Reichhart<sup>7</sup>, <sup>1</sup>Univ. of Wisconsin, Madison, WI, <sup>2</sup>Millsaps College, Jackson, MS, <sup>3</sup>Goethe-Universität, Frankfurt, Germany, <sup>4</sup>Univ. of California, Riverside, CA, <sup>5</sup>The George Washington Univ., Washington, DC, <sup>6</sup>Univ. of Wisconsin, Milwaukee, WI, <sup>7</sup>Univ. of Strasbourg, Strasbourg, France
- 3:45 **1776** The role of novel viruses as parasite mutualists. **Gaelen Burke** (grburke@uga.edu) and Kelsey Coffman, Univ. of Georgia, Athens, GA
- 4:00 **1777** Molecular analysis of immune-suppressive virus-like particles from cynipid wasp *Leptopilina heterotoma*, a generalist parasite of *Drosophila* spp. **Shubha Govind** (sgovind@ccny.cuny.edu)<sup>1</sup>, Mary Ellen Heavner<sup>1</sup>, Johnny Ramroop<sup>1</sup>, Brian Wey<sup>1</sup> and Shaneen Singh<sup>2</sup>, <sup>1</sup>City Univ. of New York, New York, NY, <sup>2</sup>City Univ. of New York, Brooklyn, NY
- 4:15 **1778** Molecular response of *Manduca sexta* immune tissues to parasitization by the bracovirus-associated wasp *Cotesia congregata*. **Elisabeth Huguet** (elisabeth.huguet@univ-tours.fr), National Center for Scientific Research, Tours, France
- 4:30 **1779** *Drosophila*-*Leptopilina* wasps interactions: Inter-species variation, mechanisms, and evolution. **Marylène Poirié** (poirie@sophia.inra.fr), Nice Sophia Antipolis Univ., Sophia Antipolis, France
- 4:45 **1780** How different parasitoids respond to immunity of the same host. **Xue-xin Chen** (xxchen@zju.edu.cn), Zhi-zhi Wang, Xi-qian Ye, Min Shi, Qijuan Gu, Ze-huan Wang, Jia-ni Zou and Le-qing Zhan, Zhejiang Univ., Hangzhou, China
- 5:00 **1781** Epigenetic interactions between insects and parasitic fungi. **Krishnendu Mukherjee** (krishnendu.mukherjee@agr.uni-giessen.de)<sup>1</sup> and Andreas Vilcinskas<sup>2</sup>, <sup>1</sup>Univ. of Giessen, Giessen, Germany, <sup>2</sup>Justus Liebig Univ., Gießen, Germany

## Symposium: Parasitoids, Polydnviruses, and Pathogens: Genomes to Immune Physiology

### Room W330 C (Convention Center)

**Moderators and Organizers:** Bruce Webb<sup>1</sup> and Nathalie Volkoff<sup>2</sup>, <sup>1</sup>Univ. of Kentucky, Lexington, KY, <sup>2</sup>INRA, Montpellier, France

- 1:30 **1782** Mechanisms of transfer of virulence molecules in ichneumonid wasps. **Anne-Nathalie Volkoff** (volkoff@supagro.inra.fr)<sup>1</sup>, Apolline Pichon<sup>1</sup>, Magali Eychenne<sup>1</sup>, Marc Ravallec<sup>1</sup>, Annie Bézier<sup>2</sup>, Matthieu Leobold<sup>2</sup>, Véronique Jouan<sup>1</sup>, Serge Urbach<sup>3</sup>, Valérie Barbe<sup>4</sup>, Jean-Michel Drezen<sup>5</sup>, Fabrice Legeai<sup>6</sup>, and Don Stoltz<sup>7</sup>, <sup>1</sup>INRA, Montpellier, France, <sup>2</sup>François Rabelais Univ., Tours, France, <sup>3</sup>National Center for Scientific Research, Montpellier, France, <sup>4</sup>National Sequencing Centre, Evry, France, <sup>5</sup>National Center for Scientific Research, Tours, France, <sup>6</sup>INRA, Le Rheu, France, <sup>7</sup>Dalhousie Univ., Halifax, NS, Canada
- 1:45 **1783** Advancing on the understanding of the genome, gene expression, and potential for biotechnological exploitation of the polydnvirus associated with *Cotesia flavipes*. **Fernando L. Cônsoli** (fconsoli@usp.br)<sup>1</sup>, Guilherme Rossi<sup>1</sup>, Bruna Merlin<sup>1</sup>, Simone Prado<sup>2</sup>, and Fabio Dossi<sup>1</sup>, <sup>1</sup>Univ. of São Paulo, Piracicaba, Brazil, <sup>2</sup>Embrapa Environment, Jaguariuna, Brazil
- 2:00 **1784** Comparative genomics of parasitoid wasps and what it says on the evolution of their endogenous bracovirus. **Jean-Michel Drezen** (drezen@univ-tours.fr)<sup>1</sup>, Jeremy Gauthier<sup>2</sup>, Annie Bézier<sup>2</sup>, Jean-Marc Aury<sup>3</sup>, Valérie Barbe<sup>3</sup>, Anthony Bretaudeau<sup>4</sup>, Fabrice Legeai<sup>5</sup>, Karine Musset<sup>2</sup>, Philippe Gayral<sup>2</sup>, Elisabeth Huguet<sup>1</sup>, and Elisabeth Herniou<sup>2</sup>, <sup>1</sup>National Center for Scientific Research, Tours, France, <sup>2</sup>François Rabelais Univ., Tours, France, <sup>3</sup>National Sequencing Center, Evry, France, <sup>4</sup>INRA, Rennes, France, <sup>5</sup>INRA, Le Rheu, France
- 2:15 **1785** On the evolutionary origins of banchine polydnviruses. **Michel Cusson** (mccusson@rncan.gc.ca)<sup>1</sup>, Catherine Béliveau<sup>1</sup>, Alejandro Cohen<sup>2</sup>, Don Stewart<sup>3</sup>, G. Periquet<sup>4</sup>, Abdelmajid Djoumad<sup>3</sup>, Lisa Kuhn<sup>2</sup>, Don Stoltz<sup>2</sup>, Brian Boyle<sup>5</sup>, Anne-Nathalie Volkoff<sup>6</sup>, Elisabeth Herniou<sup>4</sup>, and Jean-Michel Drezen<sup>7</sup>, <sup>1</sup>Natural Resources Canada, Québec City, QC, Canada, <sup>2</sup>Dalhousie Univ., Halifax, NS, Canada, <sup>3</sup>Natural Resources Canada, Halifax, NS, Canada, <sup>4</sup>François Rabelais Univ., Tours, France, <sup>5</sup>Univ. Laval, Québec City, QC, Canada, <sup>6</sup>INRA, Montpellier, France, <sup>7</sup>National Center for Scientific Research, Tours, France
- 2:30 **1786** Molecular pathways shared between host-parasitoid interaction in insect and other animals: The case of teratocyte extracellular enolase. Gerarda Grossi<sup>1</sup>, Annalisa Grimaldi<sup>2</sup>, Rosa Cardone<sup>3</sup>, Simona Laurino<sup>1</sup>, and **Patrizia Falabella** (patrizia.falabella@unibas.it)<sup>1</sup>, <sup>1</sup>Univ. of Basilicata, Potenza, Italy, <sup>2</sup>Univ. of Insubria, Varese, Italy, <sup>3</sup>Univ. of Bari, Bari, Italy
- 2:45 **1787** A trigger factor for the emergence of parasitoid wasp larvae from the host. **Yoichi Hayakawa** (hayakayo@cc.saga-u.ac.jp), Saga Univ., Saga, Japan
- 3:00 BREAK**



3:15 **1788** When two types of polydnaviruses work on the same host: What we can draw from their genomes and gene expressions. **Min Shi** (shimin0623@zju.edu.cn), Xi-qian Ye, Ze-huan Wang, and Xue-xin Chen, Zhejiang Univ., Hangzhou, China

3:30 **Discussion**

### Symposium: Plant Piercing-Sucking Insects and Vectors without Borders

**Room W232 B (Convention Center)**

**Moderators and Organizers:** Chrystel Olivier<sup>1</sup>, Charles Vincent<sup>2</sup>, Julien Saguez<sup>3</sup>, and Philippe Giordanengo<sup>4</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, London, ON, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Saint-Jean-sur-Richelieu, QC, Canada, <sup>3</sup>Entomological Society of Québec, Saint-Jean-sur-Richelieu, QC, Canada, <sup>4</sup>INRA, Sophia Antipolis, France

1:30 **1789** Potential vectors of maize bushy stunt disease in native corn grown at high elevations in southeast Mexico. **Edel Perez** (edellopez1987@gmail.com)<sup>1</sup>, Tyler Wist<sup>2</sup>, Dana Nordin<sup>2</sup>, Tim Dumonceaux<sup>2</sup>, Mauricio Luna-Rodriguez<sup>1</sup>, and Chrystel Olivier<sup>3</sup>, <sup>1</sup>Univ. Veracruzana, Xalapa, Mexico, <sup>2</sup>Agriculture and Agri-Food Canada, Saskatoon, SK, Canada, <sup>3</sup>Agriculture and Agri-Food Canada, London, ON, Canada

1:45 **1790** The acrostyle within aphid stylets: Role in plant virus transmission and plant-aphid interaction. **Marilyne Uzest** (uzest@supagro.inra.fr), INRA, Montpellier, France

2:00 **1791** When a Palearctic bacterium meets a Nearctic insect vector: Genetic and ecological insights into the emergence of the grapevine *Candidatus Phytoplasma vitis* and *Ca. P. vitialis* epidemics in Europe. Sylvie Malembic-Maher<sup>1</sup>, Delphine Desque<sup>1</sup>, Dima Khalil<sup>1</sup>, Pascal Salar<sup>1</sup>, Jean-Luc Danet<sup>1</sup>, Sibylle Duret<sup>1</sup>, Jelena Jovic<sup>2</sup>, Slobodan Krnjajic<sup>2</sup>, Elisa Angelini<sup>3</sup>, Luisa Filippin<sup>3</sup>, Ibolya Ember<sup>4</sup>, Maria Kolber<sup>5</sup>, Michele Della Bartola<sup>6</sup>, Alberto Materazzi<sup>6</sup>, Michael Maixner<sup>7</sup>, Laure Beven<sup>1</sup>, Nathalie Bouvery<sup>1</sup>, and **Xavier Foissac** (foissac@bordeaux.inra.fr)<sup>1</sup>, <sup>1</sup>INRA, Villenave d'Ornon, France, <sup>2</sup>Institute for Plant Protection and Environment, Zemun, Serbia, <sup>3</sup>CREA, Conegliano, Italy, <sup>4</sup>Univ. of Budapest, Budapest, Hungary, <sup>5</sup>Genlogs Biodiagnostika Kft., Celldömök, Hungary, <sup>6</sup>Univ. of Pisa, Pisa, Italy, <sup>7</sup>Julius Kühn Institute, Siebeldingen, Germany

2:15 **1792** Why host acquired insect-specific toxins and regulations when you are a plant pathogen? Facts and lessons from the aphid / Cyt / *Dickeya dadantii* model. **Yvan Rabhé** (Yvan.Rahbe@lyon.inra.fr)<sup>1,2</sup> and Guy Condemine<sup>2</sup>, <sup>1</sup>INRA, Villeurbanne, France, <sup>2</sup>Univ. of Lyon, Villeurbanne, France

2:30 **1793** Vector manipulation by viruses: The pathosystem Brassicaceae-aphids-phytoviruses, a study case. **Quentin Chesnais** (quentin.chesnais@u-picardie.fr)<sup>1</sup>, Aude Couty<sup>1</sup>, Marilyne Uzest<sup>2</sup>, Veronique Brault<sup>3</sup>, and Arnaud Ameline<sup>1</sup>, <sup>1</sup>Univ. of Picardie Jules Verne, Amiens, France, <sup>2</sup>INRA, Montpellier, France, <sup>3</sup>INRA, Colmar, France

2:45 **1794** Effect of mineral oil on the aphid-potato-PVY system. **Sebastien Boquel** (boquel.s@gmail.com), Jianhua Zhang, Xianzhou Nie, and Yvan Pelletier,

Agriculture and Agri-Food Canada, Fredericton, NB, Canada

3:00 **BREAK**

3:15 **1795** Phytoplasma disease in canola. **Chrystel Olivier** (drchrystelolivier@gmail.com), Tyler Wist, Tim Dumonceaux and Christine Hammond, Agriculture and Agri-Food Canada, Saskatoon, SK, Canada

3:30 **1796** Tritrophic interactions between leafhoppers, grapevines, and phytoplasmas in Canadian vineyards: An overview. **Julien Saguez** (saguezj@yahoo.com)<sup>1</sup>, Charles Vincent<sup>2</sup>, Jacques Lasnier<sup>3</sup>, Tim Dumonceaux<sup>4</sup>, Christine Hammond<sup>4</sup>, Lorne Stobbs<sup>5</sup>, Philippe Giordanengo<sup>6</sup>, and Chrystel Olivier<sup>4</sup>, <sup>1</sup>Entomological Society of Québec, Saint-Jean-sur-Richelieu, QC, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Saint-Jean-sur-Richelieu, QC, Canada, <sup>3</sup>Ag-Cord, Inc., Granby, QC, Canada, <sup>4</sup>Agriculture and Agri-Food Canada, Saskatoon, SK, Canada, <sup>5</sup>Agriculture and Agri-Food Canada, Vineland, ON, Canada, <sup>6</sup>INRA, Sophia Antipolis, France

3:45 **1797** Presentation withdrawn

### Symposium: Advances in Pest Management

**Room W240 C (Convention Center)**

**Moderators and Organizers:** Olivia Reynolds<sup>1</sup> and Eric B. Jang<sup>2</sup>, <sup>1</sup>New South Wales Dept. of Primary Industries, Menangle, Australia, <sup>2</sup>USDA - ARS, Hilo, HI

1:30 **1798** Ecological approaches to enhance biological control of insect pests. **Geoffrey Gurr** (geoff.gurr@gmail.edu.au)<sup>1,2,3</sup>, <sup>1</sup>Charles Sturt Univ., Orange, Australia, <sup>2</sup>Fujian Agriculture and Forestry Univ., Fuzhou, China, <sup>3</sup>Ministry of Agriculture, Fuzhou, China

2:00 **1799** Biosensors to support socially acceptable pest management technologies for surveillance, management, and eradication of invasive species. **D. Max Suckling** (max.suckling@plantandfood.co.nz)<sup>1</sup>, Flore Mas<sup>2</sup>, and Kye Chung Park<sup>2</sup>, <sup>1</sup>The New Zealand Institute for Plant & Food Research Ltd, Auckland, New Zealand, <sup>2</sup>The New Zealand Institute for Plant & Food Research Ltd, Christchurch, New Zealand

2:30 **1800** Toxic and beneficial effects of plant essential oils on arthropod pests lead to novel control methods. **Nikos Papadopoulos** (nikopap@uth.gr)<sup>1</sup>, Charalampos Ioannou<sup>2</sup>, Dimitrios Papachristos<sup>3</sup>, Stella Papanastasiou<sup>2</sup>, and Christos Gerofotis<sup>2</sup>, <sup>1</sup>Univ. of Thessaly, Nea Ionia, Greece, <sup>2</sup>Univ. of Thessaly, Volos, Greece, <sup>3</sup>Benaki Phytopathological Institute, Kifissia, Greece

2:45 **1801** Two in one: Use of sterile insects to transmit entomopathogenic fungi and induce sterility.



- Pablo Liedo** (pliedo@ecosur.mx)<sup>1</sup>, Pablo Montoya<sup>2</sup>, and Jorge Toledo<sup>1</sup>, <sup>1</sup>College of the Southern Border, Tapachula, Mexico, <sup>2</sup>Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food, Tapachula, Mexico
- 3:00 BREAK**
- 3:15 **1802** The development of monitoring systems for pests based on internet of things (IOTs) technology. **En-Cheng Yang** (ecyang@ntu.edu.tw), Jo-Air Jiang, Tzu-Shiang Lin, Chien-Hao Wang, and Min-Sheng Liao, National Taiwan Univ., Taipei, Taiwan
- 3:30 **1803** Computer simulation of pest detection applied to invasive tephritids. **Nicholas Manoukis** (nicholas.manoukis@ars.usda.gov), USDA - ARS, Hilo, HI
- 3:45 **1804** Stable isotope technology for the determination of pest natal origins. **Karen Armstrong** (karen.armstrong@lincoln.ac.nz)<sup>1,2</sup>, Peter Holder<sup>1,2</sup>, D. Murphy<sup>2,3</sup>, C Allen<sup>2,3</sup>, Peter Crisp<sup>2,4</sup>, W. Woods<sup>2,5</sup>, and Bernie Dominiak<sup>2,6</sup>, <sup>1</sup>Lincoln Univ., Christchurch, New Zealand, <sup>2</sup>Plant Biosecurity Cooperative Research Centre, Canberra, Australia, <sup>3</sup>Queensland Univ. of Technology, Brisbane, Australia, <sup>4</sup>South Australian Research and Development Institute, Adelaide, Australia, <sup>5</sup>Dept. of Agriculture and Food, Perth, Australia, <sup>6</sup>New South Wales Dept. of Primary Industries, Orange, Australia
- 4:00 **1805** New trap dispensers to improve detection programs for area-wide control of fruit flies (Diptera: Tephritidae): Implications of chemical degradation of trimedlure multi-lure dispensers weathered under California climatic conditions. **Roger Vargas** (roger.vargas@ars.usda.gov)<sup>1</sup>, Steven Souder<sup>1</sup>, Joseph G. Morse<sup>2</sup>, Elizabeth Grafton-Cardwell<sup>3</sup>, David R. Haviland<sup>4</sup>, John Kabashima<sup>5</sup>, Ben Faber<sup>6</sup>, Bruce Mackey<sup>7</sup>, Eddie Nkomo<sup>8</sup>, Peter Cook<sup>8</sup>, and John Stark<sup>9</sup>, <sup>1</sup>USDA - ARS, Hilo, HI, <sup>2</sup>Univ. of California, Riverside, CA, <sup>3</sup>Univ. of California, Exeter, CA, <sup>4</sup>Univ. of California Cooperative Extension, Bakersfield, CA, <sup>5</sup>Univ. of California Cooperative Extension, Costa Mesa, CA, <sup>6</sup>Univ. of California Cooperative Extension, Ventura, CA, <sup>7</sup>USDA - ARS, Albany, CA, <sup>8</sup>Farma Tech International, North Bend, WA, <sup>9</sup>Washington State Univ., Puyallup, WA

### Symposium: Insect-Resistant Genetically Engineered Crops: Current Status, Concerns, and Future Prospects

#### Room W414 A (Convention Center)

- Moderators and Organizers:** Anthony M. Shelton<sup>1</sup> and Jörg Romeis<sup>2</sup>, <sup>1</sup>Cornell Univ., Geneva, NY, <sup>2</sup>Agroscope, Zürich, Switzerland
- 1:30 **1806** Insect resistant genetically-engineered crops: Regulations, acceptance, and barriers. **Nicholas Storer** (nstorer@dow.com)<sup>1</sup>, Matthew Cahill<sup>2</sup>, Filip Cnudde<sup>3</sup>, Raju Kapoor<sup>4</sup>, and Angel Saavedra<sup>5</sup>, <sup>1</sup>Dow AgroSciences, Indianapolis, IN, <sup>2</sup>Dow AgroSciences, Sydney, Australia, <sup>3</sup>Dow AgroSciences, Brussels, Belgium, <sup>4</sup>Dow AgroSciences, New Delhi, India, <sup>5</sup>Dow AgroSciences, Guadalajara, Mexico
- 2:00 **1807** Role of Bt maize in global IPM. **Richard Hellmich** (richard.hellmich@ars.usda.gov)<sup>1</sup>, Aaron Gassmann<sup>2</sup>, Celso Omoto<sup>3</sup>, and Johnnie van den Berg<sup>4</sup>,

- <sup>1</sup>USDA - ARS, Ames, IA, <sup>2</sup>Iowa State Univ., Ames, IA, <sup>3</sup>Univ. of São Paulo, Piracicaba, Brazil, <sup>4</sup>North-West Univ., Potchefstroom, South Africa
- 2:15 **1808** Role of Bt cotton in global IPM. **Lewis Wilson** (lewis.wilson@csiro.au)<sup>1</sup>, Steven Naranjo<sup>2</sup>, Hari Sharma<sup>3</sup>, Kongming Wu<sup>4</sup>, Jeff Gore<sup>5</sup>, and Silvana V. Paula-Moraes<sup>6</sup>, <sup>1</sup>CSIRO, Narrabri, Australia, <sup>2</sup>USDA - ARS, Maricopa, AZ, <sup>3</sup>Dr. YS Parmar Univ. of Horticulture & Forestry, Nauni, Solan, India, <sup>4</sup>Chinese Academy of Agricultural Sciences, Beijing, China, <sup>5</sup>Mississippi State Univ., Stoneville, MS, <sup>6</sup>Embrapa Cerrados, Planaltina, Brazil

- 2:30 **1809** Economics of Bt crops and virus-resistant crops: A global view. **David Zilberman** (zilber11@berkeley.edu) and Scott Kaplan, Univ. of California, Berkeley, CA

#### 3:00 BREAK

- 3:15 **1810** Environmental effects of insect resistant genetically-engineered crops and implications for regulation. **Jörg Romeis** (joerg.romeis@agroscope.admin.ch)<sup>1</sup>, Michael Meissle<sup>1</sup>, and Yunhe Li<sup>2</sup>, <sup>1</sup>Agroscope, Zürich, Switzerland, <sup>2</sup>Chinese Academy of Agricultural Sciences, Beijing, China

- 3:30 **1811** Resistance management in insect resistant genetically-engineered crops. **Rick Roush** (rtr10@psu.edu)<sup>1</sup> and Sharon Downes<sup>2</sup>, <sup>1</sup>Pennsylvania State Univ., University Park, PA, <sup>2</sup>CSIRO, Narrabri, Australia

- 3:45 **1812** Bt eggplant: A bold step for Bangladesh and hope for the Philippines. **Anthony M. Shelton** (ams5@cornell.edu)<sup>1</sup>, Desiree Hautea<sup>2</sup>, Joseph E. Huesing<sup>3</sup>, and Gour Pada Das<sup>4</sup>, <sup>1</sup>Cornell Univ., Geneva, NY, <sup>2</sup>Univ. of the Philippines, Laguna, Philippines, <sup>3</sup>USAID, Washington, DC, <sup>4</sup>Sathguru, Dhaka, Bangladesh

- 4:00 **1813** Bt rice in China: From biosafety assessment to public acceptance. **Junce Tian** (tianjunce@163.com), Gongyin Ye, Zeng-Bing Lu, Cong Dang, Duo Ning, and Nai-Shun Han, Zhejiang Univ., Hangzhou, China

- 4:15 **1814** Beyond Bt: Exploiting arachnid venom peptide toxins to control crop pests. **Elaine Fitches** (e.c.fitches@durham.ac.uk)<sup>1</sup>, Jake De Their<sup>1</sup>, Erich Nakasu<sup>2</sup>, Prashant S. Pyati<sup>1</sup>, Michelle Powell<sup>3</sup>, Martin Edwards<sup>4</sup>, Angharad M. R. Gatehouse<sup>4</sup>, and John Gatehouse<sup>1</sup>, <sup>1</sup>Durham Univ., Durham, United Kingdom, <sup>2</sup>Embrapa Vegetables, Brasília, Brazil, <sup>3</sup>Fera Science Ltd., York, United Kingdom, <sup>4</sup>Newcastle Univ., Newcastle upon Tyne, United Kingdom

- 4:30 **1815** RNAi for insect control. **Murugesan Rangasamy** (mrangasamy@dow.com), Huarong Li, Elane Fishilevich, Meghan Frey, Sarah Worden, Miles Lepping, Premchand Gandra, Chaoxian Geng, and Kenneth Narva, Dow AgroSciences, Indianapolis, IN

#### 4:45 Discussion

### Symposium: Research Frontiers into the Use of Preventive Medicine in Arthropod Pest Management

#### Room W240 B (Convention Center)

- Moderators and Organizers:** Christian Nansen<sup>1</sup> and Kevin Heinz<sup>2</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>Texas A&M Univ., College Station, TX

#### 1:30 Panel Discussion



TUESDAY

- 1:45 **1816** Herbivore defenses induced in *Arabidopsis* by beneficial soil bacteria. Mina Aziz, Ranjith Nadipalli, Jin-Lin Zhang, and **Paul Pare** (paul.pare@ttu.edu), Texas Tech Univ., Lubbock, TX
- 2:00 **1817** Mutualistic soil fungi and plant nutrition jointly influence plant-herbivore interactions. **Rachel Vannette** (raleava@stanford.edu), Stanford Univ., Stanford, CA
- 2:15 **1818** A lipid-mediated cross-talk between insect defense and drought stress responses. **Michael Kolomiets** (Mike.Kolomiets@agnet.tamu.edu)<sup>1</sup>, Eli Borrego<sup>1</sup>, Pei-Cheng Huang<sup>1</sup>, Christian Nansen<sup>2</sup>, and Shawn Christensen<sup>3</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Univ. of California, Davis, CA, <sup>3</sup>USDA - ARS, Gainesville, FL
- 2:30 **1819** Beating the bugs in the cranberry bogs – nutrients influence plant resistance. **Elvira de Lange** (elvira.delange@rutgers.edu)<sup>1,2</sup>, Vera Kyryczenko-Roth<sup>2</sup>, Jennifer Johnson-Cicalese<sup>2</sup>, Joan Davenport<sup>3</sup>, Nicholi Vorsa<sup>1,2</sup>, and Cesar Rodriguez-Saona<sup>1,2</sup>, <sup>1</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, <sup>2</sup>Rutgers, The State Univ. of New Jersey, Chatsworth, NJ, <sup>3</sup>Washington State Univ., Prosser, WA
- 2:45 **1820** Plant feeding pest and predatory mites, from lab to field, implications for IPM. **Eric Palevsky** (palevsky@volcani.agri.gov.il)<sup>1</sup>, Moshe Inbar<sup>2</sup>, and Sharon Warburg<sup>1,2</sup>, <sup>1</sup>Agricultural Research Organisation, Ramat Yishay, Israel, <sup>2</sup>Univ. of Haifa, Haifa, Israel
- 3:00 **BREAK**
- 3:15 **1821** Ecological modelling of the effects of water hyacinth nutrient composition on the performance of a biological control agent. **Emily Bick** (enbick@ucdavis.edu)<sup>1</sup>, Paul Pratt<sup>2</sup>, and Christian Nansen<sup>1</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>USDA - ARS, Albany, CA
- 3:30 **1822** *Parasaccharibacter apium*, gen. nov., sp. nov., improves honey bee (Hymenoptera: Apidae) resistance to *Nosema*. Lucy Snyder, Charlotte Meador, Rebecca Naldo, Brendon Mott, **Kirk E. Anderson** (kirk.anderson@ars.usda.gov) and Vanessa Corby-Harris, USDA - ARS, Tucson, AZ
- 3:45 **1823** Efficacy of probiotics for improved honey bee colony health. **Ryan Schwarz** (ryan.schwarz@ars.usda.gov)<sup>1</sup>, Jay Evans<sup>1</sup>, and Nancy Moran<sup>2</sup>, <sup>1</sup>USDA - ARS, Beltsville, MD, <sup>2</sup>The Univ. of Texas, Austin, TX
- 4:00 **1824** Remote sensing of nutrient-induced host plant susceptibility and biotic stress responses. **Christian Nansen** (chnansen@ucdavis.edu), Univ. of California, Davis, CA
- 4:15 **1825** Crop rotation and plant nutrition modulate crop-pest interactions: Evidence from ecoinformatics datasets. **Jay Rosenheim** (jayschheim@ucdavis.edu)<sup>1</sup>, Matthew Meisner<sup>1</sup>, and Andrew Forbes<sup>2</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>Univ. of Iowa, Iowa City, IA
- 4:30 **Discussion**

## Symposium: Forest Insect Invasions in a Changing Climate: Mechanisms and Risks

### Room W224 D (Convention Center)

**Moderators and Organizers:** Dylan Parry<sup>1</sup>, Christelle Robinet<sup>2</sup>, and Patrick Tobin<sup>3</sup>, <sup>1</sup>State Univ. of New York, Syracuse, NY, <sup>2</sup>INRA, Orléans, France, <sup>3</sup>Univ. of Washington, Seattle, WA

- 1:30 **1826** Forest insect invasion in a changing climate: An overview. **Dylan Parry** (dparry@esf.edu)<sup>1</sup>, Christelle Robinet<sup>2</sup>, and Patrick Tobin<sup>3</sup>, <sup>1</sup>State Univ. of New York, Syracuse, NY, <sup>2</sup>INRA, Orléans, France, <sup>3</sup>Univ. of Washington, Seattle, WA
- 1:45 **1827** Adoption of novel hosts following a climatically induced range expansion of mountain pine beetle. **Nadir Erbilgin** (erbilgin@ualberta.ca), Univ. of Alberta, Edmonton, AB, Canada
- 2:00 **1828** Potential responses of the invasive European woodwasp, *Sirex noctilio*, to a warming world. **José Villacide** (jvillacide@bariloche.inta.gov.ar), Victoria Lantschner, and Juan C. Corley, National Agricultural Technology Institute, Bariloche, Argentina
- 2:15 **1829** The range expansion of the pine processionary moth in a changing world: How a well understood multifactorial process could tangle up. **Mathieu Laparie** (mathieu.laparie@orleans.inra.fr), Christelle Robinet, Jérôme Rousselet, and Alain Roques, INRA, Orléans, France
- 2:30 **1830** The opening and closing of climatic envelopes in the gypsy moth invasion of North America. **Kristine Grayson** (kgrayson@richmond.edu)<sup>1</sup>, Lily Thompson<sup>2</sup>, Trevor Faske<sup>2</sup>, Patrick Tobin<sup>3</sup>, Christopher Friedline<sup>2</sup>, Andrew Eckert<sup>2</sup>, Dylan Parry<sup>4</sup>, and Derek Johnson<sup>2</sup>, <sup>1</sup>Univ. of Richmond, Richmond, VA, <sup>2</sup>Virginia Commonwealth Univ., Richmond, VA, <sup>3</sup>Univ. of Washington, Seattle, WA, <sup>4</sup>State Univ. of New York, Syracuse, NY
- 2:45 **1831** Spread and pathway modelling to support pest risk assessment under global change. **Wopke van der Werf** (wopke.vanderwerf@wur.nl)<sup>1</sup>, Bob Douma<sup>1</sup>, Christelle Robinet<sup>2</sup>, Lia Hemerik<sup>1</sup>, and Monique Mourits<sup>1</sup>, <sup>1</sup>Wageningen Univ. and Research Centre, Wageningen, Netherlands, <sup>2</sup>INRA, Orléans, France
- 3:00 **BREAK**
- 3:15 **1832** Brown marmorated stink bug: The invasion potential under current and future climates. **Darren Kriticos** (darren.kriticos@csiro.au)<sup>1</sup>, Hernando Acosta<sup>2</sup>, John M. Kean<sup>3</sup>, Senait Senay<sup>4</sup>, and Craig Phillips<sup>3</sup>, <sup>1</sup>CSIRO, Canberra, Australia, <sup>2</sup>Ministry of Primary Industries, Wellington, New Zealand, <sup>3</sup>AgResearch Ltd, Christchurch, New Zealand, <sup>4</sup>Lincoln Univ., Canterbury, New Zealand
- 3:30 **1833** The International Pest Risk Research Group: Developing and promoting improved methods for pest risk modelling and mapping. **Richard Baker** (richard.baker@fera.gsi.gov.uk)<sup>1</sup>, Frank Koch<sup>2</sup>, Darren Kriticos<sup>3</sup>, Amy C. Morey<sup>4</sup>, and Robert Venette<sup>5</sup>, <sup>1</sup>The Food and Environmental Research Agency, York, United Kingdom, <sup>2</sup>USDA - Forest Service, Research Triangle Park, NC, <sup>3</sup>CSIRO, Canberra, Australia, <sup>4</sup>Univ. of Minnesota, St. Paul, MN, <sup>5</sup>USDA - Forest Service, St. Paul, MN



3:45 **1834** Impacts of climate change on habitat suitability for invasive alien species: Support for the Mix-Master hypothesis? **Robert Venette** (rvenette@fs.fed.us)<sup>1</sup>, Frank Koch<sup>2</sup>, Denys Yemshanov<sup>3</sup>, and Kevin M. Potter<sup>4</sup>, <sup>1</sup>USDA - Forest Service, St. Paul, MN, <sup>2</sup>USDA - Forest Service, Research Triangle Park, NC, <sup>3</sup>Natural Resources Canada, Sault Ste. Marie, ON, Canada, <sup>4</sup>North Carolina State Univ., Research Triangle Park, NC

## Symposium: Hitchhikers in Florida: History and Control

### Room W224 H (Convention Center)

**Moderators and Organizers:** Vivek Kumar<sup>1</sup> and Garima Kakkar<sup>2</sup>, <sup>1</sup>Univ. of Florida, Apopka, FL, <sup>2</sup>Fort Lauderdale Research & Education Center, Davie, FL

1:30 **1835** History of alien invasive arthropod detections in Florida. **Norman Leppla** (nleppa@ufl.edu)<sup>1</sup>, J. Howard Frank<sup>1</sup>, Micheal Thomas<sup>2</sup>, and Paul Skelley<sup>3</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Florida Dept. of Agriculture and Consumer Services, Gainesville, FL, <sup>3</sup>Florida State Collection of Arthropods, Gainesville, FL

2:00 **1836** Introduced urban pests in Florida. Roberto Pereira and **Philip G. Koehler** (pgk@ufl.edu), Univ. of Florida, Gainesville, FL

2:15 **1837** Unseen hitchhikers to Florida: Entomophilic nematodes. **Robin Giblin-Davis** (giblin@ufl.edu)<sup>1</sup>, Natsumi Kanzaki<sup>2</sup>, and Kerrie Davies<sup>3</sup>, <sup>1</sup>Univ. of Florida, Davie, FL, <sup>2</sup>Forestry and Forest Products Research Institute, Tsukuba, Japan, <sup>3</sup>Univ. of Adelaide, Adelaide, Australia

2:30 **1838** Florida's exotic snails and slugs. **John L. Capinera** (capinera@ufl.edu), Univ. of Florida, Gainesville, FL

2:45 **1839** Florida exotic whitefly invaders from the last decade. **Cindy L. McKenzie** (cindy.mckenzie@ars.usda.gov)<sup>1</sup>, Aaron Dickey<sup>2</sup>, Ian Stocks<sup>3</sup>, Vivek Kumar<sup>4</sup>, and Lance Osborne<sup>4</sup>, <sup>1</sup>USDA - ARS, Ft. Pierce, FL, <sup>2</sup>USDA - ARS, Clay Center, NE, <sup>3</sup>Florida Dept. of Agriculture and Consumer Services, Gainesville, FL, <sup>4</sup>Univ. of Florida, Apopka, FL

### 3:00 BREAK

3:15 **1840** Banker plants: Using a systems approach for dealing with exotic invasives in Florida. **Lance Osborne** (lsoosborn@ufl.edu)<sup>1</sup>, Vivek Kumar<sup>1</sup>, Garima Kakkar<sup>2</sup>, and Cindy L. McKenzie<sup>3</sup>, <sup>1</sup>Univ. of Florida, Apopka, FL, <sup>2</sup>Fort Lauderdale Research & Education Center, Davie, FL, <sup>3</sup>USDA - ARS, Ft. Pierce, FL

3:30 **1841** History, biology, ecology, behavior, and management of redbay beetle (*Xyloborus glabratus*) and other non-native ambrosia beetles in Florida. **Russell Mizell** (rfmizell@ufl.edu), Univ. of Florida, Quincy, FL

3:45 **1842** Biocontrol in Florida using herbivores, parasitoids, and predators. **Eric Rohrig** (eric.rohrig@freshfromflorida.com)<sup>1</sup> and J. Howard Frank<sup>2</sup>, <sup>1</sup>Florida Dept. of Agriculture and Consumer Services, Gainesville, FL, <sup>2</sup>Univ. of Florida, Gainesville, FL

4:00 **1843** Biology, behavior, and management of chilli thrips, and other invasive thrips (Thysanoptera: Thripidae) in south Florida. **Vivek Kumar** (vivekiari@ufl.edu)<sup>1</sup>, Garima Kakkar<sup>2</sup>, Cindy L. McKenzie<sup>3</sup>, Dakshina Seal<sup>4</sup>, and Lance Osborne<sup>1</sup>, <sup>1</sup>Univ. of Florida, Apopka, FL, <sup>2</sup>Fort Lauderdale Research & Education Center, Davie, FL, <sup>3</sup>USDA - ARS, Ft. Pierce, FL, <sup>4</sup>Univ. of Florida, Homestead, FL

4:15 **1844** Biology and control of Mexican bromeliad weevil in Florida. **Ronald D. Cave** (rdcave@ufl.edu)<sup>1</sup> and Teresa M. Cooper<sup>2</sup>, <sup>1</sup>Univ. of Florida, Ft. Pierce, FL, <sup>2</sup>Univ. of Florida, Gainesville, FL

4:30 **1845** Application of RNA interference (RNAi) as an invasive pest control strategy in Florida. **Robert Shatters** (robert.shatters@ars.usda.gov)<sup>1</sup>, John Ramos<sup>1</sup>, Ritesh Jain<sup>2</sup>, Kasie Sturgeon<sup>2</sup>, Charles A. Powell<sup>2</sup>, William Dawson<sup>3</sup>, Siddarame Gowda<sup>3</sup>, Magali Grando<sup>4</sup>, Cássia Ceccon<sup>4</sup>, and Dov Borovsky<sup>1</sup>, <sup>1</sup>USDA - ARS, Ft. Pierce, FL, <sup>2</sup>Univ. of Florida, Ft. Pierce, FL, <sup>3</sup>Univ. of Florida, Lake Alfred, FL, <sup>4</sup>Univ. of Passo Fundo, Passo Fundo, Brazil

## Symposium: No More Invasive Insect Species: Is Quarantine the Answer?

### West Hall F4 (WF4) (Convention Center)

**Moderators and Organizers:** Aziz Ajlan<sup>1</sup>, Khalid Alhudaib<sup>2</sup>, and J. R. Faleiro<sup>3</sup>, <sup>1</sup>King Faisal Univ., Jeddah, Saudi Arabia, <sup>2</sup>King Faisal Univ., Hofuf, Saudi Arabia, <sup>3</sup>Ministry of Agriculture, Al-Hassa, Saudi Arabia

1:30 **1846** Application of qualitative and quantitative quarantine methods for the management of red palm weevil, *Rhynchophorus ferrugineus* Olivier (Curculionidae: Coleoptera), in date palm farms. **Polana S. P. V. Vidyasagar** (vidyasagar49@yahoo.com), King Saud Univ., Riyadh, Saudi Arabia

2:00 **1847** Challenges in prevention of borers' invasion. **Victoria Soroker** (sorokerv@volcani.agri.gov.il)<sup>1</sup>, Yuval Cohen<sup>1</sup>, A. Hetzroni<sup>1</sup>, and Pompeo Suma<sup>2</sup>, <sup>1</sup>Agricultural Research Organisation, Bet-Dagan, Israel, <sup>2</sup>Univ. of Catania, Catania, Italy

2:30 **1848** Evaluation of some insecticides for the control of the African bollworm, *Helicoverpa armigera* Hübner (Lepidoptera: Noctuidae), on sorghum in the rain-fed and irrigated areas in the Sudan. **Elnayer Suliman** (elnayer\_s@hotmail.com), Gedarif Research Station, Sudan

### 2:45 BREAK

3:15 **1849** Diptera associated with citrus in the plain of Mitidja East (Ain Taya, Algeria). **Faiza Marniche** (fexena@hotmail.fr)<sup>1</sup>, Amel Milla<sup>1</sup>, and Salaheddine Doumandji<sup>2</sup>, <sup>1</sup>National Veterinary School, El Alia, Algeria, <sup>2</sup>National School of Agronomy, El Harrach, Algeria

3:30 **1850** Implicit health consequences of the 2012 floods in Rivers State. **Mekeu Noutcha** (naemekeu@yahoo.com) and F. Nwoko-Omere, Univ. of Port Harcourt, Rivers State, Nigeria

3:45 **Discussion**



**Symposium: The Role of National, Regional, and International Plant Protection Organizations to Prevent the Introduction and Spread of Plant Pests**

**Room W224 F (Convention Center)**

**Moderators and Organizers:** Lisa Neven<sup>1</sup> and Rebecca Lee<sup>2</sup>, <sup>1</sup>USDA - ARS, Wapato, WA, <sup>2</sup>North American Plant Protection Organization, Ontario, ON, Canada

- 1:30 **1851** Inter-organizational collaboration to protect plant resources while facilitating trade. Rebecca Lee<sup>1</sup> and **Stephanie Bloem** (sbloem.nappo@gmail.com)<sup>2</sup>, <sup>1</sup>North American Plant Protection Organization, Ontario, ON, Canada, <sup>2</sup>North American Plant Protection Organization, Raleigh, NC
- 1:45 **1852** Entomology in support of plant health – role of EPPO. **Philippe Reynaud** (philippe.reynaud@anses.fr)<sup>1</sup> and Françoise Petter<sup>2</sup>, <sup>1</sup>ANSES, Montferrier-sur-Lez, France, <sup>2</sup>European and Mediterranean Plant Protection Organization, Paris, France
- 2:00 **1853** Wanted, dead or alive non-viable: The role of regulation in keeping pest risk off New Zealand's shores. **Joanne Wilson** (joanne.wilson@mpi.govt.nz) and Stephen Butcher, Ministry for Primary Industries, Wellington, New Zealand
- 2:15 **1854** Inter-American cooperation in plant protection. **Lourdes Fonalleras** (lourdes.fonalleras@iica.int)<sup>1</sup>, Carol Thomas<sup>2</sup>, and Robert Ahern<sup>3</sup>, <sup>1</sup>Inter-American Institute for Cooperation on Agriculture, Montevideo, Uruguay, <sup>2</sup>Inter-American Institute for Cooperation on Agriculture, Warrens, Barbados, <sup>3</sup>Inter-American Institute for Cooperation on Agriculture, San José, Costa Rica
- 2:30 **1855** The emergency response mechanism as a tool to preventing spread of plant pests. **Macleán Vaqalo** (macleavn@spc.int) and Josua Wainiqolo, Secretariat of the Pacific Community, Suva, Fiji
- 2:45 **1856** Relevant programs to prevent the introduction and spread of plant pests: The case of Mexico. **Francisco Trujillo** (trujillo@senasica.gob.mx), Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food, Mexico City, Mexico
- 3:00 **BREAK**
- 3:15 **1857** The role of research in support of regulatory decisions. **Lisa Neven** (lisa.neven@ars.usda.gov), USDA - ARS, Wapato, WA
- 3:30 **1858** Fighting invasive species through training. **Carlos Urías** (svegetal@oirsa.org), Regional International Organization for Agricultural Health, San Salvador, El Salvador
- 3:45 **1859** Achieving Aichi biodiversity targets: Prevention, control, or eradication of invasive alien species that threaten biodiversity, agricultural production, and human well-being. **Junko Shimura** (junko.shimura@cbd.int), Secretariat of the Convention on Biological Diversity, Montréal, QC, Canada

- 4:00 **1860** International efforts to develop phytosanitary treatment standards. **Guy J. Hallman** (g.j.hallman@iaea.org) and Rui Pereira, Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, Vienna, Austria
- 4:15 **1861** An alien buried in the snow: Risk assessment of invasive alien species in the Canadian context. **Thierry Poiré** (thierry.poire@inspection.gc.ca), Canadian Food Inspection Agency, Ottawa, ON, Canada
- 4:30 **1862** How to build consensus globally to prevent the introduction and spread of plant pests while facilitating safe trade. Jingyuan Xia, and **Craig Fedchock** (craig.fedchock@fao.org), International Plant Protection Convention, Rome, Italy
- 4:45 **Panel Discussion**

**Symposium: Forensic Entomology without Borders: Uniting the Worldwide Forensic Entomology Community**

**Room W222 B (Convention Center)**

**Moderators and Organizers:** Michelle Sanford<sup>1</sup>, Adrienne Brundage<sup>2</sup>, Meaghan Pimsler<sup>2</sup>, and Charity Owings<sup>3</sup>, <sup>1</sup>Harris County Institute of Forensic Sciences, Houston, TX, <sup>2</sup>Texas A&M Univ., College Station, TX, <sup>3</sup>Indiana Univ.-Purdue Univ., Indianapolis, IN

- 1:30 **1863** Multiple independent discoveries, paradigm shifts, and testing the facilitation hypothesis of ecological succession. **J. P. Michaud** (jean-philippe.michaud@rcmp-grc.gc.ca)<sup>1</sup>, Gaétan Moreau<sup>2</sup>, and Kenneth Schoenly<sup>3</sup>, <sup>1</sup>Royal Canadian Mounted Police, Airdrie, AB, Canada, <sup>2</sup>Univ. of Moncton, Moncton, NB, Canada, <sup>3</sup>California State Univ., Turlock, CA
- 1:45 **1864** The problem of temperature in forensic entomology casework. **Michelle Sanford** (michelle.sanford@ifs.hctx.net), Harris County Institute of Forensic Sciences, Houston, TX
- 2:00 **1865** History, accomplishments, and challenges of forensic entomology in Australia. **James Wallman** (jwallman@uow.edu.au), Univ. of Wollongong, Wollongong, Australia
- 2:15 **1866** Phenotypic plasticity in necrophagous flies – a (serious) source of error in forensic entomology? **Jens Amendt** (amendt@em.uni-frankfurt.de), Institute for Forensic Medicine, Frankfurt, Germany
- 2:30 **1867** High resolution gene expression analysis for estimating the age of blow fly pupae. **Barbara Zajac** (zajac@med.uni-frankfurt.de), University Hospital of Frankfurt, Frankfurt, Germany
- 2:45 **1868** Identification of necrophagous insects in Brazil: Status and challenges. **Patricia J. Thyssen** (thyssenpj@yahoo.com.br), Univ. of Campinas, Campinas, Brazil
- SD1869** Bacterial fauna associated with forensically important flies in Thailand. Tarinee Chaiwong<sup>1</sup>, T. Srivoramas<sup>1</sup>, M. Sueabsamran Panya<sup>1</sup>, P. Panomket<sup>1</sup>, Michelle Sanford<sup>2</sup>, and **Adrienne Brundage** (adrienne.brundage@tamu.edu)<sup>3</sup>, <sup>1</sup>Ubon Ratchathani Univ., Ubon Ratchathani, Thailand, <sup>2</sup>Harris County Institute of Forensic Sciences, Houston, TX, <sup>3</sup>Texas A&M Univ., College Station, TX

3:00 **BREAK AND POSTER SESSION**



- 3:15 **1870** A comparative study of the decomposition and insect succession pattern between a human corpse and animal carcasses. **Jiangfeng Wang** (jfwang@suda.edu.cn), Soochow Univ., Suzhou, China
- 3:30 **1871** Mediators of population genetic structure in Indiana blow flies (Diptera: Calliphoridae). **Charity Owings** (charityowings@gmail.com) and Christine Picard, Indiana Univ.-Purdue Univ., Indianapolis, IN
- 3:45 **1872** The adult fly: An underestimated tool in forensic entomology. **Victoria Bernhardt** (victoria.bernhardt@hotmail.de), Institute for Forensic Medicine, Frankfurt, Germany
- 4:00 **1873** Entomotoxicology: Development and validation of CG-MS and LC/MS-MS methods for nicotine, metanfetamine, endosulfan, and coumatetralyl detection in blowflies. **Paola Magni** (doc.magni@gmail.com)<sup>1</sup>, Marco Pazzi<sup>2</sup>, Marco Vincenti<sup>2</sup>, and Ian Dadour<sup>3</sup>, <sup>1</sup>Murdoch Univ., Crawley, Australia, <sup>2</sup>Univ. of Turin, Torino, Italy, <sup>3</sup>Boston Univ., Boston, MA

### Symposium: Reducing Transmission Rates of Infectious Diseases by Targeting Mosquito Olfaction

#### Room W331 A (Convention Center)

**Moderators and Organizers:** Kostas Iatrou<sup>1</sup> and Walter S. Leal<sup>2</sup>, <sup>1</sup>National Centre for Scientific Research, Athens, Greece, <sup>2</sup>Univ. of California, Davis, CA

- 1:30 **1874** Neurogenetics of mosquito behavior. **Leslie Vosshall** (leslie@mail.rockefeller.edu), The Rockefeller Univ., New York, NY
- 2:00 **1875** Behavioral control of mosquitoes using odorants. **Anandasankar Ray** (anand.ray@ucr.edu), Univ. of California, Riverside, CA
- 2:15 **1876** Olfaction gene expression changes in three behavioral states of the yellow fever mosquito. **Luciano V. Cosme** (cosme.simple@gmail.com)<sup>1</sup>, Craig J. Coates<sup>2</sup>, and Michel A. Slotman<sup>2</sup>, <sup>1</sup>Yale Univ., New Haven, CT, <sup>2</sup>Texas A&M Univ., College Station, TX
- 2:30 **1877** Prospecting of olfactory proteins from the American trypanosomiasis vector *Rhodnius prolixus* (Heteroptera: Reduviidae). **Ana C. A. Melo** (anamelo@iq.ufrj.br)<sup>1</sup>, Daniele S. Oliveira<sup>2</sup>, Thiago A. Franco<sup>1</sup>, Nathalia F. Brito<sup>1</sup>, Pingxi Xu<sup>2</sup>, Monica F. Moreira<sup>1</sup>, Marcia R. Soares<sup>1</sup>, and Walter S. Leal<sup>2</sup>, <sup>1</sup>Federal Univ. of Rio de Janeiro, Rio de Janeiro, Brazil, <sup>2</sup>Univ. of California, Davis, CA
- 2:45 **1878** Inhibition of insect odorant receptor function through antagonism of the odorant receptor co-receptor subunit. **Charles W. Luetje** (cluetje@med.miami.edu), Devin Kepchia, and Sissi Chen, Univ. of Miami, Miami, FL
- 3:00 BREAK**
- 3:15 **1879** Mosquito anosmia-inducing and odor perception-enhancing compounds of natural origin targeting Orco function for malaria transmission control. **Kostas Iatrou** (iatrou@bio.demokritos.gr) and Panagiota Tsitoura, National Centre for Scientific Research, Athens, Greece

- 3:30 **1880** The role of grass volatiles in oviposition site selection by malaria mosquitoes. **Rickard Ignell** (rickard.ignell@slu.se), Swedish Univ. of Agricultural Sciences, Alnarp, Sweden
- 3:45 **1881** Exploiting the evolutionary dynamics of chemosensation in mosquitoes for vector management. **Zainulabeuddin Syed** (zainulabeuddin.syed.5@nd.edu), Univ. of Notre Dame, South Bend, IN
- 4:00 **1882** Mosquito olfaction: Reception of semiochemicals of medical importance. **Walter S. Leal** (wsleal@ucdavis.edu), Univ. of California, Davis, CA

### Symposium: Ticks Are Different: The Impact of Tick Biology on Their Role As Vectors

#### Room W224 A (Convention Center)

**Moderators and Organizers:** Nicholas Ogden<sup>1</sup> and Gabriele Margos<sup>2</sup>, <sup>1</sup>Public Health Agency of Canada, Saint-Hyacinthe, QC, Canada, <sup>2</sup>Bavarian Health and Food Safety Authority, Oberschleissheim, Germany

- 1:30 **1883** Ticks are different. **Annapaola Rizzoli** (annapaola.rizzoli@fmach.it), Edmund Mach Foundation, Trento, Italy
- 2:00 **1884** Interactions among *Ixodes scapularis*-borne pathogens in the United States. **Maria Diuk-Wasser** (mad2256@columbia.edu), Columbia Univ., New York, NY
- 2:30 **1885** Host specialization in ticks and the circulation of tick-borne disease agents. **Karen McCoy** (karen.mccoy@ird.fr), National Center for Scientific Research, Montpellier, France
- 2:45 **1886** Presentation withdrawn
- 3:00 BREAK**
- 3:15 **1887** The role of pathogen genomics in assessing tick-borne pathogen evolutionary dynamics. **Giovanna Carpi** (gcarpi1@jhu.edu), Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
- 3:30 **1888** Evidence for host-genotype associations of *Borrelia burgdorferi sensu stricto*. **Samir Mechai** (samir.mechai@umontreal.ca), Univ. of Montréal, Québec, QC, Canada
- 3:45 **Discussion**
- SD1889** Pathogenic bacteria in *Ixodes uriae* in Newfoundland and Labrador. **Hannah Munro** (hannah.munro@mun.ca), Memorial Univ. of Newfoundland, St. John's, NF, Canada
- SD1890** *Borrelia bavariensis* – vector adaptation and species invasion. Fanny Gatzmann<sup>1</sup>, Noemie Becker<sup>2</sup>, Dirk Metzler<sup>2</sup>, Ai Takano<sup>3</sup>, Hiroki Kawabata<sup>4</sup>, Andreas Sing<sup>5</sup>, Melissa Rieger<sup>5</sup>, **Gabriele Margos** (gmargos1@gmail.com)<sup>5</sup>, and Volker Fingerle<sup>5</sup>, <sup>1</sup>German Cancer Research Center, Heidelberg, Germany, <sup>2</sup>Ludwig Maximilians Univ., München, Germany, <sup>3</sup>Yagamuchi Univ., Yagamuchi, Japan, <sup>4</sup>National Institute of Infectious Diseases, Tokyo, Japan, <sup>5</sup>Bavarian Health and Food Safety Authority, Oberschleissheim, Germany



**SD1891** Spatial heterogeneity in *Ixodes scapularis* distribution in the Lyme disease emergence zone in southern Canada. **Marion Ripoche** (marion.ripoche@umontreal.ca), Univ. of Montréal, Saint-Hyacinthe, QC, Canada

**SD1892** Distribution of ticks and the risk of Lyme disease and other tick-borne pathogens of public health significance in Ontario, Canada. **Katie Clow** (kclow@uoguelph.ca), Univ. of Guelph, Guelph, ON, Canada

**SD1893** eTick: A Lyme disease surveillance and public health information tool. **Jules Koffi** (jules.konan.koffi@phac-aspc.gc.ca)<sup>1</sup>, Jade Savage<sup>2</sup>, Karine Thivierge<sup>3</sup>, L. Robbin Lindsay<sup>4</sup>, Catherine Bouchard<sup>5</sup>, and Nicholas Ogden<sup>1</sup>, <sup>1</sup>Public Health Agency of Canada, Saint-Hyacinthe, QC, Canada, <sup>2</sup>Bishop's Univ., Sherbrooke, QC, Canada, <sup>3</sup>National Institute of Public Health of Québec, Sainte-Anne-de-Bellevue, QC, Canada, <sup>4</sup>Public Health Agency of Canada, Winnipeg, MB, Canada, <sup>5</sup>Univ. of Montréal, Saint-Hyacinthe, QC, Canada

4:15 **Poster Session**

### Symposium: Advances in Ant Systematics: Global Sampling, New Phylogenetic Methods, and Major Taxonomic Changes

**Room W231 A (Convention Center)**

**Moderators and Organizers:** Andrea Lucky<sup>1</sup> and Philip S. Ward<sup>2</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Univ. of California, Davis, CA

1:30 **1894** Advances in our understanding of ant taxonomy and evolution. **Philip Ward** (psward@ucdavis.edu), Univ. of California, Davis, CA

1:45 **1895** Ant evolution in the age of genomics. **Corrie Moreau** (cmoreau@fieldmuseum.org), The Field Museum of Natural History, Chicago, IL

2:00 **1896** Fossil ants and the dawn of phylogenomics. **John S. LaPolla** (jlapolla@towson.edu), Towson Univ., Towson, MD

2:15 **1897** Reconciling global macroecological pattern and macroevolutionary processes in ant biodiversity. **Evan Economo** (evaneconomo@gmail.com)<sup>1</sup>, Benoit Guenard<sup>2</sup>, Michael Weiser<sup>3</sup>, and Nitish Narula<sup>1</sup>, <sup>1</sup>Okinawa Institute of Science and Technology, Onna, Japan, <sup>2</sup>Univ. of Hong Kong, Hong Kong, China, <sup>3</sup>Univ. of Oklahoma, Norman, OK

2:30 **1898** Pavement ants to population genomics: Bringing citizen science into the molecular era. **Andrea Lucky** (alucky@ufl.edu)<sup>1</sup>, Tyler Vitone<sup>1</sup>, Rob R. Dunn<sup>2</sup>, Caroline Storer<sup>1</sup>, Jiri Hulcr<sup>1</sup>, Stuart McDaniel<sup>1</sup>, and Adam Payton<sup>1</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>North Carolina State Univ., Raleigh, NC

2:45 **1899** Phylogenomic methods advance our understanding of the evolution of formicine ants. **Bonnie Blaimer** (bonnieblaimer@gmail.com)<sup>1</sup>, Seán Brady<sup>1</sup>, Ted Schultz<sup>1</sup>, Brian L. Fisher<sup>2</sup>, and Philip Ward<sup>3</sup>, <sup>1</sup>Smithsonian Institution National Museum of Natural History, Washington, DC, <sup>2</sup>California Academy of Sciences, San Francisco, CA, <sup>3</sup>Univ. of California, Davis, CA

**3:00 BREAK**

3:15 **1900** Biodiversity genomics and the future of ant systematics. **Michael Branstetter** (mgbranstetter@gmail.com), Univ. of Utah, Salt Lake City, UT

3:30 **1901** Tropical cloud forest ants: Who are they and where did they come from? **John Longino** (jacklongino@gmail.com), Univ. of Utah, Salt Lake City, UT

3:45 **1902** Male ants: Past, present, and prospects. **Brendon Boudinot** (boudinotb@gmail.com), Univ. of California, Davis, CA

4:00 **1903** It is time for taxonomists to embrace morphology. **Flavia Esteves** (flaviaesteves@gmail.com), California Academy of Sciences, San Francisco, CA

4:15 **1904** Advances in taxonomy and evolution of the Ectatomminae. **Rodrigo Feitosa** (rsmfeitosa@gmail.com), Gabriela Camacho, and Marcio R. Pie, Federal Univ. of Paraná, Curitiba, Brazil

4:30 **1905** Resolving Dorylinae: Promises and pitfalls of phylogenomics. **Marek L. Borowiec** (mlborowiec@ucdavis.edu), Univ. of California, Davis, CA

4:45 **1906** Evolution, biogeography, and diversification of the genus *Terataner*. **Francisco Hita Garcia** (fhitagarcia@gmail.com)<sup>1</sup> and Evan Economo<sup>2</sup>, <sup>1</sup>Hessian State Museum, Darmstadt, Germany, <sup>2</sup>Okinawa Institute of Science and Technology, Onna, Japan

5:00 **1907** The evolution of biomechanical complexity during the global radiation of *Strumigenys*. **Doug Booher** (dbooher@ucla.edu)<sup>1</sup> and Evan Economo<sup>2</sup>, <sup>1</sup>Univ. of California, Los Angeles, CA, <sup>2</sup>Okinawa Institute of Science and Technology, Onna, Japan

5:15 **1908** Speciation patterns and evolution of convergently evolved obligate social parasites of fungus-growing ants. **Christian Rabeling** (crabeling@gmail.com)<sup>1</sup>, Mauricio Bacci<sup>2</sup>, Ted Schultz<sup>3</sup>, and Martin Bollazzi<sup>4</sup>, <sup>1</sup>Univ. of Rochester, Rochester, NY, <sup>2</sup>São Paulo State Univ., São Paulo, Brazil, <sup>3</sup>Smithsonian Institution National Museum of Natural History, Washington, DC, <sup>4</sup>Univ. of the Republic, Montevideo, Uruguay

### Symposium: Phylogeny and Evolution of Weevils (Coleoptera: Curculionoidea): A Symposium in Honor of Guillermo "Willy" Kuschel

**West Hall F3 (WF3) (Convention Center)**

**Moderators and Organizers:** Duane D. McKenna and Dave Clarke, Univ. of Memphis, Memphis, TN

1:30 **1909** The 1,000 Curculionidae Phylogeny and Evolution Project (1K Weevils): An overview and preliminary results. **Duane D. McKenna** (dmckenna@memphis.edu), Univ. of Memphis, Memphis, TN

2:00 **1910** Towards a comprehensive view of weevil morphological evolution: Prospects and progress from the 1K Weevils project. **Dave Clarke** (djclarke@memphis.edu)<sup>1</sup>, Adriana Marvaldi<sup>2</sup>, Rolf Oberprieler<sup>3</sup>, and Duane D. McKenna<sup>1</sup>, <sup>1</sup>Univ. of Memphis, Memphis, TN, <sup>2</sup>National Univ. of La Plata, Buenos Aires, Argentina, <sup>3</sup>CSIRO, Canberra, Australia



TUESDAY



- 2:15 **1911** A backbone Phylogeny of Curculionidae from adult and larval morphology: Where do we stand after improving taxon and character sampling? **Adriana E. Marvaldi** (marvaldi@fcnym.unlp.edu.ar)<sup>1</sup>, Dave Clarke<sup>2</sup>, Rolf Oberprieler<sup>3</sup>, Miguel Alonso-Zarazaga<sup>4</sup>, Robert D. Anderson<sup>5</sup>, Roberto Caldara<sup>6</sup>, Steve Davis<sup>7</sup>, Jiri Hulcr<sup>8</sup>, Andrew Johnson<sup>9</sup>, Analia Lanteri<sup>9</sup>, Christopher Lyal<sup>10</sup>, Massimo Meregalli<sup>11</sup>, Marek Wanat<sup>12</sup>, and Duane D. McKenna<sup>2</sup>, <sup>1</sup>National Univ. of La Plata, Buenos Aires, Argentina, <sup>2</sup>Univ. of Memphis, Memphis, TN, <sup>3</sup>CSIRO, Canberra, Australia, <sup>4</sup>National Museum of Natural History, Madrid, Spain, <sup>5</sup>Canadian Museum of Nature, Ottawa, ON, Canada, <sup>6</sup>Univ. of Milan, Milano, Italy, <sup>7</sup>American Museum of Natural History, New York, NY, <sup>8</sup>Univ. of Florida, Gainesville, FL, <sup>9</sup>Univ. of La Plata, La Plata, Argentina, <sup>10</sup>The Natural History Museum, London, United Kingdom, <sup>11</sup>Univ. of Turin, Torino, Italy, <sup>12</sup>Univ. of Wroclaw, Wroclaw, Poland
- 2:30 **1912** The fossil record of weevils — separating facts from fiction. **Rolf Oberprieler** (rolf.oberprieler@csiro.au)<sup>1</sup> and Steve Davis<sup>2</sup>, <sup>1</sup>CSIRO, Canberra, Australia, <sup>2</sup>American Museum of Natural History, New York, NY
- 2:45 **1913** Preliminary look at the phylogeny of New Zealand weevils. **Richard A. B. Leschen** (leschenr@landcareresearch.co.nz)<sup>1</sup>, Talia Brav-Cubitt<sup>1</sup>, Thomas Buckley<sup>1</sup>, Samuel Brown<sup>2</sup>, Steve Davis<sup>3</sup>, and Natish Anand<sup>1</sup>, <sup>1</sup>Landcare Research, Auckland, New Zealand, <sup>2</sup>Lincoln Univ., Lincoln, New Zealand, <sup>3</sup>American Museum of Natural History, New York, NY
- SD1914** Weevil mitogenomics. **Conrad Gillett** (c.gillett@uea.ac.uk)<sup>1</sup>, Alex Crampton-Platt<sup>2</sup>, Martijn Timmermans<sup>3</sup>, Bjarte Jordal<sup>4</sup>, Brent Emerson<sup>5</sup>, and Alfried Vogler<sup>2,6</sup>, <sup>1</sup>Univ. of East Anglia, Anglia, United Kingdom, <sup>2</sup>The Natural History Museum, London, United Kingdom, <sup>3</sup>Vrije Univ., Amsterdam, Netherlands, <sup>4</sup>Univ. of Bergen, Bergen, Norway, <sup>5</sup>Institute of Natural Products and Argobiology, La Laguna, Spain, <sup>6</sup>Imperial College London, London, United Kingdom
- SD1915** Barcoding European weevils: The Molecular Weevil Identification Project. **André Schütte**<sup>1</sup>, Peter Stüben<sup>2</sup>, and **Jonas Astrin** (j.astrin.zfmk@uni-bonn.de)<sup>1</sup>, <sup>1</sup>Zoological Research Museum Alexander Koenig, Bonn, Germany, <sup>2</sup>Curculio Institute, Mönchengladbach, Germany
- SD1916** Taxonomy and evolution of New Zealand broad-nosed weevils (Coleoptera: Curculionidae: Entiminae). **Samuel Brown** (xsdjbx@gmail.com)<sup>1</sup>, Karen Armstrong<sup>2</sup>, Barbara Barratt<sup>3</sup>, Robert Cruickshank<sup>1</sup>, and Craig Phillips<sup>4</sup>, <sup>1</sup>Lincoln Univ., Lincoln, New Zealand, <sup>2</sup>Lincoln Univ., Christchurch, New Zealand, <sup>3</sup>AgResearch Ltd, Mosgiel, New Zealand, <sup>4</sup>AgResearch Ltd, Christchurch, New Zealand
- SD1917** Introductions and the potential for interspecies gene flow in endemic Galápagos weevils (Entiminae: Naupactini). **Andrea Sequeira** (asequeir@wellesley.edu), Flavia Mendonca de Souza, Sarah Pangburn, and Mary Kate Dornon, Wellesley College, Wellesley, MA
- SD1918** A phylogenetic approach to the aquatic weevil tribe Bagoini (Coleoptera: Curculionidae) using morphological characters of imagoes. Roberto Caldara<sup>1</sup>, Massimo Meregalli<sup>2</sup>, Charles W. O'Brien<sup>3</sup>, and **Lois B. O'Brien** (lbobrien@cox.net)<sup>3</sup>, <sup>1</sup>Univ. of Milan, Milano, Italy, <sup>2</sup>Univ. of Turin, Torino, Italy, <sup>3</sup>Univ. of Arizona, Tucson, AZ
- SD1919** Towards a reconstruction of the higher classification of the subfamily Ceutorhynchinae (Coleoptera: Curculionidae): A morphological approach. **Hiraku Yoshitake** (zoumushi@affrc.go.jp)<sup>1</sup>, Steve Davis<sup>2</sup>, and Enzo Colonnelli<sup>3</sup>, <sup>1</sup>National Institute for Agro-Environmental Sciences, Tsukuba, Japan, <sup>2</sup>American Museum of Natural History, New York, NY, <sup>3</sup>Rome, Italy
- 3:00 BREAK AND POSTER SESSION**
- 3:15 **1920** Primitive weevils. **Robert S. Anderson** (randerson@mus-nature.ca), Canadian Museum of Nature, Ottawa, ON, Canada
- 3:30 **1921** Evolution of Anthribidae: Which evidence describes the history of diversification? **José Ricardo Mermudes** (jrmermudes@gmail.com) and Ingrid Mattos, Federal Univ. of Rio de Janeiro, Rio de Janeiro, Brazil
- 3:45 **1922** Phylogeny of Entiminae, with special reference to the tribe Naupactini. **Analia Lanteri** (alanteri@fcnym.unlp.edu.ar)<sup>1</sup>, María Guadalupe del Río<sup>2</sup>, Vanina Pereyra<sup>1</sup>, and Adriana Marvaldi<sup>3</sup>, <sup>1</sup>National Univ. of La Plata, La Plata, Argentina, <sup>2</sup>Museum of La Plata, La Plata, Argentina, <sup>3</sup>National Univ. of La Plata, Buenos Aires, Argentina
- 4:00 **1923** Host plant use and its impact on patterns of evolutionary diversification in the weevil subfamily Ceutorhynchinae (Curculionidae: Coleoptera). **Harald Letsch** (harald.letsch@univie.ac.at)<sup>1</sup>, Ariel Leib Leonid Friedman<sup>2</sup>, Enzo Colonnelli<sup>3</sup>, Duane D. McKenna<sup>4</sup>, and Hiraku Yoshitake<sup>5</sup>, <sup>1</sup>Univ. of Vienna, Vienna, Austria, <sup>2</sup>Tel Aviv Univ., Tel Aviv, Israel, <sup>3</sup>Rome, Italy, <sup>4</sup>Univ. of Memphis, Memphis, TN, <sup>5</sup>National Institute for Agro-Environmental Sciences, Tsukuba, Japan
- 4:15 **1924** Phylogenetics and evolution of Platypodinae. **Bjarte Jordal** (bjarte.jordal@um.uib.no), Univ. of Bergen, Bergen, Norway
- 4:30 **1925** Scolytinae relationships resolved: Genomic, morphological, and symbiont data. **Andrew Johnson** (ajj@ufl.edu)<sup>1</sup>, Duane D. McKenna<sup>2</sup>, Alan Lemmon<sup>3</sup>, Emily Lemmon<sup>3</sup>, and Jiri Hulcr<sup>1</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Univ. of Memphis, Memphis, TN, <sup>3</sup>Florida State Univ., Tallahassee, FL
- 4:45 **1926** Making sense of the Molytinae. **Christopher Lyal** (c.lyal@nhm.ac.uk), The Natural History Museum, London, United Kingdom
- 5:00 **1927** Towards a new concept of Cryptorhynchinae (Coleoptera: Curculionoidea). **Alexander Riedel** (riedel@smnk.de)<sup>1</sup>, Rene Tänzler<sup>2</sup>, Joan Pons<sup>3</sup>, and Michael Balke<sup>2</sup>, <sup>1</sup>State Museum of Natural History, Karlsruhe, Germany, <sup>2</sup>Bavarian State Collection of Zoology, Munich, Germany, <sup>3</sup>Mediterranean Institute for Advanced Studies, Esporles, Spain
- 5:15 **1928** Effects of insect-host interactions on the diversification of palm-associated weevils. **Bruno de Medeiros** (souzademedeiros@fas.harvard.edu) and Brian Farrell, Harvard Univ., Cambridge, MA



**Symposium: Progress in Insect Phylogenomics: The Scale and Complexity of Next-Gen Datasets and Analyses**

**Room W315 A (Convention Center)**

**Moderators and Organizers:** Akito Y. Kawahara<sup>1</sup>, Jessica Ware<sup>2</sup>, Michelle Trautwein<sup>3</sup>, and David K. Yeates<sup>4</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>American Museum of Natural History, New York, NY, <sup>3</sup>California Academy of Sciences, San Francisco, CA, <sup>4</sup>CSIRO, Acton, Australia

- 1:30 **1929** Adaptive radiation in morphologically unremarkable scorpions. **Lauren Esposito** (espositola@gmail.com), California Academy of Sciences, San Francisco, CA
- 1:45 **1930** Divergence time methodology for big datasets: Fossil calibrations and FASTDATE. Tomas Flouri<sup>1</sup> and **Manpreet Kohli** (mkk24@njit.edu)<sup>2</sup>, <sup>1</sup>Heidelberg Institute of Theoretical Studies, Crete, Greece, <sup>2</sup>Rutgers, The State Univ. of New Jersey, Newark, NJ
- 2:00 **1931** Genome evolution and phylogenomics of heritable bacterial symbionts in insects. **Gordon Bennett** (gordon.bennett@utexas.edu), Univ. of Hawai'i, Honolulu, HI
- 2:15 **1932** Using transcriptome based phylogenomics to address previously intractable acalyprate fly phylogeny (Diptera: Cyclorrhapha). **Keith M. Bayless** (kmbayles@ncsu.edu)<sup>1</sup>, Karen Meusemann<sup>2</sup>, Michelle Trautwein<sup>3</sup>, and Brian M. Wiegmann<sup>1</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>CSIRO, Canberra, Australia, <sup>3</sup>California Academy of Sciences, San Francisco, CA
- 2:30 **1933** There is more than just phylogeny from the 1KITE. **Xin Zhou** (xinzhou@genomics.cn), BGI, Shenzhen, China
- 2:45 **1934** A Pool-Seq approach to integrate genome and transcriptome variation affecting male fitness in the 12-spotted skimmer, *Libellula pulchella*. **Ruud Schilder** (rjs360@psu.edu), Pennsylvania State Univ., University Park, PA
- 3:00 BREAK**
- 3:15 **1935** Fleas, flies, scorpionflies: Phylogenetic relationships of antliophora based on transcriptomics. **Karen Meusemann** (mail@karen-meusemann.de)<sup>1</sup>, David Yeates<sup>2</sup>, Bernhard Misof<sup>3</sup>, Frank Friedrich<sup>4</sup>, Rolf Beutel<sup>5</sup>, Katharina Schneeberg<sup>5</sup>, and Alexandros Vasilakopoulos<sup>3</sup>, <sup>1</sup>Univ. of Freiburg, Freiburg, Germany, <sup>2</sup>CSIRO, Australia, <sup>3</sup>Zoological Research Museum Alexander Koenig, Bonn, Germany, <sup>4</sup>Univ. of Hamburg, Hamburg, Germany, <sup>5</sup>Friedrich Schiller Univ., Jena, Germany
- 3:30 **1936** Model selection for phylogenomics. **Paul B. Frandsen** (paul.frandsen@rutgers.edu)<sup>1</sup>, Bernhard Misof<sup>2</sup>, Christoph Mayer<sup>2</sup>, and Karl Kjer<sup>3</sup>, <sup>1</sup>Smithsonian Institution, Herndon, VA, <sup>2</sup>Zoological Research Museum Alexander Koenig, Bonn, Germany, <sup>3</sup>Univ. of California, Davis, CA

- 3:45 **1937** Phylogeny of Lepidoptera utilizing transcriptomes and hybrid enrichment data. **Akito Y. Kawahara** (kawahara@flmnh.ufl.edu)<sup>1</sup>, Jesse Breinholt<sup>1</sup>, Karen Meusemann<sup>2</sup>, Andreas Zwick<sup>3</sup>, Charles Mitter<sup>3</sup>, Ralph Peters<sup>4</sup>, Karl Kjer<sup>5</sup>, and Bernhard Misof<sup>4</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>CSIRO, Canberra, Australia, <sup>3</sup>Univ. of Maryland, College Park, MD, <sup>4</sup>Zoological Research Museum Alexander Koenig, Bonn, Germany, <sup>5</sup>Univ. of California, Davis, CA
- 4:00 **1938** Morphology and phylogenomics: Two sides of the same medal. **Benjamin Wipfler** (bwipfle@gwdg.de), Friedrich Schiller Univ., Jena, Germany
- 4:15 **1939** Transodonata: What 1KITE has taught us about the evolution of dragonflies and damselflies. **Jessica Ware** (jware42@andromeda.rutgers.edu)<sup>1</sup>, Alexander Blanke<sup>2</sup>, Oliver Niehuis<sup>3</sup>, Karl M. Kjer<sup>4</sup>, Bernhard Misof<sup>3</sup>, and Carola Greve<sup>3</sup>, <sup>1</sup>American Museum of Natural History, New York, NY, <sup>2</sup>Univ. of Hull, Hull, United Kingdom, <sup>3</sup>Zoological Research Museum Alexander Koenig, Bonn, Germany, <sup>4</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ
- 4:30 **1940** Phylogenomics of the hemipteroid insect orders. **Kevin P. Johnson** (kjohnson@inhs.uiuc.edu), Univ. of Illinois, Champaign, IL
- 4:45 **1941** The phylogeny of Trichoptera: Coordinating big datasets. **Karl M. Kjer** (kjer@aesop.rutgers.edu)<sup>1</sup>, Paul B. Frandsen<sup>2</sup>, and Xin Zhou<sup>3</sup>, <sup>1</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, <sup>2</sup>Smithsonian Institution, Herndon, VA, <sup>3</sup>BGI, Shenzhen, China
- 5:00 **1942** Inferring the evolutionary history of wasps, ants, and bees from transcriptomic data (Insecta: Hymenoptera). **Oliver Niehuis** (o.niehuis.zfmk@uni-bonn.de)<sup>1</sup>, Karen Meusemann<sup>2</sup>, Alexander Donath<sup>1</sup>, Xin Zhou<sup>3</sup>, Bernhard Misof<sup>1</sup>, Ralph Peters<sup>1</sup>, Shalin Liu<sup>3</sup>, Malte Petersen<sup>1</sup>, Christoph Mayer<sup>1</sup>, Lars Krogmann<sup>4</sup>, and Lars Podsiadlowski<sup>5</sup>, <sup>1</sup>Zoological Research Museum Alexander Koenig, Bonn, Germany, <sup>2</sup>CSIRO, Canberra, Australia, <sup>3</sup>BGI, Shenzhen, China, <sup>4</sup>State Museum of Natural History, Stuttgart, Germany, <sup>5</sup>Univ. of Bonn, Bonn, Germany

**Symposium: Systematics and Diversity of Aquatic Beetles: An Emerging Model System in Evolutionary Biology**

**Room W223 A (Convention Center)**

**Moderator and Organizer:** Andrew Short, Univ. of Kansas, Lawrence, KS

- 1:30 **1943** Phylogenetics and diversification of the whirligig beetles (Coleoptera: Gyrrinidae): A role for sexual selection? **Grey Gustafson** (gtgustafson@gmail.com), Univ. of New Mexico, Albuquerque, NM
- 1:45 **1944** Sexual selection and diversification patterns in diving beetles (Coleoptera: Dytiscidae). **Kelly Miller** (kbmiller@unm.edu), Univ. of New Mexico, Albuquerque, NM
- 2:00 **1945** Systematic survey of the genus *Laccophilus* (Coleoptera: Dytiscidae) – future prospects outlined. **Olof Biström** (olof.bistrom@helsinki.fi), Univ. of Helsinki, Helsinki, Finland



- 2:15 **1946** Unraveling time and space in the evolution of diving beetles: A phylogenomic perspective to the biogeography of Gondwana. **Aurelie Desamore** (aurelie.desamore@nrm.se), Swedish Museum of Natural History, Stockholm, Sweden
- 2:30 **1947** Phylogeny, distribution, and speciation in the endemic river-dwelling genus *Pachynectes* (Bidessini) on Madagascar. **Johannes Bergsten** (johannes.bergsten@nrm.se)<sup>1</sup> and Rasa Bukontaite<sup>2</sup>, <sup>1</sup>Swedish Museum of Natural History, Stockholm, Sweden, <sup>2</sup>Stockholm Univ., Stockholm, Sweden
- 2:45 **1948** Phylogeny and classification of Noteridae. **Stephen Baca** (s953b810@ku.edu), Emmanuel Toussaint, and Andrew Short, Univ. of Kansas, Lawrence, KS
- 3:00 BREAK**
- 3:15 **1949** Infrageneric structure of New Guinea *Exocelina* predaceous diving beetles. **Helena Shaverdo** (shaverdo@mail.ru)<sup>1</sup> and Michael Balke<sup>2</sup>, <sup>1</sup>Vienna Museum of Natural History, Vienna, Austria, <sup>2</sup>Bavarian State Collection of Zoology, Munich, Germany
- 3:30 **1950** Diversity and endemism in water beetles of the South African Cape. **David Bilton** (d.bilton@plymouth.ac.uk), Plymouth Univ., Plymouth, United Kingdom
- 3:45 **1951** The aquatic beetle fauna of Qinghai-Xizang Plateau, China. **Fenglong Jia** (fenglongjia@aliyun.com), Sun Yat-sen Univ., Guangzhou, China
- 4:00 **1952** CReAC: A cyberinfrastructure platform for facilitating systematic and evolutionary research on aquatic beetles. **Andrew Short** (aeszshort@ku.edu), Univ. of Kansas, Lawrence, KS
- 4:15 **1953** Phylogeny and biogeography of the Lutrochidae and their relatives. **Crystal Maier** (crystal.maier@gmail.com), Univ. of Kansas, Lawrence, KS
- 4:30 **1954** 100 million years of waterfall beetle evolution. **Emmanuel Toussaint** (emmanuel.touss1@gmail.com) and Andrew Short, Univ. of Kansas, Lawrence, KS
- 4:45 **1955** Reconstructing the evolutionary history of the Acidocerinae (Coleoptera: Hydrophilidae): Advances in the *Chasmogenus* group. **Jennifer Girón** (entiminae@gmail.com) and Andrew Short, Univ. of Kansas, Lawrence, KS
- 5:00 **1956** Phylogenetic analysis of Berosini with a focus on *Berosus* Leach, 1817 (Insecta: Coleoptera: Hydrophilidae). **Bruno Clarkson** (brclarkson@gmail.com), Federal Univ. of Rio de Janeiro, Rio de Janeiro, Brazil
- 2:00 **1958** Discovery and characterization of a new family of primitive moths (Aenigmatineidae) from Kangaroo Island, South Australia. **Douglas Hilton** (dhilton@unimelb.edu.au)<sup>1</sup>, Axel Kallies<sup>1</sup>, Liz Milla<sup>1</sup>, Jadranka Rota<sup>2</sup>, Niklas Wahlberg<sup>2</sup>, Stephen Wilcox<sup>1</sup>, Richard V. Glatz<sup>3</sup>, David Young<sup>3</sup>, Glenn Cocking<sup>4</sup>, Ted Edwards<sup>4</sup>, George Gibbs<sup>5</sup>, Mike Halsey<sup>6</sup>, and Niels Kristensen<sup>7</sup>, <sup>1</sup>The Univ. of Melbourne, Melbourne, Australia, <sup>2</sup>Lund Univ., Lund, Sweden, <sup>3</sup>D'Estrees Entomology Scientific Services, MacGillivray, Australia, <sup>4</sup>CSIRO, Acton, Australia, <sup>5</sup>Victoria Univ., Kelburn, New Zealand, <sup>6</sup>La Trobe Univ., Yackandandah, Australia, <sup>7</sup>Univ. of Copenhagen, Copenhagen, Denmark
- 2:15 **1959** A preliminary phylogeny of Heliozelidae (Lepidoptera: Adeloidea), with a focus on endemic Australian genera. **Liz Milla** (emilla@student.unimelb.edu.au)<sup>1</sup>, David Young<sup>2</sup>, Axel Kallies<sup>1</sup>, Stephen Wilcox<sup>1</sup>, Tom McConville<sup>3</sup>, Qike Wang<sup>1</sup>, Brian Goodey<sup>4</sup>, Mike Halsey<sup>5</sup>, Camiel Doorenweerd<sup>6</sup>, Erik van Nieuwerkerken<sup>6</sup>, and Douglas Hilton<sup>1</sup>, <sup>1</sup>The Univ. of Melbourne, Melbourne, Australia, <sup>2</sup>D'Estrees Entomology Scientific Services, MacGillivray, Australia, <sup>3</sup>The Univ. of Melbourne, Washington, DC, Australia, <sup>4</sup>Colchester, United Kingdom, <sup>5</sup>La Trobe Univ., Yackandandah, Australia, <sup>6</sup>Naturalis Biodiversity Center, Leiden, Netherlands
- 2:30 **1960** The evolution of aposematism and chemical defense in Zygaenidae (Lepidoptera: Zygaenoidea). Chia-Hsuan Wei and **Shen-Horn Yen** (shenhornyen@faculty.nsysu.edu.tw), National Sun Yat-Sen Univ., Kaohsiung, Taiwan
- 2:45 **1961** New insights and renewed focus on the behavioural and mechanical traits of the larvae of the limacodid-group and related families (Lepidoptera: Aididae, Anomoeotidae, Dalceridae, Himantopteridae, Limacodidae, Megalopygidae, and Somabrachyidae). Steen Dupont<sup>1</sup> and **Marc Epstein** (marc.epstein@cdfa.ca.gov)<sup>2</sup>, <sup>1</sup>The Natural History Museum, London, United Kingdom, <sup>2</sup>California Dept. of Food and Agriculture, Sacramento, CA
- 3:00 BREAK**
- 3:15 **1962** Redefining *Adelpha malea fundania* abundance and geographical distribution: A case of an overlooked species in Mexican scientific collections. **Blanca Prado** (brp\_c@yahoo.com)<sup>1</sup>, Carmen Pozo<sup>1</sup>, Moisés Luis-Martínez<sup>2</sup> and Noemí Salas-Suárez<sup>1</sup>, <sup>1</sup>College of the Southern Border, Chetumal, Mexico, <sup>2</sup>National Autonomous Univ. of México, Mexico City, Mexico
- 3:30 **1963** Status of the phylogenetic-classification of the Blastobasidae (Lepidoptera: Gelechioidea) and insights to the evolution of host-plant preferences within its major clades. **David Adamski** (adamskid@si.edu), Smithsonian Institution National Museum of Natural History, Washington, DC
- 3:45 **1964** Pyraloidea: Resolution with highly derived genera and additional taxa. **M. Alma Solis** (alma.solis@ars.usda.gov)<sup>1</sup> and Charles Mitter<sup>2</sup>, <sup>1</sup>USDA - ARS, Washington, DC, <sup>2</sup>Univ. of Maryland, College Park, MD

## Symposium: The Evolution of Lepidoptera: Bringing it All Together

Room W224 G (Convention Center)

**Moderators and Organizers:** Andreas Zwick<sup>1</sup> and Jae-Cheon Sohn<sup>2</sup>, <sup>1</sup>CSIRO, Acton, Australia, <sup>2</sup>Smithsonian Institution National Museum of Natural History, Washington, DC

- 1:30 **1957** Higher phylogeny of Lepidoptera: Recent progress and future prospects. **Charles Mitter** (cmitter@umd.edu), Michael Cummings, Adam Bazinet, and Kim Mitter, Univ. of Maryland, College Park, MD



TUESDAY

- 4:00 **1965** Phylotranscriptomics of the Noctuoidea. **Jesse Breinholt** (jessebreinholt@gmail.com)<sup>1</sup>, Nicholas Homziak<sup>1</sup>, Lei Xiao<sup>1</sup>, Andreas Zwick<sup>2</sup>, and Akito Y. Kawahara<sup>1</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>CSIRO, Acton, Australia
- 4:15 **1966** Since 2012: Updates and recent progresses in studies of fossil Lepidoptera. **Jae-Cheon Sohn** (jay.c.sohn@gmail.com)<sup>1</sup>, Donald R. Davis<sup>2</sup>, Conrad Labandeira<sup>2</sup>, Maria Heikkilä<sup>2</sup>, Charles Mitter<sup>3</sup>, Carmen Soriano<sup>4</sup>, and Sei-Woong Choi<sup>1</sup>, <sup>1</sup>Mokpo National Univ., Moppo, South Korea, <sup>2</sup>Smithsonian Institution National Museum of Natural History, Washington, DC, <sup>3</sup>Univ. of Maryland, College Park, MD, <sup>4</sup>U.S. Dept. of Energy, Lemont, IL
- 4:30 **1967** An improved time frame for the diversification of Lepidoptera. **Maria Heikkilä** (heikkilam@si.edu)<sup>1</sup>, Jae-Cheon Sohn<sup>2</sup>, Charles Mitter<sup>3</sup>, Michael Cummings<sup>3</sup>, Rienk de Jong<sup>4</sup>, Dany Azar<sup>5</sup>, Donald R. Davis<sup>1</sup>, Conrad Labandeira<sup>1</sup>, Thomas Simonsen<sup>6</sup>, Wolfram Mey<sup>7</sup>, and Kim Mitter<sup>3</sup>, <sup>1</sup>Smithsonian Institution National Museum of Natural History, Washington, DC, <sup>2</sup>Mokpo National Univ., Moppo, South Korea, <sup>3</sup>Univ. of Maryland, College Park, MD, <sup>4</sup>Naturalis Biodiversity Center, Leiden, Netherlands, <sup>5</sup>Lebanese Univ., Fanar-Matn, Lebanon, <sup>6</sup>Natural History Museum, Aarhus, Denmark, <sup>7</sup>Museum of Natural History, Berlin, Germany
- 4:45 **1968** Genetic mining of Lepidoptera in museum collections – from DNA barcodes to genomes. **Andreas Zwick** (andreas.zwick@csiro.au) and Diana Hartley, CSIRO, Acton, Australia

### Symposium: Insect Biocomposites: Cuticles and Peritrophic Matrices

#### Room W331 C (Convention Center)

**Moderators and Organizers:** Michael Kanost<sup>1</sup>, Tsunaki Asano<sup>2</sup>, and Hans Merzendorfer<sup>3</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>Tokyo Metropolitan Univ., Tokyo, Japan, <sup>3</sup>Univ. of Siegen, Siegen, Germany

- 1:30 **1969** The assembly and turnover of the enigmatic insect cuticle. **Subbaratnam Muthukrishnan** (smk@k-state.edu), Kansas State Univ., Manhattan, KS
- 2:00 **1970** Cuticle formation in *Cimex lectularius*. **Bernard Moussian** (bernard.moussian@tuebingen.mpg.de), Christin Froschauer and Klaus Reinhardt, Technical Univ., Dresden, Germany
- 2:15 **1971** Major cuticular proteins in adult *Tribolium castaneum*. **Yasuyuki Arakane** (arakane@chonnam.ac.kr)<sup>1</sup>, Mi Young Noh<sup>1</sup>, Seulgi Mun<sup>1</sup>, Neal Dittmer<sup>2</sup>, Karl J. Kramer<sup>3</sup>, Subbaratnam Muthukrishnan<sup>2</sup>, and Michael Kanost<sup>2</sup>, <sup>1</sup>Chonnam National Univ., Gwangju, South Korea, <sup>2</sup>Kansas State Univ., Manhattan, KS, <sup>3</sup>USDA - ARS, Manhattan, KS
- 2:30 **1972** Structural analysis on insect cuticular proteins. **Neal Dittmer** (ndittmer@ksu.edu), Kansas State Univ., Manhattan, KS
- 2:45 **1973** Laccase activation during the molting process. **Tsunaki Asano** (asano-tsunaki@tmu.ac.jp)<sup>1</sup> and Michael Kanost<sup>2</sup>, <sup>1</sup>Tokyo Metropolitan Univ., Tokyo, Japan, <sup>2</sup>Kansas State Univ., Manhattan, KS

- 3:00 **BREAK**
- 3:15 **1974** Cuticle chitin degradation: An unrevealed complex process. **Qing Yang** (qingyang@dlut.edu.cn), Dalian Univ. of Technology, Dalian, China
- 3:30 **1975** Serosal cuticle formation and its waterproofing function during insect embryogenesis. **Gustavo Rezende** (grezende@uenf.br)<sup>1</sup>, Luana Farnesi<sup>2</sup>, Helena Vargas<sup>1</sup>, Chris Jacobs<sup>3</sup>, Ademir Martins<sup>2</sup>, Maurijn van der Zee<sup>4</sup>, and Denise Valle<sup>2</sup>, <sup>1</sup>State University of Northern Rio de Janeiro, Campos dos Goytacazes, Brazil, <sup>2</sup>Oswaldo Cruz Foundation, Rio de Janeiro, Brazil, <sup>3</sup>Max Planck Institute for Chemical Ecology, Jena, Germany, <sup>4</sup>Leiden Univ., Leiden, Netherlands
- 3:45 **1976** Body shape regulation by cuticular proteins in *Drosophila melanogaster*. **Reiko Tajiri** (rtajiri@gmail.com), The Univ. of Tokyo, Chiba, Japan
- 4:00 **1977** Molecular bases underlying the diversity of color pattern and color vision in dragonflies. **Ryo Futahashi** (ryo-futahashi@aist.go.jp)<sup>1</sup> and Takema Fukatsu<sup>2</sup>, <sup>1</sup>National Institute of Advanced Industrial Science and Technology, Ibaraki, Japan, <sup>2</sup>Advanced Industrial Science and Technology, Tsukuba, Japan
- 4:15 **1978** New insights into lepidopteran peritrophic matrix synthesis. **Umut Toprak** (utoprak@agri.ankara.edu.tr)<sup>1</sup>, Dwayne Hegedus<sup>2</sup>, and Martin Erlandson<sup>2</sup>, <sup>1</sup>Univ. of Ankara, Ankara, Turkey, <sup>2</sup>Agriculture and Agri-Food Canada, Saskatoon, Canada
- 4:30 **1979** Functional analysis of peritrophic matrix proteins in the larval midgut of *Tribolium castaneum*. **Marco Kelkenberg** (kelkenberg@biologie.uni-osnabrueck.de)<sup>1</sup>, Sinu Agrawal<sup>2</sup>, and Khurshida Begum<sup>2</sup>, <sup>1</sup>Univ. of Osnabrück, Osnabrück, Germany, <sup>2</sup>Kansas State Univ., Manhattan, KS
- 4:45 **1980** Mucin fragments in caterpillar frass alter herbivore defenses in maize. **Dawn Luthe** (dsl14@psu.edu), Pennsylvania State Univ., University Park, PA

### Symposium: Ion Channels as Targets of Synthetic and Natural Neurotoxins

#### Room W340 B (Convention Center)

**Moderators and Organizers:** Ke Dong<sup>1</sup> and Vincent Salgado<sup>2</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>BASF, Research Triangle Park, NC

*This symposium is generously sponsored by BASF, Mitsui Chemical Agro, Inc., Sumitomo Chemical Company, Syngenta and Zhong Shan Lan Ju Daily Chemical Industrial Co. LTD.*



- 1:30 **1981** Mapping the receptor sites of scorpion toxins at voltage-gated sodium channels. **Michael Gurevitz** (mamgur@post.tau.ac.il), Tel Aviv Univ., Tel Aviv, Israel



- 1:45 **1982** Glutamate-gated chloride channels of insects and ticks are targeted by okaramines, natural product leads for insecticides and acaricides. **David Sattelle** (d.sattelle@ucl.ac.uk)<sup>1</sup>, Makoto Ihara<sup>2</sup>, Shogo Furutani<sup>2</sup>, Steven Buckingham<sup>1</sup>, Kristin Lees<sup>1</sup>, Freddie Partridge<sup>1</sup>, Hideo Hayashi<sup>3</sup>, and Kazuhiko Matsuda<sup>2</sup>, <sup>1</sup>Univ. College London, London, United Kingdom, <sup>2</sup>Kinki Univ., Nara, Japan, <sup>3</sup>Osaka Prefecture Univ., Osaka, Japan
- 2:00 **1983** Charge reversal mutations in the voltage sensor of domain III enhanced the sensitivity of an insect sodium channel to a scorpion  $\beta$ -toxin. **Yuzhe Du** (duy@msu.edu), Michigan State Univ., East Lansing, MI
- 2:15 **1984** Investigating sodium channel function with insect toxins. Graham Nicholson<sup>1</sup>, Glenn F. King<sup>2</sup>, and **Frank Bosmans** (frankbosmans@jhmi.edu)<sup>3</sup>, <sup>1</sup>Univ. of Technology, Sydney, Australia, <sup>2</sup>Univ. of Queensland, Brisbane, Australia, <sup>3</sup>Johns Hopkins Univ. School of Medicine, Baltimore, MD
- 2:30 **1985** Mode of action of haedoxan A from *Phryma leptostachya*. **Zhaonong Hu** (huzhaonong@live.cn), Northwest A&F Univ., Yangling, China
- 2:45 **1986** Mechanisms of resistance to insecticides targeting RDL GABA receptors. **Toshifumi Nakao** (toshifumi.nakao@mitsui-chem.co.jp), Mitsui Chemicals Agro, Inc., Mobarra, Japan
- 3:00 BREAK**
- 3:15 **1987** The  $\alpha$ - $\alpha$  interface: A hidden binding site of neonicotinoids at nicotinic acetylcholine receptors. **Kazuhiko Matsuda** (kmatsuda@nara.kindai.ac.jp), Kinki Univ., Nara, Japan
- 3:30 **1988** Interactions of spinosad with insect nicotinic acetylcholine receptors. **Trent Perry** (trentp@unimelb.edu.au), The Univ. of Melbourne, Melbourne, Australia
- 3:45 **1989** Allosteric modulation of tick nicotinic acetylcholine receptor alpha 5 and alpha 6 by spinosad. **Mirel Puinean** (mirel.puinean@rothamsted.ac.uk), Rothamsted Research, Harpenden, United Kingdom
- 4:00 **1990** Diamide insecticides: Understanding the basis for insect selectivity and target-site resistance. **Daniel Cordova** (daniel.cordova@dupont.com)<sup>1</sup>, Eric Benner<sup>1</sup>, Yong Tao<sup>2</sup>, Steven Gutteridge<sup>1</sup>, George Lahm<sup>1</sup>, Thomas Selby<sup>1</sup>, and Alan Williams<sup>3</sup>, <sup>1</sup>DuPont Crop Protection, Newark, DE, <sup>2</sup>Chinese Academy of Sciences, Beijing, China, <sup>3</sup>Cardiff Univ., Cardiff, United Kingdom
- 4:15 **1991** Making a pest of *Drosophila*: Understanding field resistance to diamide insecticides. **Lucy Firth** (lucy.firth@syngenta.com), Jenny Willis, and Liz Hirst, Syngenta, Bracknell, United Kingdom
- 4:30 **1992** TRPV channels as insecticide targets. **Vincent Salgado** (vincent.salgado@basf.com)<sup>1</sup>, Ramani Kandasamy<sup>1</sup>, Katherine Lelito<sup>1</sup>, Brecht London<sup>1</sup>, Alexandre Nesterov<sup>1</sup>, Lynn Stam<sup>1</sup>, Christian Spalthoff<sup>2</sup>, and Martin Goepfert<sup>2</sup>, <sup>1</sup>BASF, Research Triangle Park, NC, <sup>2</sup>Georg August Univ., Göttingen, Germany
- 4:45 **1993** Potassium channels as targets of synthetic neurotoxins. **Jeffrey R. Bloomquist** (jbloomquist@epi.ufl.edu)<sup>1</sup>, Maxim Totrov<sup>2</sup>, and Paul R Carlier<sup>3</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Molsoft LLC, San Diego, CA, <sup>3</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA

- 5:00 **1994** Pyrethroids and voltage sensors in sodium channels. **Eugenio Eduardo Oliveira** (eugenio@ufv.br), Federal Univ. of Viçosa, Viçosa, Brazil
- 5:15 **1995** Pyrethroids activate olfactory receptors and elicit spatial repellency in *Drosophila melanogaster*. **Ke Dong** (dongk@cns.msu.edu), Michigan State Univ., East Lansing, MI

## Symposium: Mechanisms and Consequences of Phase Change in the Desert Locust, *Schistocerca gregaria*

### Room W232 A (Convention Center)

**Moderators and Organizers:** Arianne Cease and Stephen Rogers, Arizona State Univ., Tempe, AZ

- 1:30 **1996** How should we quantify behavioural phase state in locusts across treatments, strains, and species? **Swidbert Ott** (so120@leicester.ac.uk), Univ. of Leicester, Leicester, United Kingdom
- 1:45 **1997** Diet mixing in locusts: Physiological and molecular insights. **Spencer Behmer** (s-behmer@tamu.edu)<sup>1</sup>, Gregory Sword<sup>1</sup>, Corinna Kreml<sup>2</sup>, and Heiko Vogel<sup>2</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Max Planck Institute for Chemical Ecology, Jena, Germany
- 2:00 **1998** Monoamine receptors and swarming behaviour in locusts. **Heleen Verlinden** (heleen.verlinden@bio.kuleuven.be)<sup>1</sup>, Rut Vleugels<sup>1</sup>, and Jozef Vanden Broeck<sup>2</sup>, <sup>1</sup>Univ. of Leuven, Leuven, Belgium, <sup>2</sup>Catholic Univ., Leuven, Belgium
- 2:15 **1999** Integrating ecology and phase polyphenism into preventative locust management. **Gregory Sword** (gasword@tamu.edu), Texas A&M Univ., College Station, TX
- 2:30 **2000** Transcriptome analysis for investigating the molecular basis of phase change in the desert locust, *Schistocerca gregaria*. **Rik Verdonck** (rik.verdonck@bio.kuleuven.be)<sup>1</sup>, Jozef Vanden Broeck<sup>2</sup>, and Swidbert Ott<sup>3</sup>, <sup>1</sup>Univ. of Leuven, Leuven, Belgium, <sup>2</sup>Catholic Univ., Leuven, Belgium, <sup>3</sup>Univ. of Leicester, Leicester, United Kingdom
- 2:45 **2001** The role of yellow protein in sexual signalling between gregarious locusts. **Darron Cullen** (darron.cullen@bio.kuleuven.be)<sup>1</sup>, Stephen Simpson<sup>2</sup>, Jozef Vanden Broeck<sup>3</sup>, and Gregory Sword<sup>4</sup>, <sup>1</sup>Univ. of Leuven, Leuven, Belgium, <sup>2</sup>The Univ. of Sydney, Camperdown, Australia, <sup>3</sup>Catholic Univ., Leuven, Belgium, <sup>4</sup>Texas A&M Univ., College Station, TX
- 3:00 BREAK**
- 3:15 **2002** Phylogenetic perspective on the evolution of phase polyphenism. **Hojun Song** (hsong@tamu.edu), Texas A&M Univ., College Station, TX
- 3:30 **2003** Circadian biology of *Schistocerca gregaria* Forskål. **Tom Matheson** (tm75@le.ac.uk)<sup>1</sup>, Jonathan Shand<sup>1</sup>, Nathaniel Davies<sup>1</sup>, H Dowse<sup>2</sup>, Edward Gaten<sup>1</sup>, Benjamin Hunt<sup>1</sup>, Stephen Huston<sup>3</sup>, and Ezio Rosato<sup>1</sup>, <sup>1</sup>Univ. of Leicester, Leicester, United Kingdom, <sup>2</sup>Univ. of Maine, Orono, ME, <sup>3</sup>Janelia Farm Research Campus, Ashburn, VA



3:45 **2004** Locusts as models for collective behavior. **Amir Ayali** (ayali@tauex.tau.ac.il), Tel Aviv Univ., Tel Aviv, Israel

**Symposium: Physiological Systems for Arthropod Pest Management in the 21st Century**

**Room W330 A (Convention Center)**

**Moderators and Organizers:** Daniel R. Swale<sup>1</sup> and Lacey Jenson<sup>2</sup>, <sup>1</sup>Vanderbilt Univ., Nashville, TN, <sup>2</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA

- 1:30 **2005** Assessing the effects of hermetic storage on stored grain and pest physiology. **Scott Williams** (sbwillia88@gmail.com), Larry Murdock, and Dieudonne Baributsa, Purdue Univ., West Lafayette, IN
- 1:45 **2006** Beetleomics: Targeting the *Tribolium* gut for control. **Lindsey Perkin** (lindsey.perkin@ars.usda.gov), USDA - ARS, Manhattan, KS
- 2:00 **2007** Presentation withdrawn
- 2:15 **2008** Mosquito attraction and semiochemical analysis for mosquito vectors of dog heartworm. **Chris J. Holderman** (chrish2@ufl.edu), Univ. of Florida, Gainesville, FL
- 2:30 **2009** Regulatory frameworks and field-site considerations in advancing new genetic strategies for control of mosquito vectors of malaria. **James M. Mutunga** (jmutunga@icipe.org), International Centre of Insect Physiology and Ecology, Nairobi, Kenya
- 2:45 **2010** Differential RNAi approaches to enhance knockdown efficiency of target gene transcript in the highly DDT-resistant 91-R strain of *Drosophila melanogaster*. **Kyong Sup Yoon** (kyoon@siue.edu), Southern Illinois Univ., Edwardsville, IL
- 3:00 BREAK**
- 3:15 **2011** Characterization of inward rectifying potassium channels in the salivary glands of arthropod disease vectors. **Daniel R. Swale** (dswale@agcenter.lsu.edu), Louisiana State Univ., Baton Rouge, LA
- 3:30 **2012** The muscarinic acetylcholine receptor: An important and underexplored component of the cholinergic system in arthropods. **Aaron Gross** (adgross@epi.ufl.edu) and Jeffrey Bloomquist, Univ. of Florida, Gainesville, FL
- 3:45 **2013** Discovery of resistance-breaking chemistries for varroa mite management. **Troy D. Anderson** (anderst@vt.edu), Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 4:00 **2014** Refining and redefining insecticide target sites. **Frank Rinkevich** (fdr5@lsu.edu), Louisiana State Univ., Baton Rouge, LA
- 4:15 **2015** Toxicity and potassium channel-directed effects of flonicamid analogs. **Jennina Taylor-Wells** (jtaylorwells@ufl.edu)<sup>1</sup>, Paul R Carlier<sup>2</sup>, Aaron Gross<sup>1</sup>, Joseph Clements<sup>2</sup>, and Jeffrey Bloomquist<sup>1</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 4:30 **2016** Insect peptide neurohormone receptors as insecticide targets. **Andrew Nuss** (anuss@cabnr.unr.edu), Univ. of Nevada, Reno, NV

4:45 **2017** Mechanisms of action of pyrethroid insecticides. **Peng Xu** (xupengmsu@gmail.com), Michigan State Univ., East Lansing, MI

5:00 **2018** Control of biting midges: *Culicoides* attractants and toxicants. **Darren Snyder** (snyderd@ksu.edu), Kansas State Univ., Manhattan, KS

**Symposium: The Limits of Respiratory Function: External and Internal Constraints on Insect Gas Exchange**

**Room W331 B (Convention Center)**

**Moderators and Organizers:** Philip Matthews<sup>1</sup>, Kendra Greenlee<sup>2</sup>, and Wilco Verberk<sup>3</sup>, <sup>1</sup>The Univ. of British Columbia, Vancouver, BC, Canada, <sup>2</sup>North Dakota State Univ., Fargo, ND, <sup>3</sup>Radboud Univ. Nijmegen, Nijmegen, Netherlands

*This symposium is generously sponsored by Loligo Systems and Sable Systems International.*



- 1:30 **2019** What does it take to be a massive insect? Scaling of gas exchange capacities and tracheal structures in scarab beetles. **Jon F. Harrison** (j.harrison@asu.edu), C. Jaco Klok, Meghan Duell, Jacob Campbell, and Julian Wagner, Arizona State Univ., Tempe, AZ
- 2:00 **2020** Gills versus spiracles: The respiratory physiology of amphibious insects. **Philip Matthews** (pmatthews@zoology.ubc.ca), The Univ. of British Columbia, Vancouver, BC, Canada
- 2:15 **2021** Supply and demand: How would variation in atmospheric oxygen over geologic time have influenced insect tracheal and mitochondrial networks? **John VandenBrooks** (jvandenbrooks@midwestern.edu), Midwestern Univ., Glendale, AZ
- 2:30 **2022** Flight metabolic rate variation and its consequences on muscle metabolic machinery. **Charles Darveau** (cdarveau@uottawa.ca), Univ. of Ottawa, Ottawa, ON, Canada
- 2:45 **2023** Origin and evolution of insect respiratory proteins. **Thorsten Burmester** (thorsten.burmester@uni-hamburg.de), Univ. of Hamburg, Hamburg, Germany
- 3:00 BREAK**
- 3:15 **2024** Temperature, oxygen, cell size, performance, and life history – an insect's perspective. **Marcin Czarnotęski** (marcin.czarnoteski@uj.edu.pl), Jagiellonian Univ., Krakow, Poland
- 3:30 **2025** Tracheal system structure and function changes within an instar in insects. **Kendra Greenlee** (kendra.greenlee@ndsu.edu), North Dakota State Univ., Fargo, ND
- 3:45 **2026** Diffusion-convection switches in insect respiratory gas exchange. **John Terblanche** (jst@sun.ac.za), Stellenbosch Univ., Stellenbosch, South Africa
- 4:00 **2027** Thermal tolerance and its plasticity are shaped by the reliance on diffusive gas exchange within the *Deronectes* group of European diving beetles.



- Wilco Verberk** (wilco@aquaticceology.nl)<sup>1</sup>, Piero Calosi<sup>2</sup>, John Spicer<sup>3</sup>, Siegfried Kehl<sup>4</sup>, and David Bilton<sup>3</sup>, <sup>1</sup>Radboud Univ. Nijmegen, Nijmegen, Netherlands, <sup>2</sup>Univ. of Québec, Rimouski, QC, Canada, <sup>3</sup>Plymouth Univ., Plymouth, United Kingdom, <sup>4</sup>Univ. of Bayreuth, Bayreuth, Germany
- 4:15 **2028** Does temperature impose limits on aquatic insects via oxygen delivery/respiratory processes? **David Buchwalter** (david\_buchwalter@ncsu.edu), North Carolina State Univ., Raleigh, NC
- 4:30 **2029** Thermal tolerance of terrestrial insects: How do they solve a problem like hypoxia? **Leigh Boardman** (lboardman@ufl.edu), Univ. of Florida, Gainesville, FL
- 4:45 **2030** Interacting control systems and metabolic stimuli influence insect gas exchange patterns. **Erica Heinrich** (echeinrich@ucsd.edu), Univ. of California, La Jolla, CA
- 5:00 **2031** Inspiration from expiration: How active ventilation in the hissing cockroach informs the design of microfluidic devices. **Joel Garrett** (jfg@vt.edu), Rafael Davalos, and John Socha, Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 5:15 **2032** Respiration in the brown locust: Size, phase, and environment. **Frances Duncan** (frances.duncan@wits.ac.za), Univ. of the Witwatersrand, Johannesburg, South Africa

### Symposium: Advances in the Molecular Biology and Microbial Ecology of Important Urban Pests

#### Room W224 B (Convention Center)

**Moderators and Organizers:** Dana Nayduch<sup>1</sup> and Ludek Zurek<sup>2</sup>, <sup>1</sup>USDA - ARS, Manhattan, KS, <sup>2</sup>Kansas State Univ., Manhattan, KS

- 1:30 **2033** An antifungal defense strategy in termites. **Mark S. Bulmer** (mbulmer@towson.edu), Towson Univ., Towson, MD
- 2:00 **2034** Admixture mapping within a fire ant hybrid zone. **Elizabeth Wade** (elizabeth.wade@ars.usda.gov)<sup>1</sup>, Pnina Cohen<sup>2</sup>, Sean Ryan<sup>1</sup>, Lucinda Lawson<sup>1</sup>, Eyal Privman<sup>2</sup>, Kenneth Ross<sup>3</sup>, and DeWayne Shoemaker<sup>1</sup>, <sup>1</sup>USDA - ARS, Gainesville, FL, <sup>2</sup>Univ. of Haifa, Haifa, Israel, <sup>3</sup>Univ. of Georgia, Athens, GA
- 2:15 **2035** Caste and cuticle development of *Camponotus floridanus* lacking the endosymbiont *Blochmannia*. **Marc Seid** (seidm2@scranton.edu), Veronica Sinotte, and Samantha Freedman, The Univ. of Scranton, Scranton, PA
- 2:30 **2036** Gut bacteria mediate aggregation in the German cockroach. **Ayako Wada-Katsumata** (akatsum@ncsu.edu)<sup>1</sup>, Ludek Zurek<sup>2</sup>, Godfrey Nalyana<sup>1</sup>, Wendell L. Roelofs<sup>3</sup>, Aijun Zhang<sup>4</sup>, and Coby Schal<sup>1</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>Kansas State Univ., Manhattan, KS, <sup>3</sup>Cornell Univ., Geneva, NY, <sup>4</sup>USDA - ARS, Beltsville, MD
- 2:45 **2037** Insect pests represent a link between food animal farms and the urban environment for antibiotic resistance traits. **Ludek Zurek** (lzurek@ksu.edu) and Anuradha Ghosh, Kansas State Univ., Manhattan, KS

3:00 **BREAK**

- 3:15 **2038** Expression of *defensin* paralogs across house fly life history: Insights into fly-microbe interactions. **Dana Nayduch** (dana.nayduch@ars.usda.gov), USDA - ARS, Manhattan, KS
- 3:30 **2039** Genome sequence of the bed bug reveals underlying aspects of *Cimex lectularius* biology. **Jacob Hendershot** (henderj8@mail.uc.edu) and Joshua Benoit, Univ. of Cincinnati, Cincinnati, OH

### Undergraduate Student Oral Competition: Entomology Around the World

#### Room W232 C (Convention Center)

**Moderator:** Chandra Moffat, Univ. of New Brunswick, Fredericton, NB, Canada

- 1:30 **2040** *Apis mellifera* visit different flowers of located in the northern of Bogotá (Colombia). **Felipe Sarmiento** (mcgomez@campestre.edu.co), Federico Villota, Ignacio Leyva, and Martha Cecilia Gómez Tobar, Gimnasio Campestre, Bogotá, Colombia
- 1:45 **2041** First taxonomic list of diurnal butterfly species was compiled from two areas, Soratama (environmental reserve in the northeast of the city) and Colombo-Sueco (environmental classroom) Usaquén-Bogotá, Colombia. **Santiago Abril** (sguevara@campestre.edu.co), Alejandro Páez, Pablo Parodi, Sergio Perdomo, and Sussy Fidull Guevara, Gimnasio Campestre, Bogotá, Colombia
- 2:00 **2042** Review of the Family Cosmopterigidae Heinemann & Wocke, 1876 (Lepidoptera: Gelechioidea) in Korea. **Hyun-Kyung Yoon** (hkyoon1130@gmail.com) and Bong-Kyu Byun, Hannam Univ., Daejeon, South Korea
- 2:15 **2043** A taxonomic review of the Genus *Phyllonorycter* Hübner (Lepidoptera: Gracillariidae) from South Korea. **Da-Som Kim** (n4311@hanmail.net)<sup>1</sup>, Chung-Won Choi<sup>2</sup>, and Bong-Kyu Byun<sup>1</sup>, <sup>1</sup>Hannam Univ., Daejeon, South Korea, <sup>2</sup>Sejong Univ., Seoul, South Korea
- 2:30 **2044** Bionomic and developmental study of *Laptaulax koreanus* (Coleoptera: Passalidae) in Korea. **TaeHee Yoo** (019426@naver.com) and Bong-Kyu Byun, Hannam Univ., Daejeon, South Korea
- 2:45 **2045** Taxonomic study of the Psychidae (Lepidoptera) from Korea, with two newly recorded species. **Seung Jin Roh** (gorsj@hanmail.net) and Bong-Kyu Byun, Hannam Univ., Daejeon, South Korea
- 3:00 **BREAK**
- 3:15 **2046** An updated checklist of the bees of the Commonwealth of Dominica (Hymenoptera: Apoidea: Anthophila). **Shelby Kilpatrick** (entorocks527@tamu.edu)<sup>1</sup>, Jason Gibbs<sup>2</sup>, and James Woolley<sup>1</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Michigan State Univ., East Lansing, MI
- 3:30 **2047** A survey of *Odontomachus* (Hymenoptera: Formicidae) and general observations of nesting preferences in the Commonwealth of Dominica in the West Indies. **Andrew Graf** (cipher\_the\_noble@tamu.edu) and James Woolley, Texas A&M Univ., College Station, TX



- 3:45 **2048** A comparison of spider family diversity on vegetation between primary rainforest and secondary rainforest. **Ryan Selking** (optimus1@email.tamu.edu), Texas A&M Univ., College Station, TX
- 4:00 **2049** Key to *Septobasidium* of the southeastern United States. **Gabriel Somarriba** (gabe.somarriba@gmail.com), Andrea Lucky, and Matthew Smith, Univ. of Florida, Gainesville, FL
- 4:15 **2050** Investigating the influence of geospatial attributes on spider species richness and diversity. **Katherine Russell** (krussell1995@gmail.com)<sup>1</sup>, Alisa Coffin<sup>2</sup>, Dawn Olson<sup>2</sup>, Tim Strickland<sup>2</sup>, and Jason Schmidt<sup>1</sup>, <sup>1</sup>Univ. of Georgia, Tifton, GA, <sup>2</sup>USDA - ARS, Tifton, GA
- 4:30 **2051** Illustrated guide to the tribe Coccidulini Mulsant, 1846 (Coleoptera: Coccinellidae) of Mexico. **Enya Ramirez Del Valle** (ayne\_icneumon\_@hotmail.com) and Paulina Cifuentes Ruiz, National Autonomous Univ. of México, Mexico City, Mexico
- 4:45 **2052** Body morphometric, crop histologic structure, and their correlations with dragonflies preying habit (Anisoptera: Libellulidae: *Orthetrum sabina*, *Pantala flavescens*, and *Brachythemis contaminata*). **Amelia Nugrahaningrum** (nugrahaningrum.amelia@gmail.com)<sup>1,2</sup>, <sup>1</sup>Gadjah Mada Univ., Yogyakarta, Indonesia, <sup>2</sup>Indonesia Dragonfly Society, Sleman, Indonesia
- 5:00 **2053** Differences in tarsal morphology between arboreal and nonarboreal ants. **Andrew Nisip** (andre.wnisip@ufl.edu) and Andrea Lucky, Univ. of Florida, Gainesville, FL
- 5:15 **2054** Phylogeography of symbiotic fungi grown by two sympatric fungus-gardening ant species. **Joseph Luiso** (jluiso@patriots.uttyler.edu) and Jon Seal, The Univ. of Texas, Tyler, TX
- 5:25 **2058** Neonicotinoids in sunflower (*Helianthus annuus*) extra-floral nectar: How are beneficial insects affected? **Mike Bredeson** (michael.bredeson@sdsstate.edu)<sup>1</sup> and Jonathan Lundgren<sup>2</sup>, <sup>1</sup>South Dakota State Univ., Brookings, SD, <sup>2</sup>Ecdysis Foundation, Estelline, SD
- 5:30 **2059** Comparison of neonicotinoid concentrations in target and non-target members of the soil invertebrate community of Pennsylvania soybean fields. **Kirsten Pearsons** (kfp5094@psu.edu) and John Tooker, Pennsylvania State Univ., University Park, PA
- 5:45 **2060** Assessing the impacts of systemically-applied imidacloprid on the generalist hemipteran predator *Jalysus wickhami*. **Peter Nelson** (pnnelson@ncsu.edu), Hannah Burrack, and Clyde E. Sorenson, North Carolina State Univ., Raleigh, NC
- 3:00 **BREAK**
- 3:15 **2061** Evaluation of residual toxicity of neonicotinoids and resistance issues in thrips management in peanut. **Pin-Chu Lai** (pclai@uga.edu), Mark R. Abney, Albert K. Culbreath, and Rajagopalbabu Srinivasan, Univ. of Georgia, Tifton, GA
- 3:30 **2062** Resistance in thrips to spinosyn and neonicotinoid insecticides. **Danielle Sprague** (dsprague@ufl.edu), Joseph E. Funderburk, and Mrittunjai Srivastava, Univ. of Florida, Quincy, FL
- 3:45 **2063** Current status of the susceptibility of *Helicoverpa armigera* (Lepidoptera: Noctuidae) to insecticides in Brazil. **Mariana Durigan** (mariana.durigan@yahoo.com), Natália Leite, Dayana Sousa, Rogério Pereira, Douglas Amado, Alberto Correa, and Celso Omoto, Univ. of São Paulo, Piracicaba, Brazil
- 4:00 **2064** Chemical control of western bean cutworm (*Striacosta albicosta*): Susceptibility to insecticides and effects on non-target arthropods. **Debora Goulart Montezano** (deiagm@gmail.com)<sup>1</sup>, Thomas Hunt<sup>2</sup>, Jeffrey Bradshaw<sup>3</sup>, Blair Siegfried<sup>4</sup>, and Julie Peterson<sup>1</sup>, <sup>1</sup>Univ. of Nebraska, North Platte, NE, <sup>2</sup>Univ. of Nebraska, Concord, NE, <sup>3</sup>Univ. of Nebraska, Scottsbluff, NE, <sup>4</sup>Univ. of Florida, Gainesville, FL
- 4:15 **2065** Effects of systemic thiamethoxam exposure on the population dynamics of soybean aphids. **Matheus Ribeiro** (matheusgpmr@gmail.com)<sup>1</sup>, Thomas Hunt<sup>2</sup>, and Blair Siegfried<sup>3</sup>, <sup>1</sup>Univ. of Nebraska, Lincoln, NE, <sup>2</sup>Univ. of Nebraska, Concord, NE, <sup>3</sup>Univ. of Florida, Gainesville, FL
- 4:30 **2066** Length of thiamethoxam seed treatment activity against soybean aphid (*Aphis glycines*). **Carlos Esquivel** (esquivelpalma.1@buckeyemail.osu.edu), Luis A. Cañas, and Andrew Michel, The Ohio State Univ., Wooster, OH
- 4:45 **2067** The efficacy of sulfoxaflor and flupyradifurone on sugarcane aphids when temperatures change. **Brittany Lipsey** (bse37@msstate.edu)<sup>1</sup>, Angus Catchot<sup>1</sup>, Jeff Gore<sup>2</sup>, Erick Larson<sup>1</sup>, Don Cook<sup>2</sup>, and Fred Musser<sup>1</sup>, <sup>1</sup>Mississippi State Univ., Mississippi State, MS, <sup>2</sup>Mississippi State Univ., Stoneville, MS

**Graduate Student Oral Competition: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops: Insecticides**

**Room W230 B (Convention Center)**

**Moderator:** Neelendra Joshi, Univ. of Arkansas, Fayetteville, AR

- 1:30 **2055** Non-target effects of neonicotinoid seed treatment in a three-year field crop rotation. **Aditi Dubey** (aditid26@gmail.com)<sup>1</sup>, Galen Dively<sup>1</sup>, Margaret Lewis<sup>2</sup>, and Kelly Hamby<sup>3</sup>, <sup>1</sup>Univ. of Maryland, College Park, MD, <sup>2</sup>Pennsylvania State Univ., University Park, PA, <sup>3</sup>Univ. of California, Davis, CA
- 1:45 **2056** A season-long study of pesticide exposure in Ontario and Québec. **Nadejda Tsvetkov** (nadiats@yorku.ca)<sup>1</sup>, Olivier Samson-Robert<sup>2</sup>, Valérie Fournier<sup>2</sup>, and Amro Zayed<sup>1</sup>, <sup>1</sup>York Univ., Toronto, ON, Canada, <sup>2</sup>Univ. Laval, Québec City, QC, Canada
- 2:00 **2057** Spatiotemporal associations between herbivory and neonicotinoid insecticides in milkweeds neighboring agricultural land. **Paola Olaya-Arenas** (polayaar@purdue.edu) and Ian Kaplan, Purdue Univ., West Lafayette, IN



TUESDAY



- 5:00 **2068** Characterization of pyrethroid resistance in the western corn rootworm, *Diabrotica virgifera virgifera* LeConte. **Darlane Souza** (darlane\_lyra@hotmail.com)<sup>1</sup>, Nicholas Miller<sup>2</sup>, Blair Siegfried<sup>3</sup>, and Lance Meinke<sup>1</sup>, <sup>1</sup>Univ. of Nebraska, Lincoln, NE, <sup>2</sup>Univ. of Illinois, Chicago, IL, <sup>3</sup>Univ. of Florida, Gainesville, FL
- 5:15 **2069** Roles of carboxyesterases in pyrethroid resistant house flies, *Musca domestica*. **Xuechun Feng** (xzf0005@auburn.edu) and Nannan Liu, Auburn Univ., Auburn, AL

### Graduate Student Oral Competition: Insect Chemical Ecology

#### Room W230 D (Convention Center)

**Moderators:** Jason Wulff<sup>1</sup> and Amanda Winters<sup>2</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Bowling Green State Univ., Bowling Green, OH

- 1:30 **2070** Olfactory mediated responses to host- and non-host volatiles by female grape berry moths (*Paralobesia viteana*). **Michael Wolfin** (msw266@cornell.edu), Gregory M. Loeb, and Charles E. Linn, Cornell Univ., Geneva, NY
- 1:45 **2071** Apples infested with the oriental fruit moth are a source of HIPVs for host-habitat location of the larval parasitoid *Lytopylus rufipes*. **Chia-Ming Liu** (cobras770920@hotmail.com)<sup>1</sup>, Shigeru Matsuyama<sup>1</sup>, Masatake Sasaki<sup>2</sup>, Akihiro Arakawa<sup>3</sup>, and Yooichi Kainoh<sup>1</sup>, <sup>1</sup>Univ. of Tsukuba, Tsukuba, Japan, <sup>2</sup>Fukushima Plant Protection Association, Fukushima-shi, Japan, <sup>3</sup>Fukushima Agricultural Technology Centre, Fukushima-shi, Japan
- 2:00 **2072** Silk gland secretion of *Bombyx mori* larvae inhibits the production of herbivory-induced volatiles in mulberry leaves. **Hiroki Takai** (takai@ss.ab.a.u-tokyo.ac.jp), The Univ. of Tokyo, Tokyo, Japan
- 2:15 **2073** Evidence of shared chemistry between polyester bees of the genus *Colletes* Latreille and their brood parasites of the bee genus *Epeolus* Latreille. **Thomas Onuferko** (onuferko@yorku.ca)<sup>1</sup>, Joshua Krupp<sup>2</sup>, Joel Levine<sup>2</sup>, and Laurence Packer<sup>1</sup>, <sup>1</sup>York Univ., Toronto, ON, Canada, <sup>2</sup>Univ. of Toronto, Mississauga, ON, Canada
- 2:30 **2074** The effect of caterpillar oral secretions on indirect plant defenses. **Anne Jones** (acj152@psu.edu), James Tumlinson, and Gary Felton, Pennsylvania State Univ., University Park, PA
- 2:45 **2075** Navel orangeworm (*Amyelois transitella*) performance and insecticide detoxification in the presence of the fungus *Aspergillus flavus*. **Daniel Bush** (dsbush2@illinois.edu)<sup>1</sup>, Mark Demkovich<sup>1</sup>, Joel Siegel<sup>2</sup>, and May R. Berenbaum<sup>1</sup>, <sup>1</sup>Univ. of Illinois, Champaign, IL, <sup>2</sup>USDA - ARS, Parlier, CA
- 3:00 BREAK**
- 3:15 **2076** Picture-winged fly (Diptera: Ulidiidae: *Euxesta*, *Chaetopsis* spp.) semiochemical investigations. **David Owens** (owensd119@ufl.edu)<sup>1</sup>, Gregg Nuessly<sup>1</sup>, Paul E. Kendra<sup>2</sup>, Thomas Colquhoun<sup>3</sup>, Wayne S. Montgomery<sup>2</sup>, Daniel Hahn<sup>3</sup>, and Dakshina Seal<sup>4</sup>, <sup>1</sup>Univ. of Florida, Belle Glade, FL, <sup>2</sup>USDA - ARS, Miami, FL, <sup>3</sup>Univ. of Florida, Gainesville, FL, <sup>4</sup>Univ. of Florida, Homestead, FL

- 3:30 **2077** Effects of glucosinolates in host diets on parasitism by the endoparasitoid *Cotesia kariyai*. **Kazumu Kuramitsu** (tsuki.hi.hoshi.hoihoi@gmail.com) and Yooichi Kainoh, Univ. of Tsukuba, Tsukuba, Japan
- 3:45 **2078** Developmental differences in olfactory processing for predaceous insects. **Ulianova Vidal Gomez** (uvidalgo@purdue.edu) and Ian Kaplan, Purdue Univ., West Lafayette, IN
- 4:00 **2079** Quest to identify the attractive volatile bouquet of selected fungal species isolated from the mushroom sciarid fly, *Lycoriella ingenua*, to gravid female flies. **Kevin Cloonan** (krc204@psu.edu)<sup>1</sup>, Stefanos Andreadis<sup>1</sup>, Haibin Chen<sup>2</sup>, and Thomas C. Baker<sup>1</sup>, <sup>1</sup>Pennsylvania State Univ., University Park, PA, <sup>2</sup>Wenzhou Medical Univ., Wenzhou, China
- 4:15 **2080** Contextualizing combat: the effects of prior experience, cuticular hydrocarbons, and seasonality on territorial aggression in the red harvester ant, *Pogonomyrmex barbatus*. **Elizabeth Cash** (elizabeth.cash@asu.edu) and Jürgen Gadau, Arizona State Univ., Tempe, AZ
- 4:30 **2081** Extraordinary case of intrasexual cuticular hydrocarbon (CHC) profile dimorphism in a mason wasp, *Odynerus spinipes*, sheds light on genes involved in CHC biosynthesis. **Victoria Moris** (victoria.carla.moris@gmail.com)<sup>1</sup>, Thomas Schmitt<sup>2</sup>, and Oliver Niehuis<sup>1</sup>, <sup>1</sup>Zoological Research Museum Alexander Koenig, Bonn, Germany, <sup>2</sup>Univ. of Würzburg, Würzburg, Germany

### Graduate Student Oral Competition: Integrated Pest Management and Sustainable Agriculture: Agricultural Systems

#### Room W240 A (Convention Center)

**Moderator:** Doris Lagos-Kutz Ms., Dept. of Entomology, Univ. of Illinois, Urbana, IL

- 1:30 **2082** Impact of flea beetle feeding injury on cabbage and eggplant. **James Mason** (jmason91@vt.edu) and Thomas P. Kuhar, Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 1:45 **2083** Foliar insecticides in soybean: Implications for spectral detection of pest stress. **Tavvs Alves** (alves011@umn.edu)<sup>1,2</sup>, Zach Marston<sup>1</sup>, Ian MacRae<sup>3</sup>, and Robert Koch<sup>1</sup>, <sup>1</sup>Univ. of Minnesota, St. Paul, MN, <sup>2</sup>National Council for Scientific and Technological Development, Brasilia, Brazil, <sup>3</sup>Univ. of Minnesota, Crookston, MN
- 2:00 **2084** Influence of potassium, micronutrients, and their combinations as foliar applications to suppress soybean stem fly *Melanagromyza sojae* (Diptera: Agromyzidae) on four soybean common varieties. **Hanan Alfy** (hanan\_isaac1@yahoo.com), Agricultural Research Center, Alexandria, Egypt
- 2:15 **2085** Lethal effects of short-wavelength visible light on insects. **Kazuki Shibuya** (bwtmh349@yahoo.co.jp)<sup>1,2</sup>, Mitsunari Sato<sup>1</sup>, Yoshino Saito<sup>1</sup>, Shun Onodera<sup>1</sup>, and Masatoshi Hori<sup>1</sup>, <sup>1</sup>Tohoku Univ., Sendai, Japan, <sup>2</sup>Japan Society for the Promotion of Science, Tokyo, Japan



- 2:30 **2086** Comparing the effects of organic and conventional soil management on plant gene expression and insect development. **Karol Krey** (karol.krey@wsu.edu), Dorrie Main, and William E. Snyder, Washington State Univ., Pullman, WA
- 2:45 **2087** Behavioral and developmental effects of mineral oil on potato pests. **Andrew Galimberti** (andrew.galimberti@maine.edu) and Andrei Alyokhin, Univ. of Maine, Orono, ME
- 3:00 BREAK**
- 3:15 **2088** Control of codling moth (*Cydia pomonella*) using reduced pesticide rates and rapid reapplication. **Paul Owen-Smith** (pcowensmith@gmail.com), John Wise, and Matthew Grieshop, Michigan State Univ., East Lansing, MI
- 3:30 **2089** Temperature effects on mating and fruit infestation by the grape berry moth, *Paralobesia viteana* Clemens (Lepidoptera: Tortricidae). **Keith Mason** (masonk@msu.edu), Laura Bizzarri, and Rufus Isaacs, Michigan State Univ., East Lansing, MI
- 3:45 **2090** The role of botanical pesticides in IPM. Baoliang Tian<sup>1</sup>, Qizhi Liu<sup>2</sup> and **Yanwei Wang** (cauwangyanwei@163.com)<sup>2</sup>, <sup>1</sup>Henan Univ., Kaifeng, China, <sup>2</sup>China Agricultural Univ., Beijing, China
- 4:00 **2091** Differences in fitness traits between E and Z pheromone races of European corn borer, *Ostrinia nubilalis*, on different host plants. **Holly Lynn Walker** (hollylyn@udel.edu) and Charles Mason, Univ. of Delaware, Newark, DE
- 4:15 **2092** Spider community responses to contrasting grazing management in upland calcareous grasslands. **Ashley Lyons** (lyonsa@edgehill.ac.uk), Edge Hill Univ., Ormskirk, United Kingdom
- 4:30 **2093** Assessment of a novel Hessian fly, *Mayetiola destructor* (Diptera: Cecidomyiidae), monitoring method under field conditions. **Ryan Schmid** (rbschmid@ksu.edu)<sup>1,2</sup>, Darren Snyder<sup>1,3</sup>, Lee Cohnstaedt<sup>1,3</sup>, and Brian McCornack<sup>1,2</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>Plant Biosecurity Cooperative Research Centre, Bruce, Australia, <sup>3</sup>USDA - ARS, Manhattan, KS
- 4:45 **2094** Revising sticky trap thresholds for corn rootworms (*Diabrotica* spp.): How long will these thresholds stick? **Trisha Leaf** (trisha.franz@gmail.com) and Ken Ostlie, Univ. of Minnesota, St. Paul, MN
- 5:00 **2095** Herbicide-induced effects in rice (*Oryza sativa*) on the rice water weevil (*Lissorhoptus oryzophilus*). **Emily Kraus** (ekraus@agcenter.lsu.edu)<sup>1</sup> and Michael Stout<sup>2</sup>, <sup>1</sup>Louisiana State Univ., Baton Rouge, LA, <sup>2</sup>Louisiana State Univ. AgCenter, Baton Rouge, LA

**Graduate Student Oral Competition: Medical and Veterinary Entomology: Biting Diptera**

**Room W230 A (Convention Center)**

**Moderators:** Nicola Gallagher<sup>1</sup> and Michael Reiskind<sup>2</sup>, <sup>1</sup>Syngenta, Columbus, OH, <sup>2</sup>North Carolina State Univ., Raleigh, NC

- 1:30 **2096** Population dynamics, species composition, and transmission potentials of *Simulium damnosum* Theobald complex (Diptera: Simuliidae) in three ecological zones in Osun State, southwestern Nigeria.

- Linda Oforka** (lindaoforka@gmail.com)<sup>1</sup>, Monsuru Adeleke<sup>2</sup>, Joseph Anikwe<sup>1</sup>, Winifred Ayinke Makanjuola<sup>1</sup>, and Henry Fadamiro<sup>3</sup>, <sup>1</sup>Univ. of Lagos, Lagos, Nigeria, <sup>2</sup>Osun State Univ., Osogbo, Nigeria, <sup>3</sup>Auburn Univ., Auburn, AL
- 1:45 **2097** Gnats, rivers, and people: A spatial and social analysis of black fly (Diptera: Simuliidae) nuisance swarms. **Rebecca Wilson** (rcwilson@umd.edu) and William O. Lamp, Univ. of Maryland, College Park, MD
- 2:00 **2098** A combined morphological and molecular approach in study some phlebotomine sandflies of medical importance from Sudan. **Sara Saeed** (sarakhider@hotmail.com)<sup>1,2</sup>, Omran Osman<sup>2</sup>, Luisa Nardini<sup>1</sup>, and Lizette Koekemoer<sup>1</sup>, <sup>1</sup>Wits Research Institute for Malaria, Johannesburg, South Africa, <sup>2</sup>Univ. of Khartoum, Khartoum, Sudan
- 2:15 **2099** Mosquito surveillance in the Tongatapu Island Group, Kingdom of Tonga. **Tom Swan** (tomswanie@gmail.com)<sup>1</sup>, Jon Harding<sup>1</sup>, and Milen Marinov<sup>2</sup>, <sup>1</sup>Univ. of Canterbury, Christchurch, New Zealand, <sup>2</sup>Ministry for Primary Industries, Auckland, New Zealand
- 2:30 **2100** Dengue fever surveillance in Asia using text mining cluster analysis. **Andrea Villanes** (avillan@ncsu.edu), North Carolina State Univ., Raleigh, NC
- 2:45 **2101** Zooprophyllaxis and endectocides: Using cattle in the war on malaria. **Annie Rich** (aerich@uga.edu) and Nancy Hinkle, Univ. of Georgia, Athens, GA
- 3:00 BREAK**
- 3:15 **2102** Characterization of immunogenic proteins in *Aedes* saliva with antibodies of indigenous dengue patients in northern Taiwan. **Tsai-Ying Yen** (farscape@ms38.hinet.net) and Kun-Hsien Tsai, National Taiwan Univ., Taipei, Taiwan
- 3:30 **2103** The interplay of carbon dioxide, human skin odor, and visual cues in the host-seeking behavior of *Aedes aegypti*. **Benjamin DeMasi-Sumner** (bdema001@ucr.edu), Univ. of California, Riverside, CA
- 3:45 **2104** Fitness effects of permethrin resistance in the yellow fever mosquito, *Aedes aegypti*. **Leticia Smith** (lbs97@cornell.edu), Cornell Univ., Ithaca, NY
- 4:00 **2105** The effects of non-traditional IGRs on *Aedes aegypti* mosquitoes. **Kristen Stevens** (kcstevens93@ufl.edu), Philip G. Koehler, and Roberto M. Pereira, Univ. of Florida, Gainesville, FL
- 4:15 **2106** Examining the consequences of land use on vector diversity. **Meredith Spence** (mrspenc2@ncsu.edu) and Michael Reiskind, North Carolina State Univ., Raleigh, NC
- 4:30 **2107** Midgut basal lamina remodeling during arbovirus dissemination in *Aedes aegypti*. **Asher Kantor** (amkt33@mail.missouri.edu)<sup>1</sup>, Shengzhang Dong<sup>1</sup>, Rollie Clem<sup>2</sup>, Lorena Passarelli<sup>2</sup>, and Alexander Franz<sup>1</sup>, <sup>1</sup>Univ. of Missouri, Columbia, MO, <sup>2</sup>Kansas State Univ., Manhattan, KS
- 4:45 **2108** Increasing the effective duration of mosquito suppression on a small spatial scale (less than 0.25 ha). **Andrea Skiles** (glennskiles@gmail.com)<sup>1</sup>, Grayson Brown<sup>1</sup>, Kyndall Dye<sup>1</sup>, and Nicola T. Gallagher<sup>2</sup>, <sup>1</sup>Univ. of Kentucky, Lexington, KY, <sup>2</sup>Syngenta, Greensboro, NC



**Graduate Student Oral Competition: Morphology, Systematics, and Phylogeny: Beetles, Bugs, and Others**

**Room W230 C (Convention Center)**

**Moderators:** Joseph V. McHugh<sup>1</sup> and Helen LeBlanc<sup>2</sup>, <sup>1</sup>Univ. of Georgia, Athens, GA, <sup>2</sup>Univ. of Ontario Institute of Technology, Oshawa, ON, Canada

- 1:30 **2109** Why the long face? Insights into the mechanical behavior of the rostrum in the genus *Curculio* Linnaeus, 1758. **Michael Andrew Jansen** (entojansen@gmail.com), Arizona State Univ., Tempe, AZ
- 1:45 **2110** Allometry and morphometrics of colored facial markings in three species of burying beetle (Coleoptera: *Nicrophorus*). **Jillian Wormington** (jillianwormington@gmail.com) and Barney Luttbeg, Oklahoma State Univ., Stillwater, OK
- 2:00 **2111** Preliminary phylogeny and revised classification of sap beetles in the Carpophilinae (Coleoptera: Nitidulidae). **Gareth Powell** (powellg@purdue.edu)<sup>1</sup>, Andrew R. Cline<sup>2</sup>, and Jennifer Zaspel<sup>1</sup>, <sup>1</sup>Purdue Univ., West Lafayette, IN, <sup>2</sup>California Dept. of Food and Agriculture, Sacramento, CA
- 2:15 **2112** Novel trait evolution in weevils (Coleoptera: Curculionidae): Insights from *Diaprepes abbreviatus*. **Kyle DeMarr** (kad259@cornell.edu)<sup>1</sup> and Steve Davis<sup>2</sup>, <sup>1</sup>Cornell Univ., Ithaca, NY, <sup>2</sup>American Museum of Natural History, New York, NY
- 2:30 **2113** Preliminary phylogeny of the South American xyleborine genera *Coptoborus* and *Theoborus* (Coleoptera: Curculionidae: Scolytinae). **Rachel Osborn** (rachelkosborn@gmail.com)<sup>1</sup> and Anthony I. Cognato<sup>2</sup>, <sup>1</sup>Michigan State Univ., Okemos, MI, <sup>2</sup>Michigan State Univ., East Lansing, MI
- 2:45 **2114** Phylogenetic revision of the Neotropical weevil genus *Trichodocerus* Chevrolat (Coleoptera: Curculionidae). **Salvatore S. Anzaldo** (sanzaldo@asu.edu), Arizona State Univ., Tempe, AZ
- 3:00 BREAK**
- 3:15 **2115** Phylogenetics and revision of the rove beetle genus *Phlaeopterus* Motschulsky, 1853 (Coleoptera: Staphylinidae: Omaliinae). **Logan Mullen** (ljmullen2@alaska.edu) and Derek Sikes, Univ. of Alaska Museum, Fairbanks, AK
- 3:30 **2116** The systematics and microbial associations of psyllids (Hemiptera: Psylloidea): What is the biosecurity risk? **Francesco Martoni** (francesco.martoni@lincolnuni.ac.nz)<sup>1</sup>, Simon Bulman<sup>2</sup>, and Karen Armstrong<sup>3</sup>, <sup>1</sup>Lincoln Univ., Lincoln, New Zealand, <sup>2</sup>Plant and Food Research, Lincoln, New Zealand, <sup>3</sup>Plant Biosecurity Cooperative Research Centre, Canberra, Australia
- 3:45 **2117** A tale of two ends: Evolution of head and male genitalic morphology of *Nannocoris* Reuter (Hemiptera: Schizopteridae). Christiane Weirauch and **Sarah Frankenberg** (sfran012@ucr.edu), Univ. of California, Riverside, CA

- 4:00 **2118** Molecular and morphology-based phylogeny of Australian Orthotylini (Heteroptera: Miridae: Orthotylinae). **Marina Cheng** (marina.cheng@unsw.edu.au)<sup>1</sup> and Gerry Cassis<sup>2</sup>, <sup>1</sup>Univ. of New South Wales, Kensington, Australia, <sup>2</sup>Univ. of New South Wales, Sydney, Australia
- 4:15 **2119** Blunt labium, acute problem: Taxonomic mess in the *Corixidea* genus group (Heteroptera: Schizopteridae). **Alexander Knyshev** (aknys001@ucr.edu), Rochelle Hoey-Chamberlain, and Christiane Weirauch, Univ. of California, Riverside, CA
- 4:30 **2120** Significance of male supra-anal plate and cerci in the classification of Acridoidea and Pyrgomorphaidea (Orthoptera). **Shahnaila Usmani** (persona.usmani@gmail.com), Aligarh Muslim Univ., Aligarh, India
- 4:45 **2121** Evaluation of body-size effect on parameters of calling and courtship songs of the two-spotted cricket, *Gryllus bimaculatus*. **Atsushi Miyashita** (4298898886@mail.ecc.u-tokyo.ac.jp), Hayato Kizaki, Kazuhisa Sekimizu, and Chikara Kaito, The Univ. of Tokyo, Tokyo, Japan
- 5:00 **2122** Towards a comprehensive knowledge of Pyrgomorphidae (Orthoptera: Caelifera) systematics. **Ricardo Marino-Perez** (pselliopus@yahoo.com.mx) and Hojun Song, Texas A&M Univ., College Station, TX
- 5:15 **2123** Function of internal genitalia of bushcrickets: Comparative evidence of copulatory courtship (Orthoptera: Ensifera: Tettigoniidae). **Nadja Wulff** (nadja\_wulff@yahoo.de) and Gerlind Lehmann, Humboldt Univ., Berlin, Germany

**Contributed Papers: Agricultural and Forest Entomology: Forest Insects**

**Room W225 B (Convention Center)**

**Moderators:** Angela M. Mech<sup>1</sup> and Alvaro Fuentealba<sup>2</sup>, <sup>1</sup>Univ. of Georgia, Athens, GA, <sup>2</sup>Concordia Univ., Montréal, QC, Canada

- 1:30 **2124** Determining the role of bacterial symbionts on the heat tolerance of *Adelges tsugae*. **Angela M. Mech** (angmech@gmail.com) and Gaelen Burke, Univ. of Georgia, Athens, GA
- 1:45 **2125** Prediction of the large scale outbreak patterns of pine caterpillars under climate scenarios. **Hongbin Wang** (wanghb@caf.ac.cn), Sufang Zhang, Xiangbo Kong, and Zhen Zhang, Chinese Academy of Forestry, Beijing, China
- 2:00 **2126** Chemical communication of *Ips subelongatus* in relation to its hosts, nonhosts, and major associated fungi. **Xiangbo Kong** (xbkong@sina.com), Hongbin Wang, Sufang Zhang, and Zhen Zhang, Chinese Academy of Forestry, Beijing, China
- 2:15 **2127** Incidence of *Monochamus* species and pinewood nematode in Nova Scotia Christmas tree plantations. **Suzanne Blatt** (suzanne.blatt@agr.gc.ca)<sup>1</sup>, Charlane Bishop<sup>2</sup>, Karen Burgher-MacLellan<sup>1</sup>, and Jon Sweeney<sup>3</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, Kentville, NS, Canada, <sup>2</sup>Christmas Tree Council of Nova Scotia, Newtonville, NS, Canada, <sup>3</sup>Natural Resources Canada, Fredericton, NB, Canada



- 2:30 **2128** Thermal limitations to the biological control of *Gonipterus* sp. n. 2 in *Eucalyptus* plantations. **Michelle Schröder** (michelle.schroder@fabi.up.ac.za), Michael Wingfield, Brett Hurley, and Jeff Garnas, Univ. of Pretoria, Pretoria, South Africa
- 2:45 **2129** Molecular markers confirm the origin and reveal complex global invasion history of the eucalyptus gall wasp, *Leptocybe invasa*. **Gudrun Ditttrich-Schröder** (gudrun.ditttrich@fabi.up.ac.za)<sup>1</sup>, Brett Hurley<sup>1</sup>, Michael Wingfield<sup>1</sup>, Bernard Slippers<sup>1</sup>, Simon Lawson<sup>2</sup>, and Helen Nahrung<sup>2</sup>, <sup>1</sup>Univ. of Pretoria, Pretoria, South Africa, <sup>2</sup>Univ. of the Sunshine Coast, Sippy Downs, Australia
- 3:00 **BREAK**
- 3:15 **2130** Impact of climate change on the evolution of the pine processionary moth, *Thaumetopoea pityocampa* (Lepidoptera Notodontidae), at the Aures, Algeria. **Nacer Tarai** (tarainacer@yahoo.fr)<sup>1</sup> and Mihi Ali<sup>2</sup>, <sup>1</sup>Univ. of Biskra, Biskra, Algeria, <sup>2</sup>Univ. of Setif, Setif, Algeria
- 3:30 **2131** Mountain pine beetle, *Dendroctonus ponderosae*, as an emerging threat to eastern pine forests of North America. **Brian Aukema** (brianaukema@umn.edu)<sup>1</sup>, Robert Venette<sup>2</sup>, Mark Abrahamson<sup>3</sup>, and Derek Rosenberger<sup>1</sup>, <sup>1</sup>Univ. of Minnesota, St. Paul, MN, <sup>2</sup>USDA - Forest Service, St. Paul, MN, <sup>3</sup>Minnesota Dept. of Agriculture, St. Paul, MN
- 3:45 **2132** Responses of *Tomicus piniperda* and *Acanthocinus aedilis* in stands with different amounts of created deadwood. **Jan Weslien** (jan.weslien@skogforsk.se), The Forestry Research Institute of Sweden, Uppsala, Sweden
- 4:00 **2133** High release rate MCH dispensers increase efficiency of applications to prevent Douglas-fir beetle (*Dendroctonus pseudotsugae*) infestations. **Darrell W. Ross** (darrell.ross@oregonstate.edu)<sup>1</sup>, Harrison Brookes<sup>1</sup>, and Kimberly F. Wallin<sup>2</sup>, <sup>1</sup>Oregon State Univ., Corvallis, OR, <sup>2</sup>Univ. of Vermont, Burlington, VT
- 4:15 **2134** Modelling range shifts of native and invasive forest insects under changing climate. **Päivi Lyytikäinen-Saarenmaa** (paivi.lyytikainen-saarenmaa@helsinki.fi)<sup>1</sup>, Tuula Kantola<sup>1</sup>, Hannu Saarenmaa<sup>2</sup>, and Robert Coulson<sup>3</sup>, <sup>1</sup>Univ. of Helsinki, Helsinki, Finland, <sup>2</sup>Univ. of Eastern Finland, Joensuu, Finland, <sup>3</sup>Texas A&M Univ., College Station, TX
- 4:30 **2135** PCR multiplexes to discriminate *Fusarium* symbionts of exotic *Euwallacea* ambrosia beetles. **Matther Kasson** (mtkasson@mail.wvu.edu) and Dylan Short, West Virginia Univ., Morgantown, WV
- 4:45 **2136** New approaches for studying natural enemies of the mountain pine beetle (*Dendroctonus ponderosae*) in standing trees may answer long-standing questions. **Lawrence Haimowitz** (lhaimowi@uwyo.edu), Univ. of Wyoming, Laramie, WY
- 5:00 **2137** Black spruce susceptibility to Eastern spruce budworm defoliation under a changing climate: Phenological and biochemical responses. **Alvaro Fuentealba** (alvaro.fuentealba-morales.1@ulaval.ca)<sup>1,2</sup>, Emma Despland<sup>2</sup>, Deepa Pureswaran<sup>3</sup>, and Eric Bauce<sup>1</sup>, <sup>1</sup>Univ. Laval, Québec City, QC, Canada,

<sup>2</sup>Concordia Univ., Montréal, QC, Canada, <sup>3</sup>Natural Resources Canada, Québec City, QC, Canada

## Contributed Papers: Functional Genomics and Transgenesis

### Room W223 B (Convention Center)

**Moderators:** Alexie Papanicolaou<sup>1</sup> and Margaret Allen<sup>2</sup>, <sup>1</sup>Hawkesbury Institute for the Environment, Richmond, Australia, <sup>2</sup>USDA - ARS, Stoneville, MS

- 1:30 **2138** Transcriptomic analysis reveals the molecular mechanism of *Conopomorpha sinensis* Bradley (Lepidoptera: Gracillariidae) preference for host-plant. **Xiang Meng** (mengxiangxs@126.com), Guangdong Academy of Agricultural Sciences, Guangzhou, China
- 1:45 **2139** Genomic interactions of whitefly (*Bemisia tabaci*, MEAM 1) with ToCV and management of whitefly through RNAi. **Navneet Kaur** (navneet.kaur@ars.usda.gov)<sup>1</sup>, Wenbo Chen<sup>2</sup>, Yi Zheng<sup>2</sup>, Daniel Hasegawa<sup>2</sup>, Kai-Shu Ling<sup>3</sup>, Zhangjun Fei<sup>2</sup>, and William Wintermantel<sup>1</sup>, <sup>1</sup>USDA - ARS, Salinas, CA, <sup>2</sup>Cornell Univ., Ithaca, NY, <sup>3</sup>USDA - ARS, Charleston, SC
- 2:00 **2140** Expansion of a bitter taste receptor family in a polyphagous insect herbivore. **Wei Xu** (w.xu@murdoch.edu.au)<sup>1</sup>, Alexie Papanicolaou<sup>2</sup>, Hui-Jie Zhang<sup>3</sup>, and Alisha Anderson<sup>4</sup>, <sup>1</sup>Murdoch Univ., Murdoch, Australia, <sup>2</sup>Hawkesbury Institute for the Environment, Richmond, Australia, <sup>3</sup>CSIRO, Black Mountain, Australia, <sup>4</sup>CSIRO, Acton, Australia
- 2:15 **2141** Behavioral and molecular mechanisms of pheromone transmission in honey bees (*Apis mellifera*). **Rong Ma** (rong.ma@utexas.edu)<sup>1</sup>, Gabriel Villar<sup>2</sup>, Christina M. Grozinger<sup>2</sup>, and Juliana Rangel<sup>3</sup>, <sup>1</sup>The Univ. of Texas, Austin, TX, <sup>2</sup>Pennsylvania State Univ., University Park, PA, <sup>3</sup>Texas A&M Univ., College Station, TX
- 2:30 **2142** Molecular mechanism underlying wing dimorphism in planthoppers. **Hai-Jun Xu** (haijunxu@zju.edu.cn) and Chuan-Xi Zhang, Zhejiang Univ., Hangzhou, China
- 2:45 **2143** Genome-wide association study reveals genetic determinants of nutritional phenotypes in insect-bacterial symbiosis. **Seung Ho Chung** (sc776@cornell.edu) and Angela Douglas, Cornell Univ., Ithaca, NY
- 3:00 **BREAK**
- 3:15 **2144** Chitinase 7 is required for cuticle laminar organization and chitin deposition in *Tribolium castaneum*. **Mi Young Noh** (annemi@chonnam.ac.kr)<sup>1</sup>, Subbaratnam Muthukrishnan<sup>2</sup>, Karl J. Kramer<sup>2</sup>, and Yasuyuki Arakane<sup>1</sup>, <sup>1</sup>Chonnam National Univ., Gwangju, South Korea, <sup>2</sup>Kansas State Univ., Manhattan, KS
- 3:30 **2145** Presentation withdrawn
- 3:45 **2146** CRISPR/Cas9-induced anosmia in the crop pest moth *Spodoptera littoralis*. Fotini Koutroumpa<sup>1</sup>, Christelle Monsempe<sup>1</sup>, Marie-Christine François<sup>1</sup>, Corinne Royer<sup>2</sup>, Anne de Cian<sup>3</sup>, Jean-Paul Concordet<sup>3</sup>, and **Emmanuelle Jacquin-Joly** (emmanuelle.jacquin@versailles.inra.fr)<sup>1</sup>, <sup>1</sup>INRA, Versailles, France, <sup>2</sup>INRA, Villeurbanne, France, <sup>3</sup>National Museum of Natural History, Paris, France



- 4:00 **2147** Pipeline technology from Oxitec, Ltd.: Genetic control of *Aedes* mosquitoes. **Edward Sulston** (edward.sulston@pmb.ox.ac.uk)<sup>1</sup>, Kelly Matzen<sup>2</sup>, Simon Warner<sup>2</sup>, and Sebastian Shimeld<sup>1</sup>, <sup>1</sup>Univ. of Oxford, Oxford, United Kingdom, <sup>2</sup>Oxitec Ltd, Abingdon, United Kingdom
- 4:15 **2148** Analysis of the sex determination pathway in the African malaria mosquito, *Anopheles gambiae*. **Jaroslaw Krzywinski** (jaroslaw.krzywinski@pirbright.ac.uk) and Elzbieta Krzywinska, The Pirbright Institute, Pirbright, United Kingdom
- 4:30 **2149** Knockout of DNA damage repair genes in the disease vector *Aedes aegypti*. **Justin Overcash** (justmo1@vt.edu)<sup>1,2</sup>, Azadeh A. Aryan<sup>2</sup>, Zach Adelman<sup>1</sup>, and Kevin M. Myles<sup>2</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 4:45 **2150** Does the Y-chromosome facilitate sexual dimorphic evolution in insects or constrain autosomal evolution? **Ian Kutch** (kutch.bio@knights.ucf.edu) and Ken Fedorka, Univ. of Central Florida, Orlando, FL
- 5:00 **2151** Constraints, independence, and evolution of thermal plasticity: Probing genetic architecture of long and short-term thermal plasticity. **Daniel Hahn** (dahahn@ufl.edu)<sup>1</sup>, Alison Gerken<sup>2</sup>, and Theodore Morgan<sup>2</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Kansas State Univ., Manhattan, KS
- 2:30 **2156** Pharmacophagy in green lacewings (Neuroptera: Chrysopidae: *Chrysopa* spp.)? **Jeffrey Aldrich** (drjefaldrich@gmail.com)<sup>1</sup>, Kamlesh R. Chauhan<sup>2</sup>, and Qing-He Zhang<sup>3</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>USDA - ARS, Beltsville, MD, <sup>3</sup>Sterling International, Inc., Spokane, WA
- 2:45 **2157** Suboptimal larval habitats modulate oviposition of the malaria vector mosquito *Anopheles gambiae*. **Eunho Suh** (eunhosuh@gmail.com)<sup>1</sup>, Dong-Hwan Choe<sup>2</sup>, Ahmed Saveer<sup>1</sup>, and Laurence Zwiebel<sup>1</sup>, <sup>1</sup>Vanderbilt Univ., Nashville, TN, <sup>2</sup>Univ. of California, Riverside, CA
- 3:00 **BREAK**
- 3:15 **2158** Identification of the aggregation pheromone of the American cockroach, *Periplaneta americana*. **Masayuki Sakuma** (sakuma@kais.kyoto-u.ac.jp)<sup>1</sup>, Yukihiro Nishimura<sup>1</sup>, Masashi Tanaka<sup>1</sup>, Tamio Ueno<sup>2</sup>, Noritada Matsuo<sup>2</sup>, and Yasuyuki Koutani<sup>2</sup>, <sup>1</sup>Kyoto Univ., Kyoto, Japan, <sup>2</sup>Dainihon Jochugiku Co.,Ltd, Osaka, Japan
- 3:30 **2159** The pollination ecology of *Platanthera* orchids by snow mosquitoes. **Chloé Lahondère** (lahonder@uw.edu), Clement Vinauger, Ryo Okubo, and Jeff Riffell, Univ. of Washington, Seattle, WA
- 3:45 **2160** Regulation of worker reproduction in the polydomous ant species *Novomessor cockerelli*. **Jessica Ebie** (jebie@asu.edu), Bert Hölldobler, and Jürgen Liebig, Arizona State Univ., Tempe, AZ
- 4:00 **2161** The evolution of geodephagan chemical defense: A phylogenetic understanding of the diversity and stasis of compounds and gland structures in carabid beetles. **Kipling Will** (kipwill@berkeley.edu)<sup>1</sup>, Athula Attygalle<sup>2</sup>, Aman Gill<sup>3</sup>, Wendy Moore<sup>4</sup>, and Tanya Renner<sup>5</sup>, <sup>1</sup>Univ. of California, Berkeley, CA, <sup>2</sup>Stevens Institute of Technology, Hoboken, NJ, <sup>3</sup>Stony Brook Univ., Stony Brook, NY, <sup>4</sup>Univ. of Arizona, Tucson, AZ, <sup>5</sup>San Diego State Univ., San Diego, CA
- 4:15 **2162** Deciphering the nestmate recognition system in a stingless bee (Hymenoptera: Apidae, *Melipona scutellaris*). **Fabio Nascimento** (fnsnascim@usp.br), Daniela Nascimento, and Ivelize Tannure-Nascimento, Univ. of São Paulo, Ribeirão Preto, Brazil
- 4:30 **2163** Plants, microbes, and odorants in insect host location: Who's making the message? **Charles Linn Jr.** (cel1@cornell.edu)<sup>1</sup>, Sara Volo<sup>2</sup>, Ronald Chilson<sup>3</sup>, Michael Wolfin<sup>1</sup>, and Gregory M. Loebl<sup>1</sup>, <sup>1</sup>Cornell Univ., Geneva, NY, <sup>2</sup>Hobart and William Smith Colleges, Geneva, NY, <sup>3</sup>Penn Yan Academy High School, Penn Yan, NY
- 4:45 **2164** Identification and field evaluation of yeast volatiles attractive to *Philornis downsi*, a hematophagous invasive parasite of Darwin's finches in the Galapagos. **Dong Cha** (dongho.cha1@gmail.com)<sup>1</sup>, Alejandro Mieses<sup>1</sup>, Charlotte Causton<sup>2</sup>, Paola Lahuatue<sup>2</sup>, Andrea Cahuana<sup>2</sup>, Piedad Lincango<sup>2,3</sup>, and Stephen Teale<sup>1</sup>, <sup>1</sup>State Univ. of New York, Syracuse, NY, <sup>2</sup>Charles Darwin Foundation for the Galapagos Islands, Galapagos Islands, Ecuador, <sup>3</sup>Central Univ. of Ecuador, Quito, Ecuador

## Contributed Papers: Insect Chemical Ecology

### Room W314 B (Convention Center)

**Moderators:** Jeffrey Aldrich<sup>1</sup> and Dipsikha Bora<sup>2</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>Dibrugarh Univ., Dibrugarh, India

- 1:30 **2152** How competitive interactions between parasitoid species are shaped by herbivores, a model study. **Lia Hemerik** (lia.hemerik@wur.nl)<sup>1</sup>, Erik Poelman<sup>1</sup>, Astrid Potiek<sup>2</sup>, and Tibor Bukovinszky<sup>3</sup>, <sup>1</sup>Wageningen Univ. and Research Centre, Wageningen, Netherlands, <sup>2</sup>Univ. of Bielefeld, Bielefeld, Germany, <sup>3</sup>Koppert BV, Berkel en Rodenrijs, Netherlands
- 1:45 **2153** Restricted diet breadth and host defense specific adaptation in *Antheraea assamensis* Helfer: A case study. **Dipsikha Bora** (dipsikhabora03@yahoo.com), Amrita Mech, Bhabesh Deka, and Urbbi Devi, Dibrugarh Univ., Dibrugarh, India
- 2:00 **2154** Pollinator interactions with the "sweet" scent of cocoa flowers. **Sarah Arnold** (s.e.j.arnold@greenwich.ac.uk)<sup>1</sup>, Samantha Forbes<sup>2</sup>, Puran Bridgemohan<sup>3</sup>, Dudley Farman<sup>1</sup>, David Hall<sup>1</sup>, Daniel Bray<sup>1</sup>, Gustavo Spinelli<sup>4</sup>, Garvin Perry<sup>5</sup>, Leroy Grey<sup>6</sup>, Steven Belmain<sup>1</sup>, and Philip Stevenson<sup>1,7</sup>, <sup>1</sup>Univ. of Greenwich, Chatham, United Kingdom, <sup>2</sup>James Cook Univ., Townsville, Australia, <sup>3</sup>Univ. of Trinidad and Tobago, Carapichaima, Trinidad and Tobago, <sup>4</sup>Museum of La Plata, La Plata, Argentina, <sup>5</sup>Univ. of Trinidad and Tobago, Centeno via Arima, Trinidad and Tobago, <sup>6</sup>Ministry of Agriculture, Kingston, Jamaica, <sup>7</sup>Royal Botanic Gardens, Surrey, United Kingdom
- 2:15 **2155** Caste specific volatiles in the red imported fire ants, *Solenopsis invicta*. **Jian Chen** (jian.chen@ars.usda.gov) and Michael Grodowitz, USDA - ARS, Stoneville, MS



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- 5:00 **2165** Red imported fire ant (*Solenopsis invicta* Buren) foraging behavior in the presence of swarming bacteria *Proteus mirabilis*. **Elida Espinoza** (ellyspnz@gmail.com)<sup>1</sup>, Tawni L. Crippen<sup>2</sup>, Jeffery K. Tomberlin<sup>1</sup>, and Roger Gold<sup>1</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>USDA - ARS, College Station, TX
- 5:15 **2166** *Meloe* nest parasites locally adapt chemistry and behavior to match bee hosts. **Leslie Saul-Gershenz** (lsaulgershenz@ucdavis.edu), Univ. of California, Davis, CA
- 
- Contributed Papers: Medical and Veterinary Entomology: Repellents, Toxicants, and Resistance**
- Room W231 C (Convention Center)**
- Moderators:** M. Patricia Juárez<sup>1</sup> and Juli Wuliandari<sup>2</sup>, <sup>1</sup>Biochemical Research Institute of La Plata, La Plata, Argentina, <sup>2</sup>The Univ. of Melbourne, Parkville, Australia
- 1:30 **2167** Insecticide resistance at the surface: Contribution of the integument genes in *Triatoma infestans*. **M. Patricia Juárez** (mjuarez@isis.unlp.edu.ar) and Gustavo Calderón Fernández, Biochemical Research Institute of La Plata, La Plata, Argentina
- 1:45 **2168** Acetylcholinesterases of arthropod ectoparasites: Roles in organophosphate resistance and host-parasite interaction. **Kevin B. Temeyer** (kevin.temeyer@ars.usda.gov)<sup>1</sup>, Fan Tong<sup>2</sup>, Jeffrey Bloomquist<sup>2</sup>, Paul R Carlier<sup>3</sup>, Maxim Totrov<sup>4</sup>, Daniel R. Swale<sup>5</sup>, Andrew Li<sup>6</sup>, and Adalberto A. Pérez de León<sup>1</sup>, <sup>1</sup>USDA - ARS, Kerrville, TX, <sup>2</sup>Univ. of Florida, Gainesville, FL, <sup>3</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>4</sup>Molsoft LLC, San Diego, CA, <sup>5</sup>Louisiana State Univ., Baton Rouge, LA, <sup>6</sup>USDA - ARS, Beltsville, MD
- 2:00 **2169** Assessment of efficacy of essential oil based combination(s) against the dengue vector *Aedes aegypti* (Diptera: Culicidae) in NE India. **Bulbuli Khanikor** (khanikorbulbuli@yahoo.co.in), Riju Sarma, Sudarshana Mahanta, Sangeeta Hakmao, Sumana Das, Tulika Kuli, Rashmita Ardao, Kamal Adhikari, Alomwara Begum, Rima Rabha, and Chayanika Devi, Gauhati Univ., Guwahati, India
- 2:15 **2170** Association between three mutations, F1565C, V1023G and S996P, in the voltage-sensitive sodium channel gene and knockdown resistance (kdr) in *Aedes aegypti* from Yogyakarta, Indonesia. **Juli Wuliandari** (jwuliandari@gmail.com)<sup>1</sup>, Siu Fai Lee<sup>1</sup>, Vanessa White<sup>1</sup>, Warsito Tantowijoyo<sup>2</sup>, Ary Hoffmann<sup>1</sup>, and Nancy Endersby-Harshman<sup>1</sup>, <sup>1</sup>The Univ. of Melbourne, Parkville, Australia, <sup>2</sup>Eliminate Dengue Project, Yogyakarta, Indonesia
- 2:30 **2171** MicroRNA-275 directly targets sarco/endoplasmic reticulum Ca<sup>2+</sup> adenosine triphosphatase (SERCA) to control key functions in the mosquito gut. **Bo Zhao** (nkzhaobo@gmail.com)<sup>1,2</sup>, Keira Lucas<sup>1</sup>, Tusar Saha<sup>1</sup>, Jisu Ha<sup>1</sup>, Chun-Hong Chen<sup>3</sup>, Sourav Roy<sup>1</sup>, and Alexander Raikhel<sup>1</sup>, <sup>1</sup>Univ. of California, Riverside, CA, <sup>2</sup>North Carolina State Univ., Raleigh, NC, <sup>3</sup>Institute of Molecular and Genomic Medicine, Zhunan, Taiwan
- 2:45 **2172** Cytochrome P450 monooxygenase genes (CYP) associated with pyrethroid resistance in the Chagas disease vector *Triatoma infestans*. **Nicolás Pedrini** (nicopedrini@yahoo.com)<sup>1</sup>, Gustavo Calderón-Fernández<sup>1</sup>, Jhon Salamanca-Moreno<sup>1</sup>, Suresh Kumar<sup>2</sup>, Wilma Fleita<sup>1</sup>, and M. Patricia Juárez<sup>1</sup>, <sup>1</sup>Biochemical Research Institute of La Plata, La Plata, Argentina, <sup>2</sup>Management & Science Univ., Selangor, Malaysia
- 3:00 **BREAK**
- 3:15 **2173** Solution for developing countries: a novel in-vitro bioassay to explore the repellent effects of compounds against the mosquito *Aedes aegypti* (Diptera: Culicidae). **Junaid Rehman** (junaiddua@gmail.com), Univ. of Mississippi, Univ., MS
- 3:30 **2174** Popular homemade Brazilian mosquito repellent recipe may be misleading. **Kaiming Tan** (ktan@ucdavis.edu)<sup>1</sup>, Garisson Buss<sup>1</sup>, Ana C. A. Melo<sup>1,2</sup>, and Walter S. Leal<sup>1</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>Federal Univ. of Rio de Janeiro, Rio de Janeiro, Brazil
- 3:45 **2175** Laboratory evaluation of residual efficacy of Deltamethrin K-OTHRINE 250 WG and pirimiphos-methyl ACTELLIC 300 CS on different wall surfaces against *Culex quinquefasciatus* Say (Diptera: Culicidae). **Kolade Ibrahim** (koladeibrahim@hotmail.com), Kabir Popoola Kok, and Kenneth Akure, Univ. of Ibadan, Ibadan, Nigeria
- 4:00 **2176** Global research and development of a non-DEET insect repellent ethyl butylacetylaminopropionate (IR3535). **Howard Epstein** (howard.epstein@emdgroup.com), EMD Performance Materials Corp., Philadelphia, PA
- 4:15 **2177** Quantitative analysis of vector movement behavior following subacute exposure to behavior modifiers. **Kyndall Dye** (kyndall.dye@uky.edu), Univ. of Kentucky, Lexington, KY
- 4:30 **2178** Mosquitocidal activity and mode of action of the isoxazoline fluralaner. **Shiyao Jiang** (shiyao.jiang@ufl.edu)<sup>1</sup>, Maia Tsikolia<sup>1,2</sup>, Ulrich Bernier<sup>2</sup>, and Jeffrey Bloomquist<sup>1</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>USDA - ARS, Gainesville, FL
- 4:45 **2179** Green synthesis of silver nanoparticle (AgNPs) from *Argemone mexicana* for control of the dengue vector *Aedes aegypti*. **Siva Kamalakannan** (kamal410@yahoo.com) and Kadarkarai Murugan, Bharathiar Univ., Coimbatore, India
- 5:00 **2180** Insecticidal properties of three plant extracts against *Culex quinquefasciatus* Say and *Aedes aegypti* Linnaeus. **Abhay Khandagle** (ajkhandagle@gmail.com), Arts, Commerce and Science College, Pune, India
- 5:15 **2181** Studies on knockdown resistance (kdr) mutations in *Aedes aegypti* and *Aedes albopictus* in India. **Neera Kapoor** (neerakapoor@ignou.ac.in), Indira Gandhi National Open Univ., New Delhi, India





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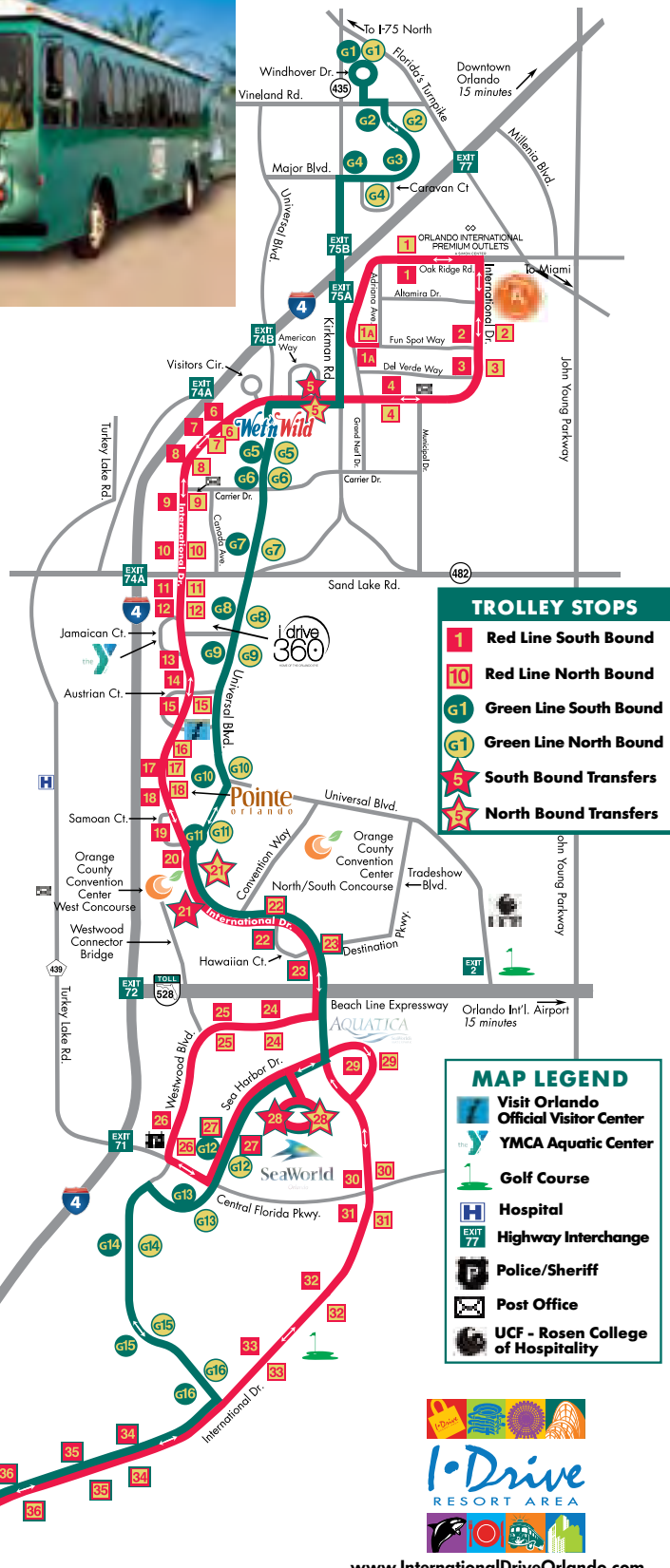
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WEDNESDAY

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**Invited Lecture Featuring  
Dr. Juan Andres Bisset Lazcano**

**Room W331 A (Convention Center)**

**Moderator and Organizer:** Walter S. Leal, Univ. of California, Davis, CA

- 4:30 **2182** Introduction of the Speaker. **Walter S. Leal** (wsleal@ucdavis.edu), Univ. of California, Davis, CA
- 4:35 **2183** *Aedes aegypti* management strategies for dengue control in Cuba. **Juan Bisset** (bisset@ipk.sld.cu), Institute of Tropical Medicine Pedro Kouri, Havana, Cuba
- 5:30 **Reception honoring Dr. Juan Bisset**  
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**Wednesday, September 28, 2016 • Morning**

**Keynote Presentation Featuring  
Dr. Jules Hoffmann**

**Valencia Room (Convention Center)**

**Moderators and Organizers:** Walter S. Leal<sup>1</sup>, Alvin M. Simmons<sup>2</sup>, and Elena Levashina<sup>3</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>USDA - ARS, Charleston, SC, <sup>3</sup>Max Planck Institute for Infection Biology, Berlin, Germany

- 8:00 **2184** Introduction of the Keynote Speaker. **Elena Levashina** (levashina@mpiib-berlin.mpg.de), Max Planck Institute for Infection Biology, Berlin, Germany
- 8:05 **2185** Innate immunity: From insects to humans. **Jules Hoffmann** (v.wolf@unistra.fr), Strasbourg Univ. Institute for Advanced Study, Strasbourg, France

**Symposium: Agronomic and Economic Benefits of Seed Treatments: The IPM Perspective**

**Room W331 A (Convention Center)**

**Moderators and Organizers:** Palle Pedersen<sup>1</sup>, Bill Striegel<sup>2</sup>, and Bradley W. Hopkins<sup>3</sup>, <sup>1</sup>Syngenta Plant Protection, Greensboro, NC, <sup>2</sup>Bayer CropScience, Research Triangle Park, NC, <sup>3</sup>Dow AgroSciences, Indianapolis, IN

- 9:15 **2186** Seed treatments and modern agriculture: Do seed treatments breach IPM principles? **Kevin Steffey**<sup>1</sup> and **Marlin Rice** (marlinrice@gmail.com)<sup>2</sup>, <sup>1</sup>Dow AgroSciences, Indianapolis, IN, <sup>2</sup>DuPont Pioneer, Johnston, IA
- 9:30 **2187** History of seed treatments and their advantage. **Ray Knake** (ray.knake@aol.com), Ray Knake Consulting, Johnston, IA

- 9:45 **2188** Agronomic advantages and benefits of seed treatments. **Shawn Conley** (spconley@wisc.edu), Paul D. Mitchell, and Adam Gaspar, Univ. of Wisconsin, Madison, WI
- 10:00 **2189** Enhancing IPM with neonicotinoid seed treatments in the Mid-Southern U.S. **Jeff Gore** (jgore@drec.msstate.edu)<sup>1</sup>, Angus Catchot<sup>2</sup>, Don Cook<sup>1</sup>, Scott Stewart<sup>3</sup>, Gus Lorenz<sup>4</sup>, Glenn Studebaker<sup>5</sup>, and David L. Kerns<sup>6</sup>, <sup>1</sup>Mississippi State Univ., Stoneville, MS, <sup>2</sup>Mississippi State Univ., Mississippi State, MS, <sup>3</sup>Univ. of Tennessee, Jackson, TN, <sup>4</sup>Univ. of Arkansas, Lonoke, AR, <sup>5</sup>Univ. of Arkansas Cooperative Extension Service, Keiser, AR, <sup>6</sup>Louisiana State Univ., Winnsboro, LA
- 10:15 **BREAK**
- 10:30 **2190** Insecticidal seed treatment – a physiological assessment re soybean yield - bean leaf beetle - Bean pod mottle virus. **James Specht** (jspecht1@unl.edu), Univ. of Nebraska, Lincoln, NE
- 10:45 **2191** Current US regulatory process. **James Aidala** (jaidala@lawbc.com), Bergeson & Campbell, Washington, DC
- 11:00 **2192** Economic benefits of neonicotinoid insecticides in the U.S. and Canada: Implications for IPM. **Peter Nowak** (pnowak@wisc.edu), Paul D. Mitchell, and Nicola Carey, Univ. of Wisconsin, Madison, WI
- 11:15 **2193** The role of seed treatments and the seed treatment application across the seed industry. **Jane DeMarchi** (jdemarchi@amseed.org), American Seed Trade Association, Alexandria, VA
- 11:30 **Panel Discussion**

**Symposium: Public-Private Partnerships for Development of Next-Generation Pest Management Methods**

**Room W314 A (Convention Center)**

**Moderators and Organizers:** Bryony Bonning<sup>1</sup> and Subba Reddy Palli<sup>2</sup>, <sup>1</sup>Iowa State Univ., Ames, IA, <sup>2</sup>Univ. of Kentucky, Lexington, KY

- 9:15 **2194** The Center for Arthropod Management Technologies: Industry perspective. **Ronald Flannagan** (ron.flannagan@monsanto.com)<sup>1</sup>, Kevin Donohue<sup>2</sup>, Kimberly Sampson<sup>3</sup>, John Dorsch<sup>4</sup>, Amit Sethi<sup>5</sup>, Dror Avisar<sup>6</sup>, and Tom Meade<sup>7</sup>, <sup>1</sup>Monsanto Company, Chesterfield, MO, <sup>2</sup>Syngenta Crop Protection, Research Triangle Park, NC, <sup>3</sup>Bayer CropScience, Morrisville, NC, <sup>4</sup>BASF, Research Triangle Park, NC, <sup>5</sup>DuPont Pioneer, Johnston, IA, <sup>6</sup>FuturaGene Ltd., Park Tamar, Israel, <sup>7</sup>Dow AgroSciences, Indianapolis, IN
- 9:30 **2195** Developing novel cell lines from selected insects. **Cynthia Goodman** (cindy.goodman@ars.usda.gov) and David Stanley, USDA - ARS, Columbia, MO
- 9:45 **2196** Mechanisms of transcytosis across the gut of *Spodoptera frugiperda*. **Mariah Kemmerer** (mjkem@iastate.edu) and Bryony Bonning, Iowa State Univ., Ames, IA
- 10:00 **2197** Insect resistance traits for control of insect pests in transgenic crops. **Tom Meade** (meade@dow.com), Dow AgroSciences, Indianapolis, IN



TUESDAY/  
WEDNESDAY

- 10:15 BREAK**
- 10:30 2198** Identification of factors responsible for differential efficiency of RNAi between coleopteran and lepidopteran insects. **Megha Kalsi** (meghakalsi@uky.edu)<sup>1</sup>, Jayendra Shukla<sup>1</sup>, Amit Sethi<sup>2</sup>, Kenneth Narva<sup>3</sup>, Elane Fishilevich<sup>3</sup>, and Subba Reddy Palli<sup>1</sup>, <sup>1</sup>Univ. of Kentucky, Lexington, KY, <sup>2</sup>DuPont Pioneer, Johnston, IA, <sup>3</sup>Dow AgroSciences, Indianapolis, IN
- 10:45 2199** Enveloped porous nanoparticles for RNA delivery to insects. **Bruce Webb** (bawebb@email.uky.edu), Stephen Rankin, and Barbara Knutson, Univ. of Kentucky, Lexington, KY
- 11:00 2200** Use of RNAi for agricultural pest control. **Renata Bolognesi** (renata.bolognesi@monsanto.com), Monsanto Company, Chesterfield, MO
- 11:15 2201** RNA-based biocontrol for Colorado potato beetle and corn rootworm control. Pascale Feldmann<sup>1</sup>, Jason Vincent<sup>2</sup>, and **Kevin Donohue** (kevin.donohue@syngenta.com)<sup>3</sup>, <sup>1</sup>Syngenta, Zwijnaarde, Belgium, <sup>2</sup>Syngenta, Bracknell, United Kingdom, <sup>3</sup>Syngenta Crop Protection, Research Triangle Park, NC

### Symposium: IPM Strategies for the Management and Sustainability of Honey Bees (*Apis mellifera*) Across the Globe

#### Room W224 F (Convention Center)

**Moderators and Organizers:** Jennifer M. Tsuruda<sup>1</sup> and Juliana Rangel<sup>2</sup>, <sup>1</sup>Clemson Univ., Clemson, SC, <sup>2</sup>Texas A&M Univ., College Station, TX

- 9:15 2202** Non-chemical control of varroa mites in honey bee colonies. **Meghan McConnell** (memconnell89@gmail.com) and Dennis vanEngelsdorp, Univ. of Maryland, College Park, MD
- 9:30 2203** RNAi therapeutics as a non-chemical control method for *Varroa* and viruses. **Gerald Hayes** (gerald.w.hayes.jr@monsanto.com), Monsanto Company, St. Louis, MO
- 9:45 2204** Evaluation of the predatory mite *Stratiolaelaps scimitus* for biological control of the honey bee ectoparasitic mite *Varroa destructor*. **Juliana Rangel** (jrangel@tamu.edu) and Lauren Ward, Texas A&M Univ., College Station, TX
- 10:00 2205** Marker-assisted selection for disease-resistance traits is an effective IPM tool in honey bees. **Shelley Hoover** (shelley.hoover@gov.ab.ca)<sup>1</sup>, Miriam Bixby<sup>2</sup>, Stephen Pernal<sup>3</sup>, Rob Currie<sup>4</sup>, Marta Guarna<sup>3</sup>, and Leonard J. Foster<sup>2</sup>, <sup>1</sup>The Univ. of British Columbia, Lethbridge, AB, Canada, <sup>2</sup>The Univ. of British Columbia, Vancouver, BC, Canada, <sup>3</sup>Agriculture and Agri-Food Canada, Beaverlodge, AB, Canada, <sup>4</sup>Univ. of Manitoba, Winnipeg, MB, Canada
- 10:15 BREAK**
- 10:30 2206** Sustainability of honey bees through increased genetic diversity at the colony and population levels. **David Tarpy** (drtarpy@ncsu.edu), North Carolina State Univ., Raleigh, NC

- 10:45 2207** Do different management approaches result in reduced *Nosema ceranae* levels? **Brenna E. Traver** (bet12@psu.edu)<sup>1</sup>, Robyn Underwood<sup>2</sup>, Kristine Nichols<sup>3</sup>, and Dennis vanEngelsdorp<sup>4</sup>, <sup>1</sup>Pennsylvania State Univ., Schuylkill Haven, PA, <sup>2</sup>Kutztown Univ., Kutztown, PA, <sup>3</sup>Rodale Institute, Kutztown, PA, <sup>4</sup>Univ. of Maryland, College Park, MD
- 11:00 2208** Treatment of varroa mites with formic acid and thymol in Africanized honey bee colonies in Costa Rica. **Rafael Calderon Fallas** (rafael.calderon.fallas@una.cr)<sup>1</sup>, Marianyela Ramirez<sup>2</sup>, and Fernando Ramirez<sup>2</sup>, <sup>1</sup>National University of Costa Rica, Heredia, Costa Rica, <sup>2</sup>Tropical Bee Research Center, Heredia, Costa Rica
- 11:15 2209** Pests and pathogens of honey bees in East Africa. **Harland M. Patch** (hmpatch@psu.edu)<sup>1</sup>, Christina M. Grozinger<sup>1</sup>, Elliud Muli<sup>2,3</sup>, and Maryann Frazier<sup>1</sup>, <sup>1</sup>Pennsylvania State Univ., University Park, PA, <sup>2</sup>International Centre of Insect Physiology and Ecology, Nairobi, Kenya, <sup>3</sup>South Eastern Kenya Univ., Kitui, Kenya
- 11:30 Panel Discussion**

### Symposium: Insect Vectors as Drivers of Emerging Plant Diseases

#### Room W230 D (Convention Center)

**Moderators and Organizers:** Alberto Fereres<sup>1</sup>, Rodrigo Almeida<sup>2</sup>, and Joao R. S. Lopes<sup>3</sup>, <sup>1</sup>Institute of Agricultural Sciences, Madrid, Spain, <sup>2</sup>Univ. of California, Berkeley, CA, <sup>3</sup>Univ. of São Paulo, Piracicaba, Brazil

- 9:15 2210** Behavioral responses of insect vectors of plant disease to climate change. **Alberto Fereres** (a.fereres@csic.es), Institute of Agricultural Sciences, Madrid, Spain
- 9:30 2211** Environmental factors and infection with *Candidatus Liberibacter asiaticus* influence long-range dispersal of the Asian citrus psyllid. **Xavier Martini** (xmartini@ufl.edu), Hannah Lewis-Rosenblum, Mark Hoffmann, Kirsten P. Stelinski, and Lukasz Stelinski, Univ. of Florida, Lake Alfred, FL
- 9:45 2212** Manipulation of host-derived olfactory cues by vector-borne pathogens. **Mark Mescher** (mcmescher@psu.edu), Pennsylvania State Univ., University Park, PA
- 10:00 2213** *Xylella fastidiosa* as a new worldwide emerging vector-borne plant pathogen. **Rodrigo Almeida** (rodrigo@nature.berkeley.edu), Univ. of California, Berkeley, CA
- 10:15 BREAK**
- 10:30 2214** Epidemiological significance of vector behavior: Interactions with plant resistance traits and climate. **Matthew P. Daugherty** (matt.daugherty@ucr.edu)<sup>1</sup>, Adam Zellinger<sup>2</sup>, and Rodrigo Almeida<sup>2</sup>, <sup>1</sup>Univ. of California, Riverside, CA, <sup>2</sup>Univ. of California, Berkeley, CA
- 10:45 2215** Presentation withdrawn
- 11:00 Panel Discussion**



**Symposium: Insects, Ecosystem Functioning, and Services: New Questions and Experimental Perspectives**

**Room W224 C (Convention Center)**

**Moderators and Organizers:** Jorge Noriega, Joaquin Hortal, and Ana Santos, National Museum of Natural Sciences, Madrid, Spain

- 9:15 **2216** How good is our knowledge of the ecosystem services provided by insects from an experimental perspective? **Jorge Noriega** (jnorieg@hotmail.com), Ana Santos, and Joaquin Hortal, National Museum of Natural Sciences, Madrid, Spain
- 9:30 **2217** Extending the trait-based approach to multi-trophic systems to assess effects on ecosystem processes – First attempts and perspectives. **Marco Moretti** (marco.moretti@wsl.ch), Swiss Federal Research Institute WSL, Birmensdorf, Switzerland
- 9:45 **2218** Impacts of fertilization amount and quality on top-down control of crop pest insects. **Laura Riggi** (laura.riggi@slu.se), Swedish Univ. of Agricultural Sciences, Uppsala, Sweden
- 10:00 **2219** Heavy metal bees: How do they indicate the transference of heavy metals through terrestrial food webs? **Yasmine Antonini** (antonini.y@gmail.com), Nathália de Oliveira Nascimento, and Alessandra Rodrigues Kozovits, Federal Univ. of Ouro Preto, Ouro Preto, Brazil
- 10:15 **BREAK**
- 10:30 **2220** Adding honey bees increases oilseed yields but also affects wild pollinators. **Sandra Lindström** (sandra.lindstrom@hushallningssallskapet.se), Swedish Univ. of Agricultural Sciences, Lund, Sweden
- 10:45 **2221** Impacts of insect herbivory and nitrogen deposition on grassland plant communities and functioning. **Pernilla Borgström** (pernilla.borgstrom@slu.se), Swedish Univ. of Agricultural Sciences, Uppsala, Sweden
- 11:00 **Panel Discussion**

**Symposium: Using Insect Diversity to Plan and Manage Conservation in Transformed Landscapes**

**Room W224 D (Convention Center)**

**Moderators and Organizers:** James Pryke<sup>1</sup> and Rene Gaigher<sup>2</sup>, <sup>1</sup>Stellenbosch Univ., Stellenbosch, South Africa, <sup>2</sup>Stellenbosch Univ., Matieland, South Africa

- 9:15 **2222** Using multiple arthropod taxa to determine conservation targets for ecological networks within timber plantations. **James Pryke** (jpryke@sun.ac.za), Stellenbosch Univ., Stellenbosch, South Africa
- 9:30 **2223** Drivers of ground-dwelling arthropod species richness and assemblage structure in the savannah biome. **Colin Schoeman** (colin.schoeman@univen.ac.za)<sup>1</sup>, Michelle Hamer<sup>2</sup>, and Stefan Foord<sup>1</sup>, <sup>1</sup>Univ. of Venda, Thohoyando, South Africa, <sup>2</sup>South African National Biodiversity Institute, Silverton, South Africa

- 9:45 **2224** Potential of old fields for increasing habitat heterogeneity and connectivity for arthropod natural enemies in farmland mosaics. **Rene Gaigher** (reneh@sun.ac.za)<sup>1</sup>, James Pryke<sup>2</sup>, and Michael J. Samways<sup>2</sup>, <sup>1</sup>Stellenbosch Univ., Matieland, South Africa, <sup>2</sup>Stellenbosch Univ., Stellenbosch, South Africa
- 10:00 **2225** Enhancing insect diversity in agricultural landscapes while providing multiple additional benefits. **Morgan Shields** (morgan.shields@lincolnuni.ac.nz), Lincoln Univ., Lincoln, New Zealand
- 10:15 **BREAK**
- 10:30 **2226** Presentation withdrawn
- 10:45 **2227** The effect of plantations and road in fragmenting natural forest arthropod populations. **Francois Roets** (fr@sun.ac.za), Stellenbosch Univ., Stellenbosch, South Africa
- 11:00 **2228** The importance of natural forests for maintaining biodiversity and ecological processes within a production landscape. **Inam Yekwayo** (yekwayoinam@gmail.com), James Pryke, Francois Roets, and Michael J. Samways, Stellenbosch Univ., Stellenbosch, South Africa
- 11:15 **2229** Identifying surrogates for conserving insect diversity in human-modified landscapes in south-eastern Australia. **Ding Li Yong** (zoothera@yahoo.com) and Philip Barton, The Australian National Univ., Canberra, Australia

**Symposium: Biological Control Perspective in South and Southeast Asia**

**Room W414 B (Convention Center)**

**Moderators and Organizers:** Alberto Barrion and Divina Amalin, De La Salle Univ., Manila, Philippines

- 9:15 **2230** Biological control initiatives of the Central Bicol State University of Agriculture (CBSUA), Bicol region, Southern Luzon, Philippines. **Maria Dulce Mostoles** (mdjmostoles@yahoo.com) and Lilia Pasiona, Central Bicol State Univ. of Agriculture, Camarines Sur, Philippines
- 9:30 **2231** Search for potential biological control agent of cattle fever tick in the Philippines. **Mary Jane Flores** (mary.jane.flores@dlsu.edu.ph)<sup>1</sup>, Bianca Mari Dizon<sup>1</sup>, Yasmin Dawud<sup>1</sup>, Bianca Victoria Pena<sup>1</sup>, Divina Amalin<sup>1</sup>, John A. Goolsby<sup>2</sup>, and Alexis Racelis<sup>3</sup>, <sup>1</sup>De La Salle Univ., Manila, Philippines, <sup>2</sup>USDA - ARS, Edinburg, TX, <sup>3</sup>The Univ. of Texas, Edinburg, TX
- 9:45 **2232** Presence of *Wolbachia* sp. in mosquito species of metro Manila, Philippines. **Thaddeus Carvajal** (thaddeus.carvajal@dlsu.edu.ph)<sup>1</sup>, Kristin Joyce Go<sup>2</sup>, Monique Martinez<sup>2</sup>, Jayson Capistrano<sup>2</sup>, Vincent Stefano<sup>2</sup>, Divina Amalin<sup>2</sup>, and Kozo Watanabe<sup>1</sup>, <sup>1</sup>Ehime Univ., Matsuyama, Japan, <sup>2</sup>De La Salle Univ., Manila, Philippines
- 10:00 **2233** Biological control of invasive pest species in the Philippines: The case of coconut scale insect, *Aspidiotus rigidus*. **Billy Joel Almarinez** (billy.almarinez@dlsu.edu.ph), Divina Amalin, and Jose Santos Carandang, De La Salle Univ., Manila, Philippines
- 10:15 **BREAK**



- 10:30 **2234** Ecological engineering: A new paradigm in rice pest management in China with emphasis on biological control. **Zhongxian Lyu** (luzxmh2004@yahoo.com)<sup>1</sup>, Zhejiang Academy of Agricultural Sciences, Hangzhou, China
- 10:45 **2235** Push-pull: A climate-smart platform technology for enhancing food security in Africa. **Charles Midega** (cmidega@mbita.icipe.org)<sup>1</sup>, Zeyaur Khan<sup>1</sup>, Jimmy Pittchar<sup>1</sup>, Toby Bruce<sup>2</sup>, and John Pickett<sup>2</sup>, <sup>1</sup>International Centre of Insect Physiology and Ecology, Nairobi, Kenya, <sup>2</sup>Rothamsted Research, Harpenden, United Kingdom
- 11:00 **2236** Rice ecosystem services in tropical Asia – an overview based on LEGATO approaches and results. **Josef Settele** (josef.settele@ufz.de)<sup>1</sup>, Joachim Spangenberg<sup>2</sup>, Kong Luen Heong<sup>3</sup>, Ingolf Kühn<sup>4</sup>, Stefan Klotz<sup>4</sup>, Nguyen Quynh Anh<sup>5</sup>, Johnathan Anthony<sup>6</sup>, Gertrudo Arida<sup>7</sup>, Dang Kinh Bac<sup>8</sup>, Alexis Beaurepaire<sup>9</sup>, Silke Beck<sup>1</sup>, Erwin Bergmeier<sup>10</sup>, Benjamin Burkhard<sup>8</sup>, Roland Brandl<sup>11</sup>, Jesus Victor Bustamante<sup>12</sup>, Adam Butler<sup>13</sup>, Jimmy Cabbigat<sup>12</sup>, Le Canh<sup>14</sup>, Josie Catindig<sup>15</sup>, Ho Chien<sup>16</sup>, Le Cuong<sup>16</sup>, Monina Escalada<sup>17</sup>, Christophe Dominik<sup>1</sup>, Markus Franzén<sup>4</sup>, Christoph Görgl<sup>1</sup>, Volker Grescho<sup>4</sup>, Sabine Grossmann<sup>4</sup>, Geoffrey Gurr<sup>18</sup>, Buyung Hadi<sup>15</sup>, Le Hai<sup>19</sup>, Alexander Harpke<sup>4</sup>, Norbert Hirneisen<sup>20</sup>, Finbarr G. Horgan<sup>15</sup>, Stefan Hotes<sup>21</sup>, Yuzuru Isoda<sup>22</sup>, Reinhold Jahn<sup>9</sup>, Helen Kettle<sup>13</sup>, Thimo Klotzbücher<sup>9</sup>, Fanny Langerwisch<sup>23</sup>, Wai-Hong Loke<sup>24</sup>, Yu-Pin Lin<sup>6</sup>, Zhong-Xian Lu<sup>25</sup>, Keng-Yeang Lum<sup>26</sup>, Damasa Magcale-Macandog<sup>27</sup>, Glenn Marion<sup>13</sup>, Leonardo Marquez<sup>7</sup>, Anika Marxen<sup>4</sup>, Robin Moritz<sup>2</sup>, Felix Müller<sup>8</sup>, Paolo Oliveira<sup>23</sup>, Jürgen Ott<sup>4</sup>, Lyubomir Penev<sup>28</sup>, Thai Pham<sup>29</sup>, Nico Radermacher<sup>10</sup>, Beatriz Rodriguez-Labajos<sup>30</sup>, Christina Sann<sup>10</sup>, Cornelia Sattler<sup>4</sup>, Martin Schädler<sup>4</sup>, Stefan Scheu<sup>31</sup>, Anja Schmidt<sup>4</sup>, Oliver Schweiger<sup>4</sup>, Ralf Seppelt<sup>1</sup>, Susanne Stoll-Kleemann<sup>32</sup>, Vera Tekken<sup>32</sup>, Kirsten Thonicke<sup>23</sup>, Andi Trisyono<sup>33</sup>, Teja Tschardt<sup>10</sup>, Manfred Türke<sup>34</sup>, Tomáš Václavík<sup>1</sup>, Doris Vetterlein<sup>4</sup>, Stefan Vidal<sup>10</sup>, Silvia Villareal<sup>15</sup>, Wolfgang Weisser<sup>34</sup>, Catrin Westphal<sup>10</sup>, Zeng-Rong Zhu<sup>35</sup>, and Martin Wiemers<sup>4</sup>, <sup>1</sup>Helmholtz Centre for Environmental Research, Leipzig, Germany, <sup>2</sup>Sustainable Europe Research Institute SERI Germany e.V., Vorsterstr, Cologne, Germany, <sup>3</sup>CGIAR Consortium, Montpellier, France, <sup>4</sup>Helmholtz Centre for Environmental Research, Halle, Germany, <sup>5</sup>Univ. of Social Sciences and Humanities, Hanoi, Vietnam, <sup>6</sup>National Taiwan Univ., Taipei, Taiwan, <sup>7</sup>Philippine Rice Research Institute, Nueva Ecija, Philippines, <sup>8</sup>Kiel Univ., Kiel, Germany, <sup>9</sup>Martin Luther Univ., Halle, Germany, <sup>10</sup>Georg August Univ., Göttingen, Germany, <sup>11</sup>Univ. of Marburg, Marburg, Germany, <sup>12</sup>LEGATO, Ifugao, Philippines, <sup>13</sup>Biomathematics & Statistics Scotland, Edinburgh, Scotland, <sup>14</sup>Vietnam Academy of Science and Technology, Hanoi, Vietnam, <sup>15</sup>International Rice Research Institute, Metro Manila, Philippines, <sup>16</sup>Southern Regional Plant Protection Center, Tien Giang, Vietnam, <sup>17</sup>Visayas State Univ., Baybay City, Philippines, <sup>18</sup>Charles Sturt Univ., Orange, Australia, <sup>19</sup>Tien Giang Univ., Tien Giang, Vietnam, <sup>20</sup>Science & Communication, Bonn, Germany, <sup>21</sup>Philipps Univ., Marburg, Germany, <sup>22</sup>Tohoku Univ., Sendai, Japan, <sup>23</sup>Potsdam Institute for Climate Impact Research, Potsdam, Germany, <sup>24</sup>CABI,

Selangor, Malaysia, <sup>25</sup>Zhejiang Academy of Agricultural Sciences, Hangzhou, China, <sup>26</sup>CABI, Kuala Lumpur, Malaysia, <sup>27</sup>Univ. of the Philippines, Los Baños, Philippines, <sup>28</sup>Bulgarian Academy of Sciences and Pensoft Publishers, Sofia, Bulgaria, <sup>29</sup>Vietnam National Museum of Nature, Hanoi, Vietnam, <sup>30</sup>Autonomous Univ. of Barcelona, Barcelona, Spain, <sup>31</sup>Technical Univ., Darmstadt, Germany, <sup>32</sup>Ernst Moritz Arndt Univ., Greifswald, Germany, <sup>33</sup>Univ. of Gadjah Mada, Yogyakarta, Indonesia, <sup>34</sup>Technical Univ., Freising, Germany, <sup>35</sup>Zhejiang Univ., Hangzhou, China

- 11:15 **2237** The two faces of arthropod biodiversity exploration for natural enemies of rice insect pests in Hainan Island, China. Qianhua Yuan<sup>1</sup>, Ducheng Cai<sup>1</sup>, **Alberto Barrion** (bertbarriontapaysr@yahoo.com)<sup>2</sup>, and Kong Luen Heong<sup>3</sup>, <sup>1</sup>Hainan Univ., Hainan, China, <sup>2</sup>De La Salle Univ., Manila, Philippines, <sup>3</sup>CABI, Selangor, Malaysia
- 11:30 **2238** Biodiversity of natural biological control agents in the agricultural landscape of irrigated low-land rice in Brunei Darussalam. **Amaniah Besar** (barc@gmail.com)<sup>1</sup>, Alberto Barrion<sup>2</sup>, and Sastroutomo Soetikno<sup>3</sup>, <sup>1</sup>Brunei Agricultural Research Center, Darussalam, Brunei, <sup>2</sup>De La Salle Univ., Manila, Philippines, <sup>3</sup>CABI, Selangor, Malaysia

### Symposium: Critical Factors Modifying the Effects of Climate Change on the Distributions of Vector-Borne Diseases

#### Room W230 B (Convention Center)

**Moderators and Organizers:** Jean Tsao<sup>1</sup> and Howard Ginsberg<sup>2</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>U.S. Geological Survey, Kingston, RI

- 9:15 **2239** Interactions of climate change with geology, infrastructure, and human demography: Implications for vectors and pathogens. **Howard Ginsberg** (hginsberg@usgs.gov), U.S. Geological Survey, Kingston, RI
- 9:45 **2240** An investigation of key abiotic and genetic factors affecting blacklegged tick population dynamics in the eastern United States. **Genevieve Pang** (gcpang@gmail.com)<sup>1</sup>, Howard Ginsberg<sup>2</sup>, Graham J. Hickling<sup>3</sup>, Nicholas Ogden<sup>4</sup>, and Jean I. Tsao<sup>1</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>U.S. Geological Survey, Kingston, RI, <sup>3</sup>Univ. of Tennessee, Knoxville, TN, <sup>4</sup>Public Health Agency of Canada, Saint-Hyacinthe, QC, Canada
- 10:00 **2241** Community ecology of mosquito vectors: Linking larval competition, climate change, and vector-borne disease. **Sarah Bowden** (sabowden@uga.edu), Univ. of Georgia, Athens, GA
- 10:15 **BREAK**
- 10:30 **2242** Effect of climate change on disease transmission by temperate vectors. **Matthew Baylis** (matthew.baylis@liverpool.ac.uk)<sup>1</sup>, Maya Wardeh<sup>1</sup>, Cyril Caminade<sup>1</sup>, Elizabeth Sutton<sup>2</sup>, Elisabeth Waldmann<sup>3</sup>, and Marcus Blagrove<sup>1</sup>, <sup>1</sup>Univ. of Liverpool, Liverpool, United Kingdom, <sup>2</sup>Univ. of Oxford, Oxford, United Kingdom, <sup>3</sup>Friedrich Alexander Univ., Erlangen, Germany



- 10:45 **2243** The impact of irrigation in arid areas of the Middle East and North Africa on the emergence of visceral leishmaniasis. **Elyes Zhioua** (elyes.zhioua@gmail.com), Pasteur Institute, Tunis, Tunisia
- 11:00 **2244** Presentation withdrawn
- 11:15 **2245** Local modulation of climate change impact on vector-borne diseases. **Uriel Kitron** (ukitron@emory.edu), Emory Univ., Atlanta, GA
- 11:45 **Discussion**

### Symposium: Department of Defense Entomology and Global Public Health: Working Together to Combat Vector Borne Disease and Protect the Environment

#### Room W222 B (Convention Center)

**Moderator and Organizer:** Mark Pomerinke, U.S. Armed Forces Pest Management Board, Silver Spring, MD

- 9:15 **2246** Military entomology: Contributions to medical entomology and global public health. **Jamie Blow** (jamie.a.blow.mil@mail.mil), Armed Forces Pest Management Board, Silver Spring, MD
- 9:30 **2247** Is military entomology evidence-based? **Steven Schofield** (steven.schofield@forces.gc.ca), Dept. of National Defence, Ottawa, ON, Canada
- 9:45 **2248** Novel use of an old technology: Thermal fogging for *Aedes aegypti* larval control. **James Cilek** (james.e.cilek.civ@mail.mil), Navy Entomology Center of Excellence, Jacksonville, FL
- 10:00 **2249** Phytochemical synergists for insecticides: Replacements for piperonyl butoxide. **Joel R. Coats** (jcoats@iastate.edu)<sup>1</sup>, Edmund Norris<sup>1</sup>, Aaron Gross<sup>2</sup>, and Lyric Bartholomay<sup>1</sup>, <sup>1</sup>Iowa State Univ., Ames, IA, <sup>2</sup>Univ. of Florida, Gainesville, FL

#### 10:15 BREAK

- 10:30 **2250** Fipronil as a systemic insecticide for vector control. **Richard Poche** (richard@genesislabs.com), Larisa Polyakova, and Daniel Hartman, Genesis Laboratories, Inc., Wellington, CO
- 10:45 **2251** Biosurveillance efforts and the public health significance of mass migration in the Syria refugee crisis. **Yvonne-Marie Linton** (linton.yvonne3@gmail.com)<sup>1</sup>, Koray Ergunay<sup>2</sup>, Filiz Gunay<sup>2</sup>, Ozge Kasap<sup>2</sup>, Luke Mitchell<sup>1</sup>, Rami Mukbel<sup>3</sup>, Nawal Hijjawi<sup>4</sup>, and Bulent Alten<sup>5</sup>, <sup>1</sup>Walter Reed Biosystematics Unit, Suitland, MD, <sup>2</sup>Hacettepe Univ., Ankara, Turkey, <sup>3</sup>Jordanian Univ. of Science and Technology, Irbid, Jordan, <sup>4</sup>Hashemite Univ., Zarqa, Jordan, <sup>5</sup>Hacettepe Univ., Beytepe, Turkey
- 11:00 **2252** The Vectormap project: A global resource combining multiple data sources used to inform vector-borne disease risk assessment. **David Pecor** (pecord@si.edu)<sup>1</sup>, Jeffrey Clark<sup>2</sup>, and Desmond Foley<sup>3</sup>, <sup>1</sup>Walter Reed Biosystematics Unit, Suitland, MD, <sup>2</sup>U.S. Army Walter Reed Army Institute of Research, Silver Spring, MD, <sup>3</sup>Walter Reed Army Institute of Research, Washington, DC

- 11:15 **2253** Navy entomology during Continuing Promise 2015: Strengthening international partnerships and advancing global public health. **James Dunford** (james.c.dunford.mil@mail.mil), Navy and Marine Corps Public Health Center, Portsmouth, VA
- 11:30 **2254** Combating vector borne disease in the Pacific. **Elizabeth Gerardo** (elizabeth.m.gerardo2.mil@mail.mil), Navy Environmental and Preventive Medicine Unit Six, Pearl Harbor, HI
- 11:45 **2255** Pathway to implementing novel technologies in Hawaii to address avian malaria. **Joshua Fisher** (joshua\_fisher@fws.gov), U.S. Fish and Wildlife Service, Honolulu, HI
- 12:00 **2256** USDA research in support of deployed military troops. **Robert Aldridge** (robert.aldridge@ars.usda.gov), Seth Britch, and Kenneth J. Linthicum, USDA - ARS, Gainesville, FL
- 12:15 **2257** Highlights of the U.S. Armed Forces Pest Management Board research program for deployed war-fighter protection against disease vectors of public health importance. **Daniel Szumlas** (daniel.e.szumlas.mil@mail.mil), Armed Forces Pest Management Board, Silver Spring, MD

### Symposium: Modern Studies of Gerromorph Insects: Behavior, Phylogeny, Physiology, and Ecology

#### Room W224 H (Convention Center)

**Moderators and Organizers:** Tetsuo Harada<sup>1</sup> and John Spence<sup>2</sup>, <sup>1</sup>Kochi Univ., Kochi, Japan, <sup>2</sup>Univ. of Alberta, Edmonton, AB, Canada

- 9:15 **2258** Photoperiodic response in body color and reproductive diapause in a waterstrider, *Limnoporus esakii*. **Shiro Nakao** (nakao@kpu.ac.jp), Kyoto Prefectural Univ., Kyoto, Japan
- 9:30 **2259** Effect of sex, hunger, and relative body size on the use of ripple signals in the interactions among water striders, *Gerris laticaudinis*. **Jae Hak Son** (dunnyson@gmail.com), Seoul National Univ., Seoul, South Korea; Univ. of Houston, Houston, TX
- 9:45 **2260** Cool coma temperature and oceanographic properties in habitat of oceanic sea skaters, *Halobates*. **Takahiro Furuki** (tfuruki9269@gmail.com), Kochi Univ., Kochi, Japan
- 10:00 **2261** Life history traits and temperature changes in accordance with global warming in a water strider, *Aquarius paludum*. **Tetsuo Harada** (haratets@kochi-u.ac.jp), Kochi Univ., Kochi, Japan
- 10:15 **BREAK**
- 10:30 **2262** Migration and dispersal patterns of semiaquatic bugs from lentic and lotic freshwater habitats. **Tomas Ditrich** (ditom@pf.jcu.cz), Univ. of South Bohemia, České Budějovice, Czech Republic
- 10:45 **2263** The biology and natural history of *Gigantometra gigas*, the Earth's most ancient gerrid, making its last stand in Hainan Island, China. **Pingying Chen** (chpingy@mail2.sysu.edu.cn), Sun Yat-sen Univ., Guangzhou, China



WEDNESDAY

11:00 **2264** Life histories, seasonal adaptation, and population dynamics of five Gerrids on a single pond: Results of a 25-year 'bug-count'. **John Spence** (jspence@ualberta.ca), Univ. of Alberta, Edmonton, AB, Canada

### Symposium: Weaving Your Web: Science Communication and Social Media for Insect Scientists

#### Room W414 A (Convention Center)

**Moderators and Organizers:** Margaret Hardy<sup>1</sup> and Gwen Pearson<sup>2</sup>, <sup>1</sup>Univ. of Queensland, Brisbane, Australia, <sup>2</sup>Purdue Univ., West Lafayette, IN

9:15 **2265** Science communication as a career: How, why, and when to build your expertise. **Gwen Pearson** (gpearso@purdue.edu), Purdue Univ., West Lafayette, IN

9:30 **2266** Evolution of a science communicator: Promoting your work and career with social media. **Aaron Pomerantz** (apomerantz@ufl.edu) and Michael Bentley, Univ. of Florida, Gainesville, FL

9:45 **2267** Web comics, entomology, and outreach education. **Carly M. Tribull** (ctribull@amnh.org), American Museum of Natural History, New York, NY

10:00 **2268** Training science communicators in Africa. **Joy Owango** (joy.owango@tcc-africa.org), Training Centre in Communication, Nairobi, Kenya

#### 10:15 BREAK

10:30 **2269** Science communication to help shape policy and funding. **Rayda Krell** (rayda.krell@earthlink.net), Rayda K. Krell, LLC, Entomological and Agricultural Communications, Ridgefield, CT

10:45 **2270** If you can sell bugs, you can sell anything: How studying and promoting insects can somehow lead to a career in television. **Phil Torres** (phillip.juan.torres@gmail.com), Al Jazeera America, Los Angeles, CA

11:00 **Discussion**

### Symposium: Insect Genetic Technologies: State of the Art and Promise for the Future

#### Room W340 B (Convention Center)

**Moderators and Organizers:** Jennifer A. Brisson<sup>1</sup> and Marcé Lorenzen<sup>2</sup>, <sup>1</sup>Univ. of Rochester, Rochester, NY, <sup>2</sup>North Carolina State Univ., Raleigh, NC

9:15 **2271** CRISPR gene drives for engineering pest populations. **Kevin Esvelt** (esvelt@mit.edu), Massachusetts Institute of Technology, Cambridge, MA

9:45 **2272** Engineered sterile insects: From lab to field. **Luke Alphey** (luke.alphey@pirbright.ac.uk), The Pirbright Institute, Woking, United Kingdom

10:00 **2273** Genetic engineering of fruit fly genomes for population control. **Alfred Handler** (al.handler@ars.usda.gov), USDA - ARS, Gainesville, FL

#### 10:15 BREAK

10:30 **2274** Decoding complex systemic protein expression patterns towards single cells using on-demand exon flipping. **Koen Venken** (kv134369@bcm.edu), Baylor College of Medicine, Houston, TX

10:45 **2275** Silkworm transgenics. **Hanfu Xu** (xuhf@swu.edu.cn), Southwest Univ., Chongqing, China

11:00 **2276** Trials and tribulations associated with transforming a non-model organism. **Marcé Lorenzen** (marce\_lorenzen@ncsu.edu), North Carolina State Univ., Raleigh, NC

11:15 **2277** Developing the CRISPR/Cas9 system in the pea aphid. **Jennifer A. Brisson** (jbrisso3@ur.rochester.edu), Univ. of Rochester, Rochester, NY

11:30 **2278** The origin of novel complex traits addressed with phylogenetic and transgenic experiments in butterflies. **Antônia Monteiro**<sup>1</sup>, **Jeffrey Oliver**<sup>2</sup>, **Nesibe Ozsu**<sup>1</sup>, **Bin Chen**<sup>3</sup>, and **Heidi Connahs** (hconnahs@gmail.com)<sup>1</sup>, <sup>1</sup>National Univ. of Singapore, Singapore, Singapore, <sup>2</sup>Yale Univ., New Haven, CT, <sup>3</sup>Chongqing Normal Univ., Chongqing, China

11:45 **2279** Functional genomics techniques in *Drosophila* and their potential application in non-model insects. **Stephanie Mohr** (smohr@genetics.med.harvard.edu)<sup>1</sup>, **Yanhui Hu**<sup>1</sup>, **Ben Housden**<sup>1</sup>, **Ben Ewen-Campen**<sup>1</sup>, **Raghuvir Viswanatha**<sup>1</sup>, **Shuailiang Lin**<sup>2</sup>, **Jianquan Ni**<sup>2</sup>, **Liz Perkins**<sup>1</sup> and **Norbert Perrimon**<sup>1,3</sup>, <sup>1</sup>Harvard Medical School, Boston, MA, <sup>2</sup>Tsinghua Univ., Beijing, China, <sup>3</sup>The Howard Hughes Medical Institute, Boston, MA

12:00 **2280** Genetic technologies in honey bees. **Martin Beye** (martin.beye@uni-duesseldorf.de), Heinrich Heine Univ., Düsseldorf, Germany

12:15 **2281** Genome-engineering with CRISPR-Cas9 in the mosquito *Aedes aegypti*. **Ben Matthews** (bmatthews@mail.rockefeller.edu)<sup>1</sup>, **Katie Kistler**<sup>1,2</sup>, and **Leslie Vosshall**<sup>1</sup>, <sup>1</sup>The Rockefeller Univ., New York, NY, <sup>2</sup>The Howard Hughes Medical Institute, New York, NY

### Symposium: Jumping Genes: Horizontal Gene Transfer in Insects and Beyond

#### Room W340 A (Convention Center)

**Moderators and Organizers:** Yannick Pauchet and Roy Kirsch, Max Planck Institute for Chemical Ecology, Jena, Germany

9:15 **2282** Lateral gene transfer from bacteria to animals, including humans. **Julie Dunning-Hotopp** (jhdhotopp@som.umaryland.edu), Univ. of Maryland, Baltimore, MD

9:45 **2283** Horizontal gene transfers and evolution of plant parasitism by invertebrates. **Etienne Danchin** (etienne.danchin@sophia.inra.fr)<sup>1</sup>, **Marie-Noëlle Rosso**<sup>2</sup>, **John Jones**<sup>3</sup>, **Annelies Haegeman**<sup>4</sup>, **Bernard Henrissat**<sup>5</sup>, and **Pierre Pontarotti**<sup>5</sup>, <sup>1</sup>Sophia Institute of Agrobiotechnology, Sophia Antipolis, France, <sup>2</sup>INRA, Marseille, France, <sup>3</sup>The James Hutton Institute, Dundee, United Kingdom, <sup>4</sup>Institute for Agricultural and Fisheries Research, Melle, Belgium, <sup>5</sup>Aix-Marseille Univ., Marseille, France

#### 10:15 BREAK

10:30 **2284** How important are bacteria-eukaryote lateral gene transfers to arthropod evolution? **John H. Werren** (werr@mail.rochester.edu), Univ. of Rochester, Rochester, NY





- 10:45 **2285** Evolutionary history of plant cell wall degrading enzymes in phytophagous beetles. **Yannick Pauchet** (ypauchet@ice.mpg.de), Roy Kirsch, André Busch, and David Heckel, Max Planck Institute for Chemical Ecology, Jena, Germany
- 11:00 **2286** Evolution of pectin breakdown in herbivorous beetles. **Roy Kirsch** (rkirsch@ice.mpg.de), Wiebke Häger, David Heckel, and Yannick Pauchet, Max Planck Institute for Chemical Ecology, Jena, Germany
- 11:15 **2287** A horizontally transferred gene enables arthropods to detoxify cyanide, a common plant defense compound. **Nicky Wybouw** (n.r.wybouw@uva.nl)<sup>1</sup>, Wannes Dermauw<sup>2</sup>, Rene Feyereisen<sup>2</sup>, and Thomas Van Leeuwen<sup>2</sup>, <sup>1</sup>Univ. of Amsterdam, Amsterdam, Netherlands, <sup>2</sup>Ghent Univ., Ghent, Belgium
- 11:30 **2288** Frequency and mechanism of horizontal transfer of transposable elements from moth to virus. **Clément Gilbert** (clement.gilbert@univ-poitiers.fr)<sup>1</sup>, Jean Peccoud<sup>1</sup>, Elisabeth Herniou<sup>2</sup>, Aurélien Chateigner<sup>2</sup>, and Richard Cordaux<sup>3</sup>, <sup>1</sup>Univ. of Poitiers, Poitiers, France, <sup>2</sup>François Rabelais Univ., Tours, France, <sup>3</sup>National Center for Scientific Research, Poitiers, France

### Symposium: Endocrine and Neural Network in Control of Physiology

#### Room W330 C (Convention Center)

**Moderators and Organizers:** Jan Veenstra<sup>1</sup> and Yoonseong Park<sup>2</sup>, <sup>1</sup>Univ. of Bordeaux, Pessac, France, <sup>2</sup>Kansas State Univ., Manhattan, KS

- 9:15 **2289** Disruption of neuropeptidergic system in arthropod pest control: Are we there yet? **Yoonseong Park** (ypark@ksu.edu), Kansas State Univ., Manhattan, KS
- 9:45 **2290** Elucidating physiological roles of the ancient glycoprotein hormone, GPA2/GPB5, and its receptor in the mosquito, *Aedes aegypti*. David Rocco, Andreea Matei, Doo Hyun Kim, and **Jean-Paul Paluzzi** (paluzzi@yorku.ca), York Univ., Toronto, ON, Canada
- 10:00 **2291** Neuropeptide signaling in the red imported fire ant in nutrition, reproduction, and division of labor. **Patricia V. Pietrantonio** (p-pietrantonio@tamu.edu), Texas A&M Univ., College Station, TX
- 10:15 BREAK**
- 10:30 **2292** Mapping the neuropeptidergic network in *Drosophila melanogaster*. **Michael Texada** (texadam@janelia.hhmi.org)<sup>1</sup> and James W. Truman<sup>2</sup>, <sup>1</sup>The Howard Hughes Medical Institute, Ashburn, VA, <sup>2</sup>Univ. of Washington, Seattle, WA
- 10:45 **2293** The *Drosophila* enteroendocrine network. **Jan Veenstra** (jan.veenstra@u-bordeaux.fr)<sup>1</sup>, Michael Texada<sup>2</sup>, and James W. Truman<sup>3</sup>, <sup>1</sup>Univ. of Bordeaux, Pessac, France, <sup>2</sup>The Howard Hughes Medical Institute, Ashburn, VA, <sup>3</sup>Univ. of Washington, Seattle, WA

- 11:00 **2294** Endocrine and neuronal control of intestinal plasticity in *Drosophila melanogaster*. Irene Miguel-Aliaga and **Jake Jacobson** (jake.jacobson@csc.mrc.ac.uk), Imperial College London, London, United Kingdom
- 11:30 **2295** Peptide-receptor couples implicated in the control of feeding and digestion in locusts. **Jozef Vanden Broeck** (jozef.vandenbroeck@bio.kuleuven.be), Catholic Univ., Leuven, Belgium
- 11:45 **2296** Neuropeptides and their potential physiological functions in the oriental fruit fly, *Bactrocera dorsalis* (Hendel). **Hongbo Jiang** (jhb8342@swu.edu.cn), Southwest Univ., Chongqing, China

### Symposium: Securing Borders While Promoting Trade: Regional Approaches to Control Agricultural Pests in the Greater Caribbean Area

#### Room W223 A (Convention Center)

**Moderator and Organizer:** Robert G. Ahern, Agricultural Health and Food Safety, San Jose, Costa Rica

- 9:15 **2297** The Greater Caribbean Safeguarding Initiative – promoting collaboration and cooperation on regional safeguarding activities to detect and mitigate the impact of plant pests and diseases. **Dennis Martin** (dennis.w.martin@aphis.usda.gov) and Andrea Simao, USDA - APHIS, Riverdale, MD
- 9:45 **2298** A model for securing borders while promoting trade: Case study of the Jamaica/USDA-APHIS preclearance. **Carol Thomas** (carol.thomas@iica.int), Inter-American Institute for Cooperation on Agriculture, Warrens, Barbados
- 10:15 BREAK**
- 10:30 **2299** Market access through a systems approach: Study of the clean stock program. **Marco González** (marco.v.gonzalez@aphis.usda.gov), USDA - APHIS, San Jose, Costa Rica
- 10:45 **2300** Thwarting the invasion: How a regional approach mitigated the impact of exotic arthropods in the greater Caribbean basin. **Wayne De Chi** (wayne.dechi@aphis.usda.gov)<sup>1</sup> and Amy L. Roda<sup>2</sup>, <sup>1</sup>USDA - APHIS, Port of Spain, Trinidad, and Tobago, <sup>2</sup>USDA - APHIS, Miami, FL
- 11:00 **2301** Modernizing agricultural health systems for improved trade and economic development in the CARIFORUM region. **Janet Lawrence** (janet.lawrence@iica.int)<sup>1</sup>, Carol Thomas<sup>1</sup>, and Robert Ahern<sup>2</sup>, <sup>1</sup>Inter-American Institute for Cooperation on Agriculture, Warrens, Barbados, <sup>2</sup>Inter-American Institute for Cooperation on Agriculture, San José, Costa Rica



**Symposium: Advances in Insect Control and in Resistance Management**

**Room W224 B (Convention Center)**

**Moderators and Organizers:** A. Rami Horowitz<sup>1</sup> and Isaac Ishaaya<sup>2</sup>, <sup>1</sup>Gilat Research Center and Katif Research Center, M.P. Negev, Israel, <sup>2</sup>Agricultural Research Organisation, Bet-Dagan, Israel

This symposium is generously sponsored by Adama Agricultural Solutions Ltd.



- 9:15 **2302** Advances in insect control and in resistance management: An overview. **Isaac Ishaaya** (vpisha@volcani.agri.gov.il)<sup>1</sup> and A. Rami Horowitz<sup>2</sup>, <sup>1</sup>Agricultural Research Organisation, Bet-Dagan, Israel, <sup>2</sup>Gilat Research Center and Katif Research Center, M.P. Negev, Israel
- 9:30 **2303** Botanical insecticides finding their place in the 21st century. **Murray B. Isman** (murray.isman@ubc.ca), The Univ. of British Columbia, Vancouver, BC, Canada
- 10:00 **2304** Advances in organic farming. **Elias Bloom** (elias.bloom@email.wsu.edu) and David Crowder, Washington State Univ., Pullman, WA
- 10:15 BREAK**
- 10:30 **2305** Disruption of insect reproductive systems as a tool in pest control. **Ally R. Harari** (aharari@volcani.agri.gov.il)<sup>1</sup>, Rakefet Sharon<sup>2</sup>, and Phyllis Weintraub<sup>3</sup>, <sup>1</sup>Agricultural Research Organisation, Bet-Dagan, Israel, <sup>2</sup>Northern Research & Development, Kiryat Shemona, Israel, <sup>3</sup>Agricultural Research Organisation, Gilat, Israel
- 10:45 **2306** Enhancing performance of biorational insecticides with novel delivery systems in tree fruit IPM. **John Wise** (wisejohn@msu.edu), Anthony Hale VanWoerkom, Srdjan Acimović, George Sundin, Bert M. Cregg, and Christine Vandervoort, Michigan State Univ., East Lansing, MI
- 11:00 **2307** Presentation withdrawn
- 11:15 **2308** Role of mixtures in bed bug management. **Yasmin Akhtar** (yasmin.akhtar@ubc.ca) and Murray B. Isman, The Univ. of British Columbia, Vancouver, BC, Canada
- 11:30 **2309** Pyrethroid resistance in *Helicoverpa armigera* conferred by the chimeric P450 CYP337B3. Nicole Joußen and **David Heckel** (heckel@ice.mpg.de), Max Planck Institute for Chemical Ecology, Jena, Germany
- 11:45 **2310** Dynamics of insecticide resistance in *Bemisia* species. **A. Rami Horowitz** (hrami@volcani.agri.gov.il)<sup>1</sup> and Isaac Ishaaya<sup>2</sup>, <sup>1</sup>Gilat Research Center and Katif Research Center, M. P. Negev, Israel, <sup>2</sup>Agricultural Research Organisation, Bet-Dagan, Israel
- 12:00 **2311** Mechanism of insecticide resistance in diamondback moth (Lepidoptera: Plutellidae) with special reference to target-site mutations. **Denise Steinbach** (denise.steinbach@bayer.com)<sup>1,2</sup> and Ralf Nauen<sup>2</sup>, <sup>1</sup>Martin Luther Univ., Halle, Germany, <sup>2</sup>Bayer CropScience, Monheim, Germany

- 12:15 **2312** Insecticide resistance and its impact on vector control. Basil Brooke<sup>1</sup> and **Mark Paine** (mark.paine@lstmed.ac.uk)<sup>2</sup>, <sup>1</sup>Wits Research Institute for Malaria, Johannesburg, South Africa, <sup>2</sup>Liverpool School of Tropical Medicine, Liverpool, United Kingdom

**Symposium: What Happens When Pest Occurrence Data is Shared: End of the World or New Horizons?**

**Room W224 E (Convention Center)**

**Moderator and Organizer:** Joseph LaForest, Univ. of Georgia, Tifton, GA

- 9:15 **2313** What happens when pest occurrence data is shared: End of the world or new horizons? **Joseph LaForest** (lafortest@uga.edu), Univ. of Georgia, Tifton, GA
- 9:30 **2314** For the greater good: Perspectives of a plant disease diagnostician on sharing data. **Carrie L. Harmon** (clharmon@ufl.edu), Univ. of Florida, Gainesville, FL
- 9:45 **2315** Perspectives of an early detection system with Citizen Science reporters. **C. T. Barger** (cbarger@uga.edu), Univ. of Georgia, Tifton, GA
- 10:00 **2316** Aggregating pest-sampling records and the advantages of using multiple data platforms. **Wendy Johnson** (wendyann@ksu.edu) and Brian McCornack, Kansas State Univ., Manhattan, KS
- 10:15 BREAK**
- 10:30 **2317** Perspectives of an extension and research network on sharing data. **Scott Isard** (sai10@psu.edu), Pennsylvania State Univ., University Park, PA
- 10:45 **2318** Perspectives of a state Department of Agriculture on data sharing. **Angie Ambourn** (angie.ambourn@state.mn.us), Monika Chandler, and Mark Abrahamson, Minnesota Dept. of Agriculture, St. Paul, MN
- 11:00 **2319** Perspectives of agribusiness intelligence. **Joe Russo** (russo@zedxinc.com), Zedx, Inc., Hamburg, PA
- 11:15 **2320** Perspectives of a network hub: Accommodating data standards and providing services for self-service exchange of information. **Rebekah Wallace** (bekahwal@uga.edu), Univ. of Georgia, Tifton, GA

**Symposium: *Sirex noctilio*: A Global Forest Insect**

**Room W330 B (Convention Center)**

**Moderators and Organizers:** Jeremy D. Allison<sup>1</sup> and Bernard Slippers<sup>2</sup>, <sup>1</sup>Natural Resources Canada, Sault Ste. Marie, ON, Canada, <sup>2</sup>Univ. of Pretoria, Pretoria, South Africa

- 9:15 **2321** Population ecology of *S. noctilio* and its biological control agents. **Juan Corley** (jcorley@bariloche.inta.gov.ar), Victoria Lantschner, Deborah Fischbein, Andres Martinez, and José Villacide, INTA, Bariloche, Argentina
- 9:30 **2322** Patterns in *Sirex noctilio*-associated tree mortality across four continents. **Flora Krivak-Tetley** (flora.e.krivak-tetley.gr@dartmouth.edu)<sup>1</sup>, Matthew Ayres<sup>1</sup>, and Andrew M. Liebhold<sup>2</sup>, <sup>1</sup>Dartmouth College, Hanover, NH, <sup>2</sup>USDA - Forest Service, Morgantown, WV



- 9:45 **2323** Important factors that limit *Sirex noctilio* in North America. **Laurel J. Haavik** (ljaavik@gmail.com)<sup>1</sup>, Kevin J. Dodds<sup>2</sup>, Kathleen Ryan<sup>3</sup>, and Jeremy Allison<sup>4</sup>, <sup>1</sup>Univ. of Kansas, Lawrence, KS, <sup>2</sup>USDA - Forest Service, Durham, NH, <sup>3</sup>Silv-Econ Ltd., Newmarket, ON, Canada, <sup>4</sup>Natural Resources Canada, Sault Ste. Marie, ON, Canada
- 10:00 **2324** Interactions of *Sirex noctilio* in North American Forests. Jeremy D. Allison<sup>1</sup>, Kevin J. Dodds<sup>2</sup>, **Laurel J. Haavik** (ljaavik@gmail.com)<sup>3</sup>, and Jean Turgeon<sup>1</sup>, <sup>1</sup>Natural Resources Canada, Sault Ste. Marie, ON, Canada, <sup>2</sup>USDA - Forest Service, Durham, NH, <sup>3</sup>Univ. of Kansas, Lawrence, KS
- 10:15 BREAK**
- 10:30 **2325** *Sirex noctilio* history and interactions in Australian plantations. **Helen Nahrung** (hnahrung@usc.edu.au)<sup>1</sup>, Manon Griffiths<sup>2</sup>, and Angus Carnegie<sup>3</sup>, <sup>1</sup>Univ. of the Sunshine Coast, Sippy Downs, Australia, <sup>2</sup>Dept. of Agriculture and Fisheries, Dutton Park, Australia, <sup>3</sup>New South Wales Dept. of Primary Industries, New South Wales, Australia
- 10:45 **2326** The global diversity of *Deladenus siricidicola*. **Osmond Mlonyeni** (osmond.mlonyemi@fab.up.ac.za)<sup>1</sup>, Katrin Fitza<sup>1</sup>, Jeff Garnas<sup>1</sup>, Jaco Greeff<sup>1</sup>, Michael Wingfield<sup>1</sup>, Brenda Wingfield<sup>1</sup>, Matthew Ayres<sup>2</sup>, Maria Lombardero<sup>3</sup>, and Bernard Slippers<sup>1</sup>, <sup>1</sup>Univ. of Pretoria, Pretoria, South Africa, <sup>2</sup>Dartmouth College, Hanover, NH, <sup>3</sup>Univ. of Santiago, Lugo, Spain
- 11:00 **2327** *Sirex-Deladenus*-environment interactions: Lessons from tens of thousands of dissections. **Brett Hurley** (brett.hurley@up.ac.za), Jeff Garnas, Bernard Slippers, and Michael Wingfield, Univ. of Pretoria, Pretoria, South Africa
- 11:15 **2328** *Sirex noctilio*-*Amylostereum-Deladenus* interactions in North America. **Ann E. Hajek** (aeh4@cornell.edu)<sup>1</sup>, Louela Castrillo<sup>1</sup>, Stefanie Kroll<sup>1</sup>, Tonya Bittner<sup>1</sup>, Jacob Henry<sup>1</sup>, Laurel J. Haavik<sup>2</sup>, Jeremy Allison<sup>3</sup>, György Csóka<sup>4</sup>, Juan Pajares<sup>5</sup>, and David Williams<sup>6</sup>, <sup>1</sup>Cornell Univ., Ithaca, NY, <sup>2</sup>Univ. of Kansas, Lawrence, KS, <sup>3</sup>Natural Resources Canada, Sault Ste. Marie, ON, Canada, <sup>4</sup>Forest Research Institute, Métrafüred, Hungary, <sup>5</sup>Univ. of Valladolid, Palencia, Spain, <sup>6</sup>USDA - APHIS, Buzzards Bay, MA
- 11:30 **2329** *Sirex noctilio* – microbial symbiont interactions and nutrition. **Brian Thompson** (brian.thompson@montana.edu), Montana State Univ., Conrad, MT
- 11:45 **2330** The genomes of *Sirex noctilio*, *Amylostereum areolatum*, and *Deladenus siricidicola*: Insights into symbiosis and invasion processes. **Alisa Postma Smidt** (alisa.postma@fab.up.ac.za), Magriet van der Nest, Osmond Mlonyeni, Katrin Fitza, Edohan Clasen, Gabriella Barnard, Sze-Huei Yek, Martin Coetzee, Michael Wingfield, Fourie Joubert, and Bernard Slippers, Univ. of Pretoria, Pretoria, South Africa
- 12:00 **2331** The chemistry between a male and a female *Sirex noctilio*. **Katalin Boroczky** (kborocz@ncsu.edu)<sup>1</sup> and Coby Schal<sup>2</sup>, <sup>1</sup>Cornell Univ., Ithaca, NY, <sup>2</sup>North Carolina State Univ., Raleigh, NC
- 12:15 **2332** *Sirex noctilio* venom and host plant interactions. **Jeffrey Dean** (jeffdean@bch.msstate.edu)<sup>1</sup>, John Bordeaux<sup>2</sup>, and Walter Lorenz<sup>2</sup>, <sup>1</sup>Mississippi State Univ., Mississippi State, MS, <sup>2</sup>Univ. of Georgia, Athens, GA

## Symposium: Medical and Veterinary Entomology in Florida

### Room W414 C (Convention Center)

**Moderator and Organizer:** Rui-De Xue, Anastasia Mosquito Control District, St. Augustine, FL

- 9:15 **2333** Program overview of USDA/ARS/Center for Medical, Agriculture, and Veterinary Entomology. **Kenneth Linthicum** (kenneth.linthicum@ars.usda.gov), USDA - ARS, Gainesville, FL
- 9:45 **2334** The Mosquito Wars: A history of Florida's war against mosquitoes. **Gordon Patterson** (patterso@fit.edu), Florida Institute of Technology, Melbourne, FL
- 10:00 **2335** Highlights of veterinary entomology in Florida. **Jerome A. Hogsette** (jerry.hogsette@ars.usda.gov), USDA - ARS, Gainesville, FL
- 10:15 BREAK**
- 10:30 **2336** *Aedes aegypti* and *Aedes albopictus* in Florida. **L. Philip Lounibos** (lounibos@ufl.edu), Univ. of Florida, Vero Beach, FL
- 10:45 **2337** Mosquito control program in Florida. **Adriane Rogers** (adriane.rogers@freshfromflorida.com), Florida Dept. of Agriculture and Consumer Services, Tallahassee, FL
- 11:00 **2338** Infectivity and importance of Florida vectors in dog heartworm transmission. **Phillip E. Kaufman** (pkaufman@ufl.edu), Univ. of Florida, Gainesville, FL
- 11:15 **2339** Presentation withdrawn
- 11:30 **2340** Benefits from applied research and collaboration in Anastasia Mosquito Control District. **Rui-De Xue** (rudyxue@yahoo.com), Anastasia Mosquito Control District, St. Augustine, FL
- 11:45 **Florida Entomological Society activity**

## Symposium: Microbiome and Vector Immunity

### Room W230 C (Convention Center)

**Moderator and Organizer:** George Dimopoulos, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

- 9:15 **2341** Tsetse's (*Glossina* sp.) symbiotic bacteria regulate host immuno-stimulatory pathways. **Brian Weiss** (brian.weiss@yale.edu), Serap Aksoy, and Joshua Benoit, Yale Univ., New Haven, CT
- 9:30 **2342** Role of the microbiome in mosquito development. **Kerri L. Coon** (kerri@uga.edu), Michael Strand, Luca Valzania, Kevin J. Vogel, and Mark R. Brown, Univ. of Georgia, Athens, GA
- 9:45 **2343** The mosquito microbiota: Implications in the control of mosquito-borne diseases. **Guido Favia** (guido.favia@unicam.it), Univ. of Camerino, Camerino, Italy
- 10:00 **2344** The mosquito microbiome: Fighting bugs with bugs. **George Dimopoulos** (gdimopo1@jhu.edu), Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
- 10:15 BREAK**



- 10:30 **2345** Tick gut microbiota and transmission of the Lyme disease agent. **Erol Fikrig** (erol.fikrig@yale.edu), Yale Univ., New Haven, CT
- 11:00 **2346** Microbiome and the healthy *Anopheles* mosquito. **Ken Vernick** (kvernick@pasteur.fr), Pasteur Institute, Paris, France

### Symposium: The Role of Microbiota in Vectors

#### Room W331 B (Convention Center)

**Moderators and Organizers:** Mariangela Bonizzoni<sup>1</sup> and Shannon Bennett<sup>2</sup>, <sup>1</sup>Univ. of Pavia, Pavia, Italy, <sup>2</sup>California Academy of Sciences, San Francisco, CA

- 9:15 **2347** The activity of the obligate mutualist *Wigglesworthia* within field-caught tsetse flies. **Rita Rio** (rita.rio@mail.wvu.edu), West Virginia Univ., Morgantown, WV
- 9:30 **2348** Exploring the role of endosymbionts in male reproductive physiology: Impact on ejaculate composition and function in the tsetse fly *Glossina m. morsitans*. **Francesca Scolari** (francesca.scolari@unipv.it)<sup>1</sup>, Grazia Savini<sup>1</sup>, Anna Malacrida<sup>1</sup>, Serap Aksoy<sup>2</sup>, and Geoffrey Attardo<sup>2</sup>, <sup>1</sup>Univ. of Pavia, Pavia, Italy, <sup>2</sup>Yale Univ., New Haven, CT
- 9:45 **2349** Paratransgenic strategies to control transmission of Chagas disease and leishmaniasis. **Ravi Durvasula** (ravi.durvasula@va.org), Univ. of New Mexico, Albuquerque, NM
- 10:00 **2350** Microbiota of *Anopheles gambiae* mosquitoes: Impacts of environmental changes and role on larval survival. **Guiyun Yan** (guiyun@uci.edu), Univ. of California, Irvine, CA
- 10:15 **BREAK**
- 10:30 **2351** Integrated analysis of miRNAs and transcriptomes in *Aedes albopictus* midgut reveals the differential expression profiles of immune-related genes during dengue virus serotype-2 infection. **Xiao-Guang Chen** (xgchen2001@hotmail.com), Southern Medical Univ., Guangzhou, China
- 10:45 **2352** Non-retroviral RNA virus integrations in *Aedes albopictus*. **Mariangela Bonizzoni** (mbonizzoni@gmail.com), Univ. of Pavia, Pavia, Italy

### Symposium: The Use of Plant Resources Against Biting Flies

#### Room W414 D (Convention Center)

**Moderators and Organizers:** Tong-Yan Zhao<sup>1</sup> and Gunter Muller<sup>2</sup>, <sup>1</sup>Beijing Institute of Microbiology & Epidemiology, Beijing, China, <sup>2</sup>The Hebrew Univ., Jerusalem, Israel

- 9:15 **2353** Attractive toxic sugar baits (ATSB): From basic science to product. **Gunter Muller** (guntercmuller@hotmail.com)<sup>1</sup> and John Beier<sup>2</sup>, <sup>1</sup>The Hebrew Univ., Jerusalem, Israel, <sup>2</sup>Univ. of Miami, Miami, FL
- 9:30 **2354** Bromeliads (Family Bromeliaceae) as habitat and potential sugar resources for mosquitoes. **Lisa L. Drake** (ldrakeamcd@gmail.com), Catherine Lippi, and Rui-De Xue, Anastasia Mosquito Control District, St. Augustine, FL

- 9:45 **2355** Flower attraction for adult mosquitoes. **Daniel L. Kline** (dan.kline@ars.usda.gov)<sup>1</sup> and Phillip E. Kaufman<sup>2</sup>, <sup>1</sup>USDA - ARS, Gainesville, FL, <sup>2</sup>Univ. of Florida, Gainesville, FL
- 10:00 **2356** Botanical based repellents against biting flies in China. **Tong-Yan Zhao** (tongyanzhao@126.com), Beijing Institute of Microbiology & Epidemiology, Beijing, China
- 10:15 **BREAK**
- 10:30 **2357** Impact of vegetation types on efficacy of ATSB against two species of *Culex* mosquitoes. **Whitney Qualls** (w.qualls@med.miami.edu)<sup>1</sup>, Rui-De Xue<sup>2</sup>, and Gunter Muller<sup>3</sup>, <sup>1</sup>Univ. of Miami, Miami, FL, <sup>2</sup>Anastasia Mosquito Control District, St. Augustine, FL, <sup>3</sup>The Hebrew Univ., Jerusalem, Israel
- 10:45 **2358** Attractive toxic sugar baits (ATSB): A new, efficient, and environmentally friendly control for malaria vectors. **Mohamed Traore** (mohamedmoumine@gmail.com), Malaria Research and Training Center, Bamako, Mali
- 11:00 **2359** Control of sand flies with attractive toxic sugar baits (ATSB). **Edita Revey** (edita@tx.technion.ac.il), Univ. of Haifa, Haifa, Israel
- 11:15 **2360** Barrier spraying for mosquito control (Diptera: Culicidae). **James Clauson** (jamesclauson@comcast.net), Beach Mosquito Control District, Panama, FL
- 11:30 **2361** Fifty plus years of integrated management of aquatic weeds and mosquitoes in Lee County, Florida. **Wayne Gale** (gale@lcmcd.org), Lee County Mosquito Control District, Lehigh Acres, FL

### Symposium: Vertebrate Host Factors: Effect on Vector Biology

#### Room W230 A (Convention Center)

**Moderators and Organizers:** Shirley Luckhart<sup>1</sup>, Luciano Moriera<sup>2</sup>, and Michael A. Riehle<sup>3</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>Oswaldo Cruz Foundation, Belo Horizonte, Brazil, <sup>3</sup>Univ. of Arizona, Tucson, AZ

- 9:15 **2362** Presentation withdrawn
- 9:30 **2363** Amino acid transceptors and the regulation of mosquito reproduction. **Immo Hansen** (immoh@nmsu.edu), New Mexico State Univ., Las Cruces, NM
- 9:45 **2364** Non-blood formulations to support the gonotrophic cycle in vector mosquitoes. **R. Jason Pitts** (j.pitts@vanderbilt.edu), Vanderbilt Univ., Nashville, TN
- 10:00 **2365** Host complement: Evasion to protect midgut and activation to shape microbiome. **Ayman Khattab** (ayman.khattab@helsinki.fi), Marta Barroso, Marija Malusev, Tiera Miettinen, Willem de Vos, and Seppo Meri, Univ. of Helsinki, Helsinki, Finland
- 10:15 **BREAK**
- 10:30 **2366** Strive to survive: Adaptive responses between the mosquito and the malaria parasite. **Stefan Kanzok** (skanzok@luc.edu), Loyola Univ., Chicago, IL
- 10:45 **2367** Targeting malaria vectors through their blood meals for malaria transmission control. **Brian D. Foy** (brian.foy@colostate.edu), Colorado State Univ., Fort Collins, CO



- 11:00 **2368** Hemozoin as an immune stimulant of the mosquito *Anopheles gambiae* response against the malaria parasite. **Maria Simões** (maria.luisa.simoese@ihmt.unl.pt)<sup>1,2</sup>, Luzia Gonçalves<sup>1</sup>, and Henrique Silveira<sup>1</sup>, <sup>1</sup>New Univ. of Lisbon, Lisbon, Portugal, <sup>2</sup>Johns Hopkins Univ., Baltimore, MD
- 11:15 **2369** Immune response and insulin signaling alter mosquito feeding behavior to enhance malaria transmission potential. **Lauren Cator** (l.cator@imperial.ac.uk)<sup>1</sup>, Jose Pietri<sup>2</sup>, Courtney Murdock<sup>3</sup>, Justin George<sup>4</sup>, Johanna Ohm<sup>5</sup>, Ed Lewis<sup>2</sup>, Thomas C. Baker<sup>5</sup>, Andrew Read<sup>5</sup>, Shirley Luckhart<sup>2</sup>, and Matthew B. Thomas<sup>5</sup>, <sup>1</sup>Imperial College London, London, United Kingdom, <sup>2</sup>Univ. of California, Davis, CA, <sup>3</sup>Univ. of Georgia, Athens, GA, <sup>4</sup>USDA - ARS, Ft. Pierce, FL, <sup>5</sup>Pennsylvania State Univ., University Park, PA

### Symposium: Molecular Bases of Behavior in Kissing Bug Vectors of Human Disease

#### Room W330 A (Convention Center)

**Moderator and Organizer:** Marcelo Lorenzo, Oswaldo Cruz Foundation, Belo Horizonte, Brazil

- 9:15 **2370** The thermal sense of disease-vector insects: On physics, receptors, and behavior. **Claudio Lazzari** (claudio.lazzari@univ-tours.fr), Univ. of Tours, Tours, France
- 9:30 **2371** Neuropeptides and olfaction in *Rhodnius prolixus*. **José Latorre-Estivalis** (josmantorres@gmail.com), Laboratory of Insect Neurobiology, La Plata, Argentina
- 9:45 **2372** Salts control feeding decisions in kissing bugs: Linking peripheral detection to behavior. **Romina Barrozo** (rbarrozo@bg.fcen.uba.ar), CONICET, Buenos Aires, Argentina
- 10:00 **2373** New pieces in the puzzle: The molecular circadian clock of *Rhodnius prolixus*. **Rafaela Bruno** (rafaelabruno@gmail.com), Oswaldo Cruz Foundation, Rio de Janeiro, Brazil
- 10:15 **BREAK**
- 10:30 **2374** The antennal transcriptome of a Chagas disease vector. **Marcelo Lorenzo** (marcelo@cpqrr.fiocruz.br), Oswaldo Cruz Foundation, Belo Horizonte, Brazil
- 10:45 **2375** Behavioral and molecular changes induced by trypanosome infection in triatomine. **Alessandra Guarneri** (guarneri@cpqrr.fiocruz.br), Oswaldo Cruz Foundation, Belo Horizonte, Brazil
- 11:00 **2376** Chemosensory transcriptomes in Chagas disease vectors: Insights to understand the domiciliation process. **Myriam Harry** (myriam.harry@egce.cnrs-gif.fr), Univ. of Paris-Sud, Gif-sur-Yvette, France

### Symposium: 9th International Symposium on the Chrysomelidae

#### Room W224 A (Convention Center)

**Moderators and Organizers:** Michael Schmitt<sup>1</sup> and Caroline S. Chaboo<sup>2</sup>, <sup>1</sup>Ernst Moritz Arndt Univ., Greifswald, Germany, <sup>2</sup>Univ. of Kansas, Lawrence, KS

- 9:15 **2377** The relationship of Galerucini and Alticini based on mitochondrial genomes (Coleoptera: Chrysomeloidea: Chrysomelidae). **RuiE Nie** (niere@ioz.ac.cn)<sup>1</sup>, Xing-Ke Yang<sup>1</sup>, and Alfried Vogler<sup>2,3</sup>, <sup>1</sup>Chinese Academy of Sciences, Beijing, China, <sup>2</sup>Imperial College London, London, United Kingdom, <sup>3</sup>The Natural History Museum, London, United Kingdom
- 9:30 **2378** Geometric morphometrics of the hindwing shape of leaf beetles: Modularity of the hindwing pattern. Jing Ren, Ming Bai, Xing-Ke Yang, and **Si-Qin Ge** (gesq@ioz.ac.cn), Chinese Academy of Sciences, Beijing, China
- 9:45 **2379** *Delocrania* Guérin, 1844, a genus at the transition from 'hispinines' to tortoise beetles (Chrysomelidae: Cassidinae s.l.). **Caroline Chaboo** (cschaboo@ku.edu), Univ. of Kansas, Lawrence, KS
- 10:00 **2380** *Oulema* taxonomy using microCT. **Michael Schmitt** (michael.schmitt@uni-greifswald.de) and Gabriele Uhl, Ernst Moritz Arndt Univ., Greifswald, Germany
- SD2381** Phylogenetic analysis on morphological characters and evolution in host-plant use of the seed beetle genus *Caryedes* (Hummel) (Coleoptera: Chrysomelidae: Bruchinae). Isaac Jorge and **Cibele Ribeiro-Costa** (cibele.ribeirocosta@gmail.com), Federal Univ. of Paraná, Curitiba, Brazil
- SD2382** Morphological phylogeny of Cassidini Gyllenhal 1813 (Coleoptera: Chrysomelidae: Cassidinae). **Sara López Pérez** (slopez.p@hotmail.com), Univ. City, Cubículo, Mexico
- 10:15 **BREAK AND POSTER SESSION**
- 10:30 **2383** Dynamics of diversification in the Bruchinae. **Geoffrey Morse** (gmorse@sandiego.edu), Univ. of San Diego, San Diego, CA
- 10:45 **2384** Recent advances in the knowledge of Mexican Alticinae. **David Furth** (furthd@si.edu), Smithsonian Institution National Museum of Natural History, Washington, DC
- 11:00 **2385** Opaque to CoL: A highly diverse coleopteran subfamily and its invisible digital footprint. **R. Wills Flowers** (rflowers7@earthlink.net), Florida A&M Univ., Tallahassee, FL
- 11:15 **2386** Fitness effects of polyandry in *Acromis sparsa* (Chrysomelidae: Cassidinae). **Paula Trillo** (ptrillo@gettysburg.edu), Gettysburg College, Gettysburg, PA
- 11:30 **2387** Chrysomelidae (Coleoptera) ecology in a tropical montane forest in Southeast Brazil. **Margarete de Macedo** (margaretevmacedo@gmail.com), Vivian Flinte, Carolina Colares, André Abejanella, Carlos Vinicius da S. Gomes, and Ricardo Monteiro, Federal Univ. of Rio de Janeiro, Rio de Janeiro, Brazil
- 11:45 **2388** Quo vadis biodiversity? Species richness after twenty years of taxonomic revision on Afrotropical Galerucinae (Coleoptera: Chrysomelidae). **Thomas Wagner** (thwagner@uni-koblenz.de), Univ. of Koblenz-Landau, Koblenz, Germany
- 12:00 **2389** Discovering a new Alticini frontier: Leaf litter- and moss-inhabiting species. **Adelita Linzmeier** (alinzmeier@yahoo.com.br), Federal Univ. of Fronteira Sul, Realeza, Brazil



**Symposium: Insect Molecular Physiology and Ecology: The Post-Genomic Era**

**Room W224 G (Convention Center)**

**Moderator and Organizer:** Klaus Hoffmann, Univ. of Bayreuth, Bayreuth, Germany

- 9:15 **2390** RNA-interference – a tool for evaluating hormonal functions in insects. **Klaus Hoffmann** (klaus.hoffmann@uni-bayreuth.de)<sup>1</sup>, Intisar Hassanien<sup>1</sup>, Laura Vannini<sup>2</sup>, Mohadmed Abdel-latief<sup>1</sup>, and Franziska Wende<sup>1</sup>, <sup>1</sup>Univ. of Bayreuth, Bayreuth, Germany, <sup>2</sup>Univ. of Siena, Siena, Italy
- 9:30 **2391** Advances in insect neuroendocrinology/physiology through genomics and peptidomics: Diuresis in *Rhodnius prolixus*. **Ian Orchard** (ian.orchard@utoronto.ca) and Angela Lange, Univ. of Toronto, Mississauga, ON, Canada
- 9:45 **2392** Bioengineering of TMOF to control mosquitoes and other insects. **Dov Borovsky** (dovborovsky@gmail.com)<sup>1</sup>, Charles A. Powell<sup>2</sup>, Robert Shatters<sup>1</sup>, Arieh Zaritsky<sup>3</sup>, and Etan Ben Dov<sup>4</sup>, <sup>1</sup>USDA - ARS, Ft. Pierce, FL, <sup>2</sup>Univ. of Florida, Ft. Pierce, FL, <sup>3</sup>Ben-Gurion Univ. of the Negev, Beer Sheva, Israel, <sup>4</sup>Achva Academic College, Beer Sheva, Israel
- 10:00 **2393** Cold case files: Molecular mechanisms of insect winter hardiness. **Kenneth Storey** (kenneth.storey@carleton.ca), Carleton Univ., Ottawa, ON, Canada
- 10:15 **BREAK**
- 10:30 **2394** The role of the circadian clock in photoperiodism of the bean bug *Riptortus pedestris*. **Shin Goto** (shingoto@sci.osaka-cu.ac.jp)<sup>1</sup> and Hideharu Numata<sup>2</sup>, <sup>1</sup>Osaka City Univ., Osaka, Japan, <sup>2</sup>Kyoto Univ., Kyoto, Japan
- 10:45 **2395** Sequestration and transport proteins in leaf beetle larvae. **Wilhelm Boland** (boland@ice.mpg.de), Max Planck Institute for Chemical Ecology, Jena, Germany
- 11:00 **2396** The coleopteran gut and targets for pest control. **Brenda Oppert** (bso@ksu.edu), Kansas State Univ., Manhattan, KS
- 11:15 **2397** Functional proteomics-assisted selection of protease inhibitors useful in plant protection against coleopteran herbivores. **Dominique Michaud** (dominique.michaud@fsaa.ulaval.ca) and Asieh Rasoolizadeh, Univ. Laval, Québec City, QC, Canada

**Symposium: The Insect Circulatory System: Vital but Widely Neglected!**

**Room W222 A (Convention Center)**

**Moderators and Organizers:** Julian F. Hillyer<sup>1</sup> and Günther Pass<sup>2</sup>, <sup>1</sup>Vanderbilt Univ., Nashville, TN, <sup>2</sup>Univ. of Vienna, Vienna, Austria

- 9:15 **2398** Development and transdifferentiation of the heart-associated alary muscles in *Drosophila*. **Manfred Frasch** (mfrasch@biologie.uni-erlangen.de), Christoph Schaub, Ingolf Reim, and Johannes März, Univ. of Erlangen, Erlangen, Germany

- 9:30 **2399** The ups and downs of cardiac contractility: How RFamides impact heart rate. **Ruthann Nichols** (nicholsr@umich.edu), Univ. of Michigan, Ann Arbor, MI
- 9:45 **2400** Mechanism and drive for the accessory hearts of the cricket ovipositor. Reinhold Hustert<sup>1</sup>, **Alexander Böhm** (a.boehm@univie.ac.at)<sup>2</sup>, and Günther Pass<sup>2</sup>, <sup>1</sup>Univ. of Göttingen, Göttingen, Germany, <sup>2</sup>Univ. of Vienna, Vienna, Austria
- 10:00 **2401** Ultrastructure of the heart in different mosquito species. **Gustavo Martins** (gmartins@ufv.br), Henrique da Silva, Ana Leodido, and Caroline Gonçalves Macedo, Federal Univ. of Viçosa, Viçosa, Brazil
- 10:15 **BREAK**
- 10:30 **2402** Structural mechanics of hemolymph circulation in mosquitoes. **Julian F. Hillyer** (julian.hillyer@vanderbilt.edu), Vanderbilt Univ., Nashville, TN
- 10:45 **2403** Circulatory and immune system interactions in a mosquito. **Leah T. Sigle** (leah.t.sigle@vanderbilt.edu) and Julian F. Hillyer, Vanderbilt Univ., Nashville, TN
- 11:00 **2404** New methods for understanding flow production in the dorsal vessel. **John Socha** (jsocha@vt.edu)<sup>1</sup>, Matthew Giarra<sup>1</sup>, Jon Harrison<sup>2</sup>, Melissa Kenny<sup>1</sup>, Laura Miller<sup>3</sup>, Craig Goergen<sup>4</sup>, and Pavlos Vlachos<sup>4</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>Arizona State Univ., Tempe, AZ, <sup>3</sup>Univ. of North Carolina, Chapel Hill, NC, <sup>4</sup>Purdue Univ., West Lafayette, IN
- 11:15 **2405** Butterfly hemolymph as a complex fluid and mechanical challenges of its flow through complex shaped channels. **Konstantin G. Kornev** (kkornev@clemson.edu), Pavel Aprelev, Chadwick Walls, Arthur Salamatin, Peter H. Adler, and Charles E. Beard, Clemson Univ., Clemson, SC

**Symposium: Psocids as Global Pests of Stored Products**

**Room W231 A (Convention Center)**

**Moderators and Organizers:** James Throne<sup>1</sup> and Christos Athanassiou<sup>2</sup>, <sup>1</sup>USDA - ARS, Parlier, CA, <sup>2</sup>Univ. of Thessaly, Nea Ionia, Greece

- 9:15 **2406** Psocids as global pests of stored products. **James Throne** (james.throne@ars.usda.gov), USDA - ARS, Parlier, CA
- 9:30 **2407** Biology and ecology of stored-product psocid pests. Christos Athanassiou<sup>1</sup>, **Nickolas Kavallieratos** (nick\_kaval@hotmail.com)<sup>2</sup>, James Throne<sup>3</sup>, and Christos Nakas<sup>1</sup>, <sup>1</sup>Univ. of Thessaly, Nea Ionia, Greece, <sup>2</sup>Agricultural Univ. of Athens, Attica, Greece, <sup>3</sup>USDA - ARS, Parlier, CA
- 9:45 **2408** Sampling, trapping, and attractants for stored-product psocid pests. **James Campbell** (james.campbell@ars.usda.gov)<sup>1</sup>, John Diaz-Montano<sup>2</sup>, Thomas Phillips<sup>3</sup>, and James Throne<sup>4</sup>, <sup>1</sup>USDA - ARS, Manhattan, KS, <sup>2</sup>Colombian Corporation for Agricultural Research, Rionegro, Colombia, <sup>3</sup>Kansas State Univ., Manhattan, KS, <sup>4</sup>USDA - ARS, Parlier, CA



WEDNESDAY

- 10:00 **2409** Chemical control of stored-product psocid pests. **Christos Athanassiou** (athanassiou@agr.uth.gr)<sup>1</sup>, James Throne<sup>2</sup>, Frank Arthur<sup>3</sup>, Nickolas Kavalieratos<sup>4</sup>, and Thomas Phillips<sup>5</sup>. <sup>1</sup>Univ. of Thessaly, Nea Ionia, Greece, <sup>2</sup>USDA - ARS, Parlier, CA, <sup>3</sup>USDA - ARS, Manhattan, KS, <sup>4</sup>Agricultural Univ. of Athens, Attica, Greece, <sup>5</sup>Kansas State Univ., Manhattan, KS
- 10:15 BREAK**
- 10:30 **2410** Alternatives to insecticides for control of stored-product psocid pests. **George Opit** (george.opit@okstate.edu), Oklahoma State Univ., Stillwater, OK
- 10:45 **2411** Mitochondrial genomes in *Liposcelis*: Minicircles with varied gene rearrangement. **Jin-Jun Wang** (jjwang7008@yahoo.com), Wei Dou, and Dan Dan Wei, Southwest Univ., Chongqing, China
- 11:00 **2412** Molecular methods for identification of stored-product psocid pests. **Zhihong Li** (lizh@cau.edu.cn)<sup>1</sup>, Qianqian Yang<sup>1</sup>, Bingyi Cui<sup>1</sup>, Aohan Pang<sup>1</sup>, Shiqian Feng<sup>1</sup>, Zuzana Kucerová<sup>2</sup>, Vaclav Stejskal<sup>2</sup>, George Opit<sup>3</sup>, and Yang Cao<sup>4</sup>. <sup>1</sup>China Agricultural Univ., Beijing, China, <sup>2</sup>Crop Research Institute, Prague, Czech Republic, <sup>3</sup>Oklahoma State Univ., Stillwater, OK, <sup>4</sup>Academy of State Administration of Grain, Beijing, China

### Symposium: Ecology and Adaptation for Survival of Termites

#### Room W331 C (Convention Center)

**Moderator and Organizer:** Kok-Boon Neoh, National Chung Hsing Univ., Taichung, Taiwan

- 9:15 **Welcoming Remarks**
- 9:30 **2413** Presentation withdrawn
- 10:00 **2414** Effects of group size and starvation on survival of *Coptotermes gestroi* foragers. **Ives Haifig** (haifig@ufu.br)<sup>1</sup> and Ana Maria Costa-Leonardo<sup>2</sup>, <sup>1</sup>Federal Univ. of Uberlândia, Monte Carmelo, Brazil, <sup>2</sup>São Paulo State Univ., Rio Claro, Brazil
- 10:15 BREAK**
- 10:30 **2415** Effect of flooding on the survival and population distribution of Formosan subterranean termites in New Orleans, Louisiana. **Mary Cornelius** (mary.cornelius@ars.usda.gov), USDA - ARS, Beltsville, MD
- 10:45 **2416** Surveillance of ectoparasitic fungus *Laboulbeniopsis termitarius* Thaxt on *Reticulitermes* spp. in Japan. **Guswenrivo Ikhsan** (ikhhsan.guswenrivo@biomaterial.lipi.go.id)<sup>1,2</sup>, Hiroki Sato<sup>3</sup>, Tsuyoshi Yoshimura<sup>1</sup>, and Izumi Fujimoto<sup>1</sup>, <sup>1</sup>Kyoto Univ., Uji, Japan, <sup>2</sup>Indonesian Institute of Sciences, West Java, Indonesia, <sup>3</sup>Forestry and Forest Products Research Institute, Ibaraki, Japan
- 11:00 **2417** Foraging activities of *Coptotermes formosanus* and *Reticulitermes flaviceps* and potential genes associated with foraging behavior through transcriptome analysis. **Dayu Zhang** (zhangdayu@zafu.edu.cn), Zhejiang A&F Univ., Hangzhou, China
- 11:15 **2418** Ecological adaptation of the sympatric *Macrotermes* spp. **Kok-Boon Neoh** (neohkokboon@nchu.edu.tw), National Chung Hsing Univ., Taichung, Taiwan

#### 12:00 Concluding Remarks

### Symposium: Novel Techniques in Urban IPM

#### Room W331 D (Convention Center)

**Moderator and Organizer:** Dong-Hwan Choe, Univ. of California, Riverside, CA

- 9:15 **2419** Semiochemical-based trapping technologies for consumer markets. **Qing-He Zhang** (qing-he@rescue.com), Sterling International, Inc., Spokane, WA
- 9:30 **2420** The use of attractants for western yellowjacket IPM. **Kathleen Campbell** (kathleen.campbell@ucr.edu), Univ. of California, Riverside, CA
- 9:45 **2421** A novel approach to insect trap design: Location of attractants. **Dangsheng Liang** (dliang@apexbait.com), Apex Bait Technologies, Inc., Santa Clara, CA
- 10:00 **2422** Enhancing biological control of citrus pests with hydrogel baits for sustainable Argentine ant, *Linepithema humile*, management. **Jia-Wei Tay** (jiawei@ucr.edu), Univ. of California, Riverside, CA
- 10:15 BREAK**
- 10:30 **2423** RNAi and baiting: Novel techniques for Argentine ant control. **Kevin Welzel** (kwelz001@ucr.edu), Univ. of California, Riverside, CA
- 10:45 **2424** The trail pheromone, neurohormone, and application of RNAi to control the fire ant. **Man-Yeon Choi** (mychoi@ars.usda.gov)<sup>1</sup> and Robert Vander Meer<sup>2</sup>, <sup>1</sup>USDA - ARS, Corvallis, OR, <sup>2</sup>USDA - ARS, Gainesville, FL
- 11:00 **2425** Microbes as tools and targets for termite control. **Chinmay Tikhe** (cvtikhe@gmail.com)<sup>1</sup>, Chris Gissendanner<sup>2</sup>, and Claudia Husseneder<sup>3</sup>, <sup>1</sup>Louisiana State Univ. AgCenter, Baton Rouge, LA, <sup>2</sup>Univ. of Louisiana, Monroe, LA, <sup>3</sup>Louisiana State Univ., Baton Rouge, LA
- 11:15 **2426** Dummy-egg carrying provides an effective pesticide delivery system for termite control. **Kenji Matsuura** (kenjijpn@kais.kyoto-u.ac.jp), Kyoto Univ., Kyoto, Japan

### Graduate Student Oral Competition: Biological Control and Insect Pathology: Biological Control

#### Room W240 A (Convention Center)

**Moderators:** Lisia de Lima Matos<sup>1</sup> and Anthony S. DiMiglio<sup>2</sup>, <sup>1</sup>Chicago, IL, <sup>2</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA

- 9:15 **2427** Population dynamics, vertical distribution, and natural parasitism of eggs of *Chrysodeixis includens* by *Trichogramma* spp. in soybean. **Diego Fraga** (diegoffraga@gmail.com)<sup>1</sup>, Cesar Rodriguez-Saona<sup>2</sup>, Antonio Busoli<sup>1</sup>, Oniel Aguirre-Gil<sup>1</sup>, and Leandro Souza<sup>1</sup>, <sup>1</sup>São Paulo State Univ., Jaboticabal, Brazil, <sup>2</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ
- 9:30 **2428** Storage strategies for a factitious host *Corcyra cephalonica* (Stainton) (Lepidoptera: Pyralidae). **Enakshi Ghosh** (enakshi.ghosh1@gmail.com) and Chandish Ballal, National Bureau of Agricultural Insect Resources, Bangalore, India



- 9:45 **2429** The effects of a nutrient-rich diet on the fertility of the parasitic wasp *Tamarixia radiata* Waterston (Hymenoptera: Eulophidae). **Dani Ruais** (daniruais@gmail.com), Anna Soper, and Valerie Mellano, California State Polytechnic Univ., Pomona, CA
- 10:00 **2430** Assessing the efficacy of hymenopteran parasitoids as biological control agents of cutworms (Lepidoptera: Noctuidae) in field crops in Canada. **R. W. M. Udari Wanigasekara** (udari\_madu@yahoo.com)<sup>1</sup> and Barbara Sharanowski<sup>2</sup>, <sup>1</sup>Univ. of Manitoba, Manitoba, MB, Canada, <sup>2</sup>Univ. of Central Florida, Orlando, FL
- 10:15 BREAK**
- 10:30 **2431** Agroecology of a salad crop pest in New Zealand. **Ryan Rayl** (ryan.rayl@lincolnuni.ac.nz), Lincoln Univ., Prebbleton, New Zealand
- 10:45 **2432** Evaluation of cool-season and warm-season intercrops for aphid biological control in organic pecan orchards. **Tzu-Chin Liu** (jean2036@uga.edu) and James Dutcher, Univ. of Georgia, Tifton, GA
- 11:00 **2433** Testing the intermediate landscape complexity hypothesis for augmentative biological control. **Ricardo Perez-Alvarez** (mrp245@cornell.edu)<sup>1</sup>, Brian A. Nault<sup>2</sup>, and Katja Poveda<sup>1</sup>, <sup>1</sup>Cornell Univ., Ithaca, NY, <sup>2</sup>Cornell Univ., Geneva, NY
- 11:15 **2434** Evaluation of the *Aphidius colemani*-*Rhopalosiphum padi* banker plant system in Oklahoma greenhouse production. **Tracey Payton Miller** (tracey.payton@okstate.edu)<sup>1</sup>, Eric Rebek<sup>1</sup>, Steven Frank<sup>2</sup>, Kris Giles<sup>1</sup>, and Mike Schnelle<sup>1</sup>, <sup>1</sup>Oklahoma State Univ., Stillwater, OK, <sup>2</sup>North Carolina State Univ., Raleigh, NC
- 11:30 **2435** Effect of land-use intensity on aphid natural enemies in Paysandú, Uruguay. **Sara Emery** (semery@berkeley.edu)<sup>1</sup>, Adela Ribeiro<sup>2</sup>, and Nicholas Mills<sup>1</sup>, <sup>1</sup>Univ. of California, Berkeley, CA, <sup>2</sup>Univ. of the Republic, Paysandú, Uruguay
- 11:45 **2436** The influence of landscape complexity and natural enemy movement on soybean aphid populations in Manitoba, Canada. **K. G. L. I. Samaranayake** (ishansamaranayake@yahoo.com) and Alejandro Costamagna, Univ. of Manitoba, Winnipeg, MB, Canada

### Graduate Student Oral Competition: Ecology and Population Dynamics: Ecology and Evolution

#### Room W240 C (Convention Center)

**Moderators:** James Nieh<sup>1</sup> and Jeremy Greene<sup>2</sup>, <sup>1</sup>Univ. of California, San Diego, CA, <sup>2</sup>Clemson Univ., Blackville, SC

- 9:15 **2437** Multitrophic interactions: The influence of *Arsenophonus* on *Toxoptera citricida* (Hemiptera: Aphididae). **Bianca Soares** (biancarbogim@yahoo.com.br) and Fernando Cônsoli, Univ. of São Paulo, Piracicaba, Brazil
- 9:30 **2438** Sex makes them sleepy: The impact of aphid sexuality on parasitoid diapause. **Kévin Tougeron** (kevin.tougeron@umontreal.ca)<sup>1,2</sup>, Jacques Brodeur<sup>1</sup>, Joan van Baaren<sup>2</sup>, and Cécile Le Lann<sup>2</sup>, <sup>1</sup>Univ. of Montréal, Montréal, QC, Canada, <sup>2</sup>Univ. of Rennes, Rennes, France

- 9:45 **2439** Microbial ecology of the bee brood cell. **Kristen Brochu** (kb532@cornell.edu) and Bryan N. Danforth, Cornell Univ., Ithaca, NY
- 10:00 **2440** Attack levels by internal and external parasitoids provide conflicting evidence for the direction of host shift in diverging populations of gall midges. **Noa Keidar** (noakeidar@gmail.com) and Netta Dorchin, Tel Aviv Univ., Tel Aviv, Israel
- 10:15 BREAK**
- 10:30 **2441** Disentangling associational effects: Resource density and resource frequency affect insect search behavior in complex environments. **Thomas Verschut** (thomas.verschut@su.se)<sup>1</sup>, Paul Becher<sup>2</sup>, Peter Anderson<sup>2</sup>, and Peter Hambäck<sup>1</sup>, <sup>1</sup>Stockholm Univ., Stockholm, Sweden, <sup>2</sup>Swedish Univ. of Agricultural Sciences, Alnarp, Sweden
- 10:45 **2442** Post-capture activity of wild-caught *Drosophila simulans* as a signature of age and activity in wild populations. **Sarah Silverman** (ssilverman@ucdavis.edu)<sup>1</sup>, Congwei Yu<sup>2</sup>, Ed Lewis<sup>1</sup>, and James R. Carey<sup>1</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>China Agricultural Univ., Beijing, China
- 11:00 **2443** Connections between the dung arthropod community and cattle management practices in eastern South Dakota. **Jacob Pecenka** (jacob.pecenka@gmail.com)<sup>1</sup> and Jonathan Lundgren<sup>2</sup>, <sup>1</sup>South Dakota State Univ., Brookings, SD, <sup>2</sup>Ecdysis Foundation, Estelline, SD
- 11:15 **2444** Presentation withdrawn
- 11:30 **2445** Phage diversity and function in a tripartite symbiosis in pea aphids. **Jayce W. Brandt** (jayce@uga.edu), Kerry M. Oliver, and Michael Strand, Univ. of Georgia, Athens, GA
- 11:45 **2446** Assessing morphological differentiation between host-associated populations of *Monelliopsis pecanis* (Hemiptera: Aphididae). **Kyle Harrison** (kharrison@tamu.edu) and Raul F. Medina, Texas A&M Univ., College Station, TX
- 12:00 **2447** Presentation withdrawn

### Graduate Student Oral Competition: Ecology and Population Dynamics: Pollinators

#### Room W240 B (Convention Center)

**Moderators:** Troy D. Anderson<sup>1</sup> and Dayna Collett<sup>2</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>Oklahoma State Univ., Stillwater, OK

- 9:15 **2448** The ecology and identification of common parasitoids (Diptera: Conopidae: *Physocephala*) in central and mid-coast Maine and behavioral changes of the bumble bee hosts. **Kalyn Bickerman-Martens** (kalyn.bickerman@umit.maine.edu) and Frank Drummond, Univ. of Maine, Orono, ME
- 9:30 **2449** *Bombus impatiens* in the pumpkin patch: A tale of population trends and pollination services featuring three years of molecular analysis and visitation rates. **R. Carley Miller** (rxm452@psu.edu)<sup>1</sup>, James Strange<sup>2</sup>, Shelby J. Fleischer<sup>1</sup>, Amber D. Tripodi<sup>2</sup>, and Dana Roberts<sup>1</sup>, <sup>1</sup>Pennsylvania State Univ., University Park, PA, <sup>2</sup>USDA - ARS, Logan, UT





- 9:45 **2450** Effects of habitat enhancement on bumble bee (*Bombus* spp.) foraging preferences and common eastern bumble bee (*Bombus impatiens*) population density. **Knute Gundersen** (gundersenknute@gmail.com)<sup>1</sup>, James Strange<sup>2</sup>, and Rufus Isaacs<sup>1</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>USDA - ARS, Logan, UT
- 10:00 **2451** The relationship between pollen diversity and foraging effort in honey bees and bumble bees. **Danny Minahan** (dfminahan@wisc.edu)<sup>1</sup> and Johanne Brunet<sup>2</sup>, <sup>1</sup>Univ. of Wisconsin, Madison, WI, <sup>2</sup>USDA - ARS, Madison, WI
- 10:15 BREAK**
- 10:30 **2452** Pollinator habitat along highway rights-of-way: Preliminary results of a comparison of pollinator communities under different meadow management regimes and quantification of common roadside pollutants in floral resources of adjacent wildflowers. **Lisa Kuder** (lkuder@umd.edu), Univ. of Maryland, College Park, MD
- 10:45 **2453** How many flowers are enough? Increasing floral resources to maintain pollinator diversity (syrphid flies and halictid bees) in an urban landscape. **Maria-Carolina Simao** (simao@umich.edu), Jill Matthijs, and Ivette Perfecto, Univ. of Michigan, Ann Arbor, MI
- 11:00 **2454** Palynological analysis of pollen collected by honey bees (*Apis mellifera*) in developed areas in four regions of the United States. Juliana Rangel<sup>1</sup>, **Pierre Lau** (plau0168@tamu.edu)<sup>2</sup>, Zachary Y. Huang<sup>3</sup>, Vaughn Bryant<sup>1</sup>, Ana Cabrera<sup>4</sup>, Daniel Schmehl<sup>4</sup>, Joseph Sullivan<sup>5</sup>, and James D. Ellis<sup>6</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Texas A&M Univ., Bryan, TX, <sup>3</sup>Michigan State Univ., East Lansing, MI, <sup>4</sup>Bayer Crop-Science, Research Triangle Park, NC, <sup>5</sup>Ardea Consulting, Woodland, CA, <sup>6</sup>Univ. of Florida, Gainesville, FL
- 11:15 **2455** Who does it better? Diversity and contributions of wild sour cherry (*Prunus cerasus*) pollinators with comparisons to managed bees. **Charlie Bailey** (charliep.bailey@yahoo.ca)<sup>1</sup> and Cory Sheffield<sup>2</sup>, <sup>1</sup>Univ. of Regina, Regina, SK, Canada, <sup>2</sup>Royal Saskatchewan Museum, Regina, SK, Canada
- 11:30 **2456** Pollination biology of two native orchid (Orchidaceae) species in south Florida. **Haleigh Ray** (hray12@ufl.edu) and Jennifer Gillett-Kaufman, Univ. of Florida, Gainesville, FL
- 11:45 **2457** Presentation withdrawn
- 9:30 **2459** Candidate genes for diapause induction in speckled wood (*Pararge aegeria*) population crosses. **Peter Pruißscher** (peter.pruisscher@zoologi.su.se), Sören Nylin, Karl Gotthard, and Christopher Wheat, Stockholm Univ., Stockholm, Sweden
- 9:45 **2460** Advances in finding Alba: The supergene affecting life history and color polymorphism in a *Colias* butterfly. **Alyssa Woronik** (alyssa.woronik@zoologi.su.se)<sup>1</sup>, Constanti Stefanescu<sup>2</sup>, and Christopher Wheat<sup>1</sup>, <sup>1</sup>Stockholm Univ., Stockholm, Sweden, <sup>2</sup>Natural History Museum, Granollers, Spain
- 10:00 **2461** Macroevolutionary trade-offs in plant-feeding Hemiptera and Lepidoptera. **Daniel Peterson** (daniel.alex.peterson@gmail.com)<sup>1</sup>, Nate Hardy<sup>2</sup>, and Benjamin Normark<sup>1</sup>, <sup>1</sup>Univ. of Massachusetts, Amherst, MA, <sup>2</sup>Auburn Univ., Auburn, AL
- 10:15 BREAK**
- 10:30 **2462** The ontogeny of intersexual communication in damselflies: Combining experimental and phylogenetic approaches. **Beatriz Willink** (beatriz.willink@biol.lu.se), Katie Duryea, and Erik Svensson, Lund Univ., Lund, Sweden
- 10:45 **2463** The role of gene expression evolution in scale insect host use adaptation. **Nicholas Christodoulides** (nzc0035@auburn.edu) and Nate Hardy, Auburn Univ., Auburn, AL
- 11:00 **2464** Population genetic structures of *Laodelphax striatellus* (Fallén) and *Sogatella furcifera* (Horváth) (Hemiptera: Delphacidae) in Asia. **Hwa Yeun Nam** (jessienam@snu.ac.kr), Byungin Sohn, and Joon-Ho Lee, Seoul National Univ., Seoul, South Korea
- 11:15 **2465** Invasion pathways and population genetics of the coconut rhinoceros beetle (*Oryctes rhinoceros*). **Jonathan Bradley Reil** (jbreil@hawaii.edu), Michael San Jose, and Daniel Rubinoff, Univ. of Hawai'i, Honolulu, HI
- 11:30 **2466** Using next generation sequencing to uncover population structure and species boundaries in *Bactrocera dorsalis* and its sister species. **Michael San Jose** (mdsjose@hawaii.edu)<sup>1</sup>, Luc Leblanc<sup>2</sup>, Scott Geib<sup>3</sup>, Norman Barr<sup>4</sup>, and Daniel Rubinoff<sup>1</sup>, <sup>1</sup>Univ. of Hawai'i, Honolulu, HI, <sup>2</sup>Univ. of Idaho, Moscow, ID, <sup>3</sup>USDA - ARS, Hilo, HI, <sup>4</sup>USDA - APHIS, Edinburg, TX
- 11:45 **2467** Gene regulatory differences among monogyne and polygyne red imported fire ants (*Solenopsis invicta*). **Joan King** (joanie.mars@uga.edu)<sup>1</sup>, Sasha Kay<sup>2</sup>, Kenneth Ross<sup>2</sup>, and Brendan Hunt<sup>2</sup>, <sup>1</sup>Univ. of Georgia, Athens, GA, <sup>2</sup>Univ. of Georgia, Griffin, GA
- 12:00 **2468** Social pheromones: Mapping their effect on the insect brain. **Justin Croft** (jcroft3@uwo.ca), Alison Camiletti, and Graham Thompson, Univ. of Western Ontario, London, ON, Canada
- 12:15 **2469** What's the buzz in *Drosophila* genome size evolution: A phylogenetic comparison of *Sophophora* and *Drosophila*. **Carl Hjelman** (cehjelman09@tamu.edu) and J. Spencer Johnston, Texas A&M Univ., College Station, TX

## Graduate Student Oral Competition: Genetics and Evolutionary Entomology: Population Genetics

### Room W232 B (Convention Center)

**Moderators:** Nate Hardy<sup>1</sup> and Stephen Losey<sup>2</sup>, <sup>1</sup>Auburn Univ., Auburn, AL, <sup>2</sup>Kansas State Univ., Manhattan, KS

- 9:15 **2458** Entomological time travel: Reconstructing the invasion history of the buckeye butterflies (genus *Junonia*) from Florida, USA. **Melanie Lalonde** (umlalonm@myumanitoba.ca) and Jeffrey Marcus, Univ. of Manitoba, Winnipeg, MB, Canada



Graduate Student Oral Competition: Invasive and Exotic Entomology: Invasives

Room W240 D (Convention Center)

**Moderators:** Chris J. Holderman<sup>1</sup> and John Cho<sup>2</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Arizona State Univ., Tempe, AZ

- 9:15 **2470** Distribution of the genus *Lissorhoptrus* (Coleoptera: Curculionidae) in the world and possibility of further invasions into China. **Chunyan Jiang** (jiangchunyan2006@163.com)<sup>1</sup>, Runzhi Zhang<sup>1</sup>, Muhammad Haseeb<sup>2</sup>, and Charles W. O'Brien<sup>3</sup>, <sup>1</sup>Chinese Academy of Sciences, Beijing, China, <sup>2</sup>Florida A&M Univ., Tallahassee, FL, <sup>3</sup>Univ. of Arizona, Tucson, AZ
- 9:30 **2471** Presentation withdrawn
- 9:45 **2472** Knowledge of California residents on Asian citrus psyllid (*Diaphorina citri*) and citrus greening disease. **Ashley Van Vliet** (acvanvliet@cpp.edu), Anna Soper, and Valerie Mellano, California State Polytechnic Univ., Pomona, CA
- 10:00 **2473** First report of invasive populations of Asian longhorned beetle in Korea, with evidence of multiple invasions. **Seunghyun Lee** (chiyark@snu.ac.kr) and Seunghwan Lee, Seoul National Univ., Seoul, South Korea
- 10:15 BREAK**
- 10:30 **2474** Determination of the distribution and factors predicting emerald ash borer (*Agrilus planipennis*) infestation in white fringetrees (*Chionanthus virginicus*). **Donnie Peterson** (peterson.143@wright.edu) and Don Cipollini, Wright State Univ., Dayton, OH
- 10:45 **2475** Can clusters of treated ash trees protect neighboring untreated ash and maintain recruitment during the emerald ash borer invasion? **Erin M. O'Brien** (obrien.501@osu.edu) and Daniel Herms, The Ohio State Univ., Wooster, OH
- 11:00 **2476** Influence of temperature on the reproductive and developmental biology of *Ontsira mellipes* (Hymenoptera: Braconidae) when reared on the exotic host *Anoplophora glabripennis* (Coleoptera: Cerambycidae). **Julian Golec** (juliang@udel.edu)<sup>1</sup>, Jian Duan<sup>2</sup>, Judith A. Hough-Goldstein<sup>1</sup>, and Ellen M. Aparicio<sup>2</sup>, <sup>1</sup>Univ. of Delaware, Newark, DE, <sup>2</sup>USDA - ARS, Newark, DE
- 11:15 **2477** Pheromone and general odorant detection by the Asian longhorned beetle (*Anoplophora glabripennis*) measured via single sensillum recording (SSR). **Loyal Hall** (lphl@psu.edu) and Thomas C. Baker, Pennsylvania State Univ., University Park, PA
- 11:30 **2478** Responses of parasitoid wasps to eggs and pheromones of cerambycid beetles in field bioassays. **Todd Johnson** (tdjohns2@illinois.edu)<sup>1</sup> and Lawrence M. Hanks<sup>2</sup>, <sup>1</sup>Univ. of Illinois, Champaign, IL, <sup>2</sup>Univ. of Illinois, Urbana, IL
- 11:45 **2479** Contrasting the species diversity and value of urban forests in inner-city and suburban Cleveland, OH. **Christopher B. Riley** (riley.595@osu.edu)<sup>1</sup>, Daniel Herms<sup>2</sup>, and Mary Gardiner<sup>2</sup>, <sup>1</sup>The Ohio State Univ., Columbus, OH, <sup>2</sup>The Ohio State Univ., Wooster, OH

Graduate Student Oral Competition: Physiology and Biochemistry: Abiotic/Biotic Effects

Room W232 C (Convention Center)

**Moderators:** Elsa Youngsteadt<sup>1</sup> and Alana Pindar<sup>2</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>Univ. of Guelph, Guelph, ON, Canada

- 9:15 **2480** Desiccation resistance in tropical insects: Causes and mechanisms underlying variability in a Panama ant community. **Jelena Bujan** (jelena.bujan@ou.edu)<sup>1</sup>, Stephen Yanoviak<sup>2</sup>, and Michael Kaspari<sup>1</sup>, <sup>1</sup>Univ. of Oklahoma, Norman, OK, <sup>2</sup>Univ. of Louisville, Louisville, KY
- 9:30 **2481** Higher upper lethal temperatures of winter insects compared to summer. **Henry Vu** (henry.vu.16@nd.edu) and John Duman, Univ. of Notre Dame, South Bend, IN
- 9:45 **2482** Cold tolerance of the crape myrtle bark scale, *Eriococcus lagerstroemiae* Kuwana (Hemiptera: Eriococcidae), an exotic pest in the southeastern United States. **Zinan Wang** (zwang67@isu.edu)<sup>1</sup>, Rodrigo Diaz<sup>1</sup>, and Yan Chen<sup>2</sup>, <sup>1</sup>Louisiana State Univ., Baton Rouge, LA, <sup>2</sup>Louisiana State Univ., Hammond, LA
- 10:00 **2483** Effects of cold acclimation on structure and transport function in insect ionoregulatory tissues (or, everything you always wanted to know about cricket rectums but were afraid to ask). **Lauren Des Marteaux** (ldesmart@uwo.ca) and Brent Sinclair, Univ. of Western Ontario, London, ON, Canada
- 10:15 BREAK**
- 10:30 **2484** Sublethal effects of cold on emerald ash borer (Coleoptera: Buprestidae): Energy reserves and flight capacity. **Dylan Tussey** (tusse001@umn.edu)<sup>1</sup>, Brian Aukema<sup>1</sup>, and Robert Venette<sup>2</sup>, <sup>1</sup>Univ. of Minnesota, St. Paul, MN, <sup>2</sup>USDA - Forest Service, St. Paul, MN
- 10:45 **2485** Investigating the molecular basis of pyrethroid selectivity at acarine sodium channels. **Alix Blockley** (alix.blockley@rothamsted.ac.uk)<sup>1</sup>, Joel Gonzalez-Cabrera<sup>2</sup>, Melania Akkoes<sup>3</sup>, T. G. Emyr Davies<sup>1</sup>, B. A. Wallace<sup>4</sup>, Andreas Turberg<sup>3</sup>, Ian Mellor<sup>5</sup>, Lin Field<sup>1</sup>, and Martin Williamson<sup>1</sup>, <sup>1</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>2</sup>Univ. of Valencia, Valencia, Spain, <sup>3</sup>Bayer CropScience, Monheim am Rhein, Germany, <sup>4</sup>Univ. of London, London, United Kingdom, <sup>5</sup>Univ. of Nottingham, Nottingham, United Kingdom
- 11:00 **2486** Using RNA-seq to understand the endocrine control of condition dependent weapons in the Asian rhinoceros beetle (*Trypoxylus dichotomus*). **Robert Zinna** (robert.zinna@wsu.edu)<sup>1</sup>, Laura C. Lavine<sup>1</sup>, Doug Emlen<sup>2</sup>, and Ian Dworkin<sup>3</sup>, <sup>1</sup>Washington State Univ., Pullman, WA, <sup>2</sup>Univ. of Montana, Missoula, MT, <sup>3</sup>McMaster Univ., Hamilton, ON, Canada
- 11:15 **2487** Advances in western corn rootworm, *Diabrotica virgifera virgifera*, artificial diets. **Man Huynh** (mphd32@mail.missouri.edu)<sup>1,2</sup>, Thomas A. Coudron<sup>3</sup>, Lisa Meihls<sup>3</sup>, Stephen L. Lapointe<sup>4</sup>, Randall P. Niedz<sup>4</sup>, and Bruce Hibbard<sup>3</sup>, <sup>1</sup>Univ. of Missouri, Columbia, MO, <sup>2</sup>Can Tho Univ., Can Tho, Vietnam, <sup>3</sup>USDA - ARS, Columbia, MO, <sup>4</sup>USDA - ARS, Ft. Pierce, FL



- 11:30 **2488** Metabolic differences between fast/slow life histories of damselflies (Odonata: Zygoptera). **Tanya Dann** (tanyadannartist@gmail.com)<sup>1</sup>, Laura Ferguson<sup>2</sup>, Ruth Jakobs<sup>3</sup>, Gerry Closs<sup>1</sup>, and Brent Sinclair<sup>2</sup>, <sup>1</sup>Univ. of Otago, Dunedin, New Zealand, <sup>2</sup>Univ. of Western Ontario, London, ON, Canada, <sup>3</sup>Bielefeld Univ., Bielefeld, Germany
- 11:45 **2489** Control of vitellogenesis in *Bactericera cockerelli* (Sulc). **Freddy Ibanez** (fibanez@neo.tamu.edu) and Cecilia Tamborindeguy, Texas A&M Univ., College Station, TX
- 12:00 **2490** Gut symbionts of a hemipteran insect, *Riptortus pedestris*, play essential roles in juvenile hormone-mediated host development and reproduction. **Jun Beom Lee** (wind2000net@gmail.com)<sup>1</sup>, Kyoung-Eun Park<sup>1</sup>, Ho Am Jang<sup>1</sup>, Ho Jeong Eo<sup>1</sup>, Chan-Hee Kim<sup>1</sup>, Toyomi Kotaki<sup>2</sup>, Yoshitomo Kikuchi<sup>3</sup>, and Bok-Luel Lee<sup>1</sup>, <sup>1</sup>Pusan National Univ., Busan, South Korea, <sup>2</sup>National Institute of Agrobiological Sciences, Tsukuba, Japan, <sup>3</sup>National Institute of Advanced Industrial Science and Technology, Sapporo, Japan
- 12:15 **2491** Cardiac regulation of viral infection in a model social insect. **Scott O'Neal** (onealst@vt.edu)<sup>1</sup>, Daniel R. Swale<sup>2</sup>, Jeffrey Bloomquist<sup>3</sup>, and Troy D. Anderson<sup>1</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>Louisiana State Univ., Baton Rouge, LA, <sup>3</sup>Univ. of Florida, Gainesville, FL
- 10:30 **2496** Oviposition propensity of *Bactrocera dorsalis* (Hendel) (Diptera: Tephritidae) on citrus varieties in South Africa: Implications for export markets. **Charmaine Theron** (cdtheron@zoology.up.ac.za)<sup>1</sup>, Aruna Manrakhan<sup>2</sup>, and Christopher Weldon<sup>1</sup>, <sup>1</sup>Univ. of Pretoria, Pretoria, South Africa, <sup>2</sup>Citrus Research International, Nelspruit, South Africa
- 10:45 **2497** An ecoinformatics approach to citrus pest management in California. **Bodil Cass** (bncass@ucdavis.edu) and Jay Rosenheim, Univ. of California, Davis, CA
- 11:00 **2498** Auchenorrhyncha (Hemiptera: Homoptera) as potential pests in citrus, olive, and tomato crops in Greece. **Antonios Tsagkarakis** (atsagarakis@aau.gr)<sup>1</sup>, Argyro Ampatzi<sup>1</sup>, Dimitrios Afentoulis<sup>1</sup>, Aikaterini Chaldeou<sup>1</sup>, Argyro Kalaitzaki<sup>2</sup>, Evangelos Kontogiannis<sup>1</sup>, Aikaterini Koutsogiannopoulou<sup>1</sup>, Zoi Thanou<sup>1</sup>, Konstantina Voulgaraki<sup>1</sup>, and Sakis Drosopoulos<sup>1</sup>, <sup>1</sup>Agricultural Univ. of Athens, Athens, Greece, <sup>2</sup>Institute of Olive Tree, Subtropical Crops & Viticulture, Chania, Greece
- 11:15 **2499** Biology of *Thrips tabaci* Lindeman on onion cultivars. **Mohammad Shafiq Ansari** (mohdsansari@yahoo.com), Maher Moraiet, and Rabiya Basri, Aligarh Muslim Univ., Aligarh, India
- 11:30 **2500** Characterization of tadpole shrimp (*Triops longicaudatus*) injury to rice and its effect on rice seedling establishment. **Luis Espino** (laespino@ucanr.edu), Univ. of California Cooperative Extension, Colusa, CA
- 11:45 **2501** *Spodoptera frugiperda* damage potential and larval response during vegetative and reproductive stages of maize development. **Paulo da Silva** (paulor.silva@pioneer.com)<sup>1</sup>, Vinicius de Faria<sup>1</sup>, Taline das Neves<sup>2</sup>, and Josemar Foresti<sup>1</sup>, <sup>1</sup>DuPont do Brasil S.A., Planaltina, Brazil, <sup>2</sup>DuPont do Brasil S.A., Itumbiara, Brazil
- 12:00 **2502** Impact of cover cropping on the epigeal arthropod community in dryland Nebraska cornfields. **Michael J. Eskelson** (michael.eskelson@unl.edu)<sup>1</sup>, Charles A. Burr<sup>2</sup>, and Julie Peterson<sup>2</sup>, <sup>1</sup>Univ. of Nebraska, Ogallala, NE, <sup>2</sup>Univ. of Nebraska, North Platte, NE
- 12:15 **2503** Impact of perennial non-crop habitat at center-pivot irrigation corners on ecosystem services for adjacent maize fields. **Julie Peterson** (julie.peterson@unl.edu) and Kayla A. Mollet, Univ. of Nebraska, North Platte, NE
- 12:30 **2504** Indian tropical root and tuber crops entomology: Challenges and strategies. **Palaniswami Mari** (palaniswamims@gmail.com), Indian Council of Agricultural Research, Trivandrum, India

## Contributed Papers: Agricultural and Forest Entomology: Fruits, Vegetables, Cereals, and Grains

### Room W231 C (Convention Center)

**Moderators:** Michael J. Eskelson<sup>1</sup> and Charmaine Theron<sup>2</sup>, <sup>1</sup>Univ. of Nebraska, Ogallala, NE, <sup>2</sup>Univ. of Pretoria, Pretoria, South Africa

- 9:15 **2492** Exclusion nets for pest management in northeastern apple orchards: An entomological perspective. **Gerald Chouinard** (gerald.chouinard@irda.qc.ca), Jonathan Veilleux, Francine Pelletier, Daniel Cormier, and Alessandro Dieni, IRDA, St-Bruno, QC, Canada
- 9:30 **2493** The autecology of fruit flies (Tephritidae) and false codling moth on multicrop farms in the Western Cape region of South Africa. **Martin Gilbert** (mg@cri.co.za), Citrus Research International, Stellenbosch, South Africa
- 9:45 **2494** Management of *Erionota torus* Evans (Lepidoptera: HesperIIDae): A threatened pest on banana by using biorationals in South India. **Sharanabasappa Deshmukh** (sharanu.deshmukh@gmail.com) and Kalleshwsara Swamy, Univ. of Agricultural and Horticultural Sciences, Shimoga, India
- 10:00 **2495** Biology of the barred fruit-tree tortrix, *Pandemis cerasana* (Hübner) (Lepidoptera: Tortricidae), causes damage in cherry orchards. **Ayşe Özdem** (aozdem1@hotmail.com), Plant Protection Central Research Institute, Ankara, Turkey

10:15 **BREAK**



WEDNESDAY

Contributed Papers: Agricultural and Forest Entomology: Pesticide Efficacy and Resistance Management

Room W232 A (Convention Center)

**Moderators:** Amanda Jacobson<sup>1</sup> and Jocelyn Smith<sup>2</sup>, <sup>1</sup>Dow AgroSciences, Greenville, MS, <sup>2</sup>Univ. of Guelph, Ridgetown, ON, Canada

- 9:15 **2505** Isoclast™ Active broad spectrum sap-feeding insecticide: Global overview and updates. **Luis E. Gomez** (egomez2@dow.com)<sup>1</sup>, Michael Shaw<sup>1</sup>, Nick Simmons<sup>1</sup>, and Armando Casino<sup>2</sup>, <sup>1</sup>Dow AgroSciences, Indianapolis, IN, <sup>2</sup>Dow AgroSciences, Horgen, Switzerland
- 9:30 **2506** Isoclast™ Active broad spectrum sap-feeding insecticide: Understanding of the mode of action and implications for resistance management. **Michael Shaw** (mcshaw@dow.com), Luis E. Gomez, Gerald B. Watson, and Thomas C. Sparks, Dow AgroSciences, Indianapolis, IN
- 9:45 **2507** Isoclast™ Active for control of sap feeding insects in U.S. commodity crops. **Amanda Jacobson** (ajjacobson@dow.com)<sup>1</sup>, Melissa Willrich Siebert<sup>1</sup>, Kevin Johnson<sup>2</sup>, Mike Lovelace<sup>3</sup>, Patricia Prasifka<sup>4</sup>, Jesse M. Richardson<sup>5</sup>, Dave Ruen<sup>6</sup>, Larry Walton<sup>7</sup>, and Harvey A. Yoshida<sup>8</sup>, <sup>1</sup>Dow AgroSciences, Greenville, MS, <sup>2</sup>Dow AgroSciences, Danville, IL, <sup>3</sup>Dow AgroSciences, Lubbock, TX, <sup>4</sup>Dow AgroSciences, West Fargo, ND, <sup>5</sup>Dow AgroSciences, Hesperia, CA, <sup>6</sup>Dow AgroSciences, Lanesboro, MN, <sup>7</sup>Dow AgroSciences, Tupelo, MS, <sup>8</sup>Dow AgroSciences, Richland, WA
- 10:00 **2508** Isoclast™ Active: management of economically important insect pests in northern Latin America. **Leonel Aviles** (lavilesmorales@dow.com)<sup>1</sup>, Alejandro Cedeño<sup>2</sup>, Eswin Castañeda<sup>3</sup>, Efraín Becerra<sup>4</sup>, and Melissa Willrich Siebert<sup>5</sup>, <sup>1</sup>Dow AgroSciences, Culiacan, Mexico, <sup>2</sup>Dow AgroSciences, San José, Costa Rica, <sup>3</sup>Dow AgroSciences, Mixco, Guatemala, <sup>4</sup>Dow AgroSciences, Bogotá, Colombia, <sup>5</sup>Dow AgroSciences, Greenville, MS
- 10:15 **BREAK**
- 10:30 **2509** Harvanta™, a new diamide insecticide with the a.i. Cyclapryny™ (Cyclaniliprole). **Sean Whipple** (whipples@iskbc.com)<sup>1</sup>, Masayuki Morita<sup>2</sup>, Taku Hamamoto<sup>3</sup>, and Tohru Koyanagi<sup>3</sup>, <sup>1</sup>ISK Biosciences Corporation, Kearney, MO, <sup>2</sup>Ishihara Sangyo Kaisha, Ltd., Osaka, Japan, <sup>3</sup>Ishihara Sangyo Kaisha, Ltd., Kusatsu, Japan
- 10:45 **2510** Beneath the surface: A novel bifenthrin formulation with targeted mobility. **Caleigh Irwin** (cirwin@vivecrop.com), Matthew Coulter, Gary Poon, Danielle Norton, Kelly Greig, Jordan Dinglasan, and Darren Anderson, Vive Crop Protection, Toronto, ON, Canada
- 11:00 **2511** Comparative efficacy of granular and new chemistry insecticides against *Chilo partellus* Swinhoe and their effect against natural enemies in maize. **Muhammad Sufyan** (muhammad.sufyan@uaf.edu.pk), Ahmad Nawaz, Muhammad Jalal Arif, Muhammad Dildar Gogi, and Shahid Majeed, Univ. of Agriculture, Faisalabad, Pakistan

- 11:15 **2512** Efficacy of *Melia azedarach* L. extracts and selected products in management of the adult tomato leafminer, *Tuta absoluta* Povolny. **Efat Abou-Fakhr Hammad** (ima27@mail.aub.edu), Zeinab Haidar, and Josiane El Chemaly, Lebanese Univ., Beirut, Lebanon
- 11:30 **2513** Predicting the efficacy of biopesticides against *Locust migratoria manilensis* in China. **Hongmei Li** (h.li@cabi.org)<sup>1,2</sup>, Yinmin Liu<sup>2,3</sup>, Dave Moore<sup>4</sup>, Bethan Perkins<sup>5</sup>, and Arabella B. K. Taylor<sup>4</sup>, <sup>1</sup>CABI, Beijing, China, <sup>2</sup>Chinese Ministry of Agriculture, Beijing, China, <sup>3</sup>Gansu Agricultural Univ., Lanzhou, China, <sup>4</sup>CABI, Ascot, United Kingdom, <sup>5</sup>Assimila Ltd., London, United Kingdom
- 11:45 **2514** Determination of time of insecticide application against *Phthorimaea operculella* in the field conditions. **Pervin Erdogan** (pervinerdogan@gmail.com), Plant Protection Central Research Institute, Ankara, Turkey
- 12:00 **2515** Testing *Beauveria bassiana* and chlorantraniliprole to control *Earias vitella* (Lepidoptera: Noctuidae). **Kashif Ali** (chkashif20@gmail.com)<sup>1</sup> and Waqas Wakil<sup>2</sup>, <sup>1</sup>Government College Univ., Faisalabad, Pakistan, <sup>2</sup>Univ. of Agriculture, Faisalabad, Pakistan
- 12:15 **2516** Evolution of spinosad resistance in Colorado potato beetle, *Leptinotarsa decemlineata*, in the eastern US: Variation, dominance, and cross-resistance. **Mitchell Baker** (mitchell.baker@qc.cuny.edu)<sup>1</sup>, Kathleen Schnaars-Uvino<sup>2</sup>, Coby Klein<sup>1</sup>, David Mota-Sanchez<sup>3</sup>, and Andrei Alyokhin<sup>4</sup>, <sup>1</sup>City Univ. of New York, Flushing, NY, <sup>2</sup>Univ. of Jamestown, Jamestown, ND, <sup>3</sup>Michigan State Univ., East Lansing, MI, <sup>4</sup>Univ. of Maine, Orono, ME
- 12:30 **2517** Characterizing the development of *Helicoverpa zea* injury to different cotton tissue types and different Bt protein combinations for use in IRM modeling. **Mohammad-Amir Aghaee** (maghaee@ncsu.edu)<sup>1</sup>, Dominic Reisig<sup>2</sup>, Michael Caprio<sup>3</sup>, Don Cook<sup>4</sup>, Jeremy Greene<sup>5</sup>, Fred Musser<sup>3</sup>, and Francis Reay-Jones<sup>6</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>North Carolina State Univ., Plymouth, NC, <sup>3</sup>Mississippi State Univ., Mississippi State, MS, <sup>4</sup>Mississippi State Univ., Stoneville, MS, <sup>5</sup>Clemson Univ., Blackville, SC, <sup>6</sup>Clemson Univ., Florence, SC
- 12:45 **2518** Assessment of the role of neonicotinoid seed treatments to manage early season corn pests. **Jocelyn Smith** (jocelyn.smith@uoguelph.ca)<sup>1</sup>, Tracey Baute<sup>2</sup>, and Arthur Schaafsma<sup>1</sup>, <sup>1</sup>Univ. of Guelph, Ridgetown, ON, Canada, <sup>2</sup>Ontario Ministry of Agriculture, Food and Rural Affairs, Ridgetown, ON, Canada
- 1:00 **2519** Mode of inheritance of insecticide resistance to imidacloprid in the brown planthopper, *Nilaparvata lugens*. **Sachiyo Sanada-Morimura** (sanadas@affrc.go.jp), Tomohisa Fujii, and Masaya Matsumura, NARO Kyushu Okinawa Agricultural Research Center, Kumamoto, Japan



**Contributed Papers: Ecology and Population Dynamics: Community Services**

**Room W225 A (Convention Center)**

**Moderators:** Joshua Campbell<sup>1</sup> and Colton Zirkle<sup>2</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Univ. of Arkansas, Fayetteville, AR

- 9:15 **2520** Insect vs. wind pollination of the Ozark chinquapin, *Castanea ozarkensis*. **Colton Zirkle** (coltonzirkle@gmail.com) and Ashley P. G. Dowling, Univ. of Arkansas, Fayetteville, AR
- 9:30 **2521** European skipper butterfly (*Thymelicus lineola*) associated with reduced seed development of showy lady's-slipper orchid (*Cypripedium reginae*). **Paul Mosquin** (mosquin@rti.org)<sup>1</sup>, Peter Hall<sup>2</sup>, Paul Catling<sup>2</sup>, and Ted Mosquin<sup>3</sup>, <sup>1</sup>RTI International, Chapel Hill, NC, <sup>2</sup>Agriculture and Agri-Food Canada, Ottawa, ON, Canada, <sup>3</sup>Mosquin Bio-Information Ltd., Balderson, ON, Canada
- 9:45 **2522** The evolution of symbiosis in firebugs (Hemiptera: Pyrrhocoridae). **Adam Martinez** (adam.martinez@uni-mainz.de) and Martin Kaltenpoth, Johannes Gutenberg Univ., Mainz, Germany
- 10:00 **2523** Crab spiders (Thomisidae) attract insect flower-visitors without UV signaling. **Ellen Welte** (elwelte@k-state.edu), Savannah Putnam, and Anthony Joern, Kansas State Univ., Manhattan, KS
- 10:15 BREAK**
- 10:30 **2524** Increased pollinator habitat enhances fruit set in Australian cacao. **Samantha Forbes** (samantha.forbes@my.jcu.edu.au) and Tobin Northfield, James Cook Univ., Cairns, Australia
- 10:45 **2525** Landscape effects on mason bee fitness mediated by diet diversity and pesticide exposure. **Mary Centrella** (mlc344@cornell.edu), Katja Poveda, and Bryan N. Danforth, Cornell Univ., Ithaca, NY
- 11:00 **2526** Pollinators and other arthropod attraction to native wildflower plantings in Florida. **Joshua Campbell** (joshuacampbell@ufl.edu), James D. Ellis, Cory Stanley-Stahr, Jaret C. Daniels, and Cherice Smithers, Univ. of Florida, Gainesville, FL
- 11:15 **2527** Effects of lead contamination in sunflowers on pollinator behavior. **Frances S. Sivakoff** (sivakoff.3@osu.edu) and Mary Gardiner, The Ohio State Univ., Wooster, OH
- 11:30 **2528** Burning love: The attraction of soil invertebrates occupying a burn chronosequence to macro and micronutrients. **Caitlin Maloney** (cemalon@bgsu.edu) and Shannon Pelini, Bowling Green State Univ., Bowling Green, OH
- 11:45 **2529** Effects of pine straw removal on arthropods in longleaf pine communities. **Samuel Buzuleciu** (sabuzule@ncsu.edu) and Clyde E. Sorenson, North Carolina State Univ., Raleigh, NC
- 12:00 **2530** The effects of elevational soil micronutrient variation on decomposer abundance and activity in a tropical forest. **Cari Ritzenthaler** (carir@bgsu.edu)<sup>1</sup>, Creighton Litton<sup>2</sup>, Christian Giardina<sup>3</sup>, and Shannon Pelini<sup>1</sup>, <sup>1</sup>Bowling Green State Univ., Bowling Green, OH, <sup>2</sup>Univ. of Hawai'i, Honolulu, HI, <sup>3</sup>USDA - Forest Service, Hilo, HI

- 12:15 **2531** Use of color cues by bumble bees foraging for multiple floral rewards. **Daniel Papaj** (papaj@email.arizona.edu), Univ. of Arizona, Tucson, AZ

**Contributed Papers: Ecology and Population Dynamics: Interactions**

**Room W225 B (Convention Center)**

**Moderators:** K. Supriya<sup>1</sup> and Sarah Bengston<sup>2</sup>, <sup>1</sup>Univ. of Chicago, Chicago, IL, <sup>2</sup>Univ. of Rochester, Rochester, NY

- 9:15 **2532** Competition between insectivorous ants and birds in eastern Himalayas. **K. Supriya** (ksupriya@uchicago.edu), Univ. of Chicago, Chicago, IL
- 9:30 **2533** Mammalian "bad" breath is lifesaving for plant-dwelling insects. **Moshe Inbar** (minbar@research.haifa.ac.il), Univ. of Haifa, Haifa, Israel
- 9:45 **2534** Sexual conflict may hinder population growth through spatial sexual segregation due to counter-harassment behavior. **Kaori Tsurui** (tsuruikaori@gmail.com)<sup>1</sup>, Tsuyoshi Ohishi<sup>2</sup>, Norikuni Kumano<sup>3</sup>, Kiyohito Teruya<sup>2</sup>, Tetsuya Toyosato<sup>4</sup>, and Kazuki Tsuji<sup>1</sup>, <sup>1</sup>Univ. of the Ryukyus, Nishihara, Japan, <sup>2</sup>Okinawa Prefectural Plant Protection Center, Naha, Japan, <sup>3</sup>Obihiro Univ. of Agriculture and Veterinary Medicine, Obihiro, Japan, <sup>4</sup>Ryukyu-Sankei Co. Ltd., Tomigusuku, Japan
- 10:00 **2535** Biotic resistance to an invasive forest insect-fungus mutualism. Brian Thompson<sup>1</sup>, Jake Bodart<sup>2</sup>, and **Daniel S. Gruner** (dsgruner@umd.edu)<sup>3</sup>, <sup>1</sup>Montana State Univ., Conrad, MT, <sup>2</sup>Univ. of Arkansas, Fayetteville, AR, <sup>3</sup>Univ. of Maryland, College Park, MD
- 10:15 BREAK**
- 10:30 **2536** Predator-prey interactions among mites in open environment I: Learned oviposition site shift reduces offspring predation. **Hatsune Otsuki** (otsuki.hatsune.44e@st.kyoto-u.ac.jp) and Shuichi Yano, Kyoto Univ., Kyoto, Japan
- 10:45 **2537** Predator-prey interactions among mites in open environment II: Further interactions between spider mite and predatory mite offspring. **Shuichi Yano** (yano@kais.kyoto-u.ac.jp) and Hatsune Otsuki, Kyoto Univ., Kyoto, Japan
- 11:00 **2538** Specificity and stability in an obligate, vertically transmitted symbiosis: An experimental analysis. **Jon Seal** (trachymyrmex@gmail.com), The Univ. of Texas, Tyler, TX
- 11:15 **2539** Patterns of floral resource use by the invasive Argentine ant, *Linepithema humile*, and a native ant, *Anoplolepis custodiens*, in a biodiversity hotspot. **Palesa Mothapo** (mothapo@sun.ac.za) and Theresa Wossler, Stellenbosch Univ., Stellenbosch, South Africa
- 11:30 **2540** Competition of the cotton bollworm (*Helicoverpa armigera*), corn earworm (*Helicoverpa zea*), and fall armyworm (*Spodoptera frugiperda*) on non-Bt corn. **José P. G. F. Silva** (jpgfdsilva@gmail.com)<sup>1</sup>, Edson Baldin<sup>1</sup>, Thomas Hunt<sup>2</sup>, and Silvana V. Paula-Moraes<sup>3</sup>, <sup>1</sup>São Paulo State Univ., Botucatu, Brazil, <sup>2</sup>Univ. of Nebraska, Concord, NE, <sup>3</sup>Embrapa Cerrados, Planaltina, Brazil



WEDNESDAY

- 11:45 **2541** A new case of social parasitism in four western *Temnothorax* ant species and the implications for colony interactions. **Sarah Bengston** (sbengsto@gmail.com) and Christian Rabeling, Univ. of Rochester, Rochester, NY
- 12:00 **2542** Converging strategies in plant-manipulating insects: Insect-induced effects on plants and possible mechanisms used by leaf-miners to manipulate their host-plant. **David Giron** (david.giron@univ-tours.fr)<sup>1</sup>, Géraldine Dubreuil<sup>1</sup>, Mélanie Body<sup>2</sup>, Hui Zhang<sup>1</sup>, Franck Dedeine<sup>1</sup>, Graham Stone<sup>3</sup>, Carlos Lopez-Vaamonde<sup>4</sup>, and Elisabeth Huguet<sup>1</sup>, <sup>1</sup>National Center for Scientific Research, Tours, France, <sup>2</sup>Univ. of Missouri, Columbia, MO, <sup>3</sup>Univ. of Edinburgh, Edinburgh, Scotland, <sup>4</sup>INRA, Orléans, France
- 12:15 **2543** Trade-offs associated with investment in winged individuals by an *Aphis glycines* colony under strong predation. **Aldo Ríos Martínez** (aldorios@live.com) and Alejandro Costamagna, Univ. of Manitoba, Winnipeg, MB, Canada
- 12:30 **2544** Do native mites suppress invasive herbivores on eastern hemlock? **Elizabeth Whitney** (ewhitney@uri.edu)<sup>1</sup>, Claire Wilson<sup>1</sup>, Robert Schaeffer<sup>2</sup>, and Evan L. Preisser<sup>1</sup>, <sup>1</sup>Univ. of Rhode Island, Kingston, RI, <sup>2</sup>Tufts Univ., Medford, MA

### Contributed Papers: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops

#### West Hall F3 (WF3) (Convention Center)

**Moderators:** Zunnu Akhtar<sup>1</sup> and Jason Wulff<sup>2</sup>, <sup>1</sup>Univ. of Agriculture, Faisalabad, Pakistan, <sup>2</sup>Texas A&M Univ., College Station, TX

- 9:15 **2545** Optimum® Leptra™ insect protection and efficacy of its individual events in South America. **Herbert Eichenseer** (herb.eichenseer@pioneer.com)<sup>1</sup>, Paulo da Silva<sup>2</sup>, Vinicius de Faria<sup>2</sup>, Josemar Foresti<sup>2</sup>, Maria Celiz<sup>3</sup>, and Gerardo Rapetti<sup>4</sup>, <sup>1</sup>DuPont Pioneer, Johnston, IA, <sup>2</sup>DuPont do Brasil S.A., Planaltina, Brazil, <sup>3</sup>DuPont Pioneer, Jesus Maria, Argentina, <sup>4</sup>DuPont Pioneer, Pergamino, Argentina
- 9:30 **2546** Discovery of a two-component lepidopteran active protein family from plants. Jeffrey Sopa<sup>1</sup>, **Eric Schepers** (eric.j.schepers@cgr.dupont.com)<sup>2</sup>, Judson Flattum<sup>3</sup>, Kara Gredell<sup>3</sup>, Natalie Stoner<sup>3</sup>, Janet Rice<sup>3</sup>, Mark Nelson<sup>3</sup>, Nuria Jiménez Juárez<sup>3</sup>, Deborah Clark<sup>3</sup>, Jennifer Barry<sup>2</sup>, Keven Hayes<sup>2</sup>, James English<sup>4</sup>, Scott Diehn<sup>2</sup>, Nasser Yalpani<sup>2</sup>, and Lu Liu<sup>4</sup>, <sup>1</sup>DuPont Crop Protection, Wilmington, DE, <sup>2</sup>DuPont Pioneer, Johnston, IA, <sup>3</sup>DuPont Pioneer, Wilmington, DE, <sup>4</sup>DuPont Pioneer, Hayward, CA
- 9:45 **2547** Tier-based study of Bt rice revealed non-target effects on thrips. **Zunnu Akhtar** (zunnuraen@gmail.com), Univ. of Agriculture, Faisalabad, Pakistan
- 10:00 **2548** Elucidating the metabolic and target site mechanisms of phenylpyrazole resistance in the brown planthopper, *Nilaparvata lugens*. **William Garrod** (william.garrod@rothamsted.ac.uk)<sup>1</sup>, Christoph Zimmer<sup>2</sup>, Martin Williamson<sup>1</sup>, Ralf Nauen<sup>3</sup>, Chris Bass<sup>2</sup>, and T. G. Emyr Davies<sup>1</sup>, <sup>1</sup>Rothamsted Research, Harpenden,

United Kingdom, <sup>2</sup>Univ. of Exeter, Penryn, United Kingdom, <sup>3</sup>Bayer CropScience, Monheim, Germany

#### 10:15 BREAK

- 10:30 **2549** Characterization of the TRP channel gene family in the brown planthopper (*Nilaparvata lugens*). **Cong-Fen Gao** (gaocongfen@njau.edu.cn), Shun-fan Wu, and Chun-Dong Niu, Nanjing Agricultural Univ., Nanjing, China
- 10:45 **2550** Genomic identification of variation and novel insecticide resistance genes in the field population of the brown planthopper, *Nilaparvata lugens*. **Rui Pang** (pr839@163.com), Sun Yat-sen Univ., Guangzhou, China
- 11:00 **2551** Direct effects of insecticides on plants: Soybean transcriptome responses to neonicotinoids and spider mites. **Jason Wulff** (j\_wulff@tamu.edu)<sup>1</sup>, Ada Szczepaniec<sup>2</sup>, Ricardo Ramirez<sup>3</sup>, Cecilia Tamborindeguy<sup>1</sup>, and Micky Eubanks<sup>1</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Texas A&M Univ., Amarillo, TX, <sup>3</sup>Utah State Univ., Logan, UT
- 11:15 **2552** Effects of different seed treatment formulations on the drift generated through Heubach meter from the seeds of cotton. **Hayder Abdelgader** (abdelgaderh@yahoo.com), Agricultural Research Corporation, Wad Madani, Sudan
- 11:30 **2553** Documenting reductions in pesticide risk: Two decades of change in lettuce pest management. **Al Fournier** (founier@cal.arizona.edu)<sup>1</sup>, Paul Jepson<sup>2</sup>, Michael Guzy<sup>2</sup>, Wayne Dixon<sup>1</sup>, John Palumbo<sup>3</sup>, and Peter Ellsworth<sup>1</sup>, <sup>1</sup>Univ. of Arizona, Maricopa, AZ, <sup>2</sup>Oregon State Univ., Corvallis, OR, <sup>3</sup>Univ. of Arizona, Yuma, AZ
- 11:45 **2554** Sublethal effects of some insecticides on life table parameters of *Tuta absoluta* (Lepidoptera: Gelechiidae). **Mir Jalil Hejazi** (mjhejazi@tabrizu.ac.ir), Zahra Nozad-Bonab, and Shahzad Iranipour, Univ. of Tabriz, Tabriz, Iran
- 12:00 **2555** Insecticide resistance and resistance monitoring with the American serpentine leafminer, *Liriomyza trifolii* (Diptera: Agromyzidae). **J. Scott Ferguson** (scott@atoconsult.com), Atlantic Turf & Ornamental Consulting, Vero Beach, FL
- 12:15 **2556** Resistance to six insecticides in populations of diamondback moth, *Plutella xylostella* (Lepidoptera: Plutellidae), in Thailand. **Suprada Sukonthabhirom na Pattalung** (bsuprada@gmail.com) and Somsak Siripontangmun, Plant Protection Research and Development Office, Bangkok, Thailand

### Contributed Papers: Insect Chemical Ecology: Attractants

#### Room W314 B (Convention Center)

**Moderators:** Aijun Zhang<sup>1</sup> and Juan Cibrian<sup>2</sup>, <sup>1</sup>USDA - ARS, Beltsville, MD, <sup>2</sup>Colegio de Postgraduados, Montecillo, Mexico

- 9:15 **2557** The advantages of semiochemical-based attract and kill techniques in insect pest management. **Kavita Sharma** (kavita.sharma@iscatech.com)<sup>1</sup>, Marcos Botton<sup>2</sup>, Rafael Borges<sup>3</sup>, Ruben Machota Jr.<sup>4</sup>, Jesse Saroli<sup>1</sup>, Jonathan Rico<sup>1</sup>, Rodrigo Oliveira da Silva<sup>1</sup>,



- Carmem Bernardi<sup>1</sup>, William Urrutia<sup>1</sup>, Leandro Ernesto Jost Mafrá<sup>5</sup>, and Agenor Mafrá-Neto<sup>1</sup>, <sup>1</sup>ISCA Technologies, Inc., Riverside, CA, <sup>2</sup>Embrapa Grape and Wine, Bento Gonçalves, Brazil, <sup>3</sup>ISCA Technologies Ltda., Ijuí, Brazil, <sup>4</sup>Federal Univ. of Pelotas, Pelotas, Brazil, <sup>5</sup>ISCA Technologies Ltda., Vacaria, Brazil
- 9:30 **2558** The advantages of semiochemical-based attract and kill techniques in insect pest management: agricultural case studies. Rodrigo Oliveira da Silva<sup>1</sup>, **William Urrutia** (william.urrutia@iscatech.com)<sup>1</sup>, Josh Ponce<sup>1</sup>, Carmem Bernardi<sup>1</sup>, Marcos Botton<sup>2</sup>, Rafael Borges<sup>3</sup>, Ruben Machota Jr<sup>4</sup>, Jonathan Rico<sup>1</sup>, Jesse Saroli<sup>1</sup>, Kavita Sharma<sup>1</sup>, Leandro Ernesto Jost Mafrá<sup>5</sup>, and Agenor Mafrá-Neto<sup>1</sup>, <sup>1</sup>ISCA Technologies, Inc., Riverside, CA, <sup>2</sup>Embrapa Grape and Wine, Bento Gonçalves, Brazil, <sup>3</sup>ISCA Technologies Ltda., Ijuí, Brazil, <sup>4</sup>Federal Univ. of Pelotas, Pelotas, Brazil, <sup>5</sup>ISCA Technologies Ltda., Vacaria, Brazil
- 9:45 **2559** Pyrophilous insects attracted by infrared traps. **Thi Phuong Hoang** (phuongnfs@gmail.com) and Stefan Schütz, Georg August Univ., Göttingen, Germany
- 10:00 **2560** Attraction of the common bed bug (*Cimex lectularius*) to their defensive secretions. **Mark F. Feldlaufer** (mark.feldlaufer@ars.usda.gov)<sup>1</sup>, Kevin Ulrich<sup>2</sup>, and Matthew Kramer<sup>1</sup>, <sup>1</sup>USDA - ARS, Beltsville, MD, <sup>2</sup>Univ. of Maryland, College Park, MD
- 10:15 **BREAK**
- 10:30 **2561** Evaluation of food attractants and methyl eugenol for mass trapping of *Bactrocera invadens* on bush mango in Ibadan, southwest Nigeria. **Juliana Ugwu** (amakajul01@yahoo.com)<sup>1</sup>, Adebayo Omoloye<sup>2</sup>, and Akindede Ogunfunmilayo<sup>3</sup>, <sup>1</sup>Forestry Research Institute of Nigeria, Ibadan, Nigeria, <sup>2</sup>Univ. of Ibadan, Ibadan, Nigeria, <sup>3</sup>Nigeria Agricultural Quarantine Services, Ibadan, Nigeria
- 10:45 **2562** Olfactory responses of African rice gall midge (*Orseolia oryzivora*) Harris and Gagné (Diptera: Cecidomyiidae) females to host plant volatiles. **Emmanuel Ogah** (emmamarg2005@yahoo.com)<sup>1,2</sup>, Toby Bruce<sup>2</sup>, Lesley Smart<sup>2</sup>, Christine Woodcock<sup>2</sup>, John Caulfield<sup>2</sup>, Michael Birkett<sup>2</sup>, John Pickett<sup>2</sup>, and Francis Nwilene<sup>3</sup>, <sup>1</sup>Ebonyi State Univ., Abakaliki, Nigeria, <sup>2</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>3</sup>African Rice Center, Ibadan, Nigeria
- 11:00 **2563** Isolation and identification of sexual pheromone of *Hypsipyla grandella* (Lepidoptera: Pyralidae). **Juan Cibrian** (jcibrian@colpos.mx) and Jose Pineda, Graduate College, Montecillo, Mexico
- 11:15 **2564** Attractive blend for spotted wing drosophila, *Drosophila suzukii* (Matsumura). **Aijun Zhang** (aijun.zhang@ars.usda.gov), Yan Feng, Robert Bruton, and Alexis Park, USDA - ARS, Beltsville, MD
- 11:30 **2565** Synergistic / additive interactions among components of food-based baits underlie female attraction in three invasive fruit fly species. **Jaime Pinero** (pineroj@lincolnu.edu)<sup>1</sup>, Steven Souder<sup>2</sup>, Trevor Smith<sup>3</sup>, Abbie Fox<sup>4</sup>, and Roger Vargas<sup>2</sup>, <sup>1</sup>Lincoln Univ., Jefferson City, MO, <sup>2</sup>USDA - ARS, Hilo, HI, <sup>3</sup>Florida Dept. of Agriculture and Consumer Services, Gainesville, FL, <sup>4</sup>USDA - APHIS, Palmetto, FL
- 11:45 **2566** Presentation withdrawn
- 12:00 **2567** Identification and field evaluation of peach and pear volatiles attractive to the Oriental fruit moth, *Grapholita molesta*. **Pengfei Lu** (lpengfei224@126.com)<sup>1</sup>, Haili Qiao<sup>2,3</sup>, and You-Qing Luo<sup>1</sup>, <sup>1</sup>Beijing Forestry Univ., Beijing, China, <sup>2</sup>Chinese Academy of Medical Sciences, Beijing, China, <sup>3</sup>Peking Union Medical College, Beijing, China
- 12:15 **2568** SPME sampling studies on date palm (*Phoenix dactylifera*) and red palm weevil (*Rhynchophorus ferrugineus*). **Paraj Shukla** (parajshukla@gmail.com)<sup>1</sup>, Asma Al-Nujiban<sup>2</sup>, M. M. Abdel-Azim<sup>1</sup>, Ahmed Badjah-Hadj-Ahmed<sup>1</sup>, and Saleh A. Aldosari<sup>1</sup>, <sup>1</sup>King Saud Univ., Riyadh, Saudi Arabia, <sup>2</sup>Qassim Univ., Qassim, Saudi Arabia
- 12:30 **2569** Host orientation of *Trissolcus japonicus* (Hymenoptera: Scelionidae) by using the volatile chemicals emitted from *Halymorpha halys* (Stål) (Hemiptera: Pentatomidae). **Jinping Zhang** (j.zhang@cabi.org)<sup>1</sup>, Yongzhi Zhong<sup>2</sup>, Guo-Hua Chen<sup>2</sup>, Tim Haye<sup>3</sup>, and Feng Zhang<sup>4</sup>, <sup>1</sup>CABI, Beijing, China, <sup>2</sup>Yunnan Agricultural Univ., Kunming, China, <sup>3</sup>CABI, Delémont, Switzerland, <sup>4</sup>Chinese Academy of Agricultural Sciences, Beijing, China

### Contributed Papers: Integrated Pest Management and Sustainable Agriculture: Biological Pest Management

#### Room W231 B (Convention Center)

**Moderators:** Abiola Oke<sup>1</sup> and Sean Coyle<sup>2</sup>, <sup>1</sup>National Horticultural Research Institute, Ibadan, Nigeria, <sup>2</sup>Texas A&M AgriLife Research, Lubbock, TX

- 9:15 **2570** Evaluation of insecticidal properties of some bio-extracts and a bio-agent performance on aphid (*Sitobion avenae* F.) (Hemiptera: Aphididae) incidence on wheat (*Triticum aestivum* L.) crop. **Muhammad Ali** (ali.klasra@gmail.com)<sup>1</sup>, Muhammad Ashfaq<sup>1</sup>, Naureen Rana<sup>2</sup>, Syed Muhammad Zakria<sup>1</sup>, and Azhar-uddin- Bahtti<sup>1</sup>, <sup>1</sup>Univ. of the Punjab, Lahore, Pakistan, <sup>2</sup>Univ. of Agriculture, Faisalabad, Pakistan
- 9:30 **2571** Economic and ecological benefits of botanical pesticides for control of insect pests on common beans (*Phaseolus vulgaris* L.). **Prisila Mkenda** (mayoprisca@gmail.com)<sup>1</sup>, Patrick Ndademi<sup>2</sup>, Philip Stevenson<sup>3</sup>, and Steven Belmain<sup>3</sup>, <sup>1</sup>Sokoine Univ. of Agriculture, Arusha, Tanzania, <sup>2</sup>Nelson Mandela African Institution of Science and Technology, Arusha, Tanzania, <sup>3</sup>Univ. of Greenwich, Chatham, United Kingdom
- 9:45 **2572** Efficacy of *Moringa oleifera* root oil extract as a seed protectant against *Callosobruchus maculatus* (F.) (Coleoptera: Chrysomelidae) on cowpea. **Mary Adewole** (modupeadewole75@gmail.com)<sup>1</sup>, Olajumoke Alabi<sup>1</sup>, and Oluwafemi Pitan<sup>2</sup>, <sup>1</sup>Univ. of Ibadan, Ibadan, Nigeria, <sup>2</sup>Federal Univ. of Agriculture, Abeokuta, Nigeria
- 10:00 **2573** Value of lady beetles in sugarcane aphid management on Texas High Plains sorghum. **Sean Coyle** (sean.coyle@ag.tamu.edu), Abdul Hakeem, and Megha Parajulee, Texas A&M AgriLife Research, Lubbock, TX



10:15 BREAK

- 10:30 **2574** Effects of natural enemies and alate immigration on soybean aphid population dynamics. **Alejandro Costamagna** (ale.costamagna@umanitoba.ca)<sup>1</sup>, Jordan Bannerman<sup>1</sup>, Nicola Koper<sup>1</sup>, Brian McCornack<sup>2</sup>, and David W. Ragsdale<sup>3</sup>, <sup>1</sup>Univ. of Manitoba, Winnipeg, MB, Canada, <sup>2</sup>Kansas State Univ., Manhattan, KS, <sup>3</sup>Texas A&M Univ., College Station, TX
- 10:45 **2575** Host plant effects: Parasitism success of *Peristenus digoneutis* on lygus bugs in canola and alfalfa. **Diana Fernández** (dianac0994@gmail.com)<sup>1</sup>, Héctor A. Cárcamo<sup>2</sup>, and Robert Laird<sup>1</sup>, <sup>1</sup>Univ. of Lethbridge, Lethbridge, AB, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Lethbridge, AB, Canada
- 11:00 **2576** Effect of haying regime on beneficial arthropods in prairie hay. **Wayne Ohnesorg** (wohnesorg2@unl.edu)<sup>1</sup>, Robert Wright<sup>2</sup>, and Thomas Hunt<sup>3</sup>, <sup>1</sup>Univ. of Nebraska, Norfolk, NE, <sup>2</sup>Univ. of Nebraska, Lincoln, NE, <sup>3</sup>Univ. of Nebraska, Concord, NE
- 11:15 **2577** Using *Typha angustifolia* pollen to build a standing army of the zoophytophagous predatory mite *Euseius gallicus* in protected ornamentals. **Juliette Pijnakker** (juliette.pijnakker@biobestgroup.com)<sup>1</sup>, Amandine De Souza<sup>2</sup>, Diana Overgaag<sup>1</sup>, Yves Arijis<sup>3</sup>, and Felix Wackers<sup>3</sup>, <sup>1</sup>Biobest, De Lier, Netherlands, <sup>2</sup>Biobest, Orange, France, <sup>3</sup>Biobest, Westerlo, Belgium
- 11:30 **2578** Detection of *Apanteles* spp. (Hymenoptera: Braconidae) larval parasitoid of tomato leafminer, *Tuta absoluta* (Lepidoptera: Gelechiidae), on greenhouse tomato in Abeokuta, Ogun State, Nigeria. **Abiola Oke** (oke2abiola@yahoo.com)<sup>1</sup>, Rauf Kolawole<sup>2</sup>, Oladapo Ogunremi<sup>3</sup>, Olufemi Akinsola<sup>3</sup>, and Solape Awe<sup>3</sup>, <sup>1</sup>National Horticultural Research Institute, Ibadan, Nigeria, <sup>2</sup>Dizengoff Nigeria Limited, Lagos, Nigeria, <sup>3</sup>Ogun State Agricultural Development Program, Abeokuta, Nigeria
- 11:45 **2579** Evaluation of *SINPV* as an effective tool in management of *Spodoptera litura* (Fab.) in cabbage crop. **Tulsi Bhardwaj** (tbhardwaj2003@yahoo.com), Indian Agricultural Research Institute, New Delhi, India
- 12:00 **2580** Consequences of bacterial inoculation on the ovipositional behavior and development of Japanese beetle (*Popillia japonica*) in bermudagrass. **R. Murphey Coy** (rmc0023@tigermail.auburn.edu), David Held, and Joseph Kloepper, Auburn Univ., Auburn, AL
- 12:15 **2581** An assessment of juvenomimic activity of *Catharanthus roseus* on growth and development of *Dysdercus koenigii*. **Sunil Kayesth** (kayesth@yahoo.co.in) and Kamal Gupta, Univ. of Delhi, New Delhi, India

Contributed Papers: Invasive and Exotic Entomology: Geography and Biology

Room W223 B (Convention Center)

**Moderators:** Stephen Taerum<sup>1</sup> and Rebecca Hallett<sup>2</sup>,

<sup>1</sup>Forestry and Agricultural Biotechnology Institute, Pretoria, South Africa, <sup>2</sup>Univ. of Guelph, Guelph, ON, Canada

- 9:15 **2582** Risk of introduction, establishment, and spread of exotic insect and mite pests on imported apples in Nepal. **Samudra Joshi** (samudralajoshi@hotmail.com), Lalitpur, Nepal
- 9:30 **2583** New exotic insect pests on California ficus trees. **Gevork Arakelian** (garakelian@acwm.lacounty.gov), Los Angeles County Dept. of Agricultural Commissioner/Weights & Measures, South Gate, CA
- 9:45 **2584** Cotton mealybug, *Phenacoccus solenopsis* Tinsley: An emerging threat to cotton production in the Sudan. **Hassan Kannan** (hkannan\_4@hotmail.com), Agricultural Research Corporation, Wad Madani, Sudan
- 10:00 **2585** Global risk of the invasive soybean aphid, *Aphis glycines*. **Rebecca Hallett** (rhallett@uoguelph.ca)<sup>1</sup>, Ross Weiss<sup>2</sup>, Owen Olfert<sup>2</sup>, and Darren Kriticos<sup>3</sup>, <sup>1</sup>Univ. of Guelph, Guelph, ON, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Saskatoon, SK, Canada, <sup>3</sup>CSIRO, Canberra, Australia
- 10:15 BREAK
- 10:30 **2586** Invasion of *Bactrocera dorsalis* (Hendel) (Diptera: Tephritidae): Population structure and invasion routes for southern Africa. **Minette Karsten** (minettek@sun.ac.za)<sup>1</sup>, Pia Addison<sup>1</sup>, and Aruna Manrakhan<sup>2</sup>, <sup>1</sup>Stellenbosch Univ., Stellenbosch, South Africa, <sup>2</sup>Citrus Research International, Nelspruit, South Africa
- 10:45 **2587** Assessment of the population of invader fly *Bactrocera invadens* Drew, Tsuruta and White (Diptera: Tephritidae) on mango and guava using methyl eugenol as an attractant. **Elechi Asawalam** (elechiasw@yahoo.com), Henry Ezenna, and Angelica Umunnakwe, Michael Okpara Univ. of Agriculture, Umuhia, Nigeria
- 11:00 **2588** Range overlap between highly invasive, cosmopolitan ant species: Identifying regions at risk. **Matthew Boot** (matthewrboot@gmail.com) and Corrie Moreau, The Field Museum of Natural History, Chicago, IL
- 11:15 **2589** Why is the invasive brown spruce longhorn beetle (*Tetropium fuscum*) spreading so slowly in North America? **Stephen Heard** (stephen.heard@unb.ca)<sup>1</sup>, Jennifer Anderson<sup>1</sup>, Kenneth Dearborn<sup>1</sup>, Allyson Heustis<sup>1</sup>, Deepa S. Pureswaran<sup>2</sup>, and Jon Sweeney<sup>3</sup>, <sup>1</sup>Univ. of New Brunswick, Fredericton, NB, Canada, <sup>2</sup>Natural Resources Canada, Québec City, QC, Canada, <sup>3</sup>Natural Resources Canada, Fredericton, NB, Canada
- 11:30 **2590** Untangling the movement patterns of the red turpentine beetle (*Dendroctonus valens*) and its fungal symbiont, *Leptographium procerum*. **Stephen Taerum** (stephen.taerum@fab.up.ac.za)<sup>1</sup>, Z. de Beer<sup>1</sup>, and Michael Wingfield<sup>2</sup>, <sup>1</sup>Forestry and Agricultural Biotechnology Institute, Pretoria, South Africa, <sup>2</sup>Univ. of Pretoria, Pretoria, South Africa



WEDNESDAY



- 11:45 **2591** Biology of *Palmelampus heinrichi* O'Brien, 2000 (Curculionidae), a new invasive species of the humid tropics of Colombia causing fruit-fall of peach palm, *Bactris gasipaes*. **Heinrich Lehmann-Danzinger** (hlehm@uni-goettingen.de)<sup>1</sup>, Maria Elena Burbano Torres<sup>2</sup>, and Rainer Daxl<sup>1</sup>, <sup>1</sup>Univ. of Göttingen, Göttingen, Germany, <sup>2</sup>Univ. of Valle, Cali, Colombia
- 12:00 **2592** Vertical transfer of nematodes associated with alates of *Coptotermes formosanus* and *Coptotermes gestroi* (Isoptera: Rhinotermitidae). Nan-Yao Su<sup>1</sup>, and **Jeremiah Foley** (folejr@ufl.edu)<sup>1,2</sup>, <sup>1</sup>Univ. of Florida, Davie, FL, <sup>2</sup>USDA - ARS, Ft. Lauderdale, FL

### Contributed Papers: Medical and Veterinary Entomology: Flies of Veterinary Importance

#### West Hall F4 (WF4) (Convention Center)

**Moderators:** Sonja L. Swiger<sup>1</sup>, Tatiana Torres<sup>2</sup>, and Thomas Spranghers<sup>3</sup>, <sup>1</sup>Texas A&M Univ., Stephenville, TX, <sup>2</sup>Univ. of São Paulo, São Paulo, Brazil, <sup>3</sup>Ghent Univ., Ghent, Belgium

- 9:15 **2593** Efficacy of PT® Alpine® Pressurized Fly Bait (BASF) on house flies. **Sonja L. Swiger** (slswiger@ag.tamu.edu)<sup>1</sup>, Samantha Hays<sup>2</sup>, and Ashley Mata<sup>3</sup>, <sup>1</sup>Texas A&M Univ., Stephenville, TX, <sup>2</sup>Texas A&M Univ., College Station, TX, <sup>3</sup>Tarleton State Univ., Stephenville, TX
- 9:30 **2594** Presentation withdrawn
- 9:45 **2595** Evolution of feeding preferences in Oestroidea (Diptera: Calyptratae). **Tatiana Torres** (tttorres@ib.usp.br), Gisele Cardoso, Raquel Monfardini, and Marina Deszo, Univ. of São Paulo, São Paulo, Brazil
- 10:00 **2596** The potential for biting flies to mechanically transmit blood-borne viruses causing livestock disease. **Jo Stoner** (jo.stoner@pirbright.ac.uk), Laura Tugwell, Jennifer Eyre, and Anthony Wilson, The Pirbright Institute, Woking, United Kingdom

#### 10:15 BREAK

- 10:30 **2597** Antennal lobe morphology of the stable fly (*Stomoxys calcitrans*) and the horn fly (*Haematobia irritans*). **Pia Olafson** (pia.olafson@ars.usda.gov)<sup>1</sup> and Ligia Borges<sup>2</sup>, <sup>1</sup>USDA - ARS, Kerrville, TX, <sup>2</sup>Federal Univ. of Goias, Goiânia, Brazil
- 10:45 **2598** Modelling with Impact: developing insect population models to improve control in partnership with industry and policy. **Anthony Wilson** (anthony.wilson@pirbright.ac.uk)<sup>1</sup>, Neil Morrison<sup>2</sup>, David Windsor<sup>3</sup>, Paulo Cancado<sup>4</sup>, and Tim Lysyk<sup>5</sup>, <sup>1</sup>The Pirbright Institute, Woking, United Kingdom, <sup>2</sup>Oxitec Ltd., Abingdon, United Kingdom, <sup>3</sup>Dept. of Agriculture and Food, Bunbury, Australia, <sup>4</sup>Embrapa Beef Cattle, Campo Grande, Brazil, <sup>5</sup>Lethbridge, AB, Canada
- 11:00 **2599** Insect protein fractionation. **Catriona Lakemond** (catriona.lakemond@wur.nl), Wageningen Univ. and Research Centre, Wageningen, Netherlands
- 11:15 **2600** Black soldier fly (*Hermetia illucens*) prepupae as a potential feedstuff for piglets. **Thomas Spranghers** (thomas.spranghers@ugent.be), Joris Michiels, Mia Eeckhout, Patrick De Clercq, and Stefaan De Smet, Ghent Univ., Ghent, Belgium

- 11:30 **2601** Horizontal and vertical distribution of face fly larvae (*Musca autumnalis*) in response to temperature and moisture gradients in dung pats. **Fallon Fowler** (fefowler@ncsu.edu), Morgan Malone, and Wes Watson, North Carolina State Univ., Raleigh, NC
- 11:45 **2602** Comparison of geometric morphometric markers between South Africa, southern Mozambique, and Swaziland tsetse populations. **Chantel de Beer** (debeerc@arc.agric.za)<sup>1</sup>, Gert Venter<sup>1</sup>, and Marc J.B. Vreysen<sup>2</sup>, <sup>1</sup>Agricultural Research Council, Onderstepoort, South Africa, <sup>2</sup>International Atomic Energy Agency, Vienna, Austria
- 12:00 **2603** Insects, a sustainable source of animal protein? **Dennis Oonincx** (dennisoonincx@gmail.com) and Arnold van Huis, Wageningen Univ. and Research Centre, Wageningen, Netherlands
- 12:15 **2604** Evaluation of insecticidal properties of plant essential oils against *Musca domestica* L. **Rashmi Morey** (moreyrashmi@gmail.com), Arts, Commerce and Science College, Pune, India

### Contributed Papers: Medical and Veterinary Entomology: Ticks I

#### West Hall F1 (WF1) (Convention Center)

**Moderators:** Lance Durden<sup>1</sup>, Dmitry Apanaskevich<sup>1</sup>, and Kirby Stafford III<sup>2</sup>, <sup>1</sup>Georgia Southern Univ., Statesboro, GA, <sup>2</sup>Connecticut Agricultural Experiment Station, New Haven, CT

- 9:15 **2605** Systematics of the *Dermacentor* ticks (Acari: Ixodidae). **Dmitry Apanaskevich** (dapanaskevich@georgiasouthern.edu) and Maria Apanaskevich, Georgia Southern Univ., Statesboro, GA
- 9:30 **2606** Temporal and spatial variation in abundance of *Dermacentor andersoni* and *Dermacentor variabilis* in western Canada. **Shaun Dergousoff** (shaun.dergousoff@agr.gc.ca)<sup>1</sup>, Neil Chilton<sup>2</sup>, Kateryn Rochon<sup>3</sup>, and Tim Lysyk<sup>4</sup>, <sup>1</sup>Lethbridge Research and Development Centre, Lethbridge, AB, Canada, <sup>2</sup>Univ. of Saskatchewan, Saskatoon, SK, Canada, <sup>3</sup>Univ. of Manitoba, Winnipeg, MB, Canada, <sup>4</sup>Lethbridge, AB, Canada
- 9:45 **2607** Phenology and ecology of tick species parasitic on cattle and wildlife in Oklahoma. **Trisha Dubie** (trishd@okstate.edu), Bruce Noden, and Justin Talley, Oklahoma State Univ., Stillwater, OK
- 10:00 **2608** Ticks (Acari: Ixodidae) parasitizing dogs, cats, humans, and some wild vertebrates in Alaska: Invasion potential. **Lance Durden** (ldurden@georgiasouthern.edu)<sup>1</sup>, Kimberlee Beckmen<sup>2</sup>, and Robert Gerlach<sup>3</sup>, <sup>1</sup>Georgia Southern Univ., Statesboro, GA, <sup>2</sup>Alaska Dept. of Fish and Game, Fairbanks, AK, <sup>3</sup>Alaska Dept. of Environmental Conservation, Anchorage, AK
- 10:15 **BREAK**
- 10:30 **2609** The infection landscape captured in nymphal ticks from a coastal county in the US northeast. **Andrea Egizi** (andrea.egizi@co.monmouth.nj.us) and Robert Jordan, Monmouth County Mosquito Control Division, Tinton Falls, NJ



- 10:45 **2610** Biotic and abiotic factors affecting blacklegged tick (*Ixodes scapularis*) distribution and tick-borne disease prevalence in Onondaga County, New York. **Nicholas Piedmonte** (nppiedmo@syr.edu)<sup>1</sup>, Melissa Prusinski<sup>2</sup>, H. Brian Underwood<sup>1</sup>, Stephen Shaw<sup>1</sup>, and Melissa K. Fierke<sup>1</sup>, <sup>1</sup>State Univ. of New York, Syracuse, NY, <sup>2</sup>New York State Dept. of Health, Albany, NY
- 11:00 **2611** *Ixodes* ticks, birds, and tick-borne diseases: The European terrestrial cycle. **Dieter Heylen** (dieter.heylen@uantwerpen.be), Univ. of Antwerpen, Antwerpen, Belgium
- 11:15 **2612** Biology of the tropical and temperate lineages of *Rhipicephalus sanguineus sensu lato* (Acari: Ixodidae) under different laboratory conditions. **Marcelo Labruna** (labruna@usp.br), Monize Gerardi, Felipe Krawczak, and Jonas Moraes-Filho, Univ. of São Paulo, São Paulo, Brazil
- 11:30 **2613** Integrated tick management of the blacklegged tick to reduce the risk of Lyme disease. **Kirby C. Stafford III** (kirby.stafford@ct.gov), Scott Williams, and Goudarz Molaei, Connecticut Agricultural Experiment Station, New Haven, CT
- 11:45 **2614** *Theileria equi* detection in *Hyalomma anatolicum anatolicum* along with ticks identifying features by scanning electron microscopy from Punjab province, India. **Deepak Sumbria** (deepak\_sumbria@yahoo.com), L. Singla, and Amrita Sharma, Guru Angad Dev Veterinary and Animal Sciences Univ., Ludhiana, India
- 12:00 **2615** Current insights into hemoglobin digestion in blood feeding ticks using *Ixodes ricinus* as a model organism. **Daniel Sojka** (sojkadan@gmail.com), Czech Academy of Sciences, České Budějovice, Czech Republic
- 12:15 **2616** Risk of encountering ticks and tick-borne pathogens within a rapidly growing metropolitan area in the United States southern Great Plains. **Bruce Noden** (bruce.noden@okstate.edu), Scott Loss, Courtney Maichak, and Faithful Williams, Oklahoma State Univ., Stillwater, OK
- 9:45 **2619** Effect of sub-sterilizing ionizing radiation on oxidative stress and DNA damage in irradiated tropical pest *Spodoptera litura* (Fabr.) and its F<sub>1</sub> progeny. **Zubeda Khan** (zubeda729@yahoo.in) and Rakesh Kumar Seth, Univ. of Delhi, New Delhi, India
- 10:00 **2620** Can the silkworm (*Bombyx mori*) be used as a human disease model? **Hiroko Tabunoki** (h\_tabuno@cc.tuat.ac.jp)<sup>1</sup>, Katsuhiko Ito<sup>1</sup>, Hidemasa Bono<sup>2</sup>, and Takeshi Yokoyama<sup>1</sup>, <sup>1</sup>Tokyo Univ. of Agriculture and Technology, Fuchu, Japan, <sup>2</sup>Research Organization of Information and Systems, Shizuoka, Japan
- 10:15 BREAK**
- 10:30 **2621** Photo-enzymatic repair of CPD and potential effect of nucleotide excision repair for 6-4PP decreasing in the twospotted mite, *Tetranychus urticae*. **Yasumasa Murata** (murata.yasumasa.22e@st.kyoto-u.ac.jp) and Masahiro Osakabe, Kyoto Univ., Kyoto, Japan
- 10:45 **2622** Ecology and evolutionary history shape the thermal niche. **Lacy D. Chick** (lacy.chick@case.edu)<sup>1</sup>, Andrew Nguyen<sup>2</sup>, Clint Penick<sup>3</sup>, Rob R. Dunn<sup>3</sup>, Nathan J. Sanders<sup>4</sup>, and Sarah Diamond<sup>1</sup>, <sup>1</sup>Case Western Reserve Univ., Cleveland, OH, <sup>2</sup>Univ. of Vermont, Burlington, VT, <sup>3</sup>North Carolina State Univ., Raleigh, NC, <sup>4</sup>Univ. of Copenhagen, Copenhagen, Denmark
- 11:00 **2623** Fine structure of the hoverfly, *Episyrphus balteatus* De Geer (Diptera: Syrphidae). Sheng-Jie Zhang, Fan Fan, Xiaofan Yang, and **Guoshu Wei** (weiguoshu03@aliyun.com), Agricultural Univ. of Hebei, Baoding, China
- 11:15 **2624** Recombinant expression, purification, and chitin binding specificity of different CPAP3s from *Bombyx mori*. **Mingbo Qu** (mingboqu@dlut.edu.cn), Yuezhou Ren, and Qing Yang, Dalian Univ. of Technology, Dalian, China
- 11:30 **2625** Crystal structure and inhibitor discovery of insect group I chitinase from *Ostrinia furnacalis*. **Tian Liu** (tianliu@dlut.edu.cn), Lei Chen, Yong Zhou, and Qing Yang, Dalian Univ. of Technology, Dalian, China
- 11:45 **2626** Structural characterization of type-II farnesyl diphosphate synthase from the spruce budworm, *Choristoneura fumiferana*. **Marie-Ève Picard** (marie-eve.picard.8@ulaval.ca)<sup>1,2</sup>, Aline Barbar<sup>1</sup>, Audrey Nisole<sup>3</sup>, Catherine Béliveau<sup>3</sup>, Stephanie Sen<sup>4</sup>, Rong Shi<sup>1,2</sup>, and Michel Cusson<sup>1,3</sup>, <sup>1</sup>Univ. Laval, Québec City, QC, Canada, <sup>2</sup>PROTEO et IBIS, Québec City, QC, Canada, <sup>3</sup>Natural Resources Canada, Québec City, QC, Canada, <sup>4</sup>The College of New Jersey, Ewing, NJ
- 12:00 **2627** Vibration enhances vision-dependent antennal response against approaching conspecifics in the Japanese pine sawyer beetle, *Monochamus alternatus* (Coleoptera: Cerambycidae). **Midori Fukaya** (viridisetviridis@gmail.com)<sup>1</sup> and Takuma Takanashi<sup>2</sup>, <sup>1</sup>Nihon Univ., Fujisawa, Japan, <sup>2</sup>Forestry and Forest Products Research Institute, Tsukuba, Japan
- 12:15 **2628** Exploiting the termite digestome for biofuel production. **S. Priya Rajarapu** (prajarapu@purdue.edu), Peter Dunn, and Michael Scharf, Purdue Univ., West Lafayette, IN

**Contributed Papers: Physiology and Biochemistry: Fundamental**

**Room W315 A (Convention Center)**

**Moderators:** S. Priya Rajarapu<sup>1</sup> and Lacy D. Chick<sup>2</sup>, <sup>1</sup>Purdue Univ., West Lafayette, IN, <sup>2</sup>Univ. of Tennessee, Knoxville, TN

- 9:15 **2617** Field evaluation of 5% EGX-101 in spray formulation (Bio-D: Bedbug Control) to control tropical bed bug, *Cimex hemipterus*, infestation. **Saiful Azlan Nordin** (saifulazlan87@gmail.com) and Hidayatulfathi Othman, National Univ. of Malaysia, Kuala Lumpur, Malaysia
- 9:30 **2618** Cuticular proteins in *Anopheles gambiae*: Their deployment in different structures and involvement in chitin-binding and sclerotization. **Judy Willis** (jhwillis@uga.edu), Laura Vannini, Yihong Zhou, Majors Badgett, John Bowen, and Ron Orlando, Univ. of Georgia, Athens, GA



WEDNESDAY

12:30 **2629** Effects of caloric restriction on immune responses against *Staphylococcus aureus* in silkworm, *Bombyx mori*. **Peng Lyu** (lvpeng\_zj@hotmail.com), Ye Pan, and Keping Chen, Jiangsu Univ., Zhenjiang, China

**Contributed Papers: Physiology and Biochemistry: Molecular, Genetics, and Genomics**

**Room W315 B (Convention Center)**

**Moderators:** Sima Jonusaite<sup>1</sup> and Lili Huang<sup>2</sup>, <sup>1</sup>York Univ., Toronto, ON, Canada, <sup>2</sup>Jiangxi Entry-Exit Inspection and Quarantine Bureau, Nanchang, China

9:15 **2630** Inheritance of critical daylength among different geographic population in the Asian corn borer, *Ostrinia furnacalis*. **Lili Huang** (l21120328@qq.com)<sup>1</sup>, Chao Chen<sup>2</sup>, and Fangsen Xue<sup>2</sup>, <sup>1</sup>Jiangxi Entry-Exit Inspection and Quarantine Bureau, Nanchang, China, <sup>2</sup>Jiangxi Agricultural Univ., Nanchang, China

9:30 **2631** Real-time PCR assay for the identification of *Thrips palmi* Karny in Thailand. **Charuwat Taekul** (charuwatt@gmail.com), Ittipon Bannakan, Rungnapha Thongkreng, and Nuttima Kositcharoenkul, Dept. of Agriculture, Bangkok, Thailand

9:45 **2632** Putative ammonia transporter expression in anal papillae of *Aedes aegypti* and response to high environmental ammonia. **Andrew Donini** (adonini@yorku.ca), Helen Chasiotis, Lidiya Misyura, Phuong Bui, and Adrian Ionescu, York Univ., Toronto, ON, Canada

10:00 **2633** Characterization of the role of occluding septate junctions in the maintenance of salt and water balance in larval mosquito (*Aedes aegypti*). **Sima Jonusaite** (artks@yorku.ca), Scott P. Kelly, and Andrew Donini, York Univ., Toronto, ON, Canada

**10:15 BREAK**

10:30 **2634** Physiological constraints of coping with energetic stress in the eusocial honey bee. **Christopher Mayack** (cmayack@gmail.com)<sup>1,2</sup>, Frank Hirche<sup>2</sup>, Ying Wang<sup>3</sup>, Gabriele I. Stangl<sup>2</sup>, and Gro V. Amdam<sup>3</sup>, <sup>1</sup>Swarthmore College, Swarthmore, PA, <sup>2</sup>Martin Luther Univ., Halle, Germany, <sup>3</sup>Arizona State Univ., Tempe, AZ

10:45 **2635** Transcriptional patterns underlying nutrition-stress interactions in the polyphagous agricultural pest *Helicoverpa zea*: How can diet modulate responses to Bt toxin and the entomopathogenic fungus *Beauveria bassiana*? **Carrie Deans** (cadeans@tamu.edu)<sup>1</sup>, Spencer T. Behmer<sup>2</sup>, Patricia Tamez Guerra<sup>3</sup>, Heiko Vogel<sup>4</sup>, and Gregory Sword<sup>2</sup>, <sup>1</sup>Univ. of Minnesota, St. Paul, MN, <sup>2</sup>Texas A&M Univ., College Station, TX, <sup>3</sup>Autonomous Univ. of Nuevo León, Nuevo Leon, Mexico, <sup>4</sup>Max Planck Institute for Chemical Ecology, Jena, Germany

11:00 **2636** Function and crystal structure of a *Bombyx mori* Omega-class glutathione transferase. **Kohji Yamamoto** (yamamok@agr.kyushu-u.ac.jp), Kyushu Univ., Fukuoka, Japan

11:15 **2637** Phytosterol metabolism in the generalist caterpillar *Helicoverpa armigera*. **Xiangfeng Jing** (jxf\_zb@sina.cn) and Jincheng Zheng, Northwest A&F Univ., Yangling, China

11:30 **2638** Identification of the main venom proteins of cotton mealybug parasitoid *Aenasius bambawalei* Hayat by RNA-Seq analysis. **Hoor Shaina** (shaina1463@gmail.com)<sup>1</sup>, Zain Ul Abidin<sup>1</sup>, Bruce Webb<sup>2</sup>, and Atif Manzoor<sup>1</sup>, <sup>1</sup>Univ. of Agriculture, Faisalabad, Pakistan, <sup>2</sup>Univ. of Kentucky, Lexington, KY

11:45 **2639** Identification and expression profiles of sex-specific *doublesex* transcripts in the non-holometabolous scale insects (Hemiptera: Coccomorpha). **Isabelle M. Vea** (isabelle.vea@gmail.com)<sup>1</sup>, Sumika Yonei<sup>1</sup>, Takahiro Shiotsuki<sup>2</sup>, Akiya Joraku<sup>2</sup>, Teruyuki Niimi<sup>3</sup>, and Chieka Minakuchi<sup>1</sup>, <sup>1</sup>Nagoya Univ., Nagoya, Japan, <sup>2</sup>National Institute of Agrobiological Sciences, Tsukuba, Japan, <sup>3</sup>National Institute for Basic Biology, Okazaki, Japan

12:00 **2640** Molecular and physiological studies of the host regulation factor of endoparasitoid *Aenasius bambawalei* Hayat (Hymenoptera: Encyrtidae). **Zain Ul Abidin** (zainunibas@gmail.com), Hoor Shaina, Saqi Kosar Abbas, and Atif Manzoor, Univ. of Agriculture, Faisalabad, Pakistan

12:15 **2641** Biochemical profiling of recombinantly expressed cytochrome P450's of *Apis mellifera* (Hymenoptera: Apidae). **Marion Zaworra** (marion.zaworra@bayer.com)<sup>1,2</sup>, Bettina Lueke<sup>2</sup>, and Ralf Nauen<sup>2</sup>, <sup>1</sup>Univ. of Bonn, Bonn, Germany, <sup>2</sup>Bayer CropScience, Monheim, Germany

12:30 **2642** Transcriptome-based proteome analysis to identify peptides and proteins involved in immunity and reproduction from male accessory glands and ejaculatory duct of *Bactrocera dorsalis*. **Dong Wei** (dong\_wei1988@yahoo.com)<sup>1</sup>, Hui-Min Li<sup>1</sup>, Chuan-Bei Tian<sup>1</sup>, Guy Smagghe<sup>2</sup>, Fu-Xian Jia<sup>1</sup>, Wei Dou<sup>1</sup>, and Jin-Jun Wang<sup>1</sup>, <sup>1</sup>Southwest Univ., Chongqing, China, <sup>2</sup>Ghent Univ., Ghent, Belgium

12:45 **2643** Identification of a strong promoter in cultured cells of *Polypedilum vanderplanki* as a tool to reveal molecular background underlying anhydrobiosis. **Yoichiro Sogame** (sogame@affrc.go.jp)<sup>1</sup>, Jun Okada<sup>1</sup>, Shingo Kikuta<sup>2</sup>, Ruslan Deviatiiarov<sup>3</sup>, Richard Cornette<sup>1</sup>, Oleg Gusev<sup>4</sup>, and Takahiro Kikawada<sup>1</sup>, <sup>1</sup>National Institute of Agrobiological Sciences, Tsukuba, Japan, <sup>2</sup>Tokyo Univ. of Agriculture and Technology, Koganei, Japan, <sup>3</sup>Kazan Federal Univ., Kazan, Russia, <sup>4</sup>RIKEN, Yokohama, Japan



WEDNESDAY

**Contributed Papers: Stored Products Entomology: Fumigants and Hypoxia**

**West Hall F2 (WF2) (Convention Center)**

**Moderators:** Vaclav Stejskal<sup>1</sup>, Muhammad Afzal<sup>2</sup>, and Ellen Thoms<sup>3</sup>, <sup>1</sup>Crop Research Institute, Prague, Czech Republic, <sup>2</sup>Quaid-i-Azam Univ., Islamabad, Pakistan, <sup>3</sup>Douglas Products, Gainesville, FL

- 9:15 **2644** Commercial fumigant fitness and bio-pesticide potential against resistant strains of quarantine insect pests. **Muhammad Afzal** (chafzal64@yahoo.com)<sup>1</sup>, Abdul Khaliq<sup>1</sup>, Muhammad Irfan Ullah<sup>1</sup>, Muhammad Ahmad<sup>1</sup>, Muhammad Saqib<sup>1</sup>, and Akhlaq Ahmad<sup>2</sup>, <sup>1</sup>Univ. of Sargodha, Sargodha, Pakistan, <sup>2</sup>Pakistan Agricultural Research Council, Karachi, Pakistan
- 9:30 **2645** Chemical composition of *Phyllantus fraternus* from Nigeria: A potential source of biofumigants. **Jacobs Mobolade Adesina** (mobolade72@gmail.com)<sup>1</sup>, Yallappa Rajashekar<sup>2</sup>, Tonsing Nghailun<sup>3</sup>, and Anjanappa Raghavendra<sup>4</sup>, <sup>1</sup>Rufus Giwa Polytechnic, Owo, Nigeria, <sup>2</sup>Institute of Bioresources & Sustainable Development, Imphal, India, <sup>3</sup>Institute of Bioresources & Sustainable Development, Manipur, India, <sup>4</sup>National Bureau of Agricultural Insect Resources, Karnataka, India
- 9:45 **2646** Global uses for sulfuryl fluoride (ProFume<sup>®</sup> gas fumigant) for post-harvest pest control. **Ellen Thoms** (ellen.thoms@douglasproducts.com)<sup>1</sup> and Barb Nead-Nylander<sup>2</sup>, <sup>1</sup>Douglas Products, Gainesville, FL, <sup>2</sup>Douglas Products, Rancho Santa Margarita, CA
- 10:00 **2647** Co-fumigation with phosphine (PH<sub>3</sub>) and sulfuryl fluoride (SO<sub>2</sub>F<sub>2</sub>) for the management of strongly phosphine-resistant insect pests of stored grain. **Rajeswaran Jagadeesan** (raj.jagadeesan@daf.qld.gov.au)<sup>1,2</sup>, Manoj Nayak<sup>1</sup>, Hervoika Pavic<sup>1</sup>, Virginetenshia Singarayan<sup>1</sup>, and Paul Ebert<sup>2</sup>, <sup>1</sup>Queensland Dept. of Agriculture and Fisheries, Brisbane, Australia, <sup>2</sup>Univ. of Queensland, Brisbane, Australia
- 10:15 **BREAK**

- 10:30 **2648** ECO<sub>2</sub>FUME<sup>®</sup> for control of western flower thrips, *Frankliniella occidentalis* (Pergande), on tomatoes and green pepper at low temperature storage conditions. **Sait Erturk** (saiterturk@gmail.com)<sup>1</sup>, Murat Olculu<sup>2</sup>, Mustafa Alkan<sup>1</sup>, Rifat Goztas<sup>3</sup>, and Arda Taner<sup>4</sup>, <sup>1</sup>Plant Protection Central Research Institute, Ankara, Turkey, <sup>2</sup>Biological Control Research Institute, Adana, Turkey, <sup>3</sup>Agrifa Agriculture Products Trade Ltd., Mersin, Turkey, <sup>4</sup>Cytec Industry, Inc., Adana, Turkey
- 10:45 **2649** Advances in developing alternative treatment for postharvest pest control. **Yong-Biao Liu** (yongbiao.liu@ars.usda.gov), USDA - ARS, Salinas, CA
- 11:00 **2650** Nitric oxide fumigation for control of certain quarantine pests on imported fresh commodities. **Xikui Wei** (xikui.wei@aphis.usda.gov)<sup>1</sup>, Woodward Bailey<sup>1</sup>, and Yong-Biao Liu<sup>2</sup>, <sup>1</sup>USDA - APHIS, Miami, FL, <sup>2</sup>USDA - ARS, Salinas, CA
- 11:15 **2651** Flour-mill fumigation using hydrogen cyanide and phosphine insecticide gases. **Vaclav Stejskal** (stejskal@vurv.cz), Crop Research Institute, Prague, Czech Republic
- 11:30 **2652** Efficacy of ozone fumigation against phosphine susceptible and resistant strains of *Rhyzopertha dominica*. **Xinyi E.** (xinyi608@gmail.com), Bhadriraju Subramanyam, and Beibei Li, Kansas State Univ., Manhattan, KS
- 11:45 **2653** Influence of hypoxia on cowpea weevil egg-laying behavior and progeny development. **Kabita Kharel** (kkharel@purdue.edu), Dieudonne Baributsa, Scott Williams, and Linda J. Mason, Purdue Univ., West Lafayette, IN
- 12:00 **2654** Cumulative oxygen consumption during development of two post-harvest pests (*Callosobruchus maculatus* Fabricius and *Plodia interpunctella* Huebner). **Hannah Quellhorst** (hquellho@purdue.edu)<sup>1</sup>, Dieudonne Baributsa<sup>2</sup>, Scott Williams<sup>2</sup>, and Larry Murdock<sup>2</sup>, <sup>1</sup>Purdue Improved Crop Storage Lab, West Lafayette, IN, <sup>2</sup>Purdue Univ., West Lafayette, IN



WEDNESDAY







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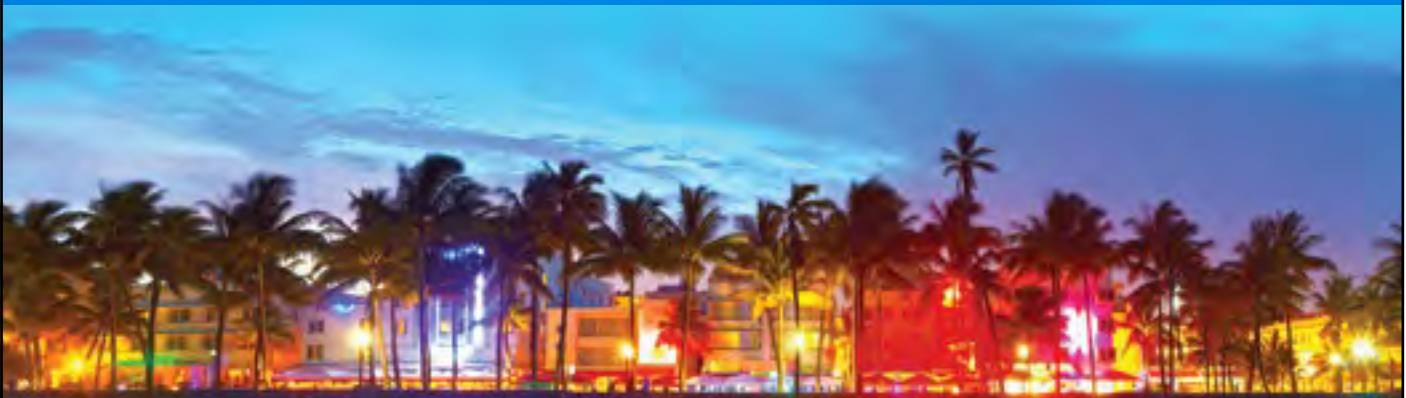
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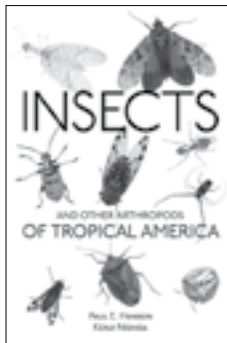
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THURSDAY

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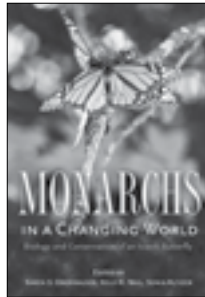
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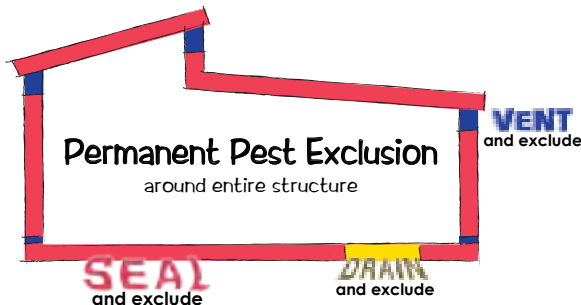


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Plenary Presentation Featuring Dr. Jacqueline Beggs

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**Moderators and Organizers:** Walter S. Leal<sup>1</sup>, Alvin M. Simmons<sup>2</sup>, and Myron Zalucki<sup>3</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>USDA - ARS, Charleston, SC, <sup>3</sup>Univ. of Queensland, Brisbane, Australia

- 8:00 **2655** Introduction of the plenary speaker. **Myron Zalucki** (m.zalucki@uq.edu.au), Univ. of Queensland, Brisbane, Australia
- 8:05 **2656** Ecological impacts of insect invaders. **Jacqueline Beggs** (j.beggs@auckland.ac.nz), Univ. of Auckland, Auckland, New Zealand

Plenary Presentation Featuring Dr. Jennifer Fewell

Chapin Theater (Convention Center)

**Moderators and Organizers:** Walter S. Leal<sup>1</sup>, Alvin M. Simmons<sup>2</sup>, and Gene E. Robinson<sup>3</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>USDA - ARS, Charleston, SC, <sup>3</sup>Univ. of Illinois, Champaign, IL

- 8:00 **2657** Introduction of the plenary speaker. **Gene E. Robinson** (generobi@illinois.edu), Univ. of Illinois, Champaign, IL
- 8:05 **2658** The spirit of the hive: Mechanisms of social evolution. **Jennifer Fewell** (j.fewell@asu.edu), Arizona State Univ., Tempe, AZ

Poster Session 3: Entomophagy and Entomology in Popular Culture

West Hall C (Convention Center)

- D3507** Research on the yearlong rearing of rice grasshopper (*Oxya chinensis sinuosa* Mishchenko). **Sungju Kang** (kang4695@korea.kr), Seongon Kim, Hyunjin Kim, Jungeun Kim, and Huiyeon Koo, Jeollanamdo Agricultural Research and Extension Services, Jangseong, South Korea
- D3508** Production of black soldier fly larvae (*Hermetia illucens*) as a commodity: Effects of various biological factors. **John Schneider** (jcs1@msstate.edu), Mississippi State Univ., Mississippi State, MS
- D3509** Influence of the liquid fraction on *Hermetia illucens* (L.) reared on vegetables. **Costanza Jucker** (costanza.jucker@unimi.it), Maria Giovanna Leonardi, Marco Palamara Mesiano, Daniela Lupi, and Sara Savoldelli, Univ. of Milan, Milan, Italy
- D3510** Teaching with insects as food and feed: Incorporating entomophagy into sustainable agriculture curricula at the university and community level. **Donald Sudbrink** (sudbrinkd@apsu.edu) and Amy Wright, Austin Peay State Univ., Clarksville, TN

Poster Session 3: Genetics and Evolutionary Entomology

West Hall C (Convention Center)

- D3511** Sixteen novel microsatellite loci for *Megachile rotundata* (Hymenoptera: Megachilidae) and related taxa. **James Strange** (james.strange@ars.usda.gov)<sup>1</sup>, Deborah A. Delaney<sup>2</sup>, David Tarpay<sup>3</sup>, and Rosalind James<sup>4</sup>, <sup>1</sup>USDA - ARS, Logan, UT, <sup>2</sup>Univ. of Delaware, Newark, DE, <sup>3</sup>North Carolina State Univ., Raleigh, NC, <sup>4</sup>USDA - ARS, Beltsville, MD
- D3512** Environmental influences on gene flow in cave crickets (Orthoptera: Rhaphidophoridae) inhabiting abandoned mines. **Kristin Dunn** (kristin.dunn.11@cnu.edu), Christopher Newport Univ., Newport News, VA
- D3513** Genetic diversity and population structure of *Anastrepha striata* (Diptera: Tephritidae) in three natural regions of southwestern Colombia using mitochondrial sequences. Jenny Gallo, **Sandra Velasco-Cuervo** (sandra.velasco@correounivalle.edu.co), Elkin Aguirre, Nancy Carrejo, Ranulfo González, and Nelson Toro-Perea, Univ. of Valle, Cali, Colombia
- D3514** Populational microgeographical study of the new world screwworm fly, *Cochliomyia hominivorax* (Diptera: Calliphoridae). Luana Bergamo<sup>1</sup>, Pablo Fresia<sup>2</sup>, and **Ana Azeredo-Espin** (azeredo@unicamp.br)<sup>1</sup>, <sup>1</sup>Univ. of Campinas, Campinas, Brazil, <sup>2</sup>Pasteur Institute, Montevideo, Uruguay
- D3515** Impact of the 2010 Deepwater Horizon oil spill on population size and genetic structure of horse flies, *Tabanus nigrovittatus*, in Louisiana marshes. **Lane Foil** (lfoil@agcenter.lsu.edu) and Claudia Husseneder, Louisiana State Univ., Baton Rouge, LA
- D3516** Analysis of genetic variability of *Aedes albopictus* in an area of growing urbanization. **Rosangela Barbosa** (barbosar@cpqam.fiocruz.br)<sup>1</sup>, Suzane Santos<sup>1</sup>, and Marcelo Paiva<sup>2</sup>, <sup>1</sup>Oswaldo Cruz Foundation, Recife, Brazil, <sup>2</sup>Federal Univ. of Pernambuco, Caruaru, Brazil
- D3517** Genetic structure of *Hylesia metabus* (Lepidoptera: Saturniidae): Moths responsible for lepidopteran outbreaks in French Guiana and Venezuela. **Marina Ciminera** (marina.ciminera@ecofog.gf)<sup>1</sup>, Alain Roques<sup>2</sup>, Niklas Tysklind<sup>3</sup>, and Marie-Anne Auger-Rozenberg<sup>2</sup>, <sup>1</sup>National Center for Scientific Research, Kourou, French Guiana, <sup>2</sup>INRA, Orléans, France, <sup>3</sup>INRA, Kourou, French Guiana
- D3518** Estimation of genetic neighborhood size of western corn rootworm, *Diabrotica virgifera virgifera*, using genotyping by sequencing. **Kyung Seok Kim** (kkssky@gmail.com)<sup>1</sup>, Brad S. Coates<sup>2</sup>, John D. Nason<sup>1</sup>, and Thomas Sappington<sup>2</sup>, <sup>1</sup>Iowa State Univ., Ames, IA, <sup>2</sup>USDA - ARS, Ames, IA
- D3519** Population genetic structure and *Wolbachia* infection in an endangered butterfly, *Zizina emelina* (Lepidoptera: Lycaenidae). **Norio Hirai** (n\_hirai@envi.osakafu-u.ac.jp)<sup>1</sup>, Yoshiko Sakamoto<sup>2</sup>, Masaya Yago<sup>3</sup>, Minoru Ishii<sup>1</sup>, and Cheol Min Lee<sup>4</sup>, <sup>1</sup>Osaka Prefecture Univ., Sakai, Japan, <sup>2</sup>National Institute for Environmental Studies, Tsukuba, Japan, <sup>3</sup>The Univ. Museum, The Univ. of Tokyo, Tokyo, Japan, <sup>4</sup>Korea Forest Research Institute, Seoul, South Korea



- D3520** Endosymbiotic bacterial fauna of sunn pest. **Nurper Guz** (nurperguz@agri.ankara.edu.tr)<sup>1</sup> and Serap Aksoy<sup>2</sup>, <sup>1</sup>Ankara Univ., Ankara, Turkey, <sup>2</sup>Yale Univ., New Haven, CT
- D3521** Diversity and phylogenetic analysis of bacterial endosymbionts from Colombian *Bemisia tabaci* (Hemiptera: Aleyrodidae). **Vanessa Muñoz** (vanem28@gmail.com), Mailyn Bedoya Saldarriaga, and James Montoya Lerma, Univ. of Valle, Cali, Colombia
- D3522** Effects of inter-body environmental variation of host insects on the morphogenesis of endoparasitoid wasps: Estimation through genome-wide association analysis on wasp morphology and host genetic variation. **Tomohiro Takigahira** (takigahira@s.okayama-u.ac.jp) and Kazuo Takahashi, Okayama Univ., Okayama, Japan
- D3523** Phylogenetic relationships of the groundnut leafminer, *Proaerema simplexella* (Walker), and *A. modicella* (Deventer) (Lepidoptera: Gelechiidae) populations collected from Africa, Australia, and India based on mitochondrial and nuclear DNA gene sequences. **Makhosi Buthelezi** (buthelezim@mut.ac.za)<sup>1</sup>, Desmond Conlong<sup>2,3</sup>, and Godfrey Zharare<sup>4</sup>, <sup>1</sup>Mangosuthu Univ. of Technology, Durban, South Africa, <sup>2</sup>SASRI, Durban, South Africa, <sup>3</sup>Univ. of KwaZulu-Natal, Pietermaritzburg, South Africa, <sup>4</sup>Univ. of Zululand, Empangeni, South Africa
- D3524** Ovipositor transcriptomes reveal an evolutionary conserved mechanism of oviposition substrate choice in *Drosophila*. **Cristina Crava** (maria.crava@fmach.it), Valerio Stacconi, Omar Rota Stabelli, and Gianfranco Anfora, Edmund Mach Foundation, San Michele all'Adige, Italy
- D3525** A new report of orange color type *Nezara viridula* (Heteroptera: Pentatomidae) from Washington County, Mississippi from a cultured population. **M. Guadalupe Rojas** (guadalupe.rojas@ars.usda.gov) and Juan Morales-Ramos, USDA - ARS, Stoneville, MS
- D3526** Hind legs used as a “risky decoy” in the leaf-footed bug, *Leptoglossus phyllopus*. **Paige Carlson** (pcarlson7@ufl.edu), Zachary Emberts, and Christine W. Miller, Univ. of Florida, Gainesville, FL
- D3527** The hidden costs of sexually selected weapons in the heliconia bug, *Leptoscelis tricolor* (Hemiptera: Coreidae). **Ummat Somjee** (ummat.s@gmail.com), Univ. of Florida, Gainesville, FL
- D3528** Male lifetime mating success in relation to body size in *Diabrotica barberi*. **Bryan French** (wade.french@ars.usda.gov)<sup>1</sup> and Leslie Hammack<sup>2</sup>, <sup>1</sup>USDA - ARS, Brookings, SD, <sup>2</sup>USDA - ARS, Keystone, SD
- D3529** Genetic relationship between development time and body mass at different temperatures and sexes in *Tribolium castaneum*. **Paulina Kramarz** (paulina.kramarz@uj.edu.pl) and Szymon Drobniak, Jagiellonian Univ., Krakow, Poland
- D3530** HSP90: A capacitor for evolution in the red flour beetle *Tribolium castaneum*? **Rasha Aboelsoud** (r\_abo01@uni-muenster.de) and Joachim Kurtz, Univ. of Münster, Münster, Germany
- D3531** Circadian clock, photoperiodic timer and genes in *Pyrrhocoris apterus* from different latitudes. **Bulah Chia-hsiang Wu** (bulah@entu.cas.cz)<sup>1,2</sup>, Lenka Pivarciova<sup>1,2</sup>, Jan Provaznik<sup>1,2</sup>, Joanna Kotwica-Rolinska<sup>2</sup>, and David Dolezel<sup>1,2</sup>, <sup>1</sup>Univ. of South Bohemia, České Budějovice, Czech Republic, <sup>2</sup>Czech Academy of Sciences, České Budějovice, Czech Republic
- D3532** Genetic mapping of a red-eye mutant in the brown planthopper, *Nilaparvata lugens*. **Jirapong Jairin** (jjairin@yahoo.com)<sup>1</sup>, Phikul Leelagud<sup>1</sup>, and Ketsara Suwannapukdee<sup>2</sup>, <sup>1</sup>Ubon Ratchathani Rice Research Center, Ubon Ratchathani, Thailand, <sup>2</sup>Maharakham Univ., Maha Sarakham, Thailand
- D3533** Using environmental association to decode adaptation: Insecticide resistance in Colorado potato beetle. **Michael Crossley** (mccrossley@wisc.edu), Univ. of Wisconsin, Madison, WI
- D3534** Anti-bat adaptations in tiger beetles (Cicindelidae). **Harlan Gough** (goughh@ufl.edu), Univ. of Florida, Gainesville, FL

### Poster Session 3: Insect Chemical Ecology

#### West Hall C (Convention Center)

- D3535** Is codling moth sprayable pheromone safe for natural enemies? The case of adult *Coccinella septempunctata* under laboratory conditions. **Bilgi Pehlevan** (bpehlevan@uludag.edu.tr) and Orkun Baris Kovanci, Uludag Univ., Bursa, Turkey
- D3536** Effect of nitrogen on rice insects pest and their natural enemies. **Jean Willy Nduwimana** (jeanwillynduwimana@yahoo.fr), Huazhong Agricultural Univ., Wuhan, China
- D3537** Behavioral responses to dimethyl disulfide of two staphylinid parasitoids of the cabbage maggot, *Delia radicum*. Jing Du and **Neil Holliday** (neil\_holliday@umanitoba.ca), Univ. of Manitoba, Winnipeg, MB, Canada
- D3538** Response of wasp parasitoid *Ibalia leucospoides* to volatiles from fungal symbiont (*Amylostereum areolatum*) of *Sirex noctilio*. **Hajar Faal Mohammad Ali** (hajar.faal@gmail.com), Dong Cha, and Stephen Teale, State Univ. of New York, Syracuse, NY
- D3539** Mechanisms of parasitism by the thermophilic ant *Melophorus anderseni*. **Sara Hu** (shu6@toromail.csudh.edu)<sup>1</sup>, Benjamin D. Hoffmann<sup>2</sup>, Adrian A. Smith<sup>3</sup>, Andrew Suarez<sup>4</sup>, and Terrence P. McGlynn<sup>1</sup>, <sup>1</sup>California State Univ., Carson, CA, <sup>2</sup>CSIRO, Winnellie, Australia, <sup>3</sup>North Carolina Museum of Natural Sciences, Raleigh, NC, <sup>4</sup>Univ. of Illinois, Champaign, IL
- D3540** Symbiotic bacteria in oral secretion of *Spodoptera litura* orchestrate host plant defense in *Arabidopsis*. **Yukiyo Yamasaki** (yamasaki.y@rs.tus.ac.jp)<sup>1</sup>, Hiroka Sumioka<sup>1</sup>, Ivan Galis<sup>2</sup>, and Gen-ichiro Arimura<sup>1</sup>, <sup>1</sup>Tokyo Univ. of Science, Tokyo, Japan, <sup>2</sup>Okayama Univ., Kurashiki, Japan
- D3541** Chemically-mediated host colonization of black cherry trees, *Prunus serotina*, by the peach bark beetle, *Phloeotribus liminaris* (Coleoptera: Scolytinae). **Matthew Ethington** (methingt@purdue.edu), Gabriel Hughes, and Matthew Ginzler, Purdue Univ., West Lafayette, IN



- D3542** Repellent factors and host recognition cues for western corn rootworm (*Diabrotica virgifera virgifera*). **Elisa Bernklau** (bernklau@colostate.edu)<sup>1</sup>, Bruce Hibbard<sup>2</sup>, and Louis Bjostad<sup>1</sup>, <sup>1</sup>Colorado State Univ., Fort Collins, CO, <sup>2</sup>USDA - ARS, Columbia, MO
- D3543** Presentation withdrawn
- D3544** Adaptation strategy of bird cherry-oat aphid to its host-plants. **Bogumil Leszczynski** (leszczb@uph.edu.pl), Cezary Sempruch, Marta Chwedczuk, Marcin Becher, Grzegorz Chrzanowski, and Hubert Sytykiewicz, Univ. of Life Sciences and Humanities, Siedlce, Poland
- D3545** Activity evaluation of spotted wing drosophila attractant. **Yan Feng** (yan.feng@ars.usda.gov), Aijun Zhang, Robert Bruton, and Alexis Park, USDA - ARS, Beltsville, MD
- D3546** D-Pinitol involved in host recognition by common grass yellow, *Eurema mandarina*, toward leguminous plants. **Hisashi Ômura** (homura@hiroshima-u.ac.jp), Shin-ya Mukae, Yuika Matsumoto, and Toshiki Ohashi, Hiroshima Univ., Higashihiroshima, Japan
- D3547** Induced resistance in soybeans against southern armyworm herbivory. **Bruno Sardinha de Souza** (souzabhs@gmail.com)<sup>1</sup>, Arlindo Boiça Junior<sup>1</sup>, Michael Stout<sup>2</sup>, Durvalina Mathias dos Santos<sup>1</sup>, Moacir Rossi Forim<sup>3</sup>, Antonio Pizolato Neto<sup>1</sup>, and Bruno Perlatti<sup>3</sup>, <sup>1</sup>São Paulo State Univ., Jaboticabal, Brazil, <sup>2</sup>Louisiana State Univ. AgCenter, Baton Rouge, LA, <sup>3</sup>Federal Univ. of São Carlos, São Carlos, Brazil
- D3548** Phytochemical co-evolution between insects and plants through plant diterpenes and insect juvenile hormone receptors. **Hyun-Woo Oh** (hwoh@kribb.re.kr)<sup>1</sup>, Chan-Seok Yun<sup>1</sup>, Jun Hyoung Jeon<sup>1</sup>, Alexander Raikhel<sup>2</sup>, and Sang Woon Shin<sup>2</sup>, <sup>1</sup>Korea Research Institute of Bioscience and Biotechnology, Daejeon, South Korea, <sup>2</sup>Univ. of California, Riverside, CA
- D3549** Host plants for *Galerucella griseescens* is determined from flavonoids in the leaves. **Makoto Abe** (abeman@akita-pu.ac.jp), Yuuki Tomioka, Koji Noge, and Shigaru Tamogami, Akita Prefectural Univ., Akita, Japan
- D3550** The discrimination between host plants and nonhost plants by tarsi in Chrysomelidae. **Shun Yosano** (shun.yosano.r6@dc.tohoku.ac.jp), Minami Akatsu, Yasuhiko Kutsuwada, Shuhei Masuta, Rei Kakazu, Naoshi Masuoka, Kazuhiro Matsuda, and Masatoshi Hori, Tohoku Univ., Sendai, Japan
- D3551** Response of adult *Anoplophora glabripennis* (Coleoptera: Cerambycidae) to host-derived isothiocyanates. **Scott Gula** (gulas@xavier.edu)<sup>1</sup>, Vanessa Lopez<sup>2</sup>, Leslie Kuhn<sup>3</sup>, Joseph Francese<sup>4</sup>, Damon Crook<sup>4</sup>, Matthew Ginzl<sup>1</sup>, and Ann M. Ray<sup>2</sup>, <sup>1</sup>Purdue Univ., West Lafayette, IN, <sup>2</sup>Xavier Univ., Cincinnati, OH, <sup>3</sup>Michigan State Univ., East Lansing, MI, <sup>4</sup>USDA - APHIS, Buzzards Bay, MA
- D3552** Representation of human scent in the mosquito antennal lobe. **Genevieve Tauxe** (gtauxe1@jhu.edu) and Conor McMeniman, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
- D3553** Location of a carbon dioxide source by *Anopheles coluzzii* in a wind tunnel. **Emerson Lacey** (eslacey@ucr.edu) and Ring T. Cardé, Univ. of California, Riverside, CA
- D3554** Alarming, but true: The chemical ecology of phorid flies attracted to injured ants. **Katherine Noble** (k.g.noble@utah.edu), Univ. of Utah, Salt Lake City, UT
- D3555** Geographic variation in sex pheromone of tea geometrid: *Ectropis griseescens* and *Ectropis obliqua*, China. **Tao Ma** (matao@scau.edu.cn)<sup>1</sup>, Xiujun Wen<sup>1</sup>, Qiang Xiao<sup>2</sup>, and Cai Wang<sup>1</sup>, <sup>1</sup>South China Agricultural Univ., Guangzhou, China, <sup>2</sup>Chinese Academy of Agricultural Sciences, Hangzhou, China
- D3556** Identification of male-produced attractants of *Anoplophora glabripennis* and their effect on behavior. Damon Crook and **Joseph Francese** (joe.francese@aphis.usda.gov), USDA - APHIS, Buzzards Bay, MA
- D3557** Pheromonotropic activity of a synthetic pheromone biosynthesis-activating neuropeptide and its expression in *Maruca vitrata*. Wook Hyun Cha, Yoon Jung Hwang, and **Dae-weon Lee** (daeweonlee@ks.ac.kr), Kyungshung Univ., Busan, South Korea
- D3558** Improved syntheses of 1-bisabolen-3-ol aggregation pheromones. **Ashot Khrimian** (ashot.khrimian@ars.usda.gov), Shyam Shirali, and Filadelfo Guzman, USDA - ARS, Beltsville, MD
- D3559** Comparative evolution of pheromone communication in heliothine moths. **Kirk Hillier** (kirk.hillier@acadiu.ca), Colin Mackay, and Ana Rizzato, Acadia Univ., Wolfville, NS, Canada
- D3560** Efficacy of current lures for detection of redbay ambrosia beetle, *Xyleborus glabratus* (Coleoptera: Curculionidae: Scolytinae). **Paul E. Kendra** (paul.kendra@ars.usda.gov)<sup>1</sup>, Wayne S. Montgomery<sup>1</sup>, Jerome Niogret<sup>2</sup>, Elena Q. Schnell<sup>1</sup>, Mark A. Deyrup<sup>3</sup>, and Nancy D. Epsky<sup>1</sup>, <sup>1</sup>USDA - ARS, Miami, FL, <sup>2</sup>Niogret Ecology Consulting LLC, Miami, FL, <sup>3</sup>Archbold Biological Station, Lake Placid, FL
- D3561** Evidence for a male-produced aggregation pheromone in *Diocalandra frumenti* Fabricius (Coleoptera: Curculionidae). **Sandra Vacas** (sanvagon@ceqa.upv.es)<sup>1</sup>, Ismael Navarro<sup>2</sup>, Elena Seris<sup>3</sup>, Estrella Hernández<sup>4</sup>, Jaime Primo<sup>1</sup>, and Vicente Navarro-Llopis<sup>1</sup>, <sup>1</sup>Polytechnic Univ. of València, València, Spain, <sup>2</sup>Ecology and Agricultural Protection SL, Carlet, Spain, <sup>3</sup>Directorate-General for Agriculture and Rural Development, Santa Cruz de Tenerife, Spain, <sup>4</sup>Canary Institute of Agricultural Research, Tenerife, Spain
- D3562** Do the cuticular hydrocarbons profiles in a highly eusocial bee queens reflect reproductive status? **Denise Alves** (daalves@usp.br)<sup>1</sup>, Maria Juliana Ferreira-Caliman<sup>2</sup>, Fabio Nascimento<sup>2</sup>, José Mauricio Bento<sup>1</sup>, and Stefan Jarau<sup>3</sup>, <sup>1</sup>São Paulo State Univ., Piracicaba, Brazil, <sup>2</sup>São Paulo State Univ., Ribeirão Preto, Brazil, <sup>3</sup>Univ. of Ulm, Ulm, Germany
- D3563** Morphology and ultrastructure of the functional sensilla on antenna, ovipositor, maxillary and labial palps of *Monochamus alternatus* (Coleoptera: Cerambycidae). **Lili Ren** (lily\_ren@bjfu.edu.cn), Juan Shi, and You-Qing Luo, Beijing Forestry Univ., Beijing, China



- D3564** (Z)-9-tetradecenyl acetate, shows stronger *in silico* binding to the pheromone-binding protein of *Lobesia botrana* than the major sex pheromone component. **Ana Mutis** (ana.mutis@ufrontera.cl)<sup>1</sup>, Herbert Venthur<sup>1</sup>, Darío Mercado<sup>1</sup>, David Castro<sup>2</sup>, Susana Izquierdo<sup>2</sup>, and Andrés Quiroz<sup>1</sup>, <sup>1</sup>Univ. of La Frontera, Temuco, Chile, <sup>2</sup>Fruit Development Foundation, Santiago, Chile

### Poster Session 3: Insect Neurobiology

#### West Hall C (Convention Center)

- D3565** Neurobiology of alarm pheromone perception in Africanized honey bees, *Apis mellifera*. **Bahram Kheradmand** (bkheradm@ucsd.edu)<sup>1</sup>, James C. Nieh<sup>1</sup>, and Kenta Asahina<sup>2</sup>, <sup>1</sup>Univ. of California, La Jolla, CA, <sup>2</sup>Salk Institute, La Jolla, CA
- D3566** Memory formation and nutritional value of reward sugars in the honey bee, *Apis mellifera*. **Julie Mustard** (julie.mustard@utrgv.edu)<sup>1</sup>, Valerie Alvarez<sup>1</sup>, Alexander Stoker<sup>2</sup>, and Kashif Malik<sup>2</sup>, <sup>1</sup>The Univ. of Texas, Brownsville, TX, <sup>2</sup>Arizona State Univ., Tempe, AZ
- D3567** Association of behavioral variation and sucrose sensitivity in *Temnothorax rugatulus*. **Colin Lynch** (colinlynch@email.arizona.edu), Anna Dornhaus, and Nicole Fischer, Univ. of Arizona, Tucson, AZ
- D3568** Taste specialization in *Drosophila sechellia*. **Carolina Reisenman** (creisenman@berkeley.edu) and Kristin Scott, Univ. of California, Berkeley, CA
- D3569** Tyrosine hydroxylase in the central nervous system of Apidae and Triatominae. **Beatriz Settembrini** (settembrini@macn.gov.ar)<sup>1,2</sup>, Gerónimo Galvani<sup>1</sup>, Jimena Leyria<sup>3</sup>, Susana Nowicki<sup>4</sup>, and Lilián Canavoso<sup>3</sup>, <sup>1</sup>Argentina Museum of Natural Sciences, Buenos Aires, Argentina, <sup>2</sup>Univ. of Austral, Derqui, Argentina, <sup>3</sup>National Univ. of Córdoba, Córdoba, Argentina, <sup>4</sup>CONICET, Buenos Aires, Argentina
- D3570** Electrophysiological characterization of insect TRPV channels. Katherine Lelito, Lynn Stam and **Vincent Salgado** (vincent.salgado@basf.com), BASF, Research Triangle Park, NC
- D3571** An electrical wild silkmoth antenna and single food leaf nutrition. **Maki Kosuge** (kosuge3580012@nifty.com), Ex Oki Electric Company, Iruma, Japan
- D3572** Activity level in *Temnothorax rugatulus* ants. **Varuska Patni** (varuskapatni@email.arizona.edu), Nicole Fischer, Kerrah Cutter, and Anna Dornhaus, Univ. of Arizona, Tucson, AZ
- D3573** Comparative analysis of the circadian clock in selected Diptera species. **Enrico Bertolini** (enrico.bertolini@uni-wuerzburg.de), Pamela Menegazzi, and Charlotte Förster, Univ. of Würzburg, Würzburg, Germany
- D3574** Control of crop function of the agricultural pest, *Delia radicum*. **Petra Pribylova** (bspp@leeds.ac.uk)<sup>1,2</sup>, June Matthews<sup>2</sup>, Neil Audsley<sup>2</sup>, and Elwyn Isaac<sup>1</sup>, <sup>1</sup>Univ. of Leeds, Leeds, United Kingdom, <sup>2</sup>Fera Science, Ltd., York, United Kingdom

### Poster Session 3: Integrated Pest Management and Sustainable Agriculture

#### West Hall C (Convention Center)

- D3575** Integrated pest management education program in Nevada, USA. **Joy Paterson** (patersonj@unce.unr.edu)<sup>1</sup>, Jay Davison<sup>2</sup>, Heidi Kratsch<sup>3</sup>, Melody Hefner<sup>3</sup>, and Kevin Burls<sup>3</sup>, <sup>1</sup>Univ. of Nevada Cooperative Extension, Yerington, NV, <sup>2</sup>Univ. of Nevada Cooperative Extension, Fallon, NV, <sup>3</sup>Univ. of Nevada Cooperative Extension, Reno, NV
- D3576** Entomology extension learning methods: Competency differences between video and slideshow presentations. **Jason Thomas** (jasonfalco@gmail.com)<sup>1</sup>, Robert Bowling<sup>2,3</sup>, and Michael Brewer<sup>3</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Texas A&M Univ., Corpus Christi, TX, <sup>3</sup>Texas A&M AgriLife Research, Corpus Christi, TX
- D3577** Integrated pest management in dry bean production in California. **Rachael Long** (rflong@ucanr.edu)<sup>1</sup> and Larry Godfrey<sup>2</sup>, <sup>1</sup>Univ. of California, Woodland, CA, <sup>2</sup>Univ. of California, Davis, CA
- D3578** Show me the money: NIFA funding opportunities for pest management. **Robert Nowierski** (rnowierski@nifa.usda.gov), USDA - NIFA, Washington, DC
- D3579** Mainbiosys project to enhance the agriculture sustainable practices in sub-Saharan Africa. **Andrea Sciarretta** (sciarretta@unimol.it) and Pasquale Trematerra, Univ. of Molise, Campobasso, Italy
- D3580** A push-pull IPM strategy for invasive ambrosia beetles in ornamental nurseries. **Chris Werle** (chris.werle@ars.usda.gov)<sup>1</sup>, John Adamczyk<sup>1</sup>, Jason B. Oliver<sup>2</sup>, Christopher Ranger<sup>3</sup>, Michael Reding<sup>3</sup>, Blair Sampson<sup>1</sup>, and Peter B. Schultz<sup>4</sup>, <sup>1</sup>USDA - ARS, Poplarville, MS, <sup>2</sup>Tennessee State Univ., McMinnville, TN, <sup>3</sup>USDA - ARS, Wooster, OH, <sup>4</sup>Virginia Polytechnic Institute and State Univ., Virginia Beach, VA
- D3581** Farmer application of post-harvest management strategies in Tahoua and Maradi regions of Niger, West Africa. Hame Abdou Kadi Kadi<sup>1</sup>, **Bonnie Pendleton** (bpendleton@wtamu.edu)<sup>1</sup>, and Kadri Aboubacar<sup>2</sup>, <sup>1</sup>West Texas A&M Univ., Canyon, TX, <sup>2</sup>Univ. Abdou Moumouni, Niamey, Niger
- D3582** Insect diversity in agro-ecological cotton in Brazilian semiarid region. **Fábio Albuquerque** (fabio.albuquerque@embrapa.br)<sup>1</sup>, Regina Wanessa Cavalcanti<sup>2</sup>, and Gildo Araújo<sup>3</sup>, <sup>1</sup>Embrapa Cotton, Campina Grande, Brazil, <sup>2</sup>Paraíba State University, Campina Grande, Brazil, <sup>3</sup>Embrapa Cotton, Barbalha, Brazil
- D3583** Interspecific cross between *Helicoverpa armigera* and *H. zea* in Brazil: Implications in IPM programs. Dayana Sousa, Mariana Durigan, Natália Leite, Rogério Pereira, Celso Omoto, and **Alberto Correa** (ascorrea@usp.br), Univ. of São Paulo, Piracicaba, Brazil
- D3584** Monitoring Hessian fly, *Mayetiola destructor*, flight: Management applications and limitations of pheromone traps. **Allen Knutson** (a-knutson@tamu.edu)<sup>1</sup>, Kris Giles<sup>2</sup>, Tom Royer<sup>2</sup>, Nathan Bradford<sup>2</sup>, and Carlos Campos<sup>3</sup>, <sup>1</sup>Texas A&M Univ., Dallas, TX, <sup>2</sup>Oklahoma State Univ., Stillwater, OK, <sup>3</sup>Texas A&M AgriLife Research, Dallas, TX





- D3585** Addressing the issue of pesticides in surface waters of the middle Rogue watershed: The Pesticide Stewardship Partnership approach. **Richard Hilton** (richard.hilton@oregonstate.edu)<sup>1</sup>, Mary Halbleib<sup>2</sup>, Paul Jepson<sup>2</sup>, and Kevin Masterson<sup>3</sup>, <sup>1</sup>Oregon State Univ., Central Point, OR, <sup>2</sup>Oregon State Univ., Corvallis, OR, <sup>3</sup>Oregon Dept. of Environmental Quality, Bend, OR
- D3586** Early season arthropod community structure on vegetable crops in high tunnels and open fields in northern Minnesota. **Lindsey Christianson** (chri1203@umn.edu)<sup>1</sup> and Christopher R. Philips<sup>2</sup>, <sup>1</sup>Univ. of Minnesota, Grand Rapids, MN, <sup>2</sup>Univ. of Minnesota, St. Paul, MN
- D3587** Cabbage maggot, *Delia radicum*, in vegetable brassicas: Are we any closer to finding a solution? **Carolyn Parsons** (carolyn.parsons@agr.gc.ca)<sup>1</sup>, Peggy Dixon<sup>1</sup>, Josée Owen<sup>2</sup>, and Todd Power<sup>1</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, St. John's, NF, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Fredericton, NB, Canada
- D3588** Impact of soil management on soil food web health in long-term organic and transitioning farming systems. **Harit K. Bal** (bal.9@osu.edu)<sup>1</sup>, Khandakar Rafiq Islam<sup>2</sup>, Edward McCoy<sup>1</sup>, Subbu Kumarappan<sup>3</sup>, Alan Sundermeier<sup>4</sup>, and Parwinder Grewal<sup>5</sup>, <sup>1</sup>The Ohio State Univ., Wooster, OH, <sup>2</sup>The Ohio State Univ., Piketon, OH, <sup>3</sup>Agricultural Technical Institute, Wooster, OH, <sup>4</sup>The Ohio State Univ., Bowling Green, OH, <sup>5</sup>The Univ. of Texas, Edinberg, TX
- D3589** What is the most cost-effective management strategy for foliage-feeding lepidopterans in Alabama soybeans? **Tim Reed** (reedtim@aces.edu), Alabama CES, Madison, AL
- D3590** Corn rootworm best management practices: Convergence or divergence of crop, pest, and resistance management? **Ken Ostlie** (ostli001@umn.edu), Trisha Leaf, and Edwin Benkert III, Univ. of Minnesota, St. Paul, MN
- D3591** Pest-damage relationships for Old World bollworm, *Helicoverpa armigera* (Lepidoptera: Noctuidae), on vegetative soybean. Joao Zanardi Júnior, **Roberto Silva** (rds.feis@gmail.com), Geraldo Papa, Matheus Castro, and Marcelo Ferraz Jr, São Paulo State Univ., Ilha Solteira, Brazil
- D3592** The impact of Extension IPM efforts on limited resource farmers in Alabama: A case study of farmers supplying Walmart with southern peas, watermelons, and collard greens. **Franklin Quarcoo** (franklynquarcoo@gmail.com) and Conrad Bonsi, Tuskegee Univ., Tuskegee, AL
- D3593** Daily temperature and precipitation can be used to forecast North American grasshopper populations. **Larry E. Jech** (larry.e.jech@aphis.usda.gov), USDA - APHIS, Phoenix, AZ
- D3594** Effects of adult density, stages of plant development, and genotype of soybeans on *Helicoverpa armigera* oviposition. **Arlindo Boiça Junior** (aboicajr@fcav.unesp.br), Renato Moraes, and Wellington Eduardo, São Paulo State Univ., Jaboticabal, Brazil
- D3595** Effect of faba bean – cereals intercropping and nitrogen fertilization on infestation by the leafminer *Liriomyza trifolii* on faba bean, *Vicia faba*. Amero Emeran, El-Kazafy Taha, and **Dalia Shamer** (dalia\_shamel@yahoo.com), Kafrelsheikh Univ., Kafr el-Sheikh, Egypt
- D3596** Surveying the abundance of corn rooworm, *Diabrotica* spp., using transects in eastern South Dakota. Billy Fuller and **Bradley McManus** (bradley.mcmanus@sdstate.edu), South Dakota State Univ., Brookings, SD
- D3597** Damage of *Bemisia tabaci* biotype B in transgenic common bean resistant to the *Bean golden mosaic virus*. **Marcus Vinicius Santana** (mvsantana@outlook.com)<sup>1</sup>, Eliane Quintela<sup>1</sup>, José Alexandre Barrigossi<sup>1</sup>, and Tássia Tuane Santos<sup>2</sup>, <sup>1</sup>Embrapa Rice and Beans, Santo Antônio de Goiás, Brazil, <sup>2</sup>Federal Univ. of Goiás, Goiânia, Brazil
- D3598** Antibiosis in soybean cultivars against *Heliothis virescens* (Lepidoptera: Noctuidae). **André Cirilo Almeida** (andre\_cirillo@hotmail.com), Cinthia Silva, Ligia Paiva, Franciele da Silva, Jean Almeida, and Flávio Jesus, Federal Institute of Goiano, Urutai, Brazil
- D3599** Resistance of soybean genotypes to *Aphis glycines* (Hemiptera: Aphididae). **Flávio Jesus** (flavio.jesus@ifgoiano.edu.br)<sup>1</sup>, Lia Marchi-Werle<sup>2</sup>, Hillary Fischer<sup>2</sup>, and Tiffany Heng-Moss<sup>2</sup>, <sup>1</sup>Federal Institute of Goiano, Urutai, Brazil, <sup>2</sup>Univ. of Nebraska, Lincoln, NE
- D3600** Characterizing cotton resistance to *Aphis gossypii* (Hemiptera: Aphididae). **Rafaela Morando** (rafaela\_morando@hotmail.com)<sup>1</sup>, Edson Baldin<sup>1</sup>, Ivana Silva<sup>1</sup>, Camila Souza<sup>1</sup>, and André Lourenção<sup>2</sup>, <sup>1</sup>São Paulo State Univ., Botucatu, Brazil, <sup>2</sup>Agronomic Institute of Campinas, Campinas, Brazil
- D3601** Evaluation of different organic sweetpotato varieties against insect damage. **Tahir Rashid** (trashid@alcorn.edu)<sup>1</sup>, Paul J. McLeod<sup>2</sup>, Victor Njiti<sup>3</sup>, Randall Luttrell<sup>4</sup>, and Larry Adams<sup>4</sup>, <sup>1</sup>Alcorn State Univ., Mound Bayou, MS, <sup>2</sup>Univ. of Arkansas, Fayetteville, AR, <sup>3</sup>Alcorn State Univ., Lorman, MS, <sup>4</sup>USDA - ARS, Stoneville, MS
- D3602** Spotted wing drosophila range expansion and establishment in Atlantic Canada. **Peggy Dixon** (peggy.dixon@agr.gc.ca)<sup>1</sup>, Debra Moreau<sup>2</sup>, and Christine Noronha<sup>3</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, St. John's, NF, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Kentville, NS, Canada, <sup>3</sup>Agriculture and Agri-Food Canada, Charlottetown, PEI, Canada
- D3603** Antixenosis of soybean genotypes to *Dichelops melacanthus* (Hemiptera: Pentatomidae). **Vinicius Canassa** (vfcanassa@hotmail.com)<sup>1</sup>, Edson Baldin<sup>1</sup>, José P. G. F. Silva<sup>1</sup>, Luiz Pannuti<sup>2</sup>, and André Lourenção<sup>3</sup>, <sup>1</sup>São Paulo State Univ., Botucatu, Brazil, <sup>2</sup>São Paulo State Univ., Campinas, Brazil, <sup>3</sup>Agronomic Institute of Campinas, Campinas, Brazil
- D3604** Feeding behavior of *Aphis glycines* (Hemiptera: Aphididae) on soybeans exhibiting antibiosis and tolerance. **Edson Baldin** (elbaldin@fca.unesp.br)<sup>1</sup>, Mitchell Stamm<sup>2</sup>, José P. G. F. Silva<sup>1</sup>, Kyle G. Koch<sup>2</sup>, Tiffany Heng-Moss<sup>2</sup>, and Thomas Hunt<sup>3</sup>, <sup>1</sup>São Paulo State Univ., Botucatu, Brazil, <sup>2</sup>Univ. of Nebraska, Lincoln, NE, <sup>3</sup>Univ. of Nebraska, Concord, NE



- D3605** Developing a research based sampling protocol for sugarcane aphid, *Melanaphis sacchari*, in sorghum. **Jessica Pavlu** (jpavlu@ostatemail.okstate.edu)<sup>1</sup>, Kris Giles<sup>2</sup>, Ali Zarrabi<sup>2</sup>, Norman Elliott<sup>3</sup>, and Tom Royer<sup>2</sup>, <sup>1</sup>Oklahoma State Univ., Perkins, OK, <sup>2</sup>Oklahoma State Univ., Stillwater, OK, <sup>3</sup>USDA - ARS, Stillwater, OK
- D3606** Compensation to pest injuries by replacing floral structures by cotton plants. **José Miranda** (jose-ednilson.miranda@embrapa.br), Embrapa, Santo Antônio de Goiás, Brazil
- D3607** Western corn rootworm product performance inquiry populations exhibit moderate variation in susceptibility to DvSnf7 dsRNA and no cross resistance to Cry3Bb1. **Chitvan Khajuria** (chitvan.khajuria@monsanto.com)<sup>1</sup>, William Moar<sup>2</sup>, Oliver Ilagan<sup>1</sup>, Michael Pleau<sup>1</sup>, Mao Chen<sup>3</sup>, Brian McNulty<sup>1</sup>, Thomas Clark<sup>1</sup>, AnilKumar Gowda<sup>1</sup>, Paula A. Price<sup>2</sup>, and Graham P. Head<sup>2</sup>, <sup>1</sup>Monsanto Company, Chesterfield, MO, <sup>2</sup>Monsanto Company, St. Louis, MO, <sup>3</sup>Monsanto Company, Singapore, Singapore
- D3608** Host plant resistance in soybean for pest management of *Megacopta cribraria* (Hemiptera: Plataspidae). **Sriyanka Lahiri** (slahiri@ncsu.edu)<sup>1</sup>, Dominic Reisig<sup>2</sup>, Francis Reay-Jones<sup>3</sup>, Thomas Carter<sup>4</sup>, M. A. Rouf Mian<sup>4</sup>, Ben Fallen<sup>3</sup>, and Jeremy Greene<sup>5</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>North Carolina State Univ., Plymouth, NC, <sup>3</sup>Clemson Univ., Florence, SC, <sup>4</sup>USDA - ARS, Raleigh, NC, <sup>5</sup>Clemson Univ., Blackville, SC
- D3609** *Cnaphalocrocis medinalis* resistant/tolerant rice varieties in Taiwan. Tzu-Wei Guo<sup>1</sup>, Kun-Yu Tu<sup>1</sup>, Yi Li<sup>1</sup>, Jie-Ming Lin<sup>1</sup>, Chung-Ta Liao<sup>2</sup>, and **Wen-Po Chuang** (wenpo@ntu.edu.tw)<sup>1</sup>, <sup>1</sup>National Taiwan Univ., Taipei, Taiwan, <sup>2</sup>Taichung District Agricultural Research and Extension Station, Changhua, Taiwan
- D3610** Use of silicon as resistance inducer to *Helicoverpa armigera* (Lepidoptera: Noctuidae) in soybean. **Mariane Coelho** (c.mahh@yahoo.com.br)<sup>1</sup>, Jair Moraes<sup>2</sup>, Roberta Alvarenga<sup>2</sup>, and Edson Baldin<sup>1</sup>, <sup>1</sup>São Paulo State Univ., Botucatu, Brazil, <sup>2</sup>Federal Univ. of Lavras, Lavras, Brazil
- D3611** Evaluation of indigenous plant extract against the aphid, *Schizaphis graminum*, under laboratory conditions. **Shahbaz Ahmad** (shahbaz.iags@pu.edu.pk), ESA, Lahore, Pakistan
- D3612** Efficacy of biopesticides for pest control in cotton. **Lawrence Malinga** (lawrencem@arc.agric.za), Agricultural Research Council, Rustenburg, South Africa
- D3613** Evaluation of a novel insecticide, sulfoxaflor 12%, for management of mustard aphid, *Lipaphis erysimi*. **Gautam Chakraborty** (entogautam@gmail.com), Bidhan Chandra Krishi Viswavidyalaya, Kalyani, India
- D3614** Efficacy of pyrethroid insecticide applied as barrier treatments for managing *Aedes albopictus* populations. **Isik Unlu** (iunlu@mercercounty.org)<sup>1,2</sup>, Devi Suman<sup>1</sup>, Yi Wang<sup>1</sup>, Kim Klingler<sup>2</sup>, Nick Indelicato<sup>2</sup>, Ary Faraji<sup>3</sup>, Scott Crans<sup>1</sup>, Greg Williams<sup>4</sup>, and Randy Gaugler<sup>1</sup>, <sup>1</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, <sup>2</sup>Mercer County Mosquito Control, West Trenton, NJ, <sup>3</sup>Salt Lake City Mosquito Abatement District, Salt Lake City, UT, <sup>4</sup>Hudson County Mosquito Control, Jersey City, NJ
- D3615** Effectiveness of microbial and chemical insecticides for controlling heliothines on Bt cotton. **Nathan Little** (nathan.little@ars.usda.gov), Randall Luttrell, Michelle Mullen, K. Clint Allen, and Omatthage P. Perera, USDA - ARS, Stoneville, MS
- D3616** Susceptibility of *Hypera postica* developmental stages to biologically derived insecticides with reference to the effect of infection on adult oviposition. **Govinda Shrestha** (govinda.shrestha@montana.edu)<sup>1</sup> and Gadi V. P. Reddy<sup>2</sup>, <sup>1</sup>Montana State Univ., Conrad, MT, <sup>2</sup>Univ. of Guam, Mangilao, Guam
- D3617** Field demonstration of different insecticide strategies for management of soybean aphids, *Aphis glycines*. **Janet Knodel** (janet.knodel@ndsu.edu) and Patrick Beauzay, North Dakota State Univ., Fargo, ND
- D3618** Cytotoxic effects of neem oil in the midgut of the predator *Ceraeochrysa claveri* (Neuroptera: Chrysopidae). **Daniela Santos** (daniela@ibb.unesp.br), Elton Scudeler, Ana Silvia Garcia, Carlos Padovani, and Patricia Pinheiro, São Paulo State Univ., Botucatu, Brazil
- D3619** The residual activity of imidacloprid and thiamethoxam seed treatments on sugar beet pests: What are the real benefits of seed treatment? Helena Viric Gasparic, Zrinka Drmic, Darija Lemic, Maja Cacija, and **Renata Bazok** (rbazok@agr.hr), Univ. of Zagreb, Zagreb, Croatia
- D3620** Potentiality of botanical natural products in supporting sustainable agriculture with special reference to floras of Sudan. **Abdalla Satti** (satisattisat@yahoo.com) and Maria Elnasikh, National Centre for Research, Khartoum, Sudan
- D3621** Insecticidal activity of cinnamon essential oils, constituents, and (*E*)-cinnamaldehyde analogues against *Metcalfa pruinosa* (Hemiptera: Flatidae) nymphs and adults. **Jun-Ran Kim** (jr2004@korea.kr)<sup>1</sup>, In-Hong Jeong<sup>1</sup>, and Sang-Guei Lee<sup>2</sup>, <sup>1</sup>National Institute of Agricultural Sciences, Wanju, South Korea, <sup>2</sup>National Institute of Agricultural Sciences, Wansan, South Korea
- D3622** Toxicity and sublethal effect of the main insecticides used in soybean to *Trichogramma pretiosum* (Hymenoptera: Trichogrammatidae). **Ana Clara Paiva** (anaclara-r@hotmail.com), Vitor Beloti, Gustavo Alves, and Pedro Yamamoto, Univ. of São Paulo, Piracicaba, Brazil
- D3623** The effects of the juvenile hormone analogues on diapausing *Halyomorpha halys*, *Megacopta cribraria* and *Nezara viridula* and associated hymenopteran egg parasitoids. **Cory Penca** (cpenca@ufl.edu) and Amanda C. Hodges, Univ. of Florida, Gainesville, FL
- D3624** Short-term activity of some insecticides on *Halyomorpha halys*: Open field trials in Italy in 2015. Edison Pasqualini<sup>1</sup>, Laura Depalo<sup>1</sup>, Massimo Scannavini<sup>2</sup>, Michele Preti<sup>2</sup>, and **Antonio Masetti** (antonio.masetti@unibo.it)<sup>1</sup>, <sup>1</sup>Univ. of Bologna, Bologna, Italy, <sup>2</sup>Astra Innovation and Development, Faenza, Italy



- D3625** Activity of insecticides used in sugar cane on the parasitoid *Cotesia flavipes*. **Fernando Celoto** (fjceloto@agr.feis.unesp.br), Roberto Silva, João Zanardi Júnior, Matheus Castro, and Geraldo Papa, São Paulo State Univ., Ilha Solteira, Brazil
- D3626** Certador™: A new BASF insecticide for control of key pests in vegetable crops. **Teresia Nyoike** (teresia.nyoike@basf.com), Joe Stout, Rebecca Willis, Tommy Wofford, Steve Broschius, Daniel O'Byrne, and Ralph Paulini, BASF, Research Triangle Park, NC
- D3627** Efficacy of nootka oil as a biopesticide for management of imported fire ants. Karla Adesso, Jason B. Oliver, **Paul O'Neal** (poneal@tnstate.edu), and Nadeer Youssef, Tennessee State Univ., McMinnville, TN
- D3628** Strategies to detect the botanical pesticides cedrelone and flavonoids coordinate to Mg (II) in larvae of *Spodoptera frugiperda* using LC-MS/MS. **Waleria Rabelo** (wallrabelo@hotmail.com)<sup>1</sup>, Samya Danielle De Freitas<sup>1</sup>, Angelina M Giongo<sup>2</sup>, Maria Fatima Da Silva<sup>1</sup>, Paulo Vieira<sup>1</sup>, Moacir Forim<sup>1</sup>, João Fernandes<sup>1</sup>, and Jose Vendramim<sup>2</sup>, <sup>1</sup>São Carlos Federal Univ., São Carlos, Brazil, <sup>2</sup>Univ. of São Paulo, Piracicaba, Brazil
- D3629** Characterization of a novel bacterial lipopeptide and examination of its potential as a new biological mosquito larvae control agent. **Il-Hwan Kim** (il-hwan.kim@nih.gov)<sup>1</sup>, Jerald Ensign<sup>2</sup>, and Walter Goodman<sup>2</sup>, <sup>1</sup>National Institute of Allergy and Infectious Diseases, Rockville, MD, <sup>2</sup>Univ. of Wisconsin, Madison, WI
- D3630** Evaluation of grubGONE!<sup>®</sup>, a new Bt-based product that protects turf from Japanese beetle, green June beetle and annual bluegrass weevil larvae. **David Matthews** (davematthews@phyllom.com), Phyllom BioProducts Corp., Oakland, CA
- D3631** Mode of intoxication of the neotropical brown stink bug, *Euschistus heros*, in soybeans treated with insecticides. Geraldo Papa, **Joao Zanardi Júnior** (joao91186@aluno.feis.unesp.br), Marcelo Ferraz Jr., Matheus Castro, and Roberto Silva, São Paulo State Univ., Ilha Solteira, Brazil
- D3632** Semiochemical attractants for fruit flies of agricultural importance. **Rodrigo Oliveira da Silva** (rodrigo.silva@iscatech.com)<sup>1</sup>, William Urrutia<sup>1</sup>, Josh Ponce<sup>1</sup>, Carmem Bernardi<sup>1</sup>, Marcos Botton<sup>2</sup>, Rafael Borges<sup>3</sup>, Ruben Machota Jr<sup>4</sup>, Jonathan Rico<sup>1</sup>, Kavita Sharma<sup>1</sup>, Leandro Ernesto Jost Mafra<sup>5</sup>, and Agenor Mafra-Neto<sup>1</sup>, <sup>1</sup>ISCA Technologies, Inc., Riverside, CA, <sup>2</sup>Embrapa Grape and Wine, Bento Gonçalves, Brazil, <sup>3</sup>ISCA Technologies, Ltda., Ijuí, Brazil, <sup>4</sup>Federal Univ. of Pelotas, Pelotas, Brazil, <sup>5</sup>ISCA Technologies, Ltda., Vacaria, Brazil
- D3633** Efficacy and side effects of the insect proof nets against spotted-wing drosophila, *Drosophila suzukii*, on cherry and soft fruits in Italy. **Nicola Mori** (nicola.mori@unipd.it)<sup>1</sup>, Stefano Caruso<sup>2</sup>, Lorenzo Tonina<sup>1</sup>, Angela Gottardello<sup>3</sup>, Giacomo Vaccari<sup>2</sup>, and Alberto Grassi<sup>3</sup>, <sup>1</sup>Univ. of Padova, Legnaro, Italy, <sup>2</sup>Plant Protection Consortium Province of Modena, Modena, Italy, <sup>3</sup>Edmund Mach Foundation, San Michele all'Adige, Italy
- D3634** Optimizing a mass trapping system design for organic management of Japanese beetles. **Austen Dudenhoeffer** (austen.dudenhoeffer657@my.lincolnu.edu), Jason Miller, and Jaime Pinero, Lincoln Univ., Jefferson City, MO
- D3635** Mating behavior disruption: A new technology of pest management by courtship signal suppression with non-toxic chemicals, acetylated glyceride (BEMIDETACH™EC) and flonicamid, against *Bemisia tabaci* and rice planthoppers. **Kenkichi Kanmiya** (k-kanmiya@iskweb.co.jp)<sup>1</sup>, Takayuki Kashima<sup>1</sup>, Kiyomitsu Yoshida<sup>1</sup>, and Yutaka Arimoto<sup>2</sup>, <sup>1</sup>Ishihara Sangyo Kaisha, Ltd., Kusatsu, Japan, <sup>2</sup>RIKEN Institute, Wako, Japan
- D3636** Evaluation of potentially attractive compounds for wood-boring beetle management in Tennessee and Connecticut. **Alicia Bray** (brayalic@gmail.com)<sup>1</sup>, Karla Adesso<sup>2</sup>, Jason B. Oliver<sup>2</sup>, and Paul O'Neal<sup>2</sup>, <sup>1</sup>Central Connecticut State Univ., New Britain, CT, <sup>2</sup>Tennessee State Univ., McMinnville, TN
- D3637** Efficacy of a linear particle accelerator for the sterilization of American serpentine leafminer, *Liriomyza trifolii*, in a sterile insect technique-based management program. **Cynthia Scott-Dupree** (cscottdu@uoguelph.ca)<sup>1</sup>, Maryam Sultan<sup>1</sup>, Graeme Murphy<sup>2</sup>, and Rose Buitenhuis<sup>3</sup>, <sup>1</sup>Univ. of Guelph, Guelph, ON, Canada, <sup>2</sup>Biological Control Solutions, Welland, ON, Canada, <sup>3</sup>Vineland Research and Innovation Centre, Vineland Station, ON, Canada
- D3638** Presentation withdrawn
- D3639** Occurrence of a neogregarine-like protozoan, *Farinocystis* sp., in an artificial diet mass-rearing system in the West Indian sweet potato weevil, *Euscepes postfasciatus*. **Tsuyoshi Ohishi** (ooishits@pref.okinawa.lg.jp)<sup>1</sup>, Kaori Tsurui<sup>2</sup>, Kiyohito Teruya<sup>1</sup>, and Atsushi Honma<sup>3</sup>, <sup>1</sup>Okinawa Prefectural Plant Protection Center, Naha, Japan, <sup>2</sup>Univ. of the Ryukyus, Nishihara, Japan, <sup>3</sup>Univ. of the Ryukyus, Okinawa, Japan
- D3640** Quantity or quality?: Reproductive development of mass-reared west Indian sweet potato weevil, *Euscepes postfasciatus*, under high yield conditions for eradication using sterile insect technique. **Kiyohito Teruya** (teruyki@pref.okinawa.lg.jp)<sup>1</sup>, Tsuyoshi Ohishi<sup>1</sup>, Norikuni Kumano<sup>2</sup>, and Kaori Tsurui<sup>3</sup>, <sup>1</sup>Okinawa Prefectural Plant Protection Center, Naha, Japan, <sup>2</sup>Obihiro Univ. of Agriculture and Veterinary Medicine, Obihiro, Japan, <sup>3</sup>Univ. of the Ryukyus, Nishihara, Japan
- D3641** Study on control effectiveness of huanglongbing based on eradication of Asian citrus psyllid, *Diaphorina citri*, surrounding citrus orchard. **Runqian Mao** 102438816@qq.com, Guangdong Academy of Agricultural Sciences, Guangzhou, China
- D3642** Nymphal development of *Dicyphus errans* under different levels of food availability. Nikos Kordas, Konstantina Arvaniti, Argyro Fantinou, and **Dionyssios Perdikis** (dperdikis@aau.gr), Agricultural Univ. of Athens, Athens, Greece
- D3643** Companion and refuge plants to control insect pests. **Jesusa C. Legaspi** (jesusa.legaspi@ars.usda.gov)<sup>1</sup>, Neil Miller<sup>1</sup>, Muhammad Haseeb<sup>2</sup>, and Lambert Kanga<sup>2</sup>, <sup>1</sup>USDA - ARS, Tallahassee, FL, <sup>2</sup>Florida A&M Univ., Tallahassee, FL



- D3644** Stress signal reduction as a tool for managing ambrosia beetles in ornamental nursery stock. **Karla Adesso** (kaddesso@tnstate.edu)<sup>1</sup>, Jason B. Oliver<sup>1</sup>, Paul A. O'Neal<sup>1</sup>, and Matthew Brown<sup>2</sup>, <sup>1</sup>Tennessee State Univ., McMinnville, TN, <sup>2</sup>Tennessee State Univ., Nashville, TN
- D3645** Pollinators but not pollination services vary across urban agricultural sites. **Ashley Bennett** (bennettashleyb@gmail.com) and Sarah Lovell, Univ. of Illinois, Champaign, IL
- D3646** Environmental influences impacting leg coloration of *Chrysodeixis includens* (Lepidoptera: Noctuidae) larvae. **K. Clint Allen** (clint.allen@ars.usda.gov), Nathan Little, and Lou Andrews, USDA - ARS, Stoneville, MS
- D3647** Dispersal of codling moth adults within typical agro-ecosystems of central Chile: Relevance of source unmanaged host-plant infestation. Constanza Fritz<sup>1</sup>, **Marcela Rodríguez** (marcerodriguez@udec.cl)<sup>2</sup>, Blas Lavandero<sup>1</sup>, Esteban Basoalto<sup>3</sup>, Wilson Barros-Parada<sup>1</sup>, Alan L. Knight<sup>4</sup>, and Eduardo Fuentes-Contreras<sup>1</sup>, <sup>1</sup>Univ. of Talca, Talca, Chile, <sup>2</sup>Univ. of Concepción, Concepción, Chile, <sup>3</sup>Austral Univ., Valdivia, Chile, <sup>4</sup>USDA - ARS, Wapato, WA
- D3648** Cultivated plant diversity controls arthropod communities and *Helicoverpa armigera* regulation in tomato cropping systems. **Anicet Dassou** (dassoua@yahoo.fr), Polytechnic Univ. of Abomey, Dassa-zoumè, Benin
- D3649** Determine efficacy of pesticides for management of armored scale in potted plants. **Yingfang Xiao** (yfxiao@ufl.edu)<sup>1</sup>, Runqian Mao<sup>2</sup>, and Steven P. Arthurs<sup>1</sup>, <sup>1</sup>Univ. of Florida, Apopka, FL, <sup>2</sup>Guangdong Academy of Agricultural Sciences, Guangzhou, China
- D3650** SCOPE: Using *anti*-conservation biology for new approaches in urban IPM. **Sabrina Hymel** (hyme0003@umn.edu) and Stephen Kells, Univ. of Minnesota, St. Paul, MN
- D3651** Using Termidor® SC (fipronil 0.06%) and an additive for Formosan subterranean termite, *Coptotermes formosanus*, management in Lake Charles, Louisiana. **Dennis R. Ring** (dring@agctr.lsu.edu)<sup>1</sup> and Robert Davis<sup>2</sup>, <sup>1</sup>Louisiana State Univ., Baton Rouge, LA, <sup>2</sup>BASF, Pflugerville, TX
- D3652** Laboratory bioassay for evaluating perimeter mulch treatments for management of outdoor species. **Patricia Zungoli** (pzngl@clemsun.edu)<sup>1</sup>, Eric Benson<sup>1</sup>, Brittany C. Russ<sup>1</sup>, Jinbo Song<sup>1</sup>, and Kerem Öter<sup>2</sup>, <sup>1</sup>Clemson Univ., Clemson, SC, <sup>2</sup>Istanbul Univ., Istanbul, Turkey
- D3654** Results from the regional identification center of the United States Department of Agriculture, Animal Plant Health Inspection Service (Raleigh hub) for the 2015-2016 wood-boring beetle surveys, including new state and county records. Richard Brown<sup>1</sup>, **Jennifer Seltzer** (jls30@entomology.msstate.edu)<sup>2</sup>, and Terence Schiefer<sup>2</sup>, <sup>1</sup>Mississippi Entomological Museum, Mississippi State, MS, <sup>2</sup>Mississippi State Univ., Mississippi State, MS
- D3655** Development of a multiplex PCR assay for the identification of coconut rhinoceros beetle (*Oryctes rhinoceros* L.). **Shizu Watanabe** (shizuw@hawaii.edu) and Michael Melzer, Univ. of Hawai'i, Honolulu, HI
- D3656** Biogeochemical interactions between an invasive scarab (Japanese beetle, *Popillia japonica* Newman) and its subterranean environment. Brittany Peterson, Michael Scharf, Matthew Ginzel, Douglas Richmond, and **Garrett Price** (price41@purdue.edu), Purdue Univ., West Lafayette, IN
- D3657** Biological and behavioral studies on *Ophraella communa* LeSage (Chrysomelidae: Galerucinae), potential biocontrol candidate agent of common ragweed (*Ambrosia artemisiifolia* L.) in Europe. **Alessandro Giuliani** (ale.giuliani90@libero.it)<sup>1</sup>, Gianfranco Anfora<sup>2</sup>, Silvia Arnone<sup>3</sup>, and Massimo Cristofaro<sup>3</sup>, <sup>1</sup>Biotechnology and Biological Control Agency, Rome, Italy, <sup>2</sup>Edmund Mach Foundation, San Michele all'Adige, Italy, <sup>3</sup>ENEA, Rome, Italy
- D3658** The spread and management of the South American tomato leafminer, *Tuta absoluta*. **Amer Fayad** (afayad@vt.edu) and Rangaswamy Muniappan, Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- D3659** Temporal and spatial distribution of sweet potato weevils, *Cylas formicarius*, in the North Carolina sweet potato weevil quarantine area. **Alonso Suazo** (alonso.suazo@ncagr.gov), North Carolina Dept. of Agriculture and Consumer Services, Raleigh, NC
- D3660** Monitoring of brown marmorated stink bug in the northern San Joaquin Valley. **Jhalendra Rijal** (jrijal@ucdavis.edu) and Roger Duncan, Univ. of California Cooperative Extension, Modesto, CA
- D3661** A comparison of nectar sources of the invasive hoverfly *Merodon equestris* and a native congener *M. kawamurae* (Diptera: Syrphidae) in Japan. **Mitsuaki Sutou** (mi.sutou@r8.dion.ne.jp), The Univ. of Tokyo, Tokyo, Japan
- D3662** Presentation withdrawn
- D3663** Survey on gamma irradiation doses to induce sterility on spotted wing drosophila (*Drosophila suzukii*). **Vicente Navarro-Llopis** (vinallo@ceqa.upv.es), Sandra Vacas, and Jaime Primo, Polytechnic Univ. of València, València, Spain
- D3664** The impact of spotted wing drosophila (*Drosophila suzukii*) on pesticide use in New Jersey highbush blueberries. **Dean Polk** (polk@aesop.rutgers.edu), Rutgers, The State Univ. of New Jersey, Chatsworth, NJ

### Poster Session 3: Invasive and Exotic Entomology

#### West Hall C (Convention Center)

- D3653** How many is too many? Risk assessment of giant African snail (*Achatina fulica*). **Shweta Sharma** (shweta.sharma@freshfromflorida.com), Katrina Dickens, Amy Howe, and Shannen Leahy, Florida Dept. of Agriculture and Consumer Services, Gainesville, FL



- D3665** Control of invasive pests on nursery stock using hot water treatments. **Bryan Vander Mey** (bvandermey@ucdavis.edu)<sup>1</sup>, James A. Bethke<sup>2</sup>, Cheryl A. Wilen<sup>3</sup>, Ramiro Lobo<sup>2</sup>, and Arnold Hara<sup>4</sup>, <sup>1</sup>Univ. of California, San Marcos, CA, <sup>2</sup>Univ. of California Cooperative Extension, San Diego, CA, <sup>3</sup>Univ. of California Statewide IPM Program, San Diego, CA, <sup>4</sup>Univ. of Hawai'i, Hilo, HI
- D3666** Establishment risk of important insect pests in Ningxia natural grassland. **Shuhua Wei** (weishuhua666@163.com)<sup>1,2</sup>, Ming Lei<sup>1</sup>, Liyuan Gao<sup>2</sup>, Rong Zhang<sup>2</sup>, and Zhihong Li<sup>1</sup>, <sup>1</sup>China Agricultural Univ., Beijing, China, <sup>2</sup>Ningxia Academy of Agriculture and Forestry Sciences, Yinchuan, China
- D3667** Objective prioritization of exotic arthropods: Development and validation of a new model. **Ernie Hain** (ernie.hain@aphis.usda.gov)<sup>1</sup>, Alison Neeley<sup>2</sup>, Leslie Newton<sup>2</sup>, ByeongJoon Kim<sup>1</sup>, Godshen Pallippambill, Jarrod Morrice<sup>1</sup>, and Betsy Randall-Schadel<sup>2</sup>, <sup>1</sup>NSF Center for Integrated Pest Management, Raleigh, NC, <sup>2</sup>USDA - APHIS, Raleigh, NC
- D3668** Agriculture quarantine inspection data: a tool for discovering new country records for insect taxa. **Jason Botz** (jason.t.botz@aphis.usda.gov), USDA - APHIS, Nogales, AZ
- D3669** Scents and sensibility: Florida's eradication efforts and long-term plans for giant African snail (*Achatina fulica*). **Amy Howe** (amy.howe@freshfromflorida.com), Florida Dept. of Agriculture and Consumer Services, Gainesville, FL
- D3670** Presentation withdrawn
- D3671** Nutrient profiles of the brown marmorated stink bug. **Victoria Skillman** (skillmav@onid.orst.edu)<sup>1</sup>, Nik G. Wiman<sup>2</sup>, and Jana Lee<sup>3</sup>, <sup>1</sup>Oregon State Univ., Corvallis, OR, <sup>2</sup>Oregon State Univ., Aurora, OR, <sup>3</sup>USDA - ARS, Corvallis, OR
- D3672** Optimizing natural biological control to manage the invasive crape myrtle bark scale (*Eriococcus lagerstroemiae* Kuwana) on crape myrtle in the landscape. **Frank Hale** (fahale@utk.edu), Univ. of Tennessee, Nashville, TN
- D3673** Presentation withdrawn
- D3674** Monitoring and risk analysis of the new invasive species *Metcalfa pruinosa* Say, 1830 (Homoptera: Flatidae) in the natural and agricultural area of Romania. **Manole Traian** (traian.manole@gmail.com)<sup>1</sup>, Petrescu Eugenia<sup>2</sup>, and Ionescu-Malancus Irina<sup>3</sup>, <sup>1</sup>Research - Development Institute for Plant Protection, Bucharest, Romania, <sup>2</sup>Carol Davila Sanitary School, Bucharest, Romania, <sup>3</sup>S. C. Marine Research S. R. L., Bucharest, Romania
- D3675** Resistance of three different tomato cultivars to tomato leafminer (*Tuta absoluta*) induced by jasmonic and salicylic acid. **Babak Zahiri** (bzahiri@gmail.com), Mohammad Khanjani, and Azim Nemati, Bu-Ali Sina Univ., Hamedan, Iran
- D3676** Introduced and potentially invasive bees (Hymenoptera: Apoidea: Anthophila) in the United States. **Allan Smith-Pardo** (allan.h.smith-pardo@aphis.usda.gov), USDA - APHIS, San Francisco, CA
- D3677** Exotic ants (Hymenoptera: Formicidae) of Mississippi. **Joe A. MacGown** (jmacgown@entomology.msstate.edu)<sup>1</sup>, JoVonn Hill<sup>2</sup>, Richard Brown<sup>1</sup>, and Ryan Whitehouse<sup>2</sup>, <sup>1</sup>Mississippi Entomological Museum, Mississippi State, MS, <sup>2</sup>Mississippi State Univ., Mississippi State, MS
- D3678** Thelytokous parthenogenesis of queens in *Strumigenys rogeri* Emery (Hymenoptera: Formicidae). **Ca-Sin Lam** (matsu.ryuhei@gmail.com), Chung-Chi Lin, and Shu-Fen Hsu, National Changhua Univ. of Education, Changhua, Taiwan
- D3679** Molecular identification of the ghost ant, *Tapinoma melanocephalum* (Fabricius): A preliminary study. **Christopher Scocco** (chris.scocco@ufl.edu) and Rudolf Scheffrahn, Univ. of Florida, Fort Lauderdale, FL
- D3680** A comprehensive genetic assay for United States native and imported fire ant species (Formicidae: *Solenopsis*). **David Cross** (dcross@entomology.msstate.edu) and Michael Caprio, Mississippi State Univ., Mississippi State, MS
- D3681** Incipient colony growth in the red imported fire ant (*Solenopsis invicta*). **Hester Dingle** (hester.dingle@gmail.com) and Joshua R. King, Univ. of Central Florida, Orlando, FL
- D3682** Population genetics and colony structure of the invasive tawny crazy ant (*Nylanderia fulva*). **Bryant McDowell** (bryant868@tamu.edu), Robert Puckett, and Edward Vargo, Texas A&M Univ., College Station, TX
- D3683** Molecular evidence for different migration patterns of *Helicoverpa armigera* in Brazil. **Rogério Gonçalves** (rogeriomg20@yahoo.com.br)<sup>1</sup>, Thiago Mastrangelo<sup>2</sup>, and Ana Maria L. Azeredo-Espin<sup>3</sup>, <sup>1</sup>Center of Molecular Biology and Genetic Engineering, Campinas, Brazil, <sup>2</sup>Univ. of São Paulo, Piracicaba, Brazil, <sup>3</sup>State Univ. of Campinas, Campinas, Brazil
- D3684** Identifying intercepted *Helicoverpa* larvae and their relatives at United States ports: Techniques and challenges. **Alexander Cunningham** (alexander.cunningham@aphis.usda.gov)<sup>1</sup> and James Young<sup>2</sup>, <sup>1</sup>USDA - APHIS, Miami, FL, <sup>2</sup>USDA - APHIS, Baltimore, MD
- D3685** Orthoptera interceptions at United States ports of entry: Frequency and pathway analysis. **Stephen T. Young** (stephen.t.young@aphis.usda.gov), USDA - APHIS, Blaine, WA
- D3686** Coming in from the cold: Refrigeration kills non-native American cockroaches but not native species. **David Bradt** (dave.bradt@okstate.edu), W. Wyatt Hoback, and Tanner Jenkins, Oklahoma State Univ., Stillwater, OK
- D3687** The effect of bioswale characteristics on arthropod diversity. **Samantha Kaiser** (srkaiser@ncsu.edu), Kelly Harris, Sarah Parsons, and Steven D. Frank, North Carolina State Univ., Raleigh, NC



## Poster Session 3: Physiology and Biochemistry

## West Hall C (Convention Center)

- D3688** Characterization of AMPK in female *Aedes aegypti* and *Georgacraigius atropalpus* mosquitoes in relation to low and adequate food intake. **Aparna Telang** (atelang@usf.edu)<sup>1</sup>, Aminda Abdul Qayum<sup>2</sup>, and Zeina E. Jouni<sup>3</sup>, <sup>1</sup>Univ. of South Florida, Sarasota, FL, <sup>2</sup>Univ. of Richmond, Richmond, VA, <sup>3</sup>Kellogg Company, Battle Creek, MI
- D3689** Analogues of sex pheromone component in the pheromone gland of *Bombyx mori*. **Takeshi Fujii** (takeshi.f0405@gmail.com)<sup>1,2</sup>, Hidefumi Mitsuno<sup>2</sup>, Shigeru Matsuyama<sup>3</sup>, Takuya Nirazawa<sup>2</sup>, Katsuhiko Ito<sup>1</sup>, Takeshi Yokoyama<sup>1</sup>, Takaaki Nishioka<sup>4</sup>, Ryohei Kanzaki<sup>2</sup>, and Yukio Ishikawa<sup>2</sup>, <sup>1</sup>Tokyo Univ. of Agriculture and Technology, Fuchu, Japan, <sup>2</sup>The Univ. of Tokyo, Tokyo, Japan, <sup>3</sup>Univ. of Tsukuba, Tsukuba, Japan, <sup>4</sup>Nara Institute of Science and Technology, Ikoma, Japan
- D3690** Pheromone biosynthesis in moths. **Russell Jurenka** (rjurenka@iastate.edu), Iowa State Univ., Ames, IA
- D3691** Wild type and mutated odorant binding protein from *Anopheles funestus* differ in binding properties. **Jiankun Yi** (jkyi@ucdavis.edu)<sup>1</sup>, Wei Xu<sup>1,2</sup>, David Wilson<sup>1</sup>, and Walter S. Leal<sup>1</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>Murdoch Univ., Murdoch, Australia
- D3692** Cloning and characterization of the pheromone biosynthesis activating neuropeptide receptor (PBANR) from *Mamestra brassicae* (Lepidoptera: Noctuidae). József Fodor<sup>1</sup>, Joe Hull<sup>2</sup>, Gabriella Köblös<sup>1</sup>, Emmanuelle Jacquin-Joly<sup>3</sup>, Tamás Szlanka<sup>4</sup>, and **Adrien Fónagy** (fonagy.adrien@agr.ar.mta.hu)<sup>1</sup>, <sup>1</sup>Hungarian Academy of Sciences, Budapest, Hungary, <sup>2</sup>USDA - ARS, Maricopa, AZ, <sup>3</sup>INRA, Versailles, France, <sup>4</sup>Hungarian Academy of Sciences, Szeged, Hungary
- D3693** Effects of neuropeptide F on growth of internal organs in grasshoppers (*Romalea guttata*). Matthew Heck, Davis Beard, and **John Hatle** (jhatle@unf.edu), Univ. of North Florida, Jacksonville, FL
- D3694** BmPCD and BmDHPH: Two BH4 synthesis enzymes are activated in the *Bombyx mori* mutant *lem*. **Junshan Gao** (gaojsh@ahau.edu.cn), Wentian Li, Daobo Zhang, Lanlan Wu, and Yan Meng, Anhui Agricultural Univ., Hefei, China
- D3695** DmCatD, a cathepsin D-like peptidase of the hematophagous insect vector *Dipetalogaster maxima* (Hemiptera: Reduviidae): Bioinformatic analysis and internalization pathway in developing oocytes. **Jimena Leyria** (jleyria@fcq.unc.edu.ar)<sup>1</sup>, Leonardo Fruttero<sup>1,2</sup>, Fabián Ramos<sup>1</sup>, Rodrigo Ligabue-Braun<sup>3</sup>, Celia Carlini<sup>2</sup>, Beatriz Settembrini<sup>4</sup>, and Lilián Canavoso<sup>1</sup>, <sup>1</sup>National Univ. of Córdoba, Córdoba, Argentina, <sup>2</sup>Pontifical Catholic Univ., Porto Alegre, Brazil, <sup>3</sup>Federal Univ. of Rio Grande, Porto Alegre, Brazil, <sup>4</sup>Univ. of Austral, Derqui, Argentina
- D3696** Binding of a novel binary corn rootworm active in midgut tissue from susceptible and Cry34/35-selected *Diabrotica virgifera virgifera* (LeConte). **Claudia Pérez-Ortega** (claudia.perezortega@pioneer.com)<sup>1</sup>, Christopher Leininger<sup>1</sup>, Mark Nelson<sup>1</sup>, J. Lindsey Flexner<sup>1</sup>, Nasser Yalpani<sup>2</sup>, Dan Altier<sup>2</sup>, Lu Liu<sup>3</sup>, and Gusui Wu<sup>2</sup>, <sup>1</sup>DuPont Pioneer, Wilmington, DE, <sup>2</sup>DuPont Pioneer, Johnston, IA, <sup>3</sup>DuPont Pioneer, Hayward, CA
- D3697** Biochemical, bioinformatic, and biophysical approaches for understanding the role of  $\beta$ -ATPase as a lipophorin receptor in *Panstrongylus megistus*, a hematophagous vector of Chagas' disease (Hemiptera: Reduviidae). Leonardo Fruttero<sup>1</sup>, Jimena Leyria<sup>1</sup>, Rodrigo Ligabue-Braun<sup>2</sup>, Pedro Clop<sup>1</sup>, Maria Perillo<sup>1</sup>, Celia Carlini<sup>3</sup>, Estela L. Arrese<sup>4</sup>, José Soulages<sup>4</sup>, and **Lilián Canavoso** (lcanavo@fcq.unc.edu.ar)<sup>1</sup>, <sup>1</sup>National Univ. of Córdoba, Córdoba, Argentina, <sup>2</sup>Federal Univ. of Rio Grande, Porto Alegre, Brazil, <sup>3</sup>Pontifical Catholic Univ., Porto Alegre, Brazil, <sup>4</sup>Oklahoma State Univ., Oklahoma City, OK
- D3698** Insect mitochondrial adenine nucleotide translocases and their functions. Ryohei Sugahara<sup>1</sup>, Akiya Jouraku<sup>1</sup>, Takenori Yamamoto<sup>2</sup>, Yasuo Shinohara<sup>2</sup>, Toyomi Kotaki<sup>1</sup>, Hideto Miyoshi<sup>3</sup>, and **Takahiro Shiotsuki** (shiotsuk@affrc.go.jp)<sup>1</sup>, <sup>1</sup>National Institute of Agrobiological Sciences, Tsukuba, Japan, <sup>2</sup>Tokushima Univ., Tokushima, Japan, <sup>3</sup>Kyoto Univ., Kyoto, Japan
- D3699** An evolutionarily-unique heterodimeric voltage-gated cation channel in aphids. **T. G. Emyr Davies** (emyr.davies@rothamsted.ac.uk)<sup>1</sup>, Joanna Amey<sup>1</sup>, Andrias O'Reilly<sup>2</sup>, Mark Burton<sup>3</sup>, Mirel Puinean<sup>1</sup>, Ian Mellor<sup>4</sup>, Ian Duce<sup>4</sup>, Lin Field<sup>1</sup>, B. Wallace<sup>5</sup>, and Martin Williamson<sup>1</sup>, <sup>1</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>2</sup>Liverpool John Moores Univ., Liverpool, United Kingdom, <sup>3</sup>Univ. of Leicester, Leicester, United Kingdom, <sup>4</sup>Univ. of Nottingham, Nottingham, United Kingdom, <sup>5</sup>Univ. of London, London, United Kingdom
- D3700** 20-hydroxyecdysone induces fatty acid synthesis and triacylglycerol storage in the fat body of *Rhodnius prolixus*. Pamela Nascimento<sup>1</sup>, Gustavo Tavares-Silva<sup>2</sup>, Alessa Macedo-Silva<sup>2</sup>, Cristina Motinha<sup>2</sup>, Priscila Ausina<sup>2</sup>, Mauro Sola-Penna<sup>2</sup>, and **David Majerowicz** (majerowicz@pharma.ufrj.br)<sup>2</sup>, <sup>1</sup>Federal Institute of Science and Technology, Rio de Janeiro, Brazil, <sup>2</sup>Federal Univ. of Rio de Janeiro, Rio de Janeiro, Brazil
- D3701** Regulatory elements of the adult molt in the western tarnished plant bug (*Lygus hesperus*). **Colin Brent** (colin.brent@ars.usda.gov)<sup>1</sup>, Meixian Wang<sup>2</sup>, Yun-Gen Miao<sup>2</sup>, and Joe Hull<sup>1</sup>, <sup>1</sup>USDA - ARS, Maricopa, AZ, <sup>2</sup>Zhejiang Univ., Hangzhou, China
- D3702** Molecular mechanism of cardol, isolated from *Trigona incisa* stingless bee propolis, on apoptosis of SW620 human colorectal cancer cell line. **Chanpen Chanchao** (chanpen@sc.chula.ac.th)<sup>1</sup>, Paula Kustiawan<sup>1</sup>, Kriengsak Lirdprapamongkol<sup>2</sup>, Tanapat Palaga<sup>1</sup>, Songchan Puthong<sup>1</sup>, Preecha Phuwapraisirisan<sup>1</sup>, and Jisnusun Svasti<sup>2</sup>, <sup>1</sup>Chulalongkorn Univ., Bangkok, Thailand, <sup>2</sup>Chulabhorn Research Institute, Bangkok, Thailand
- D3703** Molecular structural study on silkworm silk and spider silk. **Mitsuhiro Miyazawa** (miyazawa@affrc.go.jp), National Institute of Agrobiological Sciences, Tsukuba, Japan



- D3704** Increased oxidative stress induced by alkaloids derived from Girgensohnine on mitochondria isolated from larvae of *Aedes aegypti* (Diptera: Culicidae). Mayra Borrero, Aurora Carreño, Vladimir Kouznetsov, and **Stelia Mendez** (scmendez@uis.edu.co), Industrial Univ. of Santander, Piedecuesta, Colombia
- D3705** Toxicological effects of ethephon on the model organism *Galleria mellonella* L. (Lepidoptera: Pyralidae). **Hulya Altuntas** (hyalcitas@anadolu.edu.tr), Emine Duman, and Sumeyra Sanal Demirci, Anadolu Univ., Eskisehir, Turkey
- D3706** Peritrophins in Arachnida species: Evolution an expression of proteins involved in peritrophic membrane constitution. **Adriana Lopes** (adriana.lopes@butantan.gov.br)<sup>1</sup>, Jose Patane<sup>2</sup>, and Felipe Fuzita<sup>2</sup>, <sup>1</sup>Butantan Institute, São Paulo, Brazil, <sup>2</sup>Univ. of São Paulo, São Paulo, Brazil
- D3707** Expression profiles of the vitellogenin receptor gene from sunn pest *Eurygaster maura* playing a key role for oocyte development. Asli Dageri and **Nurper Guz** (nurperguz@agri.ankara.edu.tr), Ankara Univ., Ankara, Turkey
- D3708** Role of Wnt pathway in the regulation of TOR signaling-mediated egg production in the mosquito *Aedes aegypti*. **Shin-Hong Shiao** (shshiao@ntu.edu.tw), National Taiwan Univ., Taipei, Taiwan
- D3709** Development of highly active enzymes produced by microbes from insects. **Ho-Yong Park** (hypark@kribb.re.kr), Korea Research Institute of Bioscience and Biotechnology, Daejeon, South Korea
- D3710** Photoperiodism of diapause induction in the moth *Thyrassia penangae*: Measuring day length rather than night length. **Haimin He** (hehaimin1984@163.com), Haijun Xiao, and Fangsen Xue, Jiangxi Agricultural Univ., Nanchang, China
- D3711** A soluble pyrophosphatase is essential to oogenesis in the red flour beetle (*Tribolium castaneum*). **Eldo Campos** (eldocampos@yahoo.com.br), Klebea Carvalho, and Rodrigo Fonseca, Federal Univ. of Rio de Janeiro, Macaé, Brazil
- D3712** Correlation between body color and ovarian development in the stink bug, *Glaucias subpunctatus*. Tomohiro Honda and **Kyo Itoyama** (itoyama@meiji.ac.jp), Meiji Univ., Kanagawa, Japan
- D3713** Unravelling mechanotransduction in the locust ear. **Ben Warren** (bwl20@le.ac.uk) and Tom Matheson, Univ. of Leicester, Leicester, United Kingdom
- D3714** Physiological modification induced by nicotine in the German cockroach (*Blattella germanica*). **Vincenzo Di Ilio** (vincenzo.diilio@rothamsted.ac.uk), Michael Birkett, and John Pickett, Rothamsted Research, Harpenden, United Kingdom
- D3715** Roll of ice crystal growth suppression in the freeze tolerance of the rice stem borer, *Chilo suppressalis*. **Yohei Izumi** (yohei@life.shimane-u.ac.jp)<sup>1</sup>, Kanari Murakami<sup>1</sup>, and Yoshinori Furukawa<sup>2</sup>, <sup>1</sup>Shimane Univ., Matsue, Japan, <sup>2</sup>Hokkaido Univ., Sapporo, Japan
- D3716** *Aedes aegypti* Rexville D strain show diminished fecundity when infected with Dengue virus serotype 2, isolated from 2010 epidemic in Brazil. **Rafaella Ioshino** (myxelia@gmail.com), André Costa-da-Silva, Danilo Carvalho, and Margareth Capurro, Univ. of São Paulo, São Paulo, Brazil
- D3717** Seasonal plasticity of the small copper butterfly *Lycaena phlaeas daimio* Seitz. **Akira Yamanaka** (yamanaka@yamaguchi-u.ac.jp)<sup>1</sup>, Yuki Masumoto<sup>1</sup>, Narumi Abe<sup>1</sup>, Masanori Ochiai<sup>2</sup>, and Chisato Kitazawa<sup>1</sup>, <sup>1</sup>Yamaguchi Univ., Yamaguchi, Japan, <sup>2</sup>Hokkaido Univ., Sapporo, Japan
- D3718** Effect of temperature and photoperiod on the morphological trait of the butterfly *Narathura japonica*. **Hibiki Yamamoto** (v002uh@yamaguchi-u.ac.jp), Yusuke Isamura, Chisato Kitazawa, and Akira Yamanaka, Yamaguchi Univ., Yamaguchi, Japan
- D3719** Behavioral differences of a bean bug, *Riptortus pedestris*, with and without microbial symbiont, *Burkholderia* sp. **Hong Geun Kim** (hgkim408@gachon.ac.kr), Minhyung Jung, Soowan Kim, and Doo-Hyung Lee, Gachon Univ., Seongnam, South Korea
- D3720** Compensatory feeding may produce suboptimal performance in the grasshopper *Melanoplus differentialis*. **Jerry Howard** (jjhoward@uno.edu), The Univ. of New Orleans, New Orleans, LA
- D3721** Presentation withdrawn
- D3722** Evidence for the presence of biogenic magnetic particles in the migratory brown planthopper and its potential significance. **Weidong Pan** (panwd@mail.iee.ac.cn), Chinese Academy of Sciences, Beijing, China
- D3723** Renal function in the pest insect *Drosophila suzukii*. **Joseph Yeoh** (joseph.yeoh@glasgow.ac.uk)<sup>1</sup>, Richard Marley<sup>1</sup>, Elwyn Isaac<sup>2</sup>, Julian Dow<sup>1</sup>, and Shireen Davies<sup>1</sup>, <sup>1</sup>Univ. of Glasgow, Glasgow, United Kingdom, <sup>2</sup>Univ. of Leeds, Leeds, United Kingdom
- D3724** Vitellogenin transport is mediated by membrane receptors in the follicular cells of Hymenoptera. **José Eduardo Serrão** (jeserrao@ufv.br) and Virginia Dohanik, Federal Univ. of Viçosa, Viçosa, Brazil

### Poster Session 3: RNAi and Gene Expression Control in Insects

#### West Hall C (Convention Center)

- D3725** Absence of piRNA pathway in the house dust mite. **Md. Mosharrof Hossain Mondal** (mdmosharrofhossain.mondal@eagles.usm.edu) and Alex Flynt, Univ. of Southern Mississippi, Hattiesburg, MS
- D3726** cDNA library construction and gene screening of *Harmonia axyridis* (Coleoptera: Coccinellidae) for gene functional analysis. **Sang-Eun Park** (tkddms2622@naver.com), Young-Nam Youn, Yong-Man Yu, and Jung-Kyu Kim, Chungnam National Univ., Daejeon, South Korea
- D3727** RNA interference of an esterase gene results in reduced acaricide resistance in *Tetranychus cinnabarinus* (Boisduval). **Qiang Xu** (qxx07a@acu.edu)<sup>1</sup>, Li Shi<sup>2</sup>, and Lin He<sup>2</sup>, <sup>1</sup>Abilene Christian Univ., Abilene, TX, <sup>2</sup>Southwest Univ., Chongqing, China



- D3728** Peritrophic membrane genes from *Diabrotica virgifera virgifera* and their potential application as target in pest management in future. **Newton Carneiro** (newtonc800@gmail.com)<sup>1</sup>, Haichuan Wang<sup>2</sup>, Ana Vélez<sup>2</sup>, and Blair Siegfried<sup>3</sup>, <sup>1</sup>Embrapa Maize and Sorghum, Sete Lagoas, Brazil, <sup>2</sup>Univ. of Nebraska, Lincoln, NE, <sup>3</sup>Univ. of Florida, Gainesville, FL
- D3729** Nanoparticles and nucleic acids: Binding, dissociation, and RNAi. **Emily Nadeau** (eana226@g.uky.edu), Bruce Webb, Barbara Knutson, Stephen Rankin, and M. Arif Khan, Univ. of Kentucky, Lexington, KY
- D3730** *Schizaphis graminum* and *Rhopalosiphum maidis* control in maize by RNAi. **Andrea Carneiro** (andrea.carneiro@embrapa.br)<sup>1</sup>, Haichuan Wang<sup>2</sup>, Ana Laura Verdolin<sup>1</sup>, Beatriz Barros<sup>1</sup>, and Newton Carneiro<sup>1</sup>, <sup>1</sup>Embrapa Maize and Sorghum, Sete Lagoas, Brazil, <sup>2</sup>Univ. of Nebraska, Lincoln, NE
- D3731** Oral delivery of dsRNA lipoplexes to German cockroach, *Blattella germanica*, protects dsRNA from degradation. **How-Jing Lee** (m480@ntu.edu.tw), National Taiwan Univ., Taipei, Taiwan
- D3732** Developing RNA interference-based approaches for managing the German cockroach, *Blattella germanica*. **Zhiping Xu** (zhiping@ksu.edu)<sup>1,2</sup>, Peiying Hao<sup>1,3</sup>, and Kun Yan Zhu<sup>1</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>East China Univ. of Science and Technology, Shanghai, China, <sup>3</sup>China Jiliang Univ., Hangzhou, China
- D3733** Development of insecticidal gene silencing for control of kudzu bug, *Megacopta cribraria*. **Lucas Hietala** (lhietal@vols.utk.edu), Jerreme J. Jackson, Margaret Staton, Rahul Banerjee, C. Neal Stewart, and Juan Luis Jurat-Fuentes, Univ. of Tennessee, Knoxville, TN
- D3734** Knocking down laccase 2 gene in *Aedes aegypti*: Effects on egg chorion. **Caroline Louise** (cgmlouise@gmail.com)<sup>1,2</sup> and Lincoln Suesdek<sup>1,2</sup>, <sup>1</sup>Univ. of São Paulo, São Paulo, Brazil, <sup>2</sup>Instituto Butantan, São Paulo, Brazil
- D3735** cDNA library construction of 28-spotted potato ladybird, *Henosepilachna vigintioctomaculata*, for RNA interference application. **Jeong Hee Kim** (wjdgml133@naver.com), Chungnam National Univ., Daejeon, South Korea
- D3736** Effects of RNAi transgenic tomato on mortality of *Tuta absoluta* (Lepidoptera: Gelechiidae). **Flavia Bento** (flaviambento@usp.br)<sup>1</sup>, Roberto Camargo<sup>2</sup>, and Antonio Figueira<sup>1</sup>, <sup>1</sup>Univ. of São Paulo, Piracicaba, Brazil, <sup>2</sup>Nuclear Energy and Agriculture Center, Piracicaba, Brazil
- D3737** Presentation withdrawn
- VP13** Risk assessments for the potential spread of the African sweet potato weevil, *Cylas puncticolis*, due to global warming. **Joshua Okonya** (j.okonya@cgiar.org)<sup>1</sup>, Norma Mujica<sup>2</sup>, Pablo Carhuapoma<sup>2</sup>, and Jürgen Kroschel<sup>2</sup>, <sup>1</sup>International Potato Center, Kampala, Uganda, <sup>2</sup>International Potato Center, Lima, Peru
- VP14** Bioclimatic envelope-based risk mapping of the bark beetle-vectored blue stain fungus, *Ceratocystis polonica*. **Kishan Sambaraju** (kishan.sambaraju@canada.ca), Rémi Saint-Amant, and Chantal Côté, Natural Resources Canada, Québec City, QC, Canada
- VP15** Habitat associations of a Jerusalem cricket, *Stenopelmatus monahansensis*, at the Monahans sand dunes in western Texas. **Roberto Miranda** (roberto.miranda@est.zamorano.com)<sup>1</sup>, Wilber Gutierrez<sup>1</sup>, Samuel Discua<sup>2</sup>, and Scott Longing<sup>2</sup>, <sup>1</sup>Zamorano Univ., Tegucigalpa, Honduras, <sup>2</sup>Texas Tech Univ., Lubbock, TX
- VP16** Spatial distribution of cavity-nesting solitary bees (Hymenoptera: Apidae) from mangroves to forests in the southern São Paulo, Brazil. **Patricia dos Santos Vilhena** (patricia.vilhena@outlook.com) and Carlos Alberto Garófalo, Univ. of São Paulo, Ribeirão Preto, Brazil
- VP17** An annotated checklist and catalogue of the native bee species occurring on the Southern High Plains in western Texas. **Wilber Gutierrez** (wilber.gutierrez@est.zamorano.edu)<sup>1</sup>, Roberto Miranda<sup>1</sup>, Samuel Discua<sup>2</sup>, and Scott Longing<sup>2</sup>, <sup>1</sup>Zamorano Univ., Tegucigalpa, Honduras, <sup>2</sup>Texas Tech Univ., Lubbock, TX
- VP18** Phylogeny of euthyplociid mayflies (Insecta: Ephemeroptera: Euthyplociidae). **Inês C. Gonçalves** (inescg.bio@gmail.com), Jorge Luiz Nessimian, and Daniela M. Takiya, Federal Univ. Federal of Rio de Janeiro, Rio de Janeiro, Brazil
- VP19** Three new species of *Oobius* Trjapitzin (Hymenoptera: Encyrtidae) that parasitize eggs of *Agrilus* spp. (Coleoptera: Buprestidae) infesting ash and poplar trees from China. **Yan-Xia Yao** (yanxia.yao1@gmail.com)<sup>1</sup>, Jian Duan<sup>2</sup>, Xiao-Yi Wang<sup>1</sup>, Zhong-qi Yang<sup>1</sup>, Kai Zang<sup>1</sup>, and Leah S. Bauer<sup>3</sup>, <sup>1</sup>Chinese Academy of Forestry, Beijing, China, <sup>2</sup>USDA - ARS, Newark, DE, <sup>3</sup>USDA - Forest Service, Lansing, MI
- VP20** Infestations and management of the cassava mealybug, *Phenacoccus manihoti* (Hemiptera: Pseudococcidae), a newly invasive pest in Indonesia. **Aunu Rauf** (aunu@indo.net.id)<sup>1</sup>, Nila Wardani<sup>2</sup>, Kris Wyckhuys<sup>3</sup>, and Merle Shepard<sup>4</sup>, <sup>1</sup>Bogor Agricultural Univ., Bogor, Indonesia, <sup>2</sup>Assessment Institute for Agricultural Technology, Bandar Lampung, Indonesia, <sup>3</sup>International Center for Tropical Agriculture, Hanoi, Vietnam, <sup>4</sup>Clemson Univ., Charleston, SC
- VP21** Study on the control of soybean pod borer, *Leguminivora glycinivorella*, with sex pheromone combining *Trichogramma* and chemical insecticide. **Kuijun Zhao** (kjzhao@neau.edu.cn)<sup>1</sup>, Yuan Cheng<sup>1</sup>, Lanlan Han<sup>1</sup>, Hong Wang<sup>1</sup>, and Keqin Wang<sup>2</sup>, <sup>1</sup>Northeast Agricultural Univ., Harbin, China, <sup>2</sup>Heilongjiang Academy of Agricultural Sciences, Harbin, China

## Virtual Poster Session

### West Hall C (Convention Center)

- VP12** Red wood ants, *Formica rufa*-group, and tectonic processes interact and contribute to climatic change. **Gabriele Berberich** (gabriele.berberich@uni-due.de)<sup>1</sup>, Aaron M. Ellison<sup>2</sup>, and Christian Wöhler<sup>3</sup>, <sup>1</sup>Univ. of Duisburg-Essen, Essen, Germany, <sup>2</sup>Harvard Univ., Petersham, MA, <sup>3</sup>Technical Univ. of Dortmund, Dortmund, Germany





- VP22** The mirid *Engytatus varians* reduces the populations of *Bactericera cockerelli* under greenhouse conditions. **Daniel A. Perez Aguilar** (dan\_a\_p\_a@hotmail.com)<sup>1</sup>, Ana M. Martinez<sup>1</sup>, Jose I. Figueroa<sup>1</sup>, Benjamin Gomez<sup>2</sup>, and Samuel Pineda<sup>1</sup>, <sup>1</sup>Michoacan Univ. of Saint Nicholas of Hidalgo, Tarimbaro, Mexico, <sup>2</sup>Michoacan Univ. of Saint Nicholas of Hidalgo, Morelia, Mexico
- VP23** Electron microscopic examination for fungal growth in isolated red flour beetle, *Tribolium castaneum*. **Hanan Bosly** (dr\_2009\_bosly@hotmail.com), Jazan Univ., Jazan, Saudi Arabia
- VP24** Biological activity and occlusion body production of three *Spodoptera frugiperda* multiple nucleopolyhedrovirus. **Diana V. Garcia** (diana\_v\_eli@hotmail.com)<sup>1</sup>, Jose I. Figueroa<sup>1</sup>, Samuel Pineda<sup>1</sup>, Fernando Tamayo<sup>2</sup>, Rodrigo Lasa<sup>3</sup>, Jose Corrales<sup>4</sup>, Juan Cisneros<sup>5</sup>, and Ana M. Martinez<sup>1</sup>, <sup>1</sup>Michoacana Univ. of Saint Nicholas of Hidalgo, Tarimbaro, Mexico, <sup>2</sup>Secretariat of Agricultural/Food Development and Rural Celaya, Celaya, Mexico, <sup>3</sup>Institute of Ecology, Xalapa, Mexico, <sup>4</sup>Autonomous Univ. Univ. of Sinaloa, Culiacan, Mexico, <sup>5</sup>College of the Southern Border, Tapachula, Mexico
- VP25** Aphicidal activity of *Solanum panduriforme* (Mey) extracts against the cabbage aphid *Brevicoryne brassicae* (Linnaeus) on brassicas. **Mary Mhazo** (marymhere@yahoo.com)<sup>1</sup>, Edna Kunjeku<sup>1</sup>, Abe Addo-Bediako<sup>2</sup>, Thabile Ndlovu<sup>3</sup>, and Barry Blair<sup>4</sup>, <sup>1</sup>Univ. of Venda, Thoyoyandou, South Africa, <sup>2</sup>Univ. of Limpopo, Polokwane, South Africa, <sup>3</sup>Univ. of Swaziland, Matsapa, Swaziland, <sup>4</sup>Univ. of Pretoria, Pretoria, South Africa
- VP26** Sporxy™ 360SC: A novel combination of spinetoram and methoxyfenozide for the control of rice stem borers and leafroller in China and Taiwan. **Peng Wang** (gavinwang@dow.com)<sup>1</sup>, Liang Chen<sup>1</sup>, Catherine Ren<sup>1</sup>, Ta-i Huang<sup>2</sup>, George Guan-Hua Lin<sup>3</sup>, and Jim X. Huang<sup>4</sup>, <sup>1</sup>Dow AgroSciences, Shanghai, China, <sup>2</sup>Dow AgroSciences, Taipei, Taiwan, <sup>3</sup>Dow AgroSciences, PingTung, Taiwan, <sup>4</sup>Dow AgroSciences, Indianapolis, IN
- VP27** Developing management recommendations for the use of fungicide and insecticide seed treatments for soybeans in South Dakota. **Mike W. Dunbar** (dunbar@iastate.edu), Febina Mathew, Jonathan Kleinjan, and Adam Varenhorst, South Dakota State Univ., Brookings, SD
- VP28** Ultrastructure changes to AmE-711 honey bee, *Apis mellifera*, cells infected with viruses. **Michael Goblirsch** (goblirmj@umn.edu) and Anibal Armien, Univ. of Minnesota, St. Paul, MN
- VP29** Insecticide mortality, *in vitro* detoxifying enzymes kinetics, and inhibition in two honey bee species, *Apis mellifera* and *A. florea*. Amal Berjawi<sup>1</sup>, **Mohammad Ali Al-Deeb** (m\_aldeeb@uaeu.ac.ae)<sup>1</sup>, Syed Ashraf<sup>1</sup>, and Ahmed Rajab<sup>2</sup>, <sup>1</sup>United Arab Emirates Univ., Al-Ain, United Arab Emirates, <sup>2</sup>Abu Dhabi Food Control Authority, Al-Ain, United Arab Emirates
- VP30** Why several insects feeding on toxicants decrease their food intake? Pilar Muñoz<sup>1</sup>, Marian Moralejo<sup>1</sup>, Meritxell Pérez-Hedo<sup>2</sup>, Matilde Eizaguirre<sup>1</sup>, and **Carmen Lopez** (carmen.lopez@udl.cat)<sup>1</sup>, <sup>1</sup>Univ. of Lleida, Lleida, Spain, <sup>2</sup>Univ. Jaume I, Castelló de la Plana, Spain
- VP31** Behavioral and electrophysiological response to *Citrus limon* and *Citrus sinensis* in the medfly, *Ceratitis capitata* (Wiedemann) (Diptera: Tephritidae). Giorgia Sarais<sup>1</sup>, Giacomo Petretto<sup>2</sup>, Carla Lai<sup>1</sup>, Francesco Loy<sup>3</sup>, Paolo Solari<sup>3</sup>, Roberto Crnjar<sup>3</sup>, and **Carla Masala** (cmasala@unica.it)<sup>3</sup>, <sup>1</sup>Univ. of Cagliari, Cagliari, Italy, <sup>2</sup>Univ. of Sassari, Sassari, Italy, <sup>3</sup>Univ. of Cagliari, Monserrato, Italy
- VP32** Nitrogen manipulation on strawberry and its nutritional outcomes on two-spotted mite performance. **Mojtaba Hosseini** (m.hosseini@um.ac.ir), Ferdowsi Univ., Mashhad, Iran
- VP33** *Bactrocera dorsalis* Hendel and *Bactrocera zonata* (Saunders) population fluctuations as influenced by various abiotic factors, at two different locations of North West Plain Zone of India. **Reena Sinha** (bkreena2@gmail.com)<sup>1</sup>, Amandeep Kaur<sup>2</sup>, Bhav Sinha<sup>3</sup>, Pradeep Rai<sup>3</sup>, Anil Sharma<sup>1</sup>, Brinder Singh<sup>1</sup>, and Sonika Jamwal<sup>1</sup>, <sup>1</sup>Sher-e-Kashmir Univ. of Agricultural Sciences and Technology, Bari Brahmana, India, <sup>2</sup>Punjab Agriculture Univ., Patiala, India, <sup>3</sup>Sher-e-Kashmir Univ. of Agricultural Sciences and Technology, Jammu, India
- VP34** Differential gene expression profiling induced by blood feeding in the biting midge vector *Culicoides imicola*. **Wilma Fick** (wilma.fick@up.ac.za)<sup>1</sup>, Gert Venter<sup>2</sup>, Fidan Karatas<sup>1</sup>, and Erik Visser<sup>1</sup>, <sup>1</sup>Univ. of Pretoria, Hatfield, South Africa, <sup>2</sup>Agricultural Research Council, Onderstepoort, South Africa
- VP35** Mapping insecticide resistance in malaria vectors: Latest updates from IR Mapper. **Melinda Hadi** (meh@vestergaard.com)<sup>1</sup>, Duncan Athinya<sup>1</sup>, and Helen Pates Jamet<sup>2</sup>, <sup>1</sup>Vestergaard, Nairobi, Kenya, <sup>2</sup>Vestergaard, Washington, DC
- VP36** The relationship between genetic variation and vector of *Pediculus humanus capitis* (Phthiraptera: Pediculidae). **Fadime Eroglu** (eroglufadime@hotmail.com)<sup>1</sup>, Mustafa Tanrıverdi<sup>2</sup>, Eda Icbay Daglı<sup>2</sup>, and Ismail Soner Koltas<sup>3</sup>, <sup>1</sup>Zirve Univ., Gaziantep, Turkey, <sup>2</sup>Gaziantep Public Health Directorate, Gaziantep, Turkey, <sup>3</sup>Cukurova Univ., Adana, Turkey
- VP37** Measuring the 'health' of beneficial insects: Linking pest control services and sustainable crop production. **Mona Moradi-Vajargah** (mona.moradivajargah@csiro.au) and Nancy Schellhorn, CSIRO, Dutton Park, Australia

## Symposium: Advances in Acarology

### Room W314 B (Convention Center)

**Moderators and Organizers:** Jose Carlos V. Rodrigues<sup>1</sup>, Monica A. Farfan<sup>2</sup>, Daniel Carrillo<sup>3</sup>, and Raul T. Villanueva<sup>4</sup>, <sup>1</sup>Univ. of Puerto Rico, San Juan, PR, <sup>2</sup>Univ. of Illinois, Chicago, IL, <sup>3</sup>Univ. of Florida, Homestead, FL, <sup>4</sup>Texas A&M Univ., Weslaco, TX

9:15 **2659** Surface active mites in the northern Chihuahuan Desert, USA. **Cal Welbourn** (Warren.Welbourn@freshfromflorida.com), Florida Dept. of Agriculture and Consumer Services, Gainesville, FL



- 9:30 **2660** Variation in the structure of mite communities in forest soils across a metropolitan landscape. **Monica A. Farfan** (mfarfa2@uic.edu), Amanda Henderson, Kristen A. Ross, and David H. Wise, Univ. of Illinois, Chicago, IL
- 9:45 **2661** Synergistic effects of acaricides used to control the ectoparasitic mite *Varroa destructor* on the reproductive health of honey bee (*Apis mellifera*) queens. **Elizabeth Walsh** (walshe@tamu.edu) and Juliana Rangel, Texas A&M Univ., College Station, TX
- 10:00 **2662** Acarine fauna associated with *Carica papaya* in Florida. **Leonardo Alvarez Rios** (leonardoalvarez@ufl.edu), Sabyan Honey, Rita Duncan, and Daniel Carrillo, Univ. of Florida, Homestead, FL
- 10:15 BREAK**
- 10:30 **2663** Mycobiome and bacteriome diversity of *Brevipalpus yothersi* populations. **Oscar Ospina** (oscar.ospina@upr.edu) and José Carlos V. Rodrigues, Univ. of Puerto Rico, San Juan, PR
- 10:45 **2664** Nasal mites of the brood parasite brown-headed cowbird (*Molothrus ater*). **Alexis Hilario-Pérez** (ahilario@email.uark.edu) and Ashley P. G. Dowling, Univ. of Arkansas, Fayetteville, AR
- 11:00 **2665** Untangling a water mite genus: The North American *Monatractides* (Parasitengona: Torrenticolidae) story. **Whitney A. Nelson** (whitneyanelson@gmail.com), Ray Fisher, Danielle Fisher, and Ashley P. G. Dowling, Univ. of Arkansas, Fayetteville, AR
- 11:15 **2666** Diving in with torrent mites (Torrenticolidae: *Torrenticola*): Describing diversity in North America. **Ray Fisher** (jrfisher@uark.edu), Danielle Fisher, Whitney A. Nelson, and Ashley P. G. Dowling, Univ. of Arkansas, Fayetteville, AR
- 11:30 **2667** Bayesian species delimitation of the genus *Tyrophagus* (Acari: Acaridae). **Pamela Murillo** (pammr@umich.edu), Pavel B. Klimov, and Barry O'Connor, Univ. of Michigan, Ann Arbor, MI
- 11:45 **2668** A new hypothesis on the origin of the stylet sheath of the Eriophyoidea. **Samuel Bolton** (bolton.69@osu.edu)<sup>1</sup>, Gary R. Bauchan<sup>2</sup>, Ronald Ochoa<sup>2</sup>, and Hans Klompen<sup>1</sup>, <sup>1</sup>The Ohio State Univ., Columbus, OH, <sup>2</sup>USDA - ARS, Beltsville, MD

### Symposium: Advances in Tick and Mite Biology, Animal Disease Transmission, and Control

#### Room W414 C (Convention Center)

**Moderators and Organizers:** R. Michael Roe<sup>1</sup>, Daniel Sonenshine<sup>2</sup>, C. S. Apperson<sup>1</sup>, and Catherine Hill<sup>3</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>Old Dominion Univ., Norfolk, VA, <sup>3</sup>Purdue Univ., West Lafayette, IN

- 9:15 **2669** Combating tick-borne diseases on a global scale: New paradigms for protecting public health and biosecurity. **Catherine Hill** (hillca@purdue.edu), Purdue Univ., West Lafayette, IN
- 9:45 **2670** Does the tick microbiome modulate vector competence for Rickettsiales? **Loganathan Ponnusamy** (loganathan\_ponnusamy@ncsu.edu)<sup>1</sup>, R. Michael Roe<sup>1</sup>, Charles Apperson<sup>1</sup>, and Steven Meshnick<sup>2</sup>, <sup>1</sup>North

- Carolina State Univ., Raleigh, NC, <sup>2</sup>Univ. of North Carolina, Chapel Hill, NC
- 10:00 **2671** Immune response regulation in *Dermacentor variabilis*. Victoria Verhoeven and **Kevin Macaluso** (kmacaluso@vetmed.lsu.edu), Louisiana State Univ., Baton Rouge, LA
- 10:15 BREAK**
- 10:30 **2672** Mevalonate-farnesal biosynthesis and neuroendocrine regulation of blood feeding and reproduction in ticks. **Jiwei Zhu** (jzhu4@ncsu.edu), North Carolina State Univ., Raleigh, NC
- 10:45 **2673** Tick feeding physiology complexity: A proteomics view. **Albert Mulenga** (amulenga@cvm.tamu.edu), Texas A&M Univ., College Station, TX
- 11:00 **2674** Modern advances in sustainable tick control. **Robert J. Miller** (robert.miller@ars.usda.gov)<sup>1</sup>, Felix Guerrero<sup>2</sup>, and Adalberto Perez de Leon<sup>2</sup>, <sup>1</sup>USDA - ARS, Edinburg, TX, <sup>2</sup>USDA - ARS, Kerrville, TX
- 11:15 **2675** Control of ticks through the use of a tick-killing robot. **Holly Gaff** (hgaff@odu.edu)<sup>1</sup>, Daniel Sonenshine<sup>1</sup>, and James Squire<sup>2</sup>, <sup>1</sup>Old Dominion Univ., Norfolk, VA, <sup>2</sup>Virginia Military Institute, Lexington, VA
- 11:30 **2676** What makes ticks bite: New paradigms in chemoreception. **R. Michael Roe** (michael\_roe@ncsu.edu)<sup>1</sup>, Ann Carr<sup>1</sup>, and Daniel Sonenshine<sup>2</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>Old Dominion Univ., Norfolk, VA

### Symposium: Global Perspectives on Soft Ticks (Argasidae) as Pests and Disease Vectors

#### Room W414 D (Convention Center)

**Moderator and Organizer:** Job Lopez, Baylor College of Medicine, Houston, TX

- 9:15 **2677** Adaptations for spirochete persistence and transmission by fast-feeding argasid ticks. **Tom Schwan** (tschwan@niaid.nih.gov), Rocky Mountain Laboratories, Hamilton, MT
- 9:45 **2678** *Ornithodoros brasiliensis* tick toxicosis in Brazil: Field and laboratory studies. **Jose Reck** (jose.reck@gmail.com), Finamor Institute of Veterinary Research, Eldorado do Sul, Brazil
- 10:00 **2679** Argasid systematics and the evolution of blood-feeding behavior: Perspectives from salivary gland transcriptomes. **Ben Mans** (mansb@arc.agric.za), Agricultural Research Council, Onderstepoort, South Africa
- 10:15 BREAK**
- 10:30 **2680** Understanding the innate immune system of ticks. **Ryan Rego** (ryanomregoc@gmail.com), Czech Academy of Sciences, České Budějovice, Czech Republic
- 10:45 **2681** Ecology of *Ornithodoros turicata*: Success in the cavity environment. **Pete Teel** (pete.teel@agnet.tamu.edu), Texas A&M Univ., College Station, TX
- 11:00 **Panel Discussion**



## Symposium: Excavation and Construction by Social Insects: Integrating Positive and Negative Space

Room W240 D (Convention Center)

**Moderator and Organizer:** Paul Bardunias, State Univ. of New York, Syracuse, NY

- 9:15 **2682** Stigmergic construction and topochemical information shape ant nest architecture. **Guy Theraulaz** (guy.theraulaz@univ-tlse3.fr)<sup>1</sup>, Anaïs Khuong<sup>2</sup>, Jacques Gautrais<sup>2</sup>, Andréa Perna<sup>3</sup>, Pascale Kuntz<sup>4</sup>, and Christian Jost<sup>2</sup>, <sup>1</sup>National Center for Scientific Research, Toulouse, France, <sup>2</sup>Paul Sabatier Univ., Toulouse, France, <sup>3</sup>Paris Diderot Univ., Paris, France, <sup>4</sup>Univ. of Nantes, Nantes, France
- 9:30 **2683** The process of nest expansion in Macrotermitinae. **Paul Bardunias** (paulmb@ufl.edu) and Scott Turner, State Univ. of New York, Syracuse, NY
- 9:45 **2684** Sequential caching of sand and seeds in subterranean nests of the Florida harvester ant. **Christina Kwapich** (ckwapich@bio.fsu.edu)<sup>1</sup> and Walter R. Tschinkel<sup>2</sup>, <sup>1</sup>Arizona State Univ., Tempe, AZ, <sup>2</sup>Florida State Univ., Tallahassee, FL
- 10:00 **2685** Absence of robust regulation of drone comb construction by the honey bee, *Apis mellifera*. **Stephen Pratt** (stephen.pratt@asu.edu), Jonathan Jackson, and M. Barnes, Arizona State Univ., Tempe, AZ
- 10:15 BREAK**
- 10:30 **2686** The unified model: Agent-based modelling excavation and construction. **Pallavi Sharma** (pallavi-sharma@hotmail.com)<sup>1</sup>, Paul Bardunias<sup>2</sup>, and Rupert Soar<sup>1</sup>, <sup>1</sup>Nottingham Trent Univ., Nottingham, United Kingdom, <sup>2</sup>State Univ. of New York, Syracuse, NY
- 10:45 **2687** Form and function in ant nests. **Walter R. Tschinkel** (tschinkel@bio.fsu.edu), Florida State Univ., Tallahassee, FL
- 11:00 **2688** Data-driven modeling of construction behavior in mound-building termites. **Justin Werfel** (justin.werfel@wyss.harvard.edu)<sup>1</sup>, Paul Bardunias<sup>2</sup>, Benjamin Green<sup>1</sup>, Scott Turner<sup>2</sup>, and Radhika Nagpal<sup>1</sup>, <sup>1</sup>Harvard Univ., Cambridge, MA, <sup>2</sup>State Univ. of New York, Syracuse, NY
- 11:15 **2689** An individual-based model for termite tunnel patterns. **Sang-Hee Lee** (sunchaos@nims.re.kr), National Institute for Mathematical Sciences, Daejeon, South Korea
- 11:30 **2690** Living architectures in New World army ants. **Simon Garnier** (garnier@njit.edu)<sup>1</sup>, Chris Reid<sup>2</sup>, Mathew Lutz<sup>3</sup>, Scott Powell<sup>4</sup>, Albert Kao<sup>5</sup>, and Ian Couzin<sup>3</sup>, <sup>1</sup>New Jersey Institute of Technology, Newark, NJ, <sup>2</sup>The Univ. of Sydney, Sydney, Australia, <sup>3</sup>Princeton Univ., Princeton, NJ, <sup>4</sup>The George Washington Univ., Washington, DC, <sup>5</sup>Harvard Univ., Cambridge, MA
- 11:45 **2691** External drivers of termite nest construction. **Rupert Soar** (rupert.soar@ntu.ac.uk)<sup>1</sup>, Pallavi Sharma<sup>1</sup>, Paul Bardunias<sup>2</sup>, and Scott Turner<sup>2</sup>, <sup>1</sup>Nottingham Trent Univ., Nottingham, United Kingdom, <sup>2</sup>State Univ. of New York, Syracuse, NY

- 12:00 **2692** Social facilitation of excavation in fire ants. **Daniel Goldman** (daniel.goldman@physics.gatech.edu)<sup>1</sup>, Daria Monaenkova<sup>2</sup>, Bhabesh Dutta<sup>3</sup>, Michael A. D. Goodisman<sup>1</sup>, Jungsoo Park<sup>1</sup>, and Vadim Linevitch<sup>4</sup>, <sup>1</sup>Georgia Institute of Technology, Atlanta, GA, <sup>2</sup>Clemson Univ., Clemson, SC, <sup>3</sup>Univ. of Georgia, Tifton, GA, <sup>4</sup>John Bean Technologies Corporation, Chalfont, PA
- 12:15 **2693** Insect-built structures and swarm cognition. **Scott Turner** (jsturner@syr.edu), State Univ. of New York, Syracuse, NY

## Symposium: Beyond Pests: Biodiversity in the Urban Environment

Room W230 D (Convention Center)

**Moderators and Organizers:** Emily Hartop and Brian V. Brown, Natural History Museum, Los Angeles, CA

- 9:15 **Introductory Remarks**
- 9:30 **2694** Science, education, and on-the-ground conservation to protect native bees. **Gordon W. Frankie** (gwfrankie@berkeley.edu)<sup>1</sup>, Sara Leon Guerrero<sup>1</sup>, Jaime Pawelek<sup>1</sup>, Mary Schindler<sup>1</sup>, Rollin Coville<sup>1</sup>, and Robbin W. Thorp<sup>2</sup>, <sup>1</sup>Univ. of California, Berkeley, CA, <sup>2</sup>Univ. of California, Davis, CA
- 9:45 **2695** Small flies in big cities: A taxonomic perspective on Chloropidae (Diptera) diversity in North American urban spaces. **Terry Wheeler** (terry.wheeler@mcgill.ca), McGill Univ., Sainte-Anne-de-Bellevue, QC, Canada
- 10:00 **2696** Tracking DNA footprints in home dust: Continental-scale arthropod diversity of our homes. **Anne A. Madden** (madden.anne@gmail.com)<sup>1,2</sup>, Rob R. Dunn<sup>2</sup>, and Noah Fierer<sup>1</sup>, <sup>1</sup>Univ. of Colorado, Boulder, CO, <sup>2</sup>North Carolina State Univ., Raleigh, NC
- 10:15 BREAK**
- 10:30 **2697** NGS barcodes provide species-level resolution for non-biting midges (Diptera: Chironomidae) and reveal near-complete species turnover between urban and natural aquatic habitats. **Bilgenur Baloglu** (bilgenur.baloglu@u.nus.edu), Esther Clews, and Rudolf Meier, National Univ. of Singapore, Singapore, Singapore
- 10:45 **2698** The Swedish Malaise Trap Project (SMTP): A contribution to the taxonomic renaissance. **Dave Karlsson** (dave.karlsson@stationlinne.se), Station Linné, Öland, Sweden
- 11:00 **2699** The BioSCAN Project: Seizing opportunities in urban biodiversity research. **Emily A. Hartop** (ehartop@nhm.org), Natural History Museum, Los Angeles, CA
- 11:15 **2700** What can I do for urban insect biodiversity? Applying lessons from ecological research. **Alvin J. Helden** (alvin.helden@anglia.ac.uk), Anglia Ruskin Univ., Cambridge, United Kingdom
- 11:30 **2701** Presentation withdrawn
- 11:45 **2702** Arthropods of our homes. **Misha Leong** (mleong@calacademy.org)<sup>1</sup>, Matthew Bertone<sup>2</sup>, Keith Bayless<sup>2</sup>, Rob R. Dunn<sup>2</sup>, and Michelle Trautwein<sup>1</sup>, <sup>1</sup>California Academy of Sciences, San Francisco, CA, <sup>2</sup>North Carolina State Univ., Raleigh, NC



- 12:00 **2703** Discovery of high insect diversity in the mangrove and swamp forest remnants of urban Singapore facilitated by NGS barcodes. **Darren Yeo** (darrn.yeo@gmail.com)<sup>1</sup>, Amrita Srivathsan<sup>1</sup>, Wendy Wang<sup>1</sup>, Jayanthi Puniamoorthy<sup>2</sup>, Maosheng Foo<sup>3</sup>, Patrick Grootaert<sup>4</sup>, Lena Chan<sup>5</sup>, Hui Ping Ang<sup>5</sup>, and Rudolf Meier<sup>1</sup>, <sup>1</sup>National Univ. of Singapore, Singapore, Singapore, <sup>2</sup>California Academy of Sciences, San Francisco, CA, <sup>3</sup>Lee Kong Chian Natural History Museum, Singapore, Singapore, <sup>4</sup>Royal Belgian Institute of Natural Sciences, Brussels, Belgium, <sup>5</sup>National Parks Board, Singapore, Singapore
- 12:15 **2704** Dynamics of epigaeic arthropod assemblages from extensive green roofs in Edmonton Canada. **Colin Bergeron** (cb1@ualberta.ca), Jaime Pinzon, and John Spence, Univ. of Alberta, Edmonton, AB, Canada

### Symposium: Phylogeny and Evolution of Insect Communication Systems

#### Room W315 B (Convention Center)

**Moderators and Organizers:** Jennifer Zaspel<sup>1</sup>, Rebecca B. Simmons<sup>2</sup>, and Susan J. Weller<sup>3</sup>, <sup>1</sup>Purdue Univ., West Lafayette, IN, <sup>2</sup>Univ. of North Dakota, Grand Forks, ND, <sup>3</sup>Univ. of Nebraska State Museum, Lincoln, NE

- 9:15 **2705** Plant-insect communication for offense and defense. Sergio Rasmann<sup>1</sup> and **Alan Kergunteuil** (alan.kergunteuil@unine.ch)<sup>2</sup>, <sup>1</sup>Univ. of Lausanne, Lausanne, Switzerland, <sup>2</sup>Univ. of Neuchâtel, Neuchâtel, Switzerland
- 9:30 **2706** Phylogeny and evolution of communication: Danaine butterflies vs. arctiine moths. **Michael Boppre** (boppre@fzi.uni-freiburg.de), Albert Ludwigs Univ., Freiburg, Germany
- 9:45 **2707** Repeated evolution of insect adaptations to toxic pyrrolizidine alkaloids of plants. Dietrich Ober, Franziska Heidemann, and **Miriam Gutt** (miriam.gutt@googlemail.com), Kiel Univ., Kiel, Germany
- 10:00 **2708** Chemical dependency and toxic relationships in tiger moths (Lepidoptera: Erebidae). **Jennifer Zaspel** (jzaspel@purdue.edu)<sup>1</sup>, Susan J. Weller<sup>2</sup>, Alan Lemmon<sup>3</sup>, Emily Lemmon<sup>3</sup>, Clare Scott<sup>4</sup>, and Rebecca B. Simmons<sup>5</sup>, <sup>1</sup>Purdue Univ., West Lafayette, IN, <sup>2</sup>Univ. of Nebraska, Lincoln, NE, <sup>3</sup>Florida State Univ., Tallahassee, FL, <sup>4</sup>Univ. of Alabama, Tuscaloosa, AL, <sup>5</sup>Univ. of North Dakota, Grand Forks, ND
- 10:15 **BREAK**
- 10:30 **2709** Different strokes for different folks?: Can we distinguish sonar-jamming and acoustic aposematism in tiger moths (Lepidoptera: Erebidae: Arctiinae)? **Nick Dowdy** (njdowdy@gmail.com) and William E. Conner, Wake Forest Univ., Winston-Salem, NC
- 10:45 **2710** A case study in Arctiinae: Co-opting defense signals for courtship. **Susan J. Weller** (welle008@umn.edu)<sup>1</sup>, Jennifer Zaspel<sup>2</sup>, Rebecca B. Simmons<sup>3</sup>, Clare Scott<sup>4</sup>, Taylor Ward<sup>5</sup>, and Heather Hendrickson<sup>5</sup>, <sup>1</sup>Univ. of Minnesota, Minneapolis, MN, <sup>2</sup>Purdue Univ., West Lafayette, IN, <sup>3</sup>Univ. of North Dakota, Grand Forks, ND, <sup>4</sup>Univ. of Alabama, Tuscaloosa, AL, <sup>5</sup>Univ. of Minnesota, St. Paul, MN

- 11:00 **2711** Evolution and selection on wing pattern elements in tiger moths. **Rebecca B. Simmons** (rebecca.simmons@email.und.edu)<sup>1</sup>, Jennifer Zaspel<sup>2</sup>, Susan J. Weller<sup>3</sup>, and Diane Darland<sup>1</sup>, <sup>1</sup>Univ. of North Dakota, Grand Forks, ND, <sup>2</sup>Purdue Univ., West Lafayette, IN, <sup>3</sup>Univ. of Nebraska, Lincoln, NE
- 11:15 **2712** The evolution of chemical mate signaling in orchid bees. **Santiago Ramirez** (sanram@ucdavis.edu)<sup>1</sup>, Philip Brand<sup>1</sup>, and Thomas Eltz<sup>2</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>Ruhr Univ., Bochum, Denmark
- 11:30 **2713** Acoustic communication in *Dendroctonus* and *Ips* bark beetles. **Kasey Maria Yturralde** (kasey.yturralde@dc.gov)<sup>1</sup> and Richard Hofstetter<sup>2</sup>, <sup>1</sup>Urban Forestry Administration, Washington, DC, <sup>2</sup>Northern Arizona Univ., Flagstaff, AZ
- 11:45 **2714** Bioluminescence in beetles and its role in communication. **Marc A. Branham** (marcbran@ufl.edu), Univ. of Florida, Gainesville, FL
- 12:00 **2715** Jewel beetle color visual systems: An investigation of visual protein and spectral diversity within a charismatic insect group. **Nathan Lord** (bothriderid@gmail.com), Camilla Sharkey, and Seth Bybee, Brigham Young Univ., Provo, UT
- 12:15 **2716** Evolution of mimicry and speciation in *Heliconius* butterflies. **James Mallet** (jmallet@oeb.harvard.edu), Harvard Univ., Cambridge, MA

### Symposium: Towards Improved Reference Assemblies for Insect Genomes

#### Room W224 E (Convention Center)

**Moderator and Organizer:** Igor Sharakhov, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

- 9:15 **2717** Improving arthropod assemblies: Lessons from the BCM-HGSC i5K pilot. **Shwetha Murali** (shwethacanchi.murali@bcm.edu), Daniel Hughes, Kim C. Worley, Richard Gibbs, and Stephen Richards, Baylor College of Medicine, Houston, TX
- 9:45 **2718** Single molecule sequencing-guided improvement of draft assemblies. **Scott J. Emrich** (semrich@nd.edu), Shenglong Zhu, and Danny Chen, Univ. of Notre Dame, South Bend, IN
- 10:00 **2719** Improving prospects for *de novo* reference assembly in polymorphic insects. **R. Rebecca Love** (Rachel.R.Love.33@nd.edu), Univ. of Notre Dame, South Bend, IN
- 10:15 **BREAK**
- 10:30 **2720** Super-scaffolding the fire ant genome and detection of chromosomal rearrangements. **Eckart Stolle** (e.stolle@qmul.ac.uk), Rodrigo Pracana, and Yannick Wurm, Queen Mary Univ. of London, London, United Kingdom
- 10:45 **2721** Canu: A new PacBio and Nanopore assembler for genomes large and small. **Adam Phillippy** (adam.phillippy@nih.gov), National Human Genome Research Institute, Bethesda, MD
- 11:15 **2722** Phylogenomics-inspired method for scaffold co-assembly in multiple genomes. Sergey Aganezov and **Max Alekseyev** (maxal@gwu.edu), The George Washington Univ., Ashburn, VA



- 11:30 **2723** Improving *Anopheles* genomes assemblies using sequencing data and synteny evolution. **Cedric Chauve** (cedric.chauve@sfu.ca)<sup>1</sup>, Yoann Anselmetti<sup>2,3</sup>, Severine Berard<sup>2</sup>, and Eric Tannier<sup>4</sup>, <sup>1</sup>Simon Fraser Univ., Burnaby, BC, Canada, <sup>2</sup>Institute of Evolutionary Sciences, Montpellier, France, <sup>3</sup>Claude Bernard Univ., Villeurbanne, France, <sup>4</sup>INRA, Villeurbanne, France
- 11:45 **2724** Advanced cytogenetic physical mapping for the development of chromosome-based genome assemblies. **Maria Sharakhova** (msharakh@vt.edu), Virginia Polytechnic Institute and State Univ., Blacksburg, VA

### Symposium: *Trichogramma* in Augmentative Biological Control: A Worldwide View of the Past, Present, and Future

#### Room W222 B (Convention Center)

**Moderators and Organizers:** Brad Vinson<sup>1</sup>, Asha Rao<sup>1</sup>, and Shoil Greenberg<sup>2</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>USDA (Retired), Carmel, IN

- 9:15 **2725** Physiological interaction between egg parasitoids and their hosts. **S. Bradleigh Vinson** (bvinson@tamu.edu) and Asha Rao, Texas A&M Univ., College Station, TX
- 9:45 **2726** Approaches for improving methods for quality control of *Trichogramma* rearing and application. **Shoil Greenberg** (shoilgreenberg@gmail.com), USDA (Retired), Carmel, IN
- 10:00 **2727** Production and utilization of trichogrammatids - Indian scenario. **Lalitha Yadavalli** (ylalitha3112@yahoo.co.in), National Bureau of Agricultural Insects Resources, Bangalore, India
- SD2728** Methods and technical facilities for *Trichogramma* releases (experience of countries from former USSR). **B. Chicu** (boris49@inbox.ru), Academy of Sciences of Moldova, Moldova, Moldova
- SD2729** Mechanization of propagation of *Trichogramma* spp. on factitious host. **V. Gorban** (vgorban.alimeco@yahoo.com), Academy of Sciences of Moldova, Moldova, Moldova
- SD2730** Genetic improvement and field evaluation of *Trichogramma chilonis* in India. **Sushil Jalali** (jalalisk@gmail.com), National Bureau of Agricultural Insect Resources, Bangalore, India
- 10:15 BREAK AND POSTER SESSION**
- 10:30 **2731** Reproductive ecology of *Trichogramma*. **Veronique Martel** (veronique.martel@canada.ca), Univ. of New Brunswick, Fredericton, NB, Canada
- 10:45 **2732** The role of replaceable and density-dependent mortality in assessing augmentative releases of *Trichogramma* in U.S. cotton. **Charles P. C. Suh** (charles.suh@ars.usda.gov), USDA - ARS, College Station, TX
- 11:00 **2733** Quality control of mass rearing of *Trichogramma* on artificial media. **Lu Xin** (greenhopelv@163.com), Guangdong Entomological Institute, Guangzhou, China

### Symposium: Virus-Insect Interactions

#### West Hall F1 (WF1) (Convention Center)

**Moderators and Organizers:** Bryony Bonning<sup>1</sup>, Lyric Bartholomay<sup>2</sup>, and Carla Saleh<sup>3</sup>, <sup>1</sup>Iowa State Univ., Ames, IA, <sup>2</sup>Univ. of Wisconsin, Madison, WI, <sup>3</sup>Pasteur Institute, Paris, France

- 9:15 **2734** Using *Drosophila* genetics to define factors involved in antiviral immunity to human arboviruses. **Sara Cherry** (cherrys@med.upenn.edu), Univ. of Pennsylvania, Philadelphia, PA
- 9:45 **2735** Characterization of virus-lepidopteran host interactions using a *Lymantria dispar* model system. **Don Gammon** (don.gammon@umassmed.edu)<sup>1</sup> and Craig Mello<sup>2</sup>, <sup>1</sup>Univ. of Massachusetts Medical School, Worcester, MA, <sup>2</sup>Univ. of Massachusetts, Worcester, MA
- 10:00 **2736** Systemic spread of antiviral RNAi immunity in insects through extracellular vesicles containing viral RNAs. Carla Saleh and **Yasutsugu Suzuki** (yasutsugu.suzuki@pasteur.fr), Pasteur Institute, Paris, France
- 10:15 BREAK**
- 10:30 **2737** Novel viral and host factors determining arbovirus vector competence in mosquitoes. Gorben Pijlman and **Giel Göertz** (giel.goertz@wur.nl), Wageningen Univ. and Research Centre, Wageningen, Netherlands
- 10:45 **2738** How do arboviruses escape the mosquito midgut? Analysis of a novel mechanism. **Alexander Franz** (franza@missouri.edu), Univ. of Missouri, Columbia, MO
- 11:00 **2739** Pathogen-host interactions between deformed wing virus (DWV) and the honey bee (*Apis mellifera*). **Sebastian Gisder** (sebastian.gisder@hu-berlin.de) and Elke Genersch, Institute for Bee Research, Hohen Neuendorf, Germany
- 11:15 **2740** Cathepsin B localization and activity modulates *Poleovirus* transmission efficiency by *Myzus persicae*. **Michelle Cilia** (mlc68@cornell.edu)<sup>1</sup>, Patricia Pinheiro<sup>2</sup>, and Murad Ghanim<sup>3</sup>, <sup>1</sup>USDA - ARS, Ithaca, NY, <sup>2</sup>Cornell Univ., Ithaca, NY, <sup>3</sup>Agricultural Research Organisation, Bet-Dagan, Israel
- 11:30 **2741** Dissecting the molecular interplay between tospoviruses and their thrips vectors. **Anna Whitfield** (aewtospo@ksu.edu)<sup>1</sup>, Ismael Badillo-Vargas<sup>2</sup>, Catherine Stewart<sup>1</sup>, and Dorith Rotenberg<sup>1</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>Univ. of Florida, Quincy, FL
- 11:45 **2742** Deep sequencing data reveal viral sequences integrated into insect genomes. **Sijun Liu** (sliu@iastate.edu)<sup>1</sup>, Yuting Chen<sup>1</sup>, Thomas Sappington<sup>2</sup>, and Bryony Bonning<sup>1</sup>, <sup>1</sup>Iowa State Univ., Ames, IA, <sup>2</sup>USDA - ARS, Ames, IA
- 12:00 **2743** Defense and counter-defense in antiviral RNA silencing pathways of insects. **Ronald Van Rij** (ronald.vanrij@radboudumc.nl), Radboud Univ. Nijmegen Medical Centre, Nijmegen, Netherlands



**Symposium: Population Biology of Winter Moth, *Operophtera brumata* L., and Related Geometrids on Two Continents**

**Room W331 C (Convention Center)**

**Moderator and Organizer:** Joseph Elkinton, Univ. of Massachusetts, Amherst, MA

- 9:15 **2744** Population genetics of winter moth: Identifying the origin of invasive populations of winter moth in North America. **Jeremy C. Andersen** (jandersen@berkeley.edu)<sup>1</sup>, Nathan Havill<sup>2</sup>, Joseph Elkinton<sup>3</sup>, Snorre Hagan<sup>4</sup>, and Adalgisa Caccone<sup>5</sup>, <sup>1</sup>Univ. of California, Berkeley, CA, <sup>2</sup>USDA - Forest Service, Hamden, CT, <sup>3</sup>Univ. of Massachusetts, Amherst, MA, <sup>4</sup>Norwegian Institute for Agricultural and Environmental Research, Svanvik, Norway, <sup>5</sup>Yale Univ., New Haven, CT
- 9:30 **2745** Population genetics of winter moth: Hybridization between non-native winter moth and native Bruce spanworm. **Nathan Havill** (nphavill@fs.fed.us)<sup>1</sup>, Jeremy C. Andersen<sup>2</sup>, Joseph Elkinton<sup>3</sup>, and Adalgisa Caccone<sup>4</sup>, <sup>1</sup>USDA - Forest Service, Hamden, CT, <sup>2</sup>Univ. of California, Berkeley, CA, <sup>3</sup>Univ. of Massachusetts, Amherst, MA, <sup>4</sup>Yale Univ., New Haven, CT
- 9:45 **2746** Evolutionary ecology of an invasive geometrid. **Tea Ammunét** (tea.ammunet@slu.se) and Helena Bylund, Swedish Univ. of Agricultural Sciences, Uppsala, Sweden
- 10:00 **2747** Adapting to a warming world: Winter moth (*Operophtera brumata*) plastic and genetic responses in seasonal timing to increased temperatures. **Lucia Salis** (l.salis@nioo.knaw.nl) and Marcel Visser, Netherlands Institute of Ecology, Wageningen, Netherlands
- 10:15 BREAK**
- 10:30 **2748** Meso-scale geometrid guild dynamics in a geographically complex sub-arctic birch forest ecosystem. **Ole-Petter Vindstad** (ole.p.vindstad@uit.no)<sup>1</sup>, Jane Jepsen<sup>2</sup>, Malin Ek<sup>1</sup>, and Rolf Ims<sup>1</sup>, <sup>1</sup>The Arctic Univ. of Norway, Tromsø, Norway, <sup>2</sup>Norwegian Institute for Nature Research, Tromsø, Norway
- 10:45 **2749** Outbreak range expansions in geometrid moths as drivers of ecosystem state changes in sub-arctic birch forests. **Jane Jepsen** (jane.jepsen@nina.no)<sup>1</sup>, Ole-Petter Vindstad<sup>2</sup>, Malin Ek<sup>2</sup>, and Rolf Ims<sup>2</sup>, <sup>1</sup>Norwegian Institute for Nature Research, Tromsø, Norway, <sup>2</sup>The Arctic Univ. of Norway, Tromsø, Norway
- 11:00 **2750** Density-dependent and density-independent effects of predators and parasitoids on cyclic population dynamics of the autumnal moth. **Tero Klemola** (tero.klemola@utu.fi), Kai Ruohomaki, and Tommi Andersson, Univ. of Turku, Turku, Finland
- 11:15 **2751** Virus occurrence in two coexisting geometrid species. **Helena Bylund** (helena.bylund@slu.se) and Tea Ammunét, Swedish Univ. of Agricultural Sciences, Uppsala, Sweden
- 11:30 **2752** Did introduced parasitoids really control the winter moth in British Columbia?: A 35-year retrospective. **Jens Roland** (jroland@ualberta.ca), Univ. of Alberta, Edmonton, AB, Canada

- 11:45 **2753** Why are Bruce spanworm, *Operophtera bruceata*, outbreaks in North America so infrequent and short-lived? **Hannah Broadley** (hbroadley@cns.umass.edu), Joseph Elkinton, and John Burand, Univ. of Massachusetts, Amherst, MA
- 12:00 **2754** Role of dispersal in regulating densities of outbreak populations of winter moth in North America. **Adam Pepi** (apepi@umass.edu), Hannah Broadley, and Joseph Elkinton, Univ. of Massachusetts, Amherst, MA
- 12:15 **2755** Population dynamics and biological control of outbreak populations of winter moth in the north-eastern United States. **Joseph Elkinton** (elkinton@ent.umass.edu) and George Boettner, Univ. of Massachusetts, Amherst, MA

**Symposium: Stable Isotope 'Fingerprinting' in Insect Ecology**

**Room W231 B (Convention Center)**

**Moderators and Organizers:** Shawn Steffan<sup>1,2</sup> and Yoshito Chikaraishi<sup>3</sup>, <sup>1</sup>USDA - ARS, Madison, WI, <sup>2</sup>Univ. of Wisconsin, Madison, WI, <sup>3</sup>Japan Agency for Marine-Earth Science & Technology, Yokosuka, Japan

- 9:15 **2756** CSIA fingerprinting for the assessment of trophic position and habitat use in insects. **Yoshito Chikaraishi** (ychikaraishi@jamstec.go.jp), Japan Agency for Marine-Earth Science & Technology, Yokosuka, Japan
- 9:45 **2757** Microbes are trophic analogues of arthropods, mammals, and fish: Isotopic fingerprinting unites 'green' and 'brown' food webs. **Shawn Steffan** (steffan@entomology.wisc.edu)<sup>1,2</sup>, Yoshito Chikaraishi<sup>3</sup>, Prarthana Dharampal<sup>1</sup>, Cameron Currie<sup>1</sup>, Heidi Horn<sup>1</sup>, and Jonathan Pauli<sup>1</sup>, <sup>1</sup>Univ. of Wisconsin, Madison, WI, <sup>2</sup>USDA - ARS, Madison, WI, <sup>3</sup>Japan Agency for Marine-Earth Science & Technology, Yokosuka, Japan
- 10:15 BREAK**
- 10:30 **2758** Evidence of microbial provisioning of essential amino acids in an endotherm: Combining compound-specific stable isotope analysis with NexGen sequencing. **Seth Newsome** (newsome@unm.edu)<sup>1</sup> and Marilyn Fogel<sup>2</sup>, <sup>1</sup>Univ. of New Mexico, Albuquerque, NM, <sup>2</sup>Univ. of California, Merced, CA
- 10:45 **2759** Intra-trophic isotopic discrimination of <sup>15</sup>N/<sup>14</sup>N associated with the catabolism of amino acids in plants. **Yuko Takizawa** (takizawa@jamstec.go.jp)<sup>1</sup> and Yoshito Chikaraishi<sup>2</sup>, <sup>1</sup>Hokkaido Univ., Sapporo, Japan, <sup>2</sup>Japan Agency for Marine-Earth Science & Technology, Yokosuka, Japan
- 11:00 **2760** Temporal and population-level variation in amino acid δ<sup>15</sup>N values: Implications for entomology. **Peggy Ostrom** (ostrom@msu.edu)<sup>1</sup> and Yoshito Chikaraishi<sup>2</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>Japan Agency for Marine-Earth Science & Technology, Yokosuka, Japan
- 11:15 **2761** Compound-specific stable isotope analysis of phenotypic body morphs of bluegills (*Lepomis macrochirus*) from the unregulated Sipsey River system. **Prarthana Dharampal** (prarthana.1120@gmail.com)<sup>1</sup> and Robert Findlay<sup>2</sup>, <sup>1</sup>Univ. of Wisconsin, Madison, WI, <sup>2</sup>Univ. of Alabama, Tuscaloosa, AL



- 11:30 **2762** Using CSIA to identify unexpected hosts for spotted wing drosophila, *Drosophila suzukii*. **Christelle Guédot** (guedot@wisc.edu)<sup>1</sup>, Emma Pelton<sup>1</sup>, Yoshito Chikaraishi<sup>2</sup>, and Shawn Steffan<sup>3</sup>, <sup>1</sup>Univ. of Wisconsin, Madison, WI, <sup>2</sup>Japan Agency for Marine-Earth Science & Technology, Yokosuka, Japan, <sup>3</sup>USDA - ARS, Madison, WI
- 11:45 **2763** Isotopic fractionation associated with *in vitro* enzymatic deamination of glutamic acid. **Akiko Goto** (akigoto@staff.kanazawa-u.ac.jp)<sup>1,2</sup>, Kasumi Miura<sup>2</sup>, Takashi Korenaga<sup>2,3</sup>, Takashi Hasegawa<sup>1</sup>, Naohiko Ohkouchi<sup>4</sup>, and Yoshito Chikaraishi<sup>4</sup>, <sup>1</sup>Kanazawa Univ., Kanazawa, Japan, <sup>2</sup>Tokyo Metropolitan Univ., Hachioji, Japan, <sup>3</sup>Chiba Institute of Science, Chiba, Japan, <sup>4</sup>Japan Agency for Marine-Earth Science & Technology, Yokosuka, Japan

### Symposium: Case Studies in Entomology: Four Examples of Global Excellence

#### Room W222 A (Convention Center)

**Moderators and Organizers:** Margaret Hardy and Myron Zalucki, Univ. of Queensland, Brisbane, Australia

- 9:15 **2764** The role of the ESA International Branch in fostering collaboration. **Myron Zalucki** (m.zalucki@uq.edu.au) and Margaret Hardy, Univ. of Queensland, Brisbane, Australia
- 9:30 **2765** Presentation withdrawn
- 9:45 **2766** Opportunities for sharing entomology expertise internationally through United States federal agency programs. **Kaitlin Stack Whitney** (whitney3@wisc.edu), Univ. of Wisconsin, Madison, WI
- 10:00 **2767** Integrating project results across time and space: The contribution of ACIAR to entomological research in the Asia-Pacific region. **Richard Markham** (richard.markham@aciara.gov.au), Australian Centre for International Agricultural Research, Bruce, Australia

#### 10:15 BREAK

- 10:30 **2768** Experiences in collaborations across regional and disciplinary borders in rice pest management. **Kong Luen Heong** (klheong@yahoo.com)<sup>1</sup>, Zeng-Rong Zhu<sup>1</sup>, Josef Settele<sup>2</sup>, Geoffrey Gurr<sup>3</sup>, Jiaan Cheng<sup>1</sup>, Monina Escalada<sup>4</sup>, and Geoff Norton<sup>5</sup>, <sup>1</sup>Zhejiang Univ., Hangzhou, China, <sup>2</sup>Helmholtz Centre for Environmental Research, Leipzig, Germany, <sup>3</sup>Charles Sturt Univ., Orange, Australia, <sup>4</sup>Visayas State Univ., Baybay City, Philippines, <sup>5</sup>Univ. of Queensland, Brisbane, Australia
- 10:45 **Panel Discussion**

### Symposium: Entomology without Borders: Senior Member Symposium with Retired and Emeriti Professionals on Sharing their Involvement after Retirement

#### Room W231 C (Convention Center)

**Moderators and Organizers:** Kenneth A. Sorensen<sup>1</sup> and Ken Pruess<sup>2</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>Univ. of Nebraska, Lincoln, NE

- 9:15 **2769** Life cycle of an emeritus entomologist and ESA senior-student networks and mentoring. **Kenneth A. Sorensen** (kenneth\_sorensen@ncsu.edu), North Carolina State Univ., Raleigh, NC
- 9:30 **2770** Retirement: A time for hobbies. **Ken Pruess** (kpruess2@unl.edu), Univ. of Nebraska, Lincoln, NE
- 9:45 **2771** Sixty years in biocontrol. **Benjamin Puttler** (puttlerbe@Missouri.edu), Univ. of Missouri, Columbia, MO
- 10:00 **2772** Retirement as an extension of a professional career: Tales of a happy wanderer. **Elvis Heinrichs** (ehenrichs2@unl.edu), Univ. of Nebraska, Lincoln, NE
- 10:15 **BREAK**
- 10:30 **2773** Always one more bug: Activities in a second career of a dozen years at the McGuire Center for Lepidoptera and Diversity, Gainesville, FL. **Charles V. Covell** (ccovell@flmnh.ufl.edu), Florida Museum of Natural History, Gainesville, FL
- 10:45 **2774** Retirement and leadership with entrepreneurs. **John Foster** (jfoster1@unl.edu), Univ. of Nebraska, Lincoln, NE
- 11:00 **Open remarks and discussion by retired professional scientists**
- 11:15 **Open business session**

### Symposium: Sin Fronteras: Forging Collaborations through the Americas: 4th Latin American/Hispanic Symposium

#### Room W340 A (Convention Center)

**Moderators and Organizers:** Ana Legrand<sup>1</sup>, Steven Reyna<sup>2</sup>, Silvia Rondon<sup>3</sup>, and Raul Medina<sup>4</sup>, <sup>1</sup>Univ. of Connecticut, Storrs, CT, <sup>2</sup>North Carolina State Univ., Raleigh, NC, <sup>3</sup>Oregon State Univ., Hermiston, OR, <sup>4</sup>Texas A&M Univ., College Station, TX

*This symposium is generously sponsored by Oregon State University, Texas A&M University, University of Connecticut and OHP, Inc.*



- 9:15 **2775** Networks of ideas and people: Nothing is past, nothing is lost. **Ernesto Gianoli** (egianoli@gmail.com), Univ. of La Serena, La Serena, Chile
- 9:45 **2776** How to establish research collaborations in Latin America and the Caribbean: The case of greenhouse pest management. **Luis A. Cañas** (canas.4@osu.edu), The Ohio State Univ., Wooster, OH



- 10:00 **2777** Challenges and recommendations for new faculty in Latin America. **Diego Rincon** (drincon@corpoica.org.co), Colombian Agricultural Research Corporation, Mosquera, Colombia
- 10:15 **BREAK**
- 10:30 **2778** Periplo: From maize farmer to green revolutionary to foreign explorer to maize researcher. **Julio Bernal** (juliobernal@tamu.edu), Texas A&M Univ., College Station, TX
- 10:45 **2779** Twenty years after 'I just came to do a Masters' and other journeys in entomology. **Carlos Bogran** (cbogran@ohp.com), OHP, Inc., College Station, TX
- 11:00 **2780** Ecuador: A gold mine for pollinator explorations from the Amazon to the Galapagos! **Sujaya Rao** (sujaya@oregonstate.edu), Oregon State Univ., Corvallis, OR
- 11:15 **2781** Systematic and biodiversity studies of entomology in Guatemala. **Jack Schuster** (jschuste@uvg.edu.gt), Univ. of Valle de Guatemala, Guatemala, Guatemala
- 11:30 **2782** Aloha!! Importance of surveying invasive species for conservation purposes. **Leyla V. Kaufman** (leyla@hawaii.edu), Univ. of Hawai'i, Honolulu, HI
- 11:45 **2783** Plant health task force of Procinorte: A trinational effort against invasive species of North American agriculture. **Jose Lopez** (lopez.jose@inifap.gob.mx), INIFAP, Nuevo León, México
- 12:00 **2784** Collaborative efforts for controlling the tomato leafminer, *Tuta absoluta*, a native species of South America and a threat for the world. **Patricia Pereyra** (ppereyra@cepave.edu.ar), National Univ. of La Plata, Buenos Aires, Argentina

### Symposium: Economics of IPM in the 21st Century: Multiple Perspectives from Around the World

#### Room W331 A (Convention Center)

**Moderators and Organizers:** David Onstad and Philip Crain, DuPont, Wilmington, DE

- 9:15 **2785** Finding the economics in economic entomology: The last 8 years. Philip Crain, David Onstad, and **Zaiqi Pan** (zaiqi.pan@cgr.dupont.com), DuPont, Wilmington, DE
- 9:30 **2786** Economic value of arthropod biological control in IPM. **Steven Naranjo** (steve.naranjo@ars.usda.gov)<sup>1</sup>, Peter Ellsworth<sup>2</sup>, and George Frisvold<sup>3</sup>, <sup>1</sup>USDA - ARS, Maricopa, AZ, <sup>2</sup>Univ. of Arizona, Maricopa, AZ, <sup>3</sup>Univ. of Arizona, Tucson, AZ
- 10:00 **2787** Economic impact of classical biological control of papaya mealybug in India. **Rangaswamy R. Muniappan** (rmuni@vt.edu) and George Norton, Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 10:15 **BREAK**
- 10:30 **2788** Risk-based IPM for soybean aphid using neonicotinoid seed treatments and foliar insecticides. **Paul D. Mitchell** (pdmitchell@wisc.edu) and Nicola Carey, Univ. of Wisconsin, Madison, WI

- 10:45 **2789** Assessment of a more conservative stink bug economic threshold for managing stink bugs in Brazilian soybean production. **Adeney Bueno** (adeney.bueno@embrapa.br), Embrapa, Londrina, Brazil
- 11:00 **2790** Economic evaluation of integrated pest management program to control the Asian tiger mosquito in New Jersey. **Yara Halasa** (yara@brandeis.edu) and Don Shepard, Brandeis Univ., Waltham, MA
- 11:15 **2791** Have IPM farmer field schools (FFS) worked in the Philippines? An economist's perspective. **Roderick Rejesus** (rod.rejesus@gmail.com), North Carolina State Univ., Raleigh, NC
- 11:30 **2792** Chronicling successful integration of technology and knowledge over 25 years of IPM in Arizona. **Peter Ellsworth** (peterell@ag.arizona.edu)<sup>1</sup>, Al Fournier<sup>1</sup>, John Palumbo<sup>2</sup>, Steven Naranjo<sup>3</sup>, and George Frisvold<sup>4</sup>, <sup>1</sup>Univ. of Arizona, Maricopa, AZ, <sup>2</sup>Univ. of Arizona, Yuma, AZ, <sup>3</sup>USDA - ARS, Maricopa, AZ, <sup>4</sup>Univ. of Arizona, Tucson, AZ
- 11:45 **2793** Economics of western corn rootworm management. **Philip Crain** (philip.crain@gmail.com)<sup>1</sup>, Zaiqi Pan<sup>1</sup>, David Onstad<sup>1</sup>, and J. Lindsey Flexner<sup>2</sup>, <sup>1</sup>DuPont, Wilmington, DE, <sup>2</sup>DuPont Pioneer, Johnston, IA

### Symposium: Talking to Swarms Without Borders: Methods for Engaging the Public in the Buzz about Entomology

#### Room W330 B (Convention Center)

**Moderators and Organizers:** William R. Morrison<sup>1</sup> and Nicole F. Quinn<sup>2</sup>, <sup>1</sup>USDA - ARS, Kearneysville, WV, <sup>2</sup>Michigan State Univ., East Lansing, MI

- 9:15 **2794** Outreach in science: Where we're at, and why we need to engage the public in the buzz about entomology. **Nicole F. Quinn** (quinnni2@msu.edu)<sup>1</sup>, William R. Morrison<sup>2</sup>, Torri Hancock<sup>2</sup>, and Tracy C. Leskey<sup>2</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>USDA - ARS, Kearneysville, WV
- 9:30 **2795** Fluent in "Bug": The magical language that inspires learning. **Kristie Reddick** (contactus@thebug-chicks.com) and Jessica Honaker, The Bug Chicks, Portland, OR
- 9:45 **2796** MSU Bug House: Ages 3 to 93, entomology for a diverse audience. **Bernice DeMarco** (demarc10@msu.edu) and Gary Parsons, Michigan State Univ., East Lansing, MI
- 10:00 **2797** Integrating live insects as pets in elementary school classrooms. **Amanda R. Lorenz-Reaves** (lorenzam@msu.edu), Julie Libarkin, Nicole A. Fisher, and Gabriel Ording, Michigan State Univ., East Lansing, MI
- 10:15 **BREAK**
- 10:30 **2798** Bringing Blattodea back to Breckinridge: 4-H insect program ignites interest in science among middle school students. **Alexandria N. Bryant** (alexandria.bryant@uky.edu)<sup>1</sup> and William R. Morrison<sup>2</sup>, <sup>1</sup>Univ. of Kentucky, Hardinsburg, KY, <sup>2</sup>USDA - ARS, Kearneysville, WV
- 10:45 **2799** Why people swarm to insect activities: The Purdue experience. **Tom Turpin** (turpin@purdue.edu), Purdue Univ., West Lafayette, IN





- 11:00 **2800** Team *Trissolcus*: A case study in effective public science outreach. **Matthew L. Buffington** (matt.buffington@ars.usda.gov), USDA - ARS, Washington, DC
- 11:15 **2801** From combat boots to sweep nets: Experience in outreach with America's veterans. **Adam Ingrao** (ingraoad@msu.edu), Michigan State Univ., East Lansing, MI
- 11:30 **2802** Acquiring accurate insect data via citizen science: The tale of four programs. **Mary M. Gardiner** (gardiner.29@osu.edu)<sup>1</sup>, Leslie Allee<sup>2</sup>, Peter Brown<sup>3</sup>, Brian M. Kleinke<sup>4</sup>, John Losey<sup>2</sup>, Chelsea A. Gordon<sup>4</sup>, Helen Roy<sup>5</sup>, and Rebecca R. Smyth<sup>2</sup>, <sup>1</sup>The Ohio State Univ., Wooster, OH, <sup>2</sup>Cornell Univ., Ithaca, NY, <sup>3</sup>Animal and Environmental Research Group, East Rd., United Kingdom, <sup>4</sup>The Ohio State Univ., Columbus, OH, <sup>5</sup>Natural Environment Research Council, Wallingford, United Kingdom

### Symposium: Epigenetics and Insect Adaptation to Their Environment

#### West Hall F3 (WF3) (Convention Center)

**Moderators and Organizers:** Denis Tagu<sup>1</sup> and Jennifer A. Brisson<sup>2</sup>, <sup>1</sup>INRA, Le Rheu, France, <sup>2</sup>Univ. of Rochester, Rochester, NY

- 9:15 **2803** Epigenetics as an answer to Darwin's "special difficulty": Natural selection of metastable epialleles in honey bee castes. **Douglas Ruden** (douglasr@wayne.edu), Wayne State Univ., Detroit, MI
- 9:45 **2804** Evolutionary and developmental variation in DNA methylation in Hymenoptera. **Brendan Hunt** (huntbg@uga.edu), Univ. of Georgia, Griffin, GA
- 10:00 **2805** Epigenetic cross-talk between malaria parasites and their mosquito vectors. **Elena Gómez-Díaz** (elena.gomez-diaz@emory.edu)<sup>1,2</sup>, Rakiswendé Yerbanga<sup>3</sup>, Thierry Lefèvre<sup>3,4</sup>, and Victor Corces<sup>1</sup>, <sup>1</sup>Emory Univ., Atlanta, GA, <sup>2</sup>Biological Station of Doñana, Seville, Spain, <sup>3</sup>Health Sciences Research Institute, Bobo-Dioulasso, Burkina Faso, <sup>4</sup>Univ. of Montpellier, Montpellier, France
- 10:15 BREAK**
- 10:30 **2806** Epigenetic regulation of aphid phenotypic plasticity of the reproductive mode. **Gautier Richard**<sup>1</sup>, **Fabrice Legeai**<sup>1,2</sup>, **Nathalie Leterme**<sup>1</sup>, **Sylvie Hudaverdian**<sup>1</sup>, **Sylvie Tanguy**<sup>1</sup>, **Denis Tagu**<sup>1</sup>, and **Gaël Le Trionnaire** (gael.lettrionnaire@rennes.inra.fr)<sup>1</sup>, <sup>1</sup>INRA, Le Rheu, France, <sup>2</sup>IRISA/INRIA, Rennes, France
- 10:45 **2807** Allele-specific transcriptome and methylome analysis reveals *cis*-regulation of DNA methylation and lack of genomic imprinting in *Nasonia*. **Xu Wang** (xw54@cornell.edu)<sup>1</sup>, John H. Werren<sup>2</sup>, and Andrew G. Clark<sup>1</sup>, <sup>1</sup>Cornell Univ., Ithaca, NY, <sup>2</sup>Univ. of Rochester, Rochester, NY
- 11:00 **2808** TALE and CRISPR based genome and epigenome editing: Finding function in the non-coding genome. **Eric Mendenhall** (eric.mendenhall@uah.edu), Candice Coppola, and Timley Watkins, Univ. of Alabama, Huntsville, AL

- 11:15 **2809** BIPAA/Askomics, a new and easy approach for querying genomics and epigenomics elements in interaction. **Fabrice Legeai** (fabrice.legeai@rennes.inra.fr)<sup>1,2</sup>, Charles Bettembourg<sup>2</sup>, Anthony Bretaudeau<sup>1,2</sup>, Yvanne Chaussin<sup>2</sup>, Olivier Dameron<sup>2</sup>, and Denis Tagu<sup>1</sup>, <sup>1</sup>INRA, Le Rheu, France, <sup>2</sup>IRISA/INRIA, Rennes, France
- 11:30 **2810** Regulatory properties of piRNA clusters from *Drosophila melanogaster*. **Cynthia Dennis**, **Emilie Brasset**, **Silke Jensen**, and **Chantal Vaury** (chantal.vaury@udamail.fr), Univ. of Clermont-Ferrand, Clermont-Ferrand, France
- 11:45 **2811** Epigenetic programming of caste-specific division of labor in the ant *Camponotus floridanus*. **Riley J. Graham** (riley.grhm@gmail.com)<sup>1</sup>, Daniel F. Simola<sup>1</sup>, Cristina M. Brady<sup>1</sup>, Brittany L. Enzmann<sup>2</sup>, Claude Desplan<sup>3</sup>, Anandasankar Ray<sup>4</sup>, Laurence Zwiebel<sup>5</sup>, Roberto Bonasio<sup>1</sup>, Danny Reinberg<sup>3</sup>, Jürgen Liebig<sup>2</sup>, and Shelley Berger<sup>1</sup>, <sup>1</sup>Univ. of Pennsylvania, Philadelphia, PA, <sup>2</sup>Arizona State Univ., Tempe, AZ, <sup>3</sup>New York Univ., New York, NY, <sup>4</sup>Univ. of California, Riverside, CA, <sup>5</sup>Vanderbilt Univ., Nashville, TN

### Symposium: Bioinspiration Crossing Disciplinary Borders

#### Room W315 A (Convention Center)

**Moderators and Organizers:** Marianne Alleyne<sup>1</sup> and Catherine Loudon<sup>2</sup>, <sup>1</sup>Univ. of Illinois, Champaign, IL, <sup>2</sup>Univ. of California, Irvine, CA

- 9:15 **2812** Insect-inspired robots as tools for robot-inspired biology. **Robert Wood** (rjwood@seas.harvard.edu), Harvard Univ., Cambridge, MA
- 9:45 **2813** Cockroaches inspire exoskeletal shells and wings that help robots traverse obstacles and self-right. **Chen Li** (chen.li@jhu.edu)<sup>1</sup>, Ronald S. Fearing<sup>2</sup>, and Robert J. Full<sup>2</sup>, <sup>1</sup>Johns Hopkins Univ., Baltimore, MD, <sup>2</sup>Univ. of California, Berkeley, CA
- 10:00 **2814** Physical insecticides – bioinspiration from the action of bean leaves on bed bugs. **Catherine Loudon** (cloudon@uci.edu), Univ. of California, Irvine, CA
- 10:15 BREAK**
- 10:30 **2815** Linking protein-catechol-chitin interactions to the physical properties of beetle elytral cuticle, a multicomponent biomaterial. **M. Coleman Vaclaw**<sup>1</sup>, **Patricia A. Sprouse**<sup>1</sup>, **Neal Dittmer**<sup>2</sup>, **Michael Kanost**<sup>2</sup>, **Prajnaparamita Dhar**<sup>1</sup>, and **Stevin Gehrke** (shgehrke@ku.edu)<sup>1</sup>, <sup>1</sup>Univ. of Kansas, Lawrence, KS, <sup>2</sup>Kansas State Univ., Manhattan, KS
- 10:45 **2816** Antimicrobial and superhydrophobic properties of insect wings as inspiration for nanostructured engineered materials. **Marianne Alleyne** (vanlaarh@life.illinois.edu)<sup>1</sup>, **Nenad Miljkovic**<sup>1</sup>, **Junho Oh**<sup>1</sup>, **Nicole Leahy**<sup>1</sup>, and **Donald M. Cropek**<sup>2</sup>, <sup>1</sup>Univ. of Illinois, Champaign, IL, <sup>2</sup>U.S. Army Corps of Engineers, Champaign, IL
- 11:00 **2817** Insights from developmental studies into the evolution of spider silk glands and the engineering of artificial silk production. **Cheryl Hayashi** and **Crystal Chaw** (ro.chaw@ucr.edu), Univ. of California, Riverside, CA



- 11:15 **2818** The multi-linked mechanism of active ventilation in beetles: An inspiration for novel flow control. **Hodjat Pendar** (hpendar@vt.edu) and John Socha, Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 11:30 **2819** Nature inspired flow sensing: The long road from ecomechanics to microsensors. **Jérôme Casas** (jerome.casas@univ-tours.fr)<sup>1</sup> and Gijs Krijnen<sup>2</sup>, <sup>1</sup>Univ. of Tours, Tours, France, <sup>2</sup>Univ. of Twente, Enschede, Netherlands
- 11:45 **2820** Conception of an active amplification mechanism in infrared receptors of pyrophilous *Melanophila* beetles. **Helmut Schmitz** (h.schmitz@uni-bonn.de), Univ. of Bonn, Bonn, Germany
- 12:00 **2821** Cognitive challenges of biologically inspired design. **Ashok Goel** (goel@cc.gatech.edu), Georgia Institute of Technology, Atlanta, GA
- 12:15 **2822** From social insects to smart, flexible, adaptive teams of robots: The biomechanics of group decision-making. **Theodore Pavlic** (tpavlic@asu.edu), Sara Walker, and Stephen Pratt, Arizona State Univ., Tempe, AZ
- 12:30 **2823** Collective behavior in ants and engineered networks. **Deborah M. Gordon** (dmgordon@stanford.edu), Stanford Univ., Stanford, CA

### Symposium: Olfaction and Olfaction-Mediated Behaviors

#### West Hall F4 (WF4) (Convention Center)

**Moderators and Organizers:** Bill Hansson<sup>1</sup> and Laurence Zwiebel<sup>2</sup>, <sup>1</sup>Max Planck Institute for Chemical Ecology, Jena, Germany, <sup>2</sup>Vanderbilt Univ., Nashville, TN

- 9:15 **2824** Ecological context of mosquito odorant receptor function. **Jonathan Bohbot** (jonathanbohbot@yahoo.com), The Hebrew Univ., Rehovot, Israel
- 9:30 **2825** Pheromone preference decoded. **Teun Dekker** (teun.dekker@slu.se)<sup>1</sup>, Fotini Koutroumpa<sup>2</sup>, Melanie Unbehend<sup>3</sup>, Zsolt Karpati<sup>4</sup>, Astrid Groot<sup>5</sup>, and David Heckel<sup>3</sup>, <sup>1</sup>Swedish Univ. of Agricultural Sciences, Alnarp, Sweden, <sup>2</sup>INRA, Versailles, France, <sup>3</sup>Max Planck Institute for Chemical Ecology, Jena, Germany, <sup>4</sup>Hungarian Academy of Sciences, Budapest, Hungary, <sup>5</sup>Univ. of Amsterdam, Amsterdam, Netherlands
- 9:45 **2826** Olfaction-mediated aggregation and sex in your kitchen. **Coby Schal** (coby@ncsu.edu), North Carolina State Univ., Raleigh, NC
- 10:00 **2827** Using natural odor variation to probe olfactory coding. **Brian Smith** (brianhsmith@asu.edu), Arizona State Univ., Tempe, AZ
- 10:15 **BREAK**
- 10:30 **2828** A new *Drosophila* pheromone and its neural substrate. **Bill Hansson** (hansson@ice.mpg.de), Max Planck Institute for Chemical Ecology, Jena, Germany
- 10:45 **2829** Olfaction-guided navigation of the desert ant *Cataglyphis*. **Markus Knaden** (mknaden@ice.mpg.de), Max Planck Institute for Chemical Ecology, Jena, Germany

- 11:00 **2830** Olfactory-mediated behavior and the neural basis of pollinator-plant interaction. **Jeff Riffell** (jriffell@u.washington.edu), Univ. of Washington, Seattle, WA

### Symposium: Endocrine and Neural Networks that Control and Regulate Behavioral Programs

#### Room W223 A (Convention Center)

**Moderators and Organizers:** Erik Johnson<sup>1</sup> and Young-Joon Kim<sup>2</sup>, <sup>1</sup>Wake Forest Univ., Winston-Salem, NC, <sup>2</sup>Gwangju Institute of Science and Technology, Gwangju, South Korea

- 9:15 **2831** Characterization of a neuroendocrine network that connects chemosensory signals to developmental timing and behavior in *Drosophila melanogaster*. Yuya Ohhara<sup>1</sup>, Mikkal Blick<sup>2</sup>, Michael O'Connor<sup>3</sup>, and **Naoki Yamanaka** (naoki.yamanaka@ucr.edu)<sup>2</sup>, <sup>1</sup>Univ. of Shizuoka, Shizuoka, Japan, <sup>2</sup>Univ. of California, Riverside, CA, <sup>3</sup>Univ. of Minnesota, Minneapolis, MN
- 9:30 **2832** Neuropeptide regulation of reproductive behaviors in *Bombyx mori*. **Dusan Zitnan** (dusan.zitnan@savba.sk), Ivana Daubnerova, Daniel Cizmar, Branislav Bednar, and Ladislav Roller, Slovak Academy of Sciences, Bratislava, Slovakia
- 9:45 **2833** Regulation of ecdysis by orcokinin neuropeptides in the kissing bug *Rhodnius prolixus*. **Sheila Ons** (sheila.ons@presi.unlp.edu.ar), National Univ. of La Plata, La Plata, Argentina
- 10:00 **2834** The circuit mechanism for courtship behavior in *Drosophila melanogaster*. **Daisuke Yamamoto** (daichan@m.tohoku.ac.jp), Tohoku Univ., Sendai, Japan
- 10:15 **BREAK**
- 10:30 **2835** Genetic dissection of neuropeptide-controlled behavior in *Drosophila*. **John Ewer** (john.ewer@uv.cl) and Wilson Mena, Univ. of Valparaiso, Valparaiso, Chile
- 10:45 **2836** Timing of eclosion behaviour in *Drosophila*. **Christian Wegener** (christian.wegener@biozentrum.uni-wuerzburg.de)<sup>1</sup>, Mareike Selcho<sup>1</sup>, Carola Millán<sup>2</sup>, Franziska Ruf<sup>1</sup>, Angelina Palacios<sup>2</sup>, Jiangtian Chen<sup>1</sup>, Lilian Ubillo<sup>2</sup>, Chihiro Ito<sup>3</sup>, and John Ewer<sup>2</sup>, <sup>1</sup>Univ. of Würzburg, Würzburg, Germany, <sup>2</sup>Univ. of Valparaiso, Valparaiso, Chile, <sup>3</sup>Okayama Univ., Okayama, Japan
- 11:00 **2837** Central pattern generators coordinate successful fertilization and egg-laying behavior in the female locust, *Locusta migratoria*. **Angela Lange** (angela.lange@utoronto.ca), Univ. of Toronto, Mississauga, ON, Canada
- 11:15 **2838** Modulations of diuretic hormone 44 pathway and sperm ejection timing in post-mated *Drosophila* females. **Young-Joon Kim** (kimyj@gist.ac.kr), Gwangju Institute of Science and Technology, Gwangju, South Korea
- 11:30 **2839** Multiple nutrient sensors in central neurons that regulate reproduction in *Drosophila*. **Erik Johnson** (johnsoec@wfu.edu), Wake Forest Univ., Winston-Salem, NC



**Symposium: Integrated Pest Management Around the World**

**Room W231 A (Convention Center)**

**Moderators and Organizers:** Sandipa G. Gautam<sup>1</sup>, Jhalendra Rijal<sup>2</sup>, and Sudan Gyawaly<sup>3</sup>, <sup>1</sup>Oklahoma State Univ., Stillwater, OK, <sup>2</sup>Univ. of California Cooperative Extension, Modesto, CA, <sup>3</sup>Society of Overseas Nepalese Entomologists, Blacksburg, VA

- 9:15 **2840** Integrated pest and pollinator management: Investigating impacts of different pesticide programs on pest and pollinator communities in commercial orchards. **Neelendra K. Joshi** (nkjoshi@uark.edu)<sup>1</sup>, Timothy W. Leslie<sup>2</sup>, Edwin Rajotte<sup>2</sup>, and David J. Biddinger<sup>3</sup>, <sup>1</sup>Univ. of Arkansas, Fayetteville, AR, <sup>2</sup>Pennsylvania State Univ., University Park, PA, <sup>3</sup>Pennsylvania State Univ., Biglerville, PA
- 9:30 **2841** Toward a more selective pests management program in Virginia vineyards. **Douglas G. Pfeiffer** (dgpfeiff@vt.edu), Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 9:45 **2842** Current status of IPM-based pest management practices in commercial vegetable productions in Nepal. **Sudan Gyawaly** (gyawaly17@gmail.com)<sup>1</sup>, Jhalendra Rijal<sup>2</sup>, Rajendra Regmi<sup>3</sup>, Krishna Puri<sup>4</sup>, Rajan Ghimire<sup>5</sup>, and Nirajan Bhattarai<sup>3</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>Univ. of California Cooperative Extension, Modesto, CA, <sup>3</sup>Agriculture and Forestry Univ., Rampur, Nepal, <sup>4</sup>Univ. of California, Davis, CA, <sup>5</sup>New Mexico State Univ., Clovis, NM
- 10:00 **2843** IPM in the South Central US: Use of dynamic pest monitoring and management systems. **Kris Giles** (kris.giles@okstate.edu)<sup>1</sup> and Brian McCornack<sup>2</sup>, <sup>1</sup>Oklahoma State Univ., Stillwater, OK, <sup>2</sup>Kansas State Univ., Manhattan, KS
- 10:15 **BREAK**
- 10:30 **2844** Integrated pest management and conservation agriculture in commercial vegetable home gardens. **Manuel Reyes** (reyesreyesmann@gmail.com), North Carolina A&T State Univ., Greensboro, NC
- 10:45 **2845** IPM vs. IRM: The experiences from western corn rootworm management. **Ram Shrestha** (shrestrb@iastate.edu) and Aaron Gassmann, Iowa State Univ., Ames, IA

**Symposium: *Drosophila suzukii*, an Invasive Pest of Small and Stone Fruits**

**Room W240 C (Convention Center)**

**Moderators and Organizers:** Vaughn Walton<sup>1</sup>, Gianfranco Anfora<sup>2</sup>, Nik G. Wiman<sup>3</sup>, and Ashfaq Sial<sup>4</sup>, <sup>1</sup>Oregon State Univ., Corvallis, OR, <sup>2</sup>Edmund Mach Foundation, San Michele all'Adige, Italy, <sup>3</sup>Oregon State Univ., Aurora, OR, <sup>4</sup>Univ. of Georgia, Athens, GA

- 9:15 **2846** Current status of the *Drosophila suzukii* ecology and management in an Alpine production region (Trentino, Italy). **Gianfranco Anfora** (gianfranco.anfora@fmach.it)<sup>1</sup>, Alberto Grassi<sup>1</sup>, Valerio Mazzoni<sup>1</sup>, Valerio Stacconi<sup>1</sup>, Omar Stabelli<sup>1</sup>, Vaughn Walton<sup>2</sup>, and Claudio Ioriatti<sup>1</sup>, <sup>1</sup>Edmund Mach Foundation, San Michele all'Adige, Italy, <sup>2</sup>Oregon State Univ., Corvallis, OR

- 9:30 **2847** *Drosophila suzukii* invasion in South America. **Marindia Depra** (marindiadepra@gmail.com)<sup>1</sup> and Vera Valente<sup>2</sup>, <sup>1</sup>Federal Univ. of Rio Grande, Porto Alegre, Brazil, <sup>2</sup>Federal Univ. of Pelotas, Pelotas, Brazil
- 9:45 **2848** Worldwide invasion history of *Drosophila suzukii*. **Martha Pascual** (martapascual@ub.edu), Univ. of Barcelona, Barcelona, Spain
- 10:00 **2849** Biology, management, and population modeling of *Drosophila suzukii* in western North American production regions. **Vaughn Walton** (vaughn.walton@oregonstate.edu)<sup>1</sup>, Nik G. Wiman<sup>2</sup>, Daniel Dalton<sup>1</sup>, Betsey Miller<sup>1</sup>, Riki York<sup>1</sup>, Peter Shearer<sup>3</sup>, Samantha L. Tochen<sup>1</sup>, Lynell K. Tanigoshi<sup>4</sup>, Beverly S. Gerdeman<sup>5</sup>, Jana Lee<sup>6</sup>, Claudio Ioriatti<sup>7</sup>, Gianfranco Anfora<sup>7</sup>, Alberto Grassi<sup>7</sup>, Rufus Isaacs<sup>8</sup>, and Hannah Burrack<sup>9</sup>, <sup>1</sup>Oregon State Univ., Corvallis, OR, <sup>2</sup>Oregon State Univ., Aurora, OR, <sup>3</sup>Oregon State Univ., Hood River, OR, <sup>4</sup>Washington State Univ., Mt. Vernon, WA, <sup>5</sup>Washington State Univ., Vancouver, WA, <sup>6</sup>USDA - ARS, Corvallis, OR, <sup>7</sup>Edmund Mach Foundation, San Michele all'Adige, Italy, <sup>8</sup>Michigan State Univ., East Lansing, MI, <sup>9</sup>North Carolina State Univ., Raleigh, NC
- 10:15 **BREAK**
- 10:30 **2850** Spotted wing drosophila's natural enemies and the importance of landscape ecology for classical biological control. **Kent M. Daane** (kdaane@ucanr.edu), Univ. of California, Berkeley, CA
- 10:45 **2851** Tritrophic interactions between host plant, phytophagous and entomophagous insects: The case of the invasive species *Drosophila suzukii*. **Patricia Gibert** (patricia.gibert@univ-lyon1.fr)<sup>1</sup>, Mathilde Poyet<sup>2</sup>, Patrice Eslin<sup>3</sup>, Olivier Chabrier<sup>3</sup>, and Emmanuel Desouhant<sup>2</sup>, <sup>1</sup>Univ. Claude Bernard, Villeurbanne, France, <sup>2</sup>Lyon Univ., Villeurbanne, France, <sup>3</sup>Univ. of Picardie Jules Verne, Amiens, France
- 11:00 **2852** Presentation withdrawn
- 11:15 **2853** The identification of viral pathogens suitable for the control of *Drosophila suzukii*. **Darren Obbard**<sup>1</sup>, **Nathan Medd** (nathan.medd@ed.ac.uk)<sup>1</sup>, Jerry Cross<sup>2</sup>, and Simon Fellous<sup>3</sup>, <sup>1</sup>The Univ. of Edinburgh, Edinburgh, United Kingdom, <sup>2</sup>East Malling Research, Kent, United Kingdom, <sup>3</sup>INRA, Montpellier, France
- 11:30 **2854** Genome-enabled spotted wing drosophila research. **Joanna Chiu** (jcchiu@ucdavis.edu), Univ. of California, Davis, CA
- 11:45 **2855** A season-long strategy to manage spotted wing drosophila. **Hannah Burrack** (hannah\_burrack@ncsu.edu)<sup>1</sup>, Lauren M. Diepenbrock<sup>2</sup>, Katharine Swoboda Bhattarai<sup>1</sup>, Yanan Zheng<sup>1</sup>, and Ashfaq Sial<sup>3</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>Univ. of Missouri, Columbia, MO, <sup>3</sup>Univ. of California, Berkeley, CA



**Symposium: Arboviruses and One Health**

**Room W230 C (Convention Center)**

**Moderators and Organizers:** Dana Vanlandingham<sup>1</sup> and Rosemary Sang<sup>2</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>Kenya Medical Research Institute, Nairobi, Kenya

- 9:15 **2856** Ecology of West Nile virus in California exemplifies the One Health paradigm. **William Reisen** (wkreisen@gmail.com), Univ. of California, Davis, CA
- 9:30 **2857** An arbovirus system with One Health consequences in East Africa. **Ann Powers** (akp7@cdc.gov), Centers for Disease Control and Prevention, Fort Collins, CO
- 9:45 **2858** Arboviruses and hemorrhagic fever surveillance in Kenya towards achieving enhanced preparedness and response with a One Health approach. **Rosemary Sang** (rosemary.sang@usamru-k.org)<sup>1</sup>, Joel Lutomiah<sup>1</sup>, Konongoi Limbasa<sup>1</sup>, Victor Ofula<sup>2</sup>, Albert Nyunja<sup>2</sup>, Albina Makio<sup>2</sup>, Frederick Eyase<sup>2</sup>, Rodney Colden<sup>2</sup>, Edith Chepkorir<sup>3</sup>, Caroline Tigoi<sup>3</sup>, Collins Odhiambo<sup>3</sup>, Ian Njeru<sup>4</sup>, Daniel Langat<sup>4</sup>, Jaqueline Kasiiti<sup>5</sup>, and Rees Murithi<sup>5</sup>, <sup>1</sup>Kenya Medical Research Institute, Nairobi, Kenya, <sup>2</sup>U.S. Army Medical Research Directorate, Nairobi, Kenya, <sup>3</sup>International Centre of Insect Physiology and Ecology, Nairobi, Kenya, <sup>4</sup>Ministry of Health, Nairobi, Kenya, <sup>5</sup>Ministry of Livestock, Nairobi, Kenya
- 10:00 **2859** Climate-population analysis of potential mosquito vectors of emerging arbovirus disease threats to the US. **Seth Britch** (seth.britch@ars.usda.gov), USDA - ARS, Gainesville, FL
- 10:15 BREAK**
- 10:30 **2860** Factors affecting the ability of mosquitoes to transmit Rift Valley fever virus. **Michael Turell** (mturell@erols.com), U.S. Army Medical Command (Retired), Frederick, MD
- 10:45 **2861** Chikungunya and mosquito vectors. **Stephen Higgs** (shiggs@bri.ksu.edu), Yan-Jang Huang, and Dana Vanlandingham, Kansas State Univ., Manhattan, KS
- 11:00 **2862** Zika virus transmission in the Americas. **Christopher Mores** (cmores@lsu.edu)<sup>1,2</sup>, Craig Stoops<sup>2</sup>, and Rebecca Christofferson<sup>1</sup>, <sup>1</sup>Louisiana State Univ., Baton Rouge, LA, <sup>2</sup>U.S. Navy, Lima, Peru
- 11:15 **2863** Assessment of risk of a Japanese encephalitis virus introduction in the United States. **Dana Vanlandingham** (dlvanlan@vet.ksu.edu)<sup>1</sup>, Yan-Jang Huang<sup>1</sup>, Susan Hettenbach<sup>1</sup>, Julie Harbin<sup>1</sup>, So Lee Park<sup>1</sup>, Alan Barrett<sup>2</sup>, Lee Cohnstaedt<sup>3</sup>, and Stephen Higgs<sup>1</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>The Univ. of Texas, Galveston, TX, <sup>3</sup>USDA - ARS, Manhattan, KS
- 11:30 **2864** Viral genetics as a critical factor to control the infection and dissemination of yellow fever virus in *Aedes aegypti*. **Yan-Jang Huang** (yshuang@ksu.edu)<sup>1</sup>, John Nuckols<sup>2</sup>, Stephen Higgs<sup>1</sup>, Alan Barrett<sup>3</sup>, and Dana Vanlandingham<sup>1</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>U.S. Army, Fort Detrick, MD, <sup>3</sup>The Univ. of Texas, Galveston, TX

- 11:45 **2865** Molecular signatures of a midgut escape barrier in *Culex quinquefasciatus* mosquitoes infected by West Nile virus. **Gregory Ebel** (gregory.ebel@colostate.edu), Colorado State Univ., Fort Collins, CO

**Symposium: New Insights into the Metabolism of Mosquitoes that are Vectors of Human Diseases**

**Room W414 A (Convention Center)**

**Moderator and Organizer:** Patricia Scaraffia, Tulane Univ., New Orleans, LA

- 9:15 **2866** Temporal regulation of metabolism during mosquito reproduction. **Alexander Raikhel** (araikhel@ucr.edu)<sup>1</sup>, Yuan Hou<sup>2</sup>, Xue-Li Wang<sup>2</sup>, Tusar Saha<sup>1</sup>, Sourav Roy<sup>1</sup>, Bo Zhao<sup>1</sup>, and Zhen Zou<sup>2</sup>, <sup>1</sup>Univ. of California, Riverside, CA, <sup>2</sup>Chinese Academy of Sciences, Beijing, China
- 9:45 **2867** Metabolic analysis of the juvenile hormone synthesis pathways in mosquitoes. **Fernando Noriega** (noriegaf@fiu.edu), Marcela Nouzova, Crisalejandra Rivera-Perez, and Maria Areiza, Florida International Univ., Miami, FL
- 10:00 **2868** Transcriptome sequencing provides insights to the metabolic underpinnings of photoperiodic diapause in the Asian tiger mosquito, *Aedes albopictus*. **Peter A. Armbruster** (paa9@georgetown.edu)<sup>1</sup>, Xin Huang<sup>1</sup>, Zachary A. Batz<sup>1</sup>, Monica F. Poelchau<sup>1</sup>, Julie A. Reynolds<sup>2</sup>, and David L. Denlinger<sup>2</sup>, <sup>1</sup>Georgetown Univ., Washington, DC, <sup>2</sup>The Ohio State Univ., Columbus, OH
- 10:15 BREAK**
- 10:30 **2869** Recent advances in the understanding of nitrogen and carbon metabolism in *Aedes aegypti* mosquitoes. **Patricia Scaraffia** (pscaraff@tulane.edu), Tulane Univ., New Orleans, LA
- 10:45 **2870** Exploiting metabolic pathways to regulate vector competence in *Aedes aegypti* during dengue virus infection. **Rushika Perera** (rushika.perera@colostate.edu)<sup>1</sup>, Nunya Chotiwan<sup>1</sup>, Barb Andre<sup>1</sup>, Irma Sanchez-Vargus<sup>1</sup>, Jeffrey M. Grabowski<sup>2</sup>, Amber Hopf-jannasch<sup>2</sup>, Erik Gough<sup>2</sup>, Ernesto Nakayasu<sup>2</sup>, Catherine Hill<sup>2</sup>, and Richard J. Kuhn<sup>2</sup>, <sup>1</sup>Colorado State Univ., Fort Collins, CO, <sup>2</sup>Purdue Univ., West Lafayette, IN
- 11:00 **2871** Mitochondrial metabolism and the connections between physiology and immunity in *Anopheles* mosquitoes. **Shirley Luckhart** (sluckhart@ucdavis.edu), Univ. of California, Davis, CA

**Symposium: Peridomestic Animals and Chagas Vector Control**

**Room W230 B (Convention Center)**

**Moderators and Organizers:** Ricardo Gürtler<sup>1</sup> and Pamela Pennington<sup>2</sup>, <sup>1</sup>Univ. of Buenos Aires, Buenos Aires, Argentina, <sup>2</sup>Univ. of Valle de Guatemala, Guatemala, Guatemala

- 9:15 **2872** Vector blood meal analysis to evaluate the impact of community-based (or Ecohealth) house improvements for vector control. **M. Carlota Monroy** (mcarlotamonroy@gmail.com), Univ. of San Carlos, Guatemala City, Guatemala



- 9:30 **2873** Vector saliva: The vector-host interphase. **Marcos Pereira** (marcoshp@icb.ufmg.br), Federal Univ. of Minas Gerais, Belo Horizonte, Brazil
- 9:45 **2874** Anthroponotic dispersal, ecological host fitting, and mosaic population structure of sylvatic *Trypanosoma cruzi*: Insights from highland Bolivia. **Louisa Messenger** (louisa.messenger@lshtm.ac.uk), London School of Hygiene and Tropical Medicine, London, United Kingdom
- 10:00 **2875** Synanthropic rodent control to reduce transmission risk. **Pamela Pennington** (pamelap@uvg.edu.gt), Univ. of Valle de Guatemala, Guatemala, Guatemala
- 10:15 BREAK**
- 10:30 **2876** The role of the zoonotic cycle in domestic transmission in Ecuador. **Mario J. Grijalva** (grijalva@ohio.edu), Pontifical Catholic Univ., Quito, Ecuador
- 10:45 **2877** A veterinary vaccine to reduce the contribution of domestic dogs to *Trypanosoma cruzi* transmission in the Yucatan Peninsula, Mexico. **Eric Dumonteil** (edumonte@tulane.edu), Autonomous Univ. of Yucatán, Mérida, Mexico

### Symposium: Stable Flies in Agroecosystems: An International Problem

#### Room W232 B (Convention Center)

**Moderator and Organizer:** David Taylor, USDA - ARS, Lincoln, NE

- 9:15 **2878** The race between research and compliance to combat stable flies in western Australia. **David Cook** (david.cook2@agric.wa.gov.au), Dept. of Agriculture and Food, South Perth, Australia
- 9:30 **2879** Biology of stable fly on tropical fruits (pineapple, banana, and oil palm), its management strategies, and impacts on national livestock. **Jose Solorzano** (asolorzano@inta.go.cr)<sup>1</sup>, David Taylor<sup>2</sup>, and Jannery Gomez<sup>1</sup>, <sup>1</sup>INTA, San José, Costa Rica, <sup>2</sup>USDA - ARS, Lincoln, NE
- 9:45 **2880** Stable fly outbreaks related to sugarcane production in Brazil: Current situation and future outlook. **Paulo Cancado** (paulo.cancado@embrapa.br)<sup>1</sup>, Thadeu Barros<sup>1</sup>, Tacianny Ferreira Dominghetti<sup>2</sup>, and Cleber Soares<sup>1</sup>, <sup>1</sup>Embrapa Beef Cattle, Campo Grande, Brazil, <sup>2</sup>Federal Univ. of Matogrosso do Sul, Campo Grande, Brazil
- 10:00 **2881** Development of stable flies and house flies (Diptera: Muscidae) in dewatered sewage biosolids. **Carl W. Doud** (cdoud@co.midland.mi.us)<sup>1</sup>, David Taylor<sup>2</sup>, and Ludek Zurek<sup>3</sup>, <sup>1</sup>Midland County Mosquito Control, Sanford, MI, <sup>2</sup>USDA - ARS, Lincoln, NE, <sup>3</sup>Kansas State Univ., Manhattan, KS
- 10:15 BREAK**
- 10:30 **2882** Characterization of stable fly developmental substrates. **Kristina Friesen** (kristina.friesen@ars.usda.gov)<sup>1</sup>, Dennis Berkebile<sup>1</sup>, Erin Scully<sup>2</sup>, Lisa Durso<sup>1</sup>, Brian Wienhold<sup>1</sup>, Junwei Zhu<sup>1</sup>, and David Taylor<sup>1</sup>, <sup>1</sup>USDA - ARS, Lincoln, NE, <sup>2</sup>USDA - ARS, Manhattan, KS

- 10:45 **2883** Volatile semiochemicals associated with stable fly agroecosystems. **Jerry Zhu** (jerry.zhu@ars.usda.gov)<sup>1</sup>, Nadia Jelvez<sup>2</sup>, Antonio Euzebio Goulart Sant'ana<sup>2</sup>, and Jose Solorzano<sup>3</sup>, <sup>1</sup>USDA - ARS, Lincoln, NE, <sup>2</sup>Federal Univ. of Alagoas, Maceió, Brazil, <sup>3</sup>INTA, San José, Costa Rica
- 11:00 **2884** Are agronomic residues the "missing link" for understanding stable fly population dynamics in the US? **David Taylor** (dave.taylor@ars.usda.gov), Kristina Friesen, and Jerry Zhu, USDA - ARS, Lincoln, NE

### Symposium: Vector Biology and Ecology Perspective: Roadblocks and Solutions to Malaria Elimination

#### Room W414 B (Convention Center)

**Moderator and Organizer:** Jan E. Conn, New York State Dept. of Health, Slingerlands, NY

- 9:15 **2885** Metabolic and target-site mechanisms combine to confer strong DDT resistance in *Anopheles gambiae*. **Martin Donnelly** (m.j.donnelly@liverpool.ac.uk), Liverpool School of Tropical Medicine, Liverpool, United Kingdom
- 9:45 **2886** High burden of malaria following scale-up of control interventions in Nchelenge District, Luapula Province, Zambia. **Douglas E. Norris** (dnorris@jhsp.edu)<sup>1</sup>, Smita Das<sup>1</sup>, Mbanga Muleba<sup>2</sup>, Christine Jones<sup>1</sup>, Julia Pringle<sup>1</sup>, and Jennifer Stevenson<sup>3</sup>, <sup>1</sup>Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, <sup>2</sup>Tropical Disease Research Center, Ndola, Zambia, <sup>3</sup>Macha Research Trust, Choma, Zambia
- 10:00 **2887** Vector behaviour in Latin America: Challenges and opportunities for malaria elimination. **Martha L. Quinones** (mlquinonesp@unal.edu.co)<sup>1</sup>, Martha Ahumada<sup>2</sup>, Amy Krystosik<sup>3</sup>, Gerry Killeen<sup>4</sup>, Socrates Herrera<sup>5</sup>, and John Beier<sup>6</sup>, <sup>1</sup>National Univ. of Colombia, Bogotá, Colombia, <sup>2</sup>National Institute of Health, Bogotá, Colombia, <sup>3</sup>Kent State Univ., San Francisco, CA, <sup>4</sup>Liverpool School of Tropical Medicine, Liverpool, United Kingdom, <sup>5</sup>CAUCASECO, Cali, Colombia, <sup>6</sup>Univ. of Miami, Miami, FL
- 10:15 BREAK**
- 10:30 **2888** Genetic differentiation between exophagic and endophagic malaria vector populations in Brazil. **Paulo Ribolla** (pribolla@ibb.unesp.br), São Paulo State Univ., Botucatu, Brazil
- 10:45 **2889** Complex resting and biting behaviors of malaria vectors in rural transmission settings in India. **Sunita Swain** (swain.sunita@gmail.com)<sup>1</sup> and Matthew B. Thomas<sup>2</sup>, <sup>1</sup>Research Consultant to Penn State, Rourkela, India, <sup>2</sup>Pennsylvania State Univ., University Park, PA
- 11:00 **Discussion**



**Symposium: Molecular Strategies/Mechanisms of Insect Reproduction**

**Room W331 B (Convention Center)**

**Moderators and Organizers:** Muhammad Tufail<sup>1</sup> and Makio Takeda<sup>2</sup>, <sup>1</sup>King Saud Univ., Riyadh, Saudi Arabia, <sup>2</sup>Kobe Univ., Kobe, Japan

- 9:15 **2890** Function of the *Deleted Azoospermia (DAZ)* family gene in spermatogenesis in haploid male of the sawfly. **Masatsugu Hatakeyama** (sawfly@affrc.go.jp)<sup>1</sup> and Kazuki Sekiné<sup>2</sup>, <sup>1</sup>National Institute of Agrobiological Sciences, Tsukuba, Japan, <sup>2</sup>Rissho Univ., Kumagaya, Japan
- 9:30 **2891** Elucidating the molecular mechanism of transovarial transmission of tick-borne rickettsiae. **Shahid Karim** (shahid.karim@usm.edu), Univ. of Southern Mississippi, Hattiesburg, MS
- 9:45 **2892** Differential reproductive strategy in two wing-morphs of the brown planthopper, *Nilaparvata lugens* Stål (Hemiptera: Delphacidae). **Muhammad Tufail** (mtufail@ksu.edu.sa)<sup>1</sup>, Muhammad Naeemullah<sup>2</sup>, Prem Sharma<sup>3</sup>, Makio Takeda<sup>4</sup>, and Chiharu Nakamura<sup>4</sup>, <sup>1</sup>King Saud Univ., Riyadh, Saudi Arabia, <sup>2</sup>Pakistan Agricultural Research Council, Islamabad, Pakistan, <sup>3</sup>National Agricultural Research Council, Kathmandu, Nepal, <sup>4</sup>Kobe Univ., Kobe, Japan
- 10:00 **2893** Integration of midgut-fat body-gonadal axis in *Periplaneta americana*: Monoamine and peptide regulation. **A. S. M. Kamruzzaman** (asm\_kzaman@hotmail.com)<sup>1</sup>, Azam Mikani<sup>2</sup>, Hironobu Asano<sup>1</sup>, Azza Elgendy<sup>3</sup>, Muhammad Tufail<sup>4</sup>, Susumu Hiragaki<sup>1</sup>, and Makio Takeda<sup>1</sup>, <sup>1</sup>Kobe Univ., Kobe, Japan, <sup>2</sup>Tarbiat Modares Univ., Tehran, Iran, <sup>3</sup>Cairo Univ., Cairo, Egypt, <sup>4</sup>King Saud Univ., Riyadh, Saudi Arabia
- 10:15 **BREAK**
- 10:30 **2894** Molecular characterization and RNAi-mediated knockdown of vitellogenin gene in red palm weevil, *Rhynchophorus ferrugineus* (Olivier). **Abdulrahman Aldawood** (aldawood@ksu.edu.sa), Khalid Mahmood, Muhammad Tufail, Mureed Husain, and Khawaja Ghulam Rasool, King Saud Univ., Riyadh, Saudi Arabia
- 10:45 **2895** Molecular cloning, characterization, and disruption of vitellogenin gene by RNAi in warehouse moth, *Cadra cautella* (Walker). **Khawaja Ghulam Rasool** (krasool@ksu.edu.sa), Mureed Husain, Muhammad Tufail, Khalid Mahmood, and Abdulrahman Aldawood, King Saud Univ., Riyadh, Saudi Arabia
- 11:00 **2896** Molecular characterization of vitellogenin receptor and explore their uniqueness on reproduction with respect to lepidopteran insect species. **Muthukalingan Krishnan** (profmkrish@yahoo.com), Barathidasan Univ., Tiruchirappalli, India
- 11:15 **2897** Conservation of the Mos/MAPK signaling pathway during insect oocyte maturation: A case study in the silkworm, *Bombyx mori*. **Megumi Sumitani** (sumikasashima@affrc.go.jp)<sup>1</sup>, Daisuke Yamamoto<sup>2</sup>, Hideki Sezutsu<sup>1</sup>, and Mtsatsugu Hatakeyama<sup>1</sup>, <sup>1</sup>National Institute of Agrobiological Sciences, Tsukuba, Japan, <sup>2</sup>Jichi Medical Univ., Shimotsuke, Japan

**Symposium: Global Challenges in Applied Urban Entomology**

**Room W232 C (Convention Center)**

**Moderator and Organizer:** Ron Harrison, Orkin Pest Control, Atlanta, GA

- 9:15 **2898** Termite issues and control internationally. **Brian T. Forschler** (bfor@uga.edu), Univ. of Georgia, Athens, GA
- 9:30 **2899** Global food safety. **Zia Siddiqi** (zsiddiqi@rollins.com), Orkin Pest Control, Atlanta, GA
- 9:45 **2900** Training and certifications internationally. **Chris Stelzig** (cstelzig@entsoc.org), Entomological Society of America, Annapolis, MD
- 10:00 **2901** International experience with the kudzu bug, *Megacopta cribraria* F. (Hemiptera: Plataspidae). **Wayne Gardner** (wgardner@uga.edu), Univ. of Georgia, Griffin, GA
- 10:15 **BREAK**
- 10:30 **2902** Pests unique to international situations. **Pat Copps** (pcopps@rollins.com), Orkin Pest Control, Riverside, CA
- 10:45 **2903** Urban pest ant management with a minimal impact on the environment. **Dong-Hwan Choe** (donghwan.choe@ucr.edu), Univ. of California, Riverside, CA
- 11:00 **2904** Manufacturing, registering, and shipping products globally. **Cisse Spragins** (cspragins@rockwelllabs.com), Rockwell Labs, Ltd., Kansas City, MO
- 11:15 **2905** International urban pest control franchising. **Tom Luczynski** (tluczynski@rollins.com), Orkin Pest Control, Atlanta, GA

**Graduate Student Oral Competition: Agricultural and Forest Entomology: Pollinators**

**Room W224 C (Convention Center)**

**Moderator:** Justin Cappadonna, The Univ. of Queensland, Brisbane, Australia

- 9:15 **2906** The effects of land abandonment on bees (Hymenoptera: Apoidea) in NE Portugal. **Andreia Penado** (andreiapenado@gmail.com)<sup>1,2</sup>, Hugo Rebelo<sup>2,3</sup>, Pedro Beja<sup>2,4</sup>, Thomas Wood<sup>1</sup>, Ellen Rotheray<sup>1</sup>, and Dave Goulson<sup>1</sup>, <sup>1</sup>Univ. of Sussex, Brighton, United Kingdom, <sup>2</sup>CIBIO, Vairão, Portugal, <sup>3</sup>Univ. of Bristol, Bristol, United Kingdom, <sup>4</sup>Tropical Scientific Reserch Institute, Lisbon, Portugal
- 9:30 **2907** Wild bee communities in non-crop land cover in the Maine (USA) wild blueberry production landscape. **Brianne Du Clos** (brianne.duclos@maine.edu), Cynthia Loftin, and Frank Drummond, Univ. of Maine, Orono, ME
- 9:45 **2908** Integrating nutritional studies into targeted floral provisioning for *Bombus impatiens*. **Erin Treanore** (etreanore@gmail.com), Anthony Vaudo, R. Carley Miller, Christina M. Grozinger, and Shelby J. Fleischer, Pennsylvania State Univ., University Park, PA



10:00 **2909** The potential of alternative manageable bee species for raspberry pollination. **Corey Andrikopoulos** (cja576@gmail.com)<sup>1</sup>, James H. Cane<sup>2</sup>, and Diane G. Alston<sup>1</sup>, <sup>1</sup>Utah State Univ., Logan, UT, <sup>2</sup>USDA - ARS, Logan, UT

**10:15 BREAK**

10:30 **2910** Diversity in motion: Temporal responses of bee communities to a density gradient of a flowering invasive. **Michael Minnick** (minnickm@miamioh.edu) and Thomas O. Crist, Miami Univ., Oxford, OH

10:45 **2911** The influence of distinct pollinators on male and female reproductive success in alfalfa. **Emmanuel Santa-Martinez** (santamartinez@wisc.edu)<sup>1</sup> and Johanne Brunet<sup>2</sup>, <sup>1</sup>Univ. of Wisconsin, Madison, WI, <sup>2</sup>USDA - ARS, Madison, WI

11:00 **2912** The susceptibility of the alfalfa leafcutting bee (*Megachile rotundata*) to three pyrethroids used in mosquito management. **Alyssa Piccolomini** (alyssa.piccolomini@montana.edu) and Robert K. D. Peterson, Montana State Univ., Bozeman, MT

11:15 **2913** Pollinator associations with willow biomass crop utilized for phytoremediation. **Giuseppe Tumminello** (gtummine@syr.edu)<sup>1</sup>, Timothy Volk<sup>1</sup>, Scott McArt<sup>2</sup>, and Melissa K. Fierke<sup>1</sup>, <sup>1</sup>State Univ. of New York, Syracuse, NY, <sup>2</sup>Cornell Univ., Ithaca, NY

**Graduate Student Oral Competition: Agricultural and Forest Entomology: Vectors and Others**

**Room W240 B (Convention Center)**

**Moderator:** Boris Castro, Dow AgroSciences, Indianapolis, IN

9:15 **2914** Non-feeding modes of *Tomato yellow leaf curl virus* transmission by whiteflies (*Bemisia tabaci*) and implications for viral epidemics. **Wendy G. Marchant** (wmar@uga.edu) and Rajagopalbabu Srinivasan, Univ. of Georgia, Tifton, GA

9:30 **2915** Assessing the role of onion thrips (*Thrips tabaci*) in bacterial leaf blight of onion. **Ari Grode** (grodeari@msu.edu), Prissana Wiriyajitsomboon, Mary Hausbeck, and Zsofia Szendrei, Michigan State Univ., East Lansing, MI

9:45 **2916** A transformed commensal blocks transmission of the global plant pathogen, *Xylella fastidiosa*, by its most important vector. **Arinder Arora** (arinder.arora@gmail.com)<sup>1,2</sup>, Kendra N. Pesko<sup>2</sup>, Thomas A. Miller<sup>3</sup>, and Ravi Durvasula<sup>2</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Univ. of New Mexico, Albuquerque, NM, <sup>3</sup>Univ. of California, Riverside, CA

10:00 **2917** Competition with non-vectors mediates virus-vector interactions. **Paul Chisholm** (paul.chisholm@email.wsu.edu) and David Crowder, Washington State Univ., Pullman, WA

**10:15 BREAK**

10:30 **2918** Fungal-insect symbiosis: Exploring the relationship between the yeast *Kodamaea ohmeri* and its host, the small hive beetle, *Aethina tumida*. **Brogan Amos** (brogan.amos@uq.edu.au)<sup>1,2</sup>, Diana Leemon<sup>2</sup>, R. Andrew Hayes<sup>3</sup>, and Michael J. Furlong<sup>1</sup>, <sup>1</sup>Univ. of Queensland, Brisbane, Australia, <sup>2</sup>Queensland Dept. of

Agriculture and Fisheries, Brisbane, Australia, <sup>3</sup>Univ. of the Sunshine Coast, Sippy Downs, Australia

10:45 **2919** How to analyze the data from an efficacy test? Evaluating the effect of different statistical analyses on the outcome of a pesticide efficacy experiment **H. Alejandro Merchan** (hamercha@ncsu.edu), T. Aurora Toennisson, and Hannah Burrack, North Carolina State Univ., Raleigh, NC

11:00 **2920** Towards lower-cost, user friendly acoustic detection systems for hidden insect infestations in trees. **Barukh Rohde** (barukh94-school@yahoo.com)<sup>1</sup> and Richard Mankin<sup>2</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>USDA - ARS, Gainesville, FL

11:15 **2921** Host switching by ecological fitting generates oscillations in diet breadth. **Mariana Braga** (mariana.braga@zoologi.su.se)<sup>1</sup>, Sabrina Araujo<sup>2</sup>, Niklas Janz<sup>1</sup>, Sören Nylin<sup>1</sup>, and Walter Boeger<sup>2</sup>, <sup>1</sup>Stockholm Univ., Stockholm, Sweden, <sup>2</sup>Federal Univ. of Paraná, Curitiba, Brazil

**Graduate Student Oral Competition: Apidology, Sericulture, and Social Insects: Pollinators**

**Room W224 D (Convention Center)**

**Moderators:** Analiza P. Alves<sup>1</sup> and Evelien VanEckert<sup>2</sup>, <sup>1</sup>DuPont Pioneer, Johnston, IA, <sup>2</sup>USDA - ARS, Maricopa, AZ

9:15 **2922** Pollen foraging comparison of *Bombus huntii* and *Apis mellifera* (Hymenoptera: Apidae). **Houston Judd** (houstonjudd@gmail.com)<sup>1</sup>, Ricardo Ramirez<sup>1</sup>, and James Strange<sup>2</sup>, <sup>1</sup>Utah State Univ., Logan, UT, <sup>2</sup>USDA - ARS, Logan, UT

9:30 **2923** Andromonoecy might enhance fitness in muskmelon (*Cucumis melo* L.) by improving pollination efficiency. **Revanasidda Aidhbhavi** (rshlb114@gmail.com), Vasuki Belavadi, and Yaraballi Srinivasa, Univ. of Agricultural Sciences, Bangalore, India

9:45 **2924** Effects of surrounding landscape complexity on bee communities and pollination to soybean. **Ashley St. Clair** (astclair@iastate.edu), Amy Toth, Adam Dolezal, Ge Zhang, and Matt O'Neal, Iowa State Univ., Ames, IA

10:00 **2925** Landscape simplification constrains adult body size in native bees. **Heather Grab** (hlc66@cornell.edu)<sup>1</sup>, Julia Brokaw<sup>2</sup>, Bryan N. Danforth<sup>1</sup>, Jason Gibbs<sup>2</sup>, Alena Hutchinson<sup>1</sup>, Rufus Isaacs<sup>2</sup>, Katja Poveda<sup>1</sup>, Miles Renauld<sup>1</sup>, and Gregory M. Loeb<sup>3</sup>, <sup>1</sup>Cornell Univ., Ithaca, NY, <sup>2</sup>Michigan State Univ., East Lansing, MI, <sup>3</sup>Cornell Univ., Geneva, NY

**10:15 BREAK**

10:30 **2926** Influence of cultural practices on soybean nectar production. **Ty Smith** (tms377@msstate.edu)<sup>1</sup>, Angus Catchot<sup>1</sup>, Jeffrey Harris<sup>2</sup>, Natraj Krishnan<sup>1</sup>, Jeff Gore<sup>3</sup>, and Trent Irby<sup>1</sup>, <sup>1</sup>Mississippi State Univ., Mississippi State, MS, <sup>2</sup>USDA - ARS, Baton Rouge, LA, <sup>3</sup>Mississippi State Univ., Stoneville, MS

10:45 **2927** Do honey bees (*Apis mellifera* L.) near reconstructed prairies collect significant amounts of food from native prairie flowers? **Morgan Carr-Markell** (carrm163@umn.edu)<sup>1</sup>, Cora Demler<sup>1</sup>, Scott Cornman<sup>2</sup>, Deborah Iwanowicz<sup>3</sup>, and Marla Spivak<sup>1</sup>, <sup>1</sup>Univ. of



- Minnesota, St. Paul, MN, <sup>2</sup>U.S. Geological Survey, Fort Collins, CO, <sup>3</sup>U.S. Geological Survey, Kearneysville, WV
- 11:00 **2928** How landscape use affects bee health and foraging patterns. **Rachel Olsson** (rachel.olsson@email.wsu.edu) and David Crowder, Washington State Univ., Pullman, WA

**Graduate Student Oral Competition: Biodiversity, Biogeography, and Conservation of Arthropods: Butterflies and Others**

**Room W224 F (Convention Center)**

**Moderators:** Katrina Menard<sup>1</sup> and Floyd Shockley<sup>2</sup>, <sup>1</sup>Sam Noble Oklahoma Museum of Natural History, Norman, OK, <sup>2</sup>Smithsonian Institution National Museum of Natural History, Washington, DC

- 9:15 **2929** Does density of host plant (*Asclepias* spp.) and surrounding habitat influence monarch butterfly (*Danaus plexippus*) oviposition? **Teresa Blader** (teresa.blader@gmail.com)<sup>1</sup>, Richard Hellmich<sup>2</sup>, and Sue Blodgett<sup>1</sup>, <sup>1</sup>Iowa State Univ., Ames, IA, <sup>2</sup>USDA - ARS, Ames, IA
- 9:30 **2930** Habitat influences on monarch (*Danaus plexippus*) ovipositioning rates and survival of eggs and larvae. **Andrew Myers** (myersan7@msu.edu) and Douglas Landis, Michigan State Univ., East Lansing, MI
- 9:45 **2931** Evaluating the influence of urbanization on monarch butterfly (*Danaus plexippus*)-parasite interactions. **Kelsey Deal** (kelsey.deal@okstate.edu) and Kristen Baum, Oklahoma State Univ., Stillwater, OK
- 10:00 **2932** An individual-based model for the endangered Karner blue butterfly and implications for conservation. **Lainey Bristow** (lainey.bristow@gmail.com)<sup>1</sup>, Jessica Hellmann<sup>2</sup>, and Ralph Grundel<sup>3</sup>, <sup>1</sup>Univ. of Notre Dame, South Bend, IN, <sup>2</sup>Univ. of Minnesota, St. Paul, MN, <sup>3</sup>U.S. Geological Survey, Chesterton, IN

**10:15 BREAK**

- 10:30 **2933** Phylogeography of *Neophasia* butterflies (Lepidoptera: Pieridae) at a major North American ecotone. **Dale Halbritter** (dhalb001@ufl.edu), Jaret Daniels, and Akito Kawahara, Univ. of Florida, Gainesville, FL
- 10:45 **2934** Factors associated with ant tending in Fender's blue butterfly (*Plebejus icarioides fenderi*): Implications for habitat restoration and species recovery. **Cameron Thomas** (cameron.thomas@wsu.edu) and Cheryl Schultz, Washington State Univ., Vancouver, WA
- 11:00 **2935** The state of conservation of *Stichelia pelotensis* Biezanko, Mielke & Wedderhoff, [1979] (Lepidoptera: Papilionoidea: Riodinidae) in Southern Brazil. **Ana Paula dos Santos de Carvalho** (acarvalho@ufl.edu)<sup>1</sup>, Francisco Candido Cardoso Barreto<sup>2</sup>, and Ana Beatriz Barros de Moraes<sup>3</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Federal Univ. of Espirito Santo, Vitória, Brazil, <sup>3</sup>Federal Univ. of Santa Maria, Santa Maria, Brazil
- 11:15 **2936** Modeling the distribution of odonates: From the pages of 20th century field notes to the shapefiles of the 21st century. **Emily Sandall** (els22@psu.edu)<sup>1</sup>, Claire Jones<sup>2</sup>, and Andrew Deans<sup>1</sup>, <sup>1</sup>Pennsylvania State Univ., University Park, PA, <sup>2</sup>DePaul Univ., Chicago, IL

- 11:30 **2937** The *Micropeza* Meigen (Diptera: Micropezidae) of Central America. **Morgan Jackson** (morgandjackson@gmail.com)<sup>1</sup>, Jeffrey Skevington<sup>2</sup>, and Stephen Marshall<sup>1</sup>, <sup>1</sup>Univ. of Guelph, Guelph, ON, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Ottawa, ON, Canada
- 11:45 **2938** Diptera as potential bioindicators in lowland wet grasslands. **John Carey** (jgcarey@gmail.com)<sup>1</sup>, Christopher Williams<sup>2</sup>, and Michael J. Gormally<sup>1</sup>, <sup>1</sup>National Univ. of Ireland, Galway, Ireland, <sup>2</sup>Liverpool John Moores Univ., Liverpool, United Kingdom
- 12:00 **2939** The Pselaphini (Staphylinidae: Pselaphinae) of New Zealand. **Brittany Owens** (brittanyeowens@gmail.com) and Christopher E. Carlton, Louisiana State Univ., Baton Rouge, LA
- 12:15 **2940** Population estimation of the American burying beetle (*Nicrophorus americanus*) in southeastern Oklahoma. **Kyle Risser** (kyle.risser@okstate.edu), Kris Giles, and Carmen Greenwood, Oklahoma State Univ., Stillwater, OK

**Graduate Student Oral Competition: Functional Genomics and Transgenesis**

**Room W240 A (Convention Center)**

**Moderators:** István Mikó<sup>1</sup> and David Furth<sup>2</sup>, <sup>1</sup>Pennsylvania State Univ., University Park, PA, <sup>2</sup>Smithsonian Institution National Museum of Natural History, Washington, DC

- 9:15 **2941** Functional importance of group I chitin deacetylases in cuticle morphology of *Tribolium castaneum* adult. **Seulgi Mun** (sruki21@gmail.com)<sup>1</sup>, Mi Young Noh<sup>1</sup>, Subbaratnam Muthukrishnan<sup>2</sup>, Karl J. Kramer<sup>2</sup>, and Yasuyuki Arakane<sup>1</sup>, <sup>1</sup>Chonnam National Univ., Gwangju, South Korea, <sup>2</sup>Kansas State Univ., Manhattan, KS
- 9:30 **2942** *De novo* transcriptomic analysis of density-dependent phase plasticity in a locust species (*Schistocerca gregaria*) and two closely related non-swarming grasshoppers. **Bert Foquet** (bertfoquet@tamu.edu) and Hojun Song, Texas A&M Univ., College Station, TX
- 9:45 **2943** Using long-term cell tracking and transgenic crickets to understand how a well-ordered insect embryo is built. **Seth Donoughe** (donoughe@fas.harvard.edu), Jordan Hoffmann, Chris Rycroft, and Cassandra Extavour, Harvard Univ., Cambridge, MA
- 10:00 **2944** Antennal transcriptome analysis and expression profile of the seabuckthorn carpenter moth, *Holcocerus hippophaecolus* (Lepidoptera: Cossidae). **Ping Hu** (hupingcs@163.com), Jing Tao, Pengfei Lu, and You-Qing Luo, Beijing Forestry Univ., Beijing, China
- 10:15 BREAK**
- 10:30 **2945** Global analysis of microRNA species in the gall midge *Mayetiola destructor*. **Chen Du** (cdu@ksu.edu)<sup>1</sup>, Ming-Shun Chen<sup>2</sup>, and R. Jeff Whitworth<sup>1</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>USDA - ARS, Manhattan, KS
- 10:45 **2946** Can transgenic flies overexpressing antioxidant enzymes blunt radiation-induced oxidative stress and improve mating success? **Vanessa Simoes Dias** (vanessadias@ufl.edu)<sup>1</sup>, Nicholas M. Teets<sup>1</sup>, Marc Schetelig<sup>2</sup>, Alfred Handler<sup>3</sup>, Daniel Hahn<sup>1</sup>, and Gabriel Araujo<sup>4</sup>,





- <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Fraunhofer Institute for Molecular Biology and Applied Ecology, Gießen, Germany, <sup>3</sup>USDA - ARS, Gainesville, FL, <sup>4</sup>Federal Univ. of Bahia, Salvador, Brazil
- 11:00 **2947** The influence of learning on mate recognition and choice in the Asian citrus psyllid, *Diaphorina citri*. **Dara Stockton** (dara.stockton@ufl.edu), Xavier Martini, Lukasz Stelinski, and Laura Pescitelli, Univ. of Florida, Lake Alfred, FL
- 11:15 **2948** Octopamine and tyramine regulate the group thermoregulatory fanning response in honey bees (*Apis mellifera* L.). **Chelsea N. Cook** (chelsea.cook@colorado.edu)<sup>1</sup>, Michael D. Breed<sup>1</sup>, and Colin Brent<sup>2</sup>, <sup>1</sup>Univ. of Colorado, Boulder, CO, <sup>2</sup>USDA - ARS, Maricopa, AZ
- 11:30 **2949** Transcriptional variation of the red imported fire ant (*Solenopsis invicta*) worker brain during task allocation. **Chloë Hawkings** (chloe.hawks@tamu.edu) and Cecilia Tamborindeguy, Texas A&M Univ., College Station, TX
- 11:45 **2950** Searching for venom: Comparative transcriptomics in robber flies (Diptera: Asilidae). **Chris Cohen** (myelaphus@gmail.com) and Michael Brewer, East Carolina Univ., Greenville, NC
- 12:00 **2951** Identification and characterization of insect effector proteins and nutrient transporter genes underlying plant manipulation. **Léa Fléchon** (flechon.lea@laposte.net), Chaoyang Zhao, and Paul Nabity, Washington State Univ., Pullman, WA
- 12:15 **2952** *Spiroplasma-Toxoptera citricida* interactions: From comparative biology to transcriptomic analysis. **Aline Guidolin** (aline.guidolin@usp.br) and Fernando Cônsoli, Univ. of São Paulo, Piracicaba, Brazil
- 9:45 **2955** Feeding and oviposition by neonicotinoid-resistant and susceptible *Frankliniella fusca* (Thysanoptera: Thripidae) on cotton seedlings grown from neonicotinoid treated seed. **Damon D'Ambrosio** (dadambro@ncsu.edu), Anders Huseth, Thomas Chappell, Dhilati Oza, Andrea Prestemon, and George G. Kennedy, North Carolina State Univ., Raleigh, NC
- 10:00 **2956** Interaction between herbicide injury and thrips injury in peanut. **Joel Moor** (jcm563@msstate.edu)<sup>1</sup>, Jeff Gore<sup>1</sup>, Don Cook<sup>1</sup>, Angus Catchot<sup>2</sup>, Fred Musser<sup>2</sup>, and Chris Dobbins<sup>1</sup>, <sup>1</sup>Mississippi State Univ., Stoneville, MS, <sup>2</sup>Mississippi State Univ., Mississippi State, MS
- 10:15 **BREAK**
- 10:30 **2957** Monitoring tobacco thrips, *Frankliniella fusca* (Hinds), resistance to neonicotinoid insecticides in the mid-south. **Chelsie Darnell** (chd102@msstate.edu)<sup>1</sup>, Angus Catchot<sup>1</sup>, Fred Musser<sup>1</sup>, Don Cook<sup>2</sup>, Jeff Gore<sup>2</sup>, Darrin Dodds<sup>1</sup>, and Shannon Morsello<sup>3</sup>, <sup>1</sup>Mississippi State Univ., Mississippi State, MS, <sup>2</sup>Mississippi State Univ., Stoneville, MS, <sup>3</sup>Syngenta, Greensboro, NC
- 10:45 **2958** Host preference of melon thrips, *Thrips palmi* Karny (Thysanoptera: Thripidae), to six vegetable crops. **Mohammad Razzak** (rafi321@ufl.edu) and Dakshina Seal, Univ. of Florida, Homestead, FL
- 11:00 **2959** The evaluation of new Bt technologies for the control of thrips and plant bugs. **Scott Graham** (sgraha24@vols.utk.edu) and Scott Stewart, Univ. of Tennessee, Jackson, TN
- 11:15 **2960** Injury assessment and economic thresholds for three species of flower thrips found in Florida strawberry. **Iris Strzyzewski** (istrz228@ufl.edu)<sup>1</sup>, Joseph E. Funderburk<sup>1</sup>, Hugh A. Smith<sup>2</sup>, and Justin Renkema<sup>2</sup>, <sup>1</sup>Univ. of Florida, Quincy, FL, <sup>2</sup>Univ. of Florida, Wimauma, FL
- 11:30 **2961** Advancing onion thrips (*Thrips tabaci*) control and onion production with a multi-faceted IPM program. **Ashley Leach** (al2282@cornell.edu), Stephen Reiners, and Brian A. Nault, Cornell Univ., Geneva, NY
- 11:45 **2962** Host plant preference and performance of *Klambothrips myopori* (Thysanoptera) in southern California. **Christopher Shogren** (cshog001@ucr.edu), Univ. of California, Riverside, CA
- 12:00 **2963** Identifying changes in gene expression that may promote virulence in the soybean aphid, *Aphis glycines*. **Ashley Yates** (yates.229@buckeyemail.osu.edu), Raman Bansal, Vitor Pavinato, and Andrew Michel, The Ohio State Univ., Wooster, OH
- 12:15 **2964** Finding new ways to control carrot rust fly (*Psila rosae*) in Ontario, Canada. **Jason Lemay** (jlemay@mail.uoguelph.ca), Cynthia Scott-Dupree, and Mary Ruth McDonald, Univ. of Guelph, Guelph, ON, Canada
- 12:30 **2965** New issues emerging in Canadian carrot weevil (*Listronotus oregonensis*) control. **Zachariah Telfer** (ztelfer@uoguelph.ca), Mary Ruth McDonald, and Cynthia Scott-Dupree, Univ. of Guelph, Guelph, ON, Canada

## Graduate Student Oral Competition: Integrated Pest Management and Sustainable Agriculture: Thrips and Others

### Room W232 A (Convention Center)

**Moderators:** Gail Kampmeier<sup>1</sup> and Damayant Buchori<sup>2</sup>, <sup>1</sup>Illinois Natural History Survey (Retired), Champaign, IL, <sup>2</sup>Bogor Agricultural Univ., Bogor, Indonesia

- 9:15 **2953** Value of neonicotinoid insecticide seed treatments in mid-south cotton (*Gossypium hirsutum* L.) production systems. **John North** (jhn39@msstate.edu)<sup>1</sup>, Jeff Gore<sup>2</sup>, Angus Catchot<sup>1</sup>, Scott Stewart<sup>3</sup>, Gus Lorenz<sup>4</sup>, Fred Musser<sup>1</sup>, Don Cook<sup>2</sup>, David L. Kerns<sup>5</sup>, and Darrin Dodds<sup>1</sup>, <sup>1</sup>Mississippi State Univ., Mississippi State, MS, <sup>2</sup>Mississippi State Univ., Stoneville, MS, <sup>3</sup>Univ. of Tennessee, Jackson, TN, <sup>4</sup>Univ. of Arkansas, Lonoke, AR, <sup>5</sup>Louisiana State Univ., Winnsboro, LA
- 9:30 **2954** Influence of tobacco thrips (*Frankliniella fusca*) and reniform nematodes (*Rotylenchulus reniformis*) on cotton yield. **Whitney Crow** (wdc165@msstate.edu)<sup>1</sup>, Angus Catchot<sup>1</sup>, Jeff Gore<sup>2</sup>, Darrin Dodds<sup>1</sup>, Thomas W. Allen<sup>1</sup>, and Don Cook<sup>2</sup>, <sup>1</sup>Mississippi State Univ., Mississippi State, MS, <sup>2</sup>Mississippi State Univ., Stoneville, MS



**Graduate Student Oral Competition: Urban Entomology in a Changing Environment: Ants**

**Room W224 B (Convention Center)**

**Moderator:** Grzegorz Buczkowski, Purdue Univ., West Lafayette, IN

- 9:15 **2966** Black carpenter ant (*Camponotus pennsylvanicus*, De Geer) phylogenetics within Indiana. **Adam Salyer** (asalyer@purdue.edu), Michael Scharf, Gary Bennett, and Grzesiek Buczkowski, Purdue Univ., West Lafayette, IN
- 9:30 **2967** The pest case and management of the tramp ant, *Trichomyrmex destructor* (Jerdon, 1851), in Northern Taiwan (Hymenoptera: Formicidae). **Feng-Chuan Hsu** (d04b44002@ntu.edu.tw)<sup>1</sup>, Jaw-Jinn Jong<sup>2</sup>, and Chung-Chi Lin<sup>3</sup>, <sup>1</sup>National Taiwan Univ., Taipei, Taiwan, <sup>2</sup>New Taipei Municipal Er Chong Junior High School, New Taipei City, Taiwan, <sup>3</sup>National Changhua Univ. of Education, Changhua, Taiwan
- 9:45 **2968** Linking community composition with morphological and physiological traits across urbanization gradients. **Abe Perez** (abe.perez@case.edu) and Sarah Diamond, Case Western Reserve Univ., Cleveland, OH
- 10:00 **2969** Effects of laboratory maintenance on cuticular hydrocarbons and conspecific aggression in odorous house ants (*Tapinoma sessile*). **Tim Luttermoser** (tlutterm@purdue.edu), Matthew Ginzler, Gary Bennett, and Grzesiek Buczkowski, Purdue Univ., West Lafayette, IN
- 10:15 BREAK**
- 10:30 **2970** Analysis of diets for rearing the tawny crazy ant (*Nylanderia fulva*). **Andrew Davitt** (andrew.davitt@tamu.edu), Aaron Tarone, and Edward Vargo, Texas A&M Univ., College Station, TX
- 10:45 **2971** Effects of the tawny crazy ant (*Nylanderia fulva*) on the ant community at the Port of Savannah, Georgia. **Benjamin Gochnour** (bmg1110@gmail.com), Univ. of Georgia, Griffin, GA
- 11:00 **2972** I'll have what she's having: Next-Generation insights into the diets of invasive ants. **MacKenzie Kjeldgaard** (mkjeldgaard@tamu.edu)<sup>1</sup>, Jason Wulff<sup>1</sup>, Edward G. LeBrun<sup>2</sup>, Gregory Sword<sup>1</sup>, and Micky Eubanks<sup>1</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>The Univ. of Texas, Austin, TX
- 11:15 **2973** Trophic ecology of a polymorphic invasive ant: Parsing within and between colony contributions. **Karl Roeder** (karoeder@ou.edu) and Michael Kaspari, Univ. of Oklahoma, Norman, OK

**Graduate Student Oral Competition: Urban Entomology in a Changing Environment: Home and Warehouse Pests**

**Room W224 A (Convention Center)**

**Moderator:** Peter Edde, Altria Client Services, Inc., Richmond, VA

- 9:15 **2974** Eliminating cockroach infestations and reducing pesticide use in apartments by integrated pest management. **Chen Zha** (chen.zha@rutgers.edu) and Changlu Wang, Rutgers, The State Univ. of New Jersey, New Brunswick, NJ

- 9:30 **2975** Toxicity and repellency of essential oils on the Turkestan cockroach, *Blatta lateralis* (Blattodea: Blattellidae). **Sudip Gaire** (sudipg@nmsu.edu), Alvaro Romero, Mary O'Connell, and F. Omar Holguin, New Mexico State Univ., Las Cruces, NM
- 9:45 **2976** Mathematic models for maximizing the efficacy of a synthetic amorphous zeolite intended for grain protection. **Kouame Yao** (kdyao@ksu.edu), Subramanyam Bhadriraju, and Kun Yan Zhu, Kansas State Univ., Manhattan, KS
- 10:00 **2977** Effect of temperature and life stage on the bacterial community associated with khapra beetle, *Trogoderma granarium* (Coleoptera: Dermestidae). **Diana Wilches** (dm.wilchescorreal@uleth.ca)<sup>1</sup>, Robert Laird<sup>1</sup>, Kevin Floate<sup>2</sup>, and Paul Fields<sup>3</sup>, <sup>1</sup>Univ. of Lethbridge, Lethbridge, AB, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Lethbridge, AB, Canada, <sup>3</sup>Agriculture and Agri-Food Canada, Winnipeg, MB, Canada
- 10:15 BREAK**
- 10:30 **2978** Phosphine resistance in *Rhyzopertha dominica* (F.) (Coleoptera: Bostrichidae) in North America: Incidence, severity, and work towards a rapid assay for detection. **Edwin Afful** (eddaful@ksu.edu) and Thomas Phillips, Kansas State Univ., Manhattan, KS
- 10:45 **2979** Assessing efficacy of botanicals to control maize weevil (Coleoptera: Curculionidae) in stored sorghum grain. **Hame Abdou Kadi Kadi** (hkadikadi@yahoo.com) and Bonnie Pendleton, West Texas A&M Univ., Canyon, TX
- 11:00 **2980** Entomophagy in the Wild West, the struggles of eating insects in Wyoming. **Megan Wilson** (mwilso39@uwyo.edu), Univ. of Wyoming, Laramie, WY

**Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Population and Community Diversity**

**Room W331 D (Convention Center)**

**Moderators:** Daniel Gruner<sup>1</sup> and Andrea Lucky<sup>2</sup>, <sup>1</sup>Univ. of Maryland, College Park, MD, <sup>2</sup>Univ. of Florida, Gainesville, FL

- 9:15 **2981** Cercopids of Madagascar: Where do you come from and where are you going? **Adeline Soulier-Perkins** (soulier@mnhn.fr), Morgane Bequet-Rennes, and Eric Guilbert, National Museum of Natural History, Paris, France
- 9:30 **2982** The Pentatomidae of the Franklin Parker Preserve in the New Jersey Pine Barrens. **Greg Cowper** (cowper@ansp.org), Drexel Univ., Philadelphia, PA
- 9:45 **2983** Nutrient subsidies and the biogeography of invertebrate communities on islands off Canada's Pacific coast. **Crystal Ernst** (crystal\_ernst@sfu.ca)<sup>1,2</sup> and John Reynolds<sup>1,2</sup>, <sup>1</sup>Hakai Institute, Heriot Bay, BC, Canada, <sup>2</sup>Simon Fraser Univ., Burnaby, BC, Canada
- 10:00 **2984** The story of "Many Thunders": Species delimitation of the highly polymorphic Neotropical damselfly genus *Polythore* (Zygoptera: Polythoridae). **Melissa Sánchez Herrera** (melsanc@gmail.com)<sup>1</sup>, Christopher Beatty<sup>1</sup>, William R. Kuhn<sup>1</sup>, Emilio Realpe<sup>2</sup>,



- Camilo Salazar<sup>3</sup>, Andrea C. Encalada<sup>4</sup>, and Jessica Ware<sup>1</sup>,  
<sup>1</sup>Rutgers, The State Univ. of New Jersey, Newark, NJ,  
<sup>2</sup>Univ. of the Andes, Bogotá, Colombia, <sup>3</sup>Univ. of  
Rosario, Bogotá, Colombia, <sup>4</sup>Univ. of San Francisco,  
Quito, Ecuador
- 10:15 BREAK**
- 10:30 2985** Insect taxonomic diversity in the Korean peninsula. **Hong-Yul Seo** (aphid@korea.kr)<sup>1</sup>, Tae-Woo Kim, Ki-Gyoung Kim, Tae-Wha Kang, and Seon-Yi Kim, National Institute of Biological Resources, Incheon, South Korea
- 10:45 2986** Delimitation, biogeography, and diversification of *Choristoneura Lederer* (Lepidoptera: Tortricidae) using molecular evidence. **Giovanny Fagua** (faguagon@ualberta.ca)<sup>1,2</sup> and Felix Sperling<sup>1</sup>, <sup>1</sup>Univ. of Alberta, Edmonton, AB, Canada, <sup>2</sup>Pontifical Catholic Univ., Bogotá, Colombia
- 11:00 2987** A summary of current arthropod conservation work in British Columbia, Canada. **Jennifer Heron** (jennifer.heron@gov.bc.ca), British Columbia Ministry of Environment, Vancouver, BC, Canada
- 11:15 2988** Ecophylogenetics of flies (Diptera) in a subarctic site, Churchill (MB, Canada). **Anna M. Solecki** (asolecki@uoguelph.ca)<sup>1</sup>, Terry A. Wheeler<sup>2</sup>, and M. Alex Smith<sup>1</sup>, <sup>1</sup>Univ. of Guelph, Guelph, ON, Canada, <sup>2</sup>McGill Univ., Sainte-Anne-de-Bellevue, QC, Canada
- 11:30 2989** Benthic macroinvertebrate community structure in a sub-tropical river system, South Africa: Implications for conservation. **Augustine Niba** (aniba@wsu.ac.za), Walter Sisulu Univ., Mthatha, South Africa
- 11:45 2990** Historical biogeography of higher termites. **Thomas Bourguignon** (thomas.bourgui@gmail.com)<sup>1</sup>, Nathan Lo<sup>2</sup>, Jan Sobotnik<sup>3</sup>, Naeem Iqbal<sup>4</sup>, Eric Coissac<sup>5</sup>, Simon Ho<sup>2</sup>, Maria Lee<sup>6</sup>, David Sillam-Dussès<sup>7,8</sup>, Barbora Krizkova<sup>3</sup>, Yves Roisin<sup>9</sup>, Theo Evans<sup>10</sup>, and Aleš Buček<sup>3</sup>, <sup>1</sup>The Univ. of Sydney, Camperdown, Australia, <sup>2</sup>The Univ. of Sydney, Sydney, Australia, <sup>3</sup>Czech Univ. of Life Sciences, Prague, Czech Republic, <sup>4</sup>Ghazi Univ., Ghazi, Pakistan, <sup>5</sup>Univ. Grenoble Alpes, Grenoble, France, <sup>6</sup>National Univ. of Singapore, Singapore, Singapore, <sup>7</sup>Univ. of Paris, Villetaneuse, France, <sup>8</sup>IRD, Bondy, France, <sup>9</sup>Free Univ. of Brussels, Brussels, Belgium, <sup>10</sup>Univ. of Western Australia, Perth, Australia
- 12:00 2991** Ants in the saltmarsh: What they tell us about natural and technological disasters. **Linda Hooper-Bui** (lindabui@lsu.edu), Rachel M. Strecker, and Xuan Chen, Louisiana State Univ., Baton Rouge, LA
- Michelle A. E. Anderson<sup>1</sup>, and Zach Adelman<sup>1,2</sup>,  
<sup>1</sup>Virginia Polytechnic Institute and State Univ.,  
Blacksburg, VA, <sup>2</sup>Texas A&M Univ., College Station, TX
- 9:30 2993** Transcriptome analysis of putative effector genes in Phylloxera. **Chaoyang Zhao** (chaoyang\_zhao@wsu.edu), Léa Fléchon, Zhen Fu, and Paul Nabity, Washington State Univ., Pullman, WA
- 9:45 2994** Differential cellulase gene expression in response to different cellulose diets in *Ctenolepisma longicaudata*. **Ratnasri Pothula** (rmallipe@vols.utk.edu)<sup>1</sup>, William Klingeman<sup>1</sup>, Margaret Staton<sup>1</sup>, Brian Johnson<sup>2</sup>, and Juan Luis Jurat-Fuentes<sup>1</sup>, <sup>1</sup>Univ. of Tennessee, Knoxville, TN, <sup>2</sup>Univ. of California, Davis, CA
- 10:00 2995** Presentation withdrawn
- 10:15 BREAK**
- 10:30 2996** Complementary expansions and contractions of the odorant, gustatory, and ionotropic receptor gene families in arthropods. **Hugh M. Robertson** (hughrobe@life.uiuc.edu), Univ. of Illinois, Champaign, IL
- 10:45 2997** Comparative genomics of tephritid fruit flies: Strategies and approaches in genome sequencing and analysis. **Scott Geib** (scott.geib@ars.usda.gov) and Sheina Sim, USDA - ARS, Hilo, HI
- 11:00 2998** Comparative analysis of chemosensory gene families in five tsetse fly species. Rosaline Macharia<sup>1</sup>, Paul Mireji<sup>2</sup>, Edwin Murungi<sup>3</sup>, Grace Murilla<sup>4</sup>, Alan Christoffels<sup>5</sup>, Serap Aksoy<sup>6</sup>, and **Daniel Masiga** (dmasiga@icipo.org)<sup>1</sup>, <sup>1</sup>International Centre of Insect Physiology and Ecology, Nairobi, Kenya, <sup>2</sup>Yale Univ. School of Public Health, New Haven, CT, <sup>3</sup>Egerton Univ., Nakuru, Kenya, <sup>4</sup>Kenya Agricultural and Livestock Research Organization, Nairobi, Kenya, <sup>5</sup>South African National Bioinformatics Institute, Cape Town, South Africa, <sup>6</sup>Yale Univ., New Haven, CT
- 11:15 2999** Comparative population genomics in halictid bees provides insights into the evolution of social behavior. **Benjamin Rubin** (berubin@princeton.edu) and Sarah Kocher, Princeton Univ., Princeton, NJ
- 11:30 3000** The microbiome of the mechanical vectors *Chrysomya megacephala* (blow fly) and *Musca domestica* (house fly). **Ana Junqueira** (anacarina@ntu.edu.sg)<sup>1</sup>, Enzo Acerbi<sup>1</sup>, Daniela Moses<sup>1</sup>, Daniel Paulo<sup>2</sup>, Ana Azeredo-Espin<sup>2</sup>, Bodo Linz<sup>3</sup>, Aakrosh Ratan<sup>4</sup>, and Stephan Schuster<sup>1</sup>, <sup>1</sup>Nanyang Technological Univ., Singapore, Singapore, <sup>2</sup>Univ. of Campinas, Campinas, Brazil, <sup>3</sup>Pennsylvania State Univ., University Park, PA, <sup>4</sup>Univ. of Virginia, Charlottesville, VA
- 11:45 3001** Comparative analysis of genome level changes in *Helicoverpa armigera* (Lepidoptera: Noctuidae) over two decades. **Omathhage P. Perera** (op.perera@ars.usda.gov) and Randall Luttrell, USDA - ARS, Stoneville, MS
- 12:00 3002** Proteomic and comparative genomic analysis of seminal fluid in *Apis mellifera* drones from regions with or without *Varroa destructor*. **Patricia Bohls** (pabohls@ucdavis.edu) and Elina Nino, Univ. of California, Davis, CA
- 12:15 3003** Gene duplication in the evolution of sex- and caste-biased gene expression. **Lin Chau** (lchau6@gatech.edu) and Michael A. D. Goodisman, Georgia Institute of Technology, Atlanta, GA

**Contributed Papers: Bioinformatics and Comparative Genomics of Arthropods: Gene Expression**

**Room W330 A (Convention Center)**

**Moderators:** Reed Johnson<sup>1</sup> and Margaret Allen<sup>2</sup>, <sup>1</sup>The Ohio State Univ., Wooster, OH, <sup>2</sup>USDA - ARS, Stoneville, MS

- 9:15 2992** Identifying heme importers and exporters through RNA seq analysis in *Aedes aegypti*. **Heather Eggleston** (abbyhl07@vt.edu)<sup>1,2</sup>,



**Contributed Papers: Biological Control and Insect Pathology: Plant and Other Extracts as Biocides**

**Room W314 A (Convention Center)**

**Moderators:** Jan Richter<sup>1</sup> and Naveeda Qureshi<sup>2</sup>, <sup>1</sup>Dept. of Agriculture and Rural Development, Bloemfontein, FL, South Africa, <sup>2</sup>Quaid-i-Azam Univ., Islamabad, Pakistan

- 9:15 **3004** Effect of foliar application of some biocides on the predators associated with *Aphis craccivora* (Koch) and *Bemisia tabaci* (Genn). **Anwar Elsheikh** (anwar.elsheikh1@gmail.com)<sup>1</sup> and M. Aassar<sup>2</sup>, <sup>1</sup>Minufiya Univ., Shibin El Kom, Egypt, <sup>2</sup>Plant Protection Research Institute, Giza, Egypt
- 9:30 **3005** Effect of *Acorus calamus* L. extract on the toxicity, feeding, and life table of *Crociodolomia pavonana* L. (Lepidoptera: Pyralidae). **Purwatiningsih Purwatiningsih** (purwati\_ningsih2000@yahoo.com), The Univ. of Jember, Jember, Indonesia
- 9:45 **3006** Toxicity comparisons of 10 insecticides to *Bemisia tabaci* (MEAM1) and its superiority parasitoid *Eretmocerus hayati*. **Deying Ma** (mdyxnd@163.com), Xin Zhang, and Yingmiao Guo, Xinjiang Agricultural Univ., Urumqi, China
- 10:00 **3007** Antitermitic and protozoacidal properties of selected plant extractives against building-infesting lower termite *Heterotermes indicola* (Wasmann) (Isoptera: Rhinotermitidae) and its gut flagellates. **Naveeda Qureshi** (naveedaqresh@gmail.com), Quaid-i-Azam Univ., Islamabad, Pakistan
- 10:15 BREAK**
- 10:30 **3008** Chromatographic profiling of constituents in extracts from intact silverleaf nightshade plants and damaged by *Leptinotarsa texana* (Schaeffer). **Jan Richter** (richtjm@gmail.com)<sup>1</sup> and Maria Cawood<sup>2</sup>, <sup>1</sup>Dept. of Agriculture and Rural Development, Bloemfontein, South Africa, <sup>2</sup>Univ. of the Free State, Bloemfontein, South Africa
- 10:45 **3009** Resistance of commercial and non-commercial woods against *Heterotermes indicola* (Wasmann) (Isoptera: Rhinotermitidae) in laboratory and field conditions. **Muhammad Afzal** (mafzal@bs.qau.edu.pk), Quaid-i-Azam Univ., Islamabad, Pakistan
- 11:00 **3010** Essential oil variation of twenty-two genotypes of *Citrus* in Brazil – chemometric approach and repellency against *Diaphorina citri* Kuwayama. **Maria Silva** (dmfs@ufscar.br)<sup>1</sup>, Moacir Andrade<sup>1</sup>, João Fernandes<sup>1</sup>, Paulo Vieira<sup>1</sup>, Paulo Bogorni<sup>2</sup>, and José Vendramim<sup>2</sup>, <sup>1</sup>Federal Univ. of São Carlos, São Carlos, Brazil, <sup>2</sup>Univ. of São Paulo, Piracicaba, Brazil

**Contributed Papers: Ecology and Population Dynamics: Behavior**

**Room W225 B (Convention Center)**

**Moderators:** Kyle Hurley<sup>1</sup> and Leigh Boardman<sup>2</sup>, <sup>1</sup>Univ. of Central Arkansas, Conway, AR, <sup>2</sup>Univ. of Florida, Gainesville, FL

- 9:15 **3011** Emergency alert! Plants communicate about herbivory through arbuscular mycorrhizal fungi. **Zoe Getman-Pickering** (zg94@cornell.edu) and Jennifer Thaler, Cornell Univ., Ithaca, NY

- 9:30 **3012** Misdirected courtship in a community of colorful *Habronattus* jumping spiders. **Lisa Taylor** (lisa.taylor@ufl.edu)<sup>1</sup> and Kevin McGraw<sup>2</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Arizona State Univ., Tempe, AZ
- 9:45 **3013** Influence of sugar resources and nest entrance size on parasitism of arboreal ants in a coffee plantation. **Esteli Jimenez-Soto** (maesjime@ucsc.edu)<sup>1</sup>, Iris Rivera-Salinas<sup>2</sup>, and Stacy M. Philpott<sup>1</sup>, <sup>1</sup>Univ. of California, Santa Cruz, CA, <sup>2</sup>Autonomous Univ. of Chapingo, Texcoco, Mexico
- 10:00 **3014** Curious cutting: Trichomes of non-native plant trigger vein-cutting by soybean loopers. **Kyle Hurley** (kylehurley87@gmail.com) and David Dussourd, Univ. of Central Arkansas, Conway, AR
- 10:15 BREAK**
- 10:30 **3015** Paternal caring behavior against ants in a giant water bug. **Shin-ya Ohba** (ooba@nagasaki-u.ac.jp) and Airi Maeda, Nagasaki Univ., Nagasaki, Japan
- 10:45 **3016** Oviposition host selection in the Ozark Baltimore checkerspot, *Euphydryas phaeton ozarkae*. **Stephen Robertson** (smr020@email.uark.edu)<sup>1</sup> and William Baltosser<sup>2</sup>, <sup>1</sup>Univ. of Arkansas, Fayetteville, AR, <sup>2</sup>Univ. of Arkansas, Little Rock, AR
- 11:00 **3017** Wavelength preference and orientation to light sources in the oriental stink bug, *Plautia stali*. **Takuya Uehara** (tue@affrc.go.jp)<sup>1</sup>, Terumi Yamaguchi<sup>1</sup>, Toyomi Kotaki<sup>1</sup>, Kentaro Arikawa<sup>2</sup>, Motohiro Wakakuwa<sup>2</sup>, and Masami Shimoda<sup>1</sup>, <sup>1</sup>National Institute of Agrobiological Sciences, Tsukuba, Japan, <sup>2</sup>Graduate Univ. for Advanced Studies, Hayama, Japan
- 11:15 **3018** Caterpillar counterploit: Acid secretion of anti-predator gland deactivates plant defense. **David Dussourd** (dussourd@uca.edu)<sup>1</sup>, Madalyn Van Valkenburg<sup>1</sup>, Kalavathy Rajan<sup>2</sup>, and Danielle Carrier<sup>2</sup>, <sup>1</sup>Univ. of Central Arkansas, Conway, AR, <sup>2</sup>Univ. of Arkansas, Fayetteville, AR
- 11:30 **3019** Monitoring and forecasting of *Helicoverpa armigera* with the help of pheromone traps in India. **Chandra Srivastava** (csrivastava63@gmail.com), Banaras Hindu Univ., Varanasi, India

**Contributed Papers: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops**

**Room W340 B (Convention Center)**

**Moderators:** Nastaran Tofangsazi<sup>1</sup> and Nicholas Friedenberg<sup>2</sup>, <sup>1</sup>Univ. of California, Riverside, CA, <sup>2</sup>Applied Biomathematics, Setauket, NY

- 9:15 **3020** Rapid detection of Asian citrus psyllid, *Diaphorina citri*, insecticide resistance using the bottle bioassay. **Xuedong Chen** (xuedongc@yahoo.com) and Lukasz Stelinski, Univ. of Florida, Lake Alfred, FL
- 9:30 **3021** Residual insecticide efficacy on field population of *Diaphorina citri* in California. **Nastaran Tofangsazi** (nastaran.tofangsazi@ucr.edu)<sup>1</sup>, Elizabeth Grafton-Cardwell<sup>2</sup>, and Matthew P. Daugherty<sup>1</sup>, <sup>1</sup>Univ. of California, Riverside, CA, <sup>2</sup>Univ. of California, Exeter, CA



- 9:45 **3022** Insecticidal effect of some plant extracts on citrus mealybug *Planococcus citri* (Risso) (Hemiptera: Pseudococcidae). **Muhammad Majeed Zeeshan** (zeeshan.majeed@uos.edu.pk), Muhammad Abkar, Muhammad Afzal, Muhammad Nawaz, and Muhammad Asam Riaz, Univ. of Sargodha, Sargodha, Pakistan
- 10:00 **3023** Investigating malathion-resistance in spotted wing drosophila populations from British Columbia, Canada. **Murali-Mohan Ayyanath** (murali-mohan.ayyanath@agr.gc.ca)<sup>1</sup>, Cheryl Zurowski<sup>1</sup>, Ian Scott<sup>2</sup>, and Kenna Mackenzie<sup>1</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, Summerland, BC, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, London, ON, Canada
- 10:15 **BREAK**
- 10:30 **3024** Molecular characteristics, mRNA expression, and alternative splicing of a ryanodine receptor gene in the Oriental fruit fly, *Bactrocera dorsalis* (Hendel). **Guo-Rui Yuan** (ygr@swu.edu.cn), Wen-Zhi Shi, and Jin-Jun Wang, Southwest Univ., Chongqing, China
- 10:45 **3025** Obliquebanded leafroller (Lepidoptera: Tortricidae) resistance to insecticides in Michigan apple and cherry orchards. **Abdulwahab Hafez** (hafezabd@msu.edu), John Wise, David Mota-Sanchez, Larry Gut, and Christine Vandervoort, Michigan State Univ., East Lansing, MI
- 11:00 **3026** Identification and expression analysis of cytochrome P450 gene families in the red palm weevil, *Rhynchophorus ferrugineus* (Olivier). **Binu Antony** (binuantony1@yahoo.co.in), Jibin Johnny, Mehmoud Abdelazim, and Saleh A. Aldosari, King Saud Univ., Riyadh, Saudi Arabia
- 11:15 **3027** Toward greater genetic complexity in IRM modeling. **Nicholas Friedenberg** (nick@ramas.com), Applied Biomathematics, Setauket, NY
- 11:30 **3028** Modeling genetics-based methods of insect crop pest control. **Nina Alphey** (nina.alphey@zoo.ox.ac.uk) and Michael Bonsall, Univ. of Oxford, Oxford, United Kingdom
- 11:45 **3029** Synergistic impact of Diver<sup>®</sup> on toxicity of some neonicotinoids against cotton mealybug, *Phenacoccus solenopsis* (Hemiptera: Pseudococcidae), under laboratory conditions. **Muhammad Dildar Gogi** (drmdgogi1974@gmail.com), Mubashar Iqbal, Muhammad Jalal Arif, Muhammad Ahsan Khan, Muhammad Sufyan, Ahmad Nawaz, and Muhammad Arshad, Univ. of Agriculture, Faisalabad, Pakistan
- 9:30 **3031** Why do some beetles fly with their elytra closed? **Wataru Kojima** (koj.wataru@gmail.com)<sup>1,2</sup> and Toshihide Kato<sup>1</sup>, <sup>1</sup>The Univ. of Tokyo, Tokyo, Japan, <sup>2</sup>National Taiwan Normal Univ., Taipei, Taiwan
- 9:45 **3032** A comparative analysis of seasonal polyphenism in Junoniini butterflies. **Jameson Clarke** (jameson.clarke@duke.edu), Duke Univ., Durham, NC
- 10:00 **3033** The transcription factor Apontic-like controls diverse coloration pattern in caterpillars. **Shinichi Yoda** (yoda@ib.k.u-tokyo.ac.jp)<sup>1</sup>, Junichi Yamaguchi<sup>1</sup>, Toshiya Ando<sup>1</sup>, Takaaki Daimon<sup>2</sup>, and Haruhiko Fujiwara<sup>1</sup>, <sup>1</sup>The Univ. of Tokyo, Kashiwa, Japan, <sup>2</sup>National Institute of Agrobiological Sciences, Tsukuba, Japan
- 10:15 **BREAK**
- 10:30 **3034** Characterization of quantitative trait loci associated with soybean aphid adaptation to resistant plants. **Vitor Pavinato** (correapavinato.1@osu.edu)<sup>1</sup>, Doris Lagos-Kutz<sup>2</sup>, Glen L. Hartman<sup>3</sup>, Curtis B. Hill<sup>4</sup>, Anitha Chirumamilla<sup>5</sup>, and Andrew Michel<sup>1</sup>, <sup>1</sup>The Ohio State Univ., Wooster, OH, <sup>2</sup>USDA - ARS, Urbana, IL, <sup>3</sup>National Soybean Research Center, Urbana, IL, <sup>4</sup>Agriscen Sciences LLC, Pilot Point, TX, <sup>5</sup>North Dakota State Univ., Fargo, ND
- 10:45 **3035** Gene expression plasticity response to alternative host plants in the speciation process of *Spodoptera frugiperda* strains. **Karina Silva-Brandão** (klsilva@gmail.com)<sup>1</sup>, Marcelo Brandão<sup>2</sup>, Renato Horikoshi<sup>1</sup>, Daniel Bernardi<sup>1</sup>, Celso Omoto<sup>1</sup>, and Antonio Figueira<sup>1</sup>, <sup>1</sup>Univ. of São Paulo, Piracicaba, Brazil, <sup>2</sup>Univ. of Campinas, Campinas, Brazil
- 11:00 **3036** Longer is better: Mouthpart plasticity in a novel environment. **Pablo Allen** (pabloallen@ufl.edu) and Christine W. Miller, Univ. of Florida, Gainesville, FL
- 11:15 **3037** Hunting by ear: The evolution of sarcophagid hearing and acoustic eavesdropping. **Brian Stucky** (stuckyb@colorado.edu)<sup>1,2</sup> and Robert Guralnick<sup>1,2</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Univ. of Colorado, Boulder, CO
- 11:30 **3038** The function of appendage patterning genes in extreme mandible development of a sexually dimorphic stag beetle. **Hiroki Gotoh** (h-r-goto@ees.hokudai.ac.jp)<sup>1</sup>, Robert Zinna<sup>2</sup>, Hitoshi Miyakawa<sup>3</sup>, Asano Ishikawa<sup>4</sup>, Yuki Ishikawa<sup>5</sup>, Yasuhiro Sugime<sup>6</sup>, Doug Emlen<sup>7</sup>, Laura C. Lavine<sup>2</sup>, and Toru Miura<sup>6</sup>, <sup>1</sup>Nagoya Univ., Chikusa, Japan, <sup>2</sup>Washington State Univ., Pullman, WA, <sup>3</sup>Utsunomiya Univ., Utsunomiya, Japan, <sup>4</sup>National Institute of Genetics, Mishima, Japan, <sup>5</sup>Nagoya Univ., Nagoya, Japan, <sup>6</sup>Hokkaido Univ., Sapporo, Japan, <sup>7</sup>Univ. of Montana, Missoula, MT
- 11:45 **3039** Now you see me, now you don't – how *Argia apicalis* males hide in plain sight (Odonata: Coenagrionidae). **Amanda Whispell** (amanda.whispell@rutgers.edu), Rutgers, The State Univ. of New Jersey, New Brunswick, NJ
- 12:00 **3040** Sexual selection on pheromone phenotype in *Heliothis virescens*. **Jeremy Heath** (jjheath@ncsu.edu)<sup>1</sup>, Astrid Groot<sup>1,2</sup>, Michiel van Wijk<sup>1,2</sup>, and Coby Schal<sup>1</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>Univ. of Amsterdam, Amsterdam, Netherlands

## Contributed Papers: Genetics and Evolutionary Entomology: Trait Expression

Room W224 G (Convention Center)

**Moderators:** Amanda Whispell<sup>1</sup> and Isobel Ronai<sup>2</sup>, <sup>1</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, <sup>2</sup>The Univ. of Sydney, Sydney, Australia

- 9:15 **3030** *Pax6* in Collembola: Adaptive evolution of eye regression. Ya-Nan Hou, Sheng Li, and **Yun-Xia Luan** (yxluan@sibs.ac.cn), Chinese Academy of Sciences, Shanghai, China



12:15 **3041** The evolution of Geadephagan chemical defense: Molecular evolution and functional validation of genes essential to quinone production in two bombardier beetle species using RNAi. **Aman Gill** (amango@gmail.com)<sup>1</sup>, Tanya Renner<sup>2</sup>, Athula Attygalle<sup>3</sup>, Wendy Moore<sup>4</sup>, and Kipling Will<sup>1</sup>, <sup>1</sup>Univ. of California, Berkeley, CA, <sup>2</sup>San Diego State Univ., San Diego, CA, <sup>3</sup>Stevens Institute of Technology, Hoboken, NJ, <sup>4</sup>Univ. of Arizona, Tucson, AZ

### Contributed Papers: Invasive and Exotic Entomology: Diagnostics, Methods, and Responses

#### Room W223 B (Convention Center)

**Moderators:** Patrice Bouchard<sup>1</sup> and Norman Barr<sup>2</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, Ottawa, ON, Canada, <sup>2</sup>USDA - APHIS, Edinburg, TX

9:15 **3042** Responding to the introduction of high-risk exotic pests in the United States – the supporting role of New Pest Response Guidelines. **Godshen Palliparambil** (grpallip@ncsu.edu)<sup>1</sup>, Trang Vo<sup>2</sup>, and Karl Suiter<sup>1</sup>, <sup>1</sup>NSF Center for Integrated Pest Management, Raleigh, NC, <sup>2</sup>USDA - APHIS, Riverdale Park, MD

9:30 **3043** New Pest Response Guidelines (USDA - APHIS - NPRG): Response options to a potential US invasion by a West and Central Asian pest of wheat and barley, *Eurygaster integriceps* Puton. **Jaap B. van Kretschmar** (jvkretsc@ncsu.edu) and Karl Suiter, NSF Center for Integrated Pest Management, Raleigh, NC

9:45 **3044** Diagnostics response to the detection and eradication of Queensland fruit fly (*Bactrocera tryoni*) in Auckland, New Zealand. Dave Voice<sup>1</sup>, Alan Flynn<sup>2</sup>, and **Sherly George** (sherly.george@mpi.govt.nz)<sup>2</sup>, <sup>1</sup>Ministry for Primary Industries, Christchurch, New Zealand, <sup>2</sup>Ministry for Primary Industries, Auckland, New Zealand

10:00 **3045** Oregon's onslaught of terrestrial exotic invertebrates. **James R. LaBonte** (jlabonte@oda.state.or.us), Oregon Dept. of Agriculture, Salem, OR

#### 10:15 BREAK

10:30 **3046** Adventive weevils (Coleoptera: Curculionoidea) recorded from Canada. **Patrice Bouchard** (patrice.bouchard@agr.gc.ca)<sup>1</sup>, Hume Douglas<sup>1</sup>, and Robert S. Anderson<sup>2</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, Ottawa, ON, Canada, <sup>2</sup>Canadian Museum of Nature, Ottawa, ON, Canada

10:45 **3047** Disentangling the complex invasion history of *Drosophila suzukii* by means of ABC-Random Forest treatments. **Antoine Fraimout** (antoine.fraimout@edu.mnhn.fr), National Center for Scientific Research, Paris, France

11:00 **3048** New insights into the reproductive transcriptome profile of the Mediterranean fruit fly, *Ceratitis capitata*. **Ingrid Curril** (icurril@gwdg.de), Georg Oberhofer, Julia Golldamm, and Ernst Wimmer, Georg August Univ., Göttingen, Germany

11:15 **3049** Acceptance of molecular diagnostic protocols: A national and international perspective. **Norman Barr** (norman.b.barr@aphis.usda.gov), USDA - APHIS, Edinburg, TX

### Contributed Papers: Medical and Veterinary Entomology: Mosquito Ecology and Management

#### Room W230 A (Convention Center)

**Moderators:** Kathleen Walker<sup>1</sup>, Barry Alto<sup>2</sup>, and Habte Tekie<sup>3</sup>, <sup>1</sup>Univ. of Arizona, Tucson, AZ, <sup>2</sup>Univ. of Florida, Vero Beach, FL, <sup>3</sup>Addis Ababa Univ., Addis Ababa, Ethiopia

9:15 **3050** Risk of transmission of emergent lineages of chikungunya virus by Florida mosquito vectors.

**Barry Alto** (bwalto@ufl.edu), Keenan Wiggins, Bradley Eastmond, Daniel Velez, L. Philip Lounibos, and Cynthia C. Lord, Univ. of Florida, Vero Beach, FL

9:30 **3051** Evaluation of neem (*Azadirachta indica* A. Juss.) seed and leaf extracts for larvicidal and growth regulatory activities against *Anopheles arabiensis* Patton (Diptera: Culicidae) under laboratory conditions.

**Habte Tekie** (habte\_tm@yahoo.com)<sup>1</sup> and Getnet Atnafu<sup>2</sup>, <sup>1</sup>Addis Ababa Univ., Addis Ababa, Ethiopia, <sup>2</sup>Debre Markos Univ., Debre Markos, Ethiopia

9:45 **3052** Genetic variability of *Aedes aegypti* (Linnaeus) mosquito populations in El Salvador. **Andrea Joyce** (ajoyce2@ucmerced.edu)<sup>1</sup>, Miguel Moreno Mendoza<sup>2</sup>, Melany Murillo Torres<sup>3</sup>, and Eduardo Romero Chevez<sup>4</sup>, <sup>1</sup>Univ. of California, Merced, CA, <sup>2</sup>School of Biology, San Salvador, El Salvador, <sup>3</sup>CENSALUD, San Salvador, El Salvador, <sup>4</sup>Ministry of Health, San Salvador, El Salvador

10:00 **3053** Ecology of insect species in Buruli ulcer endemic and non-endemic parts of Nigeria, West Africa. **Joy Anogwih** (joyaa10@gmail.com)<sup>1</sup>, Chiamaka Odenigbo<sup>2</sup>, and Fouad Adetoro<sup>3</sup>, <sup>1</sup>Auburn Univ., Auburn, AL, <sup>2</sup>Univ. of Lagos, Yaba, Nigeria, <sup>3</sup>Univ. of Lagos, Akoka, Nigeria

#### 10:15 BREAK

10:30 **3054** Large indoor cage study of the suppression of stable *Aedes aegypti* populations by the release of thiotepa-sterilised males. **René Gato** (rene@ipk.sld.cu), Institute Pedro Kouri, Havana, Cuba

10:45 **3055** Enlisting citizen scientists for disease vector surveillance: The great Arizona mosquito hunt. **Kathleen Walker** (krwalker@cals.arizona.edu)<sup>1</sup>, Robin Rathman<sup>2</sup>, Hayley Yaglom<sup>3</sup>, Craig Levy<sup>4</sup>, Kacey Ernst<sup>1</sup>, Benjamin Beal<sup>1</sup>, Mariana Casal<sup>3</sup>, Andrew Strumpf<sup>4</sup>, and Dawn Stokka<sup>4</sup>, <sup>1</sup>Univ. of Arizona, Tucson, AZ, <sup>2</sup>Cienega High School, Vail, AZ, <sup>3</sup>Arizona Dept. of Health Services, Phoenix, AZ, <sup>4</sup>Maricopa County Dept. of Public Health, Phoenix, AZ

11:00 **3056** Monitoring *Aedes albopictus* abundance and effectiveness of control interventions in an European urban area. Beniamino Caputo<sup>1</sup>, Mattia Manica<sup>1</sup>, Roberto Rosa<sup>2</sup>, and **Alessandra della Torre** (ale.dellatorre@uniroma1.it)<sup>1</sup>, <sup>1</sup>Sapienza Univ. of Rome, Rome, Italy, <sup>2</sup>Edmund Mach Foundation, San Michele all'Adige, Italy



- 11:15 **3057** Suppression of an isolated population of the mosquito vector *Aedes polynesiensis* on the atoll of Tetiaroa, French Polynesia, by sustained release of *Wolbachia*-incompatible male mosquitoes. **Hervé Bossin** (hbossin@ilm.pf)<sup>1</sup>, Hereiti Petit<sup>1</sup>, Jerome Marie<sup>1</sup>, Benoit Stoll<sup>2</sup>, and Michel Cheong Sang<sup>1</sup>, <sup>1</sup>Institute Louis Malarde, Papeete, French Polynesia, <sup>2</sup>Univ. of French Polynesia, Faaa, French Polynesia
- 11:30 **3058** Not going high? Climate change and the distribution of invasive *Aedes* mosquitoes across an altitudinal gradient in their native range. **Luis Chaves** (lchaves@nagasaki-u.ac.jp), Nagasaki Univ., Nagasaki, Japan
- 11:45 **3059** Unraveling host-vector-arbovirus interactions by two-gene high resolution melting mosquito bloodmeal analysis in a Kenyan wildlife-livestock interface. **Jandouwe Villinger** (jandouwe@icipe.org)<sup>1</sup>, David Omondi<sup>1</sup>, Yvonne Ajamma<sup>1</sup>, Burtram Fielding<sup>2</sup>, Laban Njoroge<sup>3</sup>, and Daniel Masiga<sup>1</sup>, <sup>1</sup>International Centre of Insect Physiology and Ecology, Nairobi, Kenya, <sup>2</sup>Univ. of Western Cape, Bellville, South Africa, <sup>3</sup>National Museums of Kenya, Nairobi, Kenya
- 12:00 **3060** Factors affecting the ability of *Culex pipiens* mosquitoes to transmit Rift Valley fever virus. **Adrian Zagrajek** (adrian.zagrajek@pirbright.ac.uk) and Anthony Wilson, The Pirbright Institute, Woking, United Kingdom

### Contributed Papers: Morphology, Systematics, and Phylogeny: Lepidoptera

#### Room W330 C (Convention Center)

**Moderators:** Paul Goldstein<sup>1</sup> and Erik van Nieukerken<sup>2</sup>, <sup>1</sup>USDA - ARS, Washington, DC, <sup>2</sup>Naturalis Biodiversity Center, Leiden, Netherlands

- 9:15 **3061** Histology of Lepidoptera: An analysis of stain performance on Lepidoptera wings and genitalia. **Christi Jaeger** (christi@ualberta.ca), Mississippi Entomological Museum, Mississippi State, MS
- 9:30 **3062** Structures and development of the clear wing in Lepidoptera. **Yusuke Kondo** (yougot2003@hotmail.com) and Haruhiko Fujiwara, The Univ. of Tokyo, Kashiwa, Japan
- 9:45 **3063** Male scent scales of Tortricidae and Gelechiidae (Lepidoptera). **Richard Brown** (moth@ra.msstate.edu)<sup>1</sup>, Sangmi Lee<sup>2</sup>, and Joaquin Baixeras<sup>3</sup>, <sup>1</sup>Mississippi Entomological Museum, Mississippi State, MS, <sup>2</sup>Arizona State Univ., Tempe, AZ, <sup>3</sup>Univ. of València, València, Spain
- 10:00 **3064** New fossil Lepidoptera (Insecta: Amphiesmenoptera) from the Middle Jurassic Jiulongshan Formation of northeastern China. **Chungkun Shih** (chungkun.shih@gmail.com)<sup>1,2</sup>, Weiting Zhang<sup>3</sup>, Conrad Labandeira<sup>1,2,4</sup>, Jae-Cheon Sohn<sup>2,5</sup>, Donald R. Davis<sup>2</sup>, Jorge Santiago-Blay<sup>2</sup>, Oliver Flint<sup>2</sup>, and Dong Ren<sup>1</sup>, <sup>1</sup>Capital Normal Univ., Beijing, China, <sup>2</sup>Smithsonian Institution National Museum of Natural History, Washington, DC, <sup>3</sup>Shijiazhuang Univ. of Economics, Shijiazhuang, China, <sup>4</sup>Univ. of Maryland, College Park, MD, <sup>5</sup>Mokpo National Univ., Moppo, South Korea

- 10:15 BREAK**
- 10:30 **3065** Phylogeny and divergence times of pygmy leafmining moths (Lepidoptera: Nepticulidae), the earliest lepidopteran radiation on angiosperms? Camiel Doorenweerd<sup>1,2</sup>, **Erik van Nieukerken** (erik.vannieukerken@naturalis.nl)<sup>1</sup>, and Robert Hoare<sup>3</sup>, <sup>1</sup>Naturalis Biodiversity Center, Leiden, Netherlands, <sup>2</sup>Univ. of Amsterdam, Amsterdam, Netherlands, <sup>3</sup>Landcare Research, Auckland, New Zealand
- 10:45 **3066** A taxonomic study of the genus *Anatrachyntis* Meyrick (Lepidoptera: Cosmopterigidae) in Japan. **Toshiya Hirowatari** (hirowat\_t@agr.kyushu-u.ac.jp)<sup>1</sup> and Hiroshi Kuroko<sup>2</sup>, <sup>1</sup>Kyushu Univ., Fukuoka, Japan, <sup>2</sup>Osaka Prefecture Univ., Kishiwada, Japan
- 11:00 **3067** Phylogenetic relationships, wing shape, and the evolution of tails across the Arsenurinae (Lepidoptera: Bombycoidea: Saturniidae). **Chris Hamilton** (chamilton@flmnh.ufl.edu)<sup>1</sup>, Nathalie Keller<sup>1</sup>, Jesse Breinholt<sup>1</sup>, Jesse R. Barber<sup>2</sup>, and Akito Kawahara<sup>1</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Boise State Univ., Boise, ID
- 11:15 **3068** Phylogenetic underpinnings of the Acronictinae and Amphipyrrinae (Lepidoptera: Noctuidae) and implications for understanding larval and life history evolution in the lower Noctuidae. **David L. Wagner** (david.wagner@uconn.edu)<sup>1</sup>, Jadranka Rota<sup>2</sup>, Niklas Wahlberg<sup>2</sup>, Brigette Zacharczenko<sup>1</sup>, Kevin Keegan<sup>1</sup>, Chris Schmidt<sup>3</sup>, and Reza Zahiri<sup>4</sup>, <sup>1</sup>Univ. of Connecticut, Storrs, CT, <sup>2</sup>Lund Univ., Lund, Sweden, <sup>3</sup>Agriculture and Agri-Food Canada, Ottawa, ON, Canada, <sup>4</sup>Canadian Food Inspection Agency, Ottawa, ON, Canada
- 11:30 **3069** Beach plum (*Prunus maritima*) (Rosaceae) as an overlooked lepidopteran host: Life histories of the dune noctuid (*Sympistis riparia*) and the coastal heathland cutworm (*Abagrotis nefascia*) (Lepidoptera: Noctuidae). **Paul Goldstein** (paul.goldstein@ars.usda.gov)<sup>1</sup> and Michael Nelson<sup>2</sup>, <sup>1</sup>USDA - ARS, Washington, DC, <sup>2</sup>Natural Heritage & Endangered Species Program, Westborough, MA
- 11:45 **3070** Presentation withdrawn
- 12:00 **3071** Phylogenomics of an endemic Hawaiian butterfly reveal complex patterns of divergence and isolation. **Daniel Rubinoff** (rubinoff@hawaii.edu)<sup>1</sup>, William Haines<sup>1</sup>, Sheina Sim<sup>2</sup>, and Scott Geib<sup>2</sup>, <sup>1</sup>Univ. of Hawai'i, Honolulu, HI, <sup>2</sup>USDA - ARS, Hilo, HI
- 12:15 **3072** Phylogenetic relationships of subfamilies in the family Hesperidae (Lepidoptera: Hesperioidea) from China. **Xiangqun Yuan** (yuanxq@nwsuaf.edu.cn), Yiping Li, Ke Gao, and Feng Yuan, Northwest A&F Univ., Yangling, China
- 12:30 **3073** Sorting *incertae sedis*: Molecular phylogeny of Asian skippers (Lepidoptera: Hesperidae). **Hideyuki Chiba** (skipper@i.bekkoame.ne.jp), Freelance, Fukuoka, Japan



**Contributed Papers: Morphology, Systematics, and Phylogeny: Bees, Ants, and Wasps**

**Room W224 H (Convention Center)**

**Moderators:** Rodolfo Probst<sup>1</sup> and Manuela Sann<sup>2</sup>, <sup>1</sup>Museum of Zoology of the Univ. of São Paulo, São Paulo, Brazil, <sup>2</sup>Museum of Natural History, Berlin, Germany

- 9:15 **3074** Vespidae phylogenomics and the origins of eusociality. **Patrick Piekarski** (pkpiekarski@gmail.com)<sup>1</sup>, J. M. Carpenter<sup>2</sup>, Alan Lemmon<sup>3</sup>, Emily Lemmon<sup>3</sup>, and Barbara Sharanowski<sup>1</sup>, <sup>1</sup>Univ. of Central Florida, Orlando, FL, <sup>2</sup>American Museum of Natural History, New York, NY, <sup>3</sup>Florida State Univ., Tallahassee, FL
- 9:30 **3075** Phylogenetic relationships of apoid wasps and bees inferred from analyzing target DNA enrichment data. **Manuela Sann** (manuela.sann@mfn-berlin.de)<sup>1</sup>, Ralph Peters<sup>2</sup>, Oliver Niehuis<sup>2</sup>, Christoph Mayer<sup>2</sup>, Alexander Donath<sup>2</sup>, Malte Petersen<sup>2</sup>, Sarah Bank<sup>2</sup>, Lars Podsiadlowski<sup>3</sup>, Karen Meusemann<sup>2</sup>, Bernhard Misof<sup>2</sup>, Christoph Bleidorn<sup>4</sup>, and Michael Ohl<sup>1</sup>, <sup>1</sup>Museum of Natural History, Berlin, Germany, <sup>2</sup>Zoological Reserch Museum Alexander Koenig, Bonn, Germany, <sup>3</sup>Univ. of Bonn, Bonn, Germany, <sup>4</sup>Univ. of Leipzig, Leipzig, Germany
- 9:45 **3076** The evolution of diet breadth in *Melissodes* Latreille (Hymenoptera: Apidae). **Karen Wright** (karen@sevilleta.unm.edu) and Kelly Miller, Univ. of New Mexico, Albuquerque, NM
- 10:00 **3077** Brood parasitism in spider wasps, with special reference to its behavior of a species (Hymenoptera: Pompilidae). **Akira Shimizu** (shimizu-akira@tmu.ac.jp) and Hiroaki Kurushima, Tokyo Metropolitan Univ., Hachioji, Japan
- 10:15 BREAK**
- 10:30 **3078** Taxonomic revision of the Neotropical velvet ant genus *Tallium* André with discussion of two novel setal types (Hymenoptera: Mutillidae). **Craig Brabant** (brabant@entomology.wisc.edu), Wisconsin Insect Research Collection, Madison, WI
- 10:45 **3079** Delineating boundaries: A taxonomic revision and phylogeny of the ant genus *Prenolepis* (Hymenoptera: Formicidae: Formicinae). **Jason Williams** (jleewill@gmail.com) and John S. LaPolla, Towson Univ., Towson, MD
- 11:00 **3080** Ants of the *Pachycondyla* genus group in Ecuador: Phylogeny, taxonomy, and distribution. **Adrian Troya** (adrian.troya@epn.edu.ec) and Oscar Suing, National Polytechnic School, Quito, Ecuador
- 11:15 **3081** The phylogeny of the ant genus *Temnothorax*. **Matthew Prebus** (mmprebus@ucdavis.edu), Univ. of California, Davis, CA
- 11:30 **3082** Molecular and morphological characters as tools to resolve cryptic species taxonomy and phylogenetics — the case of the ant genus *Basicros* (Formicidae: Myrmicinae: Attini). **Rodolfo Probst** (probstrodolfo@gmail.com)<sup>1</sup>, Corrie Moreau<sup>2</sup>, and Carlos Brandão<sup>1</sup>, <sup>1</sup>Museum of Zoology of the Univ. of São Paulo, São Paulo, Brazil, <sup>2</sup>The Field Museum of Natural History, Chicago, IL

- 11:45 **3083** Microbial diversity and distribution within a widespread Neotropical ant host (*Cephalotes atratus*): An evolutionary and geographic perspective. **Shauna Price** (slprice@gmail.com) and Corrie Moreau, The Field Museum of Natural History, Chicago, IL

**Contributed Papers: Morphology, Systematics, and Phylogeny: Tenebrionids, Clerids, Staphylinids, and Scarabs**

**Room W225 A (Convention Center)**

**Moderators:** John Leavengood<sup>1</sup> and Adam Brunke<sup>2</sup>, <sup>1</sup>USDA - APHIS, Pharr, TX, <sup>2</sup>Natural History Museum, Vienna, Austria

- 9:15 **3084** Phylogeography of troglobitic beetles in Appalachia. **Karen Ober** (kober@holycross.edu), College of the Holy Cross, Worcester, MA
- 9:30 **3085** A phylogenomic study of the Tenebrionidae. **Kojun Kanda** (kojun.kanda@nau.edu)<sup>1</sup>, Aaron Smith<sup>1</sup>, and David Maddison<sup>2</sup>, <sup>1</sup>Northern Arizona Univ., Flagstaff, AZ, <sup>2</sup>Oregon State Univ., Corvallis, OR
- 9:45 **3086** A revised Amphidorini (Coleoptera: Tenebrionidae) classification based on morphological and molecular data. **Aaron Smith** (aaron.smith@nau.edu)<sup>1</sup>, Kojun Kanda<sup>1</sup>, and M. Andrew Johnston<sup>2</sup>, <sup>1</sup>Northern Arizona Univ., Flagstaff, AZ, <sup>2</sup>Arizona State Univ., Tempe, AZ
- 10:00 **3087** Pantropical Carabidae: Studies of the genus *Plochionus* Dejean 1821, the tent-caterpillar hunters. **Beulah Garner** (b.garner@nhm.ac.uk), The Natural History Museum, London, United Kingdom
- 10:15 BREAK**
- 10:30 **3088** Phylogeny of Cleroidea (Coleoptera): Morphological and palaeontological evidence. **Jiri Kolibac** (jkolibac@mzm.cz), Moravian Museum, Brno, Czech Republic
- 10:45 **3089** The New World Hydnocerinae (Coleoptera: Cleridae): Slowly bringing clarity to a tortured taxonomic history. **John Leavengood** (johnshorrorcorner@gmail.com), USDA - APHIS, Pharr, TX
- 11:00 **3090** Morphology of the wing apparatus and flight characteristics of featherwing beetles (Coleoptera: Ptiliidae), the smallest free-living insects. **Alexey Polilov** (polilov@gmail.com), Natalija Reshetnikova, and Sergey Farisenkov, Lomonosov Moscow State Univ., Moscow, Russian Federation
- 11:15 **3091** Unravelling the cryptic diversity of Australia's canthonine fauna (Scarabaeidae: Scarabaeinae: Canthonini) with a focus on *Lepanus* and allies. **Nicole Gunter** (ngunter@cmnh.org)<sup>1</sup>, Geoff Monteith<sup>2</sup>, and Tom Weir<sup>3</sup>, <sup>1</sup>Cleveland Museum of Natural History, Cleveland, OH, <sup>2</sup>Queensland Museum, Brisbane, Australia, <sup>3</sup>Australian National Insect Collection, Black Mountain, Australia
- 11:30 **3092** Towards the phylogenetic relationships of the genus *Batrisodes* Reitter (Staphylinidae: Pselaphinae) in the southern Appalachian Mountains, United States. **Laura Vasquez-Velez** (lvasque@clemson.edu), Clemson Univ., Clemson, SC





- 11:45 **3093** Molecular phylogeny of the staphylinid beetle subfamily Aleocharinae (Coleoptera, Staphylinidae). **Vladimir Gusarov** (vladimir.gusarov@nhm.uio.no), Natural History Museum, Oslo, Norway
- 12:00 **3094** Extinct diversity and integrated, dated phylogeny of a megadiverse beetle lineage (Staphylinidae: Staphylinini) using data from  $\mu$ CT reconstruction of amber fossils. **Adam Brunke** (adam.j.brunke@gmail.com)<sup>1</sup>, Nesrine Akkari<sup>1</sup>, and Alexey Solodovnikov<sup>2</sup>, <sup>1</sup>Natural History Museum, Vienna, Austria, <sup>2</sup>Natural History Museum, Copenhagen, Denmark

## Thursday, September 29, 2016 • Afternoon

### Symposium: Dynamic Interactions at the Tick-Host-Pathogen Interface

#### Room W240 C (Convention Center)

**Moderator and Organizer:** Stephen Wikel, Quinnipiac Univ., Hamden, CT

- 1:30 **3095** Next-generation transcriptome and proteome approaches to better understand the transmission life-cycle of the tick *Ixodes ricinus*. **Michalis Kotsyfakis** (mich\_kotsyfakis@yahoo.com), Czech Academy of Sciences, Branisovska, Czech Republic
- 2:00 **3096** Inhibition of nod-like receptor sensing by a tick salivary protein. **Joao Pedra** (jpedra@som.umaryland.edu), Xiaowei Wang, and Dana Shaw, Univ. of Maryland, Baltimore, MD
- 2:15 **3097** Evolutionary analysis of host resistance to cattle tick infestation and tick-borne disease in ungulates. **Nicholas Jonsson** (nicholas.jonsson@glasgow.ac.uk) and Michael Stear, Univ. of Glasgow, Glasgow, United Kingdom
- 2:30 **3098** Immunobiology of white-tailed deer response to vaccine targeting outbreak populations of cattle fever ticks in the U.S. **Adalberto Pérez de León** (beto.perezdeleon@ars.usda.gov)<sup>1</sup>, Ashley Petersen<sup>2</sup>, Lane Foil<sup>3</sup>, Felix Guerrero<sup>1</sup>, Maxim Lebedev<sup>2</sup>, and Alan Young<sup>2</sup>, <sup>1</sup>USDA - ARS, Kerrville, TX, <sup>2</sup>South Dakota State Univ., Brookings, SD, <sup>3</sup>Louisiana State Univ., Clinton, LA
- 2:45 **3099** Emerging role of basophils in acquired protective immunity to tick infestation. **Hajime Karasuyama** (karasuyama.mbch@tmd.ac.jp), Tokyo Medical and Dental Univ., Tokyo, Japan

### Symposium: Invasive Bark and Ambrosia Beetles: A Pest Problem of Worldwide Significance

#### Room W414 C (Convention Center)

**Moderators and Organizers:** Steven Seybold<sup>1</sup> and Massimo Faccoli<sup>2</sup>, <sup>1</sup>USDA - Forest Service, Davis, CA, <sup>2</sup>Univ. of Padua, Padua, Italy

- 1:30 **3100** The walnut twig beetle, *Pityophthorus juglandis* Blackman (Coleoptera: Curculionidae: Scolytinae), in northern Italy. **Massimo Faccoli** (massimo.faccoli@unipd.it), Univ. of Padua, Padua, Italy

- 1:45 **3101** Non-native bark and ambrosia beetles in Canada: Pathways, spread, and impacts. **Leland Humble** (lhumble@nrcan.gc.ca)<sup>1</sup> and David Langor<sup>2</sup>, <sup>1</sup>Natural Resources Canada, Victoria, BC, Canada, <sup>2</sup>Natural Resources Canada, Edmonton, AB, Canada
- 2:00 **3102** Impact of extreme climatic events on host selection by exotic ambrosia beetles in eastern North America. **Christopher Ranger** (christopher.ranger@ars.usda.gov), USDA - ARS, Wooster, OH
- 2:15 **3103** California, USA: A hotbed of invasive bark and ambrosia beetles on conifers and hardwoods. **Steven Seybold** (sjseybold@gmail.com), USDA - Forest Service, Davis, CA
- 2:30 **3104** Neotropical bark and ambrosia beetles in southern Florida, USA: Long overlooked native or recently introduced invasive species? **Thomas H. Atkinson** (thatkinson.austin@gmail.com), The Univ. of Texas, Austin, TX
- 2:45 **3105** Biology and mechanism of invasion by the red turpentine beetle in China. **Zhen Zhang** (zhangzhen@caf.ac.cn), Chinese Academy of Forestry, Beijing, China

#### 3:00 BREAK

- 3:15 **3106** Effect of habitat and climatic preferences on alien ambrosia beetle invasions in deciduous temperate forests. **Davide Rassati** (davide.rassati@unipd.it), Univ. of Padova, Legnaro, Italy
- 3:30 **3107** Biology and impact of Xyleborini ambrosia beetles in Japan. **Hisashi Kajimura** (kajimura@agr.nagoya-u.ac.jp), Nagoya Univ., Nagoya, Japan
- 3:45 **3108** The role of mating systems in bark and ambrosia beetle invasions. **Lawrence R. Kirkendall** (lawrence.kirkendall@zoo.uib.no), Univ. of Bergen, Bergen, Norway
- 4:00 **3109** Proactive empirical assessment of future invasive bark and ambrosia beetles. **Jiri Hulcr** (hulcr@ufl.edu), Univ. of Florida, Gainesville, FL
- 4:15 **3110** International cooperation and earlier detection of bark and ambrosia beetles. **Robert Rabaglia** (brabaglia@fs.fed.us), USDA - Forest Service, Washington, DC

### Symposium: Millions of Hectares and Counting: Knowledge Gained during Recent Bark Beetle Outbreaks in Western North America

#### Room W314 A (Convention Center)

**Moderators and Organizers:** Christopher J. Fettig<sup>1</sup> and Ann M. Lynch<sup>2</sup>, <sup>1</sup>USDA - Forest Service, Davis, CA, <sup>2</sup>USDA - Forest Service, Tucson, AZ

- 1:30 **3111** Reconstructing historical *Dendroctonus ponderosae* activity in *Pinus contorta* forests in the northern Colorado Front Range. **Jose F. Negrón** (jnegron@fs.fed.us) and Laurie S. Huckaby, USDA - Forest Service, Fort Collins, CO
- 1:45 **3112** Bark beetle dynamics across forested landscapes. **John E. Lundquist** (jlundquist@fs.fed.us)<sup>1</sup> and Robin Reich<sup>2</sup>, <sup>1</sup>USDA - Forest Service, Anchorage, AK, <sup>2</sup>Colorado State Univ., Fort Collins, CO



- 2:00 **3113** Extraordinary events in British Columbia: Chronicling the mountain pine beetle outbreak. **Lorraine Maclauchlan** (lorraine.maclauchlan@gov.bc.ca)<sup>1</sup> and Jodi Axelson<sup>2</sup>, <sup>1</sup>British Columbia Ministry of Forests, Lands and Natural Resource Operations, Kamloops, BC, Canada, <sup>2</sup>British Columbia Ministry of Forests, Lands and Natural Resource Operations, Williams Lake, BC, Canada
- 2:15 **3114** Mycoinsecticides: Developing new tools for bark beetle management. **Clifford Bradley** (cbradley@montana.com)<sup>1</sup>, Egan Jankowski<sup>1</sup>, Janina Bradley<sup>1</sup>, Richard Hofstetter<sup>2</sup>, Christopher J. Fettig<sup>3</sup>, Robert A. Progar<sup>4</sup>, Brytten E. Steed<sup>5</sup>, Steve Munson<sup>6</sup>, and Danielle Malesky<sup>6</sup>, <sup>1</sup>Montana BioAgriculture, Inc., Missoula, MT, <sup>2</sup>Northern Arizona Univ., Flagstaff, AZ, <sup>3</sup>USDA - Forest Service, Davis, CA, <sup>4</sup>USDA - Forest Service, La Grande, OR, <sup>5</sup>USDA - Forest Service, Missoula, MT, <sup>6</sup>USDA - Forest Service, Ogden, UT
- 2:30 **3115** Makings of a good host: Condition-dependent success of trees and bark beetles. **Mary L. Reid** (mreid@ucalgary.ca) and Megan D. Goulding, Univ. of Calgary, Calgary, AB, Canada
- 2:45 **3116** Physiological, physical, and chemical characteristics of Engelmann and blue spruces related to spruce beetle host selection, colonization, and reproduction. **Daniel S. Ott** (daniel.ott@oregonstate.edu)<sup>1</sup>, Christopher J. Fettig<sup>2</sup>, Steve Munson<sup>3</sup>, Darrell W. Ross<sup>1</sup>, Justin B. Runyon<sup>4</sup>, Frederick C.

Meinzer<sup>5</sup>, and Kimberly F. Wallin<sup>6</sup>, <sup>1</sup>Oregon State Univ., Corvallis, OR, <sup>2</sup>USDA - Forest Service, Davis, CA, <sup>3</sup>USDA - Forest Service, Ogden, UT, <sup>4</sup>USDA - Forest Service, Bozeman, MT, <sup>5</sup>USDA - Forest Service, Corvallis, OR, <sup>6</sup>Univ. of Vermont, Burlington, VT

**3:00 BREAK**

- 3:15 **3117** Survivor response to high-severity bark beetle outbreaks in a spruce-fir forest in southern Arizona, U.S.A. **Ann M. Lynch** (alynch@fs.fed.us)<sup>1</sup> and Christopher D. O'Connor<sup>2</sup>, <sup>1</sup>USDA - Forest Service, Tucson, AZ, <sup>2</sup>USDA - Forest Service, Missoula, MT
- 3:30 **3118** Learning to speak beetle: Recent developments using sound in pest control. **Nicholas C. Aflitto** (na398@cornell.edu)<sup>1</sup>, Richard W. Hofstetter<sup>2</sup>, David Dunn<sup>3</sup>, James Windmill<sup>4</sup>, and Jeremy Gibson<sup>4</sup>, <sup>1</sup>Cornell Univ., Ithaca, NY, <sup>2</sup>Northern Arizona Univ., Flagstaff, AZ, <sup>3</sup>Univ. of California, Santa Cruz, CA, <sup>4</sup>Univ. of Strathclyde, Glasgow, United Kingdom
- 3:45 **3119** Exploiting the chemical ecology of the mountain pine beetle. **Robert A. Progar** (rprogar@fs.fed.us)<sup>1</sup>, Christopher J. Fettig<sup>2</sup>, and Nancy E. Gillette<sup>3</sup>, <sup>1</sup>USDA - Forest Service, La Grande, OR, <sup>2</sup>USDA - Forest Service, Davis, CA, <sup>3</sup>USDA - Forest Service, Berkeley, CA
- 4:00 **3120** Interactions among mountain pine beetle and associated mites and fungi in Colorado. **Javier E. Mercado** (jmercado01@fs.fed.us), USDA - Forest Service, Fort Collins, CO

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THURSDAY

- 4:15 **3121** Do bark beetle (*Dendroctonus* spp.) outbreaks affect wildfires? Assessing beetle-induced changes to tree chemistry and flammability. **Justin B. Runyon** (jrunyon@fs.fed.us)<sup>1</sup>, Michael J. Jenkins<sup>2</sup>, and Wesley G. Page<sup>2</sup>, <sup>1</sup>USDA - Forest Service, Bozeman, MT, <sup>2</sup>Utah State Univ., Logan, UT
- 4:30 **3122** Carbon cycling in lodgepole pine forests after mountain pine beetle outbreaks. **E. Matthew Hansen** (matthansen@fs.fed.us)<sup>1</sup>, Michael C. Amacher<sup>1</sup>, Helga Van Miegroet<sup>2</sup>, James N. Long<sup>2</sup>, and Michael G. Ryan<sup>3</sup>, <sup>1</sup>USDA - Forest Service, Logan, UT, <sup>2</sup>Utah State Univ., Logan, UT, <sup>3</sup>Colorado State Univ., Fort Collins, CO
- 4:45 **3123** Red turpentine beetle: Innocuous native becomes invasive tree killer in China with new concerns for North America. **Nancy E. Gillette** (beetlegillette@yahoo.com)<sup>1</sup>, Jianghua Sun<sup>2</sup>, and Min Lu<sup>2</sup>, <sup>1</sup>USDA - Forest Service, Berkeley, CA, <sup>2</sup>Chinese Academy of Sciences, Beijing, China
- 5:00 **3124** Coexistence of two aggressive species of pine bark beetle, *Dendroctonus frontalis* and *D. mesoamericanus*, in Chiapas, Mexico: Interactions and their influence on host colonization. **Alicia Niño-Domínguez** (pupa\_rlaveu@hotmail.com)<sup>1</sup>, Brian T. Sullivan<sup>2</sup>, Jorge Macías-Sámano<sup>1</sup>, and Stephen R. Clarke<sup>3</sup>, <sup>1</sup>College of Southern Border, Tapachula, Mexico, <sup>2</sup>USDA - Forest Service, Pineville, LA, <sup>3</sup>USDA - Forest Service, Lufkin, TX

### Symposium: Breeding Honey Bees, *Apis mellifera*, for Resistance to *Varroa destructor*

#### Room W414 B (Convention Center)

**Moderators and Organizers:** Ralph Büchler<sup>1</sup>, Robert G. Danka<sup>2</sup>, and Stephen Pernal<sup>3</sup>, <sup>1</sup>Agency of Agriculture Hesse, Kirchhain, Germany, <sup>2</sup>USDA - ARS, Baton Rouge, LA, <sup>3</sup>Agriculture and Agri-Food Canada, Beaverlodge, AB, Canada

- 1:30 **3125** Characteristics of a mite-resistant population of *Apis mellifera* in Northern Europe. **Barbara Locke** (barbara.locke@slu.se), Swedish Univ. of Agricultural Sciences, Uppsala, Sweden
- 1:45 **3126** Honey bees surviving *Varroa destructor* infestations in the world: Lessons we can take. **Yves Le Conte** (yves.leconte@avignon.inra.fr), INRA, Avignon, France
- 2:00 **3127** The development and basic biology of honey bees that express *Varroa*-sensitive hygiene. **Jeffrey Harris** (jharris@entomology.msstate.edu), Mississippi State Univ., Mississippi State, MS
- 2:15 **3128** Selection in Europe for VSH-based resistance in Buckfast and Carniolan bees. **BartJan Fernhout** (bartjan.fernhout@aristabeereseearch.org), Arista Bee Research, Boxmeer, Netherlands
- 2:30 **3129** Chemical ecology of VSH. **Fanny Mondet** (fanny.mondet@paca.inra.fr)<sup>1</sup>, Cedric Alaux<sup>1</sup>, Joachim de Miranda<sup>2</sup>, Seo Hyun Kim<sup>3</sup>, Dominique Beslay<sup>1</sup>, Alison Mercer<sup>3</sup>, and Yves Le Conte<sup>1</sup>, <sup>1</sup>INRA, Avignon, France, <sup>2</sup>Swedish Univ. of Agricultural Sciences, Uppsala, Sweden, <sup>3</sup>Univ. of Otago, Dunedin, New Zealand

- 2:45 **3130** Molecular and applied approaches to selecting honey bees (*Apis mellifera*) that are effective at removing *Varroa destructor* mites. **Greg J. Hunt** (ghunt@purdue.edu), Purdue Univ., West Lafayette, IN

#### 3:00 BREAK

- 3:15 **3131** Grooming behaviour and resistance to *Varroa destructor*. **Ernesto Guzman** (eguzman@uoguelph.ca), Univ. of Guelph, Guelph, ON, Canada
- 3:30 **3132** Prospects for molecular markers to guide selective breeding of honey bees. **Leonard J. Foster** (foster@chibi.ubc.ca)<sup>1</sup>, M. Marta Guarna<sup>1</sup>, Shelley Hoover<sup>2</sup>, Rob Currie<sup>3</sup>, and Stephen Pernal<sup>4</sup>, <sup>1</sup>The Univ. of British Columbia, Vancouver, BC, Canada, <sup>2</sup>Alberta Agriculture and Rural Development, Lethbridge, AB, Canada, <sup>3</sup>Univ. of Manitoba, Winnipeg, MB, Canada, <sup>4</sup>Agriculture and Agri-Food Canada, Beaverlodge, AB, Canada
- 3:45 **3133** Genomic mapping and candidate genes as approaches to MAS of VSH. **Lelania Bourgeois** (lanie.bourgeois@ars.usda.gov), USDA - ARS, Baton Rouge, LA
- 4:00 **3134** Proteomic marker-assisted selection for *Varroa* and disease resistance. **Stephen Pernal** (steve.pernal@agr.gc.ca), Agriculture and Agri-Food Canada, Beaverlodge, AB, Canada
- 4:15 **3135** Honey bee breeding program for increasing disease resistance and productivity. **Pierre Giovenazzo** (pierre.giovenazzo@bio.ulaval.ca)<sup>1</sup> and Georges Martin<sup>2</sup>, <sup>1</sup>Univ. Laval, Québec City, QC, Canada, <sup>2</sup>Center for Research in Animal Science, Deschambault, QC, Canada
- 4:30 **3136** Smartbees project: Breeding for varroa mite resistance and preservation of honey bee diversity in Europe. **Ralph Büchler** (ralph.buechler@llh.hessen.de)<sup>1</sup>, Aleksandar Uzunov<sup>1</sup>, and Kaspar Bienefeld<sup>2</sup>, <sup>1</sup>Landesbetrieb Landwirtschaft Hessen, Kirchhain, Germany, <sup>2</sup>Institute for Bee Research, Hohen Neuendorf, Germany
- 4:45 **3137** Status of breeding and use of Russian and VSH honey bees worldwide. **Robert G. Danka** (bob.danka@ars.usda.gov), USDA - ARS, Baton Rouge, LA

### Symposium: Harnessing the Power of Genomics Tools: Functional Genomics of Pollinator Health

#### Room W340 A (Convention Center)

**Moderators and Organizers:** Christina M. Grozinger<sup>1</sup> and Robert Paxton<sup>2</sup>, <sup>1</sup>Pennsylvania State Univ., University Park, PA, <sup>2</sup>Martin Luther Univ., Halle, Germany

- 1:30 **3138** Genome-wide association mapping for studying the genetics of colony traits in honey bees (*Apis mellifera*). **Amro Zayed** (zayed@yorku.ca)<sup>1</sup>, Brock Harpur<sup>1</sup>, and Samir Kadri<sup>2</sup>, <sup>1</sup>York Univ., Toronto, ON, Canada, <sup>2</sup>São Paulo State Univ., Botucatu, Brazil
- 1:45 **3139** Genetic tools for selecting disease resistance in bee pollinators. **Jarkko Routtu** (jarkko.routtu@zoologie.uni-halle.de) and Robin Moritz, Martin Luther Univ., Halle, Germany



- 2:00 **3140** Using honey bee genetics to breed for behavioral resistance to *Varroa* mites. **Jennifer M. Tsuruda** (jtsurud@clemson.edu)<sup>1</sup>, Greg Hunt<sup>2</sup>, and Miguel E. Arechavaleta-Velasco<sup>3</sup>, <sup>1</sup>Clemson Univ., Clemson, SC, <sup>2</sup>Purdue Univ., West Lafayette, IN, <sup>3</sup>National Institute of Forestry Agriculture and Livestock, Ajuchitlan, Mexico
- 2:15 **3141** Ecological effects of genetic diversity in host-parasite interactions. **Sophie Evison** (s.evison@sheffield.ac.uk)<sup>1</sup>, Annette Jensen<sup>2</sup>, and William O. H. Hughes<sup>3</sup>, <sup>1</sup>Univ. of Leeds, Leeds, United Kingdom, <sup>2</sup>Univ. of Copenhagen, Frederiksberg, Denmark, <sup>3</sup>Univ. of Sussex, Brighton, United Kingdom
- 2:30 **3142** Comparative genomics of *Parasaccharibacter apium*, a hive bacterium that benefits honey bee (*Apis mellifera*) health. **Vanessa Corby-Harris** (vanessa.corby@ars.usda.gov) and Kirk E. Anderson, USDA - ARS, Tucson, AZ
- 2:45 **3143** BioDirect™ to control *Varroa destructor* - new biologicals for effective protection from the devastating honey bee parasitic mite. **Alex Inberg** (alex.inberg@monsanto.com), Monsanto Company, Chesterfield, MO
- 3:00 BREAK**
- 3:15 **3144** Transcriptomic approaches to identify and rapidly diagnose novel viruses infecting bee populations worldwide. **David Galbraith** (dag5031@gmail.com)<sup>1</sup>, Joyce Sakamoto<sup>1</sup>, Maryann Frazier<sup>1</sup>, Yanping Chen<sup>2</sup>, Diana Cox-Foster<sup>1</sup>, Harland M. Patch<sup>1</sup>, and Christina M. Grozinger<sup>1</sup>, <sup>1</sup>Pennsylvania State Univ., University Park, PA, <sup>2</sup>USDA - ARS, Beltsville, MD
- 3:30 **3145** Applied beentomics: New approaches to reduce honey bee disease. **Jay Evans** (evansj@ba.ars.usda.gov) and Yanping Chen, USDA - ARS, Beltsville, MD
- 3:45 **3146** A meta-analysis of transcriptomes to explore the molecular response of honey bees to pathogens. **Vincent Doublet** (vincent.doublet@zoologie.uni-halle.de)<sup>1</sup>, Yvonne Poesch<sup>1</sup>, Andreas Gogol-Döring<sup>1</sup>, Robert Paxton<sup>2</sup>, and Christina M. Grozinger<sup>3</sup>, <sup>1</sup>German Centre for Integrative Biodiversity Research, Leipzig, Germany, <sup>2</sup>Martin Luther Univ., Halle, Germany, <sup>3</sup>Pennsylvania State Univ., University Park, PA
- 4:00 **3147** Impact of biotic and abiotic stressors on honey bee health (*Apis mellifera*). **Francesco Nazzi** (francesco.nazzi@uniud.it)<sup>1</sup> and Franco Pennacchio<sup>2</sup>, <sup>1</sup>Univ. of Udine, Udine, Italy, <sup>2</sup>Univ. of Naples Federico II, Portici, Italy
- 4:15 **3148** Staying healthy in times of stress: Genome-wide study of bumble bee diapause. **Etya Amsalem** (eua6@psu.edu)<sup>1</sup>, David Galbraith<sup>1</sup>, Jonathan Cnaani<sup>2</sup>, Peter E. A. Teal<sup>3</sup>, and Christina M. Grozinger<sup>1</sup>, <sup>1</sup>Pennsylvania State Univ., University Park, PA, <sup>2</sup>BizBee, Ein Yahav, Israel, <sup>3</sup>USDA - ARS, Gainesville, FL
- 4:30 **3149** Nutritional genomics of bumble bees. **S. Hollis Woodard** (hollis.woodard@ucr.edu), Univ. of California, Riverside, CA
- 4:45 **3150** DNA barcoding of pollen for pollinator health: Challenges and prospects. **Berry J. Brosi** (bbrosi@emory.edu)<sup>1</sup>, Karen Bell<sup>1</sup>, Kevin Burgess<sup>2</sup>, and Michael MacPherson<sup>3</sup>, <sup>1</sup>Emory Univ., Atlanta, GA, <sup>2</sup>Columbus State Univ., Columbus, GA, <sup>3</sup>Chapman Univ., Orange, CA

## Symposium: Invasive Ants: Biology and Control

### Room W232 A (Convention Center)

**Moderators and Organizers:** Sanford Porter<sup>1</sup>, Joshua R. King<sup>2</sup>, David Oi<sup>1</sup>, and Robert Vander Meer<sup>1</sup>, <sup>1</sup>USDA - ARS, Gainesville, FL, <sup>2</sup>Univ. of Central Florida, Orlando, FL

- 1:30 **3151** Tawny crazy ant invasion: Chemical weapons and countermeasures, species displacement, and biotic homogenization. **Edward G. LeBrun** (edwardlebrun@austin.utexas.edu), The Univ. of Texas, Austin, TX
- 1:45 **3152** Developing strategies for the control of tawny crazy ants, *Nylanderia fulva*. **David Oi** (david.oi@ars.usda.gov), USDA - ARS, Gainesville, FL
- 2:00 **3153** Challenges of "attempted" management of the invasive European red ant. **Eleanor Groden** (groden@umit.maine.edu) and Elissa S. Ballman, Univ. of Maine, Orono, ME
- 2:15 **3154** Ants without borders: The case of *Wasmannia auropunctata*. **Cas Vanderwoude** (cas.vanderwoude@gmail.com), Univ. of Hawai'i, Hilo, HI
- 2:30 **3155** Globalization and the spread of invasive ants. **Cleo Bertelsmeier** (cleo.bertelsmeier@unil.ch)<sup>1</sup>, Sébastien Ollier<sup>2</sup>, and Laurent Keller<sup>1</sup>, <sup>1</sup>Univ. of Lausanne, Lausanne, Switzerland, <sup>2</sup>Univ. of Paris Sud, Paris, France
- 2:45 **3156** Competition between invasive and native ants. **Joshua R. King** (joshua.king@ucf.edu), Univ. of Central Florida, Orlando, FL
- 3:00 BREAK**
- 3:15 **3157** Usurpation of plant-pollinator mutualisms by non-native ants. **David Holway** (dholway@ucsd.edu)<sup>1</sup>, Erin Wilson Rankin<sup>2</sup>, and Lori Lach<sup>3</sup>, <sup>1</sup>Univ. of California, La Jolla, CA, <sup>2</sup>Univ. of California, Riverside, CA, <sup>3</sup>James Cook Univ., Cairns, Australia
- 3:30 **3158** Fire ant biological control agents: *Pseudacteon* decapitating flies and other parasites. **Sanford Porter** (sanford.porter@ars.usda.gov)<sup>1</sup>, Luis Calcaterra<sup>2</sup>, Laura Varone<sup>2</sup>, and Juan Briano<sup>2</sup>, <sup>1</sup>USDA - ARS, Gainesville, FL, <sup>2</sup>Foundation for the Study of Invasive Species, Hurlingham, Argentina
- 3:45 **3159** *Solenopsis invicta*: Biologically-based control. **Robert Vander Meer** (bob.vandermeer@ars.usda.gov), USDA - ARS, Gainesville, FL
- 4:00 **3160** Ecology of ant-fungal pathogen interactions and the implications for biocontrol. Raquel Loreto<sup>1,2</sup> and **David Hughes** (dph14@psu.edu)<sup>1</sup>, <sup>1</sup>Pennsylvania State Univ., University Park, PA, <sup>2</sup>Federal Univ. of Viçosa, Viçosa, Brazil
- 4:15 **3161** Bioprospecting: Sequencing of invasive pest ant transcriptomes to facilitate discovery of viral biocontrol agents. **Steven Valles** (steven.valles@ars.usda.gov), USDA - ARS, Gainesville, FL
- 4:30 **3162** Applied systematics of *Pheidole*: An interactive review of the world's most invasive ant lineage. **Eli Sarnat** (e.sarnat@gmail.com)<sup>1</sup>, Georg Fischer<sup>2</sup>, Benoit Guénard<sup>3</sup>, and Evan Economo<sup>2</sup>, <sup>1</sup>Antwork Consulting, LLC, Davis, CA, <sup>2</sup>Okinawa Institute of Science and Technology, Onna, Japan, <sup>3</sup>Univ. of Hong Kong, Hong Kong, China



**Symposium: Ecology, Surveillance, and Control of Biting Midges**

**Room W330 A (Convention Center)**

**Moderators and Organizers:** Lee Cohnstaedt<sup>1</sup>, Simon T. Carpenter<sup>2</sup>, and Glenn Bellis<sup>3</sup>, <sup>1</sup>USDA - ARS, Manhattan, KS, <sup>2</sup>The Pirbright Institute, Woking, United Kingdom, <sup>3</sup>Research Institute for the Environment and Livelihoods, Darwin, Australia

This symposium is generously sponsored by the North American Deer Farmer's Association.



- 1:30 **3163** The use of antennal sensilla in the systematics of *Culicoides*. **Glenn Bellis** (glenn.bellis@agriculture.gov.au)<sup>1</sup> and Alan Dyce<sup>2</sup>, <sup>1</sup>Research Institute for the Environment and Livelihoods, Darwin, Australia, <sup>2</sup>CSIRO, Sydney, Australia
- 1:45 **3164** DNA barcoding for species identification of biting midges (Ceratopogonidae: *Culicoides*) from Australasia and Eastern Asia. **David Gopurenko** (david.gopurenko@dpi.nsw.gov.au)<sup>1,2</sup>, Andrew Mitchell<sup>3</sup>, and Glenn Bellis<sup>4</sup>, <sup>1</sup>New South Wales Dept. of Primary Industries, Wagga Wagga, Australia, <sup>2</sup>Graham Centre for Agricultural Innovation, Wagga Wagga, Australia, <sup>3</sup>Australian Museum, Sydney, Australia, <sup>4</sup>Research Institute for the Environment and Livelihoods, Darwin, Australia
- 2:00 **3165** Searching for *Culicoides* vectors of bovine arboviruses in Japan. **Tohru Yanase** (tyanase@affrc.go.jp), National Institute of Animal Health, Kagoshima, Japan
- 2:15 **3166** *Culicoides imicola*: Phylogeography, population genetics, and invasive status in the Mediterranean basin. **Stéphanie Jacquet** (stephanie.jacquet@cirad.fr)<sup>1</sup>, Karine Huber<sup>1,2</sup>, H  l  ne Guis<sup>1</sup>, Thomas Balenghien<sup>1</sup>, Christine Chevillon<sup>3,4</sup>, J  r  my Bouyer<sup>1</sup>, and Claire Garros<sup>1</sup>, <sup>1</sup>CIRAD, Montpellier, France, <sup>2</sup>INRA, Montpellier, France, <sup>3</sup>National Center for Scientific Research, Montpellier, France, <sup>4</sup>IRD, Montpellier, France
- 2:30 **3167** Population dynamics of *Culicoides imicola* and *Culicoides schultzei* gp. in dairy farms in Israel. **Yuval Gottlieb** (yuvalgd@yahoo.com), Yonatan Saroya, and Eyal Klement, The Hebrew Univ., Rehovot, Israel
- 2:45 **3168** Bionomics and vector competence among pre-alpine *Culicoides* species in Switzerland. **Anca Paslaru** (ancaiona.paslaru@uzh.ch), Alexander Mathis, and Eva Veronesi, National Centre for Vector Entomology, Z  rich, Switzerland
- 3:00 BREAK**
- 3:15 **3169** *Culicoides* (Diptera: Ceratopogonidae) as vectors of African horse sickness virus in South Africa. **Gert Venter** (venterg@arc.agric.za), Agricultural Research Council, Onderstepoort, South Africa
- 3:30 **3170** *Culicoides* species of the southeastern United States and their changing distributions. **Stacey Vigil** (svigil@uga.edu) and Joseph Corn, Univ. of Georgia, Athens, GA

- 3:45 **3171** Landscape-level spatial patterns of *Culicoides sonorensis* and bluetongue virus in Colorado. **Christie Mayo** (christie.mayo@colostate.edu), Colorado State Univ., Fort Collins, CO
- 4:00 **3172** *Culicoides* spp. distribution and seasonal abundance on a Florida deer farm where hemorrhagic disease is endemic. **Katherine Sayler** (saylerk@ufl.edu)<sup>1</sup>, Nathan Burkett-Cadena<sup>2</sup>, Erik Blosser<sup>2</sup>, Bethany McGregor<sup>2</sup>, J. K. Blackburn<sup>1</sup>, and Samantha Wisely<sup>1</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Univ. of Florida, Vero Beach, FL
- 4:15 **3173** Overwintering and strategies for surviving adverse conditions in *Culicoides sonorensis*. **Emily McDermott** (emcde002@ucr.edu), Univ. of California, Riverside, CA
- 4:30 **3174** Exploring semiochemicals for improving monitoring and control of *Culicoides* spp. **Miguel Miranda** (ma.miranda@uib.es), and Carlos Barcelo, Univ. of the Balearic Islands, Palma, Spain
- 4:45 **3175** *Culicoides* and reassortant bluetongue viruses: A study of virus/vector/host interactions. **Christopher Sanders** (christopher.sanders@pirbright.ac.uk)<sup>1</sup>, Eva Veronesi<sup>2</sup>, Kyriaki Nomikou<sup>1</sup>, Peter Mertens<sup>1</sup>, and Simon T. Carpenter<sup>1</sup>, <sup>1</sup>The Pirbright Institute, Woking, United Kingdom, <sup>2</sup>National Centre for Vector Entomology, Z  rich, Switzerland
- 5:00 **3176** Quantifying the vector's impact on the epidemiology of *Culicoides*-borne equine arboviruses. **Lara Harrup** (lara.harrup@pirbright.ac.uk)<sup>1</sup>, Simon T. Carpenter<sup>1</sup>, Simon Gubbins<sup>1</sup>, and Gianni Lo Iacono<sup>2</sup>, <sup>1</sup>The Pirbright Institute, Woking, United Kingdom, <sup>2</sup>Univ. of Cambridge, Cambridge, United Kingdom
- 5:15 **3177** What influence does entomology have on policy decisions during arbovirus outbreaks? **Simon T. Carpenter** (simon.carpenter@pirbright.ac.uk), The Pirbright Institute, Woking, United Kingdom

**Symposium: Biogeographical Lessons Learned from the West Indies**

**West Hall F4 (WF4) (Convention Center)**

**Moderators and Organizers:** Jacqueline Miller<sup>1</sup> and Michael A. Ivie<sup>2</sup>, <sup>1</sup>Florida Museum of Natural History, Gainesville, FL, <sup>2</sup>Montana State Univ., Bozeman, MT

This symposium is generously sponsored by The International Biodiversity Foundation, Inc.

- 1:30 **3178** Biodiversity and biogeography of Lepidoptera in the Bahamas. **Jacqueline Miller** (jmiller@flmnh.ufl.edu), Florida Museum of Natural History, Gainesville, FL
- 1:45 **3179** Bahamian elateroid beetle diversity and geographic relations. **Paul J. Johnson** (paul.johnson@sdsu.edu), South Dakota State Univ., Brookings, SD
- 2:00 **3180** Role of Caribbean Islands in the diversification and biogeography of the neotropical *Heraclides* swallowtails. **Delano Lewis** (delano.lewis@ncu.edu.jm), Northern Caribbean Univ., Mandeville, Jamaica



- 2:15 **3181** Firefly (Coleoptera: Lampyridae) species distribution across the Caribbean. **Oliver Keller** (okeller1977@gmail.com) and Marc Branham, Univ. of Florida, Gainesville, FL
- 2:30 **3182** Origin and biogeography of Greater Antillean water beetles: The genus *Crenitulus* like a model. **Albert Deler-Hernández** (adeler1982@gmail.com), Charles Univ., Prague, Czech Republic
- 2:45 **3183** The little fire ant, *Wasmannia auropunctata* (Roger), in the West Indies: Native pest or successful invasive species? **Bert Rivera Marchand** (brivera@bc.inter.edu), Univ. of Puerto Rico, San Juan, PR
- 3:00 BREAK**
- 3:15 **3184** Agricultural experiment station research collection: A centenary legacy of biodiversity. Edda Martinez<sup>1</sup>, **Rosa Franqui** (franqui@eea.uprm.edu)<sup>1</sup>, and Alejandro Segarra<sup>2</sup>, <sup>1</sup>Museum of Entomology and Tropical Biodiversity, San Juan, PR, <sup>2</sup>Univ. of Puerto Rico, Mayaguez, PR
- 3:30 **3185** The West Indian Beetle Fauna Project: 35 years update. **Michael A. Ivie** (mivie@montana.edu), Montana State Univ., Bozeman, MT

### Symposium: SOLA Scarab Workers

Room W223 A (Convention Center)

**Moderator and Organizer:** Andrew B. T. Smith, Canadian Museum of Nature, Ottawa, ON, Canada

- 1:30 **3186** Elucidating dynastine (Coleoptera: Scarabaeidae) evolution with transcriptomic data. **Matthew Moore** (mrmoore19@ufl.edu)<sup>1</sup>, Marc Branham<sup>1</sup>, and R. Cave<sup>2</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Univ. of Florida, Homestead, FL
- 1:45 **3187** Integrative phylogeny of dung beetles (Coleoptera: Scarabaeinae). **Sergei Tarasov** (sergxf@yandex.ru), Univ. of Oslo, Oslo, Norway
- 2:00 **3188** Extinct lineages of Scarabaeoidea based on quantitative morphological approaches. **Yuanyuan Lu** (luyuanyuan442@163.com), Ming Bai, and Xing-Ke Yang, Chinese Academy of Sciences, Beijing, China
- 2:15 **3189** Phylogeny of North American Sericini (Coleoptera: Melolonthinae). **Reese J. Worthington** (rworthin@go.olemiss.edu), Univ. of Mississippi, University, MS
- 2:30 **3190** First insights into the evolutionary history of the widespread African flower chafer genus *Eudicella* (Scarabaeidae: Cetoniinae) employing molecular phylogenetic methodology. **Matthias Seidel** (matthias.seidel@zns.uni-halle.de), National Museum, Prague, Czech Republic
- 2:45 **3191** Mechanisms of condition-dependent trait growth in the weapons of sexual selection: Insights from the beetles. **Laura C. Lavine** (lavine@wsu.edu)<sup>1</sup> and Doug Emlen<sup>2</sup>, <sup>1</sup>Washington State Univ., Pullman, WA, <sup>2</sup>Univ. of Montana, Missoula, MT

**3:00 BREAK**

- 3:15 **3192** Scarab beetles collected by Charles Darwin in southern South America during the voyage of the H.M.S. Beagle. **Andrew B. T. Smith** (asmith@unl.edu), Canadian Museum of Nature, Ottawa, ON, Canada
- 3:30 **3193** Fabrician types of Scarabaeoidea in the Natural History Museum, London. **Maxwell Barclay** (m.barclay@nhm.ac.uk), The Natural History Museum, London, United Kingdom
- 3:45 **3194** Necrocenoses in the West African Savanna: Scarabs rule. **Frank Krell** (frank.krell@dmns.org)<sup>1</sup>, Minnattallah Boutros<sup>2</sup>, Christian Linder<sup>3</sup>, and Sylvia Krell-Westerwalbesloh<sup>4</sup>, <sup>1</sup>Denver Museum of Nature and Science, Denver, CO, <sup>2</sup>GFA Consulting Group GmbH, Hamburg, Germany, <sup>3</sup>On Your Own, Bielefeld, Germany, <sup>4</sup>Univ. of Würzburg, Würzburg, Germany
- 4:00 **3195** Guild structure in *Chrysina* beetles. **Don Thomas** (donald.thomas@ars.usda.gov)<sup>1</sup> and David C. Robacker<sup>2</sup>, <sup>1</sup>USDA - ARS, Edinburg, TX, <sup>2</sup>USDA - ARS, Weslaco, TX
- 4:15 **3196** Dung beetle (Scarabaeinae) endemisms in Costa Rica: A conundrum of speciation mechanisms. **Bert Kohlmann** (bkohlman@earth.ac.cr), Earth Univ., San José, Costa Rica

### Symposium: Regional Status of Microbial Control Programs

Room W232 B (Convention Center)

**Moderators and Organizers:** Steven P. Arthurs<sup>1</sup>, Surendra Dara<sup>2</sup>, and Ralf-Udo Ehlers<sup>3</sup>, <sup>1</sup>Univ. of Florida, Apopka, FL, <sup>2</sup>Univ. of California, San Luis Obispo, CA, <sup>3</sup>e-nema, Schwentimental, Germany

- 1:30 **3197** EU Regulation 2020: Stagnancy or new perspectives for biological control. **Ralf-Udo Ehlers** (ehlers@e-nema.de), e-nema, Schwentimental, Germany
- 1:45 **3198** Biopesticides – innovative technologies and strategies for pest control. **Tariq Butt** (t.butt@swansea.ac.uk), Gary Harper, Richard Massy, and James Taylor, Swansea Univ., Swansea, United Kingdom
- 2:00 **3199** Effect of regulation on commercial development of microbial biopesticides in the European Union. **Roma Gwynn** (rgwynn@biorationale.co.uk), Rationale Biopesticide Strategists, Duns, Scotland
- 2:15 **3200** Integration of microbial biopesticides in greenhouse floriculture: The Canadian experience. Graeme Murphy<sup>1</sup>, Rose Buitenhuis<sup>2</sup>, and **Michael Brownbridge** (michael.brownbridge@gmail.com)<sup>3</sup>, <sup>1</sup>Ontario Ministry of Agriculture, Food and Rural Affairs, Vineland, ON, Canada, <sup>2</sup>Vineland Research and Innovation Centre, Vineland Station, ON, Canada, <sup>3</sup>Vineland Research and Innovation Centre, Lincoln, ON, Canada
- 2:30 **3201** The potential of entomopathogenic fungi to manage coffee berry borer in Hawaii. **Robert Hollingsworth** (robert.hollingsworth@ars.usda.gov)<sup>1</sup> and Donald C. Steinkraus<sup>2</sup>, <sup>1</sup>USDA - ARS, Hilo, HI, <sup>2</sup>Univ. of Arkansas, Fayetteville, AR



- 2:45 **3202** Review of biopesticides and their markets in the United States. **Steven P. Arthurs** (spa@ufl.edu)<sup>1</sup> and Surendra Dara<sup>2</sup>, <sup>1</sup>Univ. of Florida, Apopka, FL, <sup>2</sup>Univ. of California, San Luis Obispo, CA
- 3:00 **BREAK**
- 3:15 **3203** Utilization of nucleopolyhedrovirus (NPVs) for control of lepidopteran pests in fruit and vegetable production. **William Stoneman** (bstoneman@andermattusa.com)<sup>1</sup>, Gisela Brand<sup>2</sup>, and Silvana Nidermann<sup>2</sup>, <sup>1</sup>Andermatt Biocontrol AG, Madison, WI, <sup>2</sup>Andermatt Biocontrol AG, Grosse Dietwil, Switzerland
- 3:30 **3204** Harvesting the power of fungal entomopathogens for controlling arthropod pests in Brazil. **Gabriel Mascarin** (gmmascar@gmail.com)<sup>1</sup>, Mark Jackson<sup>2</sup>, and Éverton Kamp Fernandes<sup>3</sup>, <sup>1</sup>Embrapa Rice and Beans, Santo Antônio de Goiás, Brazil, <sup>2</sup>USDA - ARS, Peoria, IL, <sup>3</sup>Federal Univ. of Goiás, Goiânia, Brazil
- 3:45 **3205** Overview of microbial control programmes in South Africa. **Justin Hatting** (HattingJ@arc.agric.za), Agricultural Research Council, Bethlehem, South Africa
- 4:00 **3206** Microbial control programmes in Eastern Africa. **Sunday Ekesi** (sekesi@icip.org) and Jean Nguya Kalembe Maniania, International Centre of Insect Physiology and Ecology, Nairobi, Kenya
- 4:15 **3207** Microbial control: Progress from New Zealand. **Travis Glare** (travis.glare@lincoln.ac.nz)<sup>1</sup> and Maureen O'Callaghan<sup>2</sup>, <sup>1</sup>Bio-Protection Research Centre, Lincoln, New Zealand, <sup>2</sup>AgResearch, Ltd., Christchurch, New Zealand
- 2:15 **3211** Energetic and life history consequences of cold adaptation in *Drosophila melanogaster*. **Caroline M. Williams** (cmw@berkeley.edu)<sup>1</sup>, Theodore Morgan<sup>2</sup>, David Allison<sup>3</sup>, and Daniel Hahn<sup>4</sup>, <sup>1</sup>Univ. of California, Berkeley, CA, <sup>2</sup>Kansas State Univ., Manhattan, KS, <sup>3</sup>Univ. of Alabama, Birmingham, AL, <sup>4</sup>Univ. of Florida, Gainesville, FL
- 2:30 **3212** No butterflies in the stomach: The collapse of insect-microbe symbiosis under climate change. **Dmitry Musolin** (musolin@gmail.com)<sup>1,2</sup>, Yoshitomo Kikuchi<sup>3</sup>, Akiyo Tada<sup>1</sup>, Nobuhiro Hari<sup>1</sup>, Takahiro Hosokawa<sup>4,5</sup>, Kenji Fujisaki<sup>1</sup>, and Takema Fukatsu<sup>5</sup>, <sup>1</sup>Kyoto Univ., Kyoto, Japan, <sup>2</sup>Saint Petersburg State Forest Technical Univ., St. Petersburg, Russia, <sup>3</sup>National Institute of Advanced Industrial Science and Technology, Sapporo, Japan, <sup>4</sup>Kyushu Univ., Fukuoka, Japan, <sup>5</sup>Advanced Industrial Science and Technology, Tsukuba, Japan
- 2:45 **3213** Hybridization in the context of a changing climate. **Sean Ryan** (ecophylic@gmail.com)<sup>1,2</sup> and Jessica Hellmann<sup>1,3</sup>, <sup>1</sup>Univ. of Notre Dame, South Bend, IN, <sup>2</sup>USDA - ARS, Gainesville, FL, <sup>3</sup>Univ. of Minnesota, St. Paul, MN
- 3:00 **BREAK**
- 3:15 **3214** Effects of weather and climate on butterfly population dynamics. **Tom Oliver** (t.oliver@reading.ac.uk), Univ. of Reading, Reading, United Kingdom
- 3:30 **3215** The role of climate change on insect herbivory rates derived from the fossil record. **Conrad Labandeira** (labandec@si.edu), Smithsonian Institution National Museum of Natural History, Washington, DC
- 3:45 **3216** Climate change and rapid bumblebee and butterfly losses within and across continents. **Jeremy Kerr** (jkerr@uottawa.ca), Ottawa-Carleton Institute of Biology, Ottawa, ON, Canada
- 4:00 **3217** Winners and losers of Arctic climate change – insect and spider abundance variation across two decades in high-arctic Greenland. **Toke Høye** (tth@aiaa.au.dk)<sup>1</sup>, Joseph Bowden<sup>2</sup>, Sarah Loboda<sup>3</sup>, Christopher Buddle<sup>3</sup>, Niels Schmidt<sup>4</sup>, and Jade Savage<sup>5</sup>, <sup>1</sup>Aarhus Univ., Rønde, Denmark, <sup>2</sup>Aarhus Univ., Aarhus, Denmark, <sup>3</sup>McGill Univ., Sainte-Anne-de-Bellevue, QC, Canada, <sup>4</sup>Aarhus Univ., Roskilde, Denmark, <sup>5</sup>Bishop's Univ., Sherbrooke, QC, Canada
- 4:15 **3218** Understanding the impacts of climate change on agricultural insect pests across Africa. **Madeleine Barton** (mbarton@sun.ac.za) and John Terblanche, Stellenbosch Univ., Stellenbosch, South Africa
- 4:30 **3219** Climate change impacts pest and beneficial insects over the last half century: Insights from the UK. **James Bell** (james.bell@rothamsted.ac.uk)<sup>1</sup>, Jessica Pérez Rodríguez<sup>2</sup>, Chris Shortall<sup>1</sup>, and Richard Harrington<sup>1</sup>, <sup>1</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>2</sup>Univ. of València, València, Spain
- 4:45 **3220** Insect-plant phenological synchrony in a changing world. **Michael Singer** (michael.singer@plymouth.ac.uk), Plymouth Univ., Plymouth, United Kingdom

## Symposium: Climate Change Impacts and Insect Population Dynamics

### West Hall F2 (WF2) (Convention Center)

**Moderators and Organizers:** James Bell<sup>1</sup>, Carol Boggs<sup>2</sup>, John Terblanche<sup>3</sup>, and Toke Høye<sup>4</sup>, <sup>1</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>2</sup>Univ. of South Carolina, Columbia, SC, <sup>3</sup>Stellenbosch Univ., Stellenbosch, South Africa, <sup>4</sup>Aarhus Univ., Rønde, Denmark

- 1:30 **3208** Insects and climate assessments: The Intergovernmental Panel on Climate Change (IPCC) and the U.S. National Assessment. **Camille Parmesan** (camille.parmesan@plymouth.ac.uk), Plymouth Univ.'s Marine Institute, Plymouth, United Kingdom
- 1:45 **3209** Demography and climate change in insects. **Carol Boggs** (cboggs@seoe.sc.edu)<sup>1,2</sup> and Nicole Kish<sup>1,2</sup>, <sup>1</sup>Univ. of South Carolina, Columbia, SC, <sup>2</sup>Rocky Mountain Biological Laboratory, Crested Butte, CO
- 2:00 **3210** Relative importance of climate, habitat, and species' traits on population dynamics. **Georgina Palmer** (georgina.palmer@york.ac.uk)<sup>1</sup>, Jane Hill<sup>1</sup>, Tom Brereton<sup>2</sup>, David Brooks<sup>3</sup>, Jason Chapman<sup>4</sup>, Richard Fox<sup>2</sup>, Tom Oliver<sup>5</sup>, and Chris Thomas<sup>1</sup>, <sup>1</sup>Univ. of York, York, United Kingdom, <sup>2</sup>Butterfly Conservation, Wareham, United Kingdom, <sup>3</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>4</sup>Univ. of Exeter, Penryn, United Kingdom, <sup>5</sup>Univ. of Reading, Reading, United Kingdom



- 5:00 **3221** Spatial synchrony in marine and terrestrial systems. **Lawrence Sheppard** (lwsheppard@ku.edu)<sup>1</sup>, James Bell<sup>2</sup>, Richard Harrington<sup>2</sup>, Philip Reid<sup>3</sup>, and Daniel Reuman<sup>4</sup>, <sup>1</sup>Univ. of Kansas, Lawrence, KS, <sup>2</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>3</sup>Sir Alister Hardy Foundation for Ocean Science, Plymouth, United Kingdom, <sup>4</sup>Univ. of Kansas, Lawrence, KS
- 5:15 **3222** Invasion biology and climate change: Comparing retracting and expanding species. **Jane Hill** (jane.hill@york.ac.uk), Georgina Palmer, Phil Platts, and Chris Thomas, Univ. of York, York, United Kingdom

### Symposium: Next-Generation Technologies for Insect Control

#### Room W224 D (Convention Center)

- Moderators and Organizers:** Murugesan Rangasamy<sup>1</sup>, Nandi Nagaraj<sup>1</sup>, Renata Bolognesi<sup>2</sup>, Blair Siegfried<sup>3</sup>, and Swapna Priya Rajarapu<sup>4</sup>, <sup>1</sup>Dow AgroSciences, Indianapolis, IN, <sup>2</sup>Monsanto Company, Chesterfield, MO, <sup>3</sup>Univ. of Florida, Gainesville, FL, <sup>4</sup>Purdue Univ., West Lafayette, IN
- 1:30 **3223** Western corn rootworm – integrated management strategies for IRM. **Matthew Carroll** (matthew.carroll@monsanto.com), Graham P. Head, and Sean Evans, Monsanto Company, St. Louis, MO
- 1:45 **3224** Presentation withdrawn
- 2:00 **3225** SmartStax® PRO corn – next-generation technology for corn rootworm management. **Bradley W. Hopkins** (bwhopkins@dow.com), Dwain M. Rule, and Nicholas Storer, Dow AgroSciences, Indianapolis, IN
- 2:15 **3226** SPEAR™: First commercialization of a cystine-knot insecticide. **John Sorenson** (JSorenson@vestaron.com), Vestaron Corporation, Kalamazoo, MI
- 2:30 **3227** New binary-toxin against western corn rootworm from a non-*Bacillus thuringiensis* bacterium. **Amit Sethi** (amit.sethi@pioneer.com)<sup>1</sup>, Claudia Pérez-Ortega<sup>2</sup>, Mark Nelson<sup>2</sup>, Timothy M. Nowatzki<sup>1</sup>, Nasser Yalpani<sup>1</sup>, Lu Liu<sup>3</sup>, Gusui Wu<sup>1</sup>, J. Lindsey Flexner<sup>1</sup>, and Laura S. Higgins<sup>1</sup>, <sup>1</sup>DuPont Pioneer, Johnston, IA, <sup>2</sup>DuPont Pioneer, Wilmington, DE, <sup>3</sup>DuPont Pioneer, Hayward, CA
- 2:45 **3228** Advancing microbial control in temperate orchard systems. **David Shapiro-Ilan** (david.shapiro@ars.usda.gov), USDA - ARS, Byron, GA
- 3:00 **BREAK**
- 3:15 **3229** Modification of a Bt toxin to target Asian citrus psyllid (*Diaphorina citri*; Hemiptera). Maria Fernandez Luna<sup>1</sup>, **Yuting Chen** (yutingc@iastate.edu)<sup>1</sup>, Michael B. Blackburn<sup>2</sup>, David Hall<sup>3</sup>, Biviana Flores-Escobar<sup>1</sup>, and Bryony Bonning<sup>1</sup>, <sup>1</sup>Iowa State Univ., Ames, IA, <sup>2</sup>USDA - ARS, Beltsville, MD, <sup>3</sup>USDA - ARS, Ft. Pierce, FL
- 3:30 **3230** Controlling honey bee pests and pathogens in the 21st century. **James D. Ellis** (jdellis@ufl.edu), Univ. of Florida, Gainesville, FL

- 3:45 **3231** New technologies and opportunities for managing filth flies. **Alec Gerry** (alec.gerry@ucr.edu), Univ. of California, Riverside, CA
- 4:00 **3232** Of flies and beetles: Adapting gene drives to address global pest problems. **Nathaniel Grubbs** (npgrubbs@ncsu.edu), Fu-Chyun Chu, and Marcé Lorenzen, North Carolina State Univ., Raleigh, NC
- 4:15 **3233** It's a trap! New traps for mosquito and bed bug control. **Roberto Pereira** (rpereira@ufl.edu), Univ. of Florida, Gainesville, FL
- 4:30 **3234** Insect control discovery at Evogene, Inc. **James Presnail** (james.presnail@evogene.com), Evogene, Inc., Saint Louis, MO

### Symposium: Effect of Global Climate Change on Vector-Borne Disease Transmission

#### Room W240 B (Convention Center)

- Moderators and Organizers:** Ephantus J. Muturi<sup>1</sup>, Allison Parker<sup>1</sup>, and Paul A. Weston<sup>2</sup>, <sup>1</sup>Univ. of Illinois, Champaign, IL, <sup>2</sup>Charles Sturt Univ., Wagga Wagga, Australia
- 1:30 **3235** An overview of the potential impact of climate change on mosquitoes. **Ephantus Muturi** (emuturi2@illinois.edu), Univ. of Illinois, Champaign, IL
- 1:45 **3236** Research update on pathogenic landscape of Chagas and Lyme disease in the U.S.-Mexico transboundary region. **Teresa Arroyo** (teresa.feriaarroyo@utrgv.edu)<sup>1</sup>, Maria Esteve-Gassent<sup>2</sup>, Ivan Castro-Arellano<sup>3</sup>, Guadalupe Gordillo-Perez<sup>4</sup>, Ramiro Patino<sup>1</sup>, and Adalberto Pérez de León<sup>5</sup>, <sup>1</sup>The Univ. of Texas, Edinburg, TX, <sup>2</sup>Texas A&M Univ., College Station, TX, <sup>3</sup>Texas State Univ., San Marcos, TX, <sup>4</sup>Research Unit on Infectious Diseases, Distrito Federal, Mexico, <sup>5</sup>USDA - ARS, Kerrville, TX
- 2:00 **3237** On the edge: Climatic influences on *Ae. aegypti* indices and dengue virus transmission in the Sonoran desert region. **Kacey Ernst** (kernst@email.arizona.edu)<sup>1</sup>, Corey Morin<sup>1</sup>, Kathleen R. Walker<sup>1</sup>, Andy Monaghan<sup>2</sup>, Mary Hayden<sup>2</sup>, Pablo Reyes-Castro<sup>1</sup>, Teresa Joy<sup>1</sup>, Mercedes Gamos<sup>3</sup>, Steve Haenchen<sup>1</sup>, Eileen Guttierrez-Jeffrey<sup>1</sup>, Yves Carrière<sup>1</sup>, and Michael A. Riehle<sup>1</sup>, <sup>1</sup>Univ. of Arizona, Tucson, AZ, <sup>2</sup>National Center for Atmospheric Research, Boulder, CO, <sup>3</sup>Hospital General, Heroica Nogales, Mexico
- 2:15 **3238** Mechanistic modeling of the impact of climate variability and change on malaria transmission in Africa. **Elfatih Eltahir** (eltahir@mit.edu)<sup>1</sup>, Noriko Endo<sup>1</sup>, and Teresa Yamana<sup>2</sup>, <sup>1</sup>Massachusetts Institute of Technology, Cambridge, MA, <sup>2</sup>Columbia Univ., New York, NY
- 2:30 **3239** Climate change and emergence of Lyme disease in Canada: A local problem with global significance. **Nicholas Ogden** (nicholas.ogden@phac-aspc.gc.ca), Public Health Agency of Canada, Saint-Hyacinthe, QC, Canada
- 2:45 **3240** Climate change effects on rangewide potential distributions and abundances of insect vectors of disease. **Lindsay Campbell** (lpcampbell@ku.edu) and A. Townsend Peterson, Univ. of Kansas, Lawrence, KS





3:00 BREAK

- 3:15 **3241** Presentation withdrawn
- 3:30 **3242** How habitat and land-use modify the distribution of a diverse mosquito vector assemblage. **Michael Reiskind** (michael\_reiskind@ncsu.edu), North Carolina State Univ., Raleigh, NC

**Symposium: Neotropical Insect Galls**

**Room W224 A (Convention Center)**

**Moderators and Organizers:** Valéria Maia and Barbara do Nascimento, Federal Univ. of Rio de Janeiro, Rio de Janeiro, Brazil

- 1:30 **3243** Galls in the Brazilian Atlantic Forest. **Valéria Maia** (maiavcid@acd.ufrj.br), Federal Univ. of Rio de Janeiro, Rio de Janeiro, Brazil
- 1:45 **3244** Gall morphotypes in the Neotropics and the need to standardize them. **Rosy Mary Isaías** (rosy.isaías@gmail.com), Federal Univ. of Minas Gerais, Belo Horizonte, Brazil
- 2:00 **3245** Galls in Brazilian ferns and the chemical changes in galled and no-galled tissues. **Marcelo dos Santos** (marceloguerrasantos@gmail.com)<sup>1</sup>, Valéria Maia<sup>2</sup>, Bruno Oliveira<sup>1</sup>, Luis Tietbohl<sup>3</sup>, and Leandro Rocha<sup>3</sup>, <sup>1</sup>State Univ. of Rio de Janeiro, São Gonçalo, Brazil, <sup>2</sup>Federal Univ. of Rio de Janeiro, Rio de Janeiro, Brazil, <sup>3</sup>Federal Univ. of Fluminense, Niterói, Brazil
- 2:15 **3246** Presentation withdrawn
- 2:30 **3247** Galls from Brazilian tropical dry forest. **Jarcilene Almeida-Cortez** (jacortez@ufpe.br)<sup>1</sup> and Sheila Fernandes-Carvalho<sup>2</sup>, <sup>1</sup>Federal Univ. of Pernambuco, Recife, Brazil, <sup>2</sup>Federal Univ. of Rio de Janeiro, Rio de Janeiro, Brazil
- 2:45 **3248** Insect galls from the Amazonian rainforest. **Barbara do Nascimento** (barbaraprozenka@yahoo.com.br) and Valéria Maia, Federal Univ. of Rio de Janeiro, Rio de Janeiro, Brazil
- SD3249** Network of monophagous and oligophagous galling insects (Diptera: Cecidomyiidae) and associated parasitoids. **Carolina Prauchner** (carol\_prauchner@hotmail.com), Fernando Luz, and Milton Mendonça Júnior, Federal Univ. of Rio Grande, Porto Alegre, Brazil
- SD3250** First report of *Mycodiplosis* Rübsaamen (Insecta: Diptera) in galls of *Schismatodiplosis lantanae* (Insecta: Diptera). Erick Siqueira, **Barbara do Nascimento** (barbaraprozenka@yahoo.com.br), and Valéria Maia, Federal Univ. of Rio de Janeiro, Rio de Janeiro, Brazil

3:00 BREAK AND POSTER SESSION

**Symposium: Engaging the World of Arthropod Education in a Digital Age**

**Room W230 A (Convention Center)**

**Moderators and Organizers:** John Guyton<sup>1</sup>, Rebecca Baldwin<sup>2</sup>, and Andrine A. Shufran<sup>3</sup>, <sup>1</sup>Mississippi State Univ., Mississippi State, MS, <sup>2</sup>Univ. of Florida, Gainesville, FL, <sup>3</sup>Oklahoma State Univ., Stillwater, OK

- 1:30 **3251** Presentation withdrawn
- 1:45 **3252** From fighting ants to collecting and teaching. **Wes Campana** (wescampana@yahoo.com)<sup>1,2</sup> and John Guyton<sup>2</sup>, <sup>1</sup>Potrerrillos, Panama, <sup>2</sup>Mississippi State Univ., Mississippi State, MS
- 2:00 **3253** Using active learning to teach a practical use for insects. **James Kopco** (james.kopco@gmail.com)<sup>1</sup>, Alyssa McDonough<sup>2</sup>, and Deirdre Prischmann-Voldseth<sup>1</sup>, <sup>1</sup>North Dakota State Univ., Fargo, ND, <sup>2</sup>Minnesota State Univ., Moorhead, MN
- 2:15 **3254** Enabling entomology: How to design entomology education programming to serve audiences with disabilities. **Alyssa McDonough** (mcdonougal@mnstate.edu), Minnesota State Univ., Moorhead, MN
- 2:30 **3255** Using modern technologies to improve entomology literacy and insect conservation practices: Case examples and research outcomes. **Douglas Golick** (dgolick2@unl.edu), Louise Lynch, and Derek Pruitt, Univ. of Nebraska, Lincoln, NE
- 2:45 **3256** Presentation withdrawn
- 3:00 BREAK
- 3:15 **3257** Coming on strong: Use bess beetles to 'unplug' our students while engaging them in scientific inquiry. **Robert Matthews** (rwmatthews@gmail.com), Univ. of Georgia, Athens, GA
- 3:30 **3258** The world of invertebrate exhibitory. **Jamie Sincage** (jamie.sincage@disney.com), Disney's Animal Kingdom, Lake Buena Vista, FL
- 3:45 **3259** Chasing bugs from middle school to graduate school: The influences and the mentors. **Matthew Thorn** (mjt152@msstate.edu) and John Guyton, Mississippi State Univ., Mississippi State, MS
- 4:00 **3260** A world of curiosity from an undergraduate entomology student. **Breanna Lyle** (bl334@msstate.edu) and John Guyton, Mississippi State Univ., Mississippi State, MS
- 4:15 **3261** The Arthropod Project, sharing resources world-wide for entomological lessons, activities, and demonstrations. **John Guyton** (j.guyton@msstate.edu), Mississippi State Univ., Mississippi State, MS
- 4:30 **3262** Bug boxes for education and outreach. **Rebecca Baldwin** (baldwinr@ufl.edu), Univ. of Florida, Gainesville, FL
- 4:45 **3263** Introducing the Invertebrates in Education and Conservation Conference (IECC). **Andrine A. Shufran** (andrine@okstate.edu), Oklahoma State Univ., Stillwater, OK



**Symposium: Entomologists without Borders: The Need for Collaboration Between Medical Professionals and Entomologists for the Betterment of Global Public Health**

**Room W230 C (Convention Center)**

**Moderators and Organizers:** Kyndall Dye, Jennifer Gordon, and Sydney Crawley, Univ. of Kentucky, Lexington, KY

- 1:30 **3264** The role of an entomologist in public health. **Mustapha Debboun** (mdebboun@hcphe.org), Harris County Public Health & Environmental Services, Houston, TX
- 1:45 **3265** Merging epidemiology and entomology to drive development of novel methods of vector control. **Tom Mascari** (thomas.m.mascari@gmail.com), S. C. Johnson & Son, Racine, WI
- 2:00 **3266** Entomology at CDC: Protecting the public from vector-borne diseases. **Janet McAllister** (jvm6@cdc.gov), Centers for Disease Control and Prevention, Fort Collins, CO
- 2:15 **3267** Comparison of US *Amblyomma*, *Dermacentor*, and *Rhipicephalus* ticks in their ability to transmit *R. rickettsii*. **Michael L. Levin** (mlevin@cdc.gov), Lindsay Killmaster, Alyssa Snellgrove, Lauren Schumacher, and Galina E. Zemtsova, Centers for Disease Control and Prevention, Atlanta, GA
- 2:30 **3268** Working with public health professionals: Why they need to know about insects and diseases. **Janet Hurley** (ja-hurley@tamu.edu), Texas A&M AgriLife Extension Service, Dallas, TX
- 2:45 **3269** Role of a state public health entomologist in global health. **Jerome Goddard** (jgoddard@entomology.msstate.edu), Mississippi State Univ., Mississippi State, MS
- 3:00 BREAK**
- 3:15 **3270** Using online and real time monitoring dengue vector system to reduce dengue cases and its cost-benefit. **Alvaro Eiras** (alvaro.eiras@gmail.com), Chief Laboratory of Chemical Ecology and Insect Vectors, Pampuhla, Brazil
- 3:30 **3271** Cross-border transmission of onchocerciasis in Africa and its implications on 2025 elimination goal: Uganda case analysis. **Lakwo Thomson** (tlakwo@gmail.com), Ministry of Health, Kampala, Uganda
- 3:45 **3272** Plague epidemiology, ecology, and control in Uganda. **Ben Beard** (cbeard@cdc.gov), Martin Schreifer, Paul Mead, and Kenneth Gage, Centers for Disease Control and Prevention, Fort Collins, CO
- 4:00 **3273** Bridging the gap: Collaboration with traditional healers to expand surveillance for plague in northwest Uganda. **Mary Hayden** (mhayden@ucar.edu)<sup>1</sup>, Emily Zeilinski-Gutierrez<sup>2</sup>, Apangu Titus<sup>3</sup>, Kevin Griffith<sup>2</sup>, Andy Monaghan<sup>1</sup>, Sean Moore<sup>1</sup>, Paul Mead<sup>2</sup>, Ben Beard<sup>2</sup>, and Rebecca Eisen<sup>2</sup>, <sup>1</sup>National Center for Atmospheric Research, Boulder, CO, <sup>2</sup>Centers for Disease Control and Prevention, Fort Collins, CO, <sup>3</sup>Uganda Virus Research Institute, Entebbe, Uganda
- 4:15 **Open Table Discussion**

**Symposium: Insect Photography Symposium: Bringing the Small to the World**

**Room W230 B (Convention Center)**

**Moderators and Organizers:** Stephen Doggett<sup>1</sup> and Thomas V. Myers<sup>2</sup>, <sup>1</sup>Westmead Hospital, Westmead, Australia, <sup>2</sup>All-Rite Pest Control, Lexington, KY

- 1:30 **3274** Field macro techniques. **Thomas V. Myers** (tomvmyers@gmail.com), All-Rite Pest Control, Lexington, KY
- 1:45 **3275** Capturing mosquitoes. **Stephen Doggett** (stephen.doggett@health.nsw.gov.au), Westmead Hospital, Westmead, Australia
- 2:00 **3276** The art and science of high speed flash photography. **John C. Abbott** (jcabbott@mail.utexas.edu), St. Edward's Univ., Austin, TX
- 2:15 **3277** Managing light for better insect photographs. **Alexander L. Wild** (alexwild@illinois.edu), Univ. of Illinois, Champaign, IL
- 2:45 **3278** The secrets behind 3D printing. **Richard Naylor** (richard@bedbugfoundation.org), CimexStore, Monmouthshire, United Kingdom
- 3:00 BREAK**
- 3:15 **3279** Cognysis: Capture the hidden world. Paul DeZeeuw<sup>1</sup> and **Roy Dunn** (hsfpix@gmail.com)<sup>2</sup>, <sup>1</sup>Cognisys, Inc., Traverse City, MI, <sup>2</sup>Cognisys, Inc., Westlake Village, CA
- 3:30 **3280** Zerene systems: The art of successful stacking. **Rik Littlefield** (rj.littlefield6@gmail.com), Zerene Systems, Richland, WA
- 3:45 **3281** High resolution imaging and 3D modeling of the massive to minuscule: Photomacrography. **Mark Smith** (mark@macroscopicsolutions.com), Macroscopic Solutions, Chicago, IL

**Symposium: International Graduate Student Showcase**

**Room W340 B (Convention Center)**

**Moderators and Organizers:** Paul Abram<sup>1</sup>, Chandra Moffat<sup>2</sup>, Carey Minter<sup>3</sup>, Mervat Mahmoud<sup>4</sup>, and Boyd Mori<sup>5</sup>, <sup>1</sup>Univ. of Montréal, Montréal, QC, Canada, <sup>2</sup>Univ. of New Brunswick, Fredericton, NB, Canada, <sup>3</sup>USDA - ARS, Ft. Lauderdale, FL, <sup>4</sup>South Valley Univ., Qena, Egypt, <sup>5</sup>Swedish Univ. of Agricultural Sciences, Alnarp, Sweden

- 1:30 **3282** Dominance hierarchies in the carpenter bee *Xylocopa virginica*: Establishing, maintaining, and changing reproductive strategies. **Jess Vickruck** (jvickruck@gmail.com), Brock Univ., St. Catharines, ON, Canada
- 2:00 **3283** It takes a village: Insights into how termites and symbionts collaborate physiologically. **Brittany Peterson** (peter137@purdue.edu), Purdue Univ., West Lafayette, IN
- 2:15 **3284** Is sex allocation in mountain pine beetles, *Dendroctonus ponderosae*, a response to male-biased mortality? **Leanna Lachowsky** (leanna.lachowsky@gmail.com), Univ. of Calgary, Toronto, ON, Canada



- 2:30 **3285** Novel constitutive and inducible antimicrobial activities against multidrug resistant bacterial pathogens in the eastern subterranean termite, *Reticulitermes flavipes*. **Yuan Zeng** (yzz0015@auburn.edu), Auburn Univ., Auburn, AL
- 2:45 **3286** How to escape parasitic manipulation? **Christoph Kurze** (christoph.kurze@zoologie.uni-halle.de), Martin Luther Univ., Halle, Germany
- 3:00 BREAK**
- 3:15 **3287** Revising arbovirus ecology in South Australia: What spatial scale can tell us about human risk of infection. **Emily Flies** (emilyj77@gmail.com), Univ. of South Australia, Adelaide, Australia
- 3:30 **3288** The role of wolf spiders (Araneae: Lycosidae) on the biological control of the bollworm, *Helicoverpa* (Lepidoptera: Noctuidae), in cotton crops. **Dalila Rendon** (rendonda@gmail.com), Macquarie Univ., Sydney, Australia
- 3:45 **3289** When things are getting hot: Consequences of exposure to high temperatures on a parasitoid-host relationship. **M. Lukas Seehausen** (ml.seehausen@mail.utoronto.ca), Univ. of Toronto, Toronto, ON, Canada

### Symposium: Orthopteroids Without Borders

#### Room W231 C (Convention Center)

**Moderators and Organizers:** Derek Woller<sup>1</sup> and Alexandre V. Latchininsky<sup>2</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Univ. of Wyoming, Laramie, WY

- 1:30 **3290** The science of natural history. **Piotr Naskrecki** (p.naskrecki@conservation.org), Harvard Univ., Cambridge, MA
- 2:00 **3291** Orthopteroid insects: A perfect group to investigate ecology, conservation, and biogeography. **Paolo Fontana** (paolo\_api.fontana@fmach.it), Edmund Mach Foundation, Pergine Valsugana, Italy
- 2:15 **3292** Ecological factors affecting grasshopper outbreaks in Wyoming. **Douglas Smith** (dsmith59@uwyo.edu) and Alexandre Latchininsky, Univ. of Wyoming, Laramie, WY
- 2:30 **3293** Ultrafast, ultrashort, and ultrasonic – the ecological and evolutionary implications of an enigmatic acoustic communication system in a bush cricket. **David Robinson** (david.robinson@open.ac.uk)<sup>1</sup>, Patricia Ash<sup>2</sup>, Marion Hall<sup>1</sup>, and Jürgen Rheinlaender<sup>3</sup>, <sup>1</sup>The Open Univ., Milton Keynes, United Kingdom, <sup>2</sup>The Open Univ. in the South, Oxford, United Kingdom, <sup>3</sup>Nordkirchen, Germany
- 2:45 **3294** Indicator plants in solitary phase and migration behavior of *Schistocerca piceifrons* in Yucatán, México. **Mario Poot Pech** (mpootpech@gmail.com), Esaú Ruíz Sánchez, and Horacio Ballina Gómez, Conkal Technological Institute, Conkal, Mexico
- 3:00 BREAK**
- 3:15 **3295** Transcriptomic profiling of the chemosensory organs in grasshoppers with diverse feeding strategies. **Tyler Raszick** (tjraszick@gmail.com) and Hojun Song, Texas A&M Univ., College Station, TX

- 3:30 **3296** Presentation withdrawn
- 3:45 **3297** Characterization of the nano-fiber silk of Embioptera. **Janice S. Edgerly** (jedgerlyrooks@scu.edu)<sup>1</sup>, Grace Stokes<sup>1</sup>, and Jeff Yarger<sup>2</sup>, <sup>1</sup>Santa Clara Univ., Santa Clara, CA, <sup>2</sup>Arizona State Univ., Tempe, AZ
- 4:00 **3298** Effects of precipitation manipulation and biotic factors on grasshopper populations: Implications for responses to climate change. **David Branson** (dave.branson@ars.usda.gov), USDA - ARS, Sidney, MT
- 4:15 **3299** Bushcricket genitalia: Morphology, function, and their role in species isolation and female choice (Orthoptera: Ensifera). **Gerlind Lehmann** (gerlind.lehmann@t-online.de), Humboldt Univ., Berlin, Germany
- 4:30 **3300** Phylogeny of neotropical Phalangopsidae (Ensifera, Grylloidea). **Pedro Souza-Dias** (pedrogdias@gmail.com), Univ. of São Paulo, São Paulo, Brazil
- 4:45 **3301** Cockroaches (Blattodea) of southern Louisiana: Morphology, diversity, and life histories. **Forest Huval** (lavuh07@yahoo.com), Louisiana State Univ., Baton Rouge, LA

### Symposium: Sericigenous Insects and 3F's: Fibre, (Human) Food and Feed-Global Status, and Future Role in Resolving Global Challenges

#### Room W224 F (Convention Center)

**Moderators and Organizers:** Motoyuki Sumida<sup>1</sup> and C. J. Prabhakar<sup>2,3</sup>, <sup>1</sup>Maharakham Univ., Maha Sarakham, Thailand, <sup>2</sup>Central Silk Board, Bangalore, India, <sup>3</sup>Independent Sericulture Consultant, Bangalore, India

- 1:30 **3302** Economic and environmental impacts of endemic silkworm farming in Madagascar. **Catherine Craig** (craig@cpali.org)<sup>1,2,3</sup>, Mamy Ratsimbazafy<sup>4</sup>, Maminirina Randrianandrasana<sup>5</sup>, May R. Berenbaum<sup>5</sup>, Kerry Oneill<sup>6</sup>, and Lalaina Raharindimby<sup>4</sup>, <sup>1</sup>Washington State Univ., Pullman, WA, <sup>2</sup>Harvard Univ., Cambridge, MA, <sup>3</sup>Conservation through Poverty Alleviation, International, Walla Walla, WA, <sup>4</sup>SEPALI Madagascar, Maroantsetra, Madagascar, <sup>5</sup>Univ. of Illinois, Champaign, IL, <sup>6</sup>CPALI, Ann Arbor, MI
- 1:45 **3303** Silk production and consumption trends - world scenario. **T. V. Maruthi** (sales@hanumanweaving.com), The Indian Silk Export Promotion Council, Mumbai, India
- 2:00 **3304** Silkworm as edible and medicinal resources for humans in China. **Jiping Liu** (liujiping@scau.edu.cn), South China Agricultural Univ., Guangzhou, China
- 2:15 **3305** Introduction of silkworms as livelihood option in new areas of Mid-India – experience of Madhya Pradesh, India. **Ajay Kumar Chaubey** (drakchaubey75@gmail.com)<sup>1</sup>, Satyanand<sup>2</sup>, Ravindra Singh<sup>3</sup>, and Ram Krishn Tiwari<sup>4</sup>, <sup>1</sup>Government College, Mundi, India, <sup>2</sup>Government of Madhya Pradesh, Bhopal, India, <sup>3</sup>Dept. of Sericulture, Hoshangabad, India, <sup>4</sup>K. N. Government P.G. College, Gyanpur, India



- 2:30 **3306** Northeastern India – an epicenter of silkworm as food practice. **Tourangbam Shantibala** (shantibro@yahoo.co.in)<sup>1</sup>, R. K. Lokeshwari<sup>1</sup> and Manisha Choudhury<sup>2</sup>, <sup>1</sup>Institute of Bioresources & Sustainable Development, Imphal, India, <sup>2</sup>Regional Resource Centre for North Eastern States, Guwahati, India
- 2:45 **3307** Silkworm use for 3F's: A new dimension for the future. **C. J. Prabhakar** (prabhakarcj@gmail.com), Korada Mohan Rao, P. Jayarama Raju, and Periasamy Kumareshan, Central Silk Board, Bangalore, India

### Symposium in Honor of the 2016 Recipients of Certificates of Distinction

#### Room W224 G (Convention Center)

**Moderators and Organizers:** Walter S. Leal<sup>1</sup>, Alvin M. Simmons<sup>2</sup>, Adriana Costero<sup>3</sup>, Wendell L. Roelofs<sup>4</sup>, and Patricia Scaraffia<sup>5</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>USDA - ARS, Charleston, SC, <sup>3</sup>National Institutes of Health, Bethesda, MD, <sup>4</sup>Cornell Univ., Geneva, NY, <sup>5</sup>Tulane Univ., New Orleans, LA

- 1:30 **3308** Introductory Remarks. **Walter S. Leal** (wsleal@ucdavis.edu), Univ. of California, Davis, CA
- 1:31 **3309** Moderator Introduction. **Adriana Costero** (acostero@niaid.nih.gov), National Institutes of Health, Bethesda, MD
- 1:35 **3310** Malaria in Africa: Towards elimination. **Maureen Coetzee** (maureen.coetzee@wits.ac.za), Univ. of the Witwatersrand, Johannesburg, South Africa
- 2:00 **3311** Moderator Introduction. **Wendell L. Roelofs** (wlr1@cornell.edu), Cornell Univ., Geneva, NY
- 2:05 **3312** Finding sources of wind-borne odor in moths and mosquitoes: Known mechanisms and outstanding issues. **Ring T. Cardé** (ring.carde@ucr.edu), Univ. of California, Riverside, CA
- 2:30 **3313** Moderator Introduction. **Patricia Scaraffia** (pscaraff@tulane.edu), Tulane Univ., New Orleans, LA
- 2:35 **3314** Biopesticides targeting voltage-gated ion channels: Efficacy and biosafety. **Angharad M. R. Gatehouse** (a.m.r.gatehouse@ncl.ac.uk), Newcastle Univ., Newcastle upon Tyne, United Kingdom

### Symposium: Insect Sex Determination

#### West Hall F3 (WF3) (Convention Center)

**Moderators and Organizers:** Leo Beukeboom<sup>1</sup>, Daniel Bopp<sup>2</sup>, Richard Meisel<sup>3</sup>, and Aaron Tarone<sup>4</sup>, <sup>1</sup>Univ. of Groningen, Groningen, Netherlands, <sup>2</sup>Univ. of Zürich, Zürich, Switzerland, <sup>3</sup>Univ. of Houston, Houston, TX, <sup>4</sup>Texas A&M Univ., College Station, TX

- 1:30 **3315** Diversity of insect sex determination mechanisms. **Leo Beukeboom** (l.w.beukeboom@rug.nl), Univ. of Groningen, Groningen, Netherlands
- 2:00 **3316** Lessons from Hymenoptera species: Insights into the evolutionary dynamics of sex-determining genes. **Martin Hasselmann** (martin.hasselmann@uni-hohenheim.de), Univ. of Hohenheim, Stuttgart, Germany

- 2:15 **3317** The evolution of doublesex in two parasitic wasp genera: *Nasonia* and *Muscidifurax*. **Eveline Verhulst** (e.c.verhulst@gmail.com), Wageningen Univ. and Research Centre, Wageningen, Netherlands
- 2:30 **3318** Sex determination in the house fly: Variations on a common theme. **Daniel Bopp** (daniel.bopp@imls.uzh.ch), Univ. of Zürich, Zürich, Switzerland
- 2:45 **3319** Sex chromosomes and sex determination in muscid flies. **Richard Meisel** (rpmeisel@uh.edu), Univ. of Houston, Houston, TX
- 3:00 **3320** Development and evaluation of male-only strains of the New World screwworm. **Max Scott** (max\_scott@ncsu.edu), North Carolina State Univ., Raleigh, NC
- SD3321** Towards the identification of the *M*-factor in the housefly, *Musca domestica*. **Akash Sharma** (a.sharma@rug.nl)<sup>1</sup>, Svenia Heinze<sup>2</sup>, Yanli Wu<sup>3</sup>, Ernst Wimmer<sup>3</sup>, Mark Robinson<sup>2</sup>, Leo Beukeboom<sup>1</sup>, and Daniel Bopp<sup>2</sup>, <sup>1</sup>Univ. of Groningen, Groningen, Netherlands, <sup>2</sup>Univ. of Zürich, Zürich, Switzerland, <sup>3</sup>Georg August Univ., Göttingen, Germany
- SD3322** RNA metabolic labeling in XX versus XX/XY embryos of *Ceratitis capitata* and RNAseq differential analysis as a tool to identify male-specific early zygotic genes. **Angela Meccariello** (angela.meccariello@unina.it) and Giuseppe Saccone, Univ. of Napoli Federico II, Napoli, Italy
- 3:00 BREAK AND POSTER SESSION**
- 3:30 **3323** Genes to behavior: Genomic studies of *Drosophila melanogaster* sex differences. **Michelle Arbeitman** (michelle.arbeitman@med.fsu.edu), Florida State Univ., Tallahassee, FL
- 3:45 **3324** Genetics of sex determination in the Mediterranean fruit fly: From basic to applied research. **Giuseppe Saccone** (giuseppe.saccone@unina.it), Univ. of Napoli Federico II, Napoli, Italy
- 4:00 **3325** Phylogenetic distribution and evolutionary dynamics of the "axis" sex determination genes *doublesex* and *transformer* in insects. **Elzemiak Geuverink** (e.geuverink@rug.nl), Univ. of Groningen, Groningen, Netherlands
- 4:15 **3326** Sex and the control of mosquito-borne infectious diseases. **Jake Tu** (jaketu@vt.edu), Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 4:30 **3327** The splice is right: Probing the evolutionary origins of an insect sexual differentiation pathway based on alternative RNA splicing. **Judy Wexler** (jrwexler@ucdavis.edu), Univ. of California, Davis, CA
- 4:45 **3328** Role of sex chromosomes in sex determination of moths and butterflies. **Frantisek Marec** (marec@entu.cas.cz), Czech Academy of Sciences, České Budějovice, Czech Republic
- 5:00 **3329** Sex determination pathways in lepidopteran insects. **Susumu Katsuma** (katsuma@ss.ab.a.u-tokyo.ac.jp), The Univ. of Tokyo, Tokyo, Japan



5:15 **3330** Evolution of new sex chromosomes by lateral genome transfer of bacterial symbiont in pillbug. **Richard Cordaux** (richard.cordaux@univ-poitiers.fr), National Center for Scientific Research, Poitiers, France

### Symposium: Insect Gut Microbe Interactions

#### Room W330 B (Convention Center)

**Moderators and Organizers:** Bruno Lemaître<sup>1</sup> and Angela Douglas<sup>2</sup>, <sup>1</sup>EPFL, Lausanne, Switzerland, <sup>2</sup>Cornell Univ., Ithaca, NY

- 1:30 **3331** Interactions in the honey bee gut community. **Waldan Kwong** (waldan.kwong@yale.edu)<sup>1</sup> and Nancy Moran<sup>2</sup>, <sup>1</sup>Yale Univ., New Haven, CT, <sup>2</sup>The Univ. of Texas, Austin, TX
- 1:45 **3332** Interplay between gut and systemic immune response in *Drosophila*. Bruno Lemaître and **Jan Dudzic** (jan.dudzic@epfl.ch), EPFL, Lausanne, Switzerland
- 2:00 **3333** Matrix reloaded: Structure and function of the peritrophic matrix in the midgut of the model beetle *Tribolium castaneum*. **Hans Merzendorfer** (hans.merzendorfer@biologie.uni-osnabrueck), Univ. of Osnabrück, Osnabrück, Germany
- 2:15 **3334** Host immune responses in *Riptortus-Burkholderia* gut symbiotic system. **Bok-Luel Lee** (brlee@pusan.ac.kr), Pusan National Univ., Busan, South Korea
- 2:30 **3335** The life stage of *Yersinia pestis* in the digestive tract of its flea vector. **Joseph Hinnebusch** (jhinnebusch@niaid.nih.gov), National Institute of Allergy and Infectious Diseases, Hamilton, MT
- 2:45 **3336** Gut check in *Drosophila*: How microbes alter intestinal homeostasis. **Nicolas Buchon** (nicolas.buchon@cornell.edu), Cornell Univ., Ithaca, NY
- 3:00 BREAK**
- 3:15 **3337** Factors shaping complex gut microbiota in insects: What can we learn from cockroaches? **Aram Mikaelyan** (arammikaelyan@gmail.com)<sup>1,2</sup>, Niclas Lampert<sup>2</sup>, Claire Thompson<sup>2</sup>, and Andreas Brune<sup>1,2</sup>, <sup>1</sup>LOEWE-Center for Synthetic Microbiology, Marburg, Germany, <sup>2</sup>Max Planck Institute for Terrestrial Microbiology, Marburg, Germany
- 3:30 **3338** The gut microbiota and host function in *Drosophila*. **Angela Douglas** (aes326@cornell.edu), Cornell Univ., Ithaca, NY

### Symposium: Trade-offs and Immunity: Physiology, Life-History, and Evolution

#### Room W230 D (Convention Center)

**Moderators and Organizers:** Nicole Gerardo<sup>1</sup> and Seth M. Barribeau<sup>2</sup>, <sup>1</sup>Emory Univ., Atlanta, GA, <sup>2</sup>East Carolina Univ., Greenville, NC

- 1:30 **3339** Polyphenism determines the cost of immunity in pea aphids. **Benjamin Parker** (benjamin.j.parker@gmail.com)<sup>1</sup> and Seth Barribeau<sup>2</sup>, <sup>1</sup>Emory Univ., Atlanta, GA, <sup>2</sup>East Carolina Univ., Greenville, NC
- 1:45 **3340** A *Daphnia*'s experience of infection: From immune cells to epidemic. **Stuart Auld** (s.k.auld@stir.ac.uk), Univ. of Stirling, Stirling, United Kingdom

2:00 **3341** 'Manipulation,' but not as we know it: Altered feeding behavior of mosquitoes is not dependent on infection with malaria parasites. Lauren Cator<sup>1</sup> and **Courtney Murdock** (cmurdock@uga.edu)<sup>2</sup>, <sup>1</sup>Imperial College London, London, United Kingdom, <sup>2</sup>Univ. of Georgia, Athens, GA

2:15 **3342** Transgenerational effects of biopesticide products in the Indian meal moth. **Joanne Littlefair** (j.e.littlefair@qmul.ac.uk), Alice Laughton, and Rob Knell, Queen Mary Univ. of London, London, United Kingdom

2:30 **3343** The influence of immune and stress genes in pathogen-induced trade-offs: What doesn't kill you makes you fitter, but sicker. **Colin McClure** (cdm28@bath.ac.uk), Univ. of Bath, Bath, United Kingdom

#### 2:45 BREAK

3:00 **3344** Does immunity trade off with sex in Wellington tree weta? **Clint Kelly** (clintdkelly@icloud.com), Univ. of Québec, Montréal, QC, Canada

3:30 **3345** Taxes of a different state: Costs associated with insect immune priming. **Ben Sadd** (bmsadd@ilstu.edu), Illinois State Univ., Normal, IL

### Symposium: Ant-Plant Interactions in a Changing World

#### Room W224 H (Convention Center)

**Moderators and Organizers:** Suzanne Koptur<sup>1</sup> and Paulo S. Oliveira<sup>2</sup>, <sup>1</sup>Florida International Univ., Miami, FL, <sup>2</sup>State Univ. of Campinas, Campinas, Brazil

1:30 **3346** Ecology of leaf-cutting ants in human-modified landscapes. **Marcelo Tabarelli** (mtrelli@ufpe.br)<sup>1</sup>, Inara Leal<sup>1</sup>, and Rainer Wirth<sup>2</sup>, <sup>1</sup>Federal Univ. of Pernambuco, Recife, Brazil, <sup>2</sup>Univ. of Kaiserslautern, Kaiserslautern, Germany

1:45 **3347** Climate change and ant-mediated seed dispersal in temperate North America. **Robert Warren** (warrenrj@buffalostate.edu), State Univ. of New York, Buffalo, NY

2:00 **3348** Ant-fruit/seed interactions in fragmented Atlantic rainforest and Cerrado savanna. **Paulo S. Oliveira** (pso@unicamp.br)<sup>1</sup>, Alexander Christianini<sup>2</sup>, and Ana Gabriela Bieber<sup>3</sup>, <sup>1</sup>State Univ. of Campinas, Campinas, Brazil, <sup>2</sup>Federal Univ. of São Carlos, Sorocaba, Brazil, <sup>3</sup>State Univ. of Southwest Bahia, Itapetinga, Brazil

2:15 **3349** Myrmecochory in Brazilian Caatinga and its response to chronic anthropogenic disturbance. **Inara Leal** (irleal@ufpe.br)<sup>1</sup>, Laura Leal<sup>1</sup>, Gabriela Arcoverde<sup>1</sup>, and Alan N. Andersen<sup>2</sup>, <sup>1</sup>Federal Univ. of Pernambuco, Recife, Brazil, <sup>2</sup>CSIRO, Winnellie, Australia

2:30 **3350** Diversity and specificity of ant-plant interactions in canopy communities of a primary and secondary tropical rainforest. **Petr Klimes** (peta.klimes@gmail.com), Czech Academy of Sciences, České Budějovice, Czech Republic



- 2:45 **3351** Mutualistic ant-plant symbioses and habitat change in tropical forests. **Tom Fayle** (tmfayle@gmail.com)<sup>1</sup>, Chua Wanji<sup>1</sup>, Ed Turner<sup>2</sup>, and Kalsum Yusah<sup>1</sup>, <sup>1</sup>Univ. of Malaysia, Sabah, Malaysia, <sup>2</sup>Univ. of Cambridge, Cambridge, United Kingdom
- 3:00 **BREAK**
- 3:15 **3352** Plasticity and effectiveness of defense strategies against herbivory in ant-visited plants growing in variable abiotic habitat conditions. **Akira Yamawo** (yamawo.aki@gmail.com), Hirosaki Univ., Hirosaki, Japan
- 3:30 **3353** Interhabitat variation in the ecology of extrafloral nectar production and associated ant assemblages in Mexican landscapes. **Cecilia Diaz-Castelazo** (diazcastelazogm@gmail.com)<sup>1</sup> and Víctor Rico-Gray<sup>2</sup>, <sup>1</sup>Institute of Ecology, Xalapa, Mexico, <sup>2</sup>Veracruzana Univ., Xalapa, Mexico
- 3:45 **3354** Urban ants and plants: Ant visitation to extrafloral nectaries and antiherbivore defense? **Suzanne Koptur** (kopturs@fiu.edu)<sup>1</sup>, Ian Jones<sup>1</sup>, Andrea Salas<sup>1</sup>, Hong Liu<sup>1</sup>, Hipólito Paulino-Neto<sup>2</sup>, Maria Rodriguez<sup>1</sup>, and Carl Weekley<sup>3</sup>, <sup>1</sup>Florida International Univ., Miami, FL, <sup>2</sup>Univ. of São Paulo, Ribeirão Preto, Brazil, <sup>3</sup>Archbold Biological Station, Venus, FL
- 4:00 **3355** Invasion biology and ant-plant systems in Australia. **Lori Lach** (lori.lach@jcu.edu.au), James Cook Univ., Cairns, Australia
- 4:15 **3356** The complexity and variable nature of ant-*Acacia* mutualisms in the African savanna. **Todd Palmer** (tmp@ufl.edu), Univ. of Florida, Gainesville, FL
- 4:30 **3357** Services and disservices of ant communities in tropical agroforestry. **Yann Clough** (yclough@gwdg.de)<sup>1</sup>, Stacy M. Philpott<sup>2</sup>, and Teja Tscharnke<sup>3</sup>, <sup>1</sup>Lund Univ., Lund, Sweden, <sup>2</sup>Univ. of Toledo, Toledo, OH, <sup>3</sup>Georg August Univ., Göttingen, Germany
- 4:45 **3358** Ant-plant-herbivore interactions in northern neotropical agroecosystems. **Inge Armbrrecht** (inge.armbrrecht@correounivalle.edu.co)<sup>1</sup> and Ivette Perfecto<sup>2</sup>, <sup>1</sup>Univ. of Valle, Cali, Colombia, <sup>2</sup>Univ. of Michigan, Ann Arbor, MI
- 5:00 **3359** Changing light conditions in pine rockland habitats affect the outcome of ant-plant interactions. **Ian Jones** (ijone002@fiu.edu)<sup>1</sup>, Suzanne Koptur<sup>1</sup>, Hilma R. Gallegos<sup>1</sup>, Joseph P. Tardanico<sup>1</sup>, Patricia A. Trainer<sup>1</sup>, and Jorge E. Peña<sup>2</sup>, <sup>1</sup>Florida International Univ., Miami, FL, <sup>2</sup>Univ. of Florida, Homestead, FL
- 1:30 **3360** Biological control based on the age-stage, two-sex life table, predation rate, and population projection. **Hsin Chi** (hsinchi@dragon.nchu.edu.tw)<sup>1</sup>, Jih-Zu Yu<sup>2</sup>, De-Fen Mou<sup>3</sup>, Chih-Chung Lee<sup>3</sup>, and Cecil L. Smith<sup>4</sup>, <sup>1</sup>National Chung Hsing Univ. (Retired), Taichung, Taiwan, <sup>2</sup>Taiwan Agricultural Research Institute, Taichung, Taiwan, <sup>3</sup>National Chung Hsing Univ., Taichung, Taiwan, <sup>4</sup>Georgia Museum of Natural History, Athens, GA
- 1:45 **3361** Demography and predation rate of *Chrysoperla carnea* (Neuroptera: Chrysopidae) fed on *Hyalopterus pruni* (Hemiptera: Aphididae). **Remzi Atlıhan** (ratlıhan@yyu.edu.tr) and Hazhar Abdulrahman, Univ. of Yuzuncu Yil, Van, Turkey
- 2:00 **3362** Life table of *Lasioderma serricorne* (F.) (Coleoptera: Anobiidae). Chiew-Liang Liew and **Chow-Yang Lee** (chowyang@usm.my), Univ. of Science, Penang, Malaysia
- 2:15 **3363** Presentation withdrawn
- 2:30 **3364** Combining insect life table and predation rate for IPM and biological control: A study of *Chrysoperla carnea* (Stephen) (Neuroptera: Chrysopidae) fed on *Myzus persicae* (Sulzer) (Homoptera: Aphididae). **Evin Polat Akköprü** (polatevin@gmail.com) and Remzi Atlıhan, Univ. of Yuzuncu Yil, Van, Turkey
- 2:45 **3365** Ecological impacts of secondary bacteria symbionts on *Sitobion avenae* (Fabricius) (Hemiptera: Aphididae). **Zu-Qing Hu** (huzuqing@nwsuaf.edu.cn), Chen Luo, and Huiyan Zhao, Northwest A&F Univ., Yangling, China
- 3:00 **BREAK**
- 3:15 **3366** Effects of a bacterial symbiont on the competitive ability and fitness of host whitefly. **Dong Chu** (chinachudong@qau.edu.cn), Wen-Ping Zhang, Hong-Ran Li, and Yi-Wei Fang, Qingdao Agricultural Univ., Qingdao, China
- 3:30 **3367** Effects of quinoa (Chenopodioideae) on some biological traits of *Drosophila melanogaster*. **Eda Özel Güneş** (dnapolimeraz@gmail.com), Univ. of Necmettin Erbakan, Konya, Turkey
- 3:45 **3368** Comparison of life history traits of two closely related predatory mites, *Neoseiulus womersleyi* and *N. longispinosus* (Acari: Phytoseiidae), found in Taiwan. **Tetsuo Gotoh** (tetsuo.gotoh.acari@vc.ibaraki.ac.jp)<sup>1</sup>, R. Sugawara<sup>1</sup>, and Chyi-Chen Ho<sup>2</sup>, <sup>1</sup>Ibaraki Univ., Ibaraki, Japan, <sup>2</sup>Taiwan Agricultural Research Institute, Taichung, Taiwan
- 4:00 **3369** Use of life tables in aphid ecological studies on environmental stress factors. **Huiyan Zhao** (zhaohy@nwsuaf.edu.cn), Zu-Qing Hu, and Xiangshun Hu, Northwest A&F Univ., Yangling, China
- 4:15 **3370** Timing of control of *Frankliniella occidentalis* (Pergande) using *Beauveria bassiana* based on life table and stage-specific mortality. **Haihong Wang** (wanghaihong2020@sina.com) and Zhongren Lei, Chinese Academy of Agricultural Sciences, Beijing, China

## Symposium: Combining Insect Life Table, Consumption Rate, and Predation Rate for IPM and Biological Control

Room W224 C (Convention Center)

**Moderators and Organizers:** Remzi Atlıhan<sup>1</sup>, Chow-Yang Lee<sup>2</sup>, Ayhan Gökçe<sup>3</sup>, Aurang Kavousi<sup>4</sup>, and Hsin Chi<sup>5</sup>, <sup>1</sup>Univ. of Yuzuncu Yil, Van, Turkey, <sup>2</sup>Univ. of Science, Penang, Malaysia, <sup>3</sup>Nigde Univ., Nigde, Turkey, <sup>4</sup>Univ. of Zanjan, Zanjan, Iran, <sup>5</sup>National Chung Hsing Univ. (Retired), Taichung, Taiwan



- 4:30 **3371** Influence of different hazelnut cultivars on some demographic characteristics of filbert aphid, *Myzocallis coryli* (Goeze). **Ali Güncan** (guncan.ali@gmail.com)<sup>1</sup> and Ebru Gümüşçü<sup>2</sup>, <sup>1</sup>Ordu Univ., Ordu, Turkey, <sup>2</sup>Hazelnut Research Institute, Giresun, Turkey
- 4:45 **3372** Life table and functional and numerical responses of *Aphelinus paramali* (Zehavi and Rosen) (Hymenoptera: Aphelinidae) reared on *Aphis gossypii* Glover (Hemiptera: Aphididae). **Yunus Bayram** (ybayram@hotmail.com)<sup>1</sup> and Erol Bayhan<sup>2</sup>, <sup>1</sup>General Directorate of Food and Control, Ankara, Turkey, <sup>2</sup>Dicle Univ., Diyarbakir, Turkey
- 5:00 **3373** Demographic effect of arrhenotokous parthenogenesis and bisexual reproduction of *Frankliniella occidentalis*. **Bin Zhang** (binzhang@qau.edu.cn), Bing-Qi Liu, and Chang-Ying Zheng, Qingdao Agricultural Univ., Qingdao, China
- 5:15 **3374** Age-dependent life table of *Myzus persicae* (Sulz.) (Hemiptera: Aphididae) from five different pepper varieties, *Capsicum annuum*, reared under laboratory conditions. **Mehmet Özgökçe** (msozgoke@gmail.com), Hilmi Kara, and Muhbet Oran, Univ. of Yuzuncu Yil, Van, Turkey

### Symposium: From Genes to Grains: The Current Sugarcane Aphid Outbreak on Sorghum in the Southern U.S.

#### Room W224 B (Convention Center)

**Moderators and Organizers:** Xinzhi Ni<sup>1</sup>, Karen Harris-Shultz<sup>1</sup>, and Phillip Wadl<sup>2</sup>, <sup>1</sup>USDA - ARS, Tifton, GA, <sup>2</sup>USDA - ARS, Charleston, SC

- 1:30 **3375** Genome sequencing of the sugarcane aphid for microsatellite development and endosymbiont detection. **Phillip Wadl** (phillip.wadl@ars.usda.gov)<sup>1</sup>, Karen Harris-Shultz<sup>2</sup>, Xinwang Wang<sup>3</sup>, and Xinzhi Ni<sup>2</sup>, <sup>1</sup>USDA - ARS, Charleston, SC, <sup>2</sup>USDA - ARS, Tifton, GA, <sup>3</sup>USDA - ARS, College Station, TX
- 1:45 **3376** Genetic diversity in *Melanaphis sacchari* and host-plant resistance in sugarcane. **Samuel Nibouche** (samuel.nibouche@cirad.fr), Hélène Delatte, Laurent Costet, and Bernard Reynaud, CIRAD, Saint-Pierre, France
- 2:00 **3377** Population genetics of the sugarcane aphid, *Melanaphis sacchari* (Zehntner), in the continental US. **Jocelyn Holt** (holtjocelyn@tamu.edu)<sup>1</sup>, J. Scott Armstrong<sup>2</sup>, Kyle Harrison<sup>1</sup>, and Raul Medina<sup>1</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>USDA - ARS, Stillwater, OK
- 2:15 **3378** Endosymbionts of *Melanaphis sacchari*. **Adrian Pekarçik** (ajp0042@tigermail.auburn.edu)<sup>1</sup>, Scott Santos<sup>1</sup>, David Kerns<sup>2</sup>, Gregg Nuessly<sup>3</sup>, and Alana Jacobson<sup>1</sup>, <sup>1</sup>Auburn Univ., Auburn, AL, <sup>2</sup>Louisiana State Univ. AgCenter, Winnsboro, LA, <sup>3</sup>Univ. of Florida, Belle Glade, FL
- 2:30 **3379** Sugarcane aphid resistance in sorghum and its potential bioenergy grass hosts. **Karen Harris-Shultz** (karen.harris@ars.usda.gov), Xinzhi Ni, Joseph Knoll, Caitlin Cato, and William F. Anderson, USDA - ARS, Tifton, GA

- 2:45 **3380** Host plant defense against sugarcane aphid in sorghum and genetic mechanism of resistance to the new pest. **Yinghua Huang** (yinghua.huang@ars.usda.gov), USDA - ARS, Stillwater, OK

#### 3:00 BREAK

- 3:15 **3381** Breeding for tolerance to the sugarcane aphid in sorghum. **Lloyd Mbulwe** (shinakalupupa@tamu.edu)<sup>1</sup>, Gary C. Peterson<sup>2</sup>, William Rooney<sup>1</sup>, and John Armstrong<sup>3</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Texas A&M AgriLife Research, Lubbock, TX, <sup>3</sup>USDA - ARS, Stillwater, OK
- 3:30 **3382** Towards efficient multi-scale methods for monitoring sugarcane aphid infestations in sorghum. **Norman Elliott** (norman.elliott@ars.usda.gov)<sup>1</sup>, Tom Royer<sup>2</sup>, Michael Brewer<sup>3</sup>, Nicholas Seiter<sup>4</sup>, Kris Giles<sup>2</sup>, Allen Knutson<sup>5</sup>, Brian McCornack<sup>6</sup>, and Georges Backoulou<sup>2</sup>, <sup>1</sup>USDA - ARS, Stillwater, OK, <sup>2</sup>Oklahoma State Univ., Stillwater, OK, <sup>3</sup>Texas A&M AgriLife Research, Corpus Christi, TX, <sup>4</sup>Univ. of Arkansas, Monticello, AR, <sup>5</sup>Texas A&M Univ., Dallas, TX, <sup>6</sup>Kansas State Univ., Manhattan, KS
- 3:45 **3383** Season-long management of sugarcane aphid, *Melanaphis sacchari*, on sorghum in the state of Georgia. Phillip M. Roberts<sup>1</sup> and **G. David Buntin** (gbuntin@uga.edu)<sup>2</sup>, <sup>1</sup>Univ. of Georgia, Tifton, GA, <sup>2</sup>Univ. of Georgia, Griffin, GA
- 4:00 **3384** Strategies of sugarcane aphid management in sweet and grain sorghum. **Joseph Knoll** (joe.knoll@ars.usda.gov)<sup>1</sup>, Xinzhi Ni<sup>1</sup>, G. David Buntin<sup>2</sup>, William F. Anderson<sup>1</sup>, and Karen Harris-Shultz<sup>1</sup>, <sup>1</sup>USDA - ARS, Tifton, GA, <sup>2</sup>Univ. of Georgia, Griffin, GA
- 4:15 **3385** Developing integrated pest management practices for the sugarcane aphid in Arkansas. **Nicholas Seiter** (nseiter@uaex.edu), Univ. of Arkansas, Monticello, AR
- 4:30 **3386** Management of sugarcane aphid in Mississippi grain sorghum: What we've learned. **Angus Catchot** (acatchot@entomology.msstate.edu)<sup>1</sup>, Jeff Gore<sup>2</sup>, Don Cook<sup>2</sup>, and Brittany Lipsey<sup>1</sup>, <sup>1</sup>Mississippi State Univ., Mississippi State, MS, <sup>2</sup>Mississippi State Univ., Stoneville, MS
- 4:45 **3387** Impacts of host, temperature, and fertilization on sugarcane aphid population dynamics. **Blake E. Wilson** (bwils26@lsu.edu)<sup>1</sup>, Monique de Souza<sup>2</sup>, Jeffrey Davis<sup>2</sup>, Julien M. Beuzelin<sup>2</sup>, Francis Reay-Jones<sup>3</sup>, Thomas E. Reagan<sup>2</sup>, Lloyd T. Wilson<sup>4</sup>, and Yubin Yang<sup>4</sup>, <sup>1</sup>Louisiana State Univ. AgCenter, Baton Rouge, LA, <sup>2</sup>Louisiana State Univ., Baton Rouge, LA, <sup>3</sup>Clemson Univ., Florence, SC, <sup>4</sup>Texas A&M AgriLife Research, Beaumont, TX
- 5:00 **3388** Variation in sorghum hybrid sensitivity and natural enemy activity provides opportunities for integrated management of sugarcane aphid. **Michael Brewer** (mjbrewer@ag.tamu.edu)<sup>1</sup>, Erin Maxson<sup>2</sup>, John Gordy<sup>3</sup>, Robert Bowling<sup>4</sup>, and James Woolley<sup>2</sup>, <sup>1</sup>Texas A&M AgriLife Research, Corpus Christi, TX, <sup>2</sup>Texas A&M Univ., College Station, TX, <sup>3</sup>Texas A&M AgriLife Extension Service, Rosenberg, TX, <sup>4</sup>Texas A&M AgriLife Extension Service, Corpus Christi, TX



**Symposium: Impact of Native and Invasive Alien True Bug Species in Agro-Ecosystems: Range Expansion, Pest Status, and Control Tactics**

**Chapin Theater (Convention Center)**

**Moderators and Organizers:** Antonino Cusumano<sup>1</sup> and Raul Medina<sup>2</sup>, <sup>1</sup>Wageningen Univ. and Research Centre, Wageningen, Netherlands, <sup>2</sup>Texas A&M Univ., College Station, TX

- 1:30 **3389** Chemical ecology of egg parasitoids associated with heteropterans: Implication for crop protection. **Stefano Colazza** (stefano.colazza@unipa.it), Univ. of Palermo, Palermo, Italy
- 1:45 **3390** Exploitation of insect and plant semiochemicals as tools for real-time control and detection of pests in crops. **Maria Blassioli-Moraes** (carolina.blassioli@embrapa.br), Mirian Michereff, Miguel Borges, and R. A. Laumann, Embrapa Genetic Resources and Biotechnology, Brasilia, Brazil
- 2:00 **3391** Pheromones of Pentatomoidea: New discoveries for application to pest management. **Donald C. Weber** (don.weber@ars.usda.gov)<sup>1</sup>, Ashot Khimian<sup>1</sup>, Maria Blassioli-Moraes<sup>2</sup>, and Jocelyn G. Millar<sup>3</sup>, <sup>1</sup>USDA - ARS, Beltsville, MD, <sup>2</sup>Embrapa Genetic Resources and Biotechnology, Brasilia, Brazil, <sup>3</sup>Univ. of California, Riverside, CA
- 2:15 **3392** Asymmetry in seasonal response of female *Riptortus pedestris* to synthetic pheromone. **Un Taek Lim** (utlim@andong.ac.kr) and M. Rahman, Andong National Univ., Andong, South Korea
- 2:30 **3393** An improved method for cuticular hydrocarbon profiling in *Murgantia histrionica* and other stink bugs. Michael Riedel<sup>1</sup>, **Michael Rostas** (michael.rostas@lincoln.ac.nz)<sup>2</sup>, Antonino Cusumano<sup>3</sup>, Ezio Peri<sup>4</sup>, and Stefano Colazza<sup>4</sup>, <sup>1</sup>Julius von Sachs Institute for Biological Sciences, Würzburg, Germany, <sup>2</sup>Lincoln Univ., Canterbury, New Zealand, <sup>3</sup>Wageningen Univ. and Research Centre, Wageningen, Netherlands, <sup>4</sup>Univ. of Palermo, Palermo, Italy
- 2:45 **3394** Understanding the feeding behavior of some heteropteran crop pests. **Paula Mitchell** (mitchellp@winthrop.edu)<sup>1</sup> and Francesca Stubbins<sup>2</sup>, <sup>1</sup>Winthrop Univ., Rock Hill, SC, <sup>2</sup>Clemson Univ., Blackville, SC
- 3:00 **BREAK**
- 3:15 **3395** Understanding local dispersal to improve pest management. **Michael Toews** (mtoews@uga.edu)<sup>1</sup>, Ta-i Huang<sup>2</sup>, Ishakh Pulakkatu-Thodi<sup>3</sup>, and Rajagopalbabu Srinivasan<sup>1</sup>, <sup>1</sup>Univ. of Georgia, Tifton, GA, <sup>2</sup>Dow AgroSciences, Taipei, Taiwan, <sup>3</sup>Univ. of Hawai'i, Honolulu, HI
- 3:30 **3396** Multifunctional strategies for management of stink bugs based on the ecology and biology of these pests and their natural enemies. **Glynn Tillman** (glynn.tillman@ars.usda.gov), USDA - ARS, Tifton, GA
- 3:45 **3397** Pest management impact of the brown marmorated stink bug, *Halyomorpha halys*, on field and vegetable crops in the Mid-Atlantic US. **Thomas P. Kuhar** (tkuhar@vt.edu), Virginia Polytechnic Institute and State Univ., Blacksburg, VA

- 4:00 **3398** When generalists specialize: Patterns of host utilization by *Halyomorpha halys* in the invaded range. **Michael J. Raupp** (mraupp@umd.edu)<sup>1</sup>, Holly Martinson<sup>1</sup>, P. Dilip Venugopal<sup>2</sup>, Erik J. Bergmann<sup>1</sup>, and Paula M. Shrewsbury<sup>1</sup>, <sup>1</sup>Univ. of Maryland, College Park, MD, <sup>2</sup>U.S. Environmental Protection Agency, Washington, DC
- 4:15 **3399** Impact of *Megacopta cribraria* (Hemiptera: Plataspidae) in the soybean agro-ecosystem. **Joni L. Blount** (jonilb@uga.edu)<sup>1</sup>, G. David Buntin<sup>1</sup>, Phillip M. Roberts<sup>2</sup>, Michael Toews<sup>2</sup>, and Wayne Gardner<sup>1</sup>, <sup>1</sup>Univ. of Georgia, Griffin, GA, <sup>2</sup>Univ. of Georgia, Tifton, GA
- 4:30 **3400** Integrating multiple strategies for *Lygus lineolaris* management in cotton. **Fred Musser** (fm61@msstate.edu)<sup>1</sup>, Scott Graham<sup>2</sup>, Angus Catchot<sup>1</sup>, Jeff Gore<sup>3</sup>, and Don Cook<sup>3</sup>, <sup>1</sup>Mississippi State Univ., Mississippi State, MS, <sup>2</sup>Univ. of Tennessee, Jackson, TN, <sup>3</sup>Mississippi State Univ., Stoneville, MS
- 4:45 **3401** Invasion, predictive distribution, and management of *Bagrada hilaris* in North America. **Thomas M. Perring** (thomas.perring@ucr.edu)<sup>1</sup>, John Palumbo<sup>2</sup>, Monica Papes<sup>3</sup>, and Darcy Reed<sup>1</sup>, <sup>1</sup>Univ. of California, Riverside, CA, <sup>2</sup>Univ. of Arizona, Yuma, AZ, <sup>3</sup>Oklahoma State Univ., Stillwater, OK
- 5:00 **3402** Redbanded stink bug: Range expansion, pest status, and control tactics in US. **Suhas Vyavhare** (suhas.7@tamu.edu), Texas A&M AgriLife Research, Beaumont, TX
- 5:15 **3403** Towards identification of cotton boll rot genes utilized by stink bug-transmitted bacterial phytopathogens using a genomics approach. **Enrique Medrano** (gino.medrano@ars.usda.gov) and Alois Bell, USDA - ARS, College Station, TX

**Symposium: Innovative Application Technologies for Pest Management**

**Room W331B (Convention Center)**

**Moderators and Organizers:** Anil Menon, Kenneth Brown, and Rebecca Willis, BASF, Research Triangle Park, NC

- 1:30 **3404** Assessment of field efficacy of an intelligent variable rate sprayer in Oregon nursery production. **Robin Rosetta** (robin.rosetta@oregonstate.edu)<sup>1</sup>, Heping Zhu<sup>2</sup>, Derek Wells<sup>1</sup>, and Adam Clark<sup>2</sup>, <sup>1</sup>Oregon State Univ., Aurora, OR, <sup>2</sup>USDA - ARS, Wooster, OH
- 1:45 **3405** A new paradigm in termiticide application technology. **Kyle Jordan** (kyle.jordan@basf.com), BASF, Research Triangle Park, NC
- 2:00 **3406** Advances in closed-handling systems for the safe application of agro-chemicals. **Ram Ramalingam** (ram.ramalingam@syngenta.com), Syngenta, Greensboro, NC
- 2:15 **3407** Precision pest management – next-generation pest management using field sensors and Cloud-based computing platforms. **Johnny Park** (johnny.park@spensatech.com) and Chad Aeschliman, Spensa Technologies, Inc., West Lafayette, IN





- 2:30 **3408** AgMusa: A new collaborative technology to optimize seedling health, transplanting and protection of sugarcane. **Walter Dias** (walter-henrique.dias@basf.com), BASF, Research Triangle Park, NC
- 2:45 **3409** Drift reduction technologies in 3-D crops using nozzles and formulation technology. **Jerome Schleier** (jjschleieriii@dow.com), Dow AgroSciences, Indianapolis, IN
- 3:00 BREAK**
- 3:15 **3410** High-efficiency, targeted application technology for tephritid management. **H. Alejandro Arevalo** (alejandro.arevalo@basf.com), Siddharth Tiwari, and Richard Tyler, BASF, Research Triangle Park, NC
- 3:30 **3411** Assessing efficacy, exposure, and risk for pesticide drift reduction technologies. **Collin Preftakes** (cjpreftakes@gmail.com), Montana State Univ., Bozeman, MT
- 3:45 **3412** Interceptor G2: A new paradigm in public health. **James W. Austin** (james.austin@basf.com), BASF, Research Triangle Park, NC

### Symposium: Approaches for Modeling Insect Pest Potential Distribution and Spread

#### Room W331 C (Convention Center)

**Moderators and Organizers:** Sunil Kumar<sup>1</sup> and Lisa Neven<sup>2</sup>, <sup>1</sup>Colorado State Univ., Fort Collins, CO, <sup>2</sup>USDA - ARS, Wapato, WA

- 1:30 **3413** Uncovering human-mediated pathways of invasive species introductions: New approaches for modeling spread and cost-effective surveillance. **Denys Yemshanov** (denys.yemshanov@nrcan-rncan.gc.ca)<sup>1</sup>, Frank Koch<sup>2</sup>, Robert G. Haight<sup>3</sup>, Robert Venette<sup>3</sup>, Bo Lu<sup>1</sup>, Ronald Fournier<sup>1</sup>, and Jean Turgeon<sup>1</sup>, <sup>1</sup>Natural Resources Canada, Sault Ste. Marie, ON, Canada, <sup>2</sup>USDA - Forest Service, Research Triangle Park, NC, <sup>3</sup>USDA - Forest Service, St. Paul, MN
- 1:45 **3414** Modeling the spread of the pine processionary moth in relation with climate change and human activities. **Christelle Robinet** (christelle.robinet@orleans.inra.fr), Jérôme Rousselet, Mathieu Laparie, and Alain Roques, INRA, Orléans, France
- 2:00 **3415** Mapping global potential risk of establishment of apple maggot (*Rhagoletis pomonella*) using CLIMEX and MaxEnt niche models. **Sunil Kumar** (sunil.kumar@colostate.edu)<sup>1</sup>, Wee Yee<sup>2</sup>, and Lisa Neven<sup>2</sup>, <sup>1</sup>Colorado State Univ., Fort Collins, CO, <sup>2</sup>USDA - ARS, Wapato, WA
- 2:15 **3416** Presentation withdrawn
- 2:30 **3417** Assessing damage severity of plant hopper and leaf folder in rice using hyperspectral remote sensing and multinomial logistic regression models. **Mathyam Prabhakar** (mprabhakar@crida.in)<sup>1</sup>, Yenumula Prasad<sup>1</sup>, Chintalapati Padmavathi<sup>2</sup>, V. Laxmi<sup>2</sup>, G. Katti<sup>2</sup>, M. Thirupathi<sup>1</sup>, G. Rao<sup>1</sup>, and V. Sailaja<sup>1</sup>, <sup>1</sup>Central Research Institute for Dryland Agriculture, Hyderabad, India, <sup>2</sup>Directorate of Rice Research, Hyderabad, India
- 2:45 **3418** Presentation withdrawn
- 3:00 BREAK**

- 3:15 **3419** Potential dispersion and establishment of red palm mite in Brazil using MaxEnt model. **Elisangela Fidelis de Morais** (elisangela.morais@embrapa.br)<sup>1</sup> and George Amaro<sup>2</sup>, <sup>1</sup>Brazilian Agricultural Research Corporation, Boa Vista, Brazil, <sup>2</sup>Embrapa Roraima, Boa Vista, Brazil
- 3:30 **3420** Global prediction of invasion risk zones for the western corn rootworm *Diabrotica virgifera virgifera*: Integrating distribution models and fitness components. **Pedro Aragon** (paragon@mncn.csic.es)<sup>1</sup>, Andrés Baselga<sup>2</sup>, and Jorge Lobo<sup>1</sup>, <sup>1</sup>National Museum of Natural Sciences, Madrid, Spain, <sup>2</sup>Univ. of Santiago de Compostela, Santiago de Compostela, Spain
- 3:45 **3421** Accounting for climate-change-related uncertainty in projected suitable ranges of invasive species. **Frank Koch** (fhkoch@fs.fed.us)<sup>1</sup>, Denys Yemshanov<sup>2</sup>, Robert Venette<sup>3</sup>, and Kevin M. Potter<sup>4</sup>, <sup>1</sup>USDA - Forest Service, Research Triangle Park, NC, <sup>2</sup>Natural Resources Canada, Sault Ste. Marie, ON, Canada, <sup>3</sup>USDA - Forest Service, St. Paul, MN, <sup>4</sup>North Carolina State Univ., Research Triangle Park, NC
- 4:00 **3422** Potential distribution and cost estimation of the damage caused by *Cryptotermes brevis* (Isoptera: Kalotermitidae) in the Azores. **Orlando Guerreiro** (orlandogue@gmail.com)<sup>1</sup>, Pedro Cardoso<sup>2,3</sup>, João Ferreira<sup>4</sup>, Maria Ferreira<sup>2</sup>, and Paulo Borges<sup>2</sup>, <sup>1</sup>Univ. of the Azores, Azores, Portugal, <sup>2</sup>Centre for Ecology, Evolution and Environmental Changes, Açores, Portugal, <sup>3</sup>Univ. of Helsinki, Helsinki, Finland, <sup>4</sup>Univ. of Porto, Porto, Portugal
- 4:15 **3423** Modeling the spread of invasive species via human transport networks. **Dean Paini** (dean.paini@csiro.au)<sup>1</sup> and Paul Mwebaze<sup>2</sup>, <sup>1</sup>CSIRO, Canberra, Australia, <sup>2</sup>CSIRO, Brisbane, Australia
- 4:30 **Panel Discussion**

### Symposium: International Perspectives Contribute Towards a Clearer Understanding of *Drosophila suzukii*

#### Room W231 A (Convention Center)

**Moderators and Organizers:** Vaughn Walton<sup>1</sup>, Gianfranco Anfora<sup>2</sup>, Nik G. Wiman<sup>3</sup>, and Ashfaq Sial<sup>4</sup>, <sup>1</sup>Oregon State Univ., Corvallis, OR, <sup>2</sup>Edmund Mach Foundation Foundation, San Michele all'Adige, Italy, <sup>3</sup>Oregon State Univ., Aurora, OR, <sup>4</sup>Univ. of Georgia, Athens, GA

- 1:30 **3424** Overwintering and seasonal dynamics of spotted wing drosophila, *D. suzukii*, in the Okanagan-Columbia River basins, 2010-2014. **Howard Thistlewood** (howard.thistlewood@agr.gc.ca)<sup>1</sup>, Paramjit Gill<sup>2</sup>, Elizabeth Beers<sup>3</sup>, Peter Shearer<sup>4</sup>, Douglas Walsh<sup>5</sup>, Brigitte Rozema<sup>1</sup>, Susanna Acheampong<sup>1</sup>, Steve Castagnoli<sup>4</sup>, Peter Smytheman<sup>3</sup>, Alix Whitener<sup>3</sup>, and Wee Yee<sup>6</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, Summerland, BC, Canada, <sup>2</sup>The Univ. of British Columbia, Kelowna, BC, Canada, <sup>3</sup>Washington State Univ., Wenatchee, WA, <sup>4</sup>Oregon State Univ., Hood River, OR, <sup>5</sup>Washington State Univ., Pullman, WA, <sup>6</sup>USDA - ARS, Wapato, WA



- 1:45 **3425** Detangling behavioral responses to semiochemicals in the spotted wing drosophila, *Drosophila suzukii*. **Paul Becher** (paul.becher@slu.se)<sup>1</sup>, Boyd Mori<sup>1</sup>, Santosh Revadi<sup>1</sup>, Teun Dekker<sup>1</sup>, Elizabeth H. Beers<sup>2</sup>, and Peter Witzgall<sup>1</sup>, <sup>1</sup>Swedish Univ. of Agricultural Sciences, Alnarp, Sweden, <sup>2</sup>Washington State Univ., Wenatchee, WA
- 2:00 **3426** Can multiple tactics stop *Drosophila suzukii*? **L. D. Stringer** (lloyd.stringer@plantandfood.co.nz)<sup>1</sup>, Jacqueline Beggs<sup>2</sup>, Rory Maclellan<sup>3</sup>, John Kean<sup>4</sup>, and D. Max Suckling<sup>1</sup>, <sup>1</sup>The New Zealand Institute for Plant and Food Research, Ltd., Christchurch, New Zealand, <sup>2</sup>Univ. of Auckland, Auckland, New Zealand, <sup>3</sup>Ministry for Primary Industries, Wellington, New Zealand, <sup>4</sup>Ag Research, Christchurch, New Zealand
- 2:15 **3427** *Drosophila suzukii* physiology and yeast associations. **Kelly Hamby** (kahamby@umd.edu), Univ. of Maryland, College Park, MD
- 2:30 **3428** Seasonal phenology and research approaches for managing spotted wing drosophila in Central Europe. Felix Briem<sup>1</sup>, **Astrid Eben** (astrid.eben@julius-kuehn.de)<sup>1</sup>, Corinna Wallinger<sup>2</sup>, Michael Traugott<sup>2</sup>, Jürgen Gross<sup>1</sup>, and Heidrun Vogt<sup>1</sup>, <sup>1</sup>Julius Kühn Institute, Dossenheim, Germany, <sup>2</sup>Univ. of Innsbruck, Innsbruck, Austria
- 2:45 **3429** *Drosophila suzukii* impact on blueberry in Japan and pathogens for management. **Madoka Nakai** (madoka@cc.tuat.ac.jp), Tokyo Univ. of Agriculture and Technology, Tokyo, Japan
- 3:00 BREAK**
- 3:15 **3430** *Drosophila suzukii* and its potential impact to wine grapes in Italy and Oregon. **Claudio Ioriatti** (claudio.ioriatti@fmach.it)<sup>1</sup>, Rupinder Guzzon<sup>2</sup>, Gianfranco Anfora<sup>2</sup>, and Vaughn Walton<sup>3</sup>, <sup>1</sup>Centre for Technology Transfer, San Michele all'Adige, Italy, <sup>2</sup>Edmund Mach Foundation, San Michele all'Adige, Italy, <sup>3</sup>Oregon State Univ., Corvallis, OR
- 3:30 **3431** A synthesis of SWD host susceptibility: To oviposit or not. **Jana C. Lee** (jana.lee@ars.usda.gov), USDA - ARS, Corvallis, OR
- 3:45 **3432** *Drosophila suzukii* resistance against often used pesticides. **Ashfaq Sial** (ashsial@uga.edu)<sup>1</sup>, Ruchir Mishra<sup>1</sup>, Joanna Chiu<sup>2</sup>, and Michael Adang<sup>1</sup>, <sup>1</sup>Univ. of Georgia, Athens, GA, <sup>2</sup>Univ. of California, Davis, CA
- 4:00 **3433** *Drosophila suzukii* alternate host and spatial distribution and improvement of pesticide efficacy. **Gregory M. Loeb** (gme1@cornell.edu)<sup>1</sup> and Richard Cowles<sup>2</sup>, <sup>1</sup>Cornell Univ., Geneva, NY, <sup>2</sup>Connecticut Agricultural Experiment Station, Windsor, CT
- 4:15 **3434** Can we use integrated pest management to control *Drosophila suzukii*? Current UK practice. Jerry Cross<sup>1</sup>, **Michelle Fountain** (michelle.fountain@emr.ac.uk)<sup>1</sup>, David Buss<sup>1</sup>, Andreja Dobrovin-Pennington<sup>1</sup>, Alison Dolan<sup>2</sup>, Dudley I. Farman<sup>3</sup>, David R. Hall<sup>3</sup>, Adrian Harris<sup>1</sup>, Ralph Noble<sup>1</sup>, and Bethan Shaw<sup>1</sup>, <sup>1</sup>East Malling Research, Kent, United Kingdom, <sup>2</sup>The James Hutton Institute, Invergowrie, United Kingdom, <sup>3</sup>Univ. of Greenwich, Kent, United Kingdom
- 4:30 **3435** *Drosophila suzukii* in South Korea. **Hoonbok Yi** (yih@swu.ac.kr), Seoul Women's Univ., Seoul, South Korea

## Symposium: Arthropod Saliva: From Basic Science to Practical Applications

Room W331D (Convention Center)

**Moderators and Organizers:** Eric Calvo and Jesus G. Valenzuela, National Institute of Allergy and Infectious Diseases, Rockville, MD

- 1:30 **3436** Structural and functional diversity in genes encoding putative effectors in the gall midge *Mayetiola destructor*. **Ming-Shun Chen** (ming-shun.chen@ars.usda.gov)<sup>1</sup>, Jeffrey J. Stuart<sup>2</sup>, Xuming Liu<sup>3</sup>, and R. Jeff Whitworth<sup>3</sup>, <sup>1</sup>USDA - ARS, Manhattan, KS, <sup>2</sup>Purdue Univ., West Lafayette, IN, <sup>3</sup>Kansas State Univ., Manhattan, KS
- 1:45 **3437** A novel high molecular weight salivary protein from *Aedes aegypti* selectively kills lymphocytes by apoptosis. **Anderson Sa-Nunes** (sanunes@usp.br)<sup>1</sup>, Bruna Bizzarro<sup>1</sup>, Eliane Esteves<sup>1</sup>, Jose Ramirez<sup>2</sup>, Margareth Capurro<sup>1</sup>, Jose Ribeiro<sup>2</sup>, Andrea Fogaca<sup>1</sup>, and Eric Calvo<sup>2</sup>, <sup>1</sup>Univ. of São Paulo, São Paulo, Brazil, <sup>2</sup>National Institute of Allergy and Infectious Diseases, Rockville, MD
- 2:00 **3438** Role of skin immune cells and mosquito saliva on the host susceptibility to Dengue virus. **Dorothee Misse** (dorothee.misse@ird.fr), Research Institute for Development, Montpellier, France
- 2:15 **3439** Functional analyses of aphid saliva proteins that modulate plant processes. **Saskia A. Hogenhout** (saskia.hogenhout@jic.ac.uk), Claire Drurey, Thomas Vincent, Friederike Bernsdorff, Yazhou Chen, David Prince, Christine Wilson, and Sam Mugford, The John Innes Centre, Norwich, United Kingdom
- 2:30 **3440** Protein structure and the mechanism of salivary components from blood feeding arthropods. **John Andersen** (john.andersen@nih.gov), National Institute of Allergy and Infectious Diseases, Bethesda, MD
- 2:45 **3441** Sand fly salivary proteins as markers of host exposure to leishmaniasis vectors. **Petr Volf** (volf@cesnet.cz), Tatiana Kostalova, Tereza Lestinova, Michal Sima, and Petra Sumova, Charles Univ., Prague, Czech Republic
- 3:00 BREAK**
- 3:15 **3442** The salivary repertoires of anopheline mosquitoes: Functions, evolution, and potential applications. **Bruno Arca** (bruno.arca@uniroma1.it)<sup>1</sup>, Claudio Struchiner<sup>2</sup>, Fabrizio Lombardo<sup>1</sup>, and Jose Ribeiro<sup>3</sup>, <sup>1</sup>Sapienza Univ., Rome, Italy, <sup>2</sup>Oswaldo Cruz Foundation, Rio de Janeiro, Brazil, <sup>3</sup>National Institute of Allergy and Infectious Diseases, Rockville, MD
- 3:30 **3443** Host-vector-pathogen interaction studies provide new data to block transmission of arboviral diseases. **Valerie Choumet** (valerie.choumet@pasteur.fr)<sup>1</sup>, Alain Le Coupanec<sup>1</sup>, Vincent Legros<sup>1</sup>, and Dorothee Misse<sup>2</sup>, <sup>1</sup>Pasteur Institute, Paris, France, <sup>2</sup>Research Institute for Development, Montpellier, France
- 3:45 **3444** Modulators of blood feeding success in mosquitoes. **Eric Calvo** (ecalvo@niaid.nih.gov), National Institute of Allergy and Infectious Diseases, Rockville, MD



**Symposium: Mosquito Host Detection**

**Room W330 C (Convention Center)**

**Moderator and Organizer:** Matthew DeGennaro, Florida International Univ., Miami, FL

- 1:30 **3445** Genetic analysis of ionotropic receptor function in *Aedes aegypti*. **Matthew DeGennaro** (mdegenna@fiu.edu), Florida International Univ., Miami, FL
- 1:45 **3446** Chemicals that produce anosmia in mosquitoes. **Ulrich R. Bernier** (uli.bernier@ars.usda.gov), USDA - ARS, Gainesville, FL
- 2:00 **3447** Chemosensory basis of malaria transmission. **Conor McMeniman** (cmcmeni1@jhu.edu), Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
- 2:15 **3448** Myriad of phytochemicals: Which ones are informative to plant-host-seeking mosquitoes and to us? **Woodbridge Foster** (foster.13@osu.edu)<sup>1</sup> and Babak Ebrahimi<sup>2</sup>, <sup>1</sup>The Ohio State Univ., Columbus, OH, <sup>2</sup>Florida International Univ., Miami, FL
- 2:45 **3449** In-flight integration of dynamic visual stimuli in *Aedes aegypti*. **Jamie Theobald** (theobald@fiu.edu), Michael Perez, and Matthew DeGennaro, Florida International Univ., Miami, FL

**3:00 BREAK**

- 3:15 **3450** Genetic and neural analysis of preference for human scent in evolutionarily divergent forms of the dengue fever mosquito *Aedes aegypti*. **Carolyn McBride** (csm7@princeton.edu), Princeton Univ., Princeton, NJ
- 3:30 **3451** When the bite is right: *Aedes aegypti* feeding patterns in nature. **Laura Harrington** (lch27@cornell.edu), Cornell Univ., Ithaca, NY
- 3:45 **3452** Terabytes and mosquito bites: The genomics and molecular biology of olfaction in disease vector mosquitoes. **Laurence J. Zwiebel** (l.zwiebel@vanderbilt.edu), Vanderbilt Univ., Nashville, TN

**Symposium: Ecology and Systematics of Elateridae (Coleoptera)**

**Room W224 E (Convention Center)**

**Moderators and Organizers:** Frank Etzler<sup>1</sup> and Hume Douglas<sup>2</sup>, <sup>1</sup>Montana State Univ., Bozeman, MT, <sup>2</sup>Agriculture and Agri-Food Canada, Ottawa, ON, Canada

- 1:30 **3453** Elateridae of the southeastern United States. **Blaine Mathison** (bmathison1972@gmail.com), Georgia Museum of Natural History, Atlanta, GA
- 1:45 **3454** Presentation withdrawn
- 2:00 **3455** Matrix key to the elaterid genera of Canada and USA. **Hume Douglas** (humedgl@gmail.com), Canadian Food Inspection Agency, Ottawa, ON, Canada
- 2:15 **3456** On the importance of Gondwanan coleopteran taxa, particularly the Elateridae, and their importance in Chilean biodiversity conservation. **Elizabeth T. Arias** (etarias.bohart@berkeley.edu)<sup>1</sup> and Mario Elgueta<sup>2</sup>, <sup>1</sup>Univ. of California, Berkeley, CA, <sup>2</sup>Museum of Natural History, Santiago, Chile
- 2:30 **3457** Presentation withdrawn

- 2:45 **3458** Revisiting the neoteny in Lycidae: A preliminary study of case in Leptolycini (Lycidae: Lycinae). **Vinicius Ferreira** (vinicius.sfb@gmail.com), Montana State Univ., Bozeman, MT

**3:00 BREAK**

- 3:15 **3459** Systematics of the genus *Hemicrepidius* (Coleoptera: Elateridae) of the World. **Frank Etzler** (etzler.frank@gmail.com), Montana State Univ., Bozeman, MT
- 3:30 **3460** Systematics of the genus *Scaptolenus* (Elateridae: Cebrioninae). **Erick Omar Martinez Luque** (erickmtzluque@gmail.com), Autonomous Univ. of Querétaro, Santiago de Querétaro, Mexico
- 3:45 **3461** Development of microsatellite markers using next-generation sequence data for assessing the spatio-temporal distribution of wireworms. **Carly Benerfer** (carly.benerfer@plymouth.ac.uk), Plymouth Univ., Plymouth, United Kingdom
- 4:00 **3462** Wireworms of economic importance in Canada: Identification, distribution, and behaviour. **Wim Van Herk** (wim.vanherk@agr.gc.ca), Pacific Agri-Food Research Station, Agassiz, BC, Canada
- 4:15 **3463** Presentation withdrawn

**Symposium: Evolution of a Megadiverse Group: The Ichneumonoid Wasps (Hymenoptera: Braconidae, Ichneumonidae)**

**Room W222 A (Convention Center)**

**Moderators and Organizers:** Andrew D. Austin<sup>1</sup> and Jose Fernandez-Triana<sup>2</sup>, <sup>1</sup>Univ. of Adelaide, Adelaide, Australia, <sup>2</sup>Agriculture and Agri-Food Canada, Ottawa, ON, Canada

- 1:30 **3464** Preliminary phylogeny of Metopiinae (Hymenoptera: Ichneumonidae). **Mabel Alvarado** (mag2199@hotmail.com), Univ. of Kansas, Lawrence, KS
- 1:45 **3465** Systematics and biology of the endemic Australian gall-forming mesostoinae wasps (Hymenoptera: Braconidae: Mesostoinae s.str.). **Andrew D. Austin** (andy.austin@adelaide.edu.au) and Erin Fagan-Jeffries, Univ. of Adelaide, Adelaide, Australia
- 2:00 **3466** Systematics and the evolution of host use in Ichneumonidae. **Andrew Bennett** (andrew.bennett@agr.gc.ca), Agriculture and Agri-Food Canada, Ottawa, ON, Canada
- 2:15 **3467** Evolution of host range in Aphidiinae (Braconidae) and impacts on diversification. Barbara Sharanowski<sup>1</sup> and **Amber Bass** (umbassa@myumanitoba.ca)<sup>2</sup>, <sup>1</sup>Univ. of Central Florida, Orlando, FL, <sup>2</sup>Univ. of Manitoba, Winnipeg, MB, Canada
- 2:30 **3468** Systematics of Microgastrinae wasps (Braconidae): An overview and proposal for worldwide studies. **Jose Fernandez-Triana** (jose.fernandez@agr.gc.ca), Agriculture and Agri-Food Canada, Ottawa, ON, Canada
- 2:45 **3469** Evolution of convergent adaptations in cryptine ichneumonid wasps: A morphospace approach. **Bernardo Santos** (bsantos@amnh.org), American Museum of Natural History, New York, NY

**3:00 BREAK**



- 3:15 **3470** Life, the Universe, and *Ophion*: Systematics and diversity of a little-known ichneumonid genus. **Marla Schwarzfeld** (marla.schwarzfeld@unbc.ca)<sup>1</sup> and Felix Sperling<sup>2</sup>, <sup>1</sup>Univ. of Northern British Columbia, Prince George, BC, Canada, <sup>2</sup>Univ. of Alberta, Edmonton, AB, Canada
- 3:30 **3471** Host-parasitoid trophic interactions (Lepidoptera - Ichneumonoidea - Tachinidae) revealed through high-throughput sequencing in eastern North America. **Michael J. Sharkey** (msharkey@uky.edu), Sarah Meierotto, and Eric G. Chapman, Univ. of Kentucky, Lexington, KY
- 3:45 **3472** New World *Aleiodes*/Aleiodini (Hymenoptera, Braconidae, Rogadinae) species-groups concepts revision. **Eduardo Shimbori** (shimbori@gmail.com)<sup>1</sup>, Scott R. Shaw<sup>2</sup>, Angelica Penteado-Dias<sup>1</sup>, and Alejandro Zaldivar-Riverón<sup>3</sup>, <sup>1</sup>Federal Univ. of São Carlos, São Carlos, Brazil, <sup>2</sup>Univ. of Wyoming, Laramie, WY, <sup>3</sup>National Autonomous Univ. of México, Mexico City, Mexico
- 4:00 **3473** The Euphorinae (Braconidae), a messy group to deal with. **Julia Stigenberg** (julia.stigenberg@nrm.se), Swedish Museum of Natural History, Stockholm, Sweden
- 4:15 **3474** Presentation withdrawn
- 4:30 **3475** Phylogeny of Microgastrinae: Taxon sampling in the age of NGS. **James Whitfield** (jwhitfie@life.uiuc.edu), Univ. of Illinois, Champaign, IL
- 4:45 **3476** Phylogeny and biogeography of two cosmopolitan braconid wasp radiations: The doryctine tribes Rhaconotini and Spathiini. **Alejandro Zaldivar-Riverón** (azaldivar@ib.unam.mx)<sup>1</sup>, Sergey Belokobylskij<sup>2</sup>, and Rubi Meza-Lázaro<sup>1</sup>, <sup>1</sup>National Autonomous Univ. of México, Mexico City, Mexico, <sup>2</sup>Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia
- 2:30 **3480** Ecological specialization and speciation in the pea aphid complex, *Acyrtosiphon pisum* (Hemiptera, Aphididae). **Jean-Christophe Simon** (jean-christophe.simon@rennes.inra.fr)<sup>1</sup>, Pierre Nouhaud<sup>1</sup>, Julie Jaquier<sup>1</sup>, and Jean Peccoud<sup>2</sup>, <sup>1</sup>INRA, Le Rheu, France, <sup>2</sup>Univ. of Poitiers, Poitiers, France
- 2:45 **3481** Systematics of the *Bemisia tabaci* species complex. **Tonny Kinene** (tonny.kinene@research.uwa.edu.au)<sup>1</sup>, Peter Sseruwagi<sup>2</sup>, James Wainaina<sup>1</sup>, Paul de Barro<sup>3</sup>, Hua-Ling Wang<sup>4</sup>, Xiao-Wei Wang<sup>4</sup>, Shu-Sheng Liu<sup>4</sup>, Christopher Omongo<sup>5</sup>, Habibu Mugerwa<sup>6</sup>, Susan Seal<sup>6</sup>, John Colvin<sup>6</sup>, Donald Kachigamba<sup>7</sup>, Laura Kubatko<sup>8</sup>, and Laura Boykin<sup>9</sup>, <sup>1</sup>Univ. of Western Australia, Perth, Australia, <sup>2</sup>Mikocheni Agriculture Research Institute, Dar es Salaam, Tanzania, <sup>3</sup>CSIRO, Brisbane, Australia, <sup>4</sup>Zhejiang Univ., Hangzhou, China, <sup>5</sup>National Agricultural Research Organisation, Kampala, Uganda, <sup>6</sup>Univ. of Greenwich, Chatham, United Kingdom, <sup>7</sup>Bvumbwe Research Station, Limbe, Malawi, <sup>8</sup>The Ohio State Univ., Columbus, OH, <sup>9</sup>Univ. of Western Australia, Crawley, Australia
- SD3482** The systematics of the jumping plant-louse family Phacopteronidae (Hemiptera: Psylloidea). **Igor Malenovsky** (imalenovsky@mzm.cz)<sup>1</sup> and Daniel Burckhardt<sup>2</sup>, <sup>1</sup>Masaryk Univ., Brno, Czech Republic, <sup>2</sup>Natural History Museum, Basel, Switzerland
- SD3483** Use of four genes in revision of the genus *Essigella* Del Guercio, 1909 (Sternorrhyncha: Aphididae: Lachninae). **Thomas Théry** (thomasjcthery@gmail.com) and Colin Favret, Univ. of Montréal, Montréal, QC, Canada
- SD3484** Presentation withdrawn
- SD3485** Aphid-endosymbiont interactions: Incongruent evolutionary patterns across taxonomic levels. **Jing Chen** (chenjing@ioz.ac.cn), Lin Liu, Li-Yun Jiang, and Ge-Xia Qiao, Chinese Academy of Sciences, Beijing, China
- SD3486** Investigating cryptic speciation among lineages of hemlock adelgids (Hemiptera: Adelgidae). **Hana Aronowitz** (haronowi@uvm.edu)<sup>1</sup>, Kimberly F. Wallin<sup>1</sup>, Nathan Havill<sup>2</sup>, and Robert Foottit<sup>3</sup>, <sup>1</sup>Univ. of Vermont, Burlington, VT, <sup>2</sup>USDA - Forest Service, Hamden, CT, <sup>3</sup>Agriculture and Agri-Food Canada, Ottawa, ON, Canada
- SD3487** Acoustic divergence of closely related psyllid species (Hemiptera: Psylloidea). **Yi-Chang Liao** (b0910528106@hotmail.com) and Man-Miao Yang, National Chung Hsing Univ., Taichung, Taiwan
- SD3488** Sound producing behavior of psylloids (Hemiptera: Psylloidea): Functional morphology and mechanisms. **Zong-Ze Wu** (abcde621621@yahoo.com.tw), Yi-Chang Liao, and Man-Miao Yang, National Chung Hsing Univ., Taichung, Taiwan
- SD3489** Diversity of scale insects (Hemiptera: Coccoomorpha) on oak trees in Israel. **Malkie Spodek** (malkiespodek@gmail.com)<sup>1</sup>, Yair Ben-Dov<sup>2</sup>, and Zvi Mendel<sup>2</sup>, <sup>1</sup>The Steinhardt Museum of Natural History, Tel Aviv, Israel, <sup>2</sup>Agricultural Research Organisation, Bet-Dagan, Israel

## Symposium: Synthesis in Sternorrhyncha Systematics

### Room W222 B (Convention Center)

**Moderator and Organizer:** Colin Favret, Univ. of Montréal, Montréal, QC, Canada

- 1:30 **3477** The fossil record of Sternorrhyncha. **Bo Wang** (bowang@nigpas.ac.cn)<sup>1</sup> and Jacek Szwedo<sup>2</sup>, <sup>1</sup>Chinese Academy of Sciences, Beijing, China, <sup>2</sup>Univ. of Gdańsk, Gdańsk, Poland
- 2:00 **3478** Evolution of the diversity of phytophagous insects: Using aphids as good models. **Jing Chen**, Yuan Wang, Lin Liu, Rui Chen, Li-Yun Jiang, and **Ge-Xia Qiao** (qiaogx@ioz.ac.cn), Chinese Academy of Sciences, Beijing, China
- 2:15 **3479** Leaving angiosperms to diversify on conifers in aphid – a case in Lachninae. **Rui Chen** (chrui1@live.cn)<sup>1</sup>, Colin Favret<sup>2</sup>, Jing Chen<sup>1</sup>, Li-Yun Jiang<sup>1</sup>, and Ge-Xia Qiao<sup>1</sup>, <sup>1</sup>Chinese Academy of Sciences, Beijing, China, <sup>2</sup>Univ. of Montréal, Montréal, QC, Canada



**SD3490** Digitules, they're not just for scale insects anymore!  
**Gary L. Miller** (gary.miller@ars.usda.gov)<sup>1</sup>, Mark Metz<sup>2</sup>, Aaron Dickey<sup>3</sup>, Gary R. Bauchan<sup>4</sup>, and Douglass Miller<sup>4</sup>,  
<sup>1</sup>USDA - ARS, Beltsville, MD, <sup>2</sup>USDA - ARS, Washington, DC, <sup>3</sup>USDA - ARS, Clay Center, NE, <sup>4</sup>USDA - ARS, Beltsville, MD

**3:00 BREAK AND POSTER SESSION**

3:15 **3491** Systematics of the invasive Mediterranean species of the *B. tabaci* complex. **Sona Vyskocilova** (s.vyskocilova@greenwich.ac.uk)<sup>1</sup>, Susan Seal<sup>2</sup>, Tonny Kinene<sup>3</sup>, Laura Boykin<sup>4</sup>, and John Colvin<sup>2</sup>,  
<sup>1</sup>Univ. of Greenwich, Kent, United Kingdom, <sup>2</sup>Univ. of Greenwich, Chatham, United Kingdom, <sup>3</sup>Univ. of Western Australia, Perth, Australia, <sup>4</sup>Univ. of Western Australia, Crawley, Australia

3:30 **3492** Psylloidea phylogenomics: Resolving the psyllid tree. **Diana Percy** (d.percy@nhm.ac.uk)<sup>1</sup>, Alex Crampton-Platt<sup>1</sup>, Saemundur Sveinsson<sup>2</sup>, David Ouvrard<sup>1</sup>, and Daniel Burckhardt<sup>3</sup>, <sup>1</sup>The Natural History Museum, London, United Kingdom, <sup>2</sup>Agricultural Univ. of Iceland, Hvanneyri, Iceland, <sup>3</sup>Natural History Museum, Basel, Switzerland

3:45 **3493** Current state of scale insect systematics, and challenges for the future. **Lyn Cook** (l.cook@uq.edu.au)<sup>1</sup>, Penny Gullan<sup>2</sup>, Nate Hardy<sup>3</sup>, and Alicia Toon<sup>1</sup>,  
<sup>1</sup>Univ. of Queensland, Brisbane, Australia, <sup>2</sup>The Australian National Univ., Acton, Australia, <sup>3</sup>Auburn Univ., Auburn, AL

4:00 **3494** Four hundred genera, zero percent 18S sequence divergence: Systematics of the explosive radiation of armored scale insects. **Benjamin Normark** (bnormark@ent.umass.edu), Scott Schneider, Daniel Peterson, and Akiko Okusu, Univ. of Massachusetts, Amherst, MA

4:15 **3495** Sternorrhyncha online taxonomic databases: From information to research. **David Ouvrard** (d.ouvrard@nhm.ac.uk)<sup>1</sup>, Colin Favret<sup>2</sup>, Mayrolin Garcia Morales<sup>3</sup>, and Nate Hardy<sup>3</sup>, <sup>1</sup>The Natural History Museum, London, United Kingdom, <sup>2</sup>Univ. of Montréal, Montréal, QC, Canada, <sup>3</sup>Auburn Univ., Auburn, AL

4:30 **3496** Synthesis in Sternorrhyncha systematics. **Colin Favret** (colinfavret@aphidnet.org)<sup>1</sup>, Nate Hardy<sup>2</sup>, Diana Percy<sup>3</sup>, Christopher H. Dietrich<sup>4</sup>, Hugh M. Robertson<sup>4</sup>, Kimberly K. O. Walden<sup>4</sup>, and Kevin P. Johnson<sup>4</sup>,  
<sup>1</sup>Univ. of Montréal, Montréal, QC, Canada, <sup>2</sup>Auburn Univ., Auburn, AL, <sup>3</sup>The Natural History Museum, London, United Kingdom, <sup>4</sup>Univ. of Illinois, Champaign, IL

**Symposium: Wings and Powered Flight: Core Novelties in Insect Evolution**

**Room W315 A (Convention Center)**

**Moderators and Organizers:** Günther Pass<sup>1</sup> and Robert Dudley<sup>2</sup>,  
<sup>1</sup>Univ. of Vienna, Vienna, Austria, <sup>2</sup>Univ. of California, Berkeley, CA

1:30 **3497** A century and a half of research on the evolution of insect flight. **David Alexander** (dalexander@ku.edu), Univ. of Kansas, Lawrence, KS

1:45 **3498** Directed aerial descent in wingless canopy arthropods. **Stephen Yanoviak** (steve.yanoviak@louisville.edu)<sup>1</sup> and Robert Dudley<sup>2</sup>, <sup>1</sup>Univ. of Louisville, Louisville, KY, <sup>2</sup>Univ. of California, Berkeley, CA

2:15 **3499** Reconstructing the flight behaviour of ancient insects from fossil evidence. **Robin Wootton** (r.j.wootton@exeter.ac.uk), Univ. of Exeter, Exeter, United Kingdom

2:30 **3500** How the wings of insects, birds, bats, and seeds generate similar leading edge vortices to avoid stall. **David Lentink** (dlentink@stanford.edu), Stanford Univ., Palo Alto, CA

2:45 **3501** Imaging the insect flight motor. **Simon Walker** (simon.walker@zoo.ox.ac.uk), Univ. of Oxford, Oxford, United Kingdom

**3:00 BREAK**

3:15 **3502** The oldest winged insects (Insecta: Pterygota). **Jakub Prokop** (jprokop@natur.cuni.cz)<sup>1</sup> and Thomas Hörnschemeyer<sup>2</sup>, <sup>1</sup>Charles Univ., Prague, Czech Republic, <sup>2</sup>Georg August Univ., Göttingen, Germany

3:30 **3503** The origin and early diversification of pterygotes. **Arnold Staniczek** (arnold.staniczek@smns-bw.de) and Günter Bechly, State Museum of Natural History, Stuttgart, Germany

3:45 **3504** Presentation withdrawn

4:15 **3505** Insect wing circulatory organs: Prime examples for the origin of evolutionary novelties. **Günther Pass** (guenther.pass@univie.ac.at)<sup>1</sup>, Markus Tögel<sup>1</sup>, Harald Krenn<sup>1</sup>, and Achim Paululat<sup>2</sup>, <sup>1</sup>Univ. of Vienna, Vienna, Austria, <sup>2</sup>Univ. of Osnabrück, Osnabrück, Germany

4:30 **3506** Evo-devo study of insect wing and its serial homologs: From apterygotes to pterygotes. **Takahiro Ohde** (ohdet@nibb.ac.jp) and Teruyuki Niimi, Nagoya Univ., Nagoya, Japan

4:45 **3507** The molecular mechanisms underlying diversified wing venation among insects. **Osamu Shimii** (osamu.shimii@helsinki.fi)<sup>1</sup> and Mtsatsugu Hatakeyama<sup>2</sup>,  
<sup>1</sup>Univ. of Helsinki, Helsinki, Finland, <sup>2</sup>National Institute of Agrobiological Sciences, Tsukuba, Japan

5:00 **3508** Lobes or gills: Exploring the origin of insect wings from an evo-devo perspective. **Yoshinori Tomoyasu** (tomoyay@miamioh.edu), Miami Univ., Oxford, OH

**Symposium: Cold Physiology in a Warming World**

**Room W231 B (Convention Center)**

**Moderators and Organizers:** Kendra Greenlee<sup>1</sup>, Julia Bowsher<sup>1</sup>, Joseph P. Rinehart<sup>2</sup>, and George D. Yocum<sup>2</sup>,  
<sup>1</sup>North Dakota State Univ., Fargo, ND, <sup>2</sup>USDA - ARS, Fargo, ND

1:30 **3509** Is winter coming? How climate warming disrupts the diapause response **Scott Hayward** (s.a.hayward@bham.ac.uk), Univ. of Birmingham, Birmingham, United Kingdom

2:00 **3510** Surviving climate change on the Antarctic peninsula: Cold and desiccation tolerance in the southernmost insect. **Richard E. Lee** (leere@miamioh.edu)<sup>1</sup> and David L. Denlinger<sup>2</sup>, <sup>1</sup>Miami Univ., Oxford, OH, <sup>2</sup>The Ohio State Univ., Columbus, OH



- 2:15 **3511** Increasing low temperature variability and its implications for arthropod populations. **Steven Chown** (steven.chown@monash.edu), Monash Univ., Victoria, Australia
- 2:30 **3512** Struggling against entropy: Why the ability to maintain ion and water homeostasis strongly impacts insect chilling tolerance. Heath MacMillan<sup>1</sup> and **Johannes Overgaard** (johannes.overgaard@biology.au.dk)<sup>2</sup>, <sup>1</sup>York Univ., Toronto, ON, Canada, <sup>2</sup>Aarhus Univ., Aarhus, Denmark
- 2:45 **3513** Ice fraction formation during extracellular freezing in the larvae of two drosophilids, *Drosophila melanogaster* and *Chymomyza costata*. **Vladimir Kostal** (kostal@entu.cas.cz), Jan Rozsypal, and Tomas Stetina, Czech Academy of Sciences, České Budějovice, Czech Republic
- 3:00 BREAK**
- 3:15 **3514** Climate, insects, and cryopreservation. **Arun Rajamohan** (arun.rajamohan@ars.usda.gov), USDA - ARS, Fargo, ND
- 3:30 **3515** A forty-year history of subzero tolerance studies of the beetle *Dendroides canadensis*. **John Duman** (duman.1@nd.edu) and Henry Vu, Univ. of Notre Dame, South Bend, IN
- 4:00 **3516** Insect eco-immunology in the cold: How will biotic interactions at low temperatures shape success in a warming world? **Laura Ferguson** (lfergus9@uwo.ca) and Brent J. Sinclair, Univ. of Western Ontario, London, ON, Canada
- 4:15 **3517** Applying stress physiology to a pollinator crisis. **Joseph P. Rinehart** (joseph.rinehart@ars.usda.gov), USDA - ARS, Fargo, ND
- 4:30 **3518** Characterizing cold tolerance of an important pollinator, the alfalfa leafcutting bee, *Megachile rotundata*. **Meghan Bennett** (meghan.bennett@ndsu.edu)<sup>1</sup>, Joseph P. Rinehart<sup>2</sup>, George Yocum<sup>2</sup>, and Kendra Greenlee<sup>1</sup>, <sup>1</sup>North Dakota State Univ., Fargo, ND, <sup>2</sup>USDA - ARS, Fargo, ND
- 4:45 **3519** Characterization of temperature stress response mechanisms in the alfalfa leafcutting bee, *Megachile rotundata*. **Alex Torson** (alex.s.torson@ndsu.edu), North Dakota State Univ., Fargo, ND
- 5:00 **3520** Pre-wintering conditions and post-winter performance in a solitary bee. Jordi Bosch<sup>1</sup>, **William Kemp** (william.kemp@ars.usda.gov)<sup>2</sup>, Fabio Sgolastra<sup>3</sup>, Theresa Pitts-Singer<sup>4</sup>, Xavier Arnan<sup>5,6</sup>, and Stefano Maini<sup>3</sup>, <sup>1</sup>Autonomous Univ. of Barcelona, Cerdanyola del Vallès, Spain, <sup>2</sup>USDA - ARS, Fargo, ND, <sup>3</sup>Univ. of Bologna, Bologna, Italy, <sup>4</sup>USDA - ARS, Logan, UT, <sup>5</sup>CREAF, Bellaterra, Spain, <sup>6</sup>Federal Univ. of Pernambuco, Recife, Brazil
- 5:15 **3521** Historical changes in thermoregulatory traits of alpine butterflies: Environmental variability limits adaptive responses to recent climate change. **Heidi MacLean** (hmaclean@live.unc.edu), Aarhus Univ., Aarhus, Denmark

## Symposium: Mechanisms Affecting the Efficiency of RNA Interference in Insects

### Room W331 A (Convention Center)

**Moderators and Organizers:** Kun Yan Zhu<sup>1</sup>, Subba Reddy Palli<sup>2</sup>, and Jianzhen Zhang<sup>3</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>Univ. of Kentucky, Lexington, KY, <sup>3</sup>Shanxi Univ., Taiyuan, China

- 1:30 **3522** Core machinery and mechanisms of RNAi in *Diabrotica virgifera virgifera*. **Elane Fishilevich** (efishilevich@dow.com)<sup>1</sup>, Ana Vélez<sup>2</sup>, Huarong Li<sup>1</sup>, Andrew Bowling<sup>1</sup>, Chitvan Khajuria<sup>2</sup>, Haichuan Wang<sup>2</sup>, Kenneth Narva<sup>1</sup>, and Blair Siegfried<sup>3</sup>, <sup>1</sup>Dow AgroSciences, Indianapolis, IN, <sup>2</sup>Univ. of Nebraska, Lincoln, NE, <sup>3</sup>Univ. of Florida, Gainesville, FL
- 1:45 **3523** Insights on the mechanisms of systemic RNAi in the desert locust. **Niels Wynant** (niels.wynant@bio.kuleuven.be), Dulce Cordeiro dos Santos, and Jozef Vanden Broeck, Catholic Univ., Leuven, Belgium
- 2:00 **3524** Understanding barriers to environmental RNAi in recalcitrant insect species. **Jeremy Kroemer** (jeremy.alan.kroemer@monsanto.com), Monsanto Company, Chesterfield, MO
- 2:15 **3525** Differential expression of miRNAs in response to dsRNA of various target genes in Noctuidae. **R. Asokan** (asokanihr@gmail.com)<sup>1</sup>, K. B. Rebijith<sup>1</sup>, and N. K. Krishna Kumar<sup>2</sup>, <sup>1</sup>Indian Institute of Horticultural Research, Bangalore, India, <sup>2</sup>Indian Council of Agricultural Research, New Delhi, India
- 2:30 **3526** Enhanced RNAi efficiency of silkworm through overexpression of Ago2. **Zhiqian Li** (zqli@sippe.ac.cn)<sup>1,2</sup>, Baosheng Zeng<sup>1</sup>, Lin Ling<sup>1</sup>, Jun Xu<sup>1</sup>, Lang You<sup>1</sup>, Abu Aslam<sup>1</sup>, Anjiang Tan<sup>1</sup>, and Yongping Huang<sup>1</sup>, <sup>1</sup>Chinese Academy of Sciences, Shanghai, China, <sup>2</sup>Chinese Academy of Sciences, Beijing, China
- 2:45 **3527** Mechanism of cellular uptake of double-stranded RNA in insects. **Kun Yan Zhu** (kzhu@ksu.edu)<sup>1</sup>, Xiao Da<sup>1,2</sup>, Young Ho Kim<sup>1</sup>, and Anastasia Cooper<sup>1</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>China Agricultural Univ., Beijing, China
- 3:00 BREAK**
- 3:15 **3528** Identifying factors that facilitate double-stranded RNA uptake and cell-to-cell transmission in mosquitoes and other dipteran insects. **Steve Whyard** (steve.whyard@umanitoba.ca), Aditi Partridge, Parker Lachance, David Giesbrecht, Cassidy Erdelyan, and David Boguski, Univ. of Manitoba, Winnipeg, MB, Canada
- 3:30 **3529** Presentation withdrawn
- 3:45 **3530** Factors affecting dsRNA uptake and RNAi efficiency in Asian citrus psyllid, *Diaphorina citri* (Hemiptera: Liviidae). **Nabil Killiny** (nabilkilliny@ufl.edu), Univ. of Florida, Lake Alfred, FL
- 4:00 **3531** Identification of key players in RNA interference. **June-Sun Yoon** (june.yoon@uky.edu), Zhongjun Gong, Jayendra Shukla, and Subba Reddy Palli, Univ. of Kentucky, Lexington, KY



- 4:15 **3532** Effect of dsRNase on the efficiency of RNA interference. **Jianzhen Zhang** (zjz@sxu.edu.cn)<sup>1</sup>, Huifang Song<sup>1</sup>, Enbo Ma<sup>1</sup>, and Kun Yan Zhu<sup>2</sup>, <sup>1</sup>Shanxi Univ., Taiyuan, China, <sup>2</sup>Kansas State Univ., Manhattan, KS
- 4:30 **3533** The challenges of RNAi-mediated insect pest control and the search for novel dsRNA delivery methods. **Olivier Christiaens** (olchrist.christiaens@ugent.be)<sup>1</sup>, Luc Swevers<sup>2</sup>, and Guy Smagghe<sup>1</sup>, <sup>1</sup>Ghent Univ., Ghent, Belgium, <sup>2</sup>Institute of Biosciences & Applications, Athens, Greece

### Symposium: Invasive Disease Vectors in Urban Environments: Current Challenges and Future Solutions

#### Room W414 D (Convention Center)

**Moderators and Organizers:** Ary Hoffmann<sup>1</sup>, Brendan Trewin<sup>2</sup>, and Jill Ulrich<sup>3</sup>, <sup>1</sup>The Univ. of Melbourne, Parkville, Australia, <sup>2</sup>CSIRO, Brisbane, Australia, <sup>3</sup>QIMR Berghofer Medical Research Institute, Brisbane, Australia

- 1:30 **3534** Changing paradigms of dengue control: A view from a dengue control veteran. **Scott Ritchie** (scott.ritchie@jcu.edu.au), James Cook Univ., Cairns, Australia
- 2:00 **3535** Characteristics of a successful *Wolbachia* release. **Ary Hoffmann** (ary@unimelb.edu.au), The Univ. of Melbourne, Parkville, Australia
- 2:15 **3536** *Aedes* species: Silent global spread and sustainable control options. **Raman Velayudhan** (velayudhan@who.int), World Health Organisation, Geneva, Switzerland
- 2:30 **3537** Spatial surveillance and control strategies for *Aedes albopictus* in California: Is eradication feasible? **Christopher M. Barker** (cmbarker@ucdavis.edu), Univ. of California, Davis, CA
- 2:45 **3538** Challenges to mitigate dengue outbreaks using traditional vector control strategies: Do we need something else? **Rafael Maciel-de Freitas** (freitas@ioc.fiocruz.br), Oswaldo Cruz Foundation, Rio de Janeiro, Brazil
- 3:00 BREAK**
- 3:15 **3539** Presentation withdrawn
- 3:30 **3540** Estimating serotype interaction and temporal variation in dengue transmission using longitudinal serological data. **Robert Reiner** (rcreiner@indiana.edu), Indiana Univ., Bloomington, IN
- 3:45 **3541** Movement of mosquito vectors between permanent water storage containers: The role of urban landscape features. **Brendan Trewin** (brendan.trewin@csiro.au)<sup>1,2</sup>, <sup>1</sup>CSIRO, Brisbane, Australia; QIMR Berghofer Medical Research Institute, Brisbane, Australia, <sup>2</sup>Univ. of Queensland, Brisbane, Australia
- 4:00 **3542** Presentation withdrawn
- 4:15 **3543** The need for self-dispersing mosquito control technologies in urban areas: Update on releases of genetically modified male mosquitoes for suppression of *Ae. aegypti* in the Florida Keys. Michael Doyle and **Andrea L. Leal** (aleal@keysmosquito.org), Florida Keys Mosquito Control District, Key West, FL

- 4:30 **3544** Drivers and trends in the future of mosquito-borne disease control. **Jill Ulrich** (jill.ulrich@qimrberghofer.edu.au), QIMR Berghofer Medical Research Institute, Brisbane, Australia
- 4:45 **Panel Discussion**

### Symposium: Invasive Termite Species: Where Are They From, Where Are They Now, and Where Will They Be?

#### Room W240 D (Convention Center)

**Moderators and Organizers:** Nan-Yao Su<sup>1</sup>, Thomas Chouvenc<sup>1</sup>, and Hou-Feng Li<sup>2</sup>, <sup>1</sup>Univ. of Florida, Davie, FL, <sup>2</sup>National Chung Hsing Univ., Taichung, Taiwan

- 1:30 **3545** Urbanization and the spread of the western drywood termite. **Michael K. Rust** (michael.rust@ucr.edu), Univ. of California, Riverside, CA
- 1:45 **3546** The West Indian drywood termite, from enigmatic origin to dominant household pest. **Rudolph H. Scheffrahn** (rhsc@ufl.edu), Univ. of Florida, Ft. Lauderdale, FL
- 2:00 **3547** New insights into the where and how of invasions of *Reticulitermes flavipes*. **Edward Vargo** (ed.vargo@tamu.edu)<sup>1</sup>, Anne-Genevieve Bagnere<sup>2</sup>, Franck Dedeine<sup>3</sup>, Elfie Perdereau<sup>2</sup>, Simon Dupont<sup>2</sup>, and Mark Janowiecki<sup>1</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Univ. of Tours, Tours, France, <sup>3</sup>National Center for Scientific Research, Tours, France
- 2:15 **3548** Invasion of *Coptotermes gestroi* (Wassmann) from Asia. **Shawn Cheng** (shawn@frim.gov.my)<sup>1</sup>, Dinaiz Thinakaran<sup>2</sup>, and Seyedeh Zeinab Mohanna<sup>3</sup>, <sup>1</sup>Forest Research Institute, Malaysia, <sup>2</sup>The Univ. of Melbourne, Victoria, Australia, <sup>3</sup>Univ. Malaya, Kuala Lumpur, Malaysia
- 2:30 **3549** Naturalization of the Asian subterranean termite in Taiwan. **Hou-Feng Li** (houfeng@nchu.edu.tw)<sup>1</sup>, Chun-I Chiu<sup>1</sup>, Hsin-Ting Yeh<sup>2</sup>, and Ming-Jer Tsai<sup>2,3</sup>, <sup>1</sup>National Chung Hsing Univ., Taichung, Taiwan, <sup>2</sup>National Taiwan Univ., Chu-Shan, Taiwan, <sup>3</sup>National Taiwan Univ., Taipei, Taiwan
- 2:45 **3550** Origin and invasion history of *Coptotermes formosanus* in Japan. Akinori Yamada<sup>1</sup>, Kunio Tsunoda<sup>2</sup>, and **Tsuyoshi Yoshimura** (tsuyoshi@rish.kyoto-u.ac.jp)<sup>2</sup>, <sup>1</sup>Nagasaki Univ., Nagasaki, Japan, <sup>2</sup>Kyoto Univ., Uji, Japan
- 3:00 BREAK**
- 3:15 **3551** Conquest of the Formosan subterranean termite. **Claudia Husseneder** (chusseneder@agcenter.lsu.edu)<sup>1</sup> and Chinmay Tikhe<sup>2</sup>, <sup>1</sup>Louisiana State Univ., Baton Rouge, LA, <sup>2</sup>Louisiana State Univ. AgCenter, Baton Rouge, LA
- 3:30 **3552** Formosan and Asian subterranean termite invasions in Hawaii. **J. Kenneth Grace** (kennethg@hawaii.edu), Univ. of Hawai'i, Honolulu, HI
- 3:45 **3553** Hybridization between two termite invaders, *Coptotermes formosanus* and *C. gestroi*: Opportunities for gene flow between species. **Thomas Chouvenc** (tomchouv@ufl.edu) and Nan-Yao Su, Univ. of Florida, Davie, FL



**Graduate Student Oral Competition: Morphology, Systematics, and Phylogeny: Hymenoptera**

**Room W232 C (Convention Center)**

**Moderators:** Barbara Sharanowski<sup>1</sup> and Jennifer Zaspel<sup>2</sup>, <sup>1</sup>Univ. of Central Florida, Orlando, FL, <sup>2</sup>Purdue Univ., West Lafayette, IN

- 1:30 **3554** Comparative functional morphology and kinematics of miniature trap-jaw ant (*Strumigenys* spp.) mandible strikes. **Josh Gibson** (jcgibso2@illinois.edu)<sup>1</sup>, Doug Booher<sup>2</sup>, and Andrew Suarez<sup>1</sup>, <sup>1</sup>Univ. of Illinois, Champaign, IL, <sup>2</sup>Univ. of California, Los Angeles, CA
- 1:45 **3555** Defensive traits exhibit an evolutionary trade-off and drive diversification in ants. **Benjamin Blanchard** (bblanchard@fieldmuseum.org) and Corrie Moreau, The Field Museum of Natural History, Chicago, IL
- 2:00 **3556** Ultraconserved elements as a tool for species delimitation in *Sericomyrmex* fungus-farming ants (Hymenoptera: Formicidae). **Ana Jesovnik** (jesovnika@si.edu)<sup>1</sup> and Ted Schultz<sup>2</sup>, <sup>1</sup>Univ. of Maryland, College Park, MD, <sup>2</sup>Smithsonian Institution National Museum of Natural History, Washington, DC
- 2:15 **3557** Taxonomic study of the Japanese subfamilies of Calosotinae and Neanastatinae (Hymenoptera, Eupelmidae). **Taisuke Kawano** (pseudoidatenankafu@gmail.com) and Toshiharu Mita, Kyushu Univ., Fukuoka, Japan
- 2:30 **3558** Revision of Nearctic *Dendrocercus* (Hymenoptera, Megaspilidae): An integrative taxonomic approach. **Kyle Burks** (kyleburks@gmail.com), Pennsylvania State Univ., University Park, PA
- 2:45 **3559** The magnificent Megaspilidae: *Conostigmus* spp. (Hymenoptera: Megaspilidae) of the Nearctic. **Carolyn Trietsch** (carolyntrietsch@gmail.com), István Mikó, and Andrew Deans, Pennsylvania State Univ., University Park, PA
- 3:00 BREAK**
- 3:15 **3560** Evolution of communication: a comparison across behaviourally diverse halictid bees. **Bernadette Wittwer** (wittwerb@unimelb.edu.au)<sup>1</sup>, Abraham Hefetz<sup>2</sup>, Mark Elgar<sup>1</sup>, Naomi E. Pierce<sup>3</sup>, and Sarah Kocher<sup>4</sup>, <sup>1</sup>The Univ. of Melbourne, Parkville, Australia, <sup>2</sup>Tel Aviv Univ., Tel Aviv, Israel, <sup>3</sup>Harvard Univ., Cambridge, MA, <sup>4</sup>Princeton Univ., Princeton, NJ
- 3:30 **3561** Presentation withdrawn
- 3:45 **3562** Systematics of mid-Mesozoic Apocrita (Hymenoptera) from northeastern China. **Longfeng Li** (fenger4499@163.com)<sup>1</sup>, Chungkun Shih<sup>1,2</sup>, and Dong Ren<sup>1</sup>, <sup>1</sup>Capital Normal Univ., Beijing, China, <sup>2</sup>Smithsonian Institution National Museum of Natural History, Washington, DC
- 4:00 **3563** Evolution and phylogeny of the parasitoid subfamily Scelioninae (Hymenoptera: Platygastroidea). **Huayan Chen** (huayanc@gmail.com)<sup>1</sup>, Norman Johnson<sup>1</sup>, and Andrew Austin<sup>2</sup>, <sup>1</sup>The Ohio State Univ., Columbus, OH, <sup>2</sup>The Univ. of Adelaide, Adelaide, Australia

- 4:15 **3564** Phylogenetic relationships among species in *Aphelinus* (Hymenoptera: Aphelinidae). **Xanthe Shirley** (xanthe23@tamu.edu)<sup>1</sup>, Keith R. Hopper<sup>2</sup>, Kristen Kuhn<sup>2</sup>, and James Woolley<sup>1</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>USDA - ARS, Newark, DE
- 4:30 **3565** Color variation does matter when delimitating species: Lessons learned from Tribe Cirrospilini (Hymenoptera: Eulophidae). **Ryan Perry** (rperr003@ucr.edu), Univ. of California, Riverside, CA
- 4:45 **3566** The Wing Interference Patterns (WIPs) of *Parapanteles* (Braconidae: Microgastrinae) wasps: A powerful and accessible tool for species-level identification of small winged insects. **Kyle Parks** (kparks4@illinois.edu), James Whitfield, and Shuyang Jin, Univ. of Illinois, Champaign, IL
- 5:00 **3567** Revision and phylogeny of *Lytopylus* (Hymenoptera: Braconidae: Agathidinae). **Ilgoo Kang** (ilgoo.kang@uky.edu) and Michael J. Sharkey, Univ. of Kentucky, Lexington, KY
- 5:15 **3568** Australian microgastrine parasitoid wasps: Systematics meets citizen science. **Erinn Fagan-Jeffries** (erinn.fagan-jeffries@adelaide.edu.au)<sup>1</sup>, Andrew Austin<sup>1</sup>, and Steven Cooper<sup>1,2</sup>, <sup>1</sup>The Univ. of Adelaide, Adelaide, Australia, <sup>2</sup>South Australian Museum, Adelaide, Australia

**Contributed Papers: Apidology, Sericulture, and Social Insects: Behavior**

**Room W225 A (Convention Center)**

**Moderators:** Sandra Rehan<sup>1</sup> and Lilia I. de Guzman<sup>2</sup>, <sup>1</sup>Univ. of Pennsylvania, Philadelphia, PA, <sup>2</sup>USDA - ARS, Baton Rouge, LA

- 1:30 **3569** Comparing the flight activities of two stocks of honey bees (*Apis mellifera*) using radio-frequency identification (RFID) technology. **Lilia I. de Guzman** (lilia.deguzman@ars.usda.gov), Amanda M. Frake, and Michael Simone-Finstrom, USDA - ARS, Baton Rouge, LA
- 1:45 **3570** Social cues and diet restriction may act through similar mechanisms to affect aggressive behavior in the honey bee (*Apis mellifera*). **Clare Rittschof** (clare.rittshof@uky.edu)<sup>1</sup>, Gene E. Robinson<sup>2</sup>, and Christina M. Grozinger<sup>3</sup>, <sup>1</sup>Univ. of Kentucky, Lexington, KY, <sup>2</sup>Univ. of Illinois, Champaign, IL, <sup>3</sup>Pennsylvania State Univ., University Park, PA
- 2:00 **3571** *Vespa soror* in Vietnam: Biological insights based on behavioral observations, and landmark morphometric and microsatellite analyses of workers and gynes. **Gard W. Otis** (gotis@uoguelph.ca)<sup>1</sup>, Maggie Bain<sup>2</sup>, Adrien Perrard<sup>3</sup>, Heather Mattila<sup>4</sup>, and Lien Nguyen<sup>5</sup>, <sup>1</sup>Univ. of Guelph, Guelph, ON, Canada, <sup>2</sup>Univ. of Guelph, Puslinch, ON, Canada, <sup>3</sup>American Museum of Natural History, New York, NY, <sup>4</sup>Wellesley College, Wellesley, MA, <sup>5</sup>Institute of Ecology and Biological Resources, Hanoi, Vietnam
- 2:15 **3572** Do kin selection and inter-colony distance mediate helping behavior in weaver ants? **Floria Mora-Kepfer Uy** (floriamk@bio.miami.edu), Univ. of Miami, Coral Gables, FL





- 2:30 **3573** Context dependency of bumble bee nectar robbing. **Elinor Lichtenberg** (elinor@email.arizona.edu)<sup>1</sup>, Rebecca E. Irwin<sup>2</sup>, and Judith L. Bronstein<sup>1</sup>, <sup>1</sup>Univ. of Arizona, Tucson, AZ, <sup>2</sup>North Carolina State Univ., Raleigh, NC
- 2:45 **3574** Effects of Cry1Ie toxin on survival, behavior, and midgut bacteria of honey bee, *Apis mellifera*. **Pingli Dai** (daipingli@caas.cn)<sup>1,2</sup>, Huiru Jia<sup>1</sup>, Qingyun Diao<sup>1</sup>, Jie Zhang<sup>1</sup>, and James D. Ellis<sup>2</sup>, <sup>1</sup>Chinese Academy of Agricultural Sciences, Beijing, China, <sup>2</sup>Univ. of Florida, Gainesville, FL
- 3:00 BREAK**
- 3:15 **3575** Polymorphism in the red imported fire ant *Solenopsis invicta*: A closer look at task performance in digging and foraging behavior. **Jason Carbaugh** (jcarbaugh@tamu.edu) and S. Bradleigh Vinson, Texas A&M Univ., College Station, TX
- 3:30 **3576** A bee on the brink of eusociality: How maternal manipulation leads to the formation of social hierarchies in the subsocial bee *Ceratina calcarata* (Hymenoptera: Apidae). **Sarah P. Lawson** (sarah.lawson@unh.edu) and Sandra Rehan, Univ. of New Hampshire, Durham, NH
- 3:45 **3577** The benefits of specialization in groups: Task switching, managing risk, and individual efficiency. **Anna Dornhaus** (dornhaus@email.arizona.edu), Univ. of Arizona, Tucson, AZ
- 4:00 **3578** Insulin receptor substrate (IRS) gene knock-down impacts complex behavior and shortens lifespan in honey bee workers. **Kate Ihle** (kateihle@gmail.com), Univ. of Zürich, Zürich, Switzerland
- 4:15 **3579** Variation in learning performance and its effect on foraging behaviour in the bumble bee *Bombus terrestris*. **Lisa Evans** (lisa.evans@plantandfood.co.nz)<sup>1</sup>, Karen Smith<sup>2</sup>, and Nigel E. Raine<sup>3</sup>, <sup>1</sup>The New Zealand Institute for Plant & Food Research, Ltd., Hamilton, New Zealand, <sup>2</sup>Royal Holloway, Univ. of London, Egham, United Kingdom, <sup>3</sup>Univ. of Guelph, Guelph, ON, Canada
- 4:30 **3580** The queen is not aggressive in the paper wasp *Polistes jokahamae*, but monopolistically or dominantly oviposits. **Hideto Yoshimura** (mieu510601@gmail.com), Jun'ichi Yamada, and Yoshihiro Yamada, Mie Univ., Tsu, Japan
- 4:45 **3581** Identification of stop signaling in foraging honey bee (*Apis mellifera* L.) colonies. **Parry Kietzman** (pmkietzm@ncsu.edu) and David Tarry, North Carolina State Univ., Raleigh, NC
- 5:00 **3582** Snap, trap, and chop: Comparative morphology and kinematics of spring-loaded mandibles in the ant genera *Myrmoteras*, *Myrmium*, and *Odontomachus*. **Fredrick Larabee** (larabee@si.edu)<sup>1</sup>, Adrian A. Smith<sup>2</sup>, and Andrew Suarez<sup>3</sup>, <sup>1</sup>Smithsonian Institution National Museum of Natural History, Washington, DC, <sup>2</sup>North Carolina Museum of Natural Sciences, Raleigh, NC, <sup>3</sup>Univ. of Illinois, Champaign, IL

## Contributed Papers: Apidology, Sericulture, and Social Insects: Ecology

### Room W225 B (Convention Center)

**Moderators:** Jinmei Wu<sup>1</sup> and Callum Kingwell<sup>2</sup>, <sup>1</sup>Jiangsu Univ. of Science and Technology, Zhenjiang, China, <sup>2</sup>Cornell Univ., Ithaca, NY

- 1:30 **3583** Ecological interactions between honey bees (*Apis mellifera*) and Talh trees (*Acacia gerrardii*) under the extreme hot-dry weather conditions. **Awad Hassan** (awad.univ@gmail.com)<sup>1,2</sup> and Abdulaziz Alqarni<sup>2</sup>, <sup>1</sup>South Valley Univ., Qena, Egypt, <sup>2</sup>King Saud Univ., Riyadh, Saudi Arabia
- 1:45 **3584** Ethological approach to reveal why only *Apis cerana japonica* suffers from the tracheal mite in Japan. **Yoshiko Sakamoto** (sakamoto.yoshiko@nies.go.jp)<sup>1</sup>, Taro Maeda<sup>2</sup>, Mikio Yoshiyama<sup>3</sup>, and Jeffrey Pettis<sup>4</sup>, <sup>1</sup>National Institute for Environmental Studies, Tsukuba, Japan, <sup>2</sup>National Institute of Agrobiological Sciences, Tsukuba, Japan, <sup>3</sup>National Institute of Livestock and Grassland Science, Tsukuba, Japan, <sup>4</sup>USDA - ARS, Beltsville, MD
- 2:00 **3585** The evolutionary origins of social insect queen pheromones: Honesty and dynamics of fertility signal production in a socially polyphenic halictid bee. **Callum Kingwell** (callumkingwell@gmail.com)<sup>1</sup>, Beryl Jones<sup>2</sup>, and William Wcislo<sup>3</sup>, <sup>1</sup>Cornell Univ., Ithaca, NY, <sup>2</sup>Univ. of Illinois, Champaign, IL, <sup>3</sup>Smithsonian Tropical Research Institute, Panama City, Panama
- 2:15 **3586** Role of forage availability and diversity for pollinator health in orchard landscapes. Meghan Milbrath, Rufus Isaacs and **Sarah Scott** (sbscott429@gmail.com), Michigan State Univ., East Lansing, MI
- 2:30 **3587** Honey bee neurogenomic responses to affiliative and agonistic social interactions. **Hagai Shpigler** (hagaishp@illinois.edu), Michael Saul, Emma Murdoch, Frida Corona, Amy Cash-Ahmed, and Gene E. Robinson, Univ. of Illinois, Champaign, IL
- 2:45 **3588** A meta-analysis of the role of the western honey bee (*Apis mellifera*) in plant-pollinator interaction networks worldwide. **Keng-Lou Hung** (kenglou.hung@gmail.com)<sup>1</sup>, Matthias Albrecht<sup>2</sup>, Jennifer Kingston<sup>1</sup>, David Holway<sup>1</sup>, and Joshua Kohn<sup>1</sup>, <sup>1</sup>Univ. of California, La Jolla, CA, <sup>2</sup>Agroscope, Zürich, Switzerland
- 3:00 BREAK**
- 3:15 **3589** Chemical analysis of the Brazilian pepper, clover, and citrus honeys produced by the honey bee workers, *Apis mellifera* L. (Hymenoptera: Apidae). Othman Zaghoul<sup>1</sup>, Nagda El-Sayed<sup>1</sup>, **Nadia Hassona** (nadia.hassona@yahoo.com)<sup>1</sup>, Mohamed Moursi<sup>2</sup>, and Maher Abou-Lila<sup>2</sup>, <sup>1</sup>Alexandria Univ., Alexandria, Egypt, <sup>2</sup>Agriculture Research Station, Alexandria, Egypt
- 3:30 **3590** Floral trait variation affects bee foraging behaviors in cultivated sunflowers. **Rachel Mallinger** (rachel.mallinger@ars.usda.gov) and Jarrad Prasifka, USDA - ARS, Fargo, ND



- 3:45 **3591** Colonies are people too: Personality and fitness in paper wasps (*Polistes fuscatus*). **Jennifer M. Jandt** (jjandt2@gmail.com)<sup>1</sup>, Colby Behrens<sup>2</sup>, Sarah Bengston<sup>3</sup>, and Amy L. Toth<sup>2</sup>, <sup>1</sup>Univ. of Otago, Dunedin, New Zealand, <sup>2</sup>Iowa State Univ., Ames, IA, <sup>3</sup>Univ. of Rochester, Rochester, NY
- 4:00 **3592** The impact of different combinations of *Varroa destructor* (Anderson and Trueman) and viruses on honey bee, *Apis mellifera* (L.), colony survival in winter. **Rob Currie** (rob.currie@umanitoba.ca)<sup>1</sup>, Graham Parsons<sup>2</sup>, and Zoe Rempel<sup>1</sup>, <sup>1</sup>Univ. of Manitoba, Winnipeg, MB, Canada, <sup>2</sup>Saskatchewan Beekeepers Association, Prince Albert, SK, Canada
- 4:15 **3593** Mason bees and mud: Does nesting material provide an alternative mode of pesticide exposure in *Osmia lignaria*? **Andi Kopit** (andikopit16@gmail.com)<sup>1</sup>, Theresa Pitts-Singer<sup>2</sup>, and Ricardo Ramirez<sup>1</sup>, <sup>1</sup>Utah State Univ., Logan, UT, <sup>2</sup>USDA - ARS, Logan, UT
- 4:30 **3594** Pollinator gardens: An aesthetic approach for conservation of pollinators and enhancing ecosystem services in urban habitats. **Timalapur Shivalingaswamy** (shivalinga.swamytm@icar.gov.in), Raghavendra Anjanappa, Ankita Gupta, Shylesha Arakalagud, Sushil Jalali, and Abraham Verghese, National Bureau of Agricultural Insect Resources, Bangalore, India
- 4:45 **3595** Who are the 'lazy' ants? Inter-worker variation gives insight into potential functions of inactivity. **Daniel Charbonneau** (charbonneau.daniel@gmail.com) and Anna Dornhaus, Univ. of Arizona, Tucson, AZ
- 5:00 **3596** Sex and asex in termite societies. **Toshihisa Yashiro** (yashiro1@kais.kyoto-u.ac.jp) and Kenji Matsuura, Kyoto Univ., Kyoto, Japan

### Contributed Papers: Arthropod Vectors of Animal and Plant Diseases: Plant-Insect-Pathogen Interactions

#### Room W240 A (Convention Center)

**Moderators:** Ki Kim<sup>1</sup> and Deepak Shrestha<sup>2</sup>, <sup>1</sup>Univ. of Florida, Lake Alfred, FL, <sup>2</sup>Univ. of Florida, Gainesville, FL

- 1:30 **3597** Phylogeny and natural host range of the whitefly *Bemisia tabaci* (Hemiptera: Aleyrodidae) sibling species group in western Ecuador. **Jorge Paredes-Montero** (jparedes@email.arizona.edu) and Judith K. Brown, Univ. of Arizona, Tucson, AZ
- 1:45 **3598** Molecular analysis of thrips diversity and thrips-transmitted *Iris yellow spot virus* (Tospovirus: Bunyaviridae) from Pakistan. **Romana Iftikhar** (rmniftikhar299@gmail.com)<sup>1</sup>, Muhammad Ashfaq<sup>2</sup>, Paul Hebert<sup>2</sup>, and Hanu Pappu<sup>3</sup>, <sup>1</sup>Pakistan Institute of Engineering and Applied Sciences, Islamabad, Pakistan, <sup>2</sup>Univ. of Guelph, Guelph, ON, Canada, <sup>3</sup>Washington State Univ., Pullman, WA
- 2:00 **3599** Identification of an aphid protein involved in *Turnip yellows virus* transmission by *Myzus persicae*. Michael Mulo<sup>1</sup>, Sylvaine Boissinot<sup>1</sup>, Baptiste Monsion<sup>2</sup>, Maryam Rastegar<sup>3</sup>, Monique Erdinger<sup>1</sup>, Nicole Bochet<sup>1</sup>, and **Veronique Brault** (veronique.brault@colmar.inra.fr)<sup>1</sup>, <sup>1</sup>INRA, Colmar, France, <sup>2</sup>INRA, Montpellier, France, <sup>3</sup>Shiraz Univ., Shiraz, Iran

- 2:15 **3600** The roles of autophagy in the interactions of a whitefly with a plant virus it transmits. **Xin-Ru Wang** (wangxinru002@163.com), Lan-Lan Wang, Shu-Sheng Liu, and Xiao-Wei Wang, Zhejiang Univ., Hangzhou, China
- 2:30 **3601** Transovarial transmission of a begomovirus by its whitefly vector. Jing Wei, **Ya-Zhou He** (heyazhou@zju.edu.cn), Qi Guo, Shu-Sheng Liu, and Xiao-Wei Wang, Zhejiang Univ., Hangzhou, China
- 2:45 **3602** Potyvirus transmission and vector-virus interactions in cucurbit production systems. **Kiran Gadhav** (krg@uga.edu), Bhabesh Dutta, Jason M. Schmidt, and Rajagopalbabu Srinivasan, Univ. of Georgia, Tifton, GA
- 3:00 **BREAK**
- 3:15 **3603** Mungbean yellow mosaic India virus strains and weed begomoviruses transmitted by *Bemisia tabaci* in central India. **Hiroaki Noda** (noda@sun.cims.jp)<sup>1</sup>, Takashi Wada<sup>2</sup>, Rakesh Kumar Singh<sup>3</sup>, Parveen Ansari<sup>3</sup>, Rakesh Marabi<sup>4</sup>, and Niraj Tripathi<sup>4</sup>, <sup>1</sup>Japan International Cooperation Agency, Tsukuba, Japan, <sup>2</sup>Japan International Cooperation Agency, Kumamoto, Japan, <sup>3</sup>Rajmata Vijayaraje Scindia Krishi Vishwavidyalaya, Indore, India, <sup>4</sup>Jawaharlal Nehru Agricultural University, Jabalpur, India
- 3:30 **3604** Factors affecting transmission rates of 'Ca. Liberibacter asiaticus' by Asian citrus psyllid (*Diaphorina citri*). **David Hall** (david.hall@ars.usda.gov)<sup>1</sup>, Eldesouky Ammar<sup>1</sup>, and Michelle Cilia<sup>2</sup>, <sup>1</sup>USDA - ARS, Ft. Pierce, FL, <sup>2</sup>USDA - ARS, Ithaca, NY
- 3:45 **3605** Host-mediated effect of squash vein yellowing virus on whitefly biology and development. **Deepak Shrestha** (dshrestha@ufl.edu), Susan Webb, and Heather J. McAuslane, Univ. of Florida, Gainesville, FL
- 4:00 **3606** Sequential transmission of Potato virus Y strains by *Myzus persicae*. **Shaonpius Mondal** (sm2536@cornell.edu)<sup>1</sup> and Stewart Gray<sup>2</sup>, <sup>1</sup>Cornell Univ., Ithaca, NY, <sup>2</sup>USDA - ARS, Ithaca, NY
- 4:15 **3607** The role of *Lygus* sp. in the epidemiology of BLTVA in potatoes in the Pacific Northwest. **Josephine Antwi** (josephine.antwi@oregonstate.edu), Silvia Rondon, Kenneth E. Frost, Aymeric Goyer, and Robert Cating, Oregon State Univ., Hermiston, OR
- 4:30 **3608** Implications of *Candidatus Liberibacter solanacearum* infection for management and ecology of potato psyllids. **Sean Prager** (sean.prager@ucr.edu), Michael Jones, and John T. Trumble, Univ. of California, Riverside, CA
- 4:45 **3609** Trunk injection of imidacloprid for the control of Asian citrus psyllid (Hemiptera: Liviidae). **Ki Kim** (ki@pacificaggroup.com), Florida Ag Research, Thonotosassa, FL
- 5:00 **3610** Thrips as vectors of an emerging maize disease: A case study of maize chlorotic mottle virus. **Johnson Nyasani** (jnyasani@icipe.org), Elizabeth Kusia, Regina Malit, and Sevgan Subramanian, International Centre of Insect Physiology and Ecology, Nairobi, Kenya



**Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Coleoptera**

**Room W414 A (Convention Center)**

**Moderators:** Mukti N. Ghimire<sup>1</sup> and Margaret Thayer<sup>2</sup>, <sup>1</sup>USDA - APHIS, Buzzards Bay, MA, <sup>2</sup>The Field Museum of Natural History, Chicago, IL

- 1:30 **3611** Tropical stream beetles show clade idiosyncratic biological patterns of narrow endemism *versus* high connectivity across major landscapes. **Athena Lam** (athenawai@gmail.com)<sup>1,2</sup>, Matthew Van Dam<sup>2</sup>, Johannes Bergsten<sup>3</sup>, and Michael Balke<sup>2</sup>, <sup>1</sup>Univ. of California, Berkeley, CA, <sup>2</sup>Bavarian State Collection of Zoology, Munich, Germany, <sup>3</sup>Swedish Museum of Natural History, Stockholm, Sweden
- 1:45 **3612** Size- and context-dependent nest-staying behavior of males of the Japanese dung beetle, *Copris acutidens* (Coleoptera: Scarabaeidae). **Mayumi Akamine** (acutidens2000@yahoo.co.jp), Nihon Univ., Fujisawa, Japan
- 2:00 **3613** The species versus subspecies conundrum in the Hercules beetles (genus *Dynastes*) and its biogeographic and conservation implications. **Jen-Pan Huang** (huangjp@umich.edu), Univ. of Michigan, Ann Arbor, MI
- 2:15 **3614** To the land beyond the end of the Earth, the rediscovery of the world's largest flightless dung beetle in southeast Angola, *Scarabaeus cancer* (Arrow) (Coleoptera: Scarabaeini). **Bruce D. Gill** (scarab57@xplornet.com)<sup>1</sup>, T. Keith Philips<sup>2</sup>, and Shaun Forgie<sup>3</sup>, <sup>1</sup>Rancho Uroxys, Woodlawn, ON, Canada, <sup>2</sup>Western Kentucky Univ., Bowling Green, KY, <sup>3</sup>Dung Beetle Innovations, Kumeu, New Zealand
- 2:30 **3615** Utilizing comparative genomic variation of two Appalachian litter beetles to assess land-use history effects on population structure. Michael Caterino and **Shelley Myers** (smyers2@clemson.edu), Clemson Univ., Clemson, SC
- 2:45 **3616** Niche and morphological evolution of the tortoise beetle tribe Dorynotini, within the context of geographical radiation (Coleoptera: Chrysomelidae: Cassidinae). **Marianna V. P. Simões** (marianna\_simoes1@ku.edu), Univ. of Kansas, Lawrence, KS
- 3:00 BREAK**
- 3:15 **3617** Response of carabid beetle assemblages to variable retention harvest in boreal mixedwood forest after 15 years. **Linhao Wu** (linhao1@ualberta.ca), John Spence, and Jaime Pinzon, Univ. of Alberta, Edmonton, AB, Canada
- 3:30 **3618** Nearly 500 genera and counting...an overview of Australian Staphylinidae (Coleoptera) and their distributions. **Margaret Thayer** (mthayer@fieldmuseum.org) and Alfred Newton, The Field Museum of Natural History, Chicago, IL
- 3:45 **3619** Does the spatial distribution of high-cut stumps matter for the red-listed beetle species *Peltis grossa* (L.) (Coleoptera: Tragossitidae)? **Line Djupström** (line.djupstrom@skogforsk.se), Uppsala Science Park, Uppsala, Sweden

- 4:00 **3620** Fine-scale forest structure as a driver for spider and carabid distribution and composition. **Jaime Pinzon** (jpinzon@ualberta.ca), Linhao Wu, John Spence, and Fangliang He, Univ. of Alberta, Edmonton, AB, Canada
- 4:15 **3621** Molecular evidence for ecological speciation in the Amazon basin: A case study using Lachnophorini ground beetles (Coleoptera: Carabidae). **Laura Zamorano** (lzamorano@calacademy.org), California Academy of Sciences, San Francisco, CA
- 4:30 **3622** Habitat complexity mediates intraguild antagonism among predatory carabids. **Joseph Taylor** (joseph.m.taylor@wsu.edu) and William E. Snyder, Washington State Univ., Pullman, WA
- 4:45 **3623** The Pselaphinae (Coleoptera: Staphylinidae) of New Zealand and Australia: A comparison of faunas. **Donald Chandler** (donald.chandler@unh.edu), Univ. of New Hampshire, Durham, NH

**Contributed Papers: Biological Control and Insect Pathology: Unique Studies II**

**West Hall F1 (WF1) (Convention Center)**

**Moderators:** Kelsey Schall<sup>1</sup>, Nader Sallam<sup>2</sup>, and Yelitza Colmenarez<sup>3</sup>, <sup>1</sup>Univ. of California, Riverside, CA, <sup>2</sup>Sugar Research Australia, Gordonvale, Australia, <sup>3</sup>CABI, Botucatu, Brazil

- 1:30 **3624** Use of parasitoids as a biocontrol agent in the Neotropical region: Challenges and potential. **Yelitza Colmenarez** (y.colmenarez@cabi.org)<sup>1</sup>, Marcus Sampaio<sup>2</sup>, and Simone Jahnke<sup>3</sup>, <sup>1</sup>CABI, Botucatu, Brazil, <sup>2</sup>Federal Univ. of Uberlândia, Uberlândia, Brazil, <sup>3</sup>Federal Univ. of Rio Grande, Porto Alegre, Brazil
- 1:45 **3625** Molecular characterization of the harmful effect of *Nesidiocoris tenuis* to tomato. **Milena Chinchilla-Ramirez** (chinchilla\_mil@gva.es)<sup>1</sup>, Alberto Urbaneja<sup>1</sup>, Víctor Flors<sup>2</sup>, and Meritxell Pérez-Hedo<sup>2</sup>, <sup>1</sup>Valencian Institute of Agricultural Research, Moncada, Spain, <sup>2</sup>Univ. Jaume I, Castelló de la Plana, Spain
- 2:00 **3626** Studies on *Adelina* sp., pathogen of the greyback canegrub, *Dermolepida albohirtum*, in Queensland canefields, Australia. **Nader Sallam** (nsallam@sugarresearch.com.au)<sup>1</sup>, Sean Marshall<sup>2</sup>, and Lisa Derby<sup>1</sup>, <sup>1</sup>Sugar Research Australia, Gordonvale, Australia, <sup>2</sup>AgResearch, Ltd., Christchurch, New Zealand
- 2:15 **3627** Baculovirus IE2 stimulates the expression of heat shock proteins in insect and mammalian cells to facilitate its proper functioning. **Yu-Chan Chao** (mbycchao@imb.sinica.edu.tw) and Hsuan Tung, Academia Sinica, Taipei, Taiwan
- 2:30 **3628** Occurrence of baculovirus infecting the soybean looper, *Crysoideixis includens* (Walker) (Lepidoptera: Noctuidae), in Brazil. **Fernando Valicente** (fernando.valicente@embrapa.br)<sup>1</sup>, Caio Luiz<sup>2</sup>, Mariana Alves<sup>2</sup>, Eloiso Campos<sup>2</sup>, Victor Costa<sup>3</sup>, and Francisco Andrés Rodríguez-Dimate<sup>4</sup>, <sup>1</sup>Embrapa Corn and Sorghum, Sete Lagoas, Brazil, <sup>2</sup>Federal Univ. of São João del-Rei, Sete Lagoas, Brazil, <sup>3</sup>Federal Univ. of Lavras, Lavras, Brazil, <sup>4</sup>Federal Univ. of Viçosa, Sete Lagoas, Brazil



- 2:45 **3629** Implications of Argentine ant management for biological control of the Asian citrus psyllid and other citrus pests. **Kelsey Schall** (kscha008@ucr.edu) and Mark S. Hoddle, Univ. of California, Riverside, CA
- 3:00 BREAK**
- 3:15 **3630** Arthropod predators of Asian citrus psyllid (*Diaphorina citri*) in southern California. **Aviva Goldmann** (agoldmann@gmail.com), Richard Stouthamer, and Paul F. Rugman-Jones, Univ. of California, Riverside, CA
- 3:30 **3631** Using population models as a predictive tool to guide biological control programs: Wheat stem sawfly as a case study. **Courtney Richmond** (richmond@rowan.edu)<sup>1</sup> and Tatyana Rand<sup>2</sup>, <sup>1</sup>Rowan Univ., Glassboro, NJ, <sup>2</sup>USDA - ARS, Sidney, MT
- 3:45 **3632** Understanding arthropod trophic relationships in Mediterranean lettuce crops by DNA-based gut-content analysis. **Nuria Agusti** (nuria.agusti@irta.cat), Priscila Gomez-Polo, Cristina Castañé, and Oscar Alomar, IRTA, Cabrils, Spain
- 4:00 **3633** Biological control with predaceous mites in open-field fruiting vegetable crops in Florida. **Jose Castillo** (jacastil@ufl.edu) and Philip A. Stansly, Univ. of Florida, Immokalee, FL
- 4:15 **3634** Characterization of the harmful effect of tomato on *Amblyseius swirskii*. **Angeliki Paspatis** (paspatis\_ang@gva.es)<sup>1</sup>, Alberto Urbaneja<sup>1</sup>, and Joel González-Cabrera<sup>2</sup>, <sup>1</sup>Valencian Institute of Agricultural Research, Moncada, Spain, <sup>2</sup>Univ. of València, Burjassot, Spain
- 4:30 **3635** Impact of the predator *Chrysoperla carnea* (Stephens) (Neuroptera: Chrysopidae) on *Zeuzera pyrina* (Linnaeus) (Lepidoptera: Cossidae) populations attacking reclaimed apple orchards at Nobareia region in Egypt. **Ahmed Merghem** (ahmedmerghem@yahoo.com), Plant Protection Research Institute, Giza, Egypt

### Contributed Papers: Ecology and Population Dynamics: Community

#### Room W315 B (Convention Center)

**Moderators:** Grant De Jong<sup>1</sup> and Cedric Alaux<sup>2</sup>, <sup>1</sup>G&E Consultants, Inc., Denver, CO, <sup>2</sup>INRA, Avignon, France

- 1:30 **3636** Coleoptera assemblages in apple orchards along pesticide disturbance and landscape gradients. **Viktor Markó** (viktor.marko@uni-corvinus.hu)<sup>1</sup>, Zoltán Elek<sup>2</sup>, Anikó Kovács-Hostyánszki<sup>3</sup>, Ádám Kőrösi<sup>2</sup>, László Somay<sup>3</sup>, Rita Földesi<sup>3</sup>, Ákos Varga<sup>1</sup>, Ágnes Iván<sup>1</sup>, and András Báldi<sup>3</sup>, <sup>1</sup>Szent István Univ., Budapest, Hungary, <sup>2</sup>Eötvös Loránd Univ., Budapest, Hungary, <sup>3</sup>MTA Centre for Ecological Research, Vácrátót, Hungary
- 1:45 **3637** Integrating landscape ecology and insect physiology: The case of overwintering survival in honey bees. **Cedric Alaux** (cedric.alaux@avignon.inra.fr)<sup>1</sup>, Fabrice Allier<sup>2</sup>, and Mickael Henry<sup>1</sup>, <sup>1</sup>INRA, Avignon, France, <sup>2</sup>ITSAP Institute of the Bee, Avignon, France

- 2:00 **3638** Altitudinal and geographic effects on communities of euglossine bees (Hymenoptera: Apidae) in three different phytogeographies of the Atlantic Forest of São Paulo State, Brazil. **Claudineia Costa** (claudineia@usp.br) and Tiago Francoy, Univ. of São Paulo, São Paulo, Brazil
- 2:15 **3639** Dung beetle (Coleoptera: Scarabaeidae) community succession in an extreme coastal environment in Turkey. **Gregory Sullivan** (gregory.sullivan@uq.net.au)<sup>1</sup>, Sebahat Ozman-Sullivan<sup>2</sup>, Myron Zalucki<sup>1</sup>, Greg Baxter<sup>1</sup>, Unal Zeybekoglu<sup>2</sup>, and Jean-Pierre Lumaret<sup>3</sup>, <sup>1</sup>Univ. of Queensland, Brisbane, Australia, <sup>2</sup>Ondokuz Mayıs Univ., Samsun, Turkey, <sup>3</sup>Univ. of Montpellier, Montpellier, France
- 2:30 **3640** Comparing the evidence for range contractions versus range expansions in populations of the introduced Argentine ant (*Linepithema humile*) in northern California after 30–40 years. **Sean Menke** (menke@lakeforest.edu)<sup>1</sup>, Philip Ward<sup>2</sup>, and David Holway<sup>3</sup>, <sup>1</sup>Lake Forest College, Lake Forest, IL, <sup>2</sup>Univ. of California, Davis, CA, <sup>3</sup>Univ. of California, La Jolla, CA
- 2:45 **3641** Patch heterogeneity, mutualists and predators drive metacommunity dynamics in an aphid-plant system. **Matthias Senft** (matthias.senft@tum.de)<sup>1</sup>, Mary Clancy<sup>2</sup>, Jörg-Peter Schnitzler<sup>2</sup>, Wolfgang Weisser<sup>1</sup>, and Sharon Zytynska<sup>1</sup>, <sup>1</sup>Technical Univ., Freising, Germany, <sup>2</sup>Helmholtz Center München, Neuherberg, Germany
- 3:00 BREAK**
- 3:15 **3642** Spatial distribution of selected beetles and bugs on an exposed beach of the Great Salt Lake, Utah, USA. **Grant De Jong** (gdejong@geiconsultants.com)<sup>1</sup>, Shaun Roark<sup>1</sup>, Ann Neville<sup>2</sup>, Amanda Kovach<sup>1</sup>, and Larry Elkin<sup>2</sup>, <sup>1</sup>G&E Consultants, Inc., Denver, CO, <sup>2</sup>Rio Tinto Kennecott Corp., South Jordan, UT
- 3:30 **3643** Interannual variation in the impacts of nutrient pulses on an arthropod foodweb. **Shannon Murphy** (shannon.m.murphy@du.edu)<sup>1</sup>, Danny Lewis<sup>2</sup>, and Gina M. Wimp<sup>2</sup>, <sup>1</sup>Univ. of Denver, Denver, CO, <sup>2</sup>Georgetown Univ., Washington, DC

- 3:45 **3644** Climate constrains range expansion of a population diverging under allochry: The case of the pine processionary moth. **Martin Godefroid** (martin.godefroid@gmail.com)<sup>1</sup>, Susana Rocha<sup>2</sup>, Helena Santos<sup>3</sup>, Maria Rosa Paiva<sup>3</sup>, Christian Burban<sup>4</sup>, Carole Kerdelhué<sup>1</sup>, Manuela Branco<sup>2</sup>, Jean-Yves Rasplus<sup>1</sup>, and Jean-Pierre Rossi<sup>1</sup>, <sup>1</sup>INRA, Montferrier-sur-Lez, France, <sup>2</sup>High Institute of Agronomy, Lisbon, Portugal, <sup>3</sup>Univ. Nova, Caparica, Portugal, <sup>4</sup>INRA, Cestas, France
- 4:00 **3645** Metacommunity structure and diversity of aquatic insects in temporary and permanent waters. **Masahiro Suzuki** (gblies.zukky@gmail.com), Nao Yamamoto, Norio Hirai, and Minoru Ishii, Osaka Prefecture Univ., Sakai, Japan
- 4:15 **3646** Spatial and temporal dynamics of natural enemies in winter wheat and canola agroecosystems. **Casi N. Jessie** (casi.jessie@okstate.edu)<sup>1</sup>, Kris Giles<sup>1</sup>, Timothy J. Kring<sup>2</sup>, Brian McCornack<sup>3</sup>, and James Hagler<sup>4</sup>, <sup>1</sup>Oklahoma State Univ., Stillwater, OK, <sup>2</sup>Univ. of Arkansas, Fayetteville, AR, <sup>3</sup>Kansas State Univ., Manhattan, KS, <sup>4</sup>USDA - ARS, Maricopa, AZ



- 4:30 **3647** Presentation withdrawn
- 4:45 **3648** Linking the green and brown worlds through nonconsumptive predator effects. **Michael Sitvarin** (michaelsitvarin@uky.edu)<sup>1</sup>, Ann Rypstra<sup>2</sup>, and James Harwood<sup>1</sup>, <sup>1</sup>Univ. of Kentucky, Lexington, KY, <sup>2</sup>Miami Univ., Oxford, OH

### Contributed Papers: Physiology and Biochemistry: Neurophysiology and Hormone Regulation

#### Room W314 B (Convention Center)

**Moderators:** Andrew Jones<sup>1</sup> and Thomas Dykstra<sup>2</sup>, <sup>1</sup>Oxford Brookes Univ., Oxford, United Kingdom, <sup>2</sup>Dykstra Laboratories, Inc, Gainesville, FL

- 1:30 **3649** Diapause incidence of progeny in relation to photoperiod and temperature experienced by their parents in the cabbage beetle, *Colaphellus bowringi*. **Fangsen Xue** (xue\_fangsen@hotmail.com), Haijun Xiao, and Haimin He, Jiangxi Agricultural Univ., Nanchang, China
- 1:45 **3650** RNA A-to-I editing broadens the transcriptome and pharmacological diversity of the mosquito RDL GABA receptor. **Andrew Jones** (a.jones@brookes.ac.uk)<sup>1</sup>, Isabel Bermudez<sup>1</sup>, and Jennina Taylor-Wells<sup>2</sup>, <sup>1</sup>Oxford Brookes Univ., Oxford, United Kingdom, <sup>2</sup>Univ. of Florida, Gainesville, FL
- 2:00 **3651** Constancy and variability of identified glomeruli in the antennal lobe of heliothine moths. **Xin-Cheng Zhao** (xincheng@henau.edu.cn), Henan Agricultural Univ., Zhengzhou, China
- 2:15 **3652** Regulation of the ecdysone signaling in *Spodoptera litura*. **Lihua Huang** (huanglh@scnu.edu.cn), South China Normal Univ., Guangzhou, China
- 2:30 **3653** Two competing theories of insect olfaction must both be rejected. **Thomas Dykstra** (dykstralabs@yahoo.com) and Drew Swaggerty, Dykstra Laboratories, Inc, Gainesville, FL
- 2:45 **3654** Regulation of ecdysteroid biosynthesis and action in the desert locust, *Schistocerca gregaria*. **Cynthia Lenaerts** (cynthia.lenaerts@bio.kuleuven.be), Elisabeth Marchal, Pieter Van Wielendaele, Paulien Peeters, Dorien Cools, Jolien Palmans, and Jozef Vanden Broeck, Catholic Univ., Leuven, Belgium
- 3:00 BREAK**
- 3:15 **3655** Morphology of the female reproductive system and physiological age-grading of *Megamelus scutellaris* (Hemiptera: Delphacidae), a biological control agent of water hyacinth. **Michael Grodowitz** (michael.grodowitz@ars.usda.gov)<sup>1</sup>, Elizabeth Mattison<sup>2</sup>, Ted Center<sup>3</sup>, and Philip Tipping<sup>2</sup>, <sup>1</sup>USDA - ARS, Stoneville, MS, <sup>2</sup>USDA - ARS, Ft. Lauderdale, FL, <sup>3</sup>USDA - ARS (Retired), Ft. Lauderdale, FL
- 3:30 **3656** Metabolomic and lipidomic insights into photoperiodically induced diapause in the green-veined white (*Pieris napi*). **Philipp Lehmann** (philipp.lehmann@zoologi.su.se)<sup>1</sup>, Karl Gotthard<sup>1</sup>, Vladimir Kostal<sup>2</sup>, Sören Nylin<sup>1</sup>, Peter Pruißscher<sup>1</sup>, and Christopher Wheat<sup>1</sup>, <sup>1</sup>Stockholm Univ., Stockholm, Sweden, <sup>2</sup>Czech Academy of Sciences, České Budějovice, Czech Republic

- 3:45 **3657** Presentation withdrawn
- 4:00 **3658** Neurobiology of self-defense: Multiple nerves and identified neurons control the defense glands of stick insects. Konrad Stolz, Christoph-Rüdiger von Bredow, Yvette von Bredow, Reinhard Lakes-Harlan, Tina Trenczek, and **Johannes Strauss** (johannes.strauss@physzool.bio.uni-giessen.de), Justus Liebig Univ., Gießen, Germany
- 4:15 **3659** *DINeR* – A Database for Insect Neuropeptide Research. **Aniruddha Pandit** (aniruddha.pandit@glasgow.ac.uk), Joseph Yeoh, Shireen Davies, and Julian Dow, Univ. of Glasgow, Glasgow, United Kingdom
- 4:30 **3660** Function of lateral cell cluster projection neurons in moth olfactory processing. **Neil J. Vickers** (n.vickers@utah.edu)<sup>1</sup>, Christine Fogarty-Celestino<sup>2</sup>, Seong-Gyu Lee<sup>1</sup>, Christoph Kleineidam<sup>3</sup>, and Jeffrey Stagg<sup>1</sup>, <sup>1</sup>Univ. of Utah, Salt Lake City, UT, <sup>2</sup>Juan Diego Catholic High School, Draper, UT, <sup>3</sup>Univ. of Konstanz, Konstanz, Germany
- 4:45 **3661** Role of octopamine in control of foregut contraction in the black field cricket (*Teleogryllus commodus*) and the Australian plague locust (*Chortoicetes terminifera*). **Paul D. Cooper** (paul.cooper@anu.edu.au)<sup>1</sup> and James Woodman<sup>2</sup>, <sup>1</sup>The Australian National Univ., Canberra, Australia, <sup>2</sup>Australian Government Dept. of Agriculture, Canberra, Australia
- 5:00 **3662** The physiological-developmental mechanisms regulating metamorphosis in solitary bees. **Bryan Helm** (bryan.r.helm@ndsu.edu)<sup>1</sup>, Joseph P. Rinehart<sup>2</sup>, George Yocum<sup>2</sup>, Kendra Greenlee<sup>1</sup>, and Julia Bowsher<sup>1</sup>, <sup>1</sup>North Dakota State Univ., Fargo, ND, <sup>2</sup>USDA - ARS, Fargo, ND

### Contributed Papers: Physiology and Biochemistry: Toxicology, Metabolism, and Nutrition

#### Room W223 B (Convention Center)

**Moderators:** Juliana Rangel Posada<sup>1</sup> and Rebecca Clark<sup>2</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Univ. of California, Berkeley, CA

- 1:30 **3663** Antioxidative enzyme expression in honey bee (*Apis mellifera*) queens as an assessment of reproductive quality. **Alejandra Gonzalez** (alejandracula@tamu.edu) and Juliana Rangel Posada, Texas A&M Univ., College Station, TX
- 1:45 **3664** Tissue nonautonomous effects of fat body methionine metabolism on epithelial repair in *Drosophila melanogaster*. **Fumiaki Obata** (fumiaki.obata@crick.ac.uk)<sup>1,2</sup>, Soshiro Kashio<sup>2</sup>, Liu Zhang<sup>2</sup>, Tomonori Katsuyama<sup>2,3</sup>, Takahiro Chihara<sup>2,3</sup>, and Masayuki Miura<sup>2,3</sup>, <sup>1</sup>The Francis Crick Institute, London, United Kingdom, <sup>2</sup>The Univ. of Tokyo, Tokyo, Japan, <sup>3</sup>Agency for Medical Research and Development, Tokyo, Japan
- 2:00 **3665** Dietary rescue of phenotype: You are what you eat. **Margaret Allen** (meg.allen@ars.usda.gov), USDA - ARS, Stoneville, MS



- 2:15 **3666** Characterization of two venom peptides of social wasp *Parapolybia varia*. **Kyungjae Yoon** (kongbob89@snu.ac.kr)<sup>1</sup>, Kyungmun Kim<sup>1</sup>, A-Young Kim<sup>2</sup>, Woo Young Bang<sup>3</sup>, Changmu Kim<sup>3</sup>, Joo-Hong Yeo<sup>3</sup>, Young Ho Koh<sup>4</sup>, and Si Hyeock Lee<sup>1</sup>, <sup>1</sup>Seoul National Univ., Seoul, South Korea, <sup>2</sup>Hallym Univ., Anyang, South Korea, <sup>3</sup>National Institute of Biological Resources, Incheon, South Korea, <sup>4</sup>Hallym Univ., Chuncheon, South Korea
- 2:30 **3667** The GPCR/G-protein/Adenylyl Cyclase/Protein Kinase A pathway in insecticide resistance of the mosquito *Culex quinquefasciatus*. **Ting Li** (litingwinner@gmail.com) and Nannan Liu, Auburn Univ., Auburn, AL
- 2:45 **3668** Nutrition physiology of the pear psylla, *Cacopsylla pyri*. **Guillaume Le Goff** (guillaume.legoff@uclouvain.be)<sup>1</sup>, Olivier Lebbe<sup>1</sup>, Gertrude Lohaus<sup>2</sup>, Aurore Richel<sup>3</sup>, Nicolas Jacquet<sup>3</sup>, Virginie Byttebier<sup>3</sup>, and Thierry Hance<sup>1</sup>, <sup>1</sup>Catholic Univ. of Louvain, Louvain-la-Neuve, Belgium, <sup>2</sup>Bergische Univ., Wuppertal, Germany, <sup>3</sup>Univ. of Liège, Gembloux, Belgium
- 3:00 BREAK**
- 3:15 **3669** Mechanisms of spinosad resistance in European populations of the tomato leafminer. Madeleine Berger<sup>1</sup>, Mirel Puinean<sup>1</sup>, Pablo Bielza<sup>2</sup>, Rob Jacobson<sup>3</sup>, Lin Field<sup>1</sup>, Chris Bass<sup>4</sup>, and **Martin Williamson** (martin.williamson@rothamsted.ac.uk)<sup>1</sup>, <sup>1</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>2</sup>Polytechnic Univ. Cartagena, Spain, <sup>3</sup>RJC, Ltd., Yorkshire, United Kingdom, <sup>4</sup>Univ. of Exeter, Penryn, United Kingdom
- 3:30 **3670** Food protein-carbohydrate content influences amino acid metabolism in the wing-dimorphic cricket *Gryllus firmus*. **Rebecca Clark** (r11clark@gmail.com)<sup>1</sup>, Spencer T. Behmer<sup>2</sup>, and Anthony J. Zera<sup>3</sup>, <sup>1</sup>Univ. of California, Berkeley, CA, <sup>2</sup>Texas A&M Univ., College Station, TX, <sup>3</sup>Univ. of Nebraska, Lincoln, NE
- 3:45 **3671** A novel protein active from a *Pseudomonas* strain with unique mode of action against western corn rootworm, *Diabrotica virgifera virgifera* (LeConte). Nuria Jiménez-Juárez<sup>1</sup>, **Mark Nelson** (mark.e.nelson@pioneer.com)<sup>1</sup>, Jarred Oral<sup>2</sup>, Lu Liu<sup>2</sup>, Gusui Wu<sup>3</sup>, Priyesh Patel<sup>1</sup>, Claudia Pérez-Ortega<sup>1</sup>, and Ute Schellenberger<sup>2,4</sup>, <sup>1</sup>DuPont Pioneer, Wilmington, DE, <sup>2</sup>DuPont Pioneer, Hayward, CA, <sup>3</sup>DuPont Pioneer, Johnston, IA, <sup>4</sup>OMT Therapeutics, Palo Alto, CA
- 4:00 **3672** Metabolic mechanisms mediating the miserable months: Metabolomics of periodic arousal in insect diapause. **Chao Chen** (chaochenjxau@126.com), Nicholas M. Teets, Thomas Powell, and Daniel Hahn, Univ. of Florida, Gainesville, FL
- 4:15 **3673** The structure, transcriptional regulation, and function of *Helicoverpa armigera* sterol carrier protein-2, an important insecticidal target from the cotton bollworm. **Rong Peng** (pengrong@mail.ccnu.edu.cn), Central China Normal Univ., Wuhan, China

- 4:30 **3674** Expressing a moth ABC2 gene in transgenic *Drosophila* causes Bt Cry1Ac susceptibility without requiring a cadherin-like protein receptor. **Simon Baxter** (simon.baxter@adelaide.edu.au), Tristan Stevens, and Sisi Song, Univ. of Adelaide, Adelaide, Australia
- 4:45 **3675** Identification of a Cry2Ab receptor in four Lepidoptera. **John Mathis** (john.mathis@pioneer.com)<sup>1</sup>, Catherine Finke<sup>1</sup>, James Becker<sup>1</sup>, and Mark Nelson<sup>2</sup>, <sup>1</sup>DuPont Pioneer, Johnston, IA, <sup>2</sup>DuPont Pioneer, Wilmington, DE
- 5:00 **3676** Studies on locomotory behaviour of susceptible and insecticide-resistant populations of *Plutella xylostella* (Linnaeus). **Anureet Chandi** (anureetchandi@pau.edu), Punjab Agricultural Univ., Ludhiana, India

## Contributed Papers: Biological Control and Insect Pathology: Utilizing Parasitoid Wasps II

### Room W224 G (Convention Center)

- Moderators:** Md. Habibullah Bahar<sup>1</sup>, Thierry Hance<sup>2</sup>, and Maryam Yazdani<sup>3</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, Saskatoon, SK, Canada, <sup>2</sup>Catholic Univ. of Louvain, Louvain-la-Neuve, Belgium, <sup>3</sup>Univ. of Adelaide, Adelaide, Australia
- 3:30 **3677** Larval interspecific competition influences adult behaviour of two aphid parasitoids: *Aphidius rhopalosiphi* and *Aphidius ervi* (Hymenoptera: Aphidiinae). **Thierry Hance** (thierry.hance@uclouvain.be) and Isabelle Frère, Catholic Univ. of Louvain, Louvain-la-Neuve, Belgium
- 3:45 **3678** Comparison of two release methods for establishing *Oobius agrili* (Hymenoptera: Encyrtidae), the introduced egg parasitoid of *Agrilus planipennis* (Coleoptera: Buprestidae), in Michigan. **Toby R. Petrice** (tpetrice@fs.fed.us)<sup>1,2</sup>, Forrest Ravlin<sup>2</sup>, Leah S. Bauer<sup>1</sup>, Therese Poland<sup>1</sup>, Kenneth Raffa<sup>3</sup>, and Deborah G. McCullough<sup>2</sup>, <sup>1</sup>USDA - Forest Service, Lansing, MI, <sup>2</sup>Michigan State Univ., East Lansing, MI, <sup>3</sup>Univ. of Wisconsin, Madison, WI
- 4:00 **3679** *Dolichogenidea tasmanica* (Hymenoptera: Braconidae) as a potential biocontrol agent of light brown apple moth (LBAM), *Epiphyas postvittana* (Lepidoptera: Tortricidae). **Maryam Yazdani** (maryam.yazdani@adelaide.edu.au) and Michael Keller, Univ. of Adelaide, Adelaide, Australia
- 4:15 **3680** Potential use of factitious and artificial hosts for mass rearing *Trichogramma* sp. in different countries. **Jureerat Rattanatip** (jureerat.rattanatip@uclouvain.be)<sup>1</sup>, Gregory Sempo<sup>2</sup>, and Thierry Hance<sup>1</sup>, <sup>1</sup>Catholic Univ. of Louvain, Louvain-la-Neuve, Belgium, <sup>2</sup>Free Univ. of Brussels, Brussels, Belgium
- 4:30 **3681** A three-year field study on the biological control of diamondback moth (*Plutella xylostella*) in Saskatchewan, Canada. **Md. Habibullah Bahar** (bablu91@yahoo.com)<sup>1,2</sup>, Juliana J. Soroka<sup>2</sup>, Owen Olfert<sup>2</sup>, and Chrystel Olivier<sup>2</sup>, <sup>1</sup>AgQuest (Alta), Inc., Taber, AB, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Saskatoon, SK, Canada



- 4:45 **3682** Parasitism rate, functional response, and preference of the endoparasitoid *Camponotus pennsylvanicus* (Cameron, 1886) to native and invasive hosts. **Henry Murillo** (hmp6@alu.ua.es)<sup>1</sup>, Maria Angeles Marcos<sup>1</sup> and Sherah VanLaerhoven<sup>2</sup>, <sup>1</sup>Univ. of Alicante, San Vicente del Raspeig, Spain, <sup>2</sup>Univ. of Windsor, Windsor, ON, Canada
- 5:00 **3683** Biological characteristics and adaptability of larval parasitoids associated with *Liriomyza huidobrensis* (Blanchard) (Diptera: Agromyzidae) in exploiting their host. **I. Wayan Supartha** (yansupartha@yahoo.com), Univ. of Udayana, Denpasar, Indonesia

Thursday, September 29, 2016 • Evening

Wigglesworth Memorial Lecture Award  
Featuring Dr. John G. Hildebrand

Chapin Theater (Convention Center)

**Moderators and Organizers:** Walter S. Leal<sup>1</sup>, Alvin M. Simmons<sup>2</sup>, and John Pickett<sup>3</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>USDA - ARS, Charleston, SC, <sup>3</sup>Rothamsted Research, Harpenden, United Kingdom

6:00 **3684** Introduction. **John Pickett** (john.pickett@rothamsted.ac.uk), Rothamsted Research, Harpenden, United Kingdom

6:05 **3685** How insects smell, and why we should care. **John Hildebrand** (jhildebr@email.arizona.edu), Univ. of Arizona, Tucson, AZ

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## Friday, September 30, 2016 • Morning

## Plenary Presentation Featuring Dr. Fred Gould

## Chapin Theater (Convention Center)

**Moderators and Organizers:** Walter S. Leal<sup>1</sup>, Alvin M. Simmons<sup>2</sup>, and May R. Berenbaum<sup>3</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>USDA - ARS, Charleston, SC, <sup>3</sup>Univ. of Illinois, Champaign, IL

- 8:00 **3686** Introduction of the Plenary Speaker.  
**May R. Berenbaum** (maybe@illinois.edu), Univ. of Illinois, Champaign, IL
- 8:05 **3687** Will genetically engineered pests protect health, biodiversity, and crop production? **Fred Gould** (fred\_gould@ncsu.edu), North Carolina State Univ., Raleigh, NC

## Plenary Presentation Featuring Dr. John A. Pickett

## Valencia Room (Convention Center)

**Moderators and Organizers:** Walter S. Leal<sup>1</sup>, Alvin M. Simmons<sup>2</sup>, and James Tumlinson<sup>3</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>USDA - ARS, Charleston, SC, <sup>3</sup>Pennsylvania State Univ., University Park, PA

- 8:00 **3688** Introduction of the Plenary Speaker.  
**James Tumlinson** (jht2@psu.edu), Pennsylvania State Univ., University Park, PA
- 8:05 **3689** Agro-ecological manipulation of insect behaviour shows how to exploit signaling between insects and their hosts via GM. **John Pickett** (john.pickett@rothamstead.ac.uk)<sup>1</sup> and Zeyaur Khan<sup>2</sup>, <sup>1</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>2</sup>International Centre of Insect Physiology and Ecology, Nairobi, Kenya

## Poster Session 4: Agriculture and Forest Entomology, Part 2

## West Hall C (Convention Center)

- D3738** Odor differences between brown rice plant hopper and health rice plant based on electronic nose. **Zhou Zhiyan** (zyzhou@scau.edu.cn), South China Agricultural Univ., Guangzhou, China
- D3739** Fresh market green bean protection in Egypt's upper Nile Valley: The USAID feed the future farmer to farmer initiative. **Thomas Anderson** (tom@entoniche.com)<sup>1</sup> and Henry Van T. Cotter<sup>2</sup>, <sup>1</sup>Entoniche Consulting LLC, Clayton, NC, <sup>2</sup>North Carolina State Univ., Raleigh, NC
- D3740** Flight parameters and the nutritive requirements for flight of *Drosophila suzukii*. **Jessica Wong** (wongjes@oregonstate.edu)<sup>1</sup>, Adam Cave<sup>2</sup>, and Jana Lee<sup>2</sup>, <sup>1</sup>Oregon State Univ., Corvallis, OR, <sup>2</sup>USDA - ARS, Corvallis, OR
- D3741** Relationship among strain of *Bacillus thuringiensis*, tannic acid and mid-gut protease with *Spodoptera exigua*. **Na-Young Jin** (dool12340@nate.com), You-Kyoung Lee, Yu-Seop Kim, Jun-Hack Jeon, Bo-Ram Lee, Hee Ji Kim, Young-Nam Youn, and Yong-Man Yu, Chungnam National Univ., Daejeon, South Korea
- D3742** Parasitism of silk moths by the tachinid *Compsilura concinnata* along forest compositional gradients. **Rea Manderino** (rmanderi@syr.edu)<sup>1</sup>, Patrick Tobin<sup>2</sup>, and Dylan Parry<sup>1</sup>, <sup>1</sup>State Univ. of New York, Syracuse, NY, <sup>2</sup>Univ. of Washington, Seattle, WA
- D3743** Tree-crop agroforestry systems promote natural control of the millet head miner, *Heliocheilus albipunctella*. **Thierry Brévault** (thierry.brevault@cirad.fr)<sup>1,2</sup>, Ahmadou Sow<sup>2,3</sup>, Ibrahima Thiaw<sup>4,5</sup>, Gérard Delvare<sup>1</sup>, and Valérie Soti<sup>1,4</sup>, <sup>1</sup>CIRAD, Montpellier, France, <sup>2</sup>BIOPASS, Dakar, Senegal, <sup>3</sup>Univ. Cheikh Anta Diop, Dakar, Senegal, <sup>4</sup>Center of Ecological Monitoring, Dakar, Senegal, <sup>5</sup>Gaston Berger Univ., Saint Louis, Senegal
- D3744** Acute toxicity of botanochemicals thymol and ginger oil against paddy leaf folder *Cnaphalocrocis medinalis* (Guenee) (Lepidoptera: Pyralidae). **Ayyasamy Regupathy** (ayyasamy.regu@gmail.com) and M. Sivasankari, Annamalai Univ., Chidambaram, India
- D3745** Effect of *Beauveria bassiana* Vuill. on nymphs of *Thaumastocoris peregrinus*. **Flávio Cechim** (flaviera@gmail.com)<sup>1</sup>, Raquel Ribeiro<sup>2</sup>, Sidinei Dallacort<sup>3</sup>, Flavia Tedesco<sup>3</sup>, Everton Lozano<sup>3</sup>, and Michele Potrich<sup>3</sup>, <sup>1</sup>Federal Institute of Paraná, Campus Quedas do Iguaçu, QuedassdosIguaçu, PR, Brazil, <sup>2</sup>Federal Univ. of Technology of Paraná, Pato Branco, Brazil, <sup>3</sup>Federal Univ. of Technology of Paraná, Dois Vizinhos, Brazil
- D3746** Indoor-rearing conditions of the fungus gnat, *Bradysia agrestis* (Diptera: Sciaridae), and their mortalities against several insecticides. **Hyun Ju Jang** (jangheunju@naver.com), Yong-Man Yu, and Young-Nam Youn, Chungnam National Univ., Daejeon, South Korea
- D3747** X-ray irradiation as a quarantine treatment for the control of six insect pests in cut flower boxes. **Wooseong Cho** (whiteckh916@naver.com)<sup>1</sup>, Hyun-Na Koo<sup>1</sup>, Seung-Hwan Yun<sup>1</sup>, Wonjin Kang<sup>1</sup>, Hyun Kyung Kim<sup>1</sup>, Jeong Oh Yang<sup>2</sup>, and Gil-Hah Kim<sup>1</sup>, <sup>1</sup>Chungbuk National Univ., Cheongju, South Korea, <sup>2</sup>Animal and Plant Quarantine Agency, Suwon, South Korea
- D3748** Eradication of the sweetpotato weevil, *Cylas formicarius* (Coleoptera: Curculionidae), from Kume Island, Okinawa, Japan by using a combination of the sterile insect technique and the male annihilation technique. **Dai Haraguchi** (hrguchid@pref.okinawa.lg.jp)<sup>1</sup>, Takashi Matsuyama<sup>2</sup>, Yasutsune Sadoyama<sup>2</sup>, Tsuguo Kohama<sup>1</sup>, Kunio Kinjo<sup>1</sup>, Norikuni Kumano<sup>3</sup>, Keiko Ohno-Shiromoto<sup>4</sup>, and Takashi Kuriwada<sup>5</sup>, <sup>1</sup>Okinawa Prefectural Agricultural Research Center, Itoman, Japan, <sup>2</sup>Okinawa Prefectural Plant Protection Center, Naha, Japan, <sup>3</sup>Obihiro Univ. of Agriculture and Veterinary Medicine, Obihiro, Japan, <sup>4</sup>Ryukyus-Sankei Co., Ltd., Naha, Japan, <sup>5</sup>Kagoshima Univ., Kagoshima, Japan
- D3749** Pest control effects according to low spray volume of pesticide in apple orchard. **Yong-Man Yu** (ymyu@cnu.ac.kr), Na-Young Jin, You-Kyoung Lee, Yu-Seop Kim, Jun-Hack Jeon, Bo-Ram Lee, Hee Ji Kim, and Young-Nam Youn, Chungnam National Univ., Daejeon, South Korea



- D3750** Fastac® CS Insecticide: Alpha-cypermethrin in an innovative formulation. **Daniel O'Byrne** (daniel.obyrne@basf.com)<sup>1</sup>, Rebecca Willis<sup>1</sup>, Christa Eilers-Kirk<sup>1</sup>, Rianna Guethling<sup>1</sup>, Claude Taranta<sup>2</sup>, Siddharth Tiwari<sup>1</sup>, and Richard Tyler<sup>1</sup>, <sup>1</sup>BASF, Research Triangle Park, NC, <sup>2</sup>BASF, Limburgerhof, Germany
- D3751** *Delia* species (Diptera: Anthomyiidae) and chlorpyrifos-resistance survey in brassica vegetable growing areas in Canada. **Josée Owen** (josee.owen@agr.gc.ca)<sup>1</sup>, Peggy Dixon<sup>2</sup>, Bob Vernon<sup>3</sup>, Renee Prasad<sup>4</sup>, and Ian Scott<sup>5</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, Fredericton, NB, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, St. John's, NF, Canada, <sup>3</sup>Agriculture and Agri-Food Canada, Agassiz, BC, Canada, <sup>4</sup>E.S. Cropconsult, Ltd., Surrey, BC, Canada, <sup>5</sup>Agriculture and Agri-Food Canada, London, ON, Canada
- D3752** Control of southern fire ant, *Solenopsis xyloni*, in tree nuts with Altrevin™ fire ant bait insecticide. **Anna Chapman** (anna.chapman@basf.com)<sup>1</sup>, H. Alejandro Arevalo<sup>2</sup>, and Doug Haller<sup>1</sup>, <sup>1</sup>BASF, Durham, NC, <sup>2</sup>BASF, Research Triangle Park, NC
- D3753** Presentation withdrawn
- D3754** Effect of tobacco thrips on yield in different varieties of upland cotton. F. Bourland<sup>1</sup>, **Glenn Studebaker** (gstudebaker@uaex.edu)<sup>2</sup> and Logan Towles<sup>1</sup>, <sup>1</sup>Univ. of Arkansas, Keiser, AR, <sup>2</sup>Univ. of Arkansas Cooperative Extension Service, Keiser, AR
- D3755** Screening new genotypes of St. Augustine grass for resistance to southern chinch bug (Hemiptera: Blissidae). **Nicole B. Benda** (nbenda@ufl.edu), Kevin Kenworthy, and Kenneth Quesenberry, Univ. of Florida, Gainesville, FL
- D3756** Expression of host plant resistance in melon to sweetpotato whitefly in the desert southwest United States. **Eric Natwick** (etnatwick@ucanr.edu)<sup>1</sup>, James McCreight<sup>2</sup>, and William Wintermantel<sup>2</sup>, <sup>1</sup>Univ. of California Cooperative Extension, Holtville, CA, <sup>2</sup>USDA - ARS, Salinas, CA
- D3757** Development and use of LED traps for monitoring the southern green stink bug, *Nezara viridula* (Heteroptera: Pentatomidae). **Nobuyuki Endo** (enobu@affrc.go.jp)<sup>1</sup> and Mantaro Hironaka<sup>2</sup>, <sup>1</sup>NARO Kyushu Okinawa Agricultural Research Center, Koshi, Japan, <sup>2</sup>Hamamatsu Univ. School of Medicine, Shizuoka, Japan
- D3758** Research on the occurrence and attraction traps development of *Chilo suppressalis* (Walker) in the bioenergy crop *Miscanthus sacchariflorus* cv. Geodae 1 in Korea. **Nakjung Choi** (njchoi@korea.kr) and June-Yeol Choi, National Institute of Crop Science, Wanju, South Korea
- D3759** The United Kingdom suction trap network – a potential early warning system for the presence of new pests and diseases. **Fiona Highet** (fiona.highet@sasa.gsi.gov.uk)<sup>1</sup>, Mairi Carnegie<sup>1</sup>, Maria Sjölund<sup>1</sup>, Adrian Roberts<sup>2</sup>, James Bell<sup>3</sup>, and Jon Pickup<sup>1</sup>, <sup>1</sup>Science and Advice for Scottish Agriculture, Edinburgh, United Kingdom, <sup>2</sup>Biomathematics & Statistics Scotland, Edinburgh, Scotland, <sup>3</sup>Rothamsted Research, Harpenden, United Kingdom
- D3760** A binary (pheromone-host plant volatile) lure combined with acetic acid could enhance bisexual monitoring of codling moth (Lepidoptera: Tortricidae). **Esteban Basoalto** (esteban.basoalto@uach.cl)<sup>1</sup>, Valentina Mujica<sup>2</sup>, Liliana Cichón<sup>3</sup>, Eduardo Fuentes-Contreras<sup>4</sup>, Wilson Barros-Parada<sup>4</sup>, and Alan L. Knight<sup>5</sup>, <sup>1</sup>Univ. Austral, Valdivia, Chile, <sup>2</sup>National Institute of Agricultural Research, Rincón del Colorado, Uruguay, <sup>3</sup>INTA, General Roca, Argentina, <sup>4</sup>Univ. of Talca, Talca, Chile, <sup>5</sup>USDA - ARS, Wapato, WA
- D3761** Monitoring, forecasting, and risk warning systems for field crop insects for the Canadian prairie ecoregion. **Jennifer Otani** (jennifer.otani@agr.gc.ca)<sup>1</sup>, Scott Meers<sup>2</sup>, Scott Hartley<sup>3</sup>, John Gavloski<sup>4</sup>, and Owen Olfert<sup>5</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, Beaverlodge, AB, Canada, <sup>2</sup>Alberta Agriculture and Rural Development, Brooks, AB, Canada, <sup>3</sup>Saskatchewan Agriculture, Regina, SK, Canada, <sup>4</sup>Manitoba Agriculture, Food and Rural Initiatives, Carman, MB, Canada, <sup>5</sup>Agriculture and Agri-Food Canada, Saskatoon, SK, Canada
- D3762** Influence of fire on ambrosia beetles (Curculionidae, Scolytinae and Platypodinae) in rubber tree plantations (*Hevea brasiliensis*) in southern Brazil. **Gabriela Pinheiro** (gabrielac.pinheiro95@gmail.com) and Carlos Flechtmann, São Paulo State Univ., Ilha Solteira, Brazil
- D3763** Flight response of the California fivespined ips, *Ips paraconfusus* Lanier (Coleoptera: Curculionidae), to lure treatments. **Todd Murray** (tmurray@wsu.edu)<sup>1</sup>, Nicholas C. Aflitto<sup>2</sup>, Elizabeth A. Willhite<sup>3</sup>, and David Wakarchuk<sup>4</sup>, <sup>1</sup>Washington State Univ., Stevenson, WA, <sup>2</sup>Cornell Univ., Ithaca, NY, <sup>3</sup>USDA - Forest Service, Sandy, OR, <sup>4</sup>Synergy Semiochemicals Corp, Burnaby, BC, Canada
- D3764** Conditional decisions to stay or disperse in cooperatively breeding beetles. **Jon Andreja Nuotclà** (jon.nuotcla@iee.unibe.ch) and Michael Taborsky, Univ. of Bern, Bern, Switzerland
- D3765** Damage of bark beetles on the establishment of radiata pine can be reduced through ethological control. **Miguel Angel Poisson** (mpoisson@arauco.cl), Rodrigo Ahumada, and Hernán Martínez, Bioforest S.A., Coronel, Chile
- D3766** Presentation withdrawn
- D3767** Microbial associates of the eusocial ambrosia beetle *Austroplatypus incompertus*. **Robert Mueller** (r.mueller@westernsydney.edu.au), Shannon Smith, and Markus Riegler, Western Sydney Univ., Richmond, Australia
- D3768** Landing rate of the walnut twig beetle, *Pityophthorus juglandis*, on two western North American walnut species, *Juglans californica* and *J. major*. **Irene Lona** (ilonal@mail.csuchico.edu)<sup>1</sup>, Donald Miller<sup>1</sup>, Colleen Hatfield<sup>1</sup>, Richard Rosecrance<sup>1</sup>, and Steven Seybold<sup>2</sup>, <sup>1</sup>California State Univ., Chico, CA, <sup>2</sup>USDA - Forest Service, Davis, CA



- D3769** Gypsy moth (*Lymantria dispar* L.) mtDNA phylogeography in forests of Europe, a base to monitor the migration of potentially dangerous populations. **Nikola Lackovic** (nikolal@sumins.hr)<sup>1</sup>, Dimitrios Avtzis<sup>2</sup>, Milan Pernek<sup>1</sup>, Damjan Franjevic<sup>3</sup>, Andreas Linde<sup>4</sup>, and Christian Stauffer<sup>5</sup>, <sup>1</sup>Croatian Forest Research Institute, Jastrebarsko, Croatia, <sup>2</sup>Forest Research Institute, Thessaloniki, Greece, <sup>3</sup>Univ. of Zagreb, Zagreb, Croatia, <sup>4</sup>Univ. of Applied Sciences, Eberswalde, Germany, <sup>5</sup>Univ. of Natural Resources & Applied Life Sciences, Vienna, Austria
- D3770** An accurate detection of *Bursaphelenchus xylophilus* and *B. mucronatus*, caused by pine wilt disease, by Multiplex PCR using species-specific primers from *Monochamus alternatus* and *M. saltuarius* insect vectors. **Chansik Jung** (csjung@korea.kr), Myeong Jin Jang, Sang-Tae Seo, Sun Keun Lee, and Kwang Sik Choi, National Institute of Forest Science, Seoul, South Korea
- D3771** A systems approach towards understanding the underlying molecular and physiological biology of the large pine weevil (*Hylobius abietis*) through transcriptomic analyses. Joseph Yeoh<sup>1</sup>, Richard Marley<sup>1</sup>, Daegan Inward<sup>2</sup>, **Anthony Dornan** (anthony.dornan@glasgow.ac.uk)<sup>1</sup>, Shireen Davies<sup>1</sup>, and Julian Dow<sup>1</sup>, <sup>1</sup>Univ. of Glasgow, Glasgow, United Kingdom, <sup>2</sup>Forest Research, Farnham, United Kingdom
- D3772** Comparison of different pheromone traps for the capture of adults of the processionary pine moth, *Thaumetopoea pityocampa* (Denis and Schiffermüller) (Lepidoptera: Thaumetopoeidae), and assessment of its control with mating disruption. Christos Athanassiou<sup>1</sup>, Nickolas Kavallieratos<sup>2</sup>, **Dimitris Kontodimas** (d.kontodimas@bpi.gr)<sup>3</sup>, Maria Boukouvala<sup>4</sup>, Anastassia Nikolaidou<sup>1</sup>, Dimitra Markoyiannaki Printziou<sup>5</sup>, Pasquale Trematerra<sup>6</sup>, Marco Colacci<sup>6</sup>, David Pardo Talavera<sup>7</sup>, Jose Sancho Sanchez<sup>8</sup>, and Santiago Galvez Settler<sup>8</sup>, <sup>1</sup>Univ. of Thessaly, Nea Ionia, Greece, <sup>2</sup>Agricultural Univ. of Athens, Attica, Greece, <sup>3</sup>Benaki Phytopathological Institute, Athens, Greece, <sup>4</sup>Agricultural Univ. of Athens, Athens, Greece, <sup>5</sup>Benaki Phytopathological Institute, Kifissia, Greece, <sup>6</sup>Univ. of Molise, Campobasso, Italy, <sup>7</sup>Sansan Prodesing S.L., Valencia, Spain, <sup>8</sup>Technological Institute of Plastics, Valencia, Spain
- D3773** Interception strategies for managing ambrosia beetles (Coleoptera: Curculionidae) in tree nurseries. **Michael Reding** (mike.reding@ars.usda.gov)<sup>1</sup>, Christopher Ranger<sup>1</sup>, Peter B. Schultz<sup>2</sup>, and Jason B. Oliver<sup>3</sup>, <sup>1</sup>USDA - ARS, Wooster, OH, <sup>2</sup>Virginia Polytechnic Institute and State Univ., Virginia Beach, VA, <sup>3</sup>Tennessee State Univ., McMinnville, TN
- D3774** Developing and improving survey methods for emerald ash borer and other woodboring beetles. **Joseph Francese** (joe.francese@aphis.usda.gov)<sup>1</sup>, Benjamin Sorensen<sup>2</sup>, Nadeer Youssef<sup>3</sup>, Vanessa Lopez<sup>4</sup>, Jacek Hilszczański<sup>5</sup>, Jason B. Oliver<sup>3</sup>, and David Lance<sup>1</sup>, <sup>1</sup>USDA - APHIS, Buzzards Bay, MA, <sup>2</sup>USDA - APHIS, Brighton, MI, <sup>3</sup>Tennessee State Univ., McMinnville, TN, <sup>4</sup>Xavier Univ., Cincinnati, OH, <sup>5</sup>Forest Research Institute, Raszyn, Poland
- D3775** Buprestid and cerambycid trapping: The progression of 13 years of trapping. **Nadeer Youssef** (nyoussef@blomand.net)<sup>1</sup>, Jason B. Oliver<sup>1</sup>, Donna Fare<sup>2</sup>, William Klingeman<sup>3</sup>, Joseph Francese<sup>4</sup>, Joshua P. Basham<sup>1</sup>, Joseph Lampley<sup>1</sup>, Debbie Eskandarnia<sup>1</sup>, and Garrett Roper<sup>1</sup>, <sup>1</sup>Tennessee State Univ., McMinnville, TN, <sup>2</sup>U.S. National Arboretum, McMinnville, TN, <sup>3</sup>Univ. of Tennessee, Knoxville, TN, <sup>4</sup>USDA - APHIS, Buzzards Bay, MA
- D3776** Trapping forest Coleoptera: What works best? **Richard Redak** (richard.redak@ucr.edu)<sup>1</sup> and Jeremy Allison<sup>2</sup>, <sup>1</sup>Univ. of California, Riverside, CA, <sup>2</sup>Natural Resources Canada, Sault Ste. Marie, ON, Canada
- D3777** Walnut twig beetle trapping yields insights for monitoring secondary pest Scolytinae in Tennessee. **William Klingeman** (wklingem@utk.edu)<sup>1</sup>, Alicia Bray<sup>2</sup>, Jason B. Oliver<sup>3</sup>, Christopher Ranger<sup>4</sup>, and Debra Palmquist<sup>5</sup>, <sup>1</sup>Univ. of Tennessee, Knoxville, TN, <sup>2</sup>Central Connecticut State Univ., New Britain, CT, <sup>3</sup>Tennessee State Univ., McMinnville, TN, <sup>4</sup>USDA - ARS, Wooster, OH, <sup>5</sup>USDA - ARS, Peoria, IL
- D3778** A 10-year evaluation of intellectual property in entomology. **Ronda L. Hamm** (rlhamm@dow.com) and Anne Gregg, Dow AgroSciences, Indianapolis, IN
- D3779** Diterpene resin acids in conifer interfere with insect juvenile hormone-mediated gene regulation in *Tribolium castaneum* and development in *Plodia interpunctella*. **Chan-Seok Yun** (godddung@kribb.re.kr)<sup>1</sup>, Alexander Raikhel<sup>2</sup>, Hyun-Woo Oh<sup>1</sup>, Doo-Sang Park<sup>1</sup>, Jun Hyoung Jeon<sup>1</sup>, and Sang Woon Shin<sup>2</sup>, <sup>1</sup>Korea Research Institute of Bioscience and Biotechnology, Daejeon, South Korea, <sup>2</sup>Univ. of California, Riverside, CA
- D3780** Agroforestry coffee system with rainforest alliance certification and insect biodiversity in Villa Rica, Peru. **Alfonso Lizárraga** (alizarraga@cientifica.edu.pe), Scientific Univ. of the South, Lima, Peru
- D3781** Forest Stewardship Council (FSC) pesticides policy and integrated pest management in certified plantations in Brazil. **Pedro Lemes** (pedroglemes@hotmail.com)<sup>1</sup>, José Zanuncio<sup>2</sup>, José Eduardo Serrão<sup>2</sup>, and Simon Lawson<sup>3</sup>, <sup>1</sup>Federal Univ. of Minas Gerais, Montes Claros, Brazil, <sup>2</sup>Federal Univ. of Viçosa, Viçosa, Brazil, <sup>3</sup>Univ. of the Sunshine Coast, Sippy Downs, Australia
- D3782** Arthropod Management Tests: Metamorphosis of an ESA journal. **Jon Babcock** (jmbabcock@dow.com)<sup>1</sup>, Eric Natwick<sup>2</sup>, and Lisa Junker<sup>3</sup>, <sup>1</sup>Dow AgroSciences, Indianapolis, IN, <sup>2</sup>Univ. of California, Holtville, CA, <sup>3</sup>Entomological Society of America, Annapolis, MD
- D3783** Educating the next generation - funding opportunities in food, agricultural, natural resources and human sciences education. **Joyce Parker** (joyce.parker@nifa.usda.gov) and Siva Sureshwaran, USDA - NIFA, Washington, DC
- D3784** eFile: A new web-based platform for United States Department of Agriculture permits. **Wayne F. Wehling** (wayne.f.wehling@aphis.usda.gov), USDA - APHIS, Riverdale, MD



- D3785** Educational impact of NPDP taxonomic training videos. **Ariane McCorquodale** (amccorquodale@ufl.edu) and Amanda C. Hodges, Univ. of Florida, Gainesville, FL
- D3786** 'Walnut Alert', thousand cankers disease, and black walnut: Can outreach crack a tough nut? **Jerome F. Grant** (jgrant@utk.edu)<sup>1</sup>, Frank Hale<sup>2</sup>, Alan Windham<sup>2</sup>, Paris L. Lambdin<sup>1</sup>, Gregory J. Wiggins<sup>1</sup>, and Mark T. Windham<sup>1</sup>, <sup>1</sup>Univ. of Tennessee, Knoxville, TN, <sup>2</sup>Univ. of Tennessee, Nashville, TN
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- Poster Session 4: Apidology, Sericulture, and Social Insects**
- West Hall C (Convention Center)**
- D3787** Comparison of microbial communities in monogynous and polygynous *Solenopsis invicta* colonies by denaturing gradient gel electrophoresis. Charles Apperson, **Nicholas Travanty** (nvtravan@ncsu.edu), and Loganathan Ponnusamy, North Carolina State Univ., Raleigh, NC
- D3788** Evidences of dear enemy phenomenon in a generalist ant species, *Pheidole oxyops* (Hymenoptera: Formicidae). **Diego Santana Assis** (santanaphoenix@gmail.com) and Fabio Nascimento, Univ. of São Paulo, Ribeirão Preto, Brazil
- D3789** Interaction and communication network among nestmates during nestsite selection and migration in *Temnothorax congruus*. **Kazutaka Syoji** (syoji-kazutaka@ed.tmu.ac.jp) and Katuyuki Eguchi, Tokyo Metropolitan Univ., Hachioji, Japan
- D3790** Sharing nutrients of the queen black carpenter ant, *Camponotus japonicus*, between her own somatic maintenance and offspring production. **Naoto Idogawa** (spinyant@gmail.com), Tomoyuki Yokoi, and Mamoru Watanabe, Univ. of Tsukuba, Tsukuba, Japan
- D3791** Inhibiting worker reproduction in a queenless ant, *Dinoponera quadricaps*: The effects of pheromones and physical presence of a gamergate. **Ivelize Tannure-Nascimento** (itannure@uol.com.br) and Fabio Nascimento, Univ. of São Paulo, Ribeirão Preto, Brazil
- D3792** Environmental and spatial heterogeneity effects on information flow in ant colonies: An agent-based model study. **Xiaohui Guo** (biogxh@gmail.com), Yun Kang, and Jennifer H. Fewell, Arizona State Univ., Tempe, AZ
- D3793** The use of translucent larval skin mutants of the silkworm "o06" as animal models of hyperuricemia. **Ryuichiro Tanaka** (tanaka-r@pharm.setsunan.ac.jp)<sup>1</sup>, Fumitoshi Sakazaki<sup>2</sup>, and Yutaka Banno<sup>3</sup>, <sup>1</sup>Setsunan Univ., Osaka, Japan, <sup>2</sup>Osaka Ohtani Univ., Osaka, Japan, <sup>3</sup>Kyushu Univ., Fukuoka, Japan
- D3794** Topochemistry and optical anisotropy of the cocoon of *Lithurgus chrysurus* (Hymenoptera: Megachilidae). **Maria Luiza Mello** (mlsmello@unicamp.br)<sup>1</sup>, Eli Heber dos Anjos<sup>1</sup>, Benedicto Vidal<sup>1</sup>, and Jerome Rozen Jr<sup>2</sup>, <sup>1</sup>Univ. of Campinas, Campinas, Brazil, <sup>2</sup>American Museum of Natural History, New York, NY
- D3795** Infrared microspectroscopy of the cocoon of *Lithurgus chrysurus* (Hymenoptera, Megachilidae). **Benedicto Vidal** (camposvi@unicamp.br)<sup>1</sup>, Jerome Rozen, Jr<sup>2</sup>, and Maria Luiza Mello<sup>1</sup>, <sup>1</sup>Univ. of Campinas, Campinas, Brazil, <sup>2</sup>American Museum of Natural History, New York, NY
- D3796** *Lactobacillus plantarum* from the gut of indigenous honey bee of Saudi Arabia inhibit the growth and bio-film formation of *Candida albicans*. **Mohammad Ansari** (mjavedansari@gmail.com) and Ahmad Alghamdi, King Saud Univ., Riyadh, Saudi Arabia
- D3797** First report of the bee louse, *Braula coeca* (Diptera: Braulidae), in apiaries of 'Los Chillos' Valley, Province of Pichincha, Ecuador. **Nelson Zapata-Carvajal** (ndavidzc@hotmail.com)<sup>1</sup>, Estefania Chérrez-Neacato<sup>1</sup>, Sarah Martín-Solano<sup>1</sup>, María Augusta Chávez-Larrea<sup>1</sup>, Claude Saegerman<sup>2</sup>, and Jorge Ron-Román<sup>1</sup>, <sup>1</sup>Univ. of las Fuerzas Armadas, Sangiolquí, Ecuador, <sup>2</sup>Univ. of Liège, Liège, Belgium
- D3798** Number of *Beauveria* spores picked up by *Varroa destructor* after walking on a treated surface for up to one minute. **Francisco Posada-Florez** (fjavierposada@gmail.com), Asha Pawar, Ryan Schwarz, Miguel Corona, and Jay Evans, USDA - ARS, Beltsville, MD
- D3799** First molecular characterization of honey bee *Varroa* sp. (Acari: Varroidae) in 'Los Chillos' Valley, Ecuador. **Estefania Chérrez-Neacato** (tefa\_9ch@hotmail.com)<sup>1</sup>, Sarah Martín-Solano<sup>1</sup>, Claude Saegerman<sup>2</sup>, and Jorge Ron-Román<sup>1</sup>, <sup>1</sup>Univ. of las Fuerzas Armadas, Sangiolquí, Ecuador, <sup>2</sup>Univ. of Liège, Liège, Belgium
- D3800** Does landscape complexity affect forage resources and health of honey bees, *Apis mellifera* L.? **Ge Zhang** (gezhang@iastate.edu), Matt O'Neal, Amy L. Toth, Adam Dolezal, and Ashley St. Clair, Iowa State Univ., Ames, IA
- D3801** Bt and pesticides influence on the longevity of *Apis mellifera* workers. **Michele Potrich** (profmichele@gmail.com), Gabriela Libardoni, Fernanda Colombo, Alfredo Gouvea, Everton Lozano, and Fabiana Costa-Maia, Federal Univ. of Technology of Paraná, Dois Vizinhos, Brazil
- D3802** Acute toxicity and survivorship of *Apis mellifera* L. 1758 after exposure to sublethal doses of clothianidin. Jander Souza<sup>1</sup>, **Stephan Carvalho** (stephan.carvalho@iciag.ufu.br)<sup>2</sup> and César Carvalho<sup>1</sup>, <sup>1</sup>Federal Univ. of Lavras, Lavras, Brazil, <sup>2</sup>Federal Univ. of Uberlândia, Uberlândia, Brazil
- D3803** Modeling the complex biology of pesticide exposure in honey bees, *Apis mellifera*. Douglas Sponser<sup>1</sup>, Michael Wransky<sup>2</sup>, and **Reed Johnson** (johnson.5005@osu.edu)<sup>1</sup>, <sup>1</sup>The Ohio State Univ., Wooster, OH, <sup>2</sup>Udacity, Inc., Mountain View, CA
- D3804** Seasonal pattern of protective compounds in honey from *Apis mellifera* L. 1758 in Brazil. Maria Auxiliadora Jacob<sup>1</sup>, Stephan Carvalho<sup>2</sup>, Wilson Abreu<sup>1</sup>, Elisângela Carvalho<sup>1</sup>, and **César Carvalho** (cfcarvalho@den.ufla.br)<sup>1</sup>, <sup>1</sup>Federal Univ. of Lavras, Lavras, Brazil, <sup>2</sup>Federal Univ. of Uberlândia, Uberlândia, Brazil

- D3805** Pollination of the coconut tree, *Cocos nucifera* L., by Africanized honey bees, *Apis mellifera scutellata* Lepelletier 1836, in Brazil. **Gerbson Mendonca** (gerbson10@gmail.com), Federal Univ. of Rio Grande, Macaiba, Brazil
- D3806** Blue orchard bees and honey bees in almonds: A nutty synergy. **Natalie Boyle** (nboyle@wsu.edu), Theresa Pitts-Singer, and Derek R. Artz, USDA - ARS, Logan, UT
- D3807** Effect of photoperiod and temperature on the efficiency of queen mates of *Bombus atratus* (Hymenoptera: Apidae) under controlled conditions. **Andrea Plazas** (nplazas@gmail.com), Diego Riaño, Jose Ricardo Cure, and Laura Rojas, Nueva Granada Military Univ., Cajica, Colombia
- D3808** Natural pollination is generally adequate for pumpkin and winter squash, *Cucurbita* spp., in Connecticut. **Kimberly Stoner** (kimberly.stoner@ct.gov), Connecticut Agricultural Experiment Station, New Haven, CT
- D3809** Aggression between floral specialist bees enhances pollination of *Hibiscus* (section *Trionum*: Malvaceae). **Blair Sampson** (blair.sampson@ars.usda.gov)<sup>1</sup>, Chris Werle<sup>2</sup>, and John Adamczyk<sup>1</sup>, <sup>1</sup>USDA - ARS, Poplarville, MS, <sup>2</sup>Louisiana State Univ., Baton Rouge, LA
- D3810** Foraging behavior of honey bee, *Apis mellifera*, and the native bumblebee *Bombus atratus* in two cultivars of highbush blueberry, *Vaccinium corymbosum*, in Colombia. **Carlos Pinilla** (crlspcruz@gmail.com), Bogota, Colombia
- D3811** Floral resource used by colonies of *Bombus atratus* (Hymenoptera: Apidae) on the campus of Nueva Granada Military University, Cajicá, Colombia. **Melissa Guerrero** (me\_l\_yvette2292@hotmail.com)<sup>1</sup>, Deicy Alarcon<sup>2</sup>, Diego Riaño<sup>1</sup>, and Jose Ricardo Cure<sup>1</sup>, <sup>1</sup>Nueva Granada Military Univ., Cajica, Colombia, <sup>2</sup>Nueva Granada Military Univ., Bogota, Colombia
- D3812** Learning flights in a male insect. **Theo Robert** (tgr203@exeter.ac.uk)<sup>1</sup>, Elisa Frasnelli<sup>1</sup>, Thomas Collett<sup>2</sup>, and Natalie Hempel de Ibarra<sup>1</sup>, <sup>1</sup>Univ. of Exeter, Exeter, United Kingdom, <sup>2</sup>Univ. of Sussex, Brighton, United Kingdom
- D3813** Foraging behavior of nectar robber bumblebee as a potential pollinator of red clover. **Tomoyuki Yokoi** (tomoyoko@envr.tsukuba.ac.jp)<sup>1</sup>, Jun Uto<sup>2</sup>, Naoko Tokuda<sup>1</sup>, Haruta Morizuka<sup>1</sup>, Rieko Fujinami<sup>3</sup>, and Mamoru Watanabe<sup>1</sup>, <sup>1</sup>Univ. of Tsukuba, Tsukuba, Japan, <sup>2</sup>Kyoto Univ., Kyoto, Japan, <sup>3</sup>Japan Women's Univ., Tokyo, Japan
- D3814** Drought-tolerant plants provide supplemental food resources to honey bees, *Apis mellifera*, and habitat for local native pollinators. **Raksha Kuenen** (raksha.kuenen@bayer.com) and Andrew Palrang, Bayer Crop-Science, Fresno, CA
- D3815** The dirt on apple pollinators: Incorporating soil survey data to predict ground-nesting bee distributions in central New York orchards. Julia Brokaw<sup>1</sup>, **Mia Park** (mia.park@und.edu)<sup>2</sup>, and Bryan N. Danforth<sup>3</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>Univ. of North Dakota, Grand Forks, ND, <sup>3</sup>Cornell Univ., Ithaca, NY
- D3816** Molecular evolution of early insect societies: Genomics of the Australian small carpenter bee, *Ceratina australensis*. **Michael Steffen** (michael.steffen@unh.edu) and Sandra Rehan, Univ. of New Hampshire, Durham, NH
- D3817** Why do burrower bug embryos hatch synchronously? Maternal regulation mitigates risks of future cannibalism. **Hiromi Mukai** (mh.isa.8088@gmail.com)<sup>1</sup>, Mantaro Hironaka<sup>2</sup>, Sumio Tojo<sup>3</sup>, and Shintaro Nomakuchi<sup>3</sup>, <sup>1</sup>Forestry and Forest Products Research Institute, Tsukuba, Japan, <sup>2</sup>Hamamatsu Univ. School of Medicine, Shizuoka, Japan, <sup>3</sup>Saga Univ., Saga, Japan

## Poster Session 4: Arthropod Vectors of Animal and Plant Disease

### West Hall C (Convention Center)

- D3818** Suppressive effect of the acetylated glyceride BEMIDETACH™ EC against tomato yellow leaf curl virus transmitted by sweetpotato whitefly, *Bemisia tabaci*, on tomato plants in a greenhouse. **Shohei Matsuura** (s-matsuura81314@pref.hiroshima.lg.jp)<sup>1</sup>, Takayuki Kashima<sup>2</sup>, Shinji Kajihara<sup>1</sup>, Toshio Kitamura<sup>3</sup>, and Hiroshi Abe<sup>4</sup>, <sup>1</sup>Hiroshima Prefectural Technology Research Institute, Hiroshima, Japan, <sup>2</sup>Ishihara Sangyo Kaisha, Ltd., Kusatsu, Japan, <sup>3</sup>NARO National Institute of Vegetable and Tea Science, Mie, Japan, <sup>4</sup>RIKEN BioResource Center, Tsukuba, Japan
- D3819** Suppressive mechanism of the acetylated glyceride BEMIDETACH™ EC on tomato yellow leaf curl virus infection. **Takayuki Kashima** (t-kashima@iskweb.co.jp)<sup>1</sup>, Shohei Matsuura<sup>2</sup>, Kenkichi Kanmiya<sup>1</sup>, Kiyomitsu Yoshida<sup>1</sup>, Shigeru Mitani<sup>3</sup>, Toshio Kitamura<sup>4</sup>, Jun Ohnishi<sup>4</sup>, Hiroshi Abe<sup>5</sup>, and Yutaka Arimoto<sup>6</sup>, <sup>1</sup>Ishihara Sangyo Kaisha, Ltd., Kusatsu, Japan, <sup>2</sup>Hiroshima Prefectural Technology Research Institute, Hiroshima, Japan, <sup>3</sup>Ishihara Sangyo Kaisha, Ltd., Shiga, Japan, <sup>4</sup>NARO National Institute of Vegetable and Tea Science, Mie, Japan, <sup>5</sup>RIKEN BioResource Center, Tsukuba, Japan, <sup>6</sup>RIKEN Institute, Wako, Japan
- D3820** Whitefly feeding behavior associated with the inoculation of the crinivirus tomato chlorosis virus by *Bemisia tabaci*. **Nathalie Maluta** (nathaliemaluta@usp.br)<sup>1</sup>, Elisa Garzo<sup>2</sup>, Joao R. S. Lopes<sup>1</sup>, Aranzazu Moreno<sup>2</sup>, Jesús Navas-Castillo<sup>3</sup>, Elvira Fiallo-Olivé<sup>3</sup>, and Alberto Fereres<sup>2</sup>, <sup>1</sup>Univ. of São Paulo, Piracicaba, Brazil, <sup>2</sup>Institute of Agricultural Sciences, Madrid, Spain, <sup>3</sup>Institute of Subtropical and Mediterranean Horticulture, Málaga, Spain
- D3821** Egg maturation by the glassy-winged sharpshooter (Hemiptera: Cicadellidae): A vector of *Xylella fastidiosa*. **Mark Sisterson** (mark.sisterson@ars.usda.gov), Christopher Wallis, Rodrigo Krugner, and Drake Stenger, USDA - ARS, Parlier, CA
- D3822** The vector of Mungbean yellow mosaic India virus, *Bemisia tabaci*: Their COI sequences and symbionts. **Rakesh Kumar Singh** (rakesh0429@gmail.com)<sup>1</sup>, Parveen Ansari<sup>1</sup>, Gaurav Raghuvanshi<sup>1</sup>, Shruti Kaushik<sup>1</sup>, Ashok Krishna<sup>1</sup>, Takashi Wada<sup>2</sup>, and Hiroaki Noda<sup>3</sup>, <sup>1</sup>Rajmata Vijayaraje Scindia Krishi Vishwavidyalaya,



- Indore, India, <sup>2</sup>Japan International Cooperation Agency, Kumamoto, Japan, <sup>3</sup>Japan International Cooperation Agency, Tsukuba, Japan
- D3823** Outbreak of yellow mosaic disease in legume crops in central India: Field survey in summer and Kharif seasons. **Rakesh Marabi** (rsmarabi78@rediffmail.com)<sup>1</sup>, Shoumitrad Das<sup>1</sup>, Ashok Bhowmick<sup>1</sup>, Hiroaki Noda<sup>2</sup>, and Takashi Wada<sup>3</sup>, <sup>1</sup>Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, India, <sup>2</sup>Japan International Cooperation Agency, Tsukuba, Japan, <sup>3</sup>Japan International Cooperation Agency, Kumamoto, Japan
- D3824** Molecular characterization and localization of bacterial endosymbionts in cassava whiteflies in Colombia. **Mariela Lobo-Hernandez** (miloboh@unal.edu.co)<sup>1</sup>, Surapathrudu Kanakala<sup>2</sup>, James Montoya-Lerma<sup>3</sup>, Helena Brochero<sup>4</sup>, and Murad Ghanim<sup>2</sup>, <sup>1</sup>National Univ. of Colombia, Cali, Colombia, <sup>2</sup>Agricultural Research Organisation, Bet-Dagan, Israel, <sup>3</sup>Univ. of Valle, Cali, Colombia, <sup>4</sup>National Univ. of Colombia, Bogotá, Colombia
- D3825** Effect of temperature on *Diaphorina citri* (Hemiptera: Liviidae) take-off. **Arthur Tomaseto** (arthur.tomaseto@usp.br)<sup>1</sup>, Marcelo Pedreira Miranda<sup>2</sup>, Alberto Fereres<sup>3</sup>, and Joao R. S. Lopes<sup>1</sup>, <sup>1</sup>Univ. of São Paulo, Piracicaba, Brazil, <sup>2</sup>Citrus Defense Fund, Araraquara, Brazil, <sup>3</sup>Institute of Agricultural Sciences, Madrid, Spain
- D3826** Nematode populations associating with ambrosia beetles in Taiwan. **Chih-shun Chang** (r04633013@ntu.edu.tw)<sup>1</sup>, Guan-yi Yu<sup>1</sup>, Hsin-hui Shih<sup>2</sup>, Ching-shan Lin<sup>3</sup>, Sheng-shan Lu<sup>2</sup>, and Jiue-in Yang<sup>1</sup>, <sup>1</sup>National Taiwan Univ., Taipei, Taiwan, <sup>2</sup>Taiwan Forestry Research Institute, Taipei, Taiwan, <sup>3</sup>Tsau-hu Elementary School, Taichung, Taiwan
- D3827** Experimental transmission of the phytoplasma 16SrIX group associated with citrus Huanglongbing symptoms by the leafhopper *Scaphytopius marginelineatus* (Cicadellidae: Deltocephalinae). **Rodrigo Marques** (rodrigonmarques@gmail.com)<sup>1</sup> and João R. S. Lopes<sup>2</sup>, <sup>1</sup>Federal Univ. of São Carlos, Buri, Brazil, <sup>2</sup>Univ. of São Paulo, Piracicaba, Brazil
- D3828** Understanding data from large scale Asian citrus psyllid, *Diaphorina citri*, Huanglongbing, *Candidatus Liberibacter asiaticus*, survey efforts: Can we locate infected trees sooner? **David W. Bartels** (david.w.bartels@aphis.usda.gov), USDA - APHIS, Edinburg, TX
- D3829** Use of the ion torrent PGM for characterizing the microbiome of Oklahoma *Amblyomma americanum* (Ixodida: Ixodidae). Zachary C. Holmes<sup>1</sup>, Brian T. Shirey<sup>1</sup>, Maria L. Zambrano<sup>1</sup>, Gregory A. Dasch<sup>1</sup>, and **Sallie A. Ruskoski** (ruskosks@nsuok.edu)<sup>2</sup>, <sup>1</sup>Centers for Disease Control and Prevention, Atlanta, GA, <sup>2</sup>Northeastern State Univ., Broken Arrow, OK
- D3830** Multiple legumains in ixodid ticks. **David Hartmann** (hartmann@paru.cas.cz)<sup>1,2</sup> and Radek Sima<sup>1</sup>, <sup>1</sup>Czech Academy of Sciences, České Budějovice, Czech Republic, <sup>2</sup>Univ. of South Bohemia, České Budějovice, Czech Republic
- D3831** Bluetongue virus monitoring in *Culicoides* collected in the Republic of Korea in 2013–2014. **Jee Yong Park** (parkjyyunesy@korea.kr)<sup>1</sup>, Su Bong Ha<sup>1</sup>, Hyeong Hwa Ha<sup>1</sup>, Hyun Ji Seo<sup>1</sup>, Ji Hye Lee<sup>1</sup>, Hye Young Jeoung<sup>1</sup>, Yong Joo Kim<sup>1</sup>, and Heung Chul Kim<sup>2</sup>, <sup>1</sup>Animal and Plant Quarantine Agency, Gimcheon, South Korea, <sup>2</sup>U.S. Army, Seoul, South Korea
- D3832** Habitat use by *Culicoides* spp.: The role of habitat type and animal use in determining species composition in a Kansas prairie preserve. **Robert Pfannenstiel** (bob.pfannenstiel@ars.usda.gov)<sup>1</sup> and Mark Ruder<sup>2</sup>, <sup>1</sup>USDA - ARS, Manhattan, KS, <sup>2</sup>Univ. of Georgia, Athens, GA
- D3833** A mechanical transmission of dengue virus infection in mice by mosquito *Aedes aegypti*. **Kuen-Nan Tsai** (kntsai@nhri.org.tw), National Health Research Institutes, Miaoli, Taiwan

### Poster Session 4: Biodiversity, Biogeography, and Conservation of Arthropods, Part 2

#### West Hall C (Convention Center)

- D3834** Honduran fireflies (Coleoptera: Lampyridae). **Lynn Faust** (tnlfaust@gmail.com)<sup>1</sup> and Hugh Faust<sup>2</sup>, <sup>1</sup>Great Smoky Mountains Conservation Association, Knoxville, TN, <sup>2</sup>Emory River Land Company, Strawberry Plains, TN
- D3835** Catalogue of West African Coccinellidae. **Kwevitoukoui Hounkpati** (bhounkpati@wacoccinellid.org) and Joseph V. McHugh, Univ. of Georgia, Athens, GA
- D3836** Longhorned beetles (Coleoptera: Cerambycidae) of Connecticut, U.S.A. **Chris Maier** (chris.maier@ct.gov), Connecticut Agricultural Experiment Station, New Haven, CT
- D3837** Wazzup? Canopy research of insect trophic interactions using aerial working platform. **Pavel Drozd** (pavel.drozd@osu.cz)<sup>1</sup>, Jan Šlpoš<sup>2</sup>, Martin Volf<sup>3</sup>, Martin Sigut<sup>1</sup>, Petr Pyszko<sup>1</sup>, Nela Kotaskova<sup>1</sup>, Jiri Hodecek<sup>1</sup>, David Kasprak<sup>1</sup>, Hana Platkova<sup>1</sup>, Ondrej Dornak<sup>1</sup>, Marketa Kirstova<sup>1</sup>, Lucie Vavrosova<sup>1</sup>, and Vojtech Novotny<sup>3,4</sup>, <sup>1</sup>Univ. of Ostrava, Ostrava, Czech Republic, <sup>2</sup>Czech Academy of Sciences, Brno, Czech Republic, <sup>3</sup>Biological Centre ASCR, České Budějovice, Czech Republic, <sup>4</sup>New Guinea Binatang Research Center, Madang, Papua New Guinea
- D3838** Biodiversity and vertical stratification of Scolytinae and Platypodinae (Curculionidae) in an Amazonian forest fragment of Amapá, Brazil. Wilson Silva<sup>1</sup> and **Carlos Flechtmann** (flechtma@bio.feis.unesp.br)<sup>2</sup>, <sup>1</sup>Macaé, Brazil, <sup>2</sup>São Paulo State Univ., Ilha Solteira, Brazil
- D3839** Vertical stratification of bark and ambrosia beetles (Curculionidae: Scolytinae and Platypodinae) in two cerrado fragments in southern Brazil. **Fábio Leonel** (fabio3l@hotmail.com), Silvia Tanabe, and Carlos Flechtmann, São Paulo State Univ., Ilha Solteira, Brazil
- D3840** Seasonal and vertical diversity of the family Elateridae (Coleoptera) in one region with tropical dry forest of the Mexican Pacific Slope. **Viridiana Vega Badillo** (vivebsemika@gmail.com), Martín Zurita García, and Santiago Zaragoza Caballero, National Autonomous Univ. of México, Mexico City, Mexico

- D3841** Backyard biodiversity: Unraveling life histories of the new fly species discovered by the BioSCAN Project. **Lisa Gonzalez** (lgonzale@nhm.org), Emily A. Hartop, and Brian V. Brown, Natural History Museum, Los Angeles, CA
- D3842** Progress in monarch butterfly conservation in Iowa. **Sue Blodgett** (sblodg@iastate.edu)<sup>1</sup>, Steven Bradbury<sup>1</sup>, Richard Hellmich<sup>2</sup>, Robert Hartzler<sup>1</sup>, Diane Debinski<sup>1</sup>, John Pleasants<sup>1</sup>, Teresa Blader<sup>1</sup>, Victoria Pocius<sup>1</sup>, Tyler Grant<sup>1</sup>, Wendy Wintersteen<sup>1</sup>, and Mark Honeyman<sup>1</sup>, <sup>1</sup>Iowa State Univ., Ames, IA, <sup>2</sup>USDA - ARS, Ames, IA
- D3843** Differential attraction to pollinators among landscape plants. **S. Kristine Braman** (kbraman@uga.edu), Univ. of Georgia, Griffin, GA
- D3844** Survey of native bee communities within several top-tier Louisiana conservation priority habitats. **Eric Van Gorder** (eric.van@selu.edu) and Janice L. Bossart, Southeastern Louisiana Univ., Hammond, LA
- D3845** Using plant-pollinator networks to determine optimal forage mixes for pollinator conservation in farmland. **Julia Brokaw** (brokawju@msu.edu)<sup>1</sup>, Emily May<sup>2</sup>, Jason Gibbs<sup>1</sup>, and Rufus Isaacs<sup>1</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>The Xerces Society for Invertebrate Conservation, Portland, OR
- D3846** The missing link: A case for increased consideration for plant-pollinator interactions for species at-risk recovery in Ontario, Canada. **Victoria MacPhail** (vmacphail@gmail.com)<sup>1</sup>, Carolyn Duthie<sup>2</sup>, Sheila R. Colla<sup>2</sup>, and Shannon Ferguson<sup>1</sup>, <sup>1</sup>Wildlife Preservation Canada, Guelph, ON, Canada, <sup>2</sup>York Univ., Toronto, ON, Canada
- D3847** Protura and Diplura of Kathara coal field area of Jharkhand, India and their ecological functions. **Amita Hembrom** (brajkishore58ranchi@gmail.com) and Braj Sinha, Ranchi Univ., Ranchi, India
- D3848** Stream macroinvertebrate communities within an urbanized watershed: A multi-year structural and functional assessment. **Mollie McIntosh** (mcintoshm2@xavier.edu), Meghan Burge, Trisha Makely, Donielle Phillips, and Lauren Stock, Xavier Univ., Cincinnati, OH
- D3849** Radioactive contamination of aquatic insects in stream impacted by the Fukushima nuclear power plant accident. **Mayumi Yoshimura** (yoshi887@ffpri.affrc.go.jp), Kansai Research Center, Kyoto, Japan
- D3850** Evaluating differences in invertebrate communities between remnant and restored prairies in the Upper Osage Grasslands. **Joseph LaRose** (jlaroseph@gmail.com), Debbie Finke, and Elizabeth Webb, Univ. of Missouri, Columbia, MO
- D3851** The impacts of grazing intensity and altered precipitation on grasshopper assemblage in a meadow steppe. **Hui Zhu** (zhuh824@nenu.edu.cn), Bingzhong Ren, Yinliang Wang, and Duo Zhang, Northeast Normal Univ., Changchun, China
- D3852** Insect fauna on different types of green roofs in Japan: Biotope, herb and meadow green roofs. **Masashi Nomura** (nomuram@faculty.chiba-u.jp)<sup>1</sup> and Ayako Nagase<sup>2</sup>, <sup>1</sup>Chiba Univ., Matsudo, Japan, <sup>2</sup>Chiba Univ., Chiba, Japan
- D3853** The impact of some agricultural practices on soil biodiversity in sunflower crop. **Maria Iamandei** (maria\_iamandei@yahoo.com) and Daniel Kurzeluk, Research - Development Institute for Plant Protection, Bucharest, Romania
- D3854** Distribution of Arthropoda at different vegetation on apple and pear orchard in Korea. **Jong-Ho Park** (jhpark75@korea.kr), National Academy of Agricultural Science, Wanju, South Korea
- D3855** The effect of agriculture and urbanization on predacious arthropod diversity of grasslands. **Bianca Greyvenstein** (Biagrey90@gmail.com), Johnnie van den Berg, and Stefan Siebert, North-West Univ., Potchefstroom, South Africa
- D3856** Effect of the distance between natural forest and acacia forest on termite diversity in acacia plantation forests. **Yoko Takematsu** (takematu@yamaguchi-u.ac.jp)<sup>1</sup>, Paulus Meleng<sup>2</sup>, Kok-Boon Neoh<sup>3</sup>, Tsuyoshi Yoshimura<sup>4</sup>, and Takao Itoioka<sup>5</sup>, <sup>1</sup>Yamaguchi Univ., Yamaguchi, Japan, <sup>2</sup>Forest Dept. Sarawak, Kuching, Malaysia, <sup>3</sup>National Chung Hsing Univ., Taichung, Taiwan, <sup>4</sup>Kyoto Univ., Uji, Japan, <sup>5</sup>Kyoto Univ., Kyoto, Japan
- D3857** Patterns of functional diversity of two trophic groups after canopy thinning in an abandoned coppice. **Jan Sipos** (jsipos@seznam.cz)<sup>1,2</sup>, Radim Hedl<sup>1,3</sup>, Vladimir Hula<sup>4</sup>, Markéta Chudomelová<sup>1</sup>, Ondrej Kosulic<sup>4</sup>, Jana Niedobová<sup>4</sup>, and Vladan Riedl<sup>1,5</sup>, <sup>1</sup>Czech Academy of Sciences, Brno, Czech Republic, <sup>2</sup>Univ. of Ostrava, Ostrava, Czech Republic, <sup>3</sup>Palacký Univ., Olomouc, Czech Republic, <sup>4</sup>Mendel Univ., Brno, Czech Republic, <sup>5</sup>Nature Conservation Agency of the Czech Republic, Brno, Czech Republic
- D3858** Prescribed burning impacts on invertebrate communities in longleaf pine ecosystems. **Sara Simmons** (sara.simmons@selu.edu) and Jancie Bossart, Southeastern Louisiana Univ., Hammond, LA
- D3859** Response of ground-dwelling insects to maritime forest disturbance. **C. Tate Holbrook** (cholbrook@ccga.edu) and Sarah McInnis, College of Coastal Georgia, Brunswick, GA

## Poster Session 4: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops, Part 2

### West Hall C (Convention Center)

- D3860** Aminopeptidase N1 is one of functional receptors of Cry1Ac toxin in *Chilo suppressalis*. **Shuwen Wu** (swwu@njau.edu.cn), Haonan Zhang, and Yihua Yang, Nanjing Agricultural Univ., Nanjing, China
- D3861** Characterization of PhABCC4 involved in ivermectin tolerance. **Ju Hyeon Kim** (jhkim35@umass.edu)<sup>1</sup>, Kyle Gellatly<sup>2</sup>, Edwin Murenzi<sup>1</sup>, Kyong Sup Yoon<sup>3</sup>, and John M. Clark<sup>1</sup>, <sup>1</sup>Univ. of Massachusetts, Amherst, MA, <sup>2</sup>Univ. of Massachusetts, Worcester, MA, <sup>3</sup>Southern Illinois Univ., Edwardsville, IL
- D3862** Overexpression of P450 genes in a buprofezin-resistant strain of the brown planthopper, *Nilaparvata lugens*. **Shun-fan Wu** (wusf@njau.edu.cn), Xi-Chao Mu, and Cong-Fen Gao, Nanjing Agricultural Univ., Nanjing, China



- D3863** Alanine to valine substitutions in the pore helix IIIPI and linker helix III L45 confer cockroach sodium channel resistance to DDT and pyrethroids. **Mengli Chen** (chenml@msu.edu)<sup>1,2</sup>, Yuzhe Du<sup>1</sup>, Yoshiko Nomura<sup>1</sup>, Guonian Zhu<sup>2</sup>, Boris S. Zhorov<sup>3</sup>, and Ke Dong<sup>1</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>Zhejiang Univ., Hangzhou, China, <sup>3</sup>McMaster Univ., Hamilton, ON, Canada
- D3864** Molecular and functional characterization of a voltage-gated sodium channel from the bumble bee *Bombus impatiens*. **Shaoying Wu** (wsy6000@msu.edu)<sup>1,2</sup>, Yuzhe Du<sup>2</sup>, Yoshiko Nomura<sup>2</sup>, and Ke Dong<sup>2</sup>, <sup>1</sup>Henan Agriculture Univ., Zhengzhou, China, <sup>2</sup>Michigan State Univ., East Lansing, MI
- D3865** Temephos resistance and esterase activity in the mosquito *Aedes aegypti* in Havana, Cuba changed dramatically between 2006 and 2013. **Maria Rodriguez** (mrodriguez@ipk.sld.cu) and Juan Bisset, Institute of Tropical Medicine Pedro Kouri, Havana, Cuba
- D3866** Molecular and functional characterization of knockdown resistance to pyrethroids in *Aedes aegypti*. **Xiangrui Tian** (15850578760@139.com)<sup>1</sup>, Yuzhe Du<sup>1</sup>, Yoshiko Nomura<sup>1</sup>, Jianya Su<sup>2</sup>, and Ke Dong<sup>1</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>Nanjing Agricultural Univ., Nanjing, China
- D3867** New opportunities to investigate insecticide and acaricide chloride channel targets through their differential interactions with diverse chemical classes. **Sofia Iqbal** (sofia.iqbal@rothamsted.ac.uk)<sup>1</sup>, Martin Williamson<sup>1</sup>, T. G. Emyr Davies<sup>1</sup>, Mirel Puinean<sup>1</sup>, Lin Field<sup>1</sup>, and Ian Mellor<sup>2</sup>, <sup>1</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>2</sup>Univ. of Nottingham, Nottingham, United Kingdom
- D3868** Studies on the mechanism of action of matrine, an insecticidal natural product. **Yuxin Li** (liyxl28@nankai.edu.cn)<sup>1</sup> and Jeffrey Bloomquist<sup>2</sup>, <sup>1</sup>Nankai Univ., Tianjin, China, <sup>2</sup>Univ. of Florida, Gainesville, FL
- D3869** Unintended impacts of the transgenic American chestnut (Fagales: Fagaceae) on lepidopteran biopesticide efficacy and parasitoid success. Dylan Parry and **Aaron Brown** (abrown02@syr.edu), State Univ. of New York, Syracuse, NY
- D3870** Discovery of insecticidal activity from bacteria associated with soil and plants. Narendra Palekar, **Mary Kroner**, (mkroner@agbiome.com), Brooke Bissinger, Jacob Pearce, Marie Encarnacion, Rebekah Kelly, Amy Shekita, Dylan Kraus, Elka Armstrong, and Amber McGuire, AgBiome, Inc., Durham, NC
- D3871** Presentation withdrawn
- D3872** Simulating prey removal, natural enemy abundance, and bicontrol in Bt maize. **Christopher Brown** (christopher.r.brown@monsanto.com) and Robert K. D. Peterson, Montana State Univ., Bozeman, MT
- D3873** Characterization of two *Bacillus thuringiensis* Vip3 proteins against lepidopteran insect pests. **Sek Yee Tan** (stan5@dow.com), Ted J. Letherer, Wendy Lo, Todd Glancy, Sarah Worden, Andrew Worden, Jeff Beringer, Stephen Foulk, Shannon Whitlock, Aaron Woosley, Ryan Lee, Marc Zack, and Kenneth Narva, Dow AgroSciences, Indianapolis, IN
- D3874** Modifications of *Bacillus thuringiensis* Cry3Aa toxicity by cadherin fragments. **Moataz Moustafa** (moataz.moustafa79@gmail.com)<sup>1</sup> and František Sehnal<sup>2</sup>, <sup>1</sup>Cairo Univ., Giza, Egypt, <sup>2</sup>Czech Academy of Sciences, České Budějovice, Czech Republic
- D3875** Effects of pollen contamination on the dominance of resistance to Bt maize in fall armyworm. **Fei Yang** (fyang@agcenter.lsu.edu)<sup>1</sup>, David L. Kerns<sup>2</sup>, Sebe Brown<sup>2</sup>, and Fangneng Huang<sup>1</sup>, <sup>1</sup>Louisiana State Univ., Baton Rouge, LA, <sup>2</sup>Louisiana State Univ., Winnsboro, LA
- D3876** Selection with Cry2Ab confers broad-spectrum resistance to Bt Cry toxins in cotton bollworm, *Helicoverpa armigera*. **Yihua Yang** (yhyang@njau.edu.cn), Laipan Liu, and Yidong Wu, Nanjing Agricultural Univ., Nanjing, China
- D3877** Challenges and options for tracking susceptibility of *Helicoverpa zea* and *Heliothis virescens* (Lepidoptera: Noctuidae) to transgenic crops expressing toxins derived from *Bacillus thuringiensis*. **Randall Luttrell** (randy.luttrell@ars.usda.gov), Nathan Little, Michelle Mullen, Kenya Dixon, Chad Roberts, K. Clint Allen, and Omaththage P. Perera, USDA - ARS, Stoneville, MS

## Poster Session 4: Insect Immunology

### West Hall C (Convention Center)

- D3878** Multi-purpose applications of beetle defensin-derived antimicrobial peptides. **Jun Ishibashi** (bishiba@affrc.go.jp)<sup>1</sup>, Takashi Iwasaki<sup>1</sup>, Ai Asaoka<sup>1</sup>, Megumi Sumitani<sup>1</sup>, Makoto Nakamura<sup>2</sup>, and Minoru Yamakawa<sup>1</sup>, <sup>1</sup>National Institute of Agrobiological Sciences, Tsukuba, Japan, <sup>2</sup>Industrial Technology Center of Wakayama Prefecture, Wakayama, Japan
- D3879** Identification, characterization and functional analysis of a serine protease inhibitor (*CvT-serpin*) from *Cotesia vestalis* teratocytes. **Qijuan Gu** (ggzjdx@163.com), Min Shi, Jian Yang, and Xue-xin Chen, Zhejiang Univ., Hangzhou, China
- D3880** A hypothetical model of crossing *Bombyx mori* nucleopolyhedrovirus through its host midgut physical barrier. **Jiaping Xu** (jiapingxu@163.com) and Minghui Liu, Anhui Agricultural Univ., Hefei, China
- D3881** A peptidoglycan recognition protein acts in sweetpotato whitefly, *Bemisia tabaci*, immunity. **Zhi-zhi Wang** (wzz1312@163.com), Min Shi, Xiao-Wei Wang, and Xue-xin Chen, Zhejiang Univ., Hangzhou, China
- D3882** Secreted factors that modulate virus infection in Lepidoptera. Vassiliki Labropoulou and **Luc Swevers** (swevers@bio.demokritos.gr), Institute of Biosciences & Applications, Athens, Greece
- D3883** Dengue virus exposure at the larval stage induced immune priming in *Aedes aegypti* adult mosquitoes. **Valeria Vargas** (valeria.vargaspl@gmail.com)<sup>1,2</sup>, Guadalupe Hernández-Martínez<sup>2</sup>, and Humberto Lanz-Mendoza<sup>2</sup>, <sup>1</sup>National Autonomous Univ. of México, Mexico City, Mexico, <sup>2</sup>National Institute of Public Health, Cuernavaca, Mexico



- D3884** Novel microbes mediate immune response on an exotic host in the specialist butterfly, *Lycaeides melissa*. **Su'ad Yoon** (suady@nevada.unr.edu), Joshua Harrison, Matthew L. Forister, and Angela Smilanich, Univ. of Nevada, Reno, NV
- D3885** Probiotics in *Drosophila* against *Aspergillus* infections. **Luis Ramirez Camejo** (ramirecamejo@gmail.com)<sup>1</sup>, Michael Garcia Alicea<sup>2</sup>, Génesis Maldonado Morales<sup>2</sup>, and Paul Batman<sup>2</sup>, <sup>1</sup>INDICASAT AIP, Panama, Panama, <sup>2</sup>Univ. of Puerto Rico, San Juan, PR
- D3886** Constitutive and induced immunity among castes of the ant *Formica exsecta*. **Dimitri Stucki** (dimitri.stucki@helsinki.fi), Liselotte Sundström, and Dalial Freitak, Univ. of Helsinki, Helsinki, Finland
- D3887** An expanded view of the immune serine protease network in *Manduca sexta*. Haobo Jiang and **Yang Wang** (yang.wang10@okstate.edu), Oklahoma State Univ., Stillwater, OK
- D3888** Biological control of the diamondback moth, *Plutella xylostella*, using various natural predators. **Shahil Pema** (spema@nevada.unr.edu), Angela Smilanich, Lora Richards, and Lee A. Dyer, Univ. of Nevada, Reno, NV
- D3894** Insecticidal activity of *Magnolia kobus* against *Culex pipiens* and *Aedes albopictus*. Jin-Won Seo, Hyun Kyung Kim, **JaeSeon Lee** (leejs910412@naver.com), Hyun-Na Koo, and Gil-Hah Kim, Chungbuk National Univ., Cheongju, South Korea
- D3895** First determination of lethal and sublethal effects of temephos on *Anopheles pseudopunctipennis* in comparison with *Aedes aegypti*. Agustin Alvarez Costa, Paula Gonzalez, Laura Harburguer, and **Hector Masuh** (hmasuh@citedef.gob.ar), Pests and Insecticides Research Centre, Villa Martelli, Argentina
- D3896** Chemical characterization and insecticidal activity of essential oils on *Aedes aegypti* (Diptera: Culicidae). Natalia Rios, Elena Stashenko, and **Jonny Duque** (jonedulu@uis.edu.co), Industrial Univ. of Santander, Bucaramanga, Colombia
- D3897** Applying *Bacillus thuringiensis israeliensis* (Bti) to control exophilic *Anopheles coluzzii* towards pre-elimination stage of malaria in the Democratic Republic of Sao Tome and Principe. **Kun-Hsien Tsai** (kunhtsai@ntu.edu.tw), National Taiwan Univ., Taipei, Taiwan
- D3898** Human C5a interacts with a G-protein coupled receptor in *Aedes aegypti* cells modulating DENV infection *in vitro*. **Berlin Londono-Renteria** (blondono@uscmcd.sc.edu), Andrea Troupin, and Tonya Colpitts, Univ. of South Carolina, Columbia, SC
- D3899** The role of AeCSPBP and SGS 1 in sporozoite invasion of *Aedes aegypti* salivary gland. **Bianca Kojin** (bianca.burini@gmail.com) and Margareth Capurro, Univ. of São Paulo, São Paulo, Brazil
- D3900** Chemical composition of *Zingiber zerumbet* (L.) Smith: Essential oil and its repellent activity against the yellow fever mosquito, *Aedes aegypti* L. **Nurhayat Tabanca** (ntabanca@ufl.edu)<sup>1</sup>, Maia Tsikolia<sup>1</sup>, Natasha Agramonte<sup>1</sup>, Betul Demirci<sup>2</sup>, Jeffrey Bloomquist<sup>1</sup>, and Ulrich Bernier<sup>3</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Anadolu Univ., Eskisehir, Turkey, <sup>3</sup>USDA - ARS, Gainesville, FL
- D3901** A cross-species comparison: The efficacy of insect repellents and attractants. **Stacy D. Rodriguez** (stacyr@nmsu.edu), Hae-Na Chung, Kristina Gonzales, and Immo Hansen, New Mexico State Univ., Las Cruces, NM
- D3902** Odorant receptor from the southern house mosquito sensitive to natural repellents. **Pingxi Xu** (pxxu@ucdavis.edu), Young-Moo Choo, Garisson Buss, and Walter S. Leal, Univ. of California, Davis, CA
- D3903** Seasonal prevalence of main vector of Japanese encephalitis, *Culex tritaeniorhynchus* (Diptera: Culicidae), at 10 areas in Republic of Korea during 2011 to 2015. **Hye Mi Yu** (xjvmgapal@naver.com), E-Hyun Shin, Wook Gyo Lee, Jong Yul Roh, Young Ran Ju, and Kyu Sik Chang, Korea National Research Institute of Health, Cheongju, South Korea
- D3904** The risk of new invasive mosquito species in southeast Europe: Current state and future risk maps. **Antonios Michaelakis** (a.michaelakis@bpi.gr)<sup>1</sup>, Rafaella Sotiropoulou<sup>2,3</sup>, Efthimios Tagaris<sup>3</sup>, Andreas Sotiropoulos<sup>4</sup>, Ioannis Spanos<sup>4</sup>, Dimitrios Papachristos<sup>1</sup>, Romeo Bellini<sup>5</sup>, and Panagiotis Milonas<sup>1</sup>, <sup>1</sup>Benaki Phytopathological Institute,

## Poster Session 4: Insects in Food Safety and Homeland Security

### West Hall C (Convention Center)

- D3889** How many insect fragments can be detected in foods using endpoint PCR? **Monica Pava-Ripoll** (monica.pava-ripoll@fda.hhs.gov), Amy K. Miller, and George C. Ziobro, U.S. Food and Drug Administration, College Park, MD
- D3890** Enhancing the United States Department of Agriculture and Department of Homeland Security partnership using live digital streaming at distance ports. **Esther Serrano** (esther.s.serrano@aphis.usda.gov)<sup>1</sup> and Paula Kelly<sup>2</sup>, <sup>1</sup>USDA - APHIS, Ft. Lauderdale, FL, <sup>2</sup>U.S. Customs and Border Protection, Palmetto, FL
- D3891** Quarantine management for biological control of invasive insects: Permitting, physical biosecurity, and staff training. **Jay S. Bancroft** (jay.bancroft@ars.usda.gov), USDA - ARS, Newark, DE

## Poster Session 4: Medical and Veterinary Entomology, Part 2

### West Hall C (Convention Center)

- D3892** Resistance monitoring through the enhanced surveillance protocol for the CDC bottle bioassay and kdr mutations in *Aedes aegypti* (Linnaeus) from Mexico. Beatriz Lopez, **Franco Morales** (francomfrs@gmail.com), Selene Gutierrez, Juan Gonzalez, and Adriana Flores, Autonomous Univ. of Nuevo León, San Nicolás de los Garza, Mexico,
- D3893** Variability and replication in insecticide resistance testing using the CDC bottle bioassay. **Mary A. Sorensen** (marys@placermosquito.org), Placer Mosquito & Vector Control District, Roseville, CA
- D3902** Odorant receptor from the southern house mosquito sensitive to natural repellents. **Pingxi Xu** (pxxu@ucdavis.edu), Young-Moo Choo, Garisson Buss, and Walter S. Leal, Univ. of California, Davis, CA
- D3903** Seasonal prevalence of main vector of Japanese encephalitis, *Culex tritaeniorhynchus* (Diptera: Culicidae), at 10 areas in Republic of Korea during 2011 to 2015. **Hye Mi Yu** (xjvmgapal@naver.com), E-Hyun Shin, Wook Gyo Lee, Jong Yul Roh, Young Ran Ju, and Kyu Sik Chang, Korea National Research Institute of Health, Cheongju, South Korea
- D3904** The risk of new invasive mosquito species in southeast Europe: Current state and future risk maps. **Antonios Michaelakis** (a.michaelakis@bpi.gr)<sup>1</sup>, Rafaella Sotiropoulou<sup>2,3</sup>, Efthimios Tagaris<sup>3</sup>, Andreas Sotiropoulos<sup>4</sup>, Ioannis Spanos<sup>4</sup>, Dimitrios Papachristos<sup>1</sup>, Romeo Bellini<sup>5</sup>, and Panagiotis Milonas<sup>1</sup>, <sup>1</sup>Benaki Phytopathological Institute,

- Kifissia, Greece, <sup>2</sup>Univ. of Western Macedonia, Kozani, Greece, <sup>3</sup>National Centre of Scientific Research, Agia Paraskevi, Greece, <sup>4</sup>Terra Nova, Ltd., Athens, Greece, <sup>5</sup>Agriculture Environment Centre, Bologna, Italy
- D3905** Validation in field conditions of the traps to capture insect with HomeTrap and Guardian Nocturno. **Héctor Parra** (hparra@uis.edu.co)<sup>1</sup>, Juliana Cuadros<sup>1</sup>, Gustavo Rincón<sup>2</sup>, Ruth Castillo<sup>2</sup>, and Nicolás Ruiz<sup>1</sup>, <sup>1</sup>Industrial Univ. of Santander, Bucaramanga, Colombia, <sup>2</sup>Industrial Univ. of Santander, Piedecuesta, Colombia
- D3906** Observation on diel oviposition periodicity of *Toxorhynchites splendens* (Wiedemann) in laboratory. **Siriporn Phasomkusolsil** (siripornp@afirms.org), Kanchana Pantuwattana, Jaruwan Tawong, Weeraphan Khongtak, Yossasin Kertmanee, Nantaporn Monkanna, Sakon Khaosanorh, and Silas Davidson, Armed Forces Research Institute of Medical Sciences, Rachatewee, Thailand
- D3907** Effects of heterotrophic microorganisms on wetland inhabiting mosquitoes. **Dagne Duguma** (duguma@ufl.edu), Univ. of Florida, Vero Beach, FL
- D3908** Ecological study on *Aedes albopictus* (Diptera: Culicidae) in Korea. **Hyunwoo Kim** (kim6959@gmail.com), E-Hyun Shin, Kyu Sik Chang, Jong Yul Roh, and Wook Gyo Lee, Korea National Research Institute of Health, Cheongju, South Korea
- D3909** Container size and shape alters interspecific competitive effects among mosquito larvae. **Peter J. Brabant** (pbrab001@gmail.com) and Steven Juliano, Illinois State Univ., Normal, IL
- D3910** WingBank: A database of morphologic and genetic data of epidemiologically important Culicidae. **Lincoln Suesdek** (lincoln.suesdek@butantan.gov.br)<sup>1</sup> and Caroline Louise<sup>2</sup>, <sup>1</sup>Univ. of São Paulo, São Paulo, Brazil, <sup>2</sup>Butantan Institute, São Paulo, Brazil
- D3911** Fauna and frequency of phlebotomine sand flies (Diptera: Psychodidae) in southwestern Iran. **Gholam Hossein Shahraki** (shahraki.gh@gmail.com), Yasuj Univ. of Medical Sciences, Yasuj, Iran
- D3912** Evaluation of sand fly trapping methods and identification of potential sand fly vectors in leishmaniasis and bartonellosis endemic areas in the northern Peruvian Amazon. Victor Zorrilla<sup>1</sup>, Liz Espada<sup>1</sup>, Marisa Lozano<sup>1</sup>, Heriberto Arevalo<sup>2</sup>, Mario Troyes<sup>3</sup>, Gissella Vasquez<sup>1</sup>, and **Craig Stoops** (craig.a.stoops.mil@mail.mil)<sup>1</sup>, <sup>1</sup>U.S. Naval Medical Research Unit, Callao, Peru, <sup>2</sup>San Martin Regional Health Directorate, Tarapoto, Peru, <sup>3</sup>Jaen Health Directorate, Jaen, Peru
- D3913** Salivary proteins from *Lutzomyia longipalpis* Hyaluronidase and Lundep as vaccine candidates against *Leishmania major* infection. **Ines Martin-Martin** (ines.martin-martin@nih.gov), Andrezza Chagas, Anderson Guimarães-Costa, Fabiano Oliveira, Jesus G. Valenzuela, Jose Ribeiro, and Eric Calvo, National Institute of Allergy and Infectious Diseases, Rockville, MD
- D3914** Undergraduate research in medical entomology at a primarily undergraduate institution. **William Dees** (wdees@mcneese.edu), Caroline Hennigan, Christopher Struchtemeyer, Caleb Ardizzone, Omar Christian, and Victoria Hayes, McNeese State Univ., Lake Charles, LA
- D3915** *Cuterebra* among definitive hosts and companion animals in the Twin Cities Metropolitan Area of Minnesota, USA. **Roger D. Moon** (rdmoon@umn.edu), Univ. of Minnesota, St. Paul, MN
- D3916** Distribution pattern of tabanids inhabiting Japan (Diptera: Tabanidae). **Hitoshi Sasaki** (h-sasaki@rakuno.ac.jp), Rakuno Gakuen Univ., Ebetsu, Japan
- D3917** Stable fly, *Stomoxys calcitrans*, phenology on a southern Manitoba, Canada dairy farm. **Kateryn Rochon** (kateryn.rochon@umanitoba.ca)<sup>1</sup> and Kristina Friesen<sup>2</sup>, <sup>1</sup>Univ. of Manitoba, Winnipeg, MB, Canada, <sup>2</sup>USDA - ARS, Lincoln, NE
- D3918** A natural cattle immune response against horn fly salivary antigens may regulate parasite blood intake. **Martín Breijo** (mbreijo@fmed.edu.uy), Lucía Pastro, Sergio Rocha, Ximena Ures, Carmen Bolatto, Cecilia Fernández, and Ana Meikle, Univ. of the Republic, Montevideo, Uruguay
- D3919** Horn fly, *Haematobia irritans*, suppression on pastured beef cattle. **Nancy Hinkle** (nhinkle@uga.edu), Annie Rich, and Brent Phelan, Univ. of Georgia, Athens, GA

## Poster Session 4: Morphology, Systematics, and Phylogeny

### West Hall C (Convention Center)

- D3920** DNA Barcode Technique for molecular identification of stored grain insects and mites. **Yi Wu** (wuyi@chinagrains.org)<sup>1</sup>, Fujun Li<sup>1</sup>, Zhihong Li<sup>2</sup>, Vaclav Stejskal<sup>3</sup>, and Yang Cao<sup>1</sup>, <sup>1</sup>Academy of State Administration of Grain, Beijing, China, <sup>2</sup>China Agricultural Univ., Beijing, China, <sup>3</sup>Crop Research Institute, Prague, Czech Republic
- D3921** Introduction of the Chlaeniini ground-beetles (Coleoptera: Carabidae) from Korea. Ik Je Choi<sup>1</sup>, Jinyoung Park<sup>2</sup>, and **Jong Kyun Park** (entopark@knu.ac.kr)<sup>3</sup>, <sup>1</sup>Korea National Arboretum, Pocheon, South Korea, <sup>2</sup>National Institute of Ecology, Seocheon, South Korea, <sup>3</sup>Kyungpook National Univ., Sangju, South Korea
- D3922** The cerambycid beetles of the genus *Oberea* Dejean, 1835 (Coleoptera: Cerambycidae) from Korea. Kyeongmi Kim<sup>1</sup>, Eun Young Choi<sup>1</sup>, Seok Young Kim<sup>1</sup>, Yang Sook Lim<sup>2</sup>, **Jinyoung Park** (entopark@nie.re.kr)<sup>3</sup>, and Jong Kyun Park<sup>1</sup>, <sup>1</sup>Kyungpook National Univ., Sangju, South Korea, <sup>2</sup>Sangju Persimmon Experiment Station, Sangju, South Korea, <sup>3</sup>National Institute of Ecology, Seocheon, South Korea
- D3923** Diversity and evolution of the ponerine ants of the genus *Leptogenys* (Hymenoptera: Formicidae) from the oriental region. **Koichi Arimoto** (kou.arimoto@gmail.com)<sup>1</sup>, Munetoshi Maruyama<sup>1</sup>, Seiki Yamane<sup>2</sup>, and Fuminori Ito<sup>3</sup>, <sup>1</sup>Kyushu Univ., Fukuoka, Japan, <sup>2</sup>Kagoshima Univ., Kagoshima, Japan, <sup>3</sup>Kagawa Univ., Kagawa, Japan



- D3924** Contribution to taxonomical and biological study of *Heteropsylla cubana* Crawford, phytophagous insect of *Leucaena leucocephala* (Lam.) de Wit. **Nurys Valenciaga Valdés** (nvalenciaga@ica.co.cu)<sup>1</sup>, Miriam Fernández Argudín<sup>2</sup>, and Ciro Mora Díaz<sup>1</sup>, <sup>1</sup>Institute of Animal Science, San José de las Lajas, Cuba, <sup>2</sup>National Center for Animal and Plant Health, San José de las Lajas, Cuba
- D3925** Development of a physiological age grading system for the southern green stink bug. **Brad Elliott** (brad.elliott@ars.usda.gov), Michael Grodowitz, M. Guadalupe Rojas, and Juan Morales-Ramos, USDA - ARS, Stoneville, MS
- D3926** Comparison of morphometric indices in male and female imagoes of *Calliptamus barbarus* (Orthoptera: Acrididae: Calliptaminae) in the region of Jijel (Algeria). **Rouibah Moad** (rouibahm@yahoo.com), Univ. of Jijel, Jijel, Algeria
- D3927** Efficient identification of 40 stingless bee species using geometric morphometric of forewings. **Patricia Daniela Pinhal** (patriciadpinhal@gmail.com)<sup>1</sup> and Tiago Franco<sup>2</sup>, <sup>1</sup>Univ. of São Paulo, Ribeirão Preto, Brazil, <sup>2</sup>Univ. of São Paulo, São Paulo, Brazil
- D3928** Comparison of the sternal spots and carinae of twelve species of North American cuckoo wasps (Hymenoptera: Chrysididae) using scanning electron microscopy. **Robert Conrow** (rtconrow@gmail.com)<sup>1</sup> and Gregory Paulson<sup>2</sup>, <sup>1</sup>Oley, PA, <sup>2</sup>Shippensburg Univ., Shippensburg, PA
- D3929** Proboscis morphology is not a good predictor of the functionality in Saturniidae (Lepidoptera). Shen-horn Yen and **Shih-Hao Tu** (a0976546859@gmail.com), National Sun Yat-Sen Univ., Kaohsiung, Taiwan
- D3930** The ultrastructure of infrabacal pocket in *Camponotus japonicus* Mayr. **Hong He** (hehong@nwsuaf.edu.cn), Jun Zhang, and Cong Wei, Northwest A&F Univ., Yangling, China
- D3931** Phylogenetic prediction: Analytical considerations. **James Hayden** (james.hayden@freshfromflorida.com)<sup>1</sup> and Michelle DaCosta<sup>2</sup>, <sup>1</sup>Florida Dept. of Agriculture and Consumer Services, Gainesville, FL, <sup>2</sup>USDA - APHIS, Miami, FL
- D3932** Higher-level phylogeny of Plecoptera based on molecular data. **Zhi-Teng Chen** (741208116@qq.com) and Yuzhou Du, Yangzhou Univ., Yangzhou, China
- D3933** Cladistic analysis of Catacanthini Atkinson, 1888 (Hemiptera: Heteroptera: Pentatomidae: Pentatominae). Jocelia Grazia<sup>1</sup>, **Brenda Fürstenau** (brendabianca@gmail.com)<sup>1</sup>, and Cristiano Schwertner<sup>2</sup>, <sup>1</sup>Federal Univ. of Rio Grande, Porto Alegre, Brazil, <sup>2</sup>Federal Univ. of São Paulo, Diadema, Brazil
- D3934** A comparison of wing flexural stiffness in butterflies within a Batesian mimicry complex. **Laura Unfried** (lunfried@eagles.usi.edu), Andrew Hamilton, and Eric McCloud, Univ. of Southern Indiana, Evansville, IN
- D3935** A comparison of wing toughness in a Batesian mimicry complex. **Andrew Hamilton** (akhamilton1@eagles.usi.edu), Laura Unfried, and Eric McCloud, Univ. of Southern Indiana, Evansville, IN
- D3936** Elliptic fourier analysis of the forewing and pronotum outline shape of male and female of *Rhipibruchus jujuyensis*. (Coleoptera: Chrysomelidae: Bruchinae). **Voyko Flores-Rocha** (voyyyko@gmail.com)<sup>1</sup>, Maria Avila<sup>2</sup>, and Susana Muruaga de L. Argentier<sup>3</sup>, <sup>1</sup>National Univ. of Salta, Salta, Argentina, <sup>2</sup>National Agricultural Technology Institute, Salta, Argentina, <sup>3</sup>National Univ. of Jujuy, Jujuy, Argentina
- D3937** Phylogenetics of Pteromalidae: Can it be done? Should it be done? Will anyone accept the answers? **Roger A. Burks** (burks.roger@gmail.com) and John M. Heraty, Univ. of California, Riverside, CA
- D3938** Phylogenetic relationships of the flesh fly genus *Ravinia* (Diptera: Sarcophagidae). **Gregory A. Dahlem** (dahlem@nku.edu)<sup>1</sup>, Evan Wong<sup>2</sup>, and Ronald W. DeBry<sup>2</sup>, <sup>1</sup>Northern Kentucky Univ., Highland Heights, KY, <sup>2</sup>Univ. of Cincinnati, Cincinnati, OH
- D3939** Excess power index: A sexually dimorphic trait in bees. **Cindy Vigueira** (cvigueir@highpoint.edu)<sup>1</sup>, Patrick Vigueira<sup>1</sup>, and Joshua Campbell<sup>2</sup>, <sup>1</sup>High Point Univ., High Point, NC, <sup>2</sup>Univ. of Florida, Gainesville, FL
- D3940** Laboulbeniales fungal ectoparasites on cave arthropods: Remarkable models for ecology and evolution. Danny Haelewaters<sup>1</sup>, Sergi Santamaria<sup>2</sup>, Donald Pfister<sup>1</sup>, Henrik Enghoff<sup>3</sup>, and **Ana Sofia Reboleira** (sreboleira@snm.ku.dk)<sup>3</sup>, <sup>1</sup>Harvard Univ., Cambridge, MA, <sup>2</sup>Autonomous Univ. of Barcelona, Bellaterra, Spain, <sup>3</sup>Natural History Museum, Copenhagen, Denmark
- D3941** A review of the New World leafhopper tribe Faltalini (Hemiptera: Cicadellidae: Deltocephalinae) and discovery of new genera and species. **James Zahniser** (james.n.zahniser@aphis.usda.gov), USDA - APHIS, San Diego, CA
- D3942** Molecular identification of *Helicoverpa armigera* from northwestern Argentina. **Maria Avila** (agranoelia@hotmail.com)<sup>1</sup>, Marta Galvan<sup>2</sup>, Voyko Flores-Rocha<sup>3</sup>, and German San Blas<sup>4,5</sup>, <sup>1</sup>National Agricultural Technology Institute, Salta, Argentina, <sup>2</sup>National Scientific and Technical Research Council, Salta, Argentina, <sup>3</sup>National Univ. of Salta, Salta, Argentina, <sup>4</sup>National Univ. of La Pampa, La Pampa, Argentina, <sup>5</sup>National Scientific and Technical Research Council, La Pampa, Argentina
- D3943** Some new species of the Rosaceae-feeding *Ectoedemia* in Japan (Lepidoptera: Nepticulidae). **Sadahisa Yagi** (yagi.sadahisa@gmail.com)<sup>1</sup>, Nagao Hirano<sup>2</sup>, and Toshiya Hirowatari<sup>1</sup>, <sup>1</sup>Kyushu Univ., Fukuoka, Japan, <sup>2</sup>Matsumoto, Japan
- D3944** Discovery of multiple cryptic species of the *Auplopus carbonarius* species-complex (Hymenoptera: Pompilidae). **Hiroaki Kurushima** (kurushima-hiroaki@ed.tmu.ac.jp) and Akira Shimizu, Tokyo Metropolitan Univ., Hachioji, Japan
- D3945** Presentation withdrawn
- D3946** New species of the entomobryomorpha (Hexapoda: Collembola) from South Korea. **Hakseo Kim** (goodkimseo@gmail.com), Chonbuk National Univ., Jeonju, South Korea



- D3947** The immature stages, larval host plants and biology of oriental poritiine butterflies (Lepidoptera: Lycaenidae: Poritiinae). **Masaya Yago** (myago@um.u-tokyo.ac.jp)<sup>1</sup>, Seiya Kudo<sup>2</sup>, Yoshichika Aoki<sup>3</sup>, Tadashi Kudo<sup>4</sup>, Michael Braby<sup>5</sup>, Koji Takayama<sup>6</sup>, and Hiroshi Ikeda<sup>1</sup>, <sup>1</sup>The Univ. Museum, The Univ. of Tokyo, Tokyo, Japan, <sup>2</sup>Hirosaki Univ., Aomori, Japan, <sup>3</sup>Matsumoto Mushi-no-Kai, Nagano, Japan, <sup>4</sup>The Lepidopterological Society of Japan, Aomori, Japan, <sup>5</sup>The Australian National Univ., Canberra, Australia, <sup>6</sup>Museum of Natural and Environmental History, Shizuoka, Japan
- D3948** Morphology, systematics, and phylogeny of sub-family of Gomphocerinae (Orthoptera: Acrididae). **Zina Sofrane** (sofranezina1@yahoo.fr)<sup>1</sup>, Simon Dupont<sup>2</sup>, Salaheddine Doumandji<sup>3</sup>, and Anne-Genevieve Bagnere<sup>2</sup>, <sup>1</sup>Univ. Ferhat Abbas Sétif, Setif, Algeria, <sup>2</sup>Univ. of Tours, Tours, France, <sup>3</sup>National Higher School of Agronomy, El-Harrach, Algeria
- D3949** DNA-based species delimitation within the flesh fly genus *Ravinia* (Diptera: Sarcophagidae). **Ronald DeBry** (ron.debry@uc.edu)<sup>1</sup>, Evan S. Wong<sup>1</sup>, and Gregory A. Dahlem<sup>2</sup>, <sup>1</sup>Univ. of Cincinnati, Cincinnati, OH, <sup>2</sup>Northern Kentucky Univ., Highland Heights, KY
- D3950** Systematic review and meta-analysis of the prey-attraction and predator-defence hypotheses for web decorations in *Argiope* and *Cyclosa* spiders. **Dumas Gálvez** (dumas.galvez@mail.com), INDICASAT AIP, Panama, Panama
- D3951** *Tipula* (*Nippotipula*) *abdominalis* (Say, 1823) (Diptera: Tipulidae), a common eastern Nearctic shredder crane fly, is actually three species. **Jon K. Gelhaus** (gelhaus@ansp.org)<sup>1</sup>, Vaughn Shirey<sup>1</sup>, and Yan Li<sup>2</sup>, <sup>1</sup>Drexel Univ., Philadelphia, PA, <sup>2</sup>Shenyang Agricultural Univ., Shenyang, China
- D3952** Species diversity and speciation of physogastric rove beetles associated with *Longipeditermes longipes* in Southeast Asia. **Taisuke Kanao** (kanatai1225@gmail.com) and Munetoshi Maruyama, Kyushu Univ., Fukuoka, Japan
- D3953** Unrecognized *Glyphomerus* species associated with gall wasps in western North America. **Chris Looney** (clooney@agr.wa.gov)<sup>1</sup> and James Strange<sup>2</sup>, <sup>1</sup>Washington State Dept. of Agriculture, Olympia, WA, <sup>2</sup>USDA - ARS, Logan, UT
- D3954** Taxonomic review to subgeneric and species level of *Augochloropsis* (Hymenoptera: Halictidae). **Cindy Julieth Celis** (cindy.celis1@gmail.com) and Jose Ricardo Cure, Nueva Granada Military University, Cajica, Colombia
- D3955** Presentation withdrawn
- D3956** Biology and taxonomy of *Plutella* species in Australia. **Tharanga Kariyawasam** (tharanga.kankanamge@hdr.qut.edu.au)<sup>1</sup>, Stephen Cameron<sup>2</sup>, Mark Schutze<sup>2</sup>, and Caroline Hauxwell<sup>1</sup>, <sup>1</sup>Queensland Univ. of Technology, Brisbane, Australia, <sup>2</sup>Plant Biosecurity Cooperative Research Centre, Bruce, Australia
- D3957** Revision of the genus *Gymnoscirtetes* (Orthoptera: Acrididae). **JoVonn Hill** (jgh4@entomology.msstate.edu), Mississippi State Univ., Mississippi State, MS
- D3958** Molecular taxonomy: A not so straightforward path to insect species identification. **Mauricio Montero-Astúa** (mauricio.monteroastua@ucr.ac.cr)<sup>1</sup>, Ericka Valverde-Ortiz<sup>1</sup>, Adonay Zúñiga Centeno<sup>1</sup>, Izayana Sandoval Carvajal<sup>1</sup>, Nicolás Pérez Hidalgo<sup>2</sup>, Grace Alpizar<sup>3</sup>, Laura Garita<sup>1</sup>, and William Villalobos<sup>1</sup>, <sup>1</sup>Univ. of Costa Rica, San José, Costa Rica, <sup>2</sup>Univ. of León, León, Spain, <sup>3</sup>State Plant Protection Service, Alajuela, Costa Rica
- D3959** A taxonomic study on the subfamily Braconinae (Hymenoptera: Braconidae) from China. **Yang Li** (xly105@163.com), Jun-hua He, and Xue-xin Chen, Zhejiang Univ., Hangzhou, China
- D3960** The good, the bad, and the ugly: The wild, wild west of specimen databasing. **Luciana Musetti** (musetti.2@osu.edu), Sara Hemly, Matt Elder, and Norman Johnson, The Ohio State Univ., Columbus, OH
- D3961** Review of Genus *Cryptorhynchus* Illiger and related genera in Japan (Coleoptera: Curculionidae). **Naomichi Tsuji** (64kurasawaterechus@gmail.com) and Katsura Morimoto, Kyushu Univ., Fukuoka, Japan
- D3962** Comparison of preservation methods for DNA extraction from *Tabanus bifarius* Lowe 1858 (Diptera: Tabanidae). **Ali Kilic** (aykilic@anadolu.edu.tr) and Sumeyra Sanal Demirci, Anadolu Univ., Eskisehir, Turkey
- D3963** Taxonomy of the genus *Pilophorus* Hahn from Nepal (Heteroptera: Miridae: Phyllinae: Pilophorini). **Ram Keshari Duwal** (ramkeshariduwal@gmail.com)<sup>1</sup>, Tomohide Yasunaga<sup>2</sup>, and Toshiya Hirowatari<sup>1</sup>, <sup>1</sup>Kyushu Univ., Fukuoka, Japan, <sup>2</sup>American Museum of Natural History, New York, NY
- D3964** Application of DNA barcoding to sawfly (Hymenoptera: Symphyta) taxonomy. **Nathan M. Schiff** (nschiff@fs.fed.us)<sup>1</sup>, David Smith<sup>2</sup>, Aaron Lancaster<sup>1</sup>, and Brian E. Scheffler<sup>3</sup>, <sup>1</sup>USDA - Forest Service, Stoneville, MS, <sup>2</sup>USDA - ARS, Washington, DC, <sup>3</sup>USDA - ARS, Stoneville, MS
- D3965** DNA barcoding of Japanese scarabaeoid beetles (Coleoptera, Scarabaeoidea). **Tadatsugu Hosoya** (tadatsugu.hosoya.848@m.kyushu-u.ac.jp), Kyushu Univ., Fukuoka, Japan
- D3966** Scope of University of Central Florida Collection of Arthropods: A growing collection. **Shiala Naranjo** (smorales20@knights.ucf.edu), Sandor Kelly, Erin Barbeau, Brian Silverman, and Ryan Ridenbaugh, Univ. of Central Florida, Orlando, FL

### Symposium: Forest Entomology without Borders: Balancing Market Forces with Government Intervention

#### Room W222 A (Convention Center)

**Moderator and Organizer:** Kimberly F. Wallin, Univ. of Vermont, Burlington, VT

- 9:15 **3690** Southern pine beetle infestations in relation to forest stand conditions, previous thinning, and prescribed burning. John T. Nowak<sup>1</sup>, James R. Meeker<sup>2</sup>, Chris Steiner<sup>2</sup>, and **David Coyle** (drcoyle@uga.edu)<sup>3</sup>, <sup>1</sup>USDA - Forest Service, Asheville, NC, <sup>2</sup>USDA - Forest Service, Pineville, LA, <sup>3</sup>Univ. of Georgia, Athens, GA

- 9:30 **3691** Emerging forest insect management issues in the Southwestern US: Insects, droughts, and megafires. **Monica Gaylord** (monicalgaylord@fs.fed.us)<sup>1</sup>, John Anhold<sup>1</sup>, Christopher J. Fettig<sup>2</sup>, and Andrew Graves<sup>3</sup>, <sup>1</sup>USDA - Forest Service, Flagstaff, AZ, <sup>2</sup>USDA - Forest Service, Davis, CA, <sup>3</sup>USDA - Forest Service, Albuquerque, NM
- 9:45 **3692** Recognizing human impacts on the estimated phylogeographic structure of indigenous exotic forest pest populations in North America. **Andrew Graves** (adgraves@fs.fed.us)<sup>1</sup>, Tom W. Coleman<sup>1</sup>, and Steven Seybold<sup>2</sup>, <sup>1</sup>USDA - Forest Service, Albuquerque, NM, <sup>2</sup>USDA - Forest Service, Davis, CA
- 10:00 **3693** Wildfire likelihood and severity following bark beetle and defoliator outbreaks in Pacific Northwest forests. Garrett Meigs<sup>1</sup>, John Bailey<sup>2</sup>, John Campbell<sup>2</sup>, William Keeton<sup>1</sup>, Robert Kennedy<sup>2</sup>, David Shaw<sup>2</sup>, Harold Zald<sup>2</sup>, and **Kimberly Wallin** (kwallin@uvm.edu)<sup>1</sup>, <sup>1</sup>Univ. of Vermont, Burlington, VT, <sup>2</sup>Oregon State Univ., Corvallis, OR
- 10:15 BREAK**
- 10:30 **3694** Habitat heterogeneity and behavior of forest Coleoptera: Implications for monitoring and management. **Brian L. Strom** (brianstrom@fs.fed.us)<sup>1</sup>, Sheri L. Smith<sup>2</sup>, Harold W. Thistle<sup>3</sup>, James R. Meeker<sup>1</sup>, and Jeremy D. Allison<sup>4</sup>, <sup>1</sup>USDA - Forest Service, Pineville, LA, <sup>2</sup>USDA - Forest Service, Susanville, CA, <sup>3</sup>USDA - Forest Service, Morgantown, WV, <sup>4</sup>Natural Resources Canada, Sault Ste. Marie, ON, Canada
- 10:45 **3695** Relieving pressure on native mahogany resources in West Africa: Overcoming the limitations on plantation mahogany imposed by the mahogany shoot borer, *Hypsipyla robusta*. **Andrew J. Storer** (storer@mtu.edu)<sup>1</sup> and Emmanuel Opuni Frimpong<sup>2</sup>, <sup>1</sup>Michigan Technological Univ., Houghton, MI, <sup>2</sup>Forest Research Institute, Kumasi, Ghana
- 11:00 **3696** Using forest insects to link biodiversity modeling and conservation management in an invaded North American Forest. **R. Talbot Trotter** (rtrotter@fs.fed.us), USDA - Forest Service, Hamden, CT
- 11:15 **3697** Looking for black and white in the grey: Variation in invasion success and management challenges in a global community. Patrick Tobin<sup>1</sup>, Travis Marisco<sup>2</sup>, Kathryn Thomas<sup>3</sup>, Daniel Herms<sup>4</sup>, and **Angela Mech** (angmech@uw.edu)<sup>1</sup>, <sup>1</sup>Univ. of Washington, Seattle, WA, <sup>2</sup>Arkansas State Univ., Jonesboro, AR, <sup>3</sup>U.S. Geological Survey, Tucson, AZ, <sup>4</sup>The Ohio State Univ., Wooster, OH
- 11:30 **3698** Measuring and modeling forest ecosystem service trade-offs of salvage logging following wind disturbances. **Kimberly F. Wallin** (kwallin@uvm.edu)<sup>1,2</sup>, Sarah Pears<sup>1</sup>, Jon Erickson<sup>1</sup>, and Eduardo Rodriguez<sup>1</sup>, <sup>1</sup>Univ. of Vermont, Burlington, VT, <sup>2</sup>USDA - Forest Service, Burlington, VT

## Symposium: The Brown Marmorated Stink Bug: An Invasive Insect of Global Importance

### Room W223 A (Convention Center)

**Moderators and Organizers:** George C. Hamilton<sup>1</sup>, Tracy C. Leskey<sup>2</sup>, and Anne L. Nielsen<sup>3</sup>, <sup>1</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, <sup>2</sup>USDA - ARS, Kearneysville, WV, <sup>3</sup>Rutgers, The State Univ. of New Jersey, Bridgeton, NJ

- 9:15 **3699** Introduction and spread of BMSB in North America. **George C. Hamilton** (hamilton@aesop.rutgers.edu), Rutgers, The State Univ. of New Jersey, New Brunswick, NJ
- 9:30 **3700** Introduction and spread of BMSB in Europe. **Tim Hays** (t.hays@cabi.org), CABI, Delémont, Switzerland
- 9:45 **3701** Occurrence and damage of BMSB in Japan. **Ken Funayama** (funayamak@pref.akita.lg.jp), Akita Fruit-Tree Experiment Station, Yokote, Japan
- 10:00 **3702** Deciphering an invader's population ecology: *Halyomorpha halys*. **Anne L. Nielsen** (nielsen@aesop.rutgers.edu)<sup>1</sup>, Shi Chen<sup>2</sup>, and Shelby J. Fleischer<sup>3</sup>, <sup>1</sup>Rutgers, The State Univ. of New Jersey, Bridgeton, NJ, <sup>2</sup>North Carolina State Univ., Raleigh, NC, <sup>3</sup>Pennsylvania State Univ., University Park, PA

### 10:15 BREAK

- 10:30 **3703** Genetic diversity and pathways of entry of *Halyomorpha halys* in recently invaded areas. **Tara Garipey** (tara.garipey@agr.gc.ca)<sup>1</sup>, Tim Hays<sup>2</sup>, and Hannah Fraser<sup>3</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, London, ON, Canada, <sup>2</sup>CABI, Delémont, Switzerland, <sup>3</sup>Ontario Ministry of Agriculture, Food and Rural Affairs, Vineland, ON, Canada
- 10:45 **3704** Current research status on *Halyomorpha halys* (Hemiptera: Pentatomidae) in South Korea. **Doo-Hyung Lee** (dl343@gachon.ac.kr), Minhyung Jung, and Soowan Kim, Gachon Univ., Seongnam, South Korea
- 11:00 **3705** Spatial movement of BMSB in agricultural systems. **Yong-Lak Park** (yong-lak.park@mail.wvu.edu), West Virginia Univ., Morgantown, WV
- 11:15 **3706** Behaviorally-based management of BMSB. **Tracy C. Leskey** (tracy.leskey@ars.usda.gov)<sup>1</sup>, Brent Short<sup>1</sup>, William R. Morrison<sup>1</sup>, Anne Nielsen<sup>2</sup>, Brett Blaauw<sup>2</sup>, Grzegorz Krawczyk<sup>3</sup>, and J. Christopher Bergh<sup>4</sup>, <sup>1</sup>USDA - ARS, Kearneysville, WV, <sup>2</sup>Rutgers, The State Univ. of New Jersey, Bridgeton, NJ, <sup>3</sup>Pennsylvania State Univ., Biglerville, PA, <sup>4</sup>Virginia Polytechnic Institute and State Univ., Winchester, VA
- 11:30 **3707** Asian remedy for an invasive Asian pest? Biological control of brown marmorated stink bug. **Kim A. Hoelmer** (kim.hoelmer@ars.usda.gov)<sup>1</sup> and Christine Dieckhoff<sup>1,2</sup>, <sup>1</sup>USDA - ARS, Newark, DE, <sup>2</sup>Univ. of Delaware, Newark, DE



## Symposium: Evolution of Insect Sociality: From Theory to Genomes and Back Again

## Room W414 A (Convention Center)

**Moderators and Organizers:** Amro Zayed<sup>1</sup> and Amy L. Toth<sup>2</sup>,  
<sup>1</sup>York Univ., Toronto, ON, Canada, <sup>2</sup>Iowa State Univ., Ames, IA

- 9:15 **3708** Evolutionary genomics of post-developmental phenotypic novelty. **Brian Johnson** (laertes74@gmail.com), Wei Lin, and Abbas Mohamed, Univ. of California, Davis, CA
- 9:30 **3709** The importance of direct and indirect selection in corbiculate bees. **Brock Harpur** (harpur@yorku.ca), Alivia Dey, and Amro Zayed, York Univ., Toronto, ON, Canada
- 9:45 **3710** Origins of social plasticity in bees. **Karen Kapheim** (karen.kapheim@usu.edu), Utah State Univ., Logan, UT
- 10:00 **3711** Social transitions and behavioural plasticity in simple societies of eusocial insects. **Seirian Sumner** (seirian.sumner@bristol.ac.uk), Univ. of Bristol, Bristol, United Kingdom
- 10:15 BREAK**
- 10:30 **3712** Genomic signatures of social evolution in pharaoh ants (*Monomorium pharaonis*). Michael Warner<sup>1</sup>, Alexander Mikheyev<sup>2</sup>, and **Timothy A. Linksvayer** (tlinks@sas.upenn.edu)<sup>1</sup>, <sup>1</sup>Univ. of Pennsylvania, Philadelphia, PA, <sup>2</sup>Okinawa Institute of Science and Technology, Onna, Japan
- 10:45 **3713** The evolution of social chromosomes. **Yannick Wurm** (y.wurm@qmul.ac.uk), Queen Mary Univ. of London, London, United Kingdom
- 11:00 **3714** Testing the kinship theory of intragenomic conflict in honey bees (*Apis mellifera*). **Christina M. Grozinger** (cmgrozinger@psu.edu)<sup>1</sup>, David Galbraith<sup>1</sup>, Sarah Kocher<sup>2</sup>, Tom Glenn<sup>3</sup>, Istvan Albert<sup>1</sup>, Greg J. Hunt<sup>4</sup>, Joan Strassmann<sup>5</sup>, and David Queller<sup>5</sup>, <sup>1</sup>Pennsylvania State Univ., University Park, PA, <sup>2</sup>Princeton Univ., Princeton, NJ, <sup>3</sup>Glen Apiaries, Fallbrook, CA, <sup>4</sup>Purdue Univ., West Lafayette, IN, <sup>5</sup>Washington Univ., St. Louis, MO
- 11:15 **3715** Genomics of *Ceratina* small carpenter bees: What early insect societies can tell us about the evolution of sociality. **Sandra Rehan** (sandra.rehan@gmail.com), Univ. of New Hampshire, Durham, NH
- 11:30 **3716** Ontogenetic shifts in gene expression among social insect castes reveal old genes for developmental novelty. **Chris R. Smith** (crsmith.ant@gmail.com), Earlham College, Richmond, IN
- 11:45 **3717** *Polistes* wasps: A model genus for social theory in the genomic era. **Amy L. Toth** (amytoth@iastate.edu), Iowa State Univ., Ames, IA
- 12:00 **3718** Molecular determinants of behavioral plasticity in a facultatively eusocial bee, *Megalopta genalis*. **Beryl M. Jones** (bmjones2@illinois.edu)<sup>1</sup>, Callum Kingwell<sup>2</sup>, William Wcislo<sup>3</sup>, and Gene E. Robinson<sup>1</sup>, <sup>1</sup>Univ. of Illinois, Champaign, IL, <sup>2</sup>Cornell Univ., Ithaca, NY, <sup>3</sup>Smithsonian Tropical Research Institute, Panama City, Panama

## Symposium: Insects and Ecosystem Services with Special Reference to Pollination Biology

## Room W224 A (Convention Center)

**Moderator and Organizer:** O. K. Remadevi<sup>1,2</sup>, <sup>1</sup>Institute of Wood Science & Technology, Bangalore, India, <sup>2</sup>Environmental Management and Policy Research Institute, Bangalore, India

This symposium is generously sponsored the Royal Entomological Society.



- 9:15 **3719** Native pollinators as key ecosystem service providers: A case study with mango (*Mangifera indica* L.) in India. **P. V. Rami Reddy** (pvreddy2011@gmail.com), Indian Institute of Horticultural Research, Bangalore, India
- 9:30 **3720** Pollination biology and the role of insect pollinators in conservation of mangroves in west coast of India. **O. K. Remadevi** (okremadevi@gmail.com)<sup>1,2</sup>, <sup>1</sup>Environmental Management and Policy Research Institute, Bangalore, India, <sup>2</sup>Institute of Wood Science & Technology, Bangalore, India
- 9:45 **3721** Genome comparison of *Nosema* species from honey bees and other members of the *Nosema/Vairimorpha* clade. **Charles Vossbrinck** (charles.vossbrinck@ct.gov), Connecticut Agricultural Experiment Station, New Haven, CT
- 10:00 **3722** Comparative ontogeny of key behaviours in the Western and Eastern honey bees. **Hema Somanathan** (hsomanathan@iisertvm.ac.in), Indian Institute of Science Education and Research, Thiruvananthapuram, India
- SD3723** Ecosystem conservation by mulberry sericulture practices in India. **E. Muniraju** (emuniraju@yahoo.com), Karnataka State Sericulture Research & Development Institute, Bangalore, India
- 10:15 BREAK AND POSTER SESSION**
- 10:30 **3724** Degradation of soil fertility can cancel pollination benefits in sunflower. **Giovanni Tamburini** (giovanni.tamburini@unipd.it), Univ. of Padova, Legnaro, Italy
- 10:45 **3725** Black-coloured Muga silk moth, *Antheraea assamensis* Helfer (Lepidoptera: Saturniidae), from Assam (India): Second best example of "industrial melanism". **Rajesh Kumar** (rajesh.ento@gmail.com), Central Muga Eri Research & Training Institute, Jorhat, India
- 11:00 **3726** Microsporidia – a sooner or later threat to beekeeping in Coorg and Waynad districts of South India. **T. O. Sasidharan** (tosasi@atree.org), Ashoka Trust for Research in Ecology and the Environment, Bangalore, India

- 11:15 **3727** Butterfly diversity and role of butterflies in ecosystem services and development of ecotourism in Western Ghats. T. V. Mohandas<sup>1</sup> and **O. K. Remadevi** (okremadevi@gmail.com)<sup>2</sup>, <sup>1</sup>Karnataka Forest Development, Bangalore, India, <sup>2</sup>Institute of Wood Science & Technology, Bangalore, India
- 11:30 **3728** Insect diversity for ecosystem services – Indian perspective. **Kailash Chandra** (kailash611@rediffmail.com), Zoological Survey of India, Kolkata, India
- 11:45 **3729** A comparative study on the insect diversity of two protected areas in southern Western Ghats, Kerala, India, with special reference to their ecological function. **Gigi K. Joseph** (gigiperiyar@yahoo.co.in), Nirmala College, Muvattupuzha, India

### Symposium: Partners in Crime: Vector-Pathogen Interactome

#### Room W232 C (Convention Center)

**Moderators and Organizers:** Cecilia Tamborindeguy<sup>1</sup> and Michelle Cilia<sup>2</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>USDA - ARS, Ithaca, NY

- 9:15 **3730** Investigating psyllid-*Liberibacter* transcriptional dialog. **Cecilia Tamborindeguy** (ctamborindeguy@tamu.edu) and Freddy Ibanez, Texas A&M Univ., College Station, TX
- 9:45 **3731** Bacterial adaptative strategies inside host cells: *Ehrlichia* as a case-study. **Damien Meyer** (damien.meyer@gmail.com), CIRAD, Petit Bourg, Guadeloupe; INRA, Montpellier, France
- 10:00 **3732** Multitasking: How single bacterial virulence proteins modulate plant development and attract insect vectors. **Zigmunds Orlovskis** (zigmunds.orlovskis@jic.ac.uk)<sup>1</sup>, Pascal Pecher<sup>1</sup>, Vera Thole<sup>1</sup>, Cristina Canale<sup>1,2</sup>, Gabriele Moro<sup>1</sup>, Akiko Sugio<sup>1</sup>, Allyson MacLean<sup>1</sup>, Joao R. S. Lopes<sup>2</sup>, and Saskia A. Hogenhout<sup>1</sup>, <sup>1</sup>The John Innes Centre, Norwich, United Kingdom, <sup>2</sup>Univ. of São Paulo, Piracicaba, Brazil
- 10:15 BREAK**
- 10:30 **3733** Rapid isolation of aphid-virus protein complexes from viruliferous insects using affinity purification-mass spectrometry. **Stacy DeBlasio** (sld98@cornell.edu)<sup>1</sup>, Richard Johnson<sup>2</sup>, Murad Ghanim<sup>3</sup>, Michael MacCoss<sup>2</sup>, and Michelle Cilia<sup>1</sup>, <sup>1</sup>USDA - ARS, Ithaca, NY, <sup>2</sup>Univ. of Washington, Seattle, WA, <sup>3</sup>Agricultural Research Organisation, Bet-Dagan, Israel
- 10:45 **3734** New proteins involved in the interaction between tomato yellow leaf curl virus in its whitefly vector *Bemisia tabaci* B biotype. **Murad Ghanim** (ghanim@volcani.agri.gov.il), Pakkianathan Britto Cathrin, Svetlana Kontsedalov, Galina Lebedev and Surapathrudu Kanakala, Agricultural Research Organisation, Bet-Dagan, Israel
- 11:00 **3735** Proteins shared by nymph and adult *Ixodes scapularis* tick saliva. **Željko Radulović** (sradul@yahoo.com), Lindsay Porter, Tae Kim, and Albert Mulenga, Texas A&M Univ., College Station, TX

### Symposium: Keeping Science in Citizen Science

#### Room W315 A (Convention Center)

**Moderators and Organizers:** Kathleen Prudic<sup>1</sup>, Maxim Larrivière<sup>2</sup>, and Kent McFarland<sup>3</sup>, <sup>1</sup>Univ. of Arizona, Tucson, AZ, <sup>2</sup>Montréal Insectarium Space for Life, Montréal, QC, Canada, <sup>3</sup>Vermont Center for Ecostudies, Norwich, VT

- 9:15 **3736** Keeping science in citizen science: Successful scientific discovery in entomology with an all-volunteer army. **Kathleen Prudic** (klprudic@email.arizona.edu)<sup>1</sup>, Kent McFarland<sup>2</sup>, and Maxim Larrivière<sup>3</sup>, <sup>1</sup>Univ. of Arizona, Tucson, AZ, <sup>2</sup>Vermont Center for Ecostudies, Norwich, VT, <sup>3</sup>Montréal Insectarium Space for Life, Montréal, QC, Canada
- 9:30 **3737** The bees' needs: Integrating ecological research and outreach. **Virginia L. Scott** (virginia.scott@colorado.edu)<sup>1</sup>, Alexandra Rose<sup>1</sup>, Adrian L. Carper<sup>2</sup>, and M. Deane Bowers<sup>2</sup>, <sup>1</sup>Univ. of Colorado Museum of Natural History, Boulder, CO, <sup>2</sup>Univ. of Colorado, Boulder, CO
- 9:45 **3738** Climate change, butterfly conservation, and citizen science in Massachusetts and Alaska. **Greg Breed** (gabreed@alaska.edu)<sup>1</sup>, Kathryn Daly<sup>1</sup>, Derek S. Sikes<sup>1</sup>, Sharon Stitche<sup>2</sup>, and Elizabeth Crone<sup>3</sup>, <sup>1</sup>Univ. of Alaska, Fairbanks, AK, <sup>2</sup>Massachusetts Butterfly Club, Fairbanks, AK, <sup>3</sup>Tufts Univ., Medford, MA
- 10:00 **3739** The butterflies and the bees: Statewide atlas in Vermont with citizen scientists jumpstarts conservation. **Kent McFarland** (kmcfarland@vtcostudies.org)<sup>1</sup>, Sara Zahendra<sup>1</sup>, Leif Richardson<sup>2</sup>, and Bryan Pfeiffer<sup>1,2</sup>, <sup>1</sup>Vermont Center for Ecostudies, Norwich, VT, <sup>2</sup>Univ. of Vermont, Burlington, VT
- 10:15 BREAK**
- 10:30 **3740** Butterfly biodiversity, conservation, and citizen science in urban Los Angeles. **Elizabeth C. Long** (elong@nhm.org), Natural History Museum, Los Angeles, CA; Mohonk Preserve, Gardiner, NY
- 10:45 **3741** Using machine learning in insect conservation and biodiversity research. **Rebecca Hutchinson** (rah@eecs.oregonstate.edu)<sup>1</sup>, Kathleen Prudic<sup>2</sup>, and Weng-Keen Wong<sup>1</sup>, <sup>1</sup>Oregon State Univ., Corvallis, OR, <sup>2</sup>Univ. of Arizona, Tucson, AZ
- 11:00 **3742** eButterfly and monarch migration in Canada. **Maxim Larrivière** (maxim.larrivee@ville.montreal.qc.ca)<sup>1</sup>, Jeremy Kerr<sup>2</sup>, Paul Galpern<sup>3</sup>, Dominique Berteaux<sup>4</sup>, and Nicolas Casajus<sup>4</sup>, <sup>1</sup>Montréal Insectarium Space for Life, Montréal, QC, Canada, <sup>2</sup>Univ. of Ottawa, Ottawa, ON, Canada, <sup>3</sup>Univ. of Calgary, Calgary, AB, Canada, <sup>4</sup>Univ. of Quebec, Rimouski, QC, Canada



## Symposium: Making Species Inventories Work for You: Diverse Uses Across Varied Fields

### Room W224 B (Convention Center)

**Moderators and Organizers:** Michael Orr and Emily A. Sadler, Utah State Univ., Logan, UT

- 9:15 **3743** Conserved natural areas: Unexplored repositories of bee diversity. **Terry Griswold** (terry.griswold@ars.usda.gov)<sup>1</sup>, John S. Ascher<sup>2</sup>, Doug Yanega<sup>3</sup>, Harold Ikerd<sup>1</sup>, Olivia Messinger Carril<sup>4</sup>, Joan M. Meiners<sup>5</sup>, Rebekah Andrus-Nelson<sup>6</sup>, and James Herndon<sup>6</sup>, <sup>1</sup>USDA - ARS, Logan, UT, <sup>2</sup>National Univ. of Singapore, Singapore, Singapore, <sup>3</sup>Univ. of California, Riverside, CA, <sup>4</sup>Southern Illinois Univ., Carbondale, IL, <sup>5</sup>Univ. of Florida, Gainesville, FL, <sup>6</sup>Utah State Univ., Logan, UT
- 9:30 **3744** Catching them all: A case study in sampling arthropod diversity. **Michael Skvarla** (mskvarla36@gmail.com) and Ashley P. G. Dowling, Univ. of Arkansas, Fayetteville, AR
- 9:45 **3745** The gall of some wasps: A small look into a large collection. **Crystal McEwen** (clmcewen@gmail.com)<sup>1</sup>, Charles Mitter<sup>1</sup>, and Michael Gates<sup>2</sup>, <sup>1</sup>Univ. of Maryland, College Park, MD, <sup>2</sup>USDA - ARS, Washington, DC
- 10:00 **3746** Worldwide collections of sand flies (Psychodidae: Phlebotominae) to assess insecticide resistance. **David Denlinger** (david.denlinger@aggiemail.usu.edu)<sup>1</sup>, Yvonne-marie Linton<sup>2</sup>, Zachariah Gompert<sup>1</sup>, and Scott A. Bernhardt<sup>1</sup>, <sup>1</sup>Utah State Univ., Logan, UT, <sup>2</sup>Walter Reed Biosystematics Unit, Suitland, MD
- 10:15 BREAK**
- 10:30 **3747** A wasp's tale: Understanding the present by revealing the past (Hymenoptera: Chyphotidae, Mutillidae, and Tiphiidae). **Emily A. Sadler** (sadler.e@gmail.com) and James P. Pitts, Utah State Univ., Logan, UT
- 10:45 **3748** Inside job: An inventory of bumble bee parasites and pathogens in the US. **Amber D. Tripodi** (amber.tripodi@ars.usda.gov) and James Strange, USDA - ARS, Logan, UT
- 11:00 **3749** What can inventories tell us about bee phenology? **Michael Orr** (michael.christopher.orr@gmail.com)<sup>1</sup>, Joan M. Meiners<sup>2</sup>, Olivia Messinger Carril<sup>3</sup>, James P. Pitts<sup>1</sup>, and Terry Griswold<sup>4</sup>, <sup>1</sup>Utah State Univ., Logan, UT, <sup>2</sup>Univ. of Florida, Gainesville, FL, <sup>3</sup>Southern Illinois Univ., Carbondale, IL, <sup>4</sup>USDA - ARS, Logan, UT

## Symposium: Advancement and Challenges in Biological Control of Invasive Forest Insects: A Global Perspective

### Room W232 B (Convention Center)

**Moderators and Organizers:** Juli Gould<sup>1</sup>, Leah S. Bauer<sup>2</sup>, Xiao-yi Wang<sup>3</sup>, and Jian Duan<sup>4</sup>, <sup>1</sup>USDA - APHIS, Buzzards Bay, MA, <sup>2</sup>USDA - Forest Service, Lansing, MI, <sup>3</sup>Chinese Academy of Forestry, Beijing, China, <sup>4</sup>USDA - ARS, Newark, DE

- 9:15 **3750** An overview of biological control programs against invasive insects and plants for protection of forested ecosystems in the United States. **Sharlene Sing** (ssing@fs.fed.us)<sup>1</sup>, Carol Bell Randall<sup>2</sup>, and Richard

Reardon<sup>3</sup>, <sup>1</sup>USDA - Forest Service, Bozeman, MT, <sup>2</sup>USDA - Forest Service, Coeur d'Alene, ID, <sup>3</sup>USDA - Forest Service, Morgantown, WV

- 9:30 **3751** Challenges and regulatory hurdles in foreign exploration for natural enemies of invasive woodborers from Asia. **Juli Gould** (juli.r.gould@aphis.usda.gov)<sup>1</sup>, Leah S. Bauer<sup>2</sup>, Jian Duan<sup>3</sup>, and David Williams<sup>1</sup>, <sup>1</sup>USDA - APHIS, Buzzards Bay, MA, <sup>2</sup>USDA - Forest Service, Lansing, MI, <sup>3</sup>USDA - ARS, Newark, DE
- 9:45 **3752** Biological control of invasive forest pests using augmentative releases of natural enemies native to China. **Zhong-qi Yang** (yangzhiqi@126.com)<sup>1</sup>, Xiao-Yi Wang<sup>1</sup>, and Yi-nan Zhang<sup>2</sup>, <sup>1</sup>Chinese Academy of Forestry, Beijing, China, <sup>2</sup>Beijing Vocational College of Agriculture, Beijing, China
- 10:00 **3753** Biosafety testing and risk assessment for biological control of forest insect pests in New Zealand. **Toni Withers** (toni.withers@scionresearch.com)<sup>1</sup>, Barbara Barratt<sup>2</sup>, and Lisa Berndt<sup>1</sup>, <sup>1</sup>Scion and Better Border Biosecurity Collaboration, Rotorua, New Zealand, <sup>2</sup>AgResearch, Ltd., Mosgiel, New Zealand
- 10:15 BREAK**
- 10:30 **3754** Issues surrounding potential introduction of parasitic nematodes against *Sirex* in North America. **E. Erin Morris** (morrie639@msu.edu)<sup>1</sup> and Ann E. Hajek<sup>2</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>Cornell Univ., Ithaca, NY
- 10:45 **3755** Cooperative foreign exploration and research in Asia to support biological control of the emerald ash borer in North America. **Leah S. Bauer** (lbauer@fs.fed.us)<sup>1</sup>, Houping Liu<sup>2</sup>, Zhong-qi Yang<sup>3</sup>, Xiao-Yi Wang<sup>3</sup>, Tonghai Zhao<sup>3</sup>, Juli Gould<sup>4</sup>, Jian Duan<sup>5</sup>, Toby R. Petrice<sup>1</sup>, Deborah Miller<sup>1</sup>, and David Williams<sup>4</sup>, <sup>1</sup>USDA - Forest Service, Lansing, MI, <sup>2</sup>Pennsylvania Dept. of Conservation and Natural Resources, Harrisburg, PA, <sup>3</sup>Chinese Academy of Forestry, Beijing, China, <sup>4</sup>USDA - APHIS, Buzzards Bay, MA, <sup>5</sup>USDA - ARS, Newark, DE
- 11:00 **3756** Biological control of an invasive forest insect: From biological invasion to population ecology. **David E. Jennings** (david.e.jennings@gmail.com)<sup>1</sup> and Jian Duan<sup>2</sup>, <sup>1</sup>Univ. of Maryland, College Park, MD, <sup>2</sup>USDA - ARS, Newark, DE
- 11:15 **3757** Candidates for biological control of the Asian and citrus longhorned beetles in Asia, Europe, and North America. Franck Hérard<sup>1</sup>, Matteo Maspero<sup>2</sup>, **Xiao-Yi Wang** (xywang@caf.ac.cn)<sup>3</sup>, Zhong-qi Yang<sup>3</sup>, Juli Gould<sup>4</sup>, and Jian Duan<sup>5</sup>, <sup>1</sup>USDA - ARS, Montferrier-sur-Lez, France, <sup>2</sup>Minoprio Foundation, Como, Italy, <sup>3</sup>Chinese Academy of Forestry, Beijing, China, <sup>4</sup>USDA - APHIS, Buzzards Bay, MA, <sup>5</sup>USDA - ARS, Newark, DE
- 11:30 **3758** What do you want to hear first: The good news or the bad news about biological control of hemlock woolly adelgid, *Adelges tsugae* (Hemiptera: Adelgidae)? **Scott Salom** (salom@vt.edu)<sup>1</sup>, Kenton Sumpter<sup>1</sup>, Ariel Heminger<sup>1</sup>, Molly Darr<sup>1</sup>, Albert E. Mayfield III<sup>2</sup>, Jerome F. Grant<sup>3</sup>, Joseph Elkinton<sup>4</sup>, Thomas McAvoy<sup>1</sup>, Andy Roberts<sup>1</sup>, and Carlyle C. Brewster<sup>1</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>USDA - Forest Service, Asheville, NC, <sup>3</sup>Univ. of Tennessee, Knoxville, TN, <sup>4</sup>Univ. of Massachusetts, Amherst, MA

**Symposium: Behavior and Ecology of Native, Naturalized, and Invasive Ladybird Beetles****Room W224 G (Convention Center)**

**Moderators and Organizers:** Eric Riddick<sup>1</sup>, Oldrich Nedved<sup>2</sup>, Louis Hesler<sup>3</sup>, Helen Roy<sup>4</sup>, John Sloggett<sup>5</sup>, and Antonio Soares<sup>6</sup>, <sup>1</sup>USDA - ARS, Stoneville, MS, <sup>2</sup>Univ. of South Bohemia, České Budějovice, Czech Republic, <sup>3</sup>USDA - ARS, Brookings, SD, <sup>4</sup>Natural Environment Research Council, Wallingford, United Kingdom, <sup>5</sup>Maastricht Univ., Maastricht, Netherlands, <sup>6</sup>Univ. of the Azores, Azores, Portugal

- 9:15 **3759** Non-native lady beetles: A diversity of outcomes. **Louis Hesler** (louis.hesler@ars.usda.gov), USDA - ARS, Brookings, SD
- 9:30 **3760** Invasion ecology and evolution in *Coccinella septempunctata*: Comparative morphometrics between native and introduced range. **Yukie Kajita** (yukie-kajita@utc.edu)<sup>1</sup>, Erik Hearn<sup>1</sup>, Kelly Lehman<sup>1</sup>, John Obrycki<sup>2</sup>, and Eric O'Neill<sup>1</sup>, <sup>1</sup>Univ. of Tennessee, Chattanooga, TN, <sup>2</sup>Univ. of Kentucky, Lexington, KY
- 9:45 **3761** Odor-mediated aggregations of *Hippodamia convergens*, a native coccinellid of North America. **Christopher Wheeler** (cwhee002@ucr.edu)<sup>1,2</sup> and Ring T. Cardé<sup>1</sup>, <sup>1</sup>Univ. of California, Riverside, CA, <sup>2</sup>Provivi, Inc., Santa Monica, CA
- 10:00 **3762** Long-term dynamics in invaded lady beetle communities. **Christie Bahlai** (cbahlai@msu.edu) and Douglas A. Landis, Michigan State Univ., East Lansing, MI
- 10:15 **BREAK**
- 10:30 **3763** Can invisibility of Azorean habitats overcome the invasiveness of *Harmonia axyridis* Pallas (Coleoptera: Coccinellidae)? **Antonio Soares** (onofre@uac.pt)<sup>1</sup>, Isabel Borges<sup>1</sup>, Alexandra Magro<sup>2</sup>, and Artur Gil<sup>1</sup>, <sup>1</sup>Univ. of the Azores, Ponta Delgada, Portugal, <sup>2</sup>Univ. of Toulouse, Castanet-Tolosan, France
- 10:45 **3764** Invasion of *Harmonia axyridis* in Chile: Spread patterns and associated changes in coccinellid assemblages. **Audrey Grez** (audreygrez@gmail.com)<sup>1</sup>, Tania Zaviezo<sup>2</sup>, and Alberto Alaniz<sup>1</sup>, <sup>1</sup>Univ. of Chile, Santiago, Chile, <sup>2</sup>Pontifical Catholic Univ., Santiago, Chile
- 11:00 **3765** Polymorphism in ladybirds: Between thermal melanism, sexual selection, and aposematism. **Oldrich Nedved** (nedved@prf.jcu.cz), Univ. of South Bohemia, České Budějovice, Czech Republic
- 11:15 **3766** Unbalanced polyandry in wild caught *Harmonia axyridis*. **Mona Awad** (mona.awad2003@gmail.com)<sup>1</sup>, Guillaume Laugier<sup>2</sup>, Anne Loiseau<sup>3</sup>, and Oldrich Nedved<sup>4</sup>, <sup>1</sup>Cairo Univ., Giza, Egypt, <sup>2</sup>Center of Advanced Studies in Arid Areas, La Serena, Chile, <sup>3</sup>INRA, Montferrier-sur-Lez, France, <sup>4</sup>Univ. of South Bohemia, České Budějovice, Czech Republic
- 11:30 **3767** Powder from cedar heartwood affects oviposition behavior in *Coleomegilla maculata*: A ladybird native to the Americas. **Eric Riddick** (eric.riddick@ars.usda.gov)<sup>1</sup>, Zhixin Wu<sup>1</sup>, Fred Eller<sup>2</sup>, and Mark Berhow<sup>2</sup>, <sup>1</sup>USDA - ARS, Stoneville, MS, <sup>2</sup>USDA - ARS, Peoria, IL

**Symposium: Insects and Landscape Ecology: Defining an Entomological Perspective****Room W414 B (Convention Center)**

**Moderator and Organizer:** Robinson Sudan, New Leaf, Austin, TX

- 9:15 **3768** Entomology and landscape ecology: History, challenges, and integration. **Robinson Sudan** (robinson@newleaf-tx.org), New Leaf, Austin, TX
- 9:45 **3769** Transient effects of corridors on invasive red imported fire ants and native ants. **Julian Resasco** (jresasco@colorado.edu), Univ. of Colorado, Boulder, CO
- 10:00 **3770** Effects of urban landscapes on native bee communities in central Texas. **Kimberly Ballare** (kim.ballare@gmail.com), The Univ. of Texas, Austin, TX
- 10:15 **BREAK**
- 10:30 **3771** Evaluating the effects of wildfire on pollinator diversity and their interactions with plants across landscapes in the Northern Rockies. **Laura Burkle** (laura.burkle@montana.edu), Montana State Univ., Bozeman, MT
- 10:45 **3772** Presentation withdrawn
- 11:15 **3773** Experimental fragmentation alters the relative roles of niche and neutral processes in structuring ant communities. **Jeff McClenahan** (jlmcclenahan@gmail.com), Univ. of Colorado, Boulder, CO

**Symposium: Globally Important Pests and Globally Important Control Tools: Comparing and Contrasting IRM Successes and Challenges, IRAC US Symposium****Room W224 H (Convention Center)**

**Moderators and Organizers:** Graham P. Head<sup>1</sup>, Bradley W. Hopkins<sup>2</sup>, Scott W. Ludwig<sup>3</sup>, Clinton D. Pilcher<sup>4</sup>, Christopher Sansone<sup>5</sup>, Caydee Savinelli<sup>6</sup>, and Sean Whipple<sup>7</sup>, <sup>1</sup>Monsanto Company, St. Louis, MO, <sup>2</sup>Dow AgroSciences, Indianapolis, IN, <sup>3</sup>Nichino America, Arp, TX, <sup>4</sup>DuPont Pioneer, Johnston, IA, <sup>5</sup>Bayer CropScience, Research Triangle Park, NC, <sup>6</sup>Syngenta Plant Protection, Greensboro, NC, <sup>7</sup>ISK Biosciences Corporation, Kearney, MO

- 9:15 **3774** Q biotype control in ornamentals – the invasion from Europe to the US. **Scott W. Ludwig** (sludwig@nichino.net)<sup>1</sup>, Cristi L. Palmer<sup>2</sup>, James A. Bethke<sup>3</sup>, Joe Chamberlin<sup>4</sup>, Daniel Gilrein<sup>5</sup>, Cindy L. McKenzie<sup>6</sup>, Ronald Oetting<sup>7</sup>, and Lance Osborne<sup>8</sup>, <sup>1</sup>Nichino America, Arp, TX, <sup>2</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, <sup>3</sup>Univ. of California Cooperative Extension, San Diego, CA, <sup>4</sup>Valent U.S.A., Snellville, GA, <sup>5</sup>Long Island Horticultural Research and Extension Center, Riverhead, NY, <sup>6</sup>USDA - ARS, Ft. Pierce, FL, <sup>7</sup>Univ. of Georgia, Griffin, GA, <sup>8</sup>Univ. of Florida, Apopka, FL
- 9:30 **3775** Implementation of the global plan for insecticide resistance management in malaria vectors: Progress, challenges, and the way forward. **Janet Hemingway** (hemingway@liverpool.ac.uk), Liverpool School of Tropical Medicine, Liverpool, United Kingdom



- 9:45 **3776** Oxitec mosquito — a novel mode of action using genetics to precisely control pest species with no off-target effects on beneficial insects and pollinators. **Simon Warner** (simon.warner@oxitec.com), Oxitec, Ltd., Abingdon, United Kingdom
- 10:00 **3777** Enhancing IRM for Bt crops: Global lessons from local challenges. **Graham P. Head** (graham.p.head@monsanto.com), Monsanto Company, St. Louis, MO
- 10:15 BREAK**
- 10:30 **3778** Magnitude of mutational effects and risks of resistance evolution: Why some populations are recurrent challenges. **David J. Hawthorne** (djh@umd.edu), Univ. of Maryland, College Park, MD
- 10:45 **3779** Colorado potato beetle insecticide resistance spreading west? **Silvia Rondon** (silvia.rondon@oregonstate.edu), Oregon State Univ., Hermiston, OR
- 11:00 **3780** A case study of western corn rootworm, *Diabrotica virgifera virgifera* LeConte, Brescia Province, Lombardy Region, NW Italy — a dynamic pest of maize. **Richard Edwards** (edwards@purdue.edu)<sup>1</sup>, Mauro Agosti<sup>2</sup>, and Lorenza Michelon<sup>2</sup>, <sup>1</sup>Purdue Univ., West Lafayette, IN, <sup>2</sup>Consortium of Intensive Crops of Defence, Brescia, Italy
- 11:15 **3781** Managing insecticide resistance and *Bemisia tabaci* in Florida tomato. **Hugh A. Smith** (hughsmith@ufl.edu), Univ. of Florida, Wimauma, FL
- 11:30 **3782** Resistance management of cotton aphid, *Aphis gossypii* Glover (Hemiptera: Aphididae), in Australian cotton: From a highly pesticide reliant system to an integrated IRM and IPM strategy. **Grant Herron** (grant.herron@dpi.nsw.gov.au)<sup>1</sup> and Lewis Wilson<sup>2</sup>, <sup>1</sup>New South Wales Dept. of Primary Industries, Narellan, Australia, <sup>2</sup>CSIRO, Narrabri, Australia
- 11:45 **3783** The global importance of the tomato borer, *Tuta absoluta*, its control, and the current state of insecticide resistance. **Emmanouil Roditakis** (eroditakis@gmail.com)<sup>1</sup>, Emmanouil Vasakis<sup>1</sup>, Marianna Stavarakaki<sup>1</sup>, Aris Ilias<sup>2</sup>, Pablo Bielza<sup>3</sup>, Chris Bass<sup>4</sup>, Andrea Bassi<sup>5</sup>, Ralf Nauen<sup>6</sup>, John Vontas<sup>7</sup>, and Anastasia Tsagkarakou<sup>1</sup>, <sup>1</sup>Hellenic Agricultural Organisation, Heraklion, Greece, <sup>2</sup>Univ. of Crete, Herakleion, Greece, <sup>3</sup>Polytechnic Univ., Cartagena, Spain, <sup>4</sup>Univ. of Exeter, Penryn, United Kingdom, <sup>5</sup>DuPont Italy, Naviglio, Italy, <sup>6</sup>Bayer CropScience, Monheim, Germany, <sup>7</sup>Agricultural Univ. of Athens, Athens, Greece
- 12:00 **3784** Diamide resistance management in the diamondback moth, *Plutella xylostella*. **Jan Elias** (jan.elias@syngenta.com), Syngenta Crop Protection, Stein, Switzerland

## Symposium: Insect-Resistant GM Crops in Asia-Pacific: Current Status, Challenges, and Opportunities

### Room W222 B (Convention Center)

**Moderators and Organizers:** Mao Chen<sup>1</sup>, Edwin P. Alcantara<sup>2</sup>, and Andi Trisyono<sup>3</sup>, <sup>1</sup>Monsanto Company, Singapore, Singapore, <sup>2</sup>Univ. of the Philippines, Los Baños, Philippines, <sup>3</sup>Univ. of Gadjah Mada, Yogyakarta, Indonesia

- 9:15 **3785** Bollgard II and onwards: Proactive resistance management in Australia. **Kristen Knight** (kristen.m.knight@monsanto.com), Monsanto Australia, Toowoomba, Australia
- 9:30 **3786** Presentation withdrawn
- 10:00 **3787** Baseline susceptibility of two Bt proteins to key corn insect pests in Vietnam. **Ngo Luc Cuong** (cuong.ngoluc@gmail.com), Cuu Long Delta Rice Research Institute, Can Tho, Vietnam
- 10:15 BREAK**
- 10:30 **3788** Bt cotton adoption and well-being of farmers in Pakistan. Ali Asif and **Masooma Naseer Cheema** (masooma@uaf.edu.pk), Univ. of Agriculture, Faisalabad, Pakistan
- 10:45 **3789** Field, laboratory, and screenhouse efficacy evaluation of Bt corn for resistance to the Asian corn borer, *Ostrinia furnacalis* (Guenee), in the Philippines. **Merdelyn Caasi-Lit** (binglit610429@gmail.com), Univ. of the Philippines, Los Baños, Philippines
- 11:00 **3790** Resistance monitoring program for Bt corn in the Philippines. **Edwin P. Alcantara** (epalcantara@uplb.edu.ph), Univ. of the Philippines, Los Baños, Philippines
- 11:15 **3791** Studies on non-target organisms in Bt corn in the Philippines and the important role of Bt corn technology in enhancing arthropod biodiversity in corn fields. **Ireneo Lit Jr.** (illit@up.edu.ph)<sup>1</sup>, Edwin Benigno<sup>2</sup>, and Merdelyn Caasi-Lit<sup>2</sup>, <sup>1</sup>Univ. of the Philippines, Laguna, Philippines, <sup>2</sup>Univ. of the Philippines, Los Baños, Philippines
- 11:30 **3792** Opportunities and challenges for Bt corn in Indonesia. **Andi Trisyono** (andi\_trisyono@yahoo.com), Univ. of Gadjah Mada, Yogyakarta, Indonesia
- 11:45 **3793** The development and status of Bt rice in China. **Yunhe Li** (yunhe.li@hotmail.com)<sup>1</sup> and Yufa Peng<sup>2</sup>, <sup>1</sup>Agroscope, Zürich, Switzerland, <sup>2</sup>Chinese Academy of Agricultural Sciences, Beijing, China
- 12:00 **3794** Evolution of resistance in *Helicoverpa armigera* to Bt cotton in China. **Yidong Wu** (wyd@njau.edu.cn), Nanjing Agricultural Univ., Nanjing, China



## Symposium: Cassava and Bean IPM throughout the Developing World: Honoring the Contributions of Anthony Bellotti and César Cardona Mejía

### Room W330 A (Convention Center)

**Moderators and Organizers:** Stephen L. Lapointe<sup>1</sup> and Kris Wyckhuys<sup>2</sup>, <sup>1</sup>USDA - ARS, Ft. Pierce, FL, <sup>2</sup>International Center for Tropical Agriculture, Hanoi, Vietnam

- 9:15 **3795** Classical biological control of cassava pests in Latin America and Africa. **Stephen L. Lapointe** (stephen.lapointe@ars.usda.gov), USDA - ARS, Ft. Pierce, FL
- 9:45 **3796** A region-wide response to invasive pests and insect-vectored diseases in southeast Asian cassava crops. **Kris Wyckhuys** (k.wyckhuys@cgiar.org), International Center for Tropical Agriculture, Hanoi, Vietnam
- 10:15 BREAK**
- 10:30 **3797** Crop and parasitoid diversity: A rich source to suppress pest insects based on scientific evidence. **Silvia Dorn** (silvia.dorn@ipw.agr.ethz.ch), ETH Zürich, Zürich, Switzerland
- 10:45 **3798** Classical biological control of cassava green mite, *Mononychellus tanajoa*. **Lincoln Smith** (link.smith@ars.usda.gov), USDA - ARS, Montferrier-sur-Lez, France
- 11:00 **3799** Revisiting the history and success of classical biological control of the cassava mealybug in north-eastern Brazil. **José Mauricio Bento** (jmsbento@usp.br), Univ. of São Paulo, Piracicaba, Brazil
- 11:15 **3800** Management of the cassava hornworm. **Jorge Peña** (jepena@ufl.edu), Univ. of Florida, Homestead, FL
- 11:30 **3801** Fungal pathogens for control of cassava pests. **Italo Delalibera** (italo@esalq.usp.br), Univ. of São Paulo, Piracicaba, Brazil
- 11:45 **3802** Cassava green mites in Africa: Anthony Bellotti's contributions to a successful classical biological control campaign. **John Stephen Yaninek** (yaninek@purdue.edu), Purdue Univ., West Lafayette, IN

## Symposium: Discovering Sustainable Insecticides: Resistance, Innovation, and Responsibility

### Room W224 C (Convention Center)

**Moderators and Organizers:** Margaret Hardy<sup>1</sup> and Stephen Duke<sup>2</sup>, <sup>1</sup>Univ. of Queensland, Brisbane, Australia, <sup>2</sup>USDA - ARS, Univ., MS

- 9:15 **3803** Funding discovery projects: How to attract commercial interest and protect your intellectual property. **Andrea Adkins** (andrea.adkins@ucf.edu), Univ. of Central Florida, Orlando, FL
- 9:30 **3804** Arthropod venoms are a rich source of environmentally friendly biopesticides. **Margaret Hardy** (m.hardy@imb.uq.edu.au) and Glenn F. King, Univ. of Queensland, Brisbane, Australia
- 9:45 **3805** Natural product-based pest management: Discovery and development considerations. **Stephen Duke** (stephen.duke@ars.usda.gov), USDA - ARS, University, MS

- 10:00 **3806** U.S. EPA's Endocrine Disruptor Screening Program: Moving forward with high throughput screening assays and computational models. **Sharlene Matten** (matten.sharlene@epamail.epa.gov), U.S. Environmental Protection Agency, Washington, DC

### 10:15 BREAK

- 10:30 **3807** An example of the agro-business response to the risk of insecticide resistance and why successful insecticide resistance management needs an integrated approach. **Russell Slater** (russell.slater@syngenta.com), Syngenta Crop Protection, Basel, Switzerland
- 10:45 **3808** Can Bt crops contribute to sustainable crop protection? A European perspective. **Michael Meissle** (michael.meissle@agroscope.admin.ch) and Jörg Romeis, Agroscope, Zürich, Switzerland
- 11:00 **3809** Development of new seed treatment technologies through the lens of integrated product stewardship. **Keri Carstens** (keri.carstens@pioneer.com), DuPont Pioneer, Johnston, IA

## Symposium: Future Approaches for the Control of Insect Pests

### Room W231 C (Convention Center)

**Moderator and Organizer:** Phil Wege, Syngenta, Bracknell, United Kingdom

*This symposium is generously sponsored by Syngenta.*



- 9:15 **3810** A brief look at the future of insect pest control in crop protection, urban, and vector control markets. **Mark Hoppe** (mark.hoppe@syngenta.com)<sup>1</sup> and Phil Wege<sup>2</sup>, <sup>1</sup>Syngenta Crop Protection, Stein, Switzerland, <sup>2</sup>Syngenta, Bracknell, United Kingdom
- 9:30 **3811** Urban pest control globally in the next twenty years. **Ron Harrison** (rharrison@rollins.com), Orkin Pest Control, Atlanta, GA
- 9:45 **3812** Presentation withdrawn
- 10:00 **3813** Characterization of vegetation biophysical components using ultra-high spatial resolution multispectral imagery acquired by drones and small aircraft. **Kevin Price** (kevin@agapixel.com)<sup>1</sup>, Lynn Brien<sup>2,3</sup>, David Burchfield<sup>2,3</sup>, Johnny Bryant<sup>2,3</sup>, Mark Lanning<sup>4</sup>, Kirk Demuth<sup>4</sup>, and Daniel Melia<sup>4</sup>, <sup>1</sup>AgPixel, Johnston, KS, <sup>2</sup>AgPixel, Manhattan, KS, <sup>3</sup>Kansas State Univ., Manhattan, KS, <sup>4</sup>AgPixel, Des Moines, IA
- 10:15 BREAK**
- 10:30 **3814** Laser-based insect population control. **Arty Makagon** (amakagon@intven.com), Intellectual Ventures Laboratory, Bellevue, WA
- 10:45 **3815** There are no silver bullets: The future of sustainable insect pest management will depend upon a blend of established and emerging technologies. **Thomas Clark** (thomas.l.clark@monsanto.com), Monsanto Company, St. Louis, MO
- 11:00 **3816** Prospects for robust insect resistance in crops via plant genetic engineering. **Mike Birkett** (mike.birkett@rothamsted.ac.uk) and John Pickett, Rothamsted Research, Harpenden, United Kingdom



- 11:15 **3817** Future trends in pest control technology. **Juergen Benting** (juergen.benting@bayer.com), Bayer CropScience, Monheim, Germany
- 11:30 **3818** Engineering technologies for future advanced agronomic and horticultural pest control. **John Schueller** (schuejk@ufl.edu), Univ. of Florida, Gainesville, FL

### Symposium: Modulation of Insect Chemical Response at Different Time Scales: Ethology, Ecology, and Evolution

#### Room W230 B (Convention Center)

**Moderators and Organizers:** Fredrik Schlyter<sup>1</sup> and Bill Hansson<sup>2</sup>,  
<sup>1</sup>Swedish Univ. of Agricultural Sciences, Alnarp, Sweden,  
<sup>2</sup>Max Planck Institute for Chemical Ecology, Jena, Germany

- 9:15 **3819** Modulation of insect olfaction: From neurons to behavior. **Sylvia Anton** (sylvia.anton@angers.inra.fr) and Christophe Gadenne, INRA, Beaucoz , France
- 9:30 **3820** Modulation of olfactory responses in *Spodoptera littoralis*. **Santosh Revadi** (revadi.santosh@slu.se)<sup>1</sup>, Saveer Ahmed<sup>1,2</sup>, Sophie Kroman<sup>1</sup>, Fredrik Schlyter<sup>1</sup>, G ran Birgersson<sup>1</sup>, Marie Bengtsson<sup>1</sup>, William B. Walker<sup>1</sup>, Peter Anderson<sup>1</sup>, Rickard Ignell<sup>1</sup>, Peter Witzgall<sup>1</sup>, and Paul Becher<sup>1</sup>, <sup>1</sup>Swedish Univ. of Agricultural Sciences, Alnarp, Sweden, <sup>2</sup>Vanderbilt Univ., Nashville, TN
- 9:45 **3821** Role of experience in host plant choice of a polyphagous moth. **Peter Anderson** (peter.anderson@slu.se), Swedish Univ. of Agricultural Sciences, Alnarp, Sweden
- 10:00 **3822** Modulation of attraction by non-host volatiles: Mechanisms for semiochemical diversity. **Fredrik Schlyter** (fredrik.schlyter@slu.se), Swedish Univ. of Agricultural Sciences, Alnarp, Sweden
- 10:15 BREAK**
- 10:30 **3823** Chemical signals, behavioral responses, and response modulation in *Drosophila*: When flies do or do not respond. **Boyd Mori** (bmori@ualberta.ca)<sup>1</sup>, Sebastien Lebreton<sup>1,2</sup>, Felipe Borrero-Echeverry<sup>1</sup>, Paul Becher<sup>1</sup>, and Peter Witzgall<sup>1</sup>, <sup>1</sup>Swedish Univ. of Agricultural Sciences, Alnarp, Sweden, <sup>2</sup>Institute of Biology and Development of Marseille, Marseille, France
- 10:45 **3824** Chemical ecology of egg laying in *Drosophila*. **Marit Solum** (marit.solum@slu.se)<sup>1</sup>, Paul Becher<sup>1</sup>, Alexandra Schmidt<sup>1</sup>, Lina Bryngelsson<sup>1</sup>, Peter Witzgall<sup>1</sup>, Bill Hansson<sup>2</sup>, Teun Dekker<sup>1</sup>, and Mattias Larsson<sup>1</sup>, <sup>1</sup>Swedish Univ. of Agricultural Sciences, Alnarp, Sweden, <sup>2</sup>Max Planck Institute for Chemical Ecology, Jena, Germany
- 11:00 **3825** Gall midge olfaction and its role in speciation. **P ter Moln r** (molnar.bela.peter@agr.mta.hu)<sup>1,2</sup>, Tina Boddum<sup>2</sup>, Sharon Hill<sup>2</sup>, Bill Hansson<sup>3</sup>, G ran Birgersson<sup>2</sup>, and Ylva Hillbur<sup>4</sup>, <sup>1</sup>Hungarian Academy of Sciences, Budapest, Hungary, <sup>2</sup>Swedish Univ. of Agricultural Sciences, Alnarp, Sweden, <sup>3</sup>Max Planck Institute for Chemical Ecology, Jena, Germany, <sup>4</sup>International Institute of Tropical Agriculture, Ibadan, Nigeria

- 11:15 **3826** Host selection among mosquito disease vectors. **Sharon Hill** (sharon.hill@slu.se), Swedish Univ. of Agricultural Sciences, Alnarp, Sweden
- 11:30 **3827** Functional, molecular, and evolutionary aspects of lepidopteran host plant olfaction. **Mattias Larsson** (mattias.larsson@slu.se)<sup>1</sup>, Arthur de Fouchier<sup>2</sup>, Nicolas Montagn <sup>3</sup>, William B. Walker<sup>1</sup>, Claudia Steiner<sup>3</sup>, Muhammad Binyameen<sup>4</sup>, Fredrik Schlyter<sup>1</sup>, Thomas Chertemps<sup>3</sup>, Christelle Monsempes<sup>2</sup>, Annick Maria<sup>3</sup>, Marie-Christine Fran ois<sup>2</sup>, G ran Birgersson<sup>1</sup>, Peter Anderson<sup>1</sup>, Bill Hansson<sup>5</sup>, and Emmanuelle Jacquin-Joly<sup>2</sup>, <sup>1</sup>Swedish Univ. of Agricultural Sciences, Alnarp, Sweden, <sup>2</sup>INRA, Versailles, France, <sup>3</sup>Pierre and Marie Curie Univ., Paris, France, <sup>4</sup>Bahauddin Zakariya Univ., Multan, Pakistan, <sup>5</sup>Max Planck Institute for Chemical Ecology, Jena, Germany

### Symposium: Outlaws of Immunology and Infection

#### Room W414 D (Convention Center)

**Moderators and Organizers:** David Schneider<sup>1</sup> and Ann Thomas Tate<sup>2</sup>, <sup>1</sup>Stanford Univ., Stanford, CA, <sup>2</sup>Univ. of Houston, Houston, TX

- 9:15 **3828** Mathematical modeling of immune priming in infected insect populations. **Ann Thomas Tate** (anntomastate@gmail.com), Univ. of Houston, Houston, TX
- 9:30 **3829** Gut, immunity, microbiota, and the problem of universals. **Nichole A. Broderick** (nichole.broderick@yale.edu), Yale Univ., New Haven, CT
- 9:45 **3830** Antimicrobial defense and persistent infection in insects revisited. **Jens Rolff** (jens.rolff@fu-berlin.de), Freie Univ., Berlin, Germany
- 10:00 **3831** How does circadian rhythm modulate immunity? **Mimi Shirasu-Hiza** (mshirasuhiza@gmail.com), Columbia Univ., New York, NY
- 10:15 BREAK**
- 10:30 **3832** A genome-wide association study to identify novel genes and pathways important for phagocytosis in *Drosophila melanogaster*. **Louisa Wu** (lwu1@umd.edu), Univ. of Maryland, College Park, MD
- 10:45 **3833** Costs of infection along the continuum of host health. **Pedro Vale** (pferrei2@staffmail.ed.ac.uk), Univ. of Edinburgh, Edinburgh, Scotland
- 11:00 **3834** Tsetse's cardia tissue: Gatekeeper of trypanosome transmission? **Aur lien Vigneron** (aurelien.vigneron@yale.edu) and Brian Weiss, Yale Univ. School of Public Health, New Haven, CT
- 11:15 **3835** Defining the shape of an immune response. **David Schneider** (dschneider@stanford.edu), Stanford Univ., Stanford, CA

## Symposium: Ecologically-Based Integrated Pest Management for Selected Food Security Crops in Central Asia

### Room W240 C (Convention Center)

**Moderators and Organizers:** Frank Zalom<sup>1</sup> and Karim Maredia<sup>2</sup>,  
<sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>Michigan State Univ., East Lansing, MI

- 9:15 **3836** An overview of the history and status of integrated pest management in Central Asia. **Karim Maredia** (kmaredia@msu.edu)<sup>1</sup>, Frank Zalom<sup>2</sup>, and Saltanat Mambetova<sup>1</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>Univ. of California, Davis, CA
- 9:45 **3837** The role of biolaboratories in facilitating IPM in Central Asia. **Bahodir Eshchanov** (bahodire@yahoo.com)<sup>1,2</sup>, George Bird<sup>2</sup>, and Frank Zalom<sup>3</sup>, <sup>1</sup>Uzbek Scientific Research Institute for Plant Protection, Tashkent, Uzbekistan, <sup>2</sup>Michigan State Univ., East Lansing, MI, <sup>3</sup>Univ. of California, Davis, CA
- 10:00 **3838** Opportunities for enhancing ecosystem services in Tajikistan agriculture. **Nurali Saidov** (n.saidov@cgiar.org)<sup>1</sup>, Douglas A. Landis<sup>2</sup>, and Anvar Jalilov<sup>3</sup>, <sup>1</sup>International Center for Agricultural Research in the Dry Areas, Duschanbe, Tajikistan, <sup>2</sup>Michigan State Univ., East Lansing, MI, <sup>3</sup>Tajik Academy of Agricultural Science, Duschanbe, Tajikistan
- 10:15 BREAK**
- 10:30 **3839** Challenges and opportunities for wheat IPM in Central Asia. **Mustafa El Bohssini** (m.bohssini@cgiar.org)<sup>1</sup>, Douglas A. Landis<sup>2</sup>, Nurali Saidov<sup>3</sup>, Anvar Jalilov<sup>4</sup>, Megan M. Kennelly<sup>5</sup>, and Ram Sharma<sup>6</sup>, <sup>1</sup>International Center for Agricultural Research in the Dry Areas, Aleppo, Syria, <sup>2</sup>Michigan State Univ., East Lansing, MI, <sup>3</sup>International Center for Agricultural Research in the Dry Areas, Duschanbe, Tajikistan, <sup>4</sup>Tajik Academy of Agricultural Science, Duschanbe, Tajikistan, <sup>5</sup>Kansas State Univ., Manhattan, KS, <sup>6</sup>International Center for Agricultural Research in the Dry Areas, Tashkent, Uzbekistan
- 10:45 **3840** Potato pest management in Central Asia. **George Bird** (birdg@msu.edu)<sup>1</sup>, Nurali Saidov<sup>2</sup>, Anara Chakaeva<sup>3</sup>, and Murataly Aitmatov<sup>4</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>International Center for Agricultural Research in the Dry Areas, Duschanbe, Tajikistan, <sup>3</sup>Kyrgyz Research Institute of Livestock Breeding and Pastures, Bishkek, Kyrgyzstan, <sup>4</sup>Aga Khan Development Network Agency, Bishkek, Kyrgyzstan
- 11:00 **3841** Status of tomato IPM in Uzbekistan. **Frank Zalom** (fgzalom@ucdavis.edu)<sup>1</sup>, Barno Tashpulatova<sup>2</sup>, and Ravza Mavlyanova<sup>3</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>International Center for Agricultural Research in the Dry Areas, Tashkent, Uzbekistan, <sup>3</sup>AVRDC-The World Vegetable Center, Tashkent, Uzbekistan
- 11:15 **3842** IPM capacity, communication, and outreach at university, governmental, and non-governmental organizations in Central Asia. **Gulnaz Kaseeva** (gkaseeva@agrolead.org)<sup>1</sup>, Karim Maredia<sup>2</sup>, and Joy Landis<sup>2</sup>, <sup>1</sup>AgroLead, Bishkek, Kyrgyzstan, <sup>2</sup>Michigan State Univ., East Lansing, MI

## Symposium: Exploiting Multi-Trophic Interactions in the Management of Invasive Agricultural Arthropod Pests

### Room W240 B (Convention Center)

**Moderator and Organizer:** Dominique Mazzi, Agroscope,  
Wädenswil, Switzerland

- 9:15 **3843** Interactions between native and invasive hogweeds, the parsnip webworm, and its parasitoid/hyperparasitoid complex. **Jeff Harvey** (j.harvey@nioo.knaw.nl)<sup>1</sup>, Paul Ode<sup>2</sup>, and Rieta Gols<sup>3</sup>, <sup>1</sup>Netherlands Institute of Ecology, Heteren, Netherlands, <sup>2</sup>Colorado State Univ., Fort Collins, CO, <sup>3</sup>Wageningen Univ. and Research Centre, Wageningen, Netherlands
- 9:30 **3844** Biological control of the Asian citrus psyllid in California. **David Morgan** (dmorgan@cdfa.ca.gov), California Dept. of Food and Agriculture, Riverside, CA
- 9:45 **3845** Integrating community ecology theories for sustaining the development of effective management of invasive pests. **Anais Chailleux** (chailleux.anais@gmail.com), CIRAD, Dakar, France
- 10:00 **3846** Foodweb ecology of an invasive mite that manipulates plant defenses. **Angelo Pallini** (pallini@ufv.br)<sup>1</sup>, Arne Janssen<sup>2</sup>, Renato Sarmento<sup>3</sup>, Felipe Lemos<sup>2</sup>, Cleide Dias<sup>1</sup>, Madelaine Venzon<sup>4</sup>, Livia Ataíde<sup>1</sup>, and Marcus Vinicius Alfenas Duarte<sup>4</sup>, <sup>1</sup>Federal Univ. of Viçosa, Viçosa, Brazil, <sup>2</sup>Univ. of Amsterdam, Amsterdam, Netherlands, <sup>3</sup>Federal Univ. of Tocantins, Tocantins, Brazil, <sup>4</sup>Agriculture and Livestock Research Enterprise of Minas Gerais, Viçosa, Brazil
- 10:15 BREAK**
- 10:30 **3847** The impact of polyphagous predators on invasive pests: The case of heteropterans in Mediterranean vegetable crops. **Judit Arnó** (judit.arno@irta.cat) and Rosa Gabarra, IRTA, Cabriels, Spain
- 10:45 **3848** Predicting the risk of exotic pest species establishing in a new area using the self-organizing map, a community ecology-based approach. **Irene Vänninen** (irene.vanninen@luke.fi)<sup>1</sup>, Susan Worner<sup>2</sup>, Erja Huusela-Veistola<sup>1</sup>, Tuomo Tuovinen<sup>1</sup>, Anne Nissinen<sup>3</sup>, and Kari Saikkonen<sup>1</sup>, <sup>1</sup>Natural Resources Institute, Helsinki, Finland, <sup>2</sup>Lincoln Univ., Canterbury, New Zealand, <sup>3</sup>AgriFood Research Finland, Jokioinen, Finland
- 11:00 **3849** Alien interference: Understanding the impact of invasive herbivores on infochemical networks and plant-parasitoid associations. **Gaylord Desurmont** (gaylord.desurmont@unine.ch) and Ted Turlings, Univ. of Neuchâtel, Neuchâtel, Switzerland

## Symposium: Global Improvements in Invasive Ant Management

### Room W224 D (Convention Center)

**Moderators and Organizers:** Grzegorz Buczkowski<sup>1</sup> and Benjamin D. Hoffmann<sup>2</sup>, <sup>1</sup>Purdue Univ., West Lafayette, IN, <sup>2</sup>CSIRO, Winnellie, Australia

- 9:15 **3850** Eradicating Argentine ants on Santa Cruz Island, California: New methods in ant elimination. **Christina Boser** (cboser@tnc.org)<sup>1</sup>, Cause Hanna<sup>2</sup>, David Holway<sup>3</sup>, Ida Naughton<sup>4</sup>, Korie Merrill<sup>5</sup>, Kate Faulkner<sup>6</sup>, John Randall<sup>1</sup>, and Scott Morrison<sup>1</sup>, <sup>1</sup>The Nature Conservancy, Ventura, CA, <sup>2</sup>California State Univ., Camarillo, CA, <sup>3</sup>Univ. of California, La Jolla, CA, <sup>4</sup>Univ. of California, San Diego, CA, <sup>5</sup>Univ. of California, Riverside, CA, <sup>6</sup>U.S. National Park Service, Ventura, CA
- 9:30 **3851** Hydrogel baits as a novel way to manage invasive Argentine ants: Field studies in South Africa. **Grzegorz Buczkowski** (gbuczko@purdue.edu), Purdue Univ., West Lafayette, IN
- 9:45 **3852** Enabling effective ant management by remote communities in the Pacific: Case studies with the yellow crazy ant in the Pacific nations of Tokelau and Kiribati. **Monica Gruber** (monica.gruber@vuw.ac.nz), Allan Burne, Phil Lester, and Gary Ward, Victoria Univ., Wellington, New Zealand
- 10:00 **3853** Scaling up ant eradications: Proven methods and new technologies. **Benjamin D. Hoffmann** (ben.hoffmann@csiro.au)<sup>1</sup>, Gloria M. Luque<sup>2</sup>, Celine Bellard<sup>3</sup>, Nick Holmes<sup>4</sup>, and Josh Donlan<sup>5</sup>, <sup>1</sup>CSIRO, Winnellie, Australia, <sup>2</sup>Univ. of Paris Sud, Orsay, France, <sup>3</sup>Univ. College London, London, United Kingdom, <sup>4</sup>Island Conservation, Santa Cruz, CA, <sup>5</sup>Advanced Conservation Strategies, Midway, UT
- 10:15 BREAK**
- 10:30 **3854** Invasive ant management through viruses and other pathogens? **Phil Lester** (phil.lester@vuw.ac.nz), Monica Gruber, Alexandra Sébastien, and Meghan Cooling, Victoria Univ., Wellington, New Zealand
- 10:45 **3855** Impacts of invasive ants. **Gloria M. Luque** (gloria.luque@u-psud.fr), Univ. of Paris Sud, Orsay, France
- 11:00 **3856** Detecting Argentine ants (*Linepithema humile*) on California's Channel Islands. **Korie Merrill** (koriecm@gmail.com)<sup>1</sup>, Christina Boser<sup>2</sup>, Ida Naughton<sup>3</sup>, Dong-Hwan Choe<sup>1</sup>, and Erin Rankin<sup>1</sup>, <sup>1</sup>Univ. of California, Riverside, CA, <sup>2</sup>The Nature Conservancy, Ventura, CA, <sup>3</sup>Univ. of California, San Diego, CA
- 11:15 **3857** Adapting little fire ant (LFA), *Wasmannia auropunctata*, mitigation strategies to Micronesia. **Ross Miller** (rmiller@uguam.uog.edu) and Aubrey Moore, Univ. of Guam, Mangilao, Guam
- 11:30 **3858** Eradication of *Wasmannia auropunctata* in Hawaii: What works and what does not. Cas Vanderwoude<sup>1</sup> and **Michelle Montgomery** (michelle.montgomery@littlefireants.com)<sup>2</sup>, <sup>1</sup>Univ. of Hawai'i, Hilo, HI, <sup>2</sup>Univ. of Hawai'i, Honolulu, HI

- 11:45 **3859** Presentation withdrawn
- 12:00 **3860** Cooperation within supercolonies: Illuminating Argentine ant (*Linepithema humile*) social structure using genomics and chemical ecology. **Neil Tsutsui** (ntsutsui@berkeley.edu), Univ. of California, Berkeley, CA
- 12:15 **3861** Eradication in the absence of all biological knowledge: *Lepisiota frauenfeldi* in Perth. **Marc Widmer** (marc.widmer@agric.wa.gov.au)<sup>1</sup>, Benjamin D. Hoffmann<sup>2</sup>, and Cleo Bertelesmeier<sup>3</sup>, <sup>1</sup>Dept. of Agriculture, Perth, Australia, <sup>2</sup>CSIRO, Winnellie, Australia, <sup>3</sup>Univ. of Lausanne, Lausanne, Switzerland

## Symposium: Genetics and Genomics of Mosquitoes and Implications for Transmission of Pathogens

### Room W224 F (Convention Center)

**Moderators and Organizers:** Frank H. Collins and Gloria I. Giraldo-Calderón, Univ. of Notre Dame, South Bend, IN

- 9:15 **Introduction**
- 9:30 **3862** Extensive genetic variation in *Aedes aegypti* and its implications for understanding and controlling dengue, chikungunya, and Zika. **Jeffrey R. Powell** (jeffrey.powell@yale.edu), Yale Univ., New Haven, CT
- 10:00 **3863** Towards a complete catalogue of functional genomic elements from multiple *Anopheles* genomes. **Robert Waterhouse** (robert.waterhouse@gmail.com), Univ. of Geneva, Geneva, Switzerland
- 10:15 BREAK**
- 10:30 **3864** Chromosome-centric view of the genome organization and evolution. **Igor V. Sharakhov** (igor@vt.edu)<sup>1,2</sup>, Xiaofang Jiang<sup>1</sup>, Ashley Peery<sup>1</sup>, A. Brantley Hall<sup>1</sup>, Maria V. Sharakhova<sup>1,2</sup>, Anastasia N. Naumenko<sup>1</sup>, Zhijian Tu<sup>1</sup>, Gleb Artemov<sup>2</sup>, and Vladimir Stegny<sup>2</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>Tomsk State Univ., Tomsk, Russia
- 10:45 **3865** Identification of SNPs associated with aridity tolerance in *Anopheles gambiae*. **Nora J. Besansky** (nbesansk@nd.edu)<sup>1</sup>, Diego Ayala<sup>2</sup>, Simo Zhang<sup>3</sup>, Carlo Costantini<sup>2</sup>, and Matthew Hahn<sup>3</sup>, <sup>1</sup>Univ. of Notre Dame, South Bend, IN, <sup>2</sup>Institute for Research Development, Montpellier, France, <sup>3</sup>Indiana Univ., Bloomington, IN
- 11:00 **3866** Impacts of natural *Wolbachia* infection on the microbiome of *Anopheles* mosquitoes. **Daniel E. Neafsey** (neafsey@broadinstitute.org)<sup>1</sup>, W. Robert Shaw<sup>2</sup>, Perrine Marcenac<sup>2</sup>, and Flaminia Catteruccia<sup>2</sup>, <sup>1</sup>Broad Institute of MIT and Harvard, Cambridge, MA, <sup>2</sup>Harvard School of Public Health, Boston, MA
- 11:15 **Discussion**

## Symposium: Hormones in Arthropod Vectors of Infectious Diseases

### Room W232 A (Convention Center)

**Moderators and Organizers:** Jinsong Zhu<sup>1</sup> and Ian Orchard<sup>2</sup>,  
<sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA,  
<sup>2</sup>Univ. of Toronto, Mississauga, ON, Canada

- 9:15 **3867** Function of a male-transferred hormone in *Anopheles gambiae* reproduction and its relevance for malaria transmission. **Perrine Marcenac** (perrinemarcenac@fas.harvard.edu)<sup>1</sup>, Adam South<sup>1</sup>, W. Robert Shaw<sup>1</sup>, Abdoulaye Diabaté<sup>2</sup>, Serge Yerbanga<sup>2</sup>, Thierry Lefèvre<sup>3</sup>, and Flaminia Catteruccia<sup>1</sup>, <sup>1</sup>Harvard School of Public Health, Boston, MA, <sup>2</sup>Health Sciences Research Institute, Bobo-Dioulasso, Burkina Faso, <sup>3</sup>Univ. of Montpellier, Montpellier, France
- 9:30 **3868** Hormonal regulation of gene expression patterns in mosquito reproduction. **Sourav Roy** (sourav.roy@ucr.edu)<sup>1</sup>, Tusar Saha<sup>1</sup>, Jisu Ha<sup>1</sup>, Lisa K. Johnson<sup>1</sup>, Bo Zhao<sup>1</sup>, Thomas Girke<sup>1</sup>, Zhen Zou<sup>2</sup>, and Alexander Raikhel<sup>1</sup>, <sup>1</sup>Univ. of California, Riverside, CA, <sup>2</sup>Chinese Academy of Sciences, Beijing, China
- 9:45 **3869** Ovary ecdysteroidogenic hormone and insulin-like peptide signaling convergently activate egg maturation in mosquitoes. **Mark R. Brown** (mrbrown@uga.edu) and Michael Strand, Univ. of Georgia, Athens, GA
- 10:00 **3870** Hormonal and molecular regulation of diapause in the mosquito *Culex pipiens*. **Cheolho Sim** (cheolho\_sim@baylor.edu), Baylor Univ., Waco, TX
- 10:15 BREAK**
- 10:30 **3871** Targets of neuropeptides regulating juvenile hormone synthesis in mosquitoes. Marcela Nouzova, Crisalejandra Rivera-Perez, **Maria Areiza** (mareiza@gmail.com), and Fernando Noriega, Florida International Univ., Miami, FL
- 10:45 **3872** Integration of genomic and nongenomic pathways in juvenile hormone signaling in *Aedes aegypti*. **Pengcheng Liu** (pcliu@vt.edu), Reyhaneh Ojani, and Jinsong Zhu, Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 11:00 **3873** Discovery of plant antagonists of insect juvenile hormone. **Sang Woon Shin** (shinwoong@gmail.com), Univ. of California, Riverside, CA
- 11:15 **3874** Prothoracicotropic hormone and insulin-like peptide act via the PI3K/Akt pathway to regulate both ecdysteroidogenesis and induction of clock protein PERIOD in the prothoracic glands of *Rhodnius prolixus* (Hemiptera). **Xanthe Vafopoulou** (xanthev@yorku.ca) and Colin Steel, York Univ., Toronto, ON, Canada
- 11:30 **3875** Transcriptional control of lipid metabolism in *Rhodnius prolixus*: How can hormones affect it? **Katia Gondim** (katia@bioqmed.ufrj.br), Federal Univ. of Rio de Janeiro, Rio de Janeiro, Brazil
- 11:45 **3876** Neuroendocrinology in the blacklegged tick, *Ixodes scapularis*. **Donghun Kim** (kp5091@ksu.edu) and Yoonseong Park, Kansas State Univ., Manhattan, KS

## Symposium: New Approaches to Biological and Integrated Control Changing Global Perspectives on Filth Fly Management

### Room W224 E (Convention Center)

**Moderators and Organizers:** Erika Machtinger<sup>1</sup> and Elad Chiel<sup>2</sup>,  
<sup>1</sup>USDA - ARS, Beltsville, MD, <sup>2</sup>Univ. of Haifa, Tivon, Israel

- 9:15 **3877** Filth fly control: What innovative control methods can be adopted from other pests? **Elad Chiel** (eladchiel@gmail.com), Univ. of Haifa, Tivon, Israel
- 9:30 **3878** Climate change and filth fly management. **Christopher Geden** (chris.geden@ars.usda.gov), USDA - ARS, Gainesville, FL
- 9:45 **3879** Monitoring and reproduction of *Stomoxys calcitrans* in stubble pineapple, banana, palm oil, and livestock in Costa Rica. **Yannery Gómez-Bonilla** (ygomez@inta.go.cr)<sup>1</sup>, Arturo Solórzano<sup>2</sup>, and Dennis Alpizar<sup>3</sup>, <sup>1</sup>INTA, San José, Costa Rica, <sup>2</sup>INTA, Centro Colón, Costa Rica, <sup>3</sup>Ministry of Agriculture and Granaderia, Santa Tecla, El Salvador
- 10:00 **3880** The business of biological filth fly control. **Carol S. Glenister** (carolg@ipmlabs.com), IPM Laboratories, Inc., Locke, NY
- 10:15 BREAK**
- 10:30 **3881** Bioconversion by the black soldier fly, *Hermetia illucens* (L.) (Diptera: Stratiomyidae): Prospects for managing organic waste and filth flies. **Jonathan A. Cammack** (jonathan.cammack@ag.tamu.edu), Jeffery K. Tomberlin, Kelly Beskin, and Chelsea Holcomb, Texas A&M Univ., College Station, TX
- 10:45 **3882** Entomophthorales on filth flies: Basic biology, co-evolution, and potential novel uses in biological control. **Jørgen Eilenberg** (jei@plen.ku.dk)<sup>1</sup>, Annette Jensen<sup>1</sup>, and Henrik de Fine Licht<sup>2</sup>, <sup>1</sup>Univ. of Copenhagen, Frederiksberg, Denmark, <sup>2</sup>Univ. of Copenhagen, Copenhagen, Denmark
- 11:00 **3883** Evaluation of two novel non-nutritive sugars as potential pesticides against the house fly (*Musca domestica*). **Edwin Burgess** (eburgess2@niu.edu), Northern Illinois Univ., DeKalb, IL
- 11:15 **3884** Manure preferences and post-emergence learning of two common filth fly parasitoids, *Spalangia cameroni* and *Muscidifurax raptor* (Hymenoptera: Pteromalidae). **Erika Machtinger** (erika.machtinger@ars.usda.gov), USDA - ARS, Beltsville, MD

## Symposium: Rapid Evolutionary Radiations in Insects: Phylogenetic Causes and Consequences of Life in the Fast Lane

### Room W231 A (Convention Center)

**Moderator and Organizer:** Brian Wiegmann, North Carolina State Univ., Raleigh, NC

- 9:15 **3885** Insect radiations: The big picture from fossils and phylogenies. **Peter Mayhew** (peter.mayhew@york.ac.uk), Univ. of York, York, United Kingdom
- 9:30 **3886** Assembly of the trophic pyramid of beetle diversity. **Brian Farrell** (bfarrell@fasmail.harvard.edu), Harvard University, Cambridge, MA



- 9:45 **3887** Diversity vs. disparity: Contrasting patterns of adaptive radiation among Hawaiian spiders. **Rosemary Gillespie** (gillespie@berkeley.edu), Univ. of California, Berkeley, CA
- 10:00 **3888** Increased resolution of major episodes of higher fly diversification. **Brian Wiegmann** (bwiegman@ncsu.edu)<sup>1</sup>, Keith Bayless<sup>1</sup>, Michelle Trautwein<sup>2</sup>, and David Yeates<sup>3</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>California Academy of Sciences, San Francisco, CA, <sup>3</sup>CSIRO, Acton, Australia
- 10:15 BREAK**
- 10:30 **3889** Host-associated radiations in plant-feeding flies: Timing, constraints, and diversification. **Isaac Winkler** (isw971@gmail.com)<sup>1</sup>, Marty A. Condon<sup>1</sup>, and Sonja Scheffer<sup>2</sup>, <sup>1</sup>Cornell College, Mount Vernon, IA, <sup>2</sup>USDA - ARS, Beltsville, MD
- 10:45 **3890** From mutations to species: Causes and consequences of host use variation in pine sawflies. **Catherine Linnen** (catherine.linnen@uky.edu), Univ. of Kentucky, Lexington, KY
- 11:00 **3891** Phylogenomic resolution and evolutionary implications of rapid radiation episodes within aculeate Hymenoptera (bees, ants, stinging wasps). **Seán Brady** (bradys@si.edu)<sup>1</sup>, Bonnie Blaimer<sup>1</sup>, Elizabeth Murray<sup>2</sup>, Michael Brainstetter<sup>3</sup>, James P. Pitts<sup>4</sup>, and Bryan N. Danforth<sup>5</sup>, <sup>1</sup>Smithsonian Institution National Museum of Natural History, Washington, DC, <sup>2</sup>Univ. of California, Riverside, CA, <sup>3</sup>Univ. of Utah, Salt Lake City, UT, <sup>4</sup>Utah State Univ., Logan, UT, <sup>5</sup>Cornell Univ., Ithaca, NY
- 10:30 **3896** Responding to environmental change: Plasticity or evolution? **Carla Sgro** (carla.sgro@monash.edu), Monash Univ., Melbourne, Australia
- 10:45 **3897** Predicting growth and fitness responses of insects to climate change: Beyond thermal performance curves. **Joel Kingsolver** (jgking@bio.unc.edu)<sup>1</sup> and Art Woods<sup>2</sup>, <sup>1</sup>Univ. of North Carolina, Chapel Hill, NC, <sup>2</sup>Univ. of Montana, Missoula, MT
- 11:00 **3898** The (thermal) ecology of individuals. **Nathan J. Sanders** (nathan.sanders@snm.ku.dk)<sup>1</sup>, Lacy D. Chick<sup>2</sup>, and Rob R. Dunn<sup>1,3</sup>, <sup>1</sup>Univ. of Copenhagen, Copenhagen, Denmark, <sup>2</sup>Case Western Reserve Univ., Cleveland, OH, <sup>3</sup>North Carolina State Univ., Raleigh, NC
- 11:15 **3899** Pattern and process in butterfly responses to climate and land-use change. **Sarah Diamond** (sarah.diamond@case.edu), Case Western Reserve Univ., Cleveland, OH
- 11:30 **3900** Social dimensions of thermal performance using whole ant colonies. **Clint Penick** (capenick@ncsu.edu)<sup>1</sup>, Sarah Diamond<sup>2</sup>, Lacy D. Chick<sup>2</sup>, and Rob R. Dunn<sup>1,3</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>Case Western Reserve Univ., Cleveland, OH, <sup>3</sup>Univ. of Copenhagen, Copenhagen, Denmark
- 11:45 **3901** Physiological consequences of social transitions in ants. **Jonathan Shik** (jonathan.shik@gmail.com)<sup>1</sup>, William Wcislo<sup>2</sup>, and Jacobus Boomsma<sup>1</sup>, <sup>1</sup>Univ. of Copenhagen, Copenhagen, Denmark, <sup>2</sup>Smithsonian Tropical Research Institute, Panama City, Panama

## Symposium: Physiological Responses to Environmental Change

### Room W414 C (Convention Center)

**Moderators and Organizers:** Jonathan Shik<sup>1</sup> and Sarah Diamond<sup>2</sup>, <sup>1</sup>Univ. of Copenhagen, Copenhagen, Denmark, <sup>2</sup>Case Western Reserve Univ., Cleveland, OH

- 9:15 **3892** Consequences of stress for diet balancing by an insect. **Shawn Wilder** (wilder.shawn@gmail.com) and Taylor Brooks, Oklahoma State Univ., Stillwater, OK
- 9:30 **3893** Interactions among bark beetles, blue stain fungi, and termites: Impacts on decomposition and diversity. **Natalie Clay** (nclay@latech.edu)<sup>1</sup>, Nathan Little<sup>2</sup>, Courtney Siegert<sup>2</sup>, Juliet Tang<sup>3</sup>, and John Riggins<sup>4</sup>, <sup>1</sup>Louisiana Tech Univ., Ruston, LA, <sup>2</sup>USDA - ARS, Stoneville, MS, <sup>3</sup>USDA - Forest Service, Madison, WI, <sup>4</sup>Mississippi State Univ., Mississippi State, MS
- 9:45 **3894** Patterns and consequences of variation in arthropod water balance across ecosystems with divergent climate, land-use, and hydrological alteration. **Kevin McCluney** (kmcclun@bgsu.edu)<sup>1</sup>, John Sabo<sup>2</sup>, Steven Frank<sup>3</sup>, and Jamie Becker<sup>1</sup>, <sup>1</sup>Bowling Green State Univ., Bowling Green, OH, <sup>2</sup>Arizona State Univ., Tempe, AZ, <sup>3</sup>North Carolina State Univ., Raleigh, NC
- 10:00 **3895** Climate change and overwintering insects: Energy, cold, and immunity. **Brent Sinclair** (bsincla7@uwo.ca), Univ. of Western Ontario, London, ON, Canada

**10:15 BREAK**

## Symposium: Spreading the Word: Bed Bug Education and Training in Today's Society

### West Hall F4 (WF4) (Convention Center)

**Moderators and Organizers:** Molly L. Stedfast and Dini Miller, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

- 9:15 **3902** Bed bug education using a webinar-based short course. **Molly L. Stedfast** (msted14@vt.edu) and Dini Miller, Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 9:30 **3903** Overcoming challenges in affordable housing bed bug management with resident outreach and education. **Susannah Reese** (sck27@cornell.edu), Northeastern IPM Center, Ithaca, NY
- 9:45 **3904** It's about instilling confidence: New results from the "Let's Beat the Bug!" campaign. **Amelia Shindelar** (shin0148@umn.edu), Univ. of Minnesota, St. Paul, MN
- 10:00 **3905** Meeting people where they are: Strategies from the National Pesticide Information Center. **Kaci Buhl** (buhl@ace.orst.edu), Oregon State Univ., Corvallis, OR
- 10:15 BREAK**
- 10:30 **3906** Learning bed bugs 101. **Frank Meek** (fmeek@rollins.com), Orkin Pest Control, Atlanta, GA
- 10:45 **3907** Fifty shades of bed bug grey: Out of the book and into the bedroom! **Nancy Troyano** (nancy.troyano@rentokilna.com), Ehrlich-Rentokil North American Pest Control, Reading, PA

- 11:00 **3908** Bed bug central: Taking science to the pest management industry. **Jeffrey White** (jeff.white@bedbugcentral.com), Bed Bug Central, Lawrenceville, NJ
- 11:15 **3909** Bed bug training and education: Progress and future work. **Dini Miller** (dinim@vt.edu) and Molly L. Stedfast, Virginia Polytechnic Institute and State Univ., Blacksburg, VA

### Contributed Papers: Acarology: Mites

#### Room W340 B (Convention Center)

**Moderators:** Samuel Ramsey<sup>1</sup>, Joseph Roberts<sup>2</sup>, and Georgios Broufas<sup>3</sup>, <sup>1</sup>Univ. of Maryland, College Park, MD, <sup>2</sup>Harper Adams Univ., Newport, United Kingdom, <sup>3</sup>Democritus Univ. of Thrace, Orestiada, Greece

- 9:15 **3910** Mites on apples in Indonesia and the biology of the predator mite *Zetzellia* sp. on the tetranychid *Panonychus citri* and *Tetranychus* sp. **Retno Puspitarini** (riniwidyo@yahoo.com), Mochamad Hadi, and Ahmad Mushoffan, Univ. of Brawijaya, Malang, Indonesia
- 9:30 **3911** Intraguild predation among exotic and native phytoseiid predators is diminished by the provision of alternative food. **Georgios Broufas** (gbroufas@agro.duth.gr), Konstantinos Samaras, Evangelos Fytas, Paraskevi Theodosiou, Vasileios Karageorgiou, and Maria Pappas, Democritus Univ. of Thrace, Orestiada, Greece
- 9:45 **3912** Paedogenesis in an oriatid mite, *Notogalumna nortoni* Ramani and Haq, 1990 (Acari: Oribatei). **Niravath Ramani** (drnramani@gmail.com), Puthiya Nalakath Nasareen, and Mohamed Haq, Univ. of Calicut, Malapuram, India
- 10:00 **3913** Identifying the primary host tissue composing the diet of a honey bee parasitic mite (*Varroa destructor*). **Samuel Ramsey** (insectious@gmail.com) and Dennis vanEngelsdorp, Univ. of Maryland, College Park, MD
- 10:15 BREAK**
- 10:30 **3914** Does the gall-inducing eriophyid mite *Aceria doctersi* (Nalepa, 1909) (Acari: Eriophyidae) influence photosynthetic performance in leaves of *Cinnamomum verum* Presl.? **Puthiya Nalakath Nasareen** (nazreenpnm@hotmail.com) and Niravath Ramani, Univ. of Calicut, Malapuram, India
- 10:45 **3915** Identification of *Tetranychus urticae*-induced plant volatiles in the headspace of French dwarf bean plants and the response of *Phytoseiulus persimilis* to synthetic volatile blends. **Joseph Roberts** (jroberts@harper-adams.ac.uk)<sup>1</sup>, Tom Pope<sup>1</sup>, Ian Baxter<sup>2</sup>, and Simon Leather<sup>3</sup>, <sup>1</sup>Harper Adams Univ., Newport, United Kingdom, <sup>2</sup>Certis UK, Great Abington, United Kingdom, <sup>3</sup>Imperial College London, Ascot, United Kingdom
- 11:00 **3916** Predatory mites of the super family Bdelloidea from Northwest Iran. **Amir Eghbalian** (ah\_eghbalian@yahoo.com), Bu-Ali Sina Univ., Hamedan, Iran
- 11:15 **3917** Description of a new predatory mite species (*Agistemus saeedii*; Acari: Stigmaeidae) from Pakistan. **Bilal Khan** (bilalentomologyuaf@gmail.com), Univ. of Agriculture, Faisalabad, Pakistan

- 11:30 **3918** Mites associated with gladiolus in Mahallat, Markazi Province Iran. **Mohammad Khanjani** (mkhanjani@gmail.com) and Mohammadreza Amin, Bu-Ali Sina Univ., Hamedan, Iran
- 11:45 **3919** Predatory activities of *Typhlodromalus* and *Anystis* spp. against the citrus red mite, *Panonychus citri* McGregor (Acarina: Tetranychidae), in Nigeria. **Vincent Umeh** (vumeha@yahoo.com) and Mercy Olaniyi, National Horticultural Research Institute, Ibadan, Nigeria

### Contributed Papers: Apidology, Sericulture, and Social Insects: Environmental Responses

#### Room W240 A (Convention Center)

**Moderators:** Reed Johnson<sup>1</sup> and Adam Dolezal<sup>2</sup>, <sup>1</sup>The Ohio State Univ., Wooster, OH, <sup>2</sup>Iowa State Univ., Ames, IA

- 9:15 **3920** The influence of the social environment and metapleural gland activity on disease resistance in acorn ants, *Temnothorax curvispinosus*. **Svjetlana Vojvodic** (vojvodic@rowan.edu), Rowan Univ., Glassboro, NJ
- 9:30 **3921** Assessing the effects of larval exposure to neonicotinoid pesticides on the development and adult reproductive fitness of a solitary bee (*Osmia bicornis*). **Elizabeth Nicholls** (e.nicholls@sussex.ac.uk)<sup>1</sup> and Dave Goulson<sup>2</sup>, <sup>1</sup>Univ. of Sussex, Sussex, United Kingdom, <sup>2</sup>Univ. of Sussex, Brighton, United Kingdom
- 9:45 **3922** Nest sites of solitary wood-nesting bees. **Per Westerfelt** (per.westerfelt@skogforsk.se), Uppsala Science Park, Uppsala, Sweden
- 10:00 **3923** Pollen stress during larval development impairs lifetime performance of critical tasks by adult honey bees (*Apis mellifera*). **Heather Mattila** (hmattila@wellesley.edu), Corena Loeb, Anne Shen, and Anita Yau, Wellesley College, Wellesley, MA
- 10:15 BREAK**
- 10:30 **3924** Multi-locus metabarcoding reveals floral origins of honey bee pollen diet across a Midwestern urban-rural gradient. **Rodney Richardson** (richardson.827@osu.edu)<sup>1</sup>, Douglas Sponsler<sup>2</sup>, Chia-Hua Lin<sup>1</sup>, and Reed Johnson<sup>2</sup>, <sup>1</sup>The Ohio State Univ., Columbus, OH, <sup>2</sup>The Ohio State Univ., Wooster, OH
- 10:45 **3925** Impact of combined exposure to abiotic and biotic stressors on bumble bee (*Bombus terrestris*) colonies. **Cristina Botias** (cristinabotias@gmail.com), Tobias Pamminger, Julia Jones, Williams O. H. Hughes, and Dave Goulson, Univ. of Sussex, Brighton, United Kingdom
- 11:00 **3926** Pollen nutrition drives bumble bee (*Bombus impatiens*) foraging preferences from the lab to the landscape. **Anthony Vaudou** (advaudou@gmail.com), Harland M. Patch, David Mortensen, John Tooker, and Christina M. Grozinger, Pennsylvania State Univ., University Park, PA
- 11:15 **3927** Presentation withdrawn
- 11:30 **3928** Agricultural land use positively contributes to wild bee communities in New England. **Erika Tucker** (erika.tucker@unh.edu) and Sandra Rehan, Univ. of New Hampshire, Durham, NH



- 11:45 **3929** Diet quantity as a mediator of caste determination in the honey bee, *Apis mellifera*. Garrett Slater<sup>1</sup>, George Yocum<sup>2</sup>, and **Julia Bowsher** (julia.bowsher@ndsu.edu)<sup>1</sup>, <sup>1</sup>North Dakota State Univ., Fargo, ND, <sup>2</sup>USDA - ARS, Fargo, ND
- 12:00 **3930** Effects of simulated heat waves on honey bees (*Apis mellifera*). **Célia Bordier** (celia.bordier@paca.inra.fr)<sup>1</sup>, Maryline Pioz<sup>1</sup>, Séverine Suchail<sup>2</sup>, Didier Crauser<sup>1</sup>, Yves Le Conte<sup>1</sup>, and Cedric Alaux<sup>1</sup>, <sup>1</sup>INRA, Avignon, France, <sup>2</sup>Univ. d'Avignon et des Pays de Vaucluse, Avignon, France
- 12:15 **3931** Effects of larval nutritional stress on honey bee disease susceptibility and immunocompetence. **Adam Dolezal** (adolezal@iastate.edu), Alexander Walton, and Amy L. Toth, Iowa State Univ., Ames, IA

### Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Lepidoptera

#### Room W223 B (Convention Center)

**Moderators:** Guanyang Zhang<sup>1</sup> and Braj Sinha<sup>2</sup>, <sup>1</sup>Arizona State Univ., Tempe, AZ, <sup>2</sup>Ranchi Univ., Ranchi, India

- 9:15 **3932** Inferring ecological processes underlying the latitudinal diversity gradient in New World swallowtail butterflies (*Papilio*, *Heracles*, and *Pterourus*). **Hannah Owens** (howens@flmnh.ufl.edu), Univ. of Florida, Gainesville, FL
- 9:30 **3933** Molecular phylogeny and biogeography of a highly diverse genus of Andean butterflies. **Pablo Padron** (sebastianpadronm@yahoo.com)<sup>1</sup> and Keith R. Willmott<sup>2</sup>, <sup>1</sup>Univ. of Azuay, Cuenca, Ecuador, <sup>2</sup>Univ. of Florida, Gainesville, FL
- 9:45 **3934** Practical use of a long term preservation method in the silkworm, *Bombyx mori*. **Tsuguru Fujii** (fujii.tsuguru.233@m.kyushu-u.ac.jp), Hisayoshi Fukumori, and Yutaka Banno, Kyushu Univ., Fukuoka, Japan
- 10:00 **3935** Butterfly biodiversity of the Australian continent. **Michael Braby** (michael.braby@anu.edu.au), The Australian National Univ., Canberra, Australia
- 10:15 **BREAK**
- 10:30 **3936** Mapping global biodiversity connections by DNA barcoding: Lepidoptera of Pakistan. **Muhammad Ashfaq** (mashfaq@uoguelph.ca) and Paul Hebert, Univ. of Guelph, Guelph, ON, Canada
- 10:45 **3937** Butterfly responses to fragmentation associated with in-situ oil sands developments in northern Alberta boreal forests. **Federico Riva** (friva@ualberta.ca), John Acorn, and Scott Nielsen, Univ. of Alberta, Edmonton, AB, Canada
- 11:00 **3938** All milkweeds are not created equal: A summary of oviposition preference tests for monarch butterflies (*Danaus plexippus*). **Victoria Pocius** (pociusv@iastate.edu)<sup>1</sup>, Keith Bidne<sup>2</sup>, Richard Hellmich<sup>2</sup>, Diane Debinski<sup>1</sup>, and John Pleasants<sup>1</sup>, <sup>1</sup>Iowa State Univ., Ames, IA, <sup>2</sup>USDA - ARS, Ames, IA
- 11:15 **3939** Composition and diversity of butterflies in Malang and Pasuruhan green spaces, East Java, Indonesia. **Amin Leksono** (amin28@ub.ac.id), Ayu Nisa, Lutfi Kurniawan, and Nikita Normalitasari, Univ. of Brawijaya, Malang, Indonesia

- 11:30 **3940** Change in butterfly species diversity in Mt. Mikusa Zephyrus Coppice, Japan for 24 years: A struggle against the dwarf bamboo understory. **Minoru Ishii** (ishii@osakafu-u.ac.jp), Yuta Asai, Yasuaki Nishinaka, and Norio Hirai, Osaka Prefecture Univ., Sakai, Japan
- 11:45 **3941** Insights into the origin and evolution of preponine butterflies. **Elena Ortiz-Acevedo** (e.ortiz.acevedo@gmail.com)<sup>1</sup>, Marianne Espeland<sup>2</sup>, and Keith R. Willmott<sup>1</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Zoological Research Museum Alexander Koenig, Bonn, Germany
- 12:00 **3942** Batesian mimetic butterflies in the Indo-Australian Archipelago: Biogeography of a novel adaptive radiation. **David Lohman** (dlohman@ccny.cuny.edu)<sup>1,2</sup>, Chia-Hsuan Wei<sup>3</sup>, Dylan Scott<sup>2</sup>, Djunijanti Peggie<sup>4</sup>, Krushnamegh Kunte<sup>5</sup>, Tenzing Doleck<sup>2</sup>, Elva Yang<sup>2</sup>, Susan Tsang<sup>2</sup>, Chris Müller<sup>6</sup>, Andrew Brownjohn<sup>2</sup>, and Shen-Horn Yen<sup>3</sup>, <sup>1</sup>National Museum of the Philippines, Manila, Philippines, <sup>2</sup>City Univ. of New York, New York, NY, <sup>3</sup>National Sun Yat-Sen Univ., Kaohsiung, Taiwan, <sup>4</sup>Research Centre for Biology-LIPI, Cibinong-Bogor, Indonesia, <sup>5</sup>National Center for Biological Sciences, Bangalore, India, <sup>6</sup>Australian Museum, Sydney, Australia

### Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Pollination, Agriculture, and Disease Control

#### Room W230 C (Convention Center)

**Moderators:** Neelendra Joshi<sup>1</sup> and Kayla A. Mollet<sup>2</sup>, <sup>1</sup>Univ. of Arkansas, Fayetteville, AR, <sup>2</sup>Univ. of Nebraska, North Platte, NE

- 9:15 **3943** Can insect biodiversity suppress infectious disease transmission? **Philip Weinstein** (philip.weinstein@adelaide.edu.au)<sup>1</sup> and Emily Flies<sup>2</sup>, <sup>1</sup>Univ. of Adelaide, Adelaide, Australia, <sup>2</sup>Univ. of South Australia, Adelaide, Australia
- 9:30 **3944** Aversive learning in the disease vector mosquito *Aedes aegypti*. **Clement Vinauger** (vinauger@uw.edu), Chloé Lahondère, Lauren Locke, Jessica Liaw, and Jeff Riffell, Univ. of Washington, Seattle, WA
- 9:45 **3945** Diversity and geographic distribution of major cereal aphid bacterial communities through metagenomics. **Samir Fakhour** (sfakhour@gmail.com)<sup>1,2</sup>, Thierry Hance<sup>1</sup>, Vincent Foray<sup>3</sup>, Jérôme Ambroise<sup>4</sup>, and Jean-Luc Gala<sup>4</sup>, <sup>1</sup>Catholic Univ. of Louvain, Louvain-la-Neuve, Belgium, <sup>2</sup>National Institute of Agronomic Research, Beni-Mellal, Morocco, <sup>3</sup>CNRS, Montpellier, France, <sup>4</sup>Catholic Univ. of Louvain, Brussels, Belgium
- 10:00 **3946** Diversity relationships between arthropods and selected plant family groups of maize agro-ecosystems in two grassy biomes of South Africa. **Monique Botha** (moniquebotha210@gmail.com), Stefan Siebert, and Johnnie van den Berg, North-West Univ., Potchefstroom, South Africa

10:15 **BREAK**



- 10:30 **3947** Pollinator habitat in agricultural ecosystems: Promoting biodiversity through incentivized conservation programs. **Kayla A. Mollet** (kmollet2@unl.edu) and Julie Peterson, Univ. of Nebraska, North Platte, NE
- 10:45 **3948** Addressing invasive alien insect species in Japan — its progress and challenges. **Koichi Goka** (goka@nies.go.jp), National Institute for Environmental Studies, Ibaraki, Japan
- 11:00 **3949** Can differences in pollinator communities and consequent crop pollination deficits be detected? **Akhmad Rizali** (akhmad.rizali@gmail.com)<sup>1</sup>, Damayanti Buchori<sup>2</sup>, Anik Larasati<sup>2</sup>, Purnama Hidayat<sup>2</sup>, Hien Ngo<sup>3</sup>, and Barbara Herren<sup>4</sup>, <sup>1</sup>Univ. of Brawijaya, Malang, Indonesia, <sup>2</sup>Bogor Agricultural Univ., Bogor, Indonesia, <sup>3</sup>Intergovernmental Platform on Biodiversity and Ecosystem Services, Bonn, Germany, <sup>4</sup>Food and Agriculture Organization of the United Nations, Nairobi, Kenya
- 11:15 **3950** Pheromone-based monitoring of threatened forest insect diversity reveals striking differences in landscape utilization with key implications for conservation. **Mikael Molander** (mikael.molander@slu.se)<sup>1</sup>, Lars Westerberg<sup>2</sup>, Per Milberg<sup>2</sup>, Karl-Olof Bergman<sup>2</sup>, Inis Winde<sup>3</sup>, Joseph Burman<sup>4</sup>, Franklin Nyabuga<sup>3</sup>, Erik Hedenström<sup>5</sup>, Nils Ryrholm<sup>6</sup>, Jocelyn G. Millar<sup>7</sup>, Lawrence M. Hanks<sup>8</sup>, and Mattias Larsson<sup>1</sup>, <sup>1</sup>Swedish Univ. of Agricultural Sciences, Alnarp, Sweden, <sup>2</sup>Linköping Univ., Linköping, Sweden, <sup>3</sup>Lund Univ., Lund, Sweden, <sup>4</sup>Canterbury Christ Church Univ., Canterbury, United Kingdom, <sup>5</sup>Mid Sweden Univ., Sundsvall, Sweden, <sup>6</sup>Univ. of Gävle, Gävle, Sweden, <sup>7</sup>Univ. of California, Riverside, CA, <sup>8</sup>Univ. of Illinois, Urbana, IL
- 11:30 **3951** Marginal lands for biocontrol and ecosystem services: Where to enhance and what do we put there? **Jason Schmidt** (jschmid2@uga.edu)<sup>1</sup>, Dawn Olson<sup>2</sup>, Tim Strickland<sup>2</sup>, and Alisa Coffin<sup>2</sup>, <sup>1</sup>Univ. of Georgia, Tifton, GA, <sup>2</sup>USDA - ARS, Tifton, GA
- 11:45 **3952** Presentation withdrawn
- 12:00 **3953** How much do pollinator species overlap between spring-blooming orchards and summer-blooming pollinator habitats? **Julianna Wilson** (jkwilson@msu.edu)<sup>1</sup>, Jason Gibbs<sup>1</sup>, Larry Gut<sup>1</sup>, and Nikki Rothwell<sup>2</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>Michigan State Univ., Traverse City, MI
- 12:15 **3954** Assessing *Nesidiocoris tenuis* as a potential biological control agent of *Bactericera cockerelli*. **Gabriela Esparza-Díaz** (gesparzadiaz@ag.tamu.edu)<sup>1</sup>, Joseph Munyaneza<sup>2</sup>, and Raul T. Villanueva<sup>1</sup>, <sup>1</sup>Texas A&M Univ., Weslaco, TX, <sup>2</sup>USDA - ARS, Wapato, WA

## Contributed Papers: Biological Control and Insect Pathology: Unique Studies III

### Room W340 A (Convention Center)

**Moderators:** Salvador Herrero<sup>1</sup> and Beth Ferguson<sup>2</sup>, <sup>1</sup>Univ. of València, Burjassot, Spain, <sup>2</sup>Univ. of Arkansas, Fayetteville, AR

- 9:15 **3955** Preliminary results of radiation dose responses of *Drosophila suzukii* (Matsumura) for use in the Sterile Insect Technique (SIT). Geneviève Lanouette<sup>1</sup>, Jacques Brodeur<sup>2</sup>, François Fournier<sup>3</sup>, Veronique Martel<sup>4</sup>, Marc J.B. Vreysen<sup>5</sup>, Carlos Caceres<sup>5</sup>, and **Annabelle Firlej** (annabelle.firlej@irda.qc.ca)<sup>6</sup>, <sup>1</sup>Institute of Research on Vegetable Biology, Montréal, QC, Canada, <sup>2</sup>Univ. of Montréal, Montréal, QC, Canada, <sup>3</sup>Collège Montmorency, Laval, QC, Canada, <sup>4</sup>Natural Resources Canada, Québec City, QC, Canada, <sup>5</sup>International Atomic Energy Agency, Vienna, Austria, <sup>6</sup>Institute of Research and Development on the Agroenvironment, St-Bruno-de-Montarville, QC, Canada
- 9:30 **3956** New RNA viruses producing covert infections in field and laboratory insects of *Ceratitis capitata* (Wiedemann): Implications in SIT programs. Angel Llopi<sup>1</sup>, Rosa González-Martínez<sup>1</sup>, Anabel Millán-Leiva<sup>2</sup>, Marta Catalá<sup>3</sup>, Elena Llacer<sup>3</sup>, Alberto Urbaneja<sup>3</sup>, and **Salvador Herrero** (sherrero@uv.es)<sup>1</sup>, <sup>1</sup>Univ. of València, Burjassot, Spain, <sup>2</sup>Institute of Subtropical and Mediterranean Horticulture, Málaga, Spain, <sup>3</sup>Valencian Institute of Agricultural Research, Moncada, Spain
- 9:45 **3957** Temperature adaptability of introduced natural enemy alligator weed flea beetle in China. **Ruiyan Ma** (maruiyan2004@163.com), Shanxi Agricultural Univ., Taigu, China
- 10:00 **3958** Floral and non-floral diet effects on *Larinus minutus*. **Beth Ferguson** (mef005@email.uark.edu), Timothy J. Kring, and Robert N. Wiedemann, Univ. of Arkansas, Fayetteville, AR
- 10:15 BREAK**
- 10:30 **3959** Provision of shelter to natural enemies via companion planting. **Lessando Gontijo** (lessandomg@ufv.br), Rafael Viana, Barbara Bordin, and Daiane Souza, Federal Univ. of Viçosa, Florestal, Brazil
- 10:45 **3960** Regulation of host reproduction by the endosymbiotic bacteria *Wolbachia* and its role in the modification of parasitic natural enemy insects. **Bin Cong** (bin1956@163.com), Shenyang Agricultural Univ., Shenyang, China
- 11:00 **3961** Biological control facilitates conventional control of weeds. **Philip Tipping** (philip.tipping@ars.usda.gov)<sup>1</sup>, Lyn Gettys<sup>2</sup>, and Carey Minter<sup>1</sup>, <sup>1</sup>USDA - ARS, Ft. Lauderdale, FL, <sup>2</sup>Univ. of Florida, Davie, FL
- 11:15 **3962** Natural enemies of coffee leaf miners increase survival feeding on extrafloral nectar. **Madelaine Venzon** (venzon@epamig.ufv.br)<sup>1</sup>, Maira Rezende<sup>2,3</sup>, Bruno Santos<sup>2</sup>, Erickson Freitas<sup>2</sup>, Eduardo Silva<sup>2</sup>, Elem Martins<sup>2</sup>, and Paulo Santos<sup>1</sup>, <sup>1</sup>Agricultural Research Company of Minas Gerais, Viçosa, Brazil, <sup>2</sup>Federal Univ. of Viçosa, Viçosa, Brazil, <sup>3</sup>Federal Institute of Education, Science and Technology of the Triangle Mine, Patos de Minas, Brazil



11:30 **3963** Impact of *Wolbachia* infection on population ecology of Pieridae butterflies in India. **H. P. Puttaraju** (puttarajuhp@hotmail.com), Bangalore Univ., Bangalore, India

### Contributed Papers: Biological Control and Insect Pathology: Utilizing Parasitoid Wasps I

#### Room W225 B (Convention Center)

**Moderators:** Masami Takagi<sup>1</sup> and Matthew Kaiser<sup>2</sup>, <sup>1</sup>Kyushu Univ., Fukuoka, Japan, <sup>2</sup>Univ. of Minnesota, St. Paul, MN

9:15 **3964** Effects of temporary host deprivation on the reproductive activity of three local trichogrammatid species in Egypt. **Essam Agamy** (essamagamy@yahoo.com), Cairo Univ., Giza, Egypt

9:30 **3965** How an introduced parasitic wasp (*Aroplectrus dimerus*) tamed a nasty caterpillar (*Darna palivitta*) in Hawaii. **Renato C. Bautista** (renato.c.bautista@hawaii.gov) and Juliana A. Yalem, Hawaii Dept. of Agriculture, Honolulu, HI

9:45 **3966** Genetic structure of coexisting sexual and asexual populations of the parasitoid wasp *Meteorus pulchricornis* (Hymenoptera: Braconidae) that attacks lepidopteran larvae. **Kaoru Maeto** (maeto@kobe-u.ac.jp), Shunpei Fujie, Hironobu Umemoto, and Yoko Tsutsui, Kobe Univ., Kobe, Japan

10:00 **3967** Ecology of a hymenopteran parasitoid, *Cotesia vanessae* (Braconidae). **Vincent Hervet** (vincent.hervet@gmail.com)<sup>1</sup>, Kevin Floate<sup>2</sup>, and Robert Laird<sup>1</sup>, <sup>1</sup>Univ. of Lethbridge, Lethbridge, AB, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Lethbridge, AB, Canada

#### 10:15 BREAK

10:30 **3968** Post-release trends in the lygus parasitoid *Peristenus relictus* in the Monterey Bay region of California, a 12-year study. **Charles H. Pickett** (cpickett@cdfa.ca.gov)<sup>1</sup>, Diego J. Nieto<sup>2</sup>, Janet A. Bryer<sup>2</sup>, Sean Swezey<sup>2</sup>, and Martin Erlandson<sup>3</sup>, <sup>1</sup>California Dept. of Food and Agriculture, Sacramento, CA, <sup>2</sup>Univ. of California, Santa Cruz, CA, <sup>3</sup>Agriculture and Agri-Food Canada, Saskatoon, SK, Canada

10:45 **3969** Improving biocontrol and adoption by farmers of an aggressive generalist predator, *Oecophylla longinoda*. **Emilie Deletre** (emilie.deletre@cirad.fr)<sup>1</sup> and Anais Chailleux<sup>2</sup>, <sup>1</sup>CIRAD, Nairobi, Kenya, <sup>2</sup>CIRAD, Dakar, France

11:00 **3970** Biological control of alfalfa weevil under unstable paddy field environment in Japan. **Masami Takagi** (mtakagi@grt.kyushu-u.ac.jp), Kengo Nakahira, Shun-ichiro Iwase, and Midori Tuda, Kyushu Univ., Fukuoka, Japan

11:15 **3971** New progress on biological control of the rice striped stem borer (*Chilo suppressalis*) with *Trichogramma* in northeastern China. **Lian-Sheng Zang** (lsz0415@163.com), Chang-Chun Ruan, and Jun-Jie Zhang, Jilin Agricultural Univ., Changchun, China

11:30 **3972** Host range test of candidate Asian parasitoids for biological control of spotted wing drosophila in North America. **Xin-geng Wang** (xggwang@ucanr.edu)<sup>1</sup>, Antonio Biondi<sup>2,3</sup>, Betsey Miller<sup>4</sup>, Jeffrey C. Miller<sup>4</sup>,

Peter Shearer<sup>5</sup>, Kim A. Hoelmer<sup>6</sup>, Vaughn Walton<sup>4</sup>, and Kent M. Daane<sup>2</sup>, <sup>1</sup>Univ. of California Cooperative Extension, Parlier, CA, <sup>2</sup>Univ. of California, Berkeley, CA, <sup>3</sup>Univ. of Catania, Catania, Italy, <sup>4</sup>Oregon State Univ., Corvallis, OR, <sup>5</sup>Oregon State Univ., Hood River, OR, <sup>6</sup>USDA - ARS, Newark, DE

11:45 **3973** Transgenerational fecundity compensation in the aphid *Aphis craccivora* in response to parasitism by two competing parasitoids. **Matthew Kaiser** (kais0101@umn.edu) and George Heimpel, Univ. of Minnesota, St. Paul, MN

12:00 **3974** Release and post-release monitoring of *Diadromus pulchellus*, a pupal parasitoid of leek moth (*Acrolepiopsis assectella*). **Peter Mason** (peter.mason@agr.gc.ca), Andrea Brauner, and Jacob Miall, Agriculture and Agri-Food Canada, Ottawa, ON, Canada

### Contributed Papers: Ecology and Population Dynamics: Pest Management

#### Room W240 D (Convention Center)

**Moderators:** Justin Cappadonna<sup>1</sup> and John Diaz-Montano<sup>2</sup>, <sup>1</sup>Univ. of Queensland, Brisbane, Australia, <sup>2</sup>Colombian Corporation for Agricultural Research, Rionegro, Colombia

9:15 **3975** Prospects of biological control and other management options of the banana aphid *Pentalonia nigronervosa*, the vector of banana bunchy top virus in Africa. **Rachid Hanna** (r.hanna@cgiar.org)<sup>1</sup>, Sergine Ngat<sup>1</sup>, and Lava Kumar<sup>2</sup>, <sup>1</sup>International Institute of Tropical Agriculture, Yaounde, Cameroon, <sup>2</sup>International Institute of Tropical Agriculture, Ibadan, Nigeria

9:30 **3976** Native vegetation isn't necessarily a source of natural enemies: The case of parasitoids of light brown apple moth in Australia. **Michael Keller** (mike.keller@adelaide.edu.au)<sup>1</sup>, Yi Feng<sup>2</sup>, Olena Kravchuk<sup>1</sup>, Stephen Wratten<sup>3</sup>, and Harpinder Sandhu<sup>4</sup>, <sup>1</sup>Univ. of Adelaide, Adelaide, Australia, <sup>2</sup>Northwest A&F Univ., Yangling, China, <sup>3</sup>Lincoln Univ., Lincoln, New Zealand, <sup>4</sup>Flinders Univ., Adelaide, Australia

9:45 **3977** Host plant resistance and biological control: A test of the movement-risk hypothesis. **Cory Straub** (cstraub@ursinus.edu)<sup>1</sup>, Katharina Griesbach-Hoback<sup>2</sup>, and Michael Traugott<sup>2</sup>, <sup>1</sup>Ursinus College, Collegeville, PA, <sup>2</sup>Univ. of Innsbruck, Innsbruck, Austria

10:00 **3978** Incidence of insect pests on avocado in the eastern region of Antioquia (Colombia, South America). **John Diaz-Montano** (jdiazm@corpoica.org.co) and Claudia Holguin, Colombian Corporation for Agricultural Research, Rionegro, Colombia

#### 10:15 BREAK

10:30 **3979** Seasonal variations in the occurrence of citrus leafminer, *Phyllocnistis citrella* Stainton, on *Citrus reticulata* in three Tehsils of District Sargodha, Pakistan. **Muhammad Irfan Ullah** (mirfanullah@uos.edu.pk)<sup>1</sup>, Muhammad Arshad<sup>1</sup>, Muhammad Afzal<sup>1</sup>, Abdul Khaliq<sup>1</sup>, Muhammad Saqib<sup>1</sup>, Samina Khalid<sup>2</sup>, Yasir Iftikhar<sup>1</sup>, and Zahoor Hussain<sup>1</sup>, <sup>1</sup>Univ. of Sargodha, Sargodha, Pakistan, <sup>2</sup>COMSATS Institute of Information Technology, Vehari, Pakistan

- 10:45 **3980** Distribution patterns of *Hypothenemus hampei* Ferr. (coffee berry borer) in coffee plants at Jenepono Regency Rumbia Sub Regency. **Itji Daud** (itfir@yahoo.com), Hasanuddin Univ., Makassar, Indonesia
- 11:00 **3981** Impact of male density and food sources on the progeny development of cotton mealybug, *Phenacoccus solenopsis* (Hemiptera: Pseudococcidae). **Muhammad Jalal Arif** (jalalarif807@yahoo.com), Muhammad Dildar Gogi, Ahmad Nawaz, Muhammad Sufyan, and Amjad Majeed Pasha, Univ. of Agriculture, Faisalabad, Pakistan
- 11:15 **3982** Multiple host-use by the generalist cotton pest *Creontiades dilutus* (Hemiptera: Miridae) in natural and agricultural landscapes. **Justin Cappadonna** (justin.cappadonna@gmail.com), James Hereward, and Gimme H. Walter, Univ. of Queensland, Brisbane, Australia
- 11:30 **3983** Seasonal occurrence of TuMV and potential aphid vectors in Kyushu, Japan. **Shuhei Adachi** (aphidtennis@gmail.com)<sup>1</sup>, Tomoki Honma<sup>2</sup>, Yasaka Ryosuke<sup>1</sup>, Ohshima Kazusato<sup>2</sup>, and Tokuda Makoto<sup>2</sup>, <sup>1</sup>Kagoshima Univ., Kagoshima, Japan, <sup>2</sup>Saga Univ., Saga, Japan
- 11:45 **3984** Offspring sex ratio and larval development are determined by sexual activity in *Echinothrips americanus* Morgan 1913 (Thysanoptera: Thripidae). **Stephanie Krueger** (stephanie.krueger@zoologie.uni-halle.de)<sup>1</sup>, Laurence Mound<sup>2</sup>, and Gerald Moritz<sup>1</sup>, <sup>1</sup>Martin Luther Univ., Halle, Germany, <sup>2</sup>CSIRO, Canberra, Australia
- 12:00 **3985** Effect of seedling age on the oviposition and performance of Hessian fly (*Mayetiola destructor*) on wheat. **Hao Zhang** (zhh1972@nwsuaf.edu.cn)<sup>1</sup>, Kirk Anderson<sup>2</sup>, and Marion Harris<sup>2</sup>, <sup>1</sup>Northwest A&F Univ., Yangling, China, <sup>2</sup>North Dakota State Univ., Fargo, ND
- 12:15 **3986** Survey of overwintering sites of *Riptortus pedestris* (Fabricius) (Hemiptera: Alydidae) in diverse landscapes in South Korea. **Minhyung Jung** (alsgud\_11@naver.com), Hong Geun Kim, and Doo-Hyung Lee, Gachon Univ., Seongnam, South Korea
- 12:30 **3987** Growth and development of *Spodoptera exigua* (Lepidoptera: Noctuidae) on alternate hosts with reference to integrated pest management. Qamar Saeed<sup>1</sup> and **Faheem Ahmad** (faheem.ahmad@comsats.edu.pk)<sup>2</sup>, <sup>1</sup>Bahauddin Zakariya Univ., Multan, Pakistan, <sup>2</sup>COMSATS Institute of Information Technology, Islamabad, Pakistan
- 12:45 **3988** Mortality factors affecting *Bemisia tabaci* (Gennadius) populations in Bt cotton: Life table analysis. **Ravinder Chandi** (rschandi@pau.edu) and Jagdev Kular, Punjab Agricultural Univ., Ludhiana, India

## Contributed Papers: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops

### Room W314 A (Convention Center)

**Moderators:** Daniel Fleming<sup>1</sup> and Waseem Akbar<sup>2</sup>, <sup>1</sup>Mississippi State Univ., Mississippi State, MS, <sup>2</sup>Monsanto Company, Chesterfield, MO

- 9:15 **3989** Predicting evolution of *Spodoptera frugiperda* (J. E. Smith) (Lepidoptera: Noctuidae) resistance to transgenic crops in agricultural landscapes, based on larval movement. **Adriano Garcia** (adrianogomesgarcia@gmail.com)<sup>1</sup>, Cláudia Ferreira<sup>2</sup>, Fernando Cônsoli<sup>1</sup>, and Wesley Godoy<sup>1</sup>, <sup>1</sup>Univ. of São Paulo, Piracicaba, Brazil, <sup>2</sup>São Paulo State Univ., Botucatu, Brazil
- 9:30 **3990** Caterpillar resistance to *Bacillus thuringiensis* (Bt): Impact of increased feeding rates. **Anirudh Dhammi** (adhammi@ncsu.edu)<sup>1</sup>, Dominic Reisig<sup>2</sup>, Ryan E. Kurtz<sup>3</sup>, Jiwei Zhu<sup>1</sup>, and R. Michael Roe<sup>1</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>North Carolina State Univ., Plymouth, NC, <sup>3</sup>Cotton Incorporated, Cary, NC
- 9:45 **3991** Does timing matter in pesticide resistance? One splice form variant of *MDR49* provides early, but not late, 'protection' to DDT. **Keon Mook Seong** (kseong6@illinois.edu)<sup>1</sup>, Barry R. Pittendrigh<sup>1</sup>, Weilin Sun<sup>1</sup>, and John M. Clark<sup>2</sup>, <sup>1</sup>Univ. of Illinois, Champaign, IL, <sup>2</sup>Univ. of Massachusetts, Amherst, MA
- 10:00 **3992** Screening for Bt resistance allele in the Philippine population of *Ostrinia furnacalis* (Guenée) (Lepidoptera: Crambidae) collected from Bt-corn sentinel sites in Isabela province. **Gelyn Sapin** (gdsapin@up.edu.ph), Barbara Caoili, Edwin P. Alcantara, and Bonifacio F. Cayabyab, Univ. of the Philippines, Los Baños, Philippines
- 10:15 **BREAK**
- 10:30 **3993** Identification of the allele responsible for field-evolved resistance to Cry1Fa corn in *Spodoptera frugiperda* from Puerto Rico. **Rahul Banerjee** (rbanerje@vols.utk.edu)<sup>1</sup>, James M. Hasler<sup>2</sup>, Lucas Hietala<sup>1</sup>, Kenneth Narva<sup>2</sup>, and Juan Luis Jurat-Fuentes<sup>1</sup>, <sup>1</sup>Univ. of Tennessee, Knoxville, TN, <sup>2</sup>Dow AgroSciences, Indianapolis, IN
- 10:45 **3994** Survival of sugarcane borer on Bt maize and refuge from seed blends. **Andre Crespo** (andre.crespo@pioneer.com)<sup>1</sup>, Gerardo Rapetti<sup>2</sup>, Maria Celiz<sup>3</sup>, Taline das Neves<sup>4</sup>, Paulo da Silva<sup>5</sup>, Josemar Foresti<sup>5</sup>, Yiwei Wang<sup>1</sup>, Bonnie Hong<sup>1</sup>, and J. Lindsey Flexner<sup>6</sup>, <sup>1</sup>DuPont Pioneer, Johnston, IA, <sup>2</sup>DuPont Pioneer, Pergamino, Argentina, <sup>3</sup>DuPont Pioneer, Jesus Maria, Argentina, <sup>4</sup>DuPont do Brasil S.A., Itumbiara, Brazil, <sup>5</sup>DuPont do Brasil S.A., Planaltina, Brazil, <sup>6</sup>DuPont Pioneer, Wilmington, DE
- 11:00 **3995** Systemic RNAi in western corn rootworm does not involve transitive pathways. **Huarong Li** (hli2@dow.com)<sup>1</sup>, Andrew Bowling<sup>1</sup>, Premchand Gandra<sup>1</sup>, Murugesan Rangasamy<sup>1</sup>, Heather Pence<sup>1</sup>, Robert McEwan<sup>1</sup>, Chitvan Khajuria<sup>2</sup>, Blair Siegfried<sup>3</sup>, and Kenneth Narva<sup>1</sup>, <sup>1</sup>Dow AgroSciences, Indianapolis, IN, <sup>2</sup>Monsanto Company, Chesterfield, MO, <sup>3</sup>Univ. of Florida, Gainesville, FL



- 11:15 **3996** Genetically modified corn hybrids resistant to the sugarcane borer in Sinaloa, Mex. **Luis Aguirre** (luisaguirreu@yahoo.com.mx)<sup>1</sup>, Agustin Hernández-Juárez<sup>1</sup>, Mariano Flores<sup>1</sup>, Ernesto Cerna<sup>1</sup>, Jerónimo Landeros<sup>1</sup>, Gustavo Frías<sup>1</sup>, and Marvin K. Harris<sup>2</sup>, <sup>1</sup>Antonio Narro Agrarian Autonomous Univ., Saltillo, Mexico, <sup>2</sup>Texas A&M Univ., College Station, TX
- 11:30 **3997** Efficacy of transgenic Bt cotton and corn events against heliothine pests: A meta-analysis. **Daniel Fleming** (def18@msstate.edu)<sup>1</sup>, Nathan Little<sup>2</sup>, and Fred Musser<sup>1</sup>, <sup>1</sup>Mississippi State Univ., Mississippi State, MS, <sup>2</sup>USDA - ARS, Stoneville, MS
- 11:45 **3998** A new transgenic trait protects cotton from thrips and *Lygus* damage. **Waseem Akbar** (waseem.akbar@monsanto.com), Jeffrey Ahrens, Robert Brown, AnilKumar Gowda, Jason Stelzer, Scott Bollman, John Greenplate, and Thomas Clark, Monsanto Company, Chesterfield, MO
- 12:00 **3999** Genetic basis of resistance to Bt toxin Cry2Ab in pink bollworm, *Pectinophora gossypiella*. **Lolita G. Mathew** (lolita.mathew@ars.usda.gov)<sup>1</sup>, Yves Carrière<sup>2</sup>, Xianchun Li<sup>2</sup>, Bruce Tabashnik<sup>2</sup>, and Jeffrey A. Fabrick<sup>1</sup>, <sup>1</sup>USDA - ARS, Maricopa, AZ, <sup>2</sup>Univ. of Arizona, Tucson, AZ
- 12:15 **4000** IRM value and potential for protein interaction in Bt soybean pyramids. **Ted C. MacRae** (ted.c.macrae@monsanto.com), Monsanto Company, Chesterfield, MO
- 10:00 **4004** Detection of imidacloprid residues in pollen and nectar collected from annual and perennial bedding plants purchased from selected retail garden stores. **Stephanie Darnell** (stephanie.darnell@bayer.com) and Daniel Schmehl, Bayer CropScience, Research Triangle Park, NC
- 10:15 BREAK**
- 10:30 **4005** Consistency patterns of toxicity of the nitroguanidine neonicotinoid insecticides to honey bee (*Apis mellifera*) colonies. **Allen Olmstead** (allen.olmstead@bayer.com)<sup>1</sup>, Silvia Hinarejos<sup>2</sup>, Rob Hummel<sup>3</sup>, and Jay Overmyer<sup>4</sup>, <sup>1</sup>Bayer CropScience, Research Triangle Park, NC, <sup>2</sup>Valent U.S.A., Dublin, CA, <sup>3</sup>Landis International, Raleigh, NC, <sup>4</sup>Syngenta Plant Protection, Greensboro, NC
- 10:45 **4006** A common neonicotinoid pesticide, thiamethoxam, impairs honey bee flight performance (*Apis mellifera* L.). **Simone Tosi** (stosi@ucsd.edu)<sup>1,2</sup>, Giovanni Burgio<sup>2</sup>, and James C. Nieh<sup>1</sup>, <sup>1</sup>Univ. of California, La Jolla, CA, <sup>2</sup>Univ. of Bologna, Bologna, Italy
- 11:00 **4007** Neonicotinoid levels found in foraging and dead honey bees (*Apis mellifera*) collected before, during and after the 2014 and 2015 corn planting seasons. **Victor Limay-Rios** (vlimayri@uoguelph.ca), Andrew Rinald, Yanjun Luo, Luis Forero, Yingen Xue, and Arthur Schaafsma, Univ. of Guelph, Ridgetown, ON, Canada
- 11:15 **4008** Effects of a new pesticide, flupyradifurone (Sivanto), on honey bee sucrose response thresholds and orientation. **James C. Nieh** (jnieh@ucsd.edu), Angeliki Kanellopoulou, and Heather Bell, Univ. of California, La Jolla, CA
- 11:30 **4009** Can poisons stimulate bees? Appreciating the potential of hormesis in bee-pesticide research. **Chris Cutler** (chris.cutler@dal.ca), Dalhousie Univ., Truro, NS, Canada
- 11:45 **4010** Chronic exposure to an agricultural spray adjuvant and honey bee pathogen causes synergistic mortality in larval honey bees (*Apis mellifera*). **Julia Fine** (jdf250@psu.edu)<sup>1</sup>, Chris Mullin<sup>1</sup>, and Diana Cox-Foster<sup>2</sup>, <sup>1</sup>Pennsylvania State Univ., University Park, PA, <sup>2</sup>USDA - ARS, Logan, UT
- 12:00 **4011** Utilizing behavior on a colony scale to examine sub-lethal toxicity in honey bees. Troy D. Anderson, Thomas P. Kuhar, and **James M. Wilson** (jamesmw3@vt.edu), Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 12:15 **4012** Assessing geographic varroacide resistance in the honey bee pest *Varroa destructor*, and effective treatment strategies for control. **Daniel Schmehl** (daniel.schmehl@bayer.com)<sup>1,2</sup>, Dick Rogers<sup>1</sup>, and James Ellis<sup>2</sup>, <sup>1</sup>Bayer CropScience, Research Triangle Park, NC, <sup>2</sup>Univ. of Florida, Gainesville, FL
- 12:30 **4013** Evaluation of modifications towards improvement of the OECD draft 22-day repeat exposure larval honey bee (*Apis mellifera* L.) methods over the course of two years. **Michael Patnaude** (mpatnaude@smithers.com) and James Hoberg, Smithers Viscient Laboratories, Wareham, MA

### Contributed Papers: Ecology of Pesticides, Resistance, Toxicology, and Genetically Modified Crops: Pollinators

#### Room W314 B (Convention Center)

**Moderators:** Ana Cabrera<sup>1</sup> and Troy D. Anderson<sup>2</sup>, <sup>1</sup>Bayer CropScience, Research Triangle Park, NC, <sup>2</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA

- 9:15 **4001** Neonicotinoid residues in ornamentals alter behavior and survival of bees and beneficials. **Vera Aber Krischik** (krisc001@umn.edu), Univ. of Minnesota, St. Paul, MN
- 9:30 **4002** Investigation of molecular mechanisms of differential toxicity of neonicotinoid insecticides in buff-tailed bumble bee, *Bombus terrestris*. **Bartek Troczka** (bartek.troczka@rothamsted.ac.uk)<sup>1</sup>, Emma Randall<sup>2</sup>, Katherine Beadle<sup>2</sup>, Laura Kor<sup>1</sup>, Christoph Zimmer<sup>2</sup>, Martin Williamson<sup>1</sup>, T. G. Emyr Davies<sup>1</sup>, Ralf Nauen<sup>3</sup>, Chris Bass<sup>2</sup>, and Lin Field<sup>1</sup>, <sup>1</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>2</sup>Univ. of Exeter, Penryn, United Kingdom, <sup>3</sup>Bayer CropScience, Monheim, Germany
- 9:45 **4003** Survey of imidacloprid residues in nectar and pollen collected by honey bees (*Apis mellifera*) in urban and suburban environments in different regions of the United States. **Ana Cabrera** (ana.cabrera@bayer.com)<sup>1</sup>, Zachary Y. Huang<sup>2</sup>, Joseph Sullivan<sup>3</sup>, Juliana Rangel<sup>4</sup>, Pierre Lau<sup>4</sup>, Vaughn Bryant<sup>4</sup>, Daniel Schmehl<sup>1,5</sup>, and James D. Ellis<sup>5</sup>, <sup>1</sup>Bayer CropScience, Research Triangle Park, NC, <sup>2</sup>Michigan State Univ., East Lansing, MI, <sup>3</sup>Ardea Consulting, Woodland, CA, <sup>4</sup>Texas A&M Univ., College Station, TX, <sup>5</sup>Univ. of Florida, Gainesville, FL

12:45 **4014** Implications of negligible transfer of diet-derived pollen microRNAs in adult honey bees. **Jonathan Snow** (jsnow@barnard.edu)<sup>1</sup>, Maryam Masood<sup>1</sup>, Claire Everett<sup>1</sup>, and Stephen Chan<sup>2</sup>, <sup>1</sup>Columbia Univ., New York, NY, <sup>2</sup>Univ. of Pittsburgh Medical Center, Pittsburgh, PA

### Contributed Papers: Integrated Pest Management and Sustainable Agriculture: Tree Fruits and Nuts

#### Room W231 B (Convention Center)

**Moderator:** Elizabeth Grafton-Cardwell, Univ. of California, Exeter, CA

- 9:15 **4015** Asian citrus psyllid (*Diaphorina citri*) and huanglongbing radically alter California citrus IPM. **Elizabeth Grafton-Cardwell** (eegraftoncardwell@ucanr.edu), Univ. of California, Exeter, CA
- 9:30 **4016** Effect of thermal therapy on transmission of *Candidatus Liberibacter asiaticus* by the Asian citrus psyllid, *Diaphorina citri*. **Alicia Kelley** (ajkelley@ufl.edu) and Kirsten S. Pelz-Stelinski, Univ. of Florida, Lake Alfred, FL
- 9:45 **4017** Post-harvest detection of *Thaumatotibia leucotreta* in citrus fruit in South Africa. **Wayne Kirkman** (waynek@cri.co.za)<sup>1,2</sup>, Sean Moore<sup>1,2</sup>, Martin Hill<sup>1</sup>, Rui Krause<sup>1</sup>, Frikkie de Beer<sup>3</sup>, Jakobus Hoffman<sup>3</sup>, and Timothy Gibson<sup>4</sup>, <sup>1</sup>Rhodes Univ., Grahamstown, South Africa, <sup>2</sup>Citrus Research International, Port Elizabeth, South Africa, <sup>3</sup>Nuclear Energy Corporation of South Africa, Pretoria, South Africa, <sup>4</sup>RoboScientific, Leeds, United Kingdom
- 10:00 **4018** Updating dormant season management thresholds for IPM of navel orangeworm (*Amyelois transitella*) in California (USA) nut crops. **Elizabeth Boyd** (eaboyd@csuchico.edu)<sup>1</sup> and Justin Nay<sup>2</sup>, <sup>1</sup>California State Univ., Chico, CA, <sup>2</sup>Integral Ag. Inc., Durham, CA
- 10:15 BREAK**
- 10:30 **4019** Determination of the efficacy of some pest control methods used in organic hazelnut growing. Seref Yamakoglu and **Sebahat Ozman-Sullivan** (sozman@omu.edu.tr), Ondokuz Mayıs Univ., Samsun, Turkey
- 10:45 **4020** Ecology of the cocoa pod borer, *Conopomorpha cramerella* (Lepidoptera: Gracillariidae), a major pest for the cocoa industry. **Jerome Niogret** (niogret.ecology.consulting@gmail.com)<sup>1</sup>, Hans Alborn<sup>2</sup>, Keith Ingram<sup>3</sup>, Paul E. Kendra<sup>4</sup>, Smilja Lambert<sup>5</sup>, and Nancy D. Epsky<sup>4</sup>, <sup>1</sup>Niogret Ecology Consulting LLC, Miami, FL, <sup>2</sup>USDA - ARS, Gainesville, FL, <sup>3</sup>Mars, Inc., Gainesville, FL, <sup>4</sup>USDA - ARS, Miami, FL, <sup>5</sup>Mars, Inc., Cairns, Australia
- 11:00 **4021** Direct and indirect methods for detecting red palm weevil infestation in date palm plantations, Kingdom of Bahrain. **Abdul Aziz Mohamed** (amamohamed@agu.edu.bh)<sup>1</sup>, Abderrazak Bannari<sup>1</sup>, and Derek Peddle<sup>2</sup>, <sup>1</sup>Arabian Gulf Univ., Manama, Bahrain, <sup>2</sup>Univ. of Lethbridge, Lethbridge, AB, Canada
- 11:15 **4022** Presentation withdrawn
- 11:30 **4023** Presentation withdrawn

- 11:45 **4024** Is relying on wild pollinators to pollinate apple and cherry orchards in Pennsylvania risky? **David Biddinger** (djb134@psu.edu)<sup>1</sup>, Neelendra K. Joshi<sup>2</sup>, Edwin Rajotte<sup>3</sup>, Thomas Kon<sup>1</sup>, and Timothy W. Leslie<sup>4</sup>, <sup>1</sup>Pennsylvania State Univ., Biglerville, PA, <sup>2</sup>Univ. of Arkansas, Fayetteville, AR, <sup>3</sup>Pennsylvania State Univ., University Park, PA, <sup>4</sup>Long Island Univ., Brooklyn, NY
- 12:00 **4025** Invasive mango-feeding fruit fly, *Bactrocera dorsalis* (Diptera: Tephritidae), in Senegal: Effect of organic insecticides (neem oil and Surround WP) on behavior and reproduction. **Asa Balayara** (balayara@vt.edu) and Douglas G. Pfeiffer, Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 12:15 **4026** The bio-ecology of the cape grapevine leafminer, *Holocacista capensis* (Lepidoptera: Heliozelidae), in the Western Cape, South Africa. **Leigh Torrance** (torrance@sun.ac.za), Pia Addison, and Henk Geertsema, Stellenbosch Univ., Stellenbosch, South Africa
- 12:30 **4027** Analytical approach to develop decision support system for managing *Hyposidra talaca*, a major pest of tea in Doars region of eastern India. **Chanchal Pramanik** (chanchal.pramanik@tcs.com)<sup>1</sup>, Bhushan Jagyasi<sup>2</sup>, Sandika Biswas<sup>3</sup>, Barun Biswas<sup>4</sup>, Amar Nain<sup>5</sup>, Srinivasu Pappula<sup>1</sup>, and Shaonpius Mondal<sup>6</sup>, <sup>1</sup>Tata Consultancy Services, Hyderabad, India, <sup>2</sup>Tata Consultancy Services, Bangalore, India, <sup>3</sup>Tata Consultancy Services, Kolkata, India, <sup>4</sup>Punjab Agricultural Univ., Gurdaspur, India, <sup>5</sup>Goodricke Group Limited, Kolkata, India, <sup>6</sup>Cornell Univ., Ithaca, NY

### Contributed Papers: Medical and Veterinary Entomology: Biting Flies

#### West Hall F3 (WF3) (Convention Center)

**Moderators:** Megan Riddin<sup>1</sup>, Peter James<sup>2</sup>, and Ramiro Morales-Hojas<sup>3</sup>, <sup>1</sup>Rhodes Univ., Grahamstown, South Africa, <sup>2</sup>Univ. of Queensland, Dutton Park, Australia, <sup>3</sup>The Pirbright Institute, Woking, United Kingdom

- 9:15 **4028** Genomics of bluetongue virus vector competence in *Culicoides sonorensis* (Diptera: Ceratopogonidae). **Ramiro Morales-Hojas** (ramiro.morales-hojas@rothamsted.ac.uk)<sup>1</sup>, Malcolm Hinsley<sup>2</sup>, Irina Armean<sup>2</sup>, Paul Kersey<sup>2</sup>, Rhiannon Silk<sup>3</sup>, Simon T. Carpenter<sup>3</sup>, and Mark Fife<sup>4</sup>, <sup>1</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>2</sup>The European Bioinformatics Institute, Hinxton, United Kingdom, <sup>3</sup>The Pirbright Institute, Woking, United Kingdom, <sup>4</sup>The Pirbright Institute, Pirbright, United Kingdom
- 9:30 **4029** Nematode parasitism of arbovirus vectors: Effects of mermithids (Nematoda: Mermithidae) on *Culicoides* biting midges and their potential use for disease and vector control. **Georgette Kluiters** (g.kluiters@liverpool.ac.uk), Univ. of Liverpool, Neston, United Kingdom
- 9:45 **4030** Differential expression of salivary genes of *Phlebotomus papatasi* in a ZCL hyperendemic area of Iran. **Nasibeh Hosseini-Vasoukolaei** (nasibeh.hoseini@gmail.com)<sup>1,2</sup>, Amir Ahmad Akhavan<sup>1</sup>, and Mahmood Jeddi-Tehrani<sup>3</sup>, <sup>1</sup>Tehran Univ. of Medical Sciences, Tehran, Iran, <sup>2</sup>Mazandaran Univ. of Medical Sciences, Sari, Iran, <sup>3</sup>Monoclonal Antibody Research Center, Tehran, Iran



- 10:00 **4031** A paratransgenic strategy to control vectorial transmission of leishmaniasis. **Ivy Hurwitz** (ihurwitz@salud.unm.edu)<sup>1</sup>, Arinder Arora<sup>2</sup>, Annabeth Fieckl<sup>1</sup>, Ju-Lin Weng<sup>3</sup>, Marcelo Ramalho-Ortigao<sup>3</sup>, and Ravi Durvasula<sup>1</sup>, <sup>1</sup>Univ. of New Mexico, Albuquerque, NM, <sup>2</sup>Texas A&M Univ., College Station, TX, <sup>3</sup>Kansas State Univ., Manhattan, KS
- 10:15 **BREAK**
- 10:30 **4032** Buffalo flies (*Haematobia exigua* de Meijere): A significant tropical cattle pest with an expanding range in Australia. **Peter James** (p.james1@uq.edu.au)<sup>1</sup>, Robert Dobson<sup>2</sup>, and James Rothwell<sup>3</sup>, <sup>1</sup>Univ. of Queensland, Dutton Park, Australia, <sup>2</sup>Murdoch Univ., Murdoch, Australia, <sup>3</sup>Univ. of Queensland, North Sydney, Australia
- 10:45 **4033** Sandfly diversity and speciation using high resolution melt analysis in a new visceral leishmaniasis foci, Marsabit County, northern Kenya. **Damaris Matoke-Muhia** (dmatoke@icipo.org)<sup>1,2</sup>, Jandouwe Villinger<sup>1</sup>, Enock Mararo<sup>1</sup>, Philip Ngumbi<sup>2</sup>, Johnstone Ingonga<sup>2</sup>, Jackline Mwangi<sup>2</sup>, Tobias Landmann<sup>1</sup>, and Daniel Masiga<sup>1</sup>, <sup>1</sup>International Centre of Insect Physiology and Ecology, Nairobi, Kenya, <sup>2</sup>Kenya Medical Research Institute, Nairobi, Kenya
- 11:00 **4034** African horse sickness virus and *Culicoides* in the Eastern Cape, South Africa. **Megan Riddin** (g09r1172@campus.ru.ac.za)<sup>1</sup>, Martin Villet<sup>1</sup>, and Gert Venter<sup>2</sup>, <sup>1</sup>Rhodes Univ., Grahamstown, South Africa, <sup>2</sup>Agricultural Research Council, Onderstepoort, South Africa
- 11:15 **4035** An Indian phlebotomine (Diptera: Psychodidae) with description of one new species. **Prakash Salunkhe** (salunkhepr.niv@gmail.com), National Institute of Virology, Pune, India
- 9:45 **4038** A pyriproxyfen autodissemination station efficacy in *Aedes albopictus* hot spots in residential areas. **Devi Suman** (dssuman37@gmail.com)<sup>1</sup>, Yi Wang<sup>1</sup>, Kshitij Chandel<sup>1</sup>, Isik Unlu<sup>2</sup>, Greg Williams<sup>3</sup>, and Randy Gaugler<sup>1</sup>, <sup>1</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, <sup>2</sup>Mercer County Mosquito Control, West Trenton, NJ, <sup>3</sup>Hudson County Mosquito Control, Jersey City, NJ
- 10:00 **4039** Targeting the breeding sites of container mosquitoes using habitat-sharing heterospecific species carrying insect growth regulator. **Yi Wang** (ywangs@hotmail.com), Devi Suman, Kshitij Chandel, and Randy Gaugler, Rutgers, The State Univ. of New Jersey, New Brunswick, NJ
- 10:15 **BREAK**
- 10:30 **4040** Female *Culex quinquefasciatus* mosquitoes are attracted to secretion derived from blood-feeding females. **Fangfang Zeng** (ffzeng@ucdavis.edu), Garisson Buss, and Walter S. Leal, Univ. of California, Davis, CA
- 10:45 **4041** Know your enemy: Bio-rational trap outperforms human landing catches across mosquito genera. **Frances Hawkes** (f.m.hawkes@gre.ac.uk)<sup>1</sup>, Simon Sawadago<sup>2</sup>, Kounbobr Dabire<sup>2</sup>, Stephen Torr<sup>3</sup>, and Gabriella Gibson<sup>1</sup>, <sup>1</sup>Natural Resources Institute, Chatham, United Kingdom, <sup>2</sup>Health Sciences Research Institute, Bobo-Dioulasso, Burkina Faso, <sup>3</sup>Liverpool School of Tropical Medicine, Liverpool, United Kingdom
- 11:00 **4042** Field evaluation of lethal ovitraps against dengue vectors: An impact on populations of *Aedes* spp. mosquitoes in Malaysia. **Hidayatulfathi Othman** (hida@ukm.edu.my)<sup>1</sup>, Saiful Azlan Nordin<sup>1</sup>, and Zainol Pawanchee<sup>2</sup>, <sup>1</sup>National Univ. of Malaysia, Kuala Lumpur, Malaysia, <sup>2</sup>Dept. of Health and the Environment, Kuala Lumpur, Malaysia
- 11:15 **4043** Influence of natal habitats on oviposition preference and larval performance in container-inhabiting mosquitoes. **Nnaemeka Ezeakacha** (ezeakacha.fn@gmail.com)<sup>1</sup> and Donald Yee<sup>2</sup>, <sup>1</sup>Pennsylvania State Univ., University Park, PA, <sup>2</sup>Univ. of Southern Mississippi, Hattiesburg, MS
- 11:30 **4044** From concept to commercialization: The story of a mosquito ovitrap. **Rebecca Heinig** (rheinig@springstar.net), SpringStar, Inc., Woodinville, WA
- 11:45 **4045** Mom knows best except when she doesn't: Linking patterns of oviposition and larval survival in the container mosquitoes *Aedes albopictus* and *Culex quinquefasciatus*. **Donald Yee** (donald.yee@usm.edu), William C. Glasgow, and Nnaemeka Francis Ezeakacha, Univ. of Southern Mississippi, Hattiesburg, MS
- 12:00 **4046** Lab evaluation of a novel lethal ovitrap for control of *Aedes aegypti* and *Aedes albopictus*. **Casey Parker** (caseyparker@ufl.edu)<sup>1</sup>, Alexandra Chaskopoulou<sup>2</sup>, Roberto Pereira<sup>1</sup>, and Philip Koehler<sup>1</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>USDA - ARS, Thessaloniki, Greece

### Contributed Papers: Medical and Veterinary Entomology: Mosquito Behavior and Trapping Technologies

#### West Hall F2 (WF2) (Convention Center)

**Moderators:** Casey Parker<sup>1</sup>, Daniel Kline<sup>2</sup>, and Pablo Gurman<sup>3</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>USDA - ARS, Gainesville, FL, <sup>3</sup>GearJump Technologies LLC, Revere, MA

- 9:15 **4036** Controlled release devices for field and personal protection against mosquitoes of public health importance. Ulrich R. Bernier<sup>1</sup>, Craig Scoops<sup>2</sup>, Melynda Perry<sup>3</sup>, Daniel Kline<sup>1</sup>, **Pablo Gurman** (pablogurman@gmail.com)<sup>4</sup>, and Noel Elman<sup>4</sup>, <sup>1</sup>USDA - ARS, Gainesville, FL, <sup>2</sup>U.S. Naval Medical Research Unit, Callao, Peru, <sup>3</sup>U.S. Army Research, Development, and Engineering Command, Natick, MA, <sup>4</sup>GearJump Technologies LLC, Revere, MA

- 9:30 **4037** Dietary carbohydrate manipulation leads to differential pathogen interference in *Wolbachia*-infected *Aedes aegypti*. **Eric Caragata** (e.caragata@gmail.com), Fernanda Rezende, Taynana Simões, and Luciano Moreira, Oswaldo Cruz Foundation, Belo Horizonte, Brazil

## Contributed Papers: Medical and Veterinary Entomology: Ticks II

### Room W331 D (Convention Center)

**Moderators:** Robert Mitchell<sup>1</sup> and Rebecca Trout Fryxell<sup>2</sup>, <sup>1</sup>North Carolina State Univ., Raleigh, NC, <sup>2</sup>Univ. of Tennessee, Knoxville, TN

- 9:15 **4047** Comparison of seasonal activity and biodiversity components of north Iranian hard ticks (Acari: Ixodidae) under highland, woodland, and plain conditions. **Mahmoud Fazeli-Dinan** (fazelidinan@gmail.com)<sup>1</sup>, Fatemeh Asgarian<sup>2</sup>, Seyyed Payman Ziapour<sup>1</sup>, Seyed Hassan Nikookar<sup>1</sup>, and Ahmadali Enayati<sup>1</sup>, <sup>1</sup>Mazandaran Univ. of Medical Sciences, Sari, Iran, <sup>2</sup>Ahvaz Jundishapur Univ. of Medical Sciences, Ahvaz, Iran
- 9:30 **4048** Deciphering mechanisms involved in tick hematophagy. **Robert Mitchell** (rdmitche@ncsu.edu), Grayson Cave, Anirudh Dhammi, Jiwei Zhu, and R. Michael Roe, North Carolina State Univ., Raleigh, NC
- 9:45 **4049** Presentation withdrawn
- 10:00 **4050** Vectorial capacity of *Rhipicephalus sanguineus* in Israel and the Palestinian Territories. **Kosta Mumcuoglu** (kostasm@ekmd.huji.ac.il), Kuvim Center for the Study of Infectious and Tropical Diseases, Jerusalem, Israel
- 10:15 BREAK**
- 10:30 **4051** Tick determinants of Powassan virus transmission. Meghan Hermance, Rodrigo Santos, and **Saravanan Thangamani** (sathanga@utmb.edu), The Univ. of Texas, Galveston, TX
- 10:45 **4052** Transmission-blocking vaccines: A solid approach for soft ticks. **Girish Neelakanta** (gneelaka@odu.edu), Old Dominion Univ., Norfolk, VA
- 11:00 **4053** Population genetics and microbial communities of field-collected *Amblyomma maculatum*. **Rebecca Trout Fryxell** (rfryxell@utk.edu), Jennifer DeBruyn, and Margaret Staton, Univ. of Tennessee, Knoxville, TN
- 11:15 **4054** Field and laboratory studies on Heartland virus (Bunyaviridae: *Phlebovirus*), a recently described human pathogen, in the lone star tick, *Amblyomma americanum* (L.) (Acari: Ixodidae). **Harry Michael Savage** (hms1@cdc.gov) and Marvin Godsey, Centers for Disease Control and Prevention, Fort Collins, CO

## Contributed Papers: Morphology, Systematics, and Phylogeny: Behavior, Chrysomelids, Curculionids, and Scarabs

### Room W230 A (Convention Center)

**Moderators:** Anthony I. Cognato<sup>1</sup> and András Dobai<sup>2</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>Carleton Univ., Ottawa, ON, Canada

- 9:15 **4055** Special behavior in beetles negates a developmental constraint against hyper-elongation of a penis. **Yoko Matsumura** (yoko.matsumura.hamupeni@gmail.com), Keio Univ., Yokohama, Japan

- 9:30 **4056** Dispersal by flight reduces survival and reproduction in the chrysomelid *Oreina cacaliae*: A field study. **Nicole Kalberer** (nicole.kalberer@bs.ch) and Mathias Koelliker, Univ. of Basel, Basel, Switzerland
- 9:45 **4057** Synopsis of North and Central American *Diabrotica* species (Coleoptera: Chrysomelidae). **Alexander Derunkov** (alderunkov@gmail.com)<sup>1</sup> and Alexander S. Konstantinov<sup>2</sup>, <sup>1</sup>National Academy of Sciences of Belarus for Bioresources, Minsk, Belarus, <sup>2</sup>USDA - ARS, Washington, DC
- 10:00 **4058** Revision and phylogeny of the nightshade flea beetles *Epitrix* and *Acallepitrix* (Coleoptera: Chrysomelidae: Galerucinae: Alticini) in America north of Mexico. **Anthony Deczynski** (adeczyn@g.clemson.edu), Clemson Univ., Clemson, SC
- 10:15 BREAK**
- 10:30 **4059** Patterns of host use within a lineage of temperate and tropical saproxylic beetles (Coleoptera: Curculionidae: Scolytinae: Scolytini). **Anthony I. Cognato** (cognato@msu.edu)<sup>1</sup>, Sarah M. Smith<sup>1</sup>, and Bjarte Jordal<sup>2</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>Univ. of Bergen, Bergen, Norway
- 10:45 **4060** Acoustic communication in bark beetles (Coleoptera: Curculionidae: Scolytinae): A new perspective. **András Dobai** (dobandi@gmail.com) and Jayne Yack, Carleton Univ., Ottawa, ON, Canada
- 11:00 **4061** Geometric morphometric analysis of the rostrum of weevils (Coleoptera: Curculionoidea). **Hui Wen** (wenhui1999108@126.com), Menglei Zhang, Zhiliang Wang, and Runzhi Zhang, Chinese Academy of Sciences, Beijing, China
- 11:15 **4062** Genome-wide species delineation in inbred, widespread, and morphologically variable ambrosia beetles. **Caroline Storer** (cgstorer@gmail.com) and Jiri Hulcr, Univ. of Florida, Gainesville, FL
- 11:30 **4063** Chorion ultrasculpture of eggs in diagnostics of June beetles (Coleoptera: Scarabaeidae). **Sreedevi Kolla** (kolla.sreedevi@gmail.com), Indian Council of Agricultural Research, New Delhi, India

## Contributed Papers: Morphology, Systematics, and Phylogeny: Diptera

### Room W331 B (Convention Center)

**Moderators:** Gary Steck<sup>1</sup> and John Moulton<sup>2</sup>, <sup>1</sup>Florida Dept. of Agriculture and Consumer Services, Gainesville, FL, <sup>2</sup>Univ. of Tennessee, Knoxville, TN

- 9:15 **4064** Molecular phylogenetics of *Aedini* mosquitoes. **John Soghigian** (jsoghigian@clarku.edu) and Todd P. Livdahl, Clark Univ., Worcester, MA
- 9:30 **4065** Revisionary studies of the Nearctic Dixidae (Diptera): The *Dixa inextricata* and *D. modesta* species complexes. **John Moulton** (jmoulton@utk.edu), Univ. of Tennessee, Knoxville, TN
- 9:45 **4066** Systematics and natural history of the millipede-parasitic genus *Myriophora* (Diptera: Phoridae). **John Hash** (jhash001@ucr.edu)<sup>1</sup>, John M. Heraty<sup>1</sup>, and Brian V. Brown<sup>2</sup>, <sup>1</sup>Univ. of California, Riverside, CA, <sup>2</sup>Natural History Museum, Los Angeles, CA



- 10:00 **4067** The *Anastrepha* Project: Morphological, molecular, and biological studies of adults and larvae. **Gary Steck** (gary.steck@freshfromflorida.com)<sup>1</sup>, Allen Norrbom<sup>2</sup>, Bruce Sutton<sup>1</sup>, Erick Rodriguez<sup>1</sup>, and Pratibha Srivastava<sup>1</sup>, <sup>1</sup>Florida Dept. of Agriculture and Consumer Services, Gainesville, FL, <sup>2</sup>USDA - ARS, Washington, DC
- 10:15 **BREAK**
- 10:30 **4068** Sex ticklers and dirty flies: The evolution of a novel abdominal appendage in male sepsid flies. **Kathy Su** (kathysufy@gmail.com), Gowri Rajaratnam, and Rudolf Meier, National Univ. of Singapore, Singapore, Singapore
- 10:45 **4069** A review of the stilt-legged fly subfamily Eurybatinae (Diptera: Micropezidae). **Nur Athiqah Md. Yusof** (nurathiqah.mdyusof@gmail.com) and Stephen A. Marshall, Univ. of Guelph, Guelph, ON, Canada
- 11:00 **4070** A review and phylogeny of the ant-like flies *Plocoscelus* Enderlein, 1922 (Diptera: Micropezidae), with the description of 13 new species. **Gustavo Ferro** (gustavo\_ferro01@yahoo.com.br), Univ. of Guelph, Guelph, ON, Canada
- 11:15 **4071** A revision of the Australian species of *Howickia* (Diptera: Sphaeroceridae). **Hailey Ashbee** (hashbee@uoguelph.ca)<sup>1</sup> and Stephen A. Marshall<sup>2</sup>, <sup>1</sup>Univ. of Guelph, Fenwick, ON, Canada, <sup>2</sup>Univ. of Guelph, Guelph, ON, Canada
- 11:30 **4072** The mega diverse, minute Diptera: A revision of the New World genus *Bromeloecia* (Sphaeroceridae, Limosininae). **Tiffany Yau** (tyau@alumni.uoguelph.ca) and Stephen Marshall, Univ. of Guelph, Guelph, ON, Canada
- 11:45 **4073** A mitogenomic perspective on calyptrate phylogeny. **Liping Yan** (yanlp523@qq.com)<sup>1</sup>, Kai Li<sup>1</sup>, Thomas Pape<sup>2</sup>, and Dong Zhang<sup>1</sup>, <sup>1</sup>Beijing Forestry Univ., Beijing, China, <sup>2</sup>Natural History Museum, Copenhagen, Denmark
- 12:00 **4074** Morphology of *Gasterophilus* (Diptera: Oestridae) larvae: Evolutionary trends, homology and phylogenetic implications. **Xin-yu Li** (lixinyubjfu@bjfu.edu.cn)<sup>1</sup>, Liping Yan<sup>1</sup>, Kai Li<sup>1</sup>, Thomas Pape<sup>2</sup>, and Dong Zhang<sup>1</sup>, <sup>1</sup>Beijing Forestry Univ., Beijing, China, <sup>2</sup>Natural History Museum, Copenhagen, Denmark
- 12:15 **4075** Phylogenetical insights on the evolution of stomach bot flies (Oestridae: *Gasterophilus*). **Dong Zhang** (ernest8445@163.com)<sup>1</sup>, Liping Yan<sup>1</sup>, Xin-yu Li<sup>1</sup>, Kai Li<sup>1</sup>, and Thomas Pape<sup>2</sup>, <sup>1</sup>Beijing Forestry Univ., Beijing, China, <sup>2</sup>Natural History Museum, Copenhagen, Denmark
- 12:30 **4076** A phylogenetic framework for the tachinid fly tribe Blondeliini (Diptera: Tachinidae: Exoristinae). **Z. L. Burington** (keroplatus@gmail.com) and John Stireman III, Wright State Univ., Dayton, OH

## Contributed Papers: Morphology, Systematics, and Phylogeny: Hemiptera

### Room W225 A (Convention Center)

**Moderators:** Adam Wallner<sup>1</sup> and Christopher Owen<sup>2</sup>, <sup>1</sup>USDA - APHIS, Miami, FL, <sup>2</sup>The George Washington Univ., Ashburn, VA

- 9:15 **4077** Morphology of thoracic muscles in Hemiptera and its significance in uncovering evolution of jumping behavior. **Naoki Ogawa** (ogawa222@res.agr.hokudai.ac.jp) and Kazunori Yoshizawa, Hokkaido Univ., Sapporo, Japan
- 9:30 **4078** Revision of the taxonomic status of *Aphis floridanae* Tissot (Hemiptera: Aphididae). **Doris Lagos-Kutz** (dlagos@illinois.edu)<sup>1</sup>, Susan Halbert<sup>2</sup>, David Voegtlin<sup>1</sup>, and Glen L. Hartman<sup>3</sup>, <sup>1</sup>Univ. of Illinois, Champaign, IL, <sup>2</sup>Florida Dept. of Agriculture and Consumer Services, Gainesville, FL, <sup>3</sup>National Soybean Research Center, Urbana, IL
- 9:45 **4079** Chromosomal variation and cryptic species in the *Apiomorpha minor* species complex. **Penelope Mills** (penelope.mills@uqconnect.edu.au) and Lyn Cook, Univ. of Queensland, Brisbane, Australia
- 10:00 **4080** Systematics, biogeography, and host-plant relationships of the Neotropical jumping plant-louse genus *Russelliana* (Hemiptera: Psylloidea). **Liliya Serbina** (liliya\_serbina@mail.ru)<sup>1,2</sup> and Daniel Burckhardt<sup>1</sup>, <sup>1</sup>Natural History Museum, Basel, Switzerland, <sup>2</sup>Univ. of Basel, Basel, Switzerland
- 10:15 **BREAK**
- 10:30 **4081** Phylogenomic estimate of the Cicadidae (Hemiptera: Cicadoidea): Identifying contaminated/paralogous locus copies and exploring the utility of Hemiptera and cicada 1:1 ortholog sets in pest Hemiptera lineages. **Christopher Owen** (christopherlowen@yahoo.com)<sup>1</sup>, David C. Marshall<sup>2</sup>, Katherine B. R. Hill<sup>2</sup>, Elizabeth Wade<sup>2</sup>, Geert Goemans<sup>2</sup>, Alan Lemmon<sup>3</sup>, Emily Lemmon<sup>3</sup>, and Chris Simon<sup>2</sup>, <sup>1</sup>The George Washington Univ., Ashburn, VA, <sup>2</sup>Univ. of Connecticut, Storrs, CT, <sup>3</sup>Florida State Univ., Tallahassee, FL
- 10:45 **4082** A phylogenetic investigation of the spittlebug superfamily Cercopoidea (Hemiptera: Auchenorrhyncha). **Adam J. Bell** (ajbell7@gmail.com)<sup>1</sup> and Jason Cryan<sup>2</sup>, <sup>1</sup>State Univ. of New York, Albany, NY, <sup>2</sup>North Carolina Museum of Natural Sciences, Raleigh, NC
- 11:00 **4083** Morphological utility of the female gonapophysis in Delphacidae (Hemiptera: Delphacidae) taxonomy. **Adam Wallner** (adam.m.wallner@aphis.usda.gov)<sup>1</sup> and Charles Bartlett<sup>2</sup>, <sup>1</sup>USDA - APHIS, Miami, FL, <sup>2</sup>Univ. of Delaware, Newark, DE
- 11:15 **4084** Establishing a DNA metabarcoding approach to determine diet profiles of assassin bugs (Heteroptera: Reduviidae). **Wei Song Hwang** (nhmhws@nus.edu.sg) and Rudolf Meier, National Univ. of Singapore, Singapore, Singapore
- 11:30 **4085** Pollinator predators exposed: Using molecules and morphometrics to delimit species boundaries of ambush bugs (Hemiptera: Reduviidae). **Paul Masonick** (pmaso001@ucr.edu) and Christiane Weirauch, Univ. of California, Riverside, CA



- 11:45 **4086** Know your enemy: A comprehensive study of macadamia lace bugs (Tingidae: *Ulonemia* spp.). **Ryan Shofner** (r.shofner@unsw.edu.au), Gerry Cassis, and William Sherwin, Univ. of New South Wales, Sydney, Australia
- 12:00 **4087** The Tingidae (Hemiptera: Heteroptera) of Costa Rica. **Alex Knudson** (alexander.knudson.2@ndsu.edu), David Rider, and Janet Knodel, North Dakota State Univ., Fargo, ND

### Contributed Papers: Morphology, Systematics, and Phylogeny: Parasitoid Wasps and Trichoptera

#### Room W230 D (Convention Center)

**Moderators:** Jason Mottern<sup>1</sup> and Austin Baker<sup>2</sup>, <sup>1</sup>USDA - ARS, Washington, DC, <sup>2</sup>Univ. of California, Riverside, CA

- 9:15 **4088** Hymenoptera, taxonomy, and the integument. **István Mikó** (istvan.miko@gmail.com), Heather M. Hines, and Andrew Deans, Pennsylvania State Univ., University Park, PA
- 9:30 **4089** How many species of Pteromalidae (Hymenoptera: Chalcidoidea) exist in North- and Central-Europe? **Michael Haas** (michael.haas@smns-bw.de)<sup>1</sup>, Carlos Monje<sup>1</sup>, Hannes Baur<sup>2</sup>, Dave Karlsson<sup>3</sup>, Johannes Steidle<sup>4</sup>, and Lars Krogmann<sup>1</sup>, <sup>1</sup>State Museum of Natural History, Stuttgart, Germany, <sup>2</sup>Natural History Museum of Civil Society, Bern, Switzerland, <sup>3</sup>Station Linné, Öland, Sweden, <sup>4</sup>Univ. of Hohenheim, Stuttgart, Germany
- 9:45 **4090** Preliminary results on the taxonomy and molecular phylogenetics of *Oobius* (Hymenoptera: Encyrtidae), parasitoids of wood-boring Coleoptera. **Jason Mottern** (jason.mottern@ars.usda.gov) and Michael Gates, USDA - ARS, Washington, DC
- 10:00 **4091** Phylogenetics of ant parasitoids in the subfamily Oraseminae (Hymenoptera: Eucharitidae). **Austin Baker** (bakerau73@gmail.com) and John M. Heraty, Univ. of California, Riverside, CA
- 10:15 BREAK**
- 10:30 **4092** Solving the *Habrobracon hebetor* species complex. **Rebecca Kittel** (rebecca.n.kittel@gmail.com) and Kaoru Maeto, Kobe Univ., Kobe, Japan
- 10:45 **4093** The European species of *Eupelmus* (*Macroneura*) (Hymenoptera: Chalcidoidea: Eupelmidae): An integrative taxonomic approach. **Lucian Fusu** (lucufusu@hotmail.com), Alexandru Ioan Cuza Univ., Iasi, Romania
- 11:00 **4094** Evolutionary history of the Podagrionini, parasitoids of praying mantises. **Petr Janšta** (janstapetr@gmail.com)<sup>1</sup> and Gérard Delvare<sup>2</sup>, <sup>1</sup>Charles Univ., Prague, Czech Republic, <sup>2</sup>CIRAD, Montpellier, France
- 11:15 **4095** Comparative head anatomy of larval caddisflies with implications on the phylogeny of Trichoptera. **Frank Friedrich** (frank.friedrich@uni-hamburg.de), Univ. of Hamburg, Hamburg, Germany

### Contributed Papers: RNAi and Gene Expression Control in Insects: Interactions

#### Room W315 B (Convention Center)

**Moderators:** Joe Hull<sup>1</sup> and Jornt Spit<sup>2</sup>, <sup>1</sup>USDA - ARS, Maricopa, AZ, <sup>2</sup>Syngenta Ghent Innovation Center, Zwijnaarde, Belgium

- 9:15 **4096** Uptake and degradation of dsRNA in the gut lumen of insects in relation to environmental RNAi efficiency. **Jornt Spit** (jornt.spit@bio.kuleuven.be)<sup>1,2</sup>, Annelies Philips<sup>2</sup>, Niels Wynant<sup>1</sup>, and Jozef Vanden Broeck<sup>1</sup>, <sup>1</sup>Catholic Univ., Leuven, Belgium, <sup>2</sup>Syngenta Ghent Innovation Center, Zwijnaarde, Belgium
- 9:30 **4097** The spookiest phenotype: RNAi-mediated knockdown of Halloween genes in the western tarnished plant bug, *Lygus hesperus*. **Joe Hull** (joe.hull@ars.usda.gov)<sup>1</sup>, Evelien Van Ekert<sup>1</sup>, Meixian Wang<sup>2</sup>, Yun-Gen Miao<sup>2</sup>, and Colin Brent<sup>1</sup>, <sup>1</sup>USDA - ARS, Maricopa, AZ, <sup>2</sup>Zhejiang Univ., Hangzhou, China
- 9:45 **4098** A transcription factor FOXG1 controls twin-spot markings on caterpillars. **Nozomi Uemura** (uemuranoz@ib.k.u-tokyo.ac.jp), Junichi Yamaguchi, and Haruhiko Fujiwara, The Univ. of Tokyo, Kashiwa, Japan
- 10:00 **4099** RNAi knockdown of red flour beetle, *Tribolium castaneum*, odorant binding proteins result in altered electrophysiological responses. **Karthi Balakrishnan** (karthimrgn@gmail.com), Stefan Dippel, Ernst A. Wimmer, and Stefan Schütz, Georg August Univ., Göttingen, Germany
- 10:15 BREAK**
- 10:30 **4100** RNA interference by soaking in the two spotted spider mite, *Tetranychus urticae*. **Takeshi Suzuki** (tszk@cc.tuat.ac.jp)<sup>1</sup>, Maria Urizarra<sup>2</sup>, Maria Nunes<sup>2</sup>, Vojislava Grbic<sup>2</sup>, and Miodrag Grbic<sup>2</sup>, <sup>1</sup>Tokyo Univ. of Agriculture and Technology, Tokyo, Japan, <sup>2</sup>Univ. of Western Ontario, London, ON, Canada
- 10:45 **4101** Using RNA interference to block egg development in *Lygus hesperus* Knight (Hemiptera: Miridae). **Evelien Van Ekert** (evelien.vanekert@ars.usda.gov), Joe Hull, Colin Brent, and Jeff Fabrick, USDA - ARS, Maricopa, AZ
- 11:00 **4102** Sex-sorting and sterilization of male Asian tiger mosquitoes (*Aedes albopictus*) using RNA interference. **David Giesbrecht** (d.gies@ymail.com), Alison Tayler, David Boguski, and Steve Whyard, Univ. of Manitoba, Winnipeg, MB, Canada
- 11:15 **4103** RNAi-based interactions: Persistent and acute viral infections in lepidopteran cell lines. **Dulce Santos** (dulce.cordeirodosantos@bio.kuleuven.be)<sup>1</sup>, Niels Wynant<sup>1</sup>, Lina Mingels<sup>1</sup>, Luc Swevers<sup>2</sup>, and Jozef Vanden Broeck<sup>1</sup>, <sup>1</sup>Catholic Univ., Leuven, Belgium, <sup>2</sup>Institute of Biosciences & Applications, Athens, Greece



## Contributed Papers: Stored Products Entomology: Novel Strategies II

## Room W331 C (Convention Center)

**Moderators:** Sharon Dobesh<sup>1</sup>, Dylan McFarlane<sup>2</sup>, and Hongjian Ding<sup>3</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>Univ. of Queensland, Brisbane, Australia, <sup>3</sup>U.S. Food and Drug Administration, Jefferson, AR

- 9:15 **4104** Developing an intelligent recognition system for storage pest fragments contaminating food products. **Hongjian Ding** (hongjian.ding@fda.hhs.gov)<sup>1</sup>, Joshua Xu<sup>1</sup>, Howard Semey<sup>1</sup>, Himansu Vyas<sup>1</sup>, Darryl Langley<sup>1</sup>, Amy Barnes<sup>1</sup>, Monica Pava-Ripoll<sup>2</sup>, and Weida Tong<sup>1</sup>, <sup>1</sup>U.S. Food and Drug Administration, Jefferson, AR, <sup>2</sup>U.S. Food and Drug Administration, College Park, MD
- 9:30 **4105** Comparative evaluation of four Nigeria-derived diatomaceous earths and a commercial DE Insecto<sup>®</sup> against *Callosobruchus maculatus* F. (Coleoptera: Bruchidae) on two varieties of stored cowpea in Nigeria. **Egobude Okonkwo** (egoulu@yahoo.com), Olufemi Peters, Samuel Nwaubani, Grace O. Otitodun, Moses Ogundare, Grace Abel, Michael Omodara, Adaora N. Osegbo, Oluwatoyin Atibioke, and Oluswaseun D. Olagunju, Nigerian Stored Products Research Institute, Ilorin, Nigeria
- 9:45 **4106** Understanding the effects of PICS bags in reducing PHL in maize storage in Nigeria. **Bamikole Ayedun** (b.ayedun@cgiar.org)<sup>1</sup>, Tahirou Abdoulaye<sup>1</sup>, and Dieudonne Baributsa<sup>2</sup>, <sup>1</sup>International Institute of Tropical Agriculture, Ibadan, Nigeria, <sup>2</sup>Purdue Univ., West Lafayette, IN
- 10:00 **4107** Effects of air plant (*Bryophyllum pinnatum*) on bean weevil (*Acanthoscelides obectus*). **Love Allison** (lovealldy@yahoo.com)<sup>1</sup> and Alex Allison<sup>1,2,3</sup>, <sup>1</sup>Federal Univ. of Technology, Owerri, Nigeria, <sup>2</sup>Imo State Univ., Owerri, Nigeria, <sup>3</sup>Nkiru Kamalu, Owerri, Nigeria
- 10:15 BREAK**
- 10:30 **4108** Effect of different insect growth regulators for their anti-insect activity against the larvae of *Tribolium castaneum* (Herbst) and *Trogoderma granarium* (Everts). **Mansoor ul Hasan** (mansoorsahi2000@yahoo.com)<sup>1</sup>, Qurban Ali<sup>1</sup>, Muhammad Sagheer<sup>1</sup>, Imran Faraz<sup>1</sup>, and Shahzad Saleem<sup>2</sup>, <sup>1</sup>Univ. of Agriculture, Faisalabad, Pakistan, <sup>2</sup>COMSATS Institute of Information Technology, Sahiwal, Pakistan
- 10:45 **4109** The role of fungi and their associated volatiles in the ecology of *Tribolium castaneum*. **Dylan McFarlane** (dylan.mcfarlane@uqconnect.edu.au), Univ. of Queensland, Brisbane, Australia
- 11:00 **4110** Bait trap attractiveness to warehouse beetle (*Trogoderma variabile*) and larger cabinet beetle (*Trogoderma inclusum*) using commercially available traps. **Sharon Dobesh** (sdobesh@ksu.edu)<sup>1</sup>, Frank Arthur<sup>2</sup>, James Campbell<sup>2</sup>, and R. Jeff Whitworth<sup>1</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>USDA - ARS, Manhattan, KS
- 11:15 **4111** A new point mutation in the gene coding for strong phosphine resistance in *Tribolium castaneum* (Coleoptera: Tenebrionidae). **Zhaorigetu Chen** (jorigtoo@k-state.edu)<sup>1</sup>, Hongbo Jiang<sup>1</sup>, David Schlipalius<sup>2</sup>,

Yoonseong Park<sup>1</sup>, Raul Narciso Guedes<sup>3</sup>, Brenda Oppert<sup>4</sup>, George Opit<sup>5</sup>, and Thomas Phillips<sup>1</sup>, <sup>1</sup>Kansas State Univ., Manhattan, KS, <sup>2</sup>Agri-Science Queensland, Brisbane, Australia, <sup>3</sup>Federal Univ. of Vicosa, Viçosa, Brazil, <sup>4</sup>USDA - ARS, Manhattan, KS, <sup>5</sup>Oklahoma State Univ., Stillwater, OK

- 11:30 **4112** Phosphine resistance in *Oryzaephilus surinamensis* (L.) from almond storage and processing facilities in California. **Sandipa G. Gautam** (sandipa.gautam@okstate.edu), George Opit, and Kandara Shakya, Oklahoma State Univ., Stillwater, OK
- 11:45 **4113** Detection, identification, and quantification of insect infestation in stored products using PCR approaches. **Mireia Solà** (mireia.sola.cassi@gmail.com)<sup>1</sup>, Nuria Agusti<sup>1</sup>, Jonathan Lundgren<sup>2</sup>, and Jordi Riudavets<sup>3</sup>, <sup>1</sup>IRTA, Cibrils, Spain, <sup>2</sup>USDA - ARS, Brookings, SD, <sup>3</sup>IRTA, Barcelona, Spain

## Contributed Papers: Urban Entomology in a Changing Environment: Termites and Ants

## West Hall F1 (WF1) (Convention Center)

**Moderators:** Joe DeMark<sup>1</sup> and Rou-Ling Yang<sup>2</sup>, <sup>1</sup>Dow AgroSciences, Fayetteville, AR, <sup>2</sup>National Palace Museum, Taipei, Taiwan

- 9:15 **4114** Survey and control of termites in National Palace Museum. **Rou-Ling Yang** (rlyang@npm.gov.tw), National Palace Museum, Taipei, Taiwan
- 9:30 **4115** Presentation withdrawn
- 9:45 **4116** Entomotoxicant potential of *Croton penduliflorous* extract in the control of subterranean termites, *Macrotermes subhyalinus*. **Adenike Adeyemo** (acadeyemo@futa.edu.ng), Olaniyi Ogungbite, Funmilola Arogundade, Taiwo Bamigboye, and Caleb Faboye, Federal Univ. of Technology, Akure, Nigeria
- 10:00 **4117** Evaluation of efficacy of synthetic resins on woods against subterranean termites. **Sohail Ahmed** (saha786\_pk@yahoo.com), Univ. of Agriculture, Faisalabad, Pakistan
- 10:15 BREAK**
- 10:30 **4118** An investigation of the factors influencing the colony structure of the eastern subterranean termite, *Reticulitermes flavipes*. **Carlos Agüero** (cague001@tamu.edu)<sup>1</sup>, Tawni L. Crippen<sup>2</sup>, Jason Martin<sup>3</sup>, Mark S. Bulmer<sup>3</sup>, and Edward Vargo<sup>1</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>USDA - ARS, College Station, TX, <sup>3</sup>Towson Univ., Towson, MD
- 10:45 **4119** Area-wide treatment of Formosan subterranean termites at Jackson Barracks, New Orleans, LA. **Carrie Cottone** (cbcottone@nola.gov) and Claudia Riegel, City of New Orleans Mosquito, Termite & Rodent Control Board, New Orleans, LA
- 11:00 **4120** Totality™ wood treatment: A summary of pre-construction termite treatment success in the field. **Dina Richman** (dina.richman@fmc.com)<sup>1</sup> and Brian Mount<sup>2</sup>, <sup>1</sup>FMC Corporation, Philadelphia, PA, <sup>2</sup>FMC Corporation, Bradenton, FL

- 11:15 **4121** Sentricon® System Recruit® AG FlexPack new bait matrix lab and field trials. **Joe DeMark** (jddemark@dow.com)<sup>1</sup> and Neil Spomer<sup>2</sup>, <sup>1</sup>Dow AgroSciences, Fayetteville, AR, <sup>2</sup>Dow AgroSciences, Indianapolis, IN
- 11:30 **4122** Termidor® H+E High-Efficiency Termiticide: Market introduction and benefits. **Freder Medina** (freder.medina@basf.com)<sup>1</sup>, Robert Davis<sup>2</sup>, Robert Hickman<sup>3</sup>, Thomas Nishimura<sup>4</sup>, Jason Meyers<sup>5</sup>, Kyle Jordan<sup>6</sup>, and Joseph Schuh<sup>6</sup>, <sup>1</sup>BASF, Phoenix, AZ, <sup>2</sup>BASF, Pflugerville, TX, <sup>3</sup>BASF, Maitland, FL, <sup>4</sup>BASF, Raleigh, NC, <sup>5</sup>BASF, Kansas City, MO, <sup>6</sup>BASF, Research Triangle Park, NC
- 11:45 **4123** Effects of resorcinol, a phenol characterized from heartwood extractives of white mulberry (*Morus alba*) against *Reticulitermes flavipes* (Isoptera: Rhinotermitidae). **Mark E. Mankowski** (markemankowski@fs.fed.us)<sup>1</sup>, Babar Hassan<sup>2</sup>, and Grant Kirker<sup>3</sup>, <sup>1</sup>USDA - Forest Service, Starkville, MS, <sup>2</sup>Univ. of Agriculture, Faisalabad, Pakistan, <sup>3</sup>USDA - Forest Service, Madison, WI
- 12:00 **4124** How do red imported fire ants (Hymenoptera: Formicidae) feed on sugar water? **Cai Wang** (wangcai@scau.edu.cn)<sup>1</sup>, Xuan Chen<sup>2</sup>, Xiujun Wen<sup>1</sup>, and Tao Ma<sup>1</sup>, <sup>1</sup>South China Agricultural Univ., Guangzhou, China, <sup>2</sup>Louisiana State Univ., Baton Rouge, LA
- 2:45 **4129** Status of insecticide resistance and virulence to resistant rice varieties in the brown planthopper in Asia. **Masaya Matsumura** (mmasaya@affrc.go.jp)<sup>1</sup> and Hideshi Yasui<sup>2</sup>, <sup>1</sup>NARO Kyushu Okinawa Agricultural Research Center, Kumamoto, Japan, <sup>2</sup>Kyushu Univ., Fukuoka, Japan
- 3:00 **BREAK**
- 3:15 **4130** New IPM tactics and tools for management of key invertebrate pests in Californian rice. **Larry Godfrey** (ldgodfrey@ucdavis.edu)<sup>1</sup>, Luis Espino<sup>2</sup>, Mohammad-Amir Aghaee<sup>1</sup>, Joanna Bloese<sup>1</sup>, and Kevin Goding<sup>1</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>Univ. of California Cooperative Extension, Colusa, CA
- 3:30 **4131** Developing economic thresholds for stink bugs in rice – problems and prospects. **José Barrigossi** (jose.barrigossi@embrapa.br)<sup>1</sup>, Daniel Caixeta<sup>2</sup>, and Tavvs Alves<sup>3</sup>, <sup>1</sup>Embrapa Rice and Beans, Santo Antônio de Goiás, Brazil, <sup>2</sup>Uni-Evangélica, Goianésia, Brazil, <sup>3</sup>Univ. of Minnesota, St. Paul, MN
- 3:45 **4132** Influence of water conservation practices on pest management in Australian rice. **Mark Stevens** (mark.stevens@dpi.nsw.gov.au), New South Wales Dept. of Primary Industries, Yanco, Australia
- 4:00 **4133** Identification of novel fecundity-related genes and molecular markers in the brown planthopper, *Nilaparvata lugens*. **Wenqing Zhang** (lsszwq@mail.sysu.edu.cn), Zhongxiang Sun, Jieqi Qiu, Tengchao Li, and Rui Pang, Sun Yat-sen Univ., Guangzhou, China
- 4:15 **4134** The predicted response of *Scirpophaga incertulas* Walker (Lepidoptera: Pyralidae) to climate change and its implications for rice production in Bangladesh. **Panna Ali** (panna\_ali@yahoo.com), Bangladesh Rice Research Institute, Gazipur, Bangladesh

## Friday, September 30, 2016 • Afternoon

### Symposium: Global Challenges in Rice Pest Management

#### Room W230 C (Convention Center)

**Moderators and Organizers:** Mark Stevens<sup>1</sup> and Larry Godfrey<sup>2</sup>, <sup>1</sup>New South Wales Dept. of Primary Industries, Yanco, Australia, <sup>2</sup>Univ. of California, Davis, CA

- 1:30 **4125** Advances in the management of insect pests in rice. **Michael Stout** (mstout@agcenter.lsu.edu), Louisiana State Univ. AgCenter, Baton Rouge, LA
- 2:00 **4126** Ecological engineering for insect pest management in rice – results from the Yangtze River Delta Plain. **Ping Qian** (pq2009@zju.edu.cn)<sup>1</sup>, Hang Yu<sup>1</sup>, Gui-Yao Wang<sup>1</sup>, Fei-Qiang Li<sup>1</sup>, Zi-Jie Zhu<sup>1</sup>, Ye Tan<sup>1</sup>, Xiao-Xiao Shi<sup>1</sup>, Xin Yuan<sup>1</sup>, Guang-Hua Wang<sup>1</sup>, Xue-Qin Wang<sup>1</sup>, Yue Chen<sup>2</sup>, Jian-Liang Zhang<sup>2</sup>, Yan-Dong Jiang<sup>1</sup>, Qin-Zi Zhu<sup>1</sup>, Yue-Liang Bai<sup>1</sup>, Wen-Juan Jiao<sup>1</sup>, Mu-Fei Zhu<sup>1</sup>, Jing Ye<sup>1</sup>, Yi Ma<sup>1</sup>, Nan-Nan Wang<sup>1</sup>, Kong Luen Heong<sup>1</sup>, Jiaan Cheng<sup>1</sup>, and Zeng-Rong Zhu<sup>1</sup>, <sup>1</sup>Zhejiang Univ., Hangzhou, China, <sup>2</sup>Jiaying Agricultural Development Investment Limited Company, Jiaying, China
- 2:15 **4127** Incursions of exotic pests into European rice areas – detection and management. **Daniela Lupi** (daniela.lupi@unimi.it)<sup>1</sup> and François-Régis Goebel<sup>2</sup>, <sup>1</sup>Univ. of Milan, Milan, Italy, <sup>2</sup>CIRAD, Montpellier, France
- 2:30 **4128** New approaches to midge management in temperate direct-seeded rice. **Maria del Mar Català Forner** (mar.catala@irta.cat), IRTA, Amposta, Spain

### Symposium: Technological Innovations and Integrated Pest Management

#### Room W331 B (Convention Center)

**Moderators and Organizers:** Grzegorz Krawczyk<sup>1</sup> and Waqas Wakil<sup>2</sup>, <sup>1</sup>Pennsylvania State Univ., Biglerville, PA, <sup>2</sup>Univ. of Agriculture, Faisalabad, Pakistan

- 1:30 **4135** New technologies in delivery of mating disruption products. **Larry Gut** (gut@msu.edu), Michigan State Univ., East Lansing, MI
- 1:45 **4136** Fixed spraying systems for improved pesticide application in fruit planting. **Arthur Agnello** (ama4@cornell.edu), Cornell Univ., Geneva, NY
- 2:00 **4137** Sampling of *Bemisia tabaci* adults using a pre-programmed autonomous pest control robot. **Chunlei Xia** (c.xia2009@gmail.com)<sup>1</sup>, Bu-Keun Chung<sup>2</sup>, Jang-Myung Lee<sup>3</sup>, Yan Li<sup>3</sup>, and Tae-Soo Chon<sup>3</sup>, <sup>1</sup>Chinese Academy of Sciences, Yantai, China, <sup>2</sup>Gyeongsangnam-Do Agricultural Research and Extension Services, Jinju, South Korea, <sup>3</sup>Pusan National Univ., Busan, South Korea
- 2:15 **4138** Automated traps and Cloud-based pest management. **Greg Krawczyk** (gkx13@psu.edu)<sup>1</sup>, Brian Lehman<sup>1</sup>, Larry A. Hull<sup>1</sup>, and Johnny Park<sup>2</sup>, <sup>1</sup>Pennsylvania State Univ., Biglerville, PA, <sup>2</sup>Spensa Technologies, Inc., West Lafayette, IN



- 2:30 **4139** Mass trapping and attract-and-kill to control medfly (*Ceratitis capitata* Wied.) for low-zero residues in apples. **Lucia-Adriana Escudero-Colomar** (adriana.escudero@irta.cat)<sup>1</sup>, Mariano Vilajeliu<sup>1</sup>, Esther Penarrubia-Maria<sup>1</sup>, and Lluís Batllori<sup>2</sup>, <sup>1</sup>IRTA Mas Badia, Girona, Spain, <sup>2</sup>DAAM Aiguamolls de l'Empordà, Girona, Spain
- 2:45 **4140** Mass trapping and new toxic bait formulations for fruit fly management. **Marcos Botton** (marcos.botton@embrapa.br), Embrapa Grape and Wine, Bento Gonçalves, Brazil
- 3:00 BREAK**
- 3:15 **4141** Trunk injection technology for pesticide delivery in apples. **Charles Coslor** (coslorch@msu.edu), Christine Vandervoort, and John Wise, Michigan State Univ., East Lansing, MI
- 3:30 **4142** Field efficacy and economics of insect-pathogens and jasmonic acid against *Helicoverpa armigera* Hübner (Lepidoptera: Noctuidae): Impact on natural enemies. **Waqas Wakil** (waqaswakeel@hotmail.com), Univ. of Agriculture, Faisalabad, Pakistan
- 3:45 **4143** Interactions of Bt cotton, entomopathogenic fungi, and temperature variations on the life parameters of *Heliothis virescens* (Fabricius) (Insecta: Lepidoptera: Noctuidae) under laboratory conditions. **M. Usman Ghazanfar** (usmanghazanfar1073@yahoo.com), Univ. of Sargodha, Sargodha, Pakistan
- 2:00 **4146** Using genome-derived tools to track and trace honey bee killer diseases. **Giles Budge** (giles.budge@newcastle.ac.uk)<sup>1</sup>, Victoria Tomkies<sup>2</sup>, Mark Shirley<sup>1</sup>, Barbara Morrissey<sup>2</sup>, Mike Brown<sup>3</sup>, and Edward Haynes<sup>2</sup>, <sup>1</sup>Newcastle Univ., Newcastle upon Tyne, United Kingdom, <sup>2</sup>Fera Science, Ltd., York, United Kingdom, <sup>3</sup>Animal and Plant Health Agency, York, United Kingdom
- 2:15 **4147** Integrative and comparative genome analyses of the honey bee microsporidia parasites, *Nosema ceranae* and *N. apis*: Toward RNAi-mediated nosema disease control. **Yanping Chen** (judy.chen@ars.usda.gov), Wenfeng Li, Jiang Huang, and Jay Evans, USDA - ARS, Beltsville, MD
- 2:30 **4148** Global patterns of genetic variation of *Nosema* in bumble bees at different genomic scales. **Sydney A. Cameron** (scameron@life.illinois.edu)<sup>1</sup>, Jeffrey D. Lozier<sup>2</sup>, Haw Lim<sup>3</sup>, Michelle Duennes<sup>1</sup>, and Robbin W. Thorp<sup>4</sup>, <sup>1</sup>Univ. of Illinois, Champaign, IL, <sup>2</sup>Univ. of Alabama, Tuscaloosa, AL, <sup>3</sup>Smithsonian Institution National Museum of Natural History, Washington, DC, <sup>4</sup>Univ. of California, Davis, CA
- 2:45 **4149** Worldwide patterns of genetic variation in the honey bee, *Apis mellifera*. **Matthew Webster** (matthew.webster@imbim.uu.se)<sup>1</sup>, Andreas Wallberg<sup>1</sup>, Mike Allsopp<sup>2</sup>, and Christian Pirk<sup>3</sup>, <sup>1</sup>Uppsala Univ., Uppsala, Sweden, <sup>2</sup>Agricultural Research Council, Stellenbosch, South Africa, <sup>3</sup>Univ. of Pretoria, Pretoria, South Africa

### Symposium: Harnessing the Power of Genomics Tools: Monitoring Stressors in Pollinator Populations

#### Room W315 A (Convention Center)

**Moderators and Organizers:** Christina M. Grozinger<sup>1</sup> and Robert Paxton<sup>2</sup>, <sup>1</sup>Pennsylvania State Univ., University Park, PA, <sup>2</sup>Martin Luther Univ., Halle, Germany

- 1:30 **4144** The influence of the ectoparasite *Varroa* on the transmission and population of deformed wing virus in honey bees. **David Evans** (d.j.evans@st-andrews.ac.uk)<sup>1</sup>, James Bull<sup>2</sup>, Nick Burroughs<sup>2</sup>, David Chandler<sup>3</sup>, Jess Fannon<sup>2</sup>, Adite Kibe<sup>2</sup>, Andrew Mead<sup>2</sup>, Chris Moffat<sup>1</sup>, Jonathan Moore<sup>2</sup>, Eugene Ryabov<sup>2</sup>, and Graham Wood<sup>2</sup>, <sup>1</sup>Univ. of St. Andrews, St. Andrews, United Kingdom, <sup>2</sup>Univ. of Warwick, Coventry, United Kingdom, <sup>3</sup>Univ. of Warwick, Warwick, United Kingdom
- 1:45 **4145** More than a common cold: An emerging virus genotype causes elevated honey bee loss. **Dino McMahon** (dino.mcmahon@gmail.com)<sup>1</sup>, Myrsini Natsopoulou<sup>2</sup>, Vincent Doublet<sup>3</sup>, Matthias Fürst<sup>4</sup>, Eva Frey<sup>5</sup>, Peter Rosenkranz<sup>5</sup>, Silvio Weging<sup>3</sup>, Mark Brown<sup>6</sup>, Andreas Gogol-Döring<sup>3</sup>, and Robert Paxton<sup>2</sup>, <sup>1</sup>Federal Institute for Materials Research and Testing, Berlin, Germany, <sup>2</sup>Martin Luther Univ., Halle, Germany, <sup>3</sup>German Centre for Integrative Biodiversity Research, Leipzig, Germany, <sup>4</sup>Institute of Science and Technology Austria, Klosterneuburg, Austria, <sup>5</sup>Univ. of Hohenheim, Stuttgart, Germany, <sup>6</sup>Royal Holloway, Univ. of London, Egham, United Kingdom

#### 3:00 BREAK

- 3:15 **4150** Harnessing natural variation to study local adaptation in native pollinators. **Sarah D. Kocher** (skocher@gmail.com), Harvard Univ., Cambridge, MA
- 3:30 **4151** The honey bee gut symbiont *Frischella perrara*: Friend or foe? **Philipp Engel** (philipp.engel@unil.ch), Univ. of Lausanne, Lausanne, Switzerland
- 3:45 **4152** New insights into the microbial world of bees and the pollination environment. **Quinn McFrederick** (quinn.mcfrederick@ucr.edu), Univ. of California, Riverside, CA

### Symposium: Integrated Crop Pollination in Theory and Practice

#### Room W414 C (Convention Center)

**Moderators and Organizers:** Jason Gibbs<sup>1</sup>, Cory Stanley-Stahr<sup>2</sup>, and Rufus Isaacs<sup>1</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>Wildlife International, Gainesville, FL

- 1:30 **4153** Pollination of European crops – lessons learned across boundaries. Simon Potts, Michael Garratt, and **Tom Breeze** (t.d.breeze@reading.ac.uk), Univ. of Reading, Reading, United Kingdom
- 2:00 **4154** Factors affecting pollinator diversity and yield in highbush blueberry. **Jason Gibbs** (jgibbs@msu.edu)<sup>1</sup>, Elizabeth Elle<sup>2</sup>, George Hoffman<sup>3</sup>, Sujaya Rao<sup>3</sup>, and Cory Stanley-Stahr<sup>4</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>Simon Fraser Univ., Burnaby, BC, Canada, <sup>3</sup>Oregon State Univ., Corvallis, OR, <sup>4</sup>Univ. of Florida, Gainesville, FL

- 2:15 **4155** The economic contributions of wild bees to specialty crops. **James Reilly** (jreilly45@gmail.com) and Rachael Winfree, Rutgers, The State Univ. of New Jersey, New Brunswick, NJ
- 2:30 **4156** Habitat enhancements to support pollinator diversity and pollination service in agricultural lands. **Neal M. Williams** (nmwilliams@ucdavis.edu)<sup>1</sup>, Kimiora Ward<sup>1</sup>, Rufus Isaacs<sup>2</sup>, Ola Lundin<sup>1</sup>, Jason Gibbs<sup>4</sup>, Julianna Wilson<sup>2</sup>, Cory Stanley-Stahr<sup>3</sup>, Shelby J. Fleischer<sup>4</sup>, and Julia Brokaw<sup>2</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>Michigan State Univ., East Lansing, MI, <sup>3</sup>Univ. of Florida, Gainesville, FL, <sup>4</sup>Pennsylvania State Univ., University Park, PA
- 2:45 **4157** The challenge of sustainable pollination of Florida watermelons. **Cory Stanley-Stahr** (cstanley-stahr@eag.com)<sup>1</sup>, James D. Ellis<sup>2</sup>, and Jaret C. Daniels<sup>2</sup>, <sup>1</sup>Wildlife International, Gainesville, FL, <sup>2</sup>Univ. of Florida, Gainesville, FL
- 3:00 BREAK**
- 3:15 **4158** The impact and sustainability of blue orchard bees as almond pollinators. **Derek R. Artz** (derek.artz@ars.usda.gov)<sup>1</sup>, Theresa Pitts-Singer<sup>1</sup>, and Natalie Boyle<sup>2</sup>, <sup>1</sup>USDA - ARS, Logan, UT, <sup>2</sup>Washington State Univ., Prosser, WA
- 3:30 **4159** Communicating management strategies that support crop pollinators. **Katharina Ullmann** (katharina@xerces.org)<sup>1</sup>, Emily May<sup>1</sup>, Jennifer L. Hopwood<sup>2</sup>, and Mace Vaughan<sup>1</sup>, <sup>1</sup>The Xerces Society for Invertebrate Conservation, Portland, OR, <sup>2</sup>Univ. of Kansas, Lawrence, KS
- 3:45 **4160** Knowledge networks for managing pollinators and pollination services in agriculture. **Kelly Garbach** (kgarbach@luc.edu)<sup>1</sup>, Geoffrey Morgan<sup>2</sup>, Earvin Balderama<sup>1</sup>, Emma Zajdela<sup>1</sup>, and Victoria Reese<sup>1</sup>, <sup>1</sup>Loyola Univ., Chicago, IL, <sup>2</sup>Carnegie Mellon Univ., Pittsburgh, PA
- 4:00 **4161** Spatial modeling of pollinators to support farm management decisions. **Eric Lonsdorf** (eric.lonsdorf@fandm.edu)<sup>1</sup>, Taylor Ricketts<sup>2</sup>, Insu Koh<sup>2</sup>, Claire Brittain<sup>3</sup>, Neal M. Williams<sup>3</sup>, Claire Kremen<sup>4</sup>, and Rufus Isaacs<sup>5</sup>, <sup>1</sup>Franklin and Marshall College, Lancaster, PA, <sup>2</sup>Univ. of Vermont, Burlington, VT, <sup>3</sup>Univ. of California, Davis, CA, <sup>4</sup>Univ. of California, Berkeley, CA, <sup>5</sup>Michigan State Univ., East Lansing, MI
- 4:15 **4162** The future of Integrated Crop Pollination. **Rufus Isaacs** (isaacs@msu.edu) and Jason Gibbs, Michigan State Univ., East Lansing, MI

### Symposium: Interactions Between Pollination Services and Agricultural Practices

#### Room W414 B (Convention Center)

**Moderator and Organizer:** Decio Gazzoni, Embrapa, Londrina, Brazil

- 1:30 **4163** An overview of the pollination services. **Decio Gazzoni** (decio.gazzoni@embrapa.br), Embrapa, Londrina, Brazil
- 1:45 **4164** Economic importance of the pollination services. **Nicola Gallai** (nicola.gallai@educagri.fr), Univ. of Toulouse, Castanet-Tolosan, France

- 2:00 **4165** The importance of pollinator diversity for crop production. **Michael Garratt** (m.p.garratt@reading.ac.uk), Univ. of Reading, Reading, United Kingdom
- 2:15 **4166** Impact of habitat reduction and simplification on pollination services. **Stephen D. Wratten** (wrattens@lincoln.ac.nz), Lincoln Univ., Christchurch, New Zealand
- 2:30 **4167** Threats to pollinators from parasites and pathogens. **Qiang Huang** (qiang-huang@live.com), USDA - ARS, Beltsville, MD
- 2:45 **4168** The impact of the global climate changes and the pollination. Vera Lúcia Fonseca<sup>1</sup> and **Blande Viana** (blande.viana@gmail.com)<sup>2</sup>, <sup>1</sup>Univ. of São Paulo, São Paulo, Brazil, <sup>2</sup>Federal Univ. of Bahia, Salvador, Brazil
- 3:00 BREAK**
- 3:15 **4169** Impacts of introduced pollinators on agriculture. **Marcelo Aizen** (marcelo.aizen@gmail.com), National Univ. of Comahue, San Carlos de Bariloche, Argentina
- 3:30 **4170** Honey bee colony losses and declines. **Nathalie Steinhauer** (nathalie.steinhauer@gmail.com), Univ. of Maryland, College Park, MD
- 3:45 **4171** Nutrition, transportation, and other stressors on bees providing commercial pollination services. **Ramesh Sagili** (ramesh.sagili@oregonstate.edu), Oregon State Univ., Corvallis, OR
- 4:00 **4172** Crop management friendly to pollinators. **Barbara Herren** (barbara.herren@fao.org), Food and Agriculture Organization of the United Nations, Nairobi, Kenya
- 4:15 **4173** Acute impact of insecticides to pollinators. **Jens Pistorius** (jens.pistorius@jki.bund.de), Julius Kühn Institute, Braunschweig, Germany
- 4:30 **4174** A close look into the future of global agriculture – an eye on pollination services. **Manfred Kern** (info@agriexcellence.de), Agriexcellence GmbH, Lörzweiler, Germany
- 4:45 **Discussion and wrap up**

### Symposium: Regulation of Honey Bee Polyethism: Clock, Neuroendocrine System, and Environmental Toxicants

#### Room W315 B (Convention Center)

**Moderators and Organizers:** Makio Takeda<sup>1</sup> and Darrell Moore<sup>2</sup>, <sup>1</sup>Kobe Univ., Kobe, Japan, <sup>2</sup>East Tennessee State Univ., Johnson City, TN

- 1:30 **4175** The interplay between social organization and circadian rhythms in bees. **Guy Bloch** (guy.bloch@mail.huji.ac.il), The Hebrew Univ., Jerusalem, Israel
- 2:00 **4176** Environmental and experiential influences on expression of time-memory behavior in honey bee foragers. **Darrell Moore** (moored@mail.etsu.edu), East Tennessee State Univ., Johnson City, TN
- 2:15 **4177** The role of temperature on the development and regulation of circadian rhythms in honey bees. **Jose Agosto** (jose.agosto1@upr.edu), Univ. of Puerto Rico, San Juan, PR



- 2:30 **4178** RNA-editing in regulation of circadian rhythms in social insects. **Guojie Zhang** (zhanggjconi@gmail.com), Univ. of Copenhagen, Copenhagen, Denmark
- 2:45 **4179** Hormonal regulation of gene expression in hypopharyngeal gland of worker honey bees in association with worker behavior. **Takayuki Ueno** (tueno@dw.doshisha.ac.jp), Doshisha Women's College of Liberal Arts, Kyoto, Japan
- 3:00 BREAK**
- 3:15 **4180** Regulation system of brain dopamine for reproduction in social insects. **Ken Sasaki** (sasakik@agr.tamagawa.ac.jp), Tamagawa Univ., Tokyo, Japan
- 3:30 **4181** Pesticide toxicity varies with honey bee physiological castes. Shudong Luo<sup>1</sup> and **Zachary Y. Huang** (bees@msu.edu)<sup>2</sup>, <sup>1</sup>Chinese Academy of Agricultural Sciences, Beijing, China, <sup>2</sup>Michigan State Univ., East Lansing, MI
- 3:45 **4182** Variation in honey bee behavioral regulation and insights into indolamine pathway. **Tugrul Giray** (tgiray2@yahoo.com), Univ. of Puerto Rico, San Juan, PR
- 4:00 **4183** Regulation of polyethism in honey bee: Indolamines, receptors, and aaNAT. **Makio Takeda** (mtakeda@kobe-u.ac.jp)<sup>1</sup>, Naznin Nahar<sup>2</sup>, Quishi Wang<sup>1</sup>, Tran Quynh<sup>1</sup>, Ahmed Muhammad<sup>1</sup>, Susumu Hiragaki<sup>1</sup>, and Takeshi Ohtani<sup>1</sup>, <sup>1</sup>Kobe Univ., Kobe, Japan, <sup>2</sup>Bangladesh Agricultural Univ., Mymensingh, Bangladesh

### Symposium: *Rhipicephalus sanguineus*: Tick without Borders

#### Room W224 H (Convention Center)

**Moderators and Organizers:** Emma N. I. Weeks and Phillip E. Kaufman, Univ. of Florida, Gainesville, FL

- 1:30 **4184** *Rhipicephalus sanguineus* lato sensu – new and future opportunities for an improved management. **Frederic Beugnet** (frederic.beugnet@merial.com), Merial S.A.S., Lyon, France
- 2:00 **4185** The challenges that homeowners and PCOs encounter when managing brown dog tick. **Faith Oi** (foi@ufl.edu)<sup>1</sup>, Phillip E. Kaufman<sup>1</sup>, and Amanda L. Eiden<sup>2</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ
- 2:15 **4186** Detection of acaricide resistance and metabolic detoxification mechanisms in *Rhipicephalus sanguineus*. **Amanda L. Eiden** (amanda.eiden@rutgers.edu)<sup>1</sup>, Phillip E. Kaufman<sup>2</sup>, Faith Oi<sup>2</sup>, Michael J. Dark<sup>2</sup>, and Jeffrey Bloomquist<sup>2</sup>, <sup>1</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, <sup>2</sup>Univ. of Florida, Gainesville, FL
- 2:30 **4187** Characterizing sodium channel mutations conferring pyrethroid resistance in the indoor pest *Rhipicephalus sanguineus*. **Nick Tucker** (nicktu@ufl.edu)<sup>1</sup>, Emma N. I. Weeks<sup>1</sup>, Jason P. Tidwell<sup>2</sup>, Rafael Barreto<sup>2</sup>, Jessica Rowland<sup>1</sup>, and Phillip E. Kaufman<sup>1</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>USDA - ARS, Edinburg, TX

- 2:45 **4188** Phylogenetic structure and reproductive separation of ubiquitous brown dog ticks. **Galina Zemtsova** (gzemtsova@cdc.gov)<sup>1</sup>, Dmitry Apanaskevich<sup>2</sup>, Will K. Reeves<sup>3</sup>, Micah Hahn<sup>4</sup>, Alyssa Snellgrove<sup>1</sup>, and Michael Levin<sup>1</sup>, <sup>1</sup>Centers for Disease Control and Prevention, Atlanta, GA, <sup>2</sup>Georgia Southern Univ., Statesboro, GA, <sup>3</sup>U.S. Air Force School of Aerospace Medicine, Wright-Patterson AFB, OH, <sup>4</sup>National Center for Atmospheric Research, Boulder, CO
- 3:00 BREAK**
- 3:15 **4189** Host location cues of the brown dog tick, *Rhipicephalus sanguineus*. **Emma N. I. Weeks** (eniweeks@ufl.edu)<sup>1</sup>, Brooke Cantrell<sup>1</sup>, Phillip E. Kaufman<sup>1</sup>, and Sandra A. Allan<sup>2</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>USDA - ARS, Gainesville, FL
- 3:30 **4190** Dynamics of brown dog tick infestations: Environmental, premise, and on-dog populations. **Susan Little** (susan.little@okstate.edu), Oklahoma State Univ., Stillwater, OK
- 3:45 **4191** *Rhipicephalus sanguineus* importation into the UK: Surveillance, response, and public health awareness. **Kayleigh Hansford** (kayleigh.hansford@phe.gov.uk), Benjamin Cull, Maaik Pietzsch, and Jolyon Medlock, Public Health England, Salisbury, United Kingdom
- 4:00 **4192** Ecology and epidemiology of Rocky Mountain spotted fever associated with *Rhipicephalus sanguineus*. **William Nicholson** (wnicholson@cdc.gov), Centers for Disease Control and Prevention, Atlanta, GA
- 4:15 **4193** Challenges of preventing *Ehrlichia canis* infections in a highly endemic *Rhipicephalus sanguineus* area. **Jennifer Ketzis** (jketzis@rossu.edu), Andrea Peda, James Fairs, Rajeev Nair, Linda Shell, and Diana Scorpio, Ross Univ. School of Veterinary Medicine, Basseterre, St. Kitts and Nevis

### Symposium: Global Status of Native and Invasive Coccinellids

#### Room W224 E (Convention Center)

**Moderator and Organizer:** Leslie Allee, Cornell Univ., Ithaca, NY

- 1:30 **4194** Sexual selection drives the evolution of limb regeneration in *Harmonia axyridis*. **J. P. Michaud** (jpmi@ksu.edu), Kansas State Univ., Manhattan, KS
- 2:00 **4195** Lady beetles (Coleoptera: Coccinellidae) of the Indian Region: Diversity and utilization in biological control of crop pests. **Janakiraman Poorani** (pooranj@gmail.com), Project Directorate of Biological Control, Bangalore, India
- 2:15 **4196** How has global diversity of predacious coccinellids changed over time? **Leslie Allee** (lla1@cornell.edu) and John Losey, Cornell Univ., Ithaca, NY
- 2:30 **4197** Implications for loss of coccinellid diversity and "service" at local, regional, and global levels: Predictions and plans for conservation. **Rebecca R. Smyth** (rrs7@cornell.edu) and John Losey, Cornell Univ., Ithaca, NY

**3:00 BREAK**

3:00 **4198** Establishing a coccinellid specialist group in the International Union for Conservation of Nature – Species Survival Commission (IUCN SSC). **John Losey** (jel27@cornell.edu), Leslie Allee, Todd Ugine, and Rebecca R. Smyth, Cornell Univ., Ithaca, NY

3:30 **Panel Discussion**

### Symposium: Resource Management and Biodiversity in Cockroach and Termite Lineages: Exploring the Common Ground in Their Nutrition, Biodiversity, and Systematics

**Room W414 A (Convention Center)**

**Moderators and Organizers:** Donald Mullins<sup>1</sup>, Aaron Mullins<sup>2</sup>, Clifford Keil<sup>3</sup>, Christine Nalepa<sup>4</sup>, and Jessica Ware<sup>5</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>Univ. of Florida, Ft. Lauderdale, FL, <sup>3</sup>Pontifical Catholic Univ., Quito, Ecuador, <sup>4</sup>North Carolina State Univ., Raleigh, NC, <sup>5</sup>Rutgers, The State Univ. of New Jersey, Newark, NJ

1:30 **Panel Discussion: Exploring the common ground of cockroach and termite lineages**

1:45 **4199** Termite diversity in Ecuador – biogeography to microbiology. **Clifford Keil** (keil617@yahoo.com), Pontifical Catholic Univ., Quito, Ecuador

2:00 **4200** Landscape ecology of cockroach communities in the land of many waters. **Dominic Evangelista** (dominicev@gmail.com) and Jessica Ware, Rutgers, The State Univ. of New Jersey, Newark, NJ

2:15 **4201** A species-rich genus of “desert” cockroaches and some factors contributing to species niche. **Heidi Hopkins** (cockroachdoc@gmail.com)<sup>1</sup> and Jacek Giermakowski<sup>2</sup>, <sup>1</sup>Ithaca College, Ithaca, NY, <sup>2</sup>Univ. of New Mexico, Albuquerque, NM

2:30 **4202** Subsocial cockroach to eusocial termite: Economics of the transition. **Christine Nalepa** (cnalepa@ncsu.edu), North Carolina State Univ., Raleigh, NC

2:45 **4203** Symbionts and the rise of termites to ecological dominance in the tropics. **David Bignell** (d.bignell@qmul.ac.uk), Queen Mary Univ. of London, London, United Kingdom

**3:00 BREAK**

3:15 **4204** The evolution of diverse feeding and nesting strategies in Australian Nasutitermitinae. **Nathan Lo** (nathan@usyd.au), The Univ. of Sydney, Sydney, Australia

3:30 **4205** Castes and fat body in termites. **Ana Maria Costa-Leonardo** (amcl@rc.unesp.br)<sup>1</sup>, Lara Laranjo<sup>2</sup>, and Ives Haifig<sup>3</sup>, <sup>1</sup>São Paulo State Univ., Rio Claro, Brazil, <sup>2</sup>São Paulo State Univ., Rio Claro, Brazil, <sup>3</sup>Federal Univ. of Uberlândia, Monte Carmelo, Brazil

3:45 **4206** Nitrogen resource management in cockroaches. **Donald Mullins** (mullinsd@vt.edu), Virginia Polytechnic Institute and State Univ., Blacksburg, VA

4:00 **4207** Nitrogenase activity in wood-feeding termites and cockroaches. **Aaron Mullins** (amull81@ufl.edu), Univ. of Florida, Ft. Lauderdale, FL

4:15 **4208** Genome sequencing and transcriptome analyses during caste differentiation of lower termites. **Kiyoto Maekawa** (kmaekawa@sci.u-toyama.ac.jp), Hajime Yaguchi, and Yudai Masuoka, Univ. of Toyama, Toyama, Japan

4:30 **4209** Microbial community dynamics and host evolution in dictyopteran lineages. **Zakee Sabree** (sabree.8@osu.edu), The Ohio State Univ., Columbus, OH

4:45 **4210** Genomic and metabolic transitions of the intracellular symbiont during evolution of the wood-feeding cockroaches, *Cryptocercus* spp. **Gaku Tokuda** (tokuda@comb.u-ryukyu.ac.jp), Tropical Biosphere Research Center, Okinawa, Japan

5:00 **4211** Evolution and transmission of cockroach and termite hindgut symbiotic protozoa. **Gillian Gile** (ggile@asu.edu), Arizona State Univ., Tempe, AZ

### Symposium: Industry-Academia Collaborative Research and Development in Biological Control of Arthropod Pests: Results from Four Years of Marie-Curie Staff Exchange, and Perspectives

**Room W222 B (Convention Center)**

**Moderator and Organizer:** Thibaut Malausa, INRA, Sophia Antipolis, France

1:30 **4212** Four years of Marie-Curie staff-exchange on innovation in biological control: Overview and perspectives. **Thibaut Malausa** (tmalausa@sophia.inra.fr) and Nicolas Ris, INRA, Sophia Antipolis, France

1:45 **4213** Molecular and morphological characterization of scale insects and associated natural enemies in Chile and France. **Paul Amouroux** (pamourou@yahoo.fr)<sup>1</sup>, Margarita Correa<sup>1,2,3</sup>, Jimena Ampuero<sup>2</sup>, Paula Javiera Molina<sup>2</sup>, Philippe Kreiter<sup>3</sup>, Géraldine Groussier Bout<sup>3</sup>, Didier Crochard<sup>3</sup>, Thibaut Malausa<sup>3</sup>, and Tania Zaviezo<sup>1</sup>, <sup>1</sup>Pontifical Catholic Univ., Santiago, Chile, <sup>2</sup>Anasac Xilema, Quillota, Chile, <sup>3</sup>INRA, Sophia Antipolis, France

2:00 **4214** Research and development of a new biological control agent against the San José scale, *Diaspidiotus perniciosus*, in Chile. **Margarita Correa** (maggiecorrea@gmail.com)<sup>1,2</sup>, María Fernanda Flores<sup>3</sup>, Carola Roman<sup>1</sup>, Jimena Ampuero<sup>1</sup>, Aurélie Blin<sup>2</sup>, Paul Amouroux<sup>4</sup>, Paula Javiera Molina<sup>1</sup>, Sergio Salvador<sup>1</sup>, Felipe Sandoval<sup>1</sup>, Philippe Kreiter<sup>2</sup>, and Thibaut Malausa<sup>2</sup>, <sup>1</sup>Anasac Xilema, Quillota, Chile, <sup>2</sup>INRA, Sophia Antipolis, France, <sup>3</sup>Pontifical Catholic Univ., Curauma, Chile, <sup>4</sup>Pontifical Catholic Univ., Santiago, Chile

2:15 **4215** Disentangling taxonomic issues and reproductive isolation patterns in complexes of cryptic species in the genus *Trichogramma*. **Nicolas Ris** (nicolas.ris@sophia.inra.fr)<sup>1</sup>, Paloma Martinez-Rodriguez<sup>1</sup>, Astrid Cruaud<sup>2</sup>, Thibaut Malausa<sup>1</sup>, Jean-Yves Rasplus<sup>2</sup>, Géraldine Groussier Bout<sup>1</sup>, Sylvie Warot<sup>1</sup>, and Julien Seguret<sup>3</sup>, <sup>1</sup>INRA, Sophia Antipolis, France, <sup>2</sup>INRA, Montferrier-sur-Lez, France, <sup>3</sup>Biotop, Valbonne, France

2:30 **4216** Exploring and exploiting intraspecific diversity in the genus *Trichogramma*. **Paloma Martinez-Rodriguez** (pmartinez@paca.inra.fr)<sup>1</sup>, Cyndel Berger<sup>1</sup>, Géraldine Groussier Bout<sup>1</sup>, Thierry Dumbardon-Martial<sup>1,2</sup>, Thomas Lepilleur<sup>2</sup>, Pascal Maignet<sup>2</sup>, Thibaut Malausa<sup>1</sup>,



- Nicolas Ris<sup>1</sup>, Virginia Sanchez-Martin<sup>2</sup>, Julien Seguret<sup>2</sup>, Valentin Vergès<sup>1</sup>, Sylvie Warot<sup>1</sup>, and Tania Zaviezo<sup>3</sup>, <sup>1</sup>INRA, Sophia Antipolis, France, <sup>2</sup>Biotop, Valbonne, France, <sup>3</sup>Pontifical Catholic Univ., Santiago, Chile
- 2:45 **4217** Coupling chemistry and entomology to setup mass-rearing methods for *Chrysoperla externa*, *Cryptolaemus montrouzieri*, and *Rhyzobius lophantae*. **Géraldine Groussier Bout** (geraldine.groussier-bout@sophia.inra.fr)<sup>1</sup>, Paulina Godoy<sup>2</sup>, Felipe Sandoval Briones<sup>3</sup>, Carola Roman<sup>3</sup>, María Fernanda Flores<sup>2</sup>, Francisca Belen Lopez Saavedra<sup>3</sup>, Paula Javiera Molina<sup>3</sup>, and Margarita Correa<sup>1,3,4</sup>, <sup>1</sup>INRA, Sophia Antipolis, France, <sup>2</sup>Pontifical Catholic Univ., Curauma, Chile, <sup>3</sup>Anasac Xilema, Quillota, Chile, <sup>4</sup>Pontifical Catholic Univ., Santiago, Chile
- SD4218** BINGO: Breeding Invertebrates for Next Generation BioControl. Bart Pannebakker<sup>1</sup> and **Leo Beukeboom** (l.w.beukeboom@rug.nl)<sup>2</sup>, <sup>1</sup>Wageningen Univ. and Research Centre, Wageningen, Netherlands, <sup>2</sup>Univ. of Groningen, Groningen, Netherlands
- 3:00 BREAK AND POSTER SESSION**
- 3:15 **4219** Inbreeding and outbreeding in biological control agents: Do they actually matter? **Bastien Quaglietti** (bquaglietti@sophia.inra.fr)<sup>1,2,3</sup>, Apostolos Pekas<sup>3</sup>, Felix Wackers<sup>3</sup>, Didier Crochard<sup>2</sup>, Paul Amouroux<sup>4</sup>, Ferran Palero<sup>2</sup>, and Thibaut Malausa<sup>2</sup>, <sup>1</sup>Anasac Xilema, Quillota, Chile, <sup>2</sup>INRA, Sophia Antipolis, France, <sup>3</sup>Biobest, Westerlo, Belgium, <sup>4</sup>Pontifical Catholic Univ., Santiago, Chile
- 3:30 **4220** Exploring the microbiome of biological control agents: First insights and perspectives. **Ferran Palero** (fpalero@paca.inra.fr)<sup>1</sup>, Bastien Quaglietti<sup>1,2</sup>, Apostolos Pekas<sup>2</sup>, Aurelie Blin<sup>1</sup>, Michela Ion-Scotta<sup>1</sup>, Jean-Claude Streito<sup>3</sup>, Nicolas Ris<sup>1</sup>, Thibaut Malausa<sup>1</sup>, and Felix Wackers<sup>2</sup>, <sup>1</sup>INRA, Sophia Antipolis, France, <sup>2</sup>Biobest, Westerlo, Belgium, <sup>3</sup>INRA, Montferrier-sur-Lez, France
- 3:45 **4221** Integrated pest management in citrus in Spain: Recent results and current challenges for the biological control community. **Antonia Soto** (asoto@eaf.upv.es)<sup>1</sup>, Cristina Navarro Campos<sup>2</sup>, Altea Calabuig<sup>1</sup>, Ferran Garcia-Mari<sup>1</sup>, Felix Wackers<sup>2</sup>, Apostolos Pekas<sup>2</sup>, and Alexandre Beltra<sup>1</sup>, <sup>1</sup>Polytechnic Univ. of València, Valencia, Spain, <sup>2</sup>Biobest, Westerlo, Belgium
- 4:00 **4222** Novel strategies increase the population density of local beneficial phytoseiid mite populations. **Felix Wackers** (felix.wackers@biobest.be), Biobest, Westerlo, Belgium
- 4:15 **4223** Food supplements enhance phytoseiid mite populations in citrus. **Alexandre Beltra** (albeliv@etsia.upv.es)<sup>1</sup>, Cristina Navarro-Campos<sup>2</sup>, Altea Calabuig<sup>1</sup>, Antonia Soto<sup>1</sup>, Ferran Garcia-Mari<sup>1</sup>, Felix Wackers<sup>2</sup>, and Apostolos Pekas<sup>2</sup>, <sup>1</sup>Polytechnic Univ. of València, Valencia, Spain, <sup>2</sup>Biobest, Westerlo, Belgium
- 4:30 **4224** Advances in biological control using soil-dwelling mites. **Cristina Navarro-Campos** (cristina.navarro@biobest.be)<sup>1</sup>, Altea Calabuig<sup>2</sup>, Alexandre Beltra<sup>2</sup>, Antonia Soto<sup>2</sup>, Ferran Garcia-Mari<sup>2</sup>, Felix Wackers<sup>1</sup>, and Apostolos Pekas<sup>1</sup>, <sup>1</sup>Biobest, Westerlo, Belgium, <sup>2</sup>Polytechnic Univ. of València, Valencia, Spain
- 4:45 **4225** Attract and distract: Alternative sugars disrupt the ant-hemipteran mutualism and improve biological control. **Apostolos Pekas** (tolis@biobest.be)<sup>1</sup>, Cristina Navarro-Campos<sup>1</sup>, Alexandre Beltra<sup>2</sup>, Kurt Put<sup>1</sup>, and Felix Wackers<sup>1</sup>, <sup>1</sup>Biobest, Westerlo, Belgium, <sup>2</sup>Polytechnic Univ. of València, Valencia, Spain
- 5:00 **4226** Decision-support tools for the monitoring of arthropod pests and integration of biological control products: A case-study in Chile. **Alexandre Bout** (alexandre.bout@paca.inra.fr)<sup>1</sup>, Felipe Morales Rubio<sup>2</sup>, Kevin Simon<sup>1</sup>, and Hugo Herrera Garay<sup>2</sup>, <sup>1</sup>INRA, Sophia Antipolis, France, <sup>2</sup>Anasac Xilema, Quillota, Chile

### Symposium: Ecology, Biodiversity, and Geography of Gall-Inducing Insects: Now and Beyond

#### Room W330 B (Convention Center)

**Moderator and Organizer:** G. Wilson Fernandes, Federal Univ. of Minas Gerais, Belo Horizonte, Brazil

- 1:30 **4227** Presentation withdrawn
- 1:45 **4228** Canopy stress and galling species richness. **G. Wilson Fernandes** (gw.fernandes@gmail.com), Federal Univ. of Minas Gerais, Belo Horizonte, Brazil
- 2:00 **4229** Patterns in gall species diversity across altitudinal and precipitation gradients in northern Patagonia, Argentina: Explanatory variables switch between alpha and beta diversity. **Carolina Quintero** (quintero.carolina@gmail.com), National Univ. of Comahue, Bariloche, Argentina
- 2:15 **4230** On the diversity and host relations of galling lepidopterans in South America. **Gilson Moreira** (gilson.moreira@ufrgs.br), Federal Univ. of Rio Grande, Porto Alegre, Brazil
- 2:30 **4231** Indirect secondary effects of species removal from galler-parasitoid food web: An experimental approach. **Milton Barbosa** (miltonbsjunior@gmail.com), Univ. of Oxford, Oxford, United Kingdom
- 2:45 **4232** The complex life cycle and niche use of four *Daphnephila* species (Diptera: Cecidomyiidae) on the leaves of *Machilus thunbergii* (Lauraceae) in Northern Taiwan. **Man-Miao Yang** (mmy.letsfall@gmail.com), National Chung Hsing Univ., Taichung, Taiwan
- 3:00 BREAK**
- 3:15 **4233** Taxonomic status of a gall midge (Diptera: Cecidomyiidae) associated with *Symplocos cochinchinensis* (Symplocaceae) in Japan: The first example of *Rabdophaga* on a host plant other than Salicaceae. **Ayman Elsayed** (ayman.khamis77@gmail.com), Kagoshima Univ., Kagoshima, Japan
- 3:30 **4234** Life history and host manipulation mechanism by a gall-inducing psyllid *Stenopsylla nigricornis* (Hemiptera). **Makoto Tokuda** (tokudam@cc.saga-u.ac.jp), Saga Univ., Saga, Japan



**Symposium: Host Relations of Gall-Inducing Insects****Room W231 C (Convention Center)**

**Moderators and Organizers:** Donald Miller<sup>1</sup> and Anantanarayanan Raman<sup>2</sup>, <sup>1</sup>California State Univ., Chico, CA, <sup>2</sup>Charles Sturt Univ., Orange, Australia

- 1:30 **4235** What we have learned from the interactions between gall-inducing insects and their host plants. **Junichi Yukawa** (jzs02305@nifty.ne.jp), Kyushu Univ., Fukuoka, Japan
- 2:00 **4236** Cleanliness may lead to sociality in the gall-inducing thrips on Australian *Acacia*. **Tom Chapman** (tomc@mun.ca), Memorial Univ. of Newfoundland, St. John's, NF, Canada
- 2:15 **4237** Host specificity of gall-inducing *Calophya* spp. (Hemiptera: Calophyidae): Implications for biological control of Brazilian peppertree. **Rodrigo Diaz** (rdiaz@agcenter.lsu.edu)<sup>1</sup>, Patricia Prade<sup>2</sup>, Bill Overholt<sup>3</sup>, James P. Cuda<sup>2</sup>, and Marcelo D. Vitorino<sup>4</sup>, <sup>1</sup>Louisiana State Univ., Baton Rouge, LA, <sup>2</sup>Univ. of Florida, Gainesville, FL, <sup>3</sup>Univ. of Florida, Ft. Pierce, FL, <sup>4</sup>Regional Foundation Univ. of Blumenau, Santa Catarina, Brazil
- 2:30 **4238** The big and small of defense in the social aphid *Pemphigus spyrothecae*. **Holly Caravan** (hcaravan@mun.ca), Memorial Univ. of Newfoundland, St. John's, NF, Canada
- 2:45 **4239** The *Tamalia* gall-inducing aphid as intermediary between host plant and inquiline. **Donald Miller** (dgmiller@csuchico.edu), California State Univ., Chico, CA
- 3:00 BREAK**
- 3:15 **4240** Why do the species of *Synglycaspis* (Hemiptera: Psylloidea: Aphalaridae) induce galls only on *Eucalyptus macrorhyncha* (Myrtaceae)? **Anantanarayanan Raman** (araman@csu.edu.au), Charles Sturt Univ., Orange, Australia
- 3:30 **4241** Diversification of lasiopterine gall midges (Diptera: Cecidomyiidae) on plants of the genus *Suaeda* (Chenopodiaceae) – a role for plant life-form and anatomy? **Netta Dorchin** (ndorchin@tauex.tau.ac.il), Gilad Danon, and Roi Dor, Tel Aviv Univ., Tel Aviv, Israel
- 3:45 **4242** Host relations and colonization of Taiwanese *Bruggmanniella* species (Diptera: Cecidomyiidae) on *Litsea* Lam. and *Cinnamomum* Schaeffer (Lauraceae). **Sheng-Feng Lin** (sane654@yahoo.com.tw), National Chung Hsing Univ., Taichung, Taiwan
- 4:00 **4243** A multiplicity of galls: How do so many galler wasp species co-exist within a fig microcosm? **Renee Borges** (renee@ces.iisc.ernet.in) and Ananya Jana, Indian Institute of Science, Bangalore, India
- 4:15 **4244** Recent topics in the life history and host relations of gall wasps (Cynipidae) in Asia. **Yoshihisa Abe** (y\_abe@scs.kyushu-u.ac.jp)<sup>1</sup> and Tatsuya Ide<sup>2</sup>, <sup>1</sup>Kyushu Univ., Fukuoka, Japan, <sup>2</sup>Forestry and Forest Products Research Institute, Tsukuba, Japan

- 4:30 **4245** Insight on evolution of gall induction from species of Lepidoptera and Diptera that appear to evade host-plant defenses similarly by altering phytohormone levels. **John Tooker** (tookert@psu.edu), Pennsylvania State Univ., University Park, PA
- 4:45 **4246** Host relations of gall-inducing Cynipoidea. **Fredrik Ronquist** (fredrik.ronquist@nrm.se), Swedish Museum of Natural History, Stockholm, Sweden

**Symposium: Monitoring and Forecasting of Migratory Insect Movements****Room W232 A (Convention Center)**

**Moderators and Organizers:** Haikou Wang<sup>1</sup> and Baoping Zhai<sup>2</sup>, <sup>1</sup>Australian Plague Locust Commission, Canberra, Australia, <sup>2</sup>Nanjing Agricultural Univ., Nanjing, China

- 1:30 **4247** Forecasting field outbreaks of pests using suction-traps. **Chris Shortall** (chris.shortall@rothamsted.ac.uk)<sup>1</sup>, Sam Cook<sup>1</sup>, Alice Mauchline<sup>2</sup>, Julian Park<sup>2</sup>, and James Bell<sup>1</sup>, <sup>1</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>2</sup>Univ. of Reading, Reading, United Kingdom
- 2:00 **4248** Ecology and management of migratory *Helicoverpa punctigera* in Australia. **Alice Del Socorro** (adelsoc2@une.edu.au), Peter Gregg, and Kris Le Mottee, Univ. of New England, Armidale, Australia
- 2:15 **4249** Long term changes in host plants of *Helicoverpa punctigera* in inland Australia: Effects on migration patterns. **Kris Le Mottee** (krislemottee@gmail.com), Peter Gregg, and Alice Del Socorro, Univ. of New England, Armidale, Australia
- 2:30 **4250** The migration potential of the new maize pest *Athetis lepigone*. **Jianrong Huang** (hjr130705@126.com)<sup>1</sup>, Xiaowei Fu<sup>2</sup>, Hongqiang Feng<sup>1</sup>, and Guoping Li<sup>1</sup>, <sup>1</sup>Henan Academy of Agricultural Sciences, Zhengzhou, China, <sup>2</sup>Chinese Academy of Agricultural Sciences, Beijing, China
- 2:45 **4251** Wind-related orientation patterns in migratory insects in Australia. **Zhenhua Hao** (zhenhua.hao@student.adfa.edu.au), Univ. of New South Wales, Canberra, Australia
- 3:00 BREAK**
- 3:15 **4252** How many nights do rice leaf roller moths fly? **Gao Hu** (huago@njau.edu.cn), Fan Yang, Fengying Wang, and Baoping Zhai, Nanjing Agricultural Univ., Nanjing, China
- 3:30 **4253** Dispersion of the common cutworm, *Spodoptera litura*, observed in western Japan with a VLR-type entomological radar and a pheromone trap. **Akira Otuka** (aotuka@affrc.go.jp) and Masaya Matsumura, NARO Kyushu Okinawa Agricultural Research Center, Kumamoto, Japan
- 4:00 **4254** New techniques for monitoring agricultural pests in China. **Hongqiang Feng** (fenghongqiang@msn.com)<sup>1</sup>, Juan Zen<sup>2</sup>, Qing Yao<sup>3</sup>, Hongbo Qiao<sup>4</sup>, and Jianrong Huang<sup>1</sup>, <sup>1</sup>Henan Academy of Agricultural Sciences, Zhengzhou, China, <sup>2</sup>National Agro-Technical Extension and Service Centre, Beijing, China, <sup>3</sup>Zhejiang Sci-Tech Univ., Hangzhou, China, <sup>4</sup>Henan Agriculture Univ., Zhengzhou, China



- 4:15 **4255** Do spur-throated locusts, *Austracris guttulosa* (Walker), return to the tropics for winter? **Haikou Wang** (haikou.wang@agriculture.gov.au)<sup>1</sup> and V. Alistair Drake<sup>2</sup>, <sup>1</sup>Australian Plague Locust Commission, Canberra, Australia, <sup>2</sup>Univ. of New South Wales, Canberra, Australia
- 4:30 **4256** Desert locust forecasting: Art or science? **Keith Cressman** (keith.cressman@fao.org), Food and Agriculture Organization of the United Nations, Rome, Italy

### Symposium: Biotechnologically-Based Insect Control Strategies

#### Room W230 D (Convention Center)

**Moderators and Organizers:** Angharad M. R. Gatehouse<sup>1</sup> and Gongyin Ye<sup>2</sup>, <sup>1</sup>Newcastle Univ., Newcastle upon Tyne, United Kingdom, <sup>2</sup>Zhejiang Univ., Hangzhou, China

- 1:30 **4257** Novel transgenes for plant resistance to aphids from plant virus-aphid vector molecular interactions. **Bryony Bonning** (bbonning@iastate.edu), Iowa State Univ., Ames, IA
- 2:00 **4258** Discovery of novel strains and genes from *Bacillus thuringiensis* against sucking insects. **Jie Zhang** (jzhang@ippcaas.cn), Chinese Academy of Agricultural Sciences, Beijing, China
- 2:15 **4259** Transgenic tobacco expressing a viral cystatin gene, CpBV-CST1, exhibits insect resistance. **Yonggyun Kim** (hosanna@andong.ac.kr) and Eunseong Kim, Andong National Univ., Andong, South Korea
- 2:30 **4260** Functions of parasitoid venom proteins/peptides and their potential for pest control. **Gongyin Ye** (chu@zju.edu.cn)<sup>1</sup>, Qi Fang<sup>1</sup>, Zhichao Yan<sup>1</sup>, Lei Wang<sup>2</sup>, and Yu Zhu<sup>1</sup>, <sup>1</sup>Zhejiang Univ., Hangzhou, China, <sup>2</sup>Anhui Agricultural Univ., Hefei, China
- 2:45 **4261** Novel control strategies based on manipulation and exploitation of insect antagonistic associations. **Silvia Caccia** (silvia.caccia@unina.it), Ilaria Di Lelio, and Francesco Pennacchio, Univ. of Napoli Federico II, Napoli, Italy
- 3:00 BREAK**
- 3:15 **4262** Role of host translation-inhibitory factor in molecular interaction between host and parasitoid. **Kaijun Luo** (kaijun\_luo@ynu.edu.cn), Ming Li, Jiansheng Hu, and Yang Yang, Yunnan Univ., Kunming, China
- 3:30 **4263** Glycoprotein hemomucin protects embryos of polyembryonic parasitoid *Macrocentrus cingulum* to evade the encapsulation of host hemocytes. **Jian Hu** (lsshj@mail.sysu.edu.cn)<sup>1</sup>, Qiuyun Xu<sup>1</sup>, Shengfeng Hu<sup>1</sup>, Xiao-Qiang Yu<sup>2</sup>, Zhikun Liang<sup>1</sup>, and Wenqing Zhang<sup>1</sup>, <sup>1</sup>Sun Yat-sen Univ., Guangzhou, China, <sup>2</sup>Univ. of Missouri, Kansas City, MO
- 3:45 **4264** Natural insecticides from spider venom for the control of crop pests and disease vectors. **Glenn F. King** (glenn.king@imb.uq.edu.au), Univ. of Queensland, Brisbane, Australia
- 4:15 **4265** Fusion protein-based biopesticides. **John Gatehouse** (j.a.gatehouse@dur.ac.uk) and Elaine Fitches, Durham Univ., Durham, United Kingdom

- 4:30 **4266** RNAi-based biopesticides. **Guy Smagghe** (guy.smagghe@ugent.be), Ghent Univ., Ghent, Belgium
- 4:45 **4267** RNAi-mediated knockdown of the voltage-gated sodium ion channel (paralytic A) causes mortality in *Tribolium castaneum*. **Martin Edwards** (martin.edwards@newcastle.ac.uk)<sup>1</sup>, Hesham Abd El Halim<sup>2</sup>, and Angharad M. R. Gatehouse<sup>1</sup>, <sup>1</sup>Newcastle Univ., Newcastle upon Tyne, United Kingdom, <sup>2</sup>Benha Univ., Benha, Egypt
- 5:00 **4268** Screening new specific inhibitors using heterologous expressed honey bee ion channels. **Matthieu Rousset** (matthieu.rousset@crbm.cnrs.fr), Thierry Cens, and Pierre Charnet, National Center for Scientific Research, Montpellier, France

### Symposium: Key Challenges with Bt Crops in Latin America

#### Room W231 B (Convention Center)

**Moderators and Organizers:** Ana Vélez<sup>1</sup>, Amit Sethi<sup>2</sup>, and Analiza P. Alves<sup>2</sup>, <sup>1</sup>Univ. of Nebraska, Lincoln, NE, <sup>2</sup>DuPont Pioneer, Johnston, IA

- 1:30 **4269** Challenges for IPM and IRM in intensive cropping systems in Brazil. **Silvana de Paula-Moraes** (silvana.moraes@embrapa.br) and Alexandre Specht, Embrapa Cerrados, Planaltina, Brazil
- 1:45 **4270** Situation and perspectives of insect resistance management (IRM) in Bt crops in Argentina. **Maria Murúa** (gmurua@eeaoc.org.ar), Maria Garcia Degano, Augusto Casmuz, Sofia Fogliata, Maria Herrero, Alejandro Vera, Eduardo Willink, and Gerardo Gastamiza, National Council for Scientific and Technical Research, Tucumán, Argentina
- 2:00 **4271** Socio-economic barriers to the durable deployment of Bt crops: Can they be knocked down? **Terrance Hurley** (tmh@umn.edu), Univ. of Minnesota, St. Paul, MN
- 2:15 **4272** Characterizing resistance to Bt corn in fall armyworm strains from Brazil. **Eliseu Pereira** (eliseu.pereira@ufv.br)<sup>1</sup>, Oscar Santos-Amaya<sup>1</sup>, Natália Leite<sup>1</sup>, Fernanda Feitas<sup>1</sup>, Simone Mendes<sup>2</sup>, and Analiza P. Alves<sup>3</sup>, <sup>1</sup>Federal Univ. of Viçosa, Viçosa, Brazil, <sup>2</sup>Embrapa Maize and Sorghum, Sete Lagoas, Brazil, <sup>3</sup>DuPont Pioneer, Johnston, IA
- 2:30 **4273** Field adaptation of the fall armyworm to xenobiotics: Risk for corn production. **David Mota-Sanchez** (motasanc@msu.edu)<sup>1</sup>, Rebeca Gutierrez<sup>1</sup>, and Carlos A. Blanco<sup>2</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>USDA - APHIS, Riverdale, MD
- 2:45 **4274** Modeling the evolution of resistance to Bt maize in *Spodoptera frugiperda* in Brazil. **David Onstad** (david.onstad@pioneer.com), Zaiqi Pan, J. Lindsey Flexner, and Philip Crain, DuPont, Wilmington, DE
- 3:00 BREAK**
- 3:15 **4275** Bioecological aspects of *Spodoptera frugiperda*: Current knowledge and future needs to support IPM. **Odair Aparecido Fernandes** (oafarnandes@fcav.unesp.br), São Paulo State Univ., Jaboticabal, Brazil

- 3:30 **4276** IRM strategy for Intacta RR2 PRO in Brazil. **Samuel Martinelli** (samuel.martinelli@monsanto.com)<sup>1</sup>, Patrick Dourado<sup>2</sup>, Renato A. de Carvalho<sup>2</sup>, and Graham P. Head<sup>1</sup>, <sup>1</sup>Monsanto Company, St. Louis, MO, <sup>2</sup>Monsanto do Brasil, Ltda., São Paulo, Brazil
- 3:45 **4277** The fall armyworm (*Spodoptera frugiperda*): The greatest challenge in Latin America. **Carlos A. Blanco** (carlos.a.blanco@aphis.usda.gov)<sup>1</sup>, Willy Chiaravalle<sup>2</sup>, Marco Dalla-Rizza<sup>3</sup>, Juilano Farias<sup>4</sup>, Maria Garcia Degano<sup>5</sup>, Gerardo Gastamiza<sup>5</sup>, Maria Murúa<sup>5</sup>, Celso Omoto<sup>4</sup>, Jairo Rodriguez-Chalarca<sup>6</sup>, David Mota-Sanchez<sup>7</sup>, J. Concepcion Rodriguez<sup>8</sup>, Henry Teran Santofimio<sup>9</sup>, Antonio Terán-Vargas<sup>10</sup>, Sandra Valencia<sup>6</sup>, and Eduardo Willink<sup>5</sup>, <sup>1</sup>USDA - APHIS, Riverdale, MD, <sup>2</sup>Ento Agro, Carmelo, Uruguay, <sup>3</sup>National Institute of Agricultural Research, Canelones, Uruguay, <sup>4</sup>Univ. of São Paulo, Piracicaba, Brazil, <sup>5</sup>National Council of Scientific and Technical Research, Tucumán, Argentina, <sup>6</sup>International Center for Tropical Agriculture, Palmira, Colombia, <sup>7</sup>Michigan State Univ., East Lansing, MI, <sup>8</sup>Graduate College, Montecillo, Mexico, <sup>9</sup>DuPont Pioneer, Salinas, PR, <sup>10</sup>INIFAP, Cuauhtemoc, Mexico
- 4:00 **4278** Best management practices for sustaining the durability of MIR162 in Latin America. **Anthony D. Burd** (tony.burd@syngenta.com)<sup>1</sup> and Julio Fatoretto<sup>2</sup>, <sup>1</sup>Syngenta Plant Protection, Greensboro, NC, <sup>2</sup>Syngenta Crop Protection, Ltda., São Paulo, Brazil

## Symposium: Aquatic Entomology Around the World

### Room W240 D (Convention Center)

**Moderators and Organizers:** Kayla I. Perry<sup>1</sup> and Kyndall Dye<sup>2</sup>, <sup>1</sup>The Ohio State Univ., Wooster, OH, <sup>2</sup>Univ. of Kentucky, Lexington, KY

- 1:30 **4279** Bt maize and streams: Risk of exposure and hazard to aquatic insects. **William O. Lamp** (lamp@umd.edu), Cerruti Hooks, Qin Wang, and Galen Dively, Univ. of Maryland, College Park, MD
- 1:45 **4280** Distribution and potential effects of water beetles in lakes recovering from acidification. **Yves G. Alarie** (yalarie@laurentian.ca)<sup>1</sup> and Shelley E. Arnott<sup>2</sup>, <sup>1</sup>Laurentian Univ., Sudbury, ON, Canada, <sup>2</sup>Queen's Univ., Kingston, ON, Canada
- 2:00 **4281** The living stream: A functional approach. **Richard Merritt** (merrittr@msu.edu)<sup>1</sup>, Kenneth W. Cummins<sup>2</sup>, and Mollie D. McIntosh<sup>3</sup>, <sup>1</sup>Michigan State Univ., East Lansing, MI, <sup>2</sup>Humboldt State Univ., Arcata, CA, <sup>3</sup>Xavier Univ., Cincinnati, OH
- 2:30 **4282** Beyond pins and vials: Giggixel specimens annotated for reference and teaching purposes. **Andrea Kautz** (kautza@carnegiemnh.org)<sup>1</sup>, Marti Louw<sup>2</sup>, John Wenzel<sup>1</sup>, and John C. Morse<sup>3</sup>, <sup>1</sup>Carnegie Museum of Natural History, Rector, PA, <sup>2</sup>Center for Learning in Out-of-School Environments, Pittsburgh, PA, <sup>3</sup>Clemson Univ., Clemson, SC

- 2:45 **4283** Diversity and phenology of aquatic beetles in three localities of Tlaxcala state, central Mexico. **Magali Luna-Luna** (magui\_ll89@hotmail.com)<sup>1,2</sup> and Atilano Contreras-Ramos<sup>2</sup>, <sup>1</sup>Autonomous Univ. of Tlaxcala, Tlaxcala, Mexico, <sup>2</sup>National Autonomous Univ. of México, Mexico City, Mexico

### 3:00 BREAK

- 3:15 **4284** Legacy effects of emerald ash borer (*Agilus planipennis*) on stream ecosystems. **Courtney Larson** (larso126@msu.edu), Jennifer L. Pechal, Deborah G. McCullough, and M. Eric Benbow, Michigan State Univ., East Lansing, MI
- 3:30 **4285** Presentation withdrawn

## Symposium: Connecting with the World's Best Talent: Attracting and Retaining Diverse Entomologists

### Room W340 A (Convention Center)

**Moderators and Organizers:** Bill Hendrix<sup>1</sup> and Gail Kampmeier<sup>2</sup>, <sup>1</sup>Dow AgroSciences, Indianapolis, IN, <sup>2</sup>Illinois Natural History Survey (Ret.), Champaign, IL

- 1:30 **Reception**
- 2:00 **4286** Data-driven decisions: Use of a demographic model to optimize recruiting and retention efforts to enhance diversity in the Entomological Society of America. **Robert N. Wiedenmann** (rwieden@uark.edu)<sup>1</sup>, S. Raghu<sup>2</sup>, Debi Sutton<sup>3</sup>, and Katherine Matthews<sup>3</sup>, <sup>1</sup>Univ. of Arkansas, Fayetteville, AR, <sup>2</sup>CSIRO, Brisbane, QLD, Australia, <sup>3</sup>Entomological Society of America, Annapolis, MD
- 2:15 **4287** Women as bellwethers of diversity in entomology. **Gail Kampmeier** (gkamp@illinois.edu), Illinois Natural History Survey (Ret.), Champaign, IL
- 2:30 **4288** On discovery, comradery, and disability in entomology. **Richard Mankin** (richard.mankin@ars.usda.gov), USDA - ARS, Gainesville, FL
- 2:45 **4289** A look at the minority experience in entomology. **Michelle Samuel-Foo** (mfoo@ufl.edu), Univ. of Florida, Gainesville, FL
- 3:00 **BREAK**
- 3:15 **4290** Chasing rainbows with a net: Entomologists breaking LGBT barriers. **Bill Hendrix** (wmhendrix@dow.com), Dow AgroSciences, Indianapolis, IN
- 3:30 **4291** Inclusiveness: Planting, cultivating, and harvesting the insights of a multi-national team. **Scott Hutchins** (shhutchins@dow.com), Dow AgroSciences, Indianapolis, IN
- 3:45 **4292** Cultural shock: Tales of an expat entomologist. **Jessica Gillung** (jggillung@ucdavis.edu), Univ. of California, Davis, CA
- 4:00 **4293** Attraction of young diverse communities to entomology. **Jessica Hartshorn** (jahartsho@uark.edu)<sup>1</sup> and Molly Darr<sup>2</sup>, <sup>1</sup>Univ. of Arkansas, Fayetteville, AR, <sup>2</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA



- 4:15 **4294** Leading to foster diversity. **Michelle S. Smith** (mssmith@dow.com), Dow AgroSciences, Indianapolis, IN
- 4:30 **4295** The Entomological Society of America Diversity and Inclusion Committee – working to engage more diverse entomologists. **Vernard Lewis** (urbanpests@berkeley.edu), Univ. of California, Richmond, CA
- 4:45 The importance of diversity and inclusion in the sciences. **Wanda Ward** (wanda\_e\_ward@ostp.eop.gov), White House, Washington, DC
- 5:00 **Panel Discussion**

### Symposium: Tales from the Understory: Unraveling Secrets behind Tropical Butterfly Communication, Behavior, Wing Patterns, and Diversity

#### West Hall F3 (WF3) (Convention Center)

**Moderators and Organizers:** Susan Finkbeiner<sup>1</sup> and Adrea Susan Gonzalez-Karlsson<sup>2</sup>, <sup>1</sup>Boston Univ., Boston, MA, <sup>2</sup>Univ. of California, Los Angeles, CA

- 1:30 **4296** Variations in toxin concentrations within *Heliconius* butterfly communities: Evolutionary causes and consequences. **Monica Arias**, **Aimilia Meichanetzoglou**, **Marianne Elias**, **Bastien Nay**, and **Violaine Llaurens** (llaurens@mnhn.fr), National Museum of Natural History, Paris, France
- 1:45 **4297** Wing patterns and tropical butterfly community diversity. **Keith R. Willmott** (kwillmott@flmnh.ufl.edu), Univ. of Florida, Gainesville, FL
- 2:00 **4298** Fluorescence complements UV as a visual signal for butterflies but not for predators. **Susan D. Finkbeiner** (sfinkbei@bu.edu), Boston Univ., Boston, MA
- 2:15 **4299** Color vision in the butterfly *Heliconius erato*: Genes and physiology. **Adriana D. Briscoe** (abriscoe@uci.edu), Univ. of California, Irvine, CA
- 2:30 **4300** Gender as an evolutionary battleground: The remarkable dynamics of sex ratio in Australian *Eurema* butterflies. **Darrell Kemp** (darrell.kemp@mq.edu.au)<sup>1</sup> and **Nina Wedell**<sup>2</sup>, <sup>1</sup>Macquarie Univ., Sydney, Australia, <sup>2</sup>Univ. of Exeter, Cornwall, United Kingdom
- 2:45 **4301** Signaling strategies and mimetic fidelity in ithomiine butterflies. **Adrea Susan Gonzalez-Karlsson** (adrea@ucla.edu), Univ. of California, Los Angeles, CA
- SD4302** Presentation withdrawn
- SD4303** Presentation withdrawn
- SD4304** Presentation withdrawn
- SD4305** Interactions in ithomiine aggregations by wing pattern, species identity, and gender. **Talavai Denipah-Cook** (tldenipahcook@fortlewis.edu)<sup>1</sup> and **Adrea Susan Gonzalez-Karlsson**<sup>2</sup>, <sup>1</sup>Ft. Lewis College, Durango, CO, <sup>2</sup>Agricultural Research Organisation, Bet-Dagan, Israel
- 3:00** **BREAK AND POSTER SESSION**
- 3:30 **4306** Effect on the phenotype when hybridizing two subspecies of *Morpha helenor* (Nymphalidae) from Costa Rica. **Ricardo Murillo-Hiller** (murillohiller@gmail.com), Univ. of Costa Rica, San Jose, Costa Rica

- 3:45 **4307** Speciation and wing pattern diversification in tropical *Papilio* swallowtail butterflies. **Krushnamegh Kunte** (krushnamegh@ncbs.res.in), National Center for Biological Sciences, Bangalore, India
- 4:00 **4308** Multiple sources of reproductive isolation in *Heliconius* butterflies. **Chris Jiggins** and **Richard Merrill** (r.merrill@zoo.cam.ac.uk), Univ. of Cambridge, Cambridge, United Kingdom
- 4:15 **4309** Signalling escaping ability to predators: The evidence from Neotropical butterflies. **Carlos Pinheiro** (cegp@unb.br), Univ. of Brasilia, Brasilia, Brazil
- 4:30 **4310** Multiple signal components in mimetic ithomiine butterflies. **Ryan Hill** (rhill@pacific.edu), Univ. of the Pacific, Stockton, CA
- 4:45 **Panel Discussion**

### Symposium: Crop Domestication Effects on Plant-Insect Interactions: Patterns, Mechanisms, and Future Directions

#### Room W314 A (Convention Center)

**Moderators and Organizers:** Katja Poveda and Susan Whitehead, Cornell Univ., Ithaca, NY

- 1:30 **4311** Presentation withdrawn
- 2:00 **4312** Crop domestication, naturally-selected species interactions, and challenges for sustainable agriculture. **Yolanda Chen** (yolanda.chen@uvm.edu)<sup>1</sup>, **Rieta Gols**<sup>2</sup>, and **Betty Benrey**<sup>3</sup>, <sup>1</sup>Univ. of Vermont, Burlington, VT, <sup>2</sup>Wageningen Univ. and Research Centre, Wageningen, Netherlands, <sup>3</sup>Univ. of Neuchâtel, Neuchâtel, Switzerland
- 2:15 **4313** Facilitation by domestication? Susceptibility of wild and cultivated blueberries to an invasive pest. **Cesar Rodriguez-Saona** (crodriguez@rce.rutgers.edu)<sup>1</sup>, **Monica Giusti**<sup>2</sup>, **Fernando Sanchez-Pedraza**<sup>3</sup>, **Yucheng Zhou**<sup>2</sup>, **Manuel Chacon-Fuentes**<sup>4</sup>, and **Betty Benrey**<sup>5</sup>, <sup>1</sup>Rutgers, The State Univ. of New Jersey, Chatsworth, NJ, <sup>2</sup>The Ohio State Univ., Columbus, OH, <sup>3</sup>Antonio Narro Agrarian Autonomous Univ., Saltillo, Mexico, <sup>4</sup>Univ. of La Frontera, Temuco, Chile, <sup>5</sup>Univ. of Neuchâtel, Neuchâtel, Switzerland
- 2:30 **4314** Fine-tuning the “plant domestication-reduced defense” hypothesis: Co-evolved specialist versus generalist herbivores. **Mickaël Gaillard** (mickael.gaillard@unine.ch)<sup>1</sup>, **Gaetan Glauser**<sup>1</sup>, **Christelle Robert**<sup>2</sup>, and **Ted Turlings**<sup>1</sup>, <sup>1</sup>Univ. of Neuchâtel, Neuchâtel, Switzerland, <sup>2</sup>Univ. of Bern, Bern, Switzerland
- 2:45 **4315** Domestication of tomato has reduced attraction of herbivore natural enemies. **Juli Carrillo** (carrillj@purdue.edu)<sup>1</sup>, **Xiaohong Li**<sup>2</sup>, **Michael Garvey**<sup>1</sup>, and **Ian Kaplan**<sup>1</sup>, <sup>1</sup>Purdue Univ., West Lafayette, IN, <sup>2</sup>Nanjing Agricultural Univ., Nanjing, China
- 3:00** **BREAK**
- 3:15 **4316** Effects of crop domestication on herbivore defense: A meta-analysis. **Susan Whitehead** (susan.whitehead@cornell.edu)<sup>1</sup>, **Martin Turcotte**<sup>2</sup>, and **Katja Poveda**<sup>1</sup>, <sup>1</sup>Cornell Univ., Ithaca, NY, <sup>2</sup>Institute for Integrative Biology, Zürich, Switzerland

- 3:30 **4317** Tissue specific effects of plant domestication on chemical defenses: The case of beans and *Brassica*. **Betty Benrey** (betty.benrey@unine.ch)<sup>1</sup>, J. Gwen Shlichta<sup>1</sup>, Maximilien Cuny<sup>1</sup>, Diana La Forgia<sup>1</sup>, and Gaylord Desurmont<sup>2</sup>, <sup>1</sup>Univ. of Neuchâtel, Neuchâtel, Switzerland, <sup>2</sup>European Biological Control Laboratory, Montpellier, France
- 3:45 **4318** Crop evolution and temporal dynamics of resistance to herbivory. **Bhupendra Chaudhary** (bhupendrach@gmail.com), Gautam Buddha Univ., Uttar Pradesh, India
- 4:00 **4319** Patterns in phytochemical changes from the domestication and diversification of crops. **Rachel Meyer** (rmi181@nyu.edu), New York Univ., New York, NY
- 4:15 **4320** Maize domestication and spread drove the emergence of contemporary pests. **Ana Fontes-Puebla** (aurorafontes@gmail.com), Raul Medina, and Julio S. Bernal, Texas A&M Univ., College Station, TX
- 4:30 **4321** The impact of plant domestication on the performance and evolution of generalist herbivores. **Martin M. Turcotte** (mart.turcotte@gmail.com)<sup>1</sup>, Amaneet Lochab<sup>2</sup>, Nash Turley<sup>3</sup>, and Marc Johnson<sup>4</sup>, <sup>1</sup>Institute for Integrative Biology, Zürich, Switzerland, <sup>2</sup>Harvard Univ., Cambridge, MA, <sup>3</sup>Michigan State Univ., East Lansing, MI, <sup>4</sup>Univ. of Toronto, Mississauga, ON, Canada
- 4:45 **Discussion**
- 2:15 **4325** Taking entomological research from the swamps to the suburbs with social media. **Cameron Webb** (cameron.webb@swahs.health.nsw.gov.au), The Univ. of Sydney, Westmead, Australia
- 2:30 **4326** The SIWOTI syndrome: How to fight entomological misinformation. **Doug Yanega** (dyanega@ucr.edu), Univ. of California, Riverside, CA
- 2:45 **4327** What's bugging you? Ask an entomologist! Science engagement through blogging. **Nancy Miorelli** (miorelln@uga.edu)<sup>1</sup> and Joe Ballenger<sup>2</sup>, <sup>1</sup>Univ. of Georgia, Athens, GA, <sup>2</sup>Randstad, Florissant, MO
- 3:00 **BREAK**
- 3:15 **4328** Relax, I'm an entomologist: A Facebook page to discuss pertinent topics in entomology and science. **Jake E. Bova** (jbova86@vt.edu)<sup>1</sup> and Rea Manderino<sup>2</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>State Univ. of New York, Syracuse, NY
- 3:30 **4329** MyPestGuide – the 'BEST' suite of Biosecurity Engagement and Surveillance Tools. **Robert Emery** (rob.emery@agric.wa.gov.au)<sup>1</sup>, Laura Fagan<sup>1</sup>, Rosalie McCauley<sup>1</sup>, Darryl Hardie<sup>1</sup>, Nichole Hammond<sup>1</sup>, David Cook<sup>1</sup>, Dominic Wright<sup>1</sup>, David Cousins<sup>1</sup>, Jeff Russell<sup>2</sup>, and Nicolas Garel<sup>3</sup>, <sup>1</sup>Dept. of Agriculture and Food, South Perth, Australia, <sup>2</sup>Plant Health Australia, Deakin, Australia, <sup>3</sup>Ngperceptive, Cloverdale, Australia
- 3:45 **4330** Mobile-IPM: Real-time pest management in the digital age. Barbara J. Sharanowski<sup>1</sup>, **Ana Dal Molin** (adalmolin@tamu.edu)<sup>2</sup>, Amber Bass<sup>2</sup>, Douglas Cattani<sup>2</sup>, John Gavloski<sup>3</sup>, Robert H. Gulden<sup>2</sup>, Leah Irwin<sup>2</sup>, Kale McKay<sup>2</sup>, Julia Leeson<sup>4</sup>, Scott Meers<sup>5</sup>, Owen Olfert<sup>4</sup>, Jennifer Otani<sup>6</sup>, Kelly Turkington<sup>7</sup>, Ross Weiss<sup>4</sup>, and Leanne Peixoto<sup>2</sup>, <sup>1</sup>Univ. of Central Florida, Orlando, FL, <sup>2</sup>Univ. of Manitoba, Winnipeg, MB, Canada, <sup>3</sup>Manitoba Agriculture, Food and Rural Initiatives, Carman, MB, Canada, <sup>4</sup>Agriculture and Agri-Food Canada, Saskatoon, SK, Canada, <sup>5</sup>Alberta Agriculture and Rural Development, Brooks, AB, Canada, <sup>6</sup>Agriculture and Agri-Food Canada, Beaverlodge, AB, Canada, <sup>7</sup>Agriculture and Agri-Food Canada, Lacombe, AB, Canada
- 4:00 **4331** Biodiversity informatics skills for collections and research in the 21<sup>st</sup> century. **Deborah Paul** (dpaul@fsu.edu)<sup>1,2</sup>, Pamela Soltis<sup>3</sup>, and Matthew Collins<sup>4</sup>, <sup>1</sup>Integrated Digitized Biological Collections (iDigBio), Tallahassee, FL, <sup>2</sup>Florida State Univ., Tallahassee, FL, <sup>3</sup>Integrated Digitized Biological Collections (iDigBio), Gainesville, FL, <sup>4</sup>Univ. of Florida, Gainesville, FL
- 4:15 **4332** Where do we come from, where do we go to?: 20 years of Open Access to biodiversity knowledge. **Donat Agosti** (agosti@plazi.org), Plazi GmbH, Bern, Switzerland
- 4:30 **Discussion**
- 1:30 **4322** Get out of your exoskeleton: Using social media tools to research, teach, and communicate about entomology. Christopher Buddle and **Christopher Cloutier** (christopher.cloutier@mail.mcgill.ca), McGill Univ., Sainte-Anne-de-Bellevue, QC, Canada
- 1:45 **4323** Insights from the Thematic Collections Networks and beyond on using digitized specimens for education and outreach. Talia Karim<sup>1</sup>, Misha Leong<sup>2</sup>, **Molly Phillips** (mphillips@flmnh.ufl.edu)<sup>3</sup>, Mari Roberts<sup>4</sup>, and Katja C. Seltmann<sup>5</sup>, <sup>1</sup>Univ. of Colorado, Boulder, CO, <sup>2</sup>California Academy of Sciences, San Francisco, CA, <sup>3</sup>Florida Museum of Natural History, Gainesville, FL, <sup>4</sup>New York Botanical Garden, New York, NY, <sup>5</sup>Univ. of California, Santa Barbara, CA
- 2:00 **4324** Technology and butterfly citizen science: It's not just about getting data! **Karen Oberhauser** (oberh001@umn.edu) and Eva Lewandowski, Univ. of Minnesota, St. Paul, MN

## Symposium: Entomology in the Digital Age

### Room W222 A (Convention Center)

**Moderators and Organizers:** Barbara J. Sharanowski<sup>1</sup>, Ana Dal Molin<sup>1</sup>, Miles Zhang<sup>2</sup>, and Leanne Peixoto<sup>1</sup>, <sup>1</sup>Univ. of Manitoba, Winnipeg, MB, Canada, <sup>2</sup>Univ. of Central Florida, Orlando, FL



## Symposium: Next-Generation Ecology, Morphology, and Genomics: What can We Learn about the Evolution of Odonata?

### Room W224 G (Convention Center)

**Moderators and Organizers:** Maren Wellenreuther<sup>1</sup>, Sebastian Büsse<sup>2,3</sup>, and Seth Bybee<sup>2</sup>, <sup>1</sup>Lund Univ., Lund, Sweden, <sup>2</sup>Brigham Young Univ., Provo, UT, <sup>3</sup>Univ. of Kiel, Kiel, Germany

- 1:30 **4333** Next-generation ecology: Odonata, a non-model system to bridge the gaps between genomes and environment. **Heike Hadrys** (heike.hadrys@yale.edu)<sup>1,2,3</sup>, <sup>1</sup>Univ. of Veterinary Medicine, Hannover, Germany, <sup>2</sup>American Museum of Natural History, New York, NY, <sup>3</sup>Yale Univ., New Haven, CT
- 1:45 **4334** The social dimension: Agonistic behaviour in larvae. **Richard Rowe** (richard.rowe.dragonflies@gmail.com), The Australian National Univ., Canberra, Australia
- 2:00 **4335** Non-adaptive radiation in damselflies. **Maren Wellenreuther** (maren.wellenreuther@biol.lu.se) and Rosa Sánchez-Guillén, Lund Univ., Lund, Sweden
- 2:15 **4336** Temperature body control is associated to climatic and geographic variables but not wing pigmentation in two rubyspot damselflies (Odonata: Calopterygidae). **Alex Cordoba** (acordoba@ecologia.unam.mx) and Miguel Rivas, National Autonomous Univ. of México, Mexico City, Mexico
- 2:30 **4337** Dragonfly wings: A complex hierarchical composite system. **Esther Appel** (eappel@zoologie.uni-kiel.de)<sup>1</sup>, Lars Heepe<sup>1</sup>, Chung-Ping Lin<sup>2</sup>, and Stanislav N. Gorb<sup>4</sup>, <sup>1</sup>Univ. of Kiel, Kiel, Germany, <sup>2</sup>National Taiwan Normal Univ., Taipei, Taiwan, <sup>3</sup>Christian Albrechts Univ., Kiel, Germany
- 2:45 **4338** The functional morphology of the thorax of Odonata – review and prospects. **Sebastian Büsse** (sbuesse@zoologie.uni-kiel.de) and Stanislav N. Gorb, Christian Albrechts Univ., Kiel, Germany
- 3:00 **BREAK**
- 3:15 **4339** New insights into the functional morphology of the claspers and copulatory organs of selected male damselflies. **Jana Willkommen** (jwillkommen@zoologie.uni-kiel.de)<sup>1</sup>, Jan Michels<sup>1</sup>, and Stanislav N. Gorb<sup>2</sup>, <sup>1</sup>Univ. of Kiel, Kiel, Germany, <sup>2</sup>Christian Albrechts Univ., Kiel, Germany
- 3:30 **4340** A role for ecology in the evolution of color variation and sexual dimorphism in Hawaiian damselflies. **Idelle Cooper** (cooperia@jmu.edu), James Madison Univ., Harrisonburg, VA
- 3:45 **4341** Opsin and color evolution among the most molecularly complex terrestrial visual system (Odonata). **Seth Bybee** (seth.bybee@byu.edu), Anton Suvorov, and Camilla Sharkey, Brigham Young Univ., Provo, UT
- 4:00 **4342** Opsins have evolved under the permanent heterozygote model: Insights from phylotranscriptomics of Odonata. **Anton Suvorov** (antony.suvorov@gmail.com), Brigham Young Univ., Provo, UT

- 4:15 **4343** Phylogenetic and morphological structure of odonate communities along broad-scale environmental gradients. **Jean-Philippe Lessard** (jp.lessard@concordia.ca), Univ. of Concordia, Montréal, QC, Canada
- 4:30 **4344** Genetic architecture of the hybridization: Insights from damselflies. **Rosa Sanchez Guillen** (rguillenuvigo@hotmail.com)<sup>1</sup>, Bengt Hansson<sup>1</sup>, Jesús Chaves Rios<sup>2</sup>, and Maren Wellenreuther<sup>1</sup>, <sup>1</sup>Lund Univ., Lund, Sweden, <sup>2</sup>National Autonomous Univ. of México, Mexico City, Mexico
- 4:45 **4345** Genomic adaptation along an environmental gradient in range-expanding damselflies (*Ischnura elegans*). **Rachael Dudaniec** (rachael.dudaniec@mq.edu.au), Macquarie Univ., Sydney, Australia
- 5:00 **4346** Sex-biased gene expression in *Ischnura elegans* (Odonata: Zygoptera). **Bengt Hansson** (bengt.hansson@biol.lu.se), Pallavi Chauhan, and Maren Wellenreuther, Lund Univ., Lund, Sweden

## Symposium: Wood Borer-Fungus Alliances and Conflicts: The Frontier of Forest Entomology

### Room W414 D (Convention Center)

**Moderator and Organizer:** Jiri Hulcr, Univ. of Florida, Gainesville, FL

- 1:30 **4347** Bark beetle/tree pathogen interactions: More than meets the eye. Michael Wingfield<sup>1</sup>, Tuan Duong<sup>2</sup>, Stephen Taerum<sup>2</sup>, and **Wilhelm de Beer** (wilhelm.debeer@fab.up.ac.za)<sup>2</sup>, <sup>1</sup>Univ. of Pretoria, Pretoria, South Africa, <sup>2</sup>Forestry and Agricultural Biotechnology Institute, Pretoria, South Africa
- 1:45 **4348** *Geosmithia*: Ubiquitous associates of subcortical insects. **Miroslav Kolarik** (miroslavkolarik@seznam.cz)<sup>1</sup>, Martin Kostovcik<sup>1</sup>, Jiri Hulcr<sup>2</sup>, and Robert Jankowiak<sup>3</sup>, <sup>1</sup>Czech Academy of Sciences, Prague, Czech Republic, <sup>2</sup>Univ. of Florida, Gainesville, FL, <sup>3</sup>Agricultural Univ. of Cracow, Cracow, Poland
- 2:00 **4349** Top-down controls of the ambrosia beetle symbiont fidelity. **James Skelton** (skelto3@gmail.com) and Jiri Hulcr, Univ. of Florida, Gainesville, FL
- 2:15 **4350** The *Sirex* woodwasp: Complex interactions and evolving management paradigms of a globally invasive forest pest. **Bernard Slippers** (bernard.slippers@fab.up.ac.za), Brett Hurley, and Michael Wingfield, Univ. of Pretoria, Pretoria, South Africa
- 2:30 **4351** Why does the Japanese oak wilt occur only in Japan? **Naoto Kamata** (kamatan@uf.a.u-tokyo.ac.jp), The Univ. of Tokyo, Furano, Japan
- 2:45 **4352** Time to stop studying them and start killing them? Tree-killing bark beetles and modern forest management. **Kier Klepzig** (kklepzig@fs.fed.us)<sup>1</sup>, Brian L. Strom<sup>2</sup>, and John T. Nowak<sup>1</sup>, <sup>1</sup>USDA - Forest Service, Asheville, NC, <sup>2</sup>USDA - Forest Service, Pineville, LA
- 3:00 **BREAK**
- 3:15 **4353** Know your farmer: Genome sequencing and phylogenomics of ambrosia beetle fungal cultivars. **Dan Vanderpool** (ddvanderpool@gmail.com) and John McCutcheon, Univ. of Montana, Missoula, MT

- 3:30 **4354** Horizontal transfer of a phytopathogenic symbiont among native and exotic ambrosia beetles. **Daniel Carrillo** (dancar@ufl.edu)<sup>1</sup>, Randy Ploetz<sup>1</sup>, Julio Mantilla<sup>1</sup>, Jose Saucedo<sup>1</sup>, Octavio Menocal<sup>1</sup>, Joshua Konkol<sup>1</sup>, Rita E. Duncan<sup>1</sup>, Juliette Hubbard<sup>1</sup>, Luis Ibarra<sup>2</sup>, and Luisa Cruz<sup>1</sup>, <sup>1</sup>Univ. of Florida, Homestead, FL, <sup>2</sup>Institute of Ecology, Xalapa, Mexico
- 3:45 **4355** Thousand cankers disease research: The good, the bad, and the ugly. **Denita Hadziabdic** (purdash@gmail.com)<sup>1</sup>, Romina Gazis<sup>1</sup>, Emel Oren<sup>1</sup>, William Klingeman<sup>1</sup>, Lisa Vito<sup>1</sup>, Mark T. Windham<sup>1</sup>, Laura Poplawski<sup>1</sup>, Paris L. Lambdin<sup>1</sup>, Jerome F. Grant<sup>1</sup>, Gregory J. Wiggins<sup>1</sup>, Phillip Wadl<sup>1,2</sup>, Bonnie Ownley<sup>1</sup>, Margaret Staton<sup>1</sup>, John K. Moulton<sup>1</sup>, Paul Merten<sup>3</sup>, Jay Pscheidt<sup>4</sup>, Whitney Cranshaw<sup>5</sup>, Massimo Faccoli<sup>6</sup>, Jennifer Juzwik<sup>7</sup>, Matthew Ginzel<sup>8</sup>, and Robert Trigiano<sup>1</sup>, <sup>1</sup>Univ. of Tennessee, Knoxville, TN, <sup>2</sup>USDA - ARS, Charleston, SC, <sup>3</sup>USDA - Forest Service, Asheville, NC, <sup>4</sup>Oregon State Univ., Corvallis, OR, <sup>5</sup>Colorado State Univ., Fort Collins, CO, <sup>6</sup>Dept. of Agronomy, Food, Natural Resources, Animals, and Environment, Legnaro, Italy, <sup>7</sup>USDA - Forest Service, St. Paul, MN, <sup>8</sup>Purdue Univ., West Lafayette, IN
- 4:00 **4356** The infection process of *Xyleborus glabratus*, vector of laurel wilt. **Marc Hughes** (mhughes741@ufl.edu)<sup>1</sup>, Xavier Martini<sup>2</sup>, Lukasz Stelinski<sup>2</sup>, and Jason A. Smith<sup>1</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Univ. of Florida, Lake Alfred, FL
- 4:15 **4357** A tale of three *Euwallacea*: From a species to a complex. **Miriam Cooperband** (miriam.f.cooperband@aphis.usda.gov)<sup>1</sup>, Richard Stouthamer<sup>2</sup>, Allard Cossé<sup>3</sup>, Daniel Carrillo<sup>4</sup>, and Tappey H. Jones<sup>5</sup>, <sup>1</sup>USDA - APHIS, Buzzards Bay, MA, <sup>2</sup>Univ. of California, Riverside, CA, <sup>3</sup>USDA - ARS, Peoria, IL, <sup>4</sup>Univ. of Florida, Homestead, FL, <sup>5</sup>Virginia Military Institute, Lexington, VA
- 4:30 **4358** Transmission and function of the major fungal symbiont of the Asian longhorned beetle (*Anoplophora glabripennis*). Charles Mason, Alex Campbell, and **Kelli Hoover** (kxh25@psu.edu), Pennsylvania State Univ., University Park, PA

## Symposium: Optical Manipulation of Arthropod Pests and Beneficials

### Room W331 D (Convention Center)

**Moderators and Organizers:** David Ben-Yakir<sup>1</sup> and Irene Vänninen<sup>2</sup>, <sup>1</sup>Agricultural Research Organisation, Bet-Dagan, Israel, <sup>2</sup>Natural Resources Institute, Helsinki, Finland

- 1:30 **4359** An entirely new kind of visual system in the honey bee. **Adrian Horridge** (horridge@netspeed.com.au), The Australian National Univ., Canberra, Australia
- 2:00 **4360** The molecular basis for light entrainment of insect clocks. **Ying Li** (yhli@ucdavis.edu), Univ. of California, Davis, CA
- 2:15 **4361** Induced resistance in plants against pests with specific photon fluxes generated using LEDs. **Ole Rechner** (rechner@ipp.uni-hannover.de)<sup>1</sup>, Sasa Wu<sup>2</sup>, Susanne Neugart<sup>2</sup>, Monica Schreiner<sup>2</sup>, and Hans-Michael Poehling<sup>1</sup>, <sup>1</sup>Leibniz Univ., Hannover, Germany, <sup>2</sup>Leibniz Institute for Vegetable and Ornamental Crops, Großbeeren, Germany

- 2:30 **4362** LED-based screening of the color choice behavior of the greenhouse whitefly (*Trialeurodes vaporariorum*): Proof of blue-green opponency and trichromatic vision. **Niklas Stukenberg** (stukenberg@ipp.uni-hannover.de) and Hans-Michael Poehling, Leibniz Univ., Hannover, Germany
- 2:45 **4363** Visual responses of the spotted wing drosophila and their use for monitoring tools and management tactics. **Brent Short** (brent.short@ars.usda.gov), USDA - ARS, Kearneysville, WV
- 3:00 **BREAK**
- 3:15 **4364** Pest control using the predatory bug *Orius sauteri* with lighting devices. **Masami Shimoda** (shimodal@affrc.go.jp)<sup>1</sup>, Takumi Ogino<sup>1</sup>, Takuya Uehara<sup>1</sup>, Terumi Yamaguchi<sup>1</sup>, Takahisa Ichihashi<sup>2</sup>, Takahiro Suzuki<sup>2</sup>, and Yooichi Kainoh<sup>3</sup>, <sup>1</sup>National Institute of Agrobiological Sciences, Tsukuba, Japan, <sup>2</sup>SHIGRAY, Inc., Tokyo, Japan, <sup>3</sup>Univ. of Tsukuba, Tsukuba, Japan
- 3:30 **4365** Spectral preference of the predatory bug *Orius sauteri*, a biological control agent against agricultural pests. **Takumi Ogino** (hirundorustica@affrc.go.jp)<sup>1,2</sup>, Takuya Uehara<sup>1</sup>, Terumi Yamaguchi<sup>1</sup>, Takahisa Ichihashi<sup>3</sup>, Takahiro Suzuki<sup>3</sup>, Yooichi Kainoh<sup>2</sup>, and Masami Shimoda<sup>1</sup>, <sup>1</sup>National Institute of Agrobiological Sciences, Tsukuba, Japan, <sup>2</sup>Univ. of Tsukuba, Tsukuba, Japan, <sup>3</sup>SHIGRAY, Inc., Tokyo, Japan
- 3:45 **4366** Optical manipulations of whiteflies, aphids, and thrips. **David Ben-Yakir** (benyak@agri.gov.il), Agricultural Research Organisation, Bet-Dagan, Israel
- 4:00 **4367** Optical manipulation of arthropod pests in northern greenhouses — state of the art. **Nina Johansen** (nina.johansen@nibio.no)<sup>1</sup>, Irene Vänninen<sup>2</sup>, and Roselyne Labbe<sup>3</sup>, <sup>1</sup>Norwegian Institute of Bioeconomy, Ås, Norway, <sup>2</sup>Natural Resources Institute, Helsinki, Finland, <sup>3</sup>Agriculture and Agri-Food Canada, Harrow, ON, Canada

## Symposium: Arthropod Population Genomics

### Room W331 A (Convention Center)

**Moderator and Organizer:** David G. Heckel, Max Planck Institute for Chemical Ecology, Jena, Germany

- 1:30 **4368** Molecular population genomics of chromosomal inversions in *Drosophila pseudoobscura*. **Stephen Richards** (stephenr@bcm.edu)<sup>1</sup>, Zachary Fuller<sup>2</sup>, Gwilym Haynes<sup>2</sup>, Shannon Duggan<sup>1</sup>, Dianhuiz Zhu<sup>1</sup>, and Stephen Schaeffer<sup>2</sup>, <sup>1</sup>Baylor College of Medicine, Houston, TX, <sup>2</sup>Pennsylvania State Univ., University Park, PA
- 1:45 **4369** Microevolutionary patterns in the generalist herbivore *Tetranychus urticae* as revealed by large-scale strain sequencing. **Richard Clark** (clark@biology.utah.edu)<sup>1</sup>, Andre Kurlovs<sup>1</sup>, Robert Greenhalgh<sup>1</sup>, Huyen Bui<sup>1</sup>, Joshua Steffen<sup>2</sup>, Wannas Dermauw<sup>3</sup>, Astrid Bryon<sup>3</sup>, Sabina Bajda<sup>3</sup>, and Thomas Van Leeuwen<sup>3</sup>, <sup>1</sup>Univ. of Utah, Salt Lake City, UT, <sup>2</sup>Colby-Sawyer College, New London, NH, <sup>3</sup>Ghent Univ., Ghent, Belgium
- 2:00 **4370** The genetic and neural basis of female mate preference and species isolation in *Drosophila*. **Amanda Moehring** (amoehrin@uwo.ca), Western Univ., London, ON, Canada



- 2:15 **4371** The genetics of monarch butterfly migration and warning coloration. **Shuai Zhan** (szhan@sibs.ac.cn)<sup>1</sup>, Wei Zhang<sup>2</sup>, Kristjan Niitepõld<sup>3</sup>, Jeremy Hsu<sup>4</sup>, Juan Fernández Haeger<sup>5</sup>, Myron Zalucki<sup>6</sup>, Sonia Altizer<sup>7</sup>, Jacobus C. De Roode<sup>8</sup>, Steven Reppert<sup>9</sup>, and Marcus Kronforst<sup>2</sup>, <sup>1</sup>Chinese Academy of Sciences, Shanghai, China, <sup>2</sup>Univ. of Chicago, Chicago, IL, <sup>3</sup>Univ. of Helsinki, Helsinki, Finland, <sup>4</sup>Stanford Univ., Stanford, CA, <sup>5</sup>Univ. of Córdoba, Córdoba, Spain, <sup>6</sup>Univ. of Queensland, Brisbane, Australia, <sup>7</sup>Univ. of Georgia, Athens, GA, <sup>8</sup>Emory Univ., Atlanta, GA, <sup>9</sup>Univ. of Massachusetts, Worcester, MA
- 2:30 **4372** The genomics of population divergence: Across the speciation boundary in *Rhagoletis* fruit flies. **Jeffrey Feder** (jfeder@nd.edu), Univ. of Notre Dame, South Bend, IN
- 2:45 **4373** Genome-wide introgression among distantly related *Heliconius* butterfly species. **Marcus Kronforst** (mkronforst@uchicago.edu)<sup>1</sup>, Wei Zhang<sup>1</sup>, Kanchoon Dasmahapatra<sup>2</sup>, James Mallet<sup>3</sup>, and Gilson Moreira<sup>4</sup>, <sup>1</sup>Univ. of Chicago, Chicago, IL, <sup>2</sup>Univ. of York, York, United Kingdom, <sup>3</sup>Harvard Univ., Cambridge, MA, <sup>4</sup>Federal Univ. of Rio Grande, Porto Alegre, Brazil
- 3:00 BREAK**
- 3:15 **4374** How the evolution of anopheline reproductive traits influenced malaria vectorial capacity. **Sara Mitchell** (snmitchell@google.com), Evdokia Kakani, Adam South and Flaminia Catteruccia, Harvard School of Public Health, Boston, MA
- 3:30 **4375** *Helicoverpa armigera*: A global perspective on the species population genetics. **Tom Walsh** (tom.walsh@csiro.au)<sup>1</sup>, J. Arnemann<sup>2</sup>, Karl Gordon<sup>3</sup>, Alisha Anderson<sup>1</sup>, and Wee Tek Tay<sup>3</sup>, <sup>1</sup>CSIRO, Acton, Australia, <sup>2</sup>Federal Univ. of Santa Maria, Santa Maria, Brazil, <sup>3</sup>CSIRO, Canberra, Australia
- 3:45 **4376** The evolution and genomic consequences of adaptive inversion polymorphism in butterflies. **Mathieu Joron** (mathieu.joron@cefe.cnrs.fr)<sup>1,2</sup>, Annabel Whibley<sup>3</sup>, Angeles de Cara<sup>3</sup>, Paul Jay<sup>4</sup>, Yann Le Poul<sup>3</sup>, Florence Prunier<sup>3</sup>, Barbara Huber<sup>3</sup>, and Violaine Llaurens<sup>3</sup>, <sup>1</sup>National Center for Scientific Research, Montpellier, France, <sup>2</sup>National Center for Scientific Research, Paris, France, <sup>3</sup>National Museum of Natural History, Paris, France, <sup>4</sup>Univ. Paul Valéry, Montpellier, France,
- 2:00 **4379** Threshold linking insecticides and spatial repellents. **Kamlesh R. Chauhan** (kamal.chauhan@ars.usda.gov), USDA - ARS, Beltsville, MD
- 2:15 **4380** The taste of repellents in mosquitoes. **Joseph C. Dickens** (joseph.dickens@ars.usda.gov), USDA - ARS, Beltsville, MD
- 2:30 **4381** Spatial tsetse repellents from un-preferred hosts for enhancing livestock productivity and improving livelihoods. **Rajinder Saini** (rsaini@icipe.org), International Centre of Insect Physiology and Ecology, Nairobi, Kenya
- 2:45 **4382** Saltidin – broad spectrum and highly efficacious repellent. **G. K. (Ghona) Sangha** (sangha8@roadrunner.com), Lanxess Corporation, Pittsburg, PA
- 3:00 BREAK**
- 3:15 **4383** Long-lasting repellent formulations for effective insect pest management. Kavita Sharma<sup>1</sup>, Agenor Mafra-Neto<sup>1</sup>, Rodrigo Alves Silva<sup>2</sup>, Carmem Bernardi<sup>1</sup>, and **Jesse Saroli** (jessesaroli@iscatech.com)<sup>1</sup>, <sup>1</sup>ISCA Technologies, Inc., Riverside, CA, <sup>2</sup>Embrapa Rice and Beans, Santo Antônio de Goiás, Brazil
- 3:30 **4384** The case for using topical repellents against malaria. **Anthony Kiszewski** (akiszewski@bentley.edu), Bentley Univ., Waltham, MA
- 3:45 **4385** Natural products as repellents: Bioassay systems for screening and evaluation against mosquitoes. **Abbas Ali** (aali@olemiss.edu), Mississippi State Univ., Mississippi State, MS

## Symposium: Eco-Immunology of Invertebrates

### Room W224 D (Convention Center)

**Moderators and Organizers:** Kenneth Wilson<sup>1</sup>, Fleur Ponton<sup>2</sup>, and Sheena Cotter<sup>3</sup>, <sup>1</sup>Lancaster Univ., Lancaster, United Kingdom, <sup>2</sup>The Univ. of Sydney, Sydney, Australia, <sup>3</sup>Univ. of Lincoln, Lincoln, United Kingdom

## Symposium: Global Research and Development of Insect Repellents

### Room W224 C (Convention Center)

**Moderator and Organizer:** Mustapha Debboun, Harris County Public Health & Environmental Services, Houston, TX

- 1:30 **4377** Biorepellents: Natural and biorational terpenes. Joel R. Coats<sup>1</sup>, **Edmund Norris** (ejnorris@iastate.edu)<sup>1</sup>, Lyric Bartholomay<sup>2</sup>, and James Klimavicz<sup>1</sup>, <sup>1</sup>Iowa State Univ., Ames, IA, <sup>2</sup>Univ. of Wisconsin, Madison, WI
- 1:45 **4378** Mosquito repellent research at Florida State University. **John Smith** (jsmith@pc.fsu.edu), Florida State Univ., Panama City, FL
- 1:30 **4386** Immune defense in context – the missing piece. **Paul Schmid-Hempel** (paul.schmid-hempel@env.ethz.ch), ETH Zürich, Zürich, Switzerland
- 2:00 **4387** Environmental determinants of resistance: Theoretical models and *Plodia interpunctella* vs PiGV. **Mike Boots** (m.boots@exeter.ac.uk), Univ. of California, Berkeley, CA
- 2:15 **4388** Host and symbiont jointly control gut microbiota during complete metamorphosis. **Paul Johnston** (paul.johnston@fu-berlin.de) and Jens Rolff, Freie Univ., Berlin, Germany
- 2:30 **4389** Stress responses reconfigure the immune system network, optimizing defense in an ever-changing world. **Shelley A. Adamo** (sadamo@dal.ca), Dalhousie Univ., Halifax, NS, Canada
- 2:45 **4390** Reproductive influences on the kinetics of infection in *Drosophila*. **Brian Lazzaro** (bplazzaro@cornell.edu), Cornell Univ., Ithaca, NY
- 3:00 BREAK**
- 3:15 **4391** Cellular immune function – new insights from bed bugs. **Michael T. Siva-Jothy** (m.siva-jothy@sheffield.ac.uk), Univ. of Sheffield, Sheffield, United Kingdom



- 3:30 **4392** Adaptive nutritional ecoimmunology: Evidence that fruit flies mitigate survival costs of infection-driven protein limitation by increasing the protein composition of their diet. **Nick Priest** (n.priest@bath.ac.uk), Univ. of Bath, Bath, United Kingdom
- 3:45 **4393** Resistance, tolerance, and fitness in *Drosophila melanogaster*. **Sophie Armitage** (sophie.armitage@uni-muenster.de) and Megan Kutzer, Univ. of Münster, Münster, Germany
- 4:00 **4394** Diet and migration can compromise immunity. **Robert B. Srygley** (robert.srygley@ars.usda.gov), USDA - ARS, Sidney, MT
- 4:15 **4395** Climate change and the evolution of insect immunity. **Ken Fedorka** (kenneth.fedorka@ucf.edu), Univ. of Central Florida, Orlando, FL
- 4:30 **4396** Phytochemistry and immunity influence local and regional networks of host-parasite-pathogen interactions. **Lee A. Dyer** (nolaclimber@gmail.com), Nick Pardikes, Will Lumpkin, Lora Richards, Matthew L. Forister, Tom Parchman, Christopher Jeffrey, and Angela Smilanich, Univ. of Nevada, Reno, NV
- 4:45 **4397** Immune priming might have evolved from infection by gram-positive bacterial pathogens in the mealworm beetle, *Tenebrio molitor*. **Yannick Moret** (yannick.moret@u-bourgogne.fr), Univ. of Bourgogne, Dijon, France
- 5:00 **4398** Host-parasite coevolution and immune memory in the red flour beetle, *Tribolium castaneum*. **Joachim Kurtz** (joachim.kurtz@uni-muenster.de), Univ. of Münster, Münster, Germany
- 5:15 **4399** Cross-generational immune priming in burying beetles is limited by the nature of the challenge. **Charlotte Miller** (cmiller08@qub.ac.uk), Queen's Univ., Lincoln, United Kingdom

### Symposium: Insect Symbiosis and Immunity

Room W330 A (Convention Center)

**Moderators and Organizers:** Bessem Chouaia<sup>1</sup> and Abdelaziz Heddi<sup>2</sup>, <sup>1</sup>Cornell Univ., Ithaca, NY, <sup>2</sup>INRA, Villeurbanne, France

- 1:30 **4400** Obligate symbiont-generated vitamin B6 is critical to maintain proline homeostasis and fecundity in the tsetse fly (*Glossina morsitans*). **Geoffrey Attardo** (geoffrey.attardo@yale.edu), Yale Univ., New Haven, CT
- 1:45 **4401** Testing the balancing act of innate immunity, the microbiome, and the environment. **Robert Brucker** (brucker@rowland.harvard.edu), Rowland Institute at Harvard Univ., Cambridge, MA
- 2:00 **4402** Host regulation of its co-primary symbiont metabolisms. **Bessem Chouaia** (bc335@cornell.edu), Cornell Univ., Ithaca, NY
- 2:15 **4403** Honey bee bacterial symbionts: Probiotic effect against the causal agent of American foulbrood disease. **Elena Crotti** (elena.crotti@unimi.it)<sup>1</sup>, Elena Gonella<sup>2</sup>, Alberto Alma<sup>2</sup>, Daniele Daffonchio<sup>1,3</sup>, and Ameer Cherif<sup>4</sup>, <sup>1</sup>Univ. of Milan, Milan, Italy, <sup>2</sup>Univ. of Torino, Grugliasco, Italy, <sup>3</sup>King Abdullah Univ. of Science and Technology, Thuwal, Saudi Arabia, <sup>4</sup>Univ. of Manouba, Ariana, Tunisia

- 2:30 **4404** When your host shuts down — microbiota dynamics and host immunity during larval diapause in *Nasonia* wasp. **Jessica Dittmer** (dittmer@rowland.harvard.edu), Rowland Institute at Harvard Univ., Cambridge, MA
- 2:45 **4405** Symbiotic chimeras: Novel immunological properties of *Asaia* symbionts engineered to be covered by the *Wolbachia* surface protein. **Sara Epis** (sara.epis@unimi.it), Univ. of Milan, Milan, Italy
- 3:00 **BREAK**
- 3:15 **4406** How protective symbionts alter aphid immune responses. **Nicole Gerardo** (nicole.gerardo@emory.edu), Emory Univ., Atlanta, GA
- 3:30 **4407** Immune and cellular processes controlling endosymbiont dynamics in insects. **Abdelaziz Heddi** (abdelaziz.heddi@insa-lyon.fr), INRA, Villeurbanne, France
- 3:45 **4408** Fighting malaria with engineered symbiotic bacteria from vector mosquitoes. **Marcelo Jacobs-Lorena** (mlorena@jhsp.edu), Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
- 4:00 **4409** Immune interactions between the pea aphid and its primary and secondary symbionts. Marylène Poirié and **Jean-Luc Gatti** (jean-luc.gatti@sophia.inra.fr), Univ. Nice Sophia Antipolis, Nice, France
- 4:15 **4410** Presentation withdrawn
- 4:30 **4411** Immunity, digestion, and resource defense in burying beetles: Host-microbiota collaboration? **Heiko Vogel** (hvogel@ice.mpg.de)<sup>1</sup>, Shantanu Shukla<sup>2</sup>, Chris Jacobs<sup>1</sup>, Martin Kaltenpoth<sup>1</sup>, Sandra Steiger<sup>2</sup>, David Heckel<sup>1</sup>, and Andreas Vilcinskis<sup>3,4</sup>, <sup>1</sup>Max Planck Institute for Chemical Ecology, Jena, Germany, <sup>2</sup>Univ. of Ulm, Ulm, Germany, <sup>3</sup>Fraunhofer Institute for Molecular Biology and Applied Ecology, Gießen, Germany, <sup>4</sup>Justus Liebig Univ., Gießen, Germany

### Symposium: Vector Immunology

Room W240 C (Convention Center)

**Moderator and Organizer:** Petros Ligoxygakis, Univ. of Oxford, Oxford, United Kingdom

- 1:30 **4412** Novel and surprising players in innate immunity. **Sarah Short** (sshort7@jhu.edu), Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
- 1:45 **4413** Function of complement-like molecules in tick immune system. **Petr Kopacek** (kopajz@paru.cas.cz), Veronika Urbanova, Radek Sima, and Ondrej Hajdusek, Czech Academy of Sciences, České Budějovice, Czech Republic
- 2:15 **4414** *Rhodnius prolixus* immune responses following parasite infection and interactions with microbiota. **Daniele Castro** (didan.castro@gmail.com), Oswaldo Cruz Foundation, Rio de Janeiro, Brazil
- 2:30 **4415** How tsetse fly immunity controls the transmission of the trypanosome parasite. **Jan Van Den Abbeele** (jvdabeele@itg.be), Institute of Tropical Medicine, Antwerp, Belgium
- 3:00 **BREAK**



3:15 **4416** *A Drosophila-Herpetomonas* model to pinpoint the evolutionary conserved component of the dipteran insect-trypanosomid parasite interaction. **Petros Ligoxygakis** (petros.ligoxygakis@bioch.ox.ac.uk), Univ. of Oxford, Oxford, United Kingdom

3:30 **Discussion**

### Symposium: Genetically Modified Insecticidal Crops and Sustainable Pest Management: An Ecological Perspective of Their Compatibility in Sustainable Agriculture

#### Room W340 B (Convention Center)

**Moderators and Organizers:** Salvatore Arpaia<sup>1</sup>, Jian Duan<sup>2</sup>, and Jonathan G. Lundgren<sup>3</sup>, <sup>1</sup>ENEA, Rotondella, Italy, <sup>2</sup>USDA - ARS, Newark, DE, <sup>3</sup>USDA - ARS, Brookings, SD

1:30 **4417** Genetically modified crops and biological control: An ecological perspective of their compatibility in sustainable pest management. **Jian Duan** (jian.duan@ars.usda.gov)<sup>1</sup> and Jonathan G. Lundgren<sup>2</sup>, <sup>1</sup>USDA - ARS, Newark, DE, <sup>2</sup>USDA - ARS, Brookings, SD

1:45 **4418** Non-target organisms and genetically modified agro-ecosystems: Does the receiving environment matter? **Salvatore Arpaia** (salvatore.arpaia@enea.it), ENEA, Rotondella, Italy

2:00 **4419** Adoption of Bt crops and their impact on pest management in China. **Wangpeng Shi** (wpshi@cau.edu.cn), China Agricultural Univ., Beijing, China

2:15 **4420** Can Bt-maize be successfully integrated in the context of IPM in Europe? **Ludovit Cagan** (ludovit.cagan@gmail.com)<sup>1</sup>, Peter Bokor<sup>1</sup>, Tina D'Hertenfeld<sup>2</sup>, and Lars Petterson<sup>2</sup>, <sup>1</sup>Slovak Agricultural Univ., Nitra, Slovakia, <sup>2</sup>Lund Univ., Dalby, Sweden

2:30 **4421** Integrating insect resistant GM crops into IPM systems in Europe. **Heikki Hokkanen** (heikki.hokkanen@helsinki.fi) and Ingeborg Menzler-Hokkanen, Univ. of Helsinki, Helsinki, Finland

2:45 **4422** *Diatraea saccharalis*: A target organism after fifteen years of GMO adoption in Argentina. **Daniela Tosto** (tosto.daniela@inta.gob.ar)<sup>1</sup>, Diego Zavallo<sup>1</sup>, Lucila Peluffo<sup>1</sup>, Cynthia Cagnotti<sup>1</sup>, Fernando Flores<sup>2</sup>, Noelia Ulrich<sup>1</sup>, Mariana Viscarret<sup>1</sup>, Silvia Lopez<sup>1</sup>, Silvana Sede<sup>3</sup>, and Esteban Hopp<sup>1</sup>, <sup>1</sup>INTA, Hurlingham, Argentina, <sup>2</sup>INTA, Marcos Juarez, Argentina, <sup>3</sup>Instituto Darwinion, San Isidro, Argentina

#### 3:00 BREAK

3:15 **4423** Sustainability of genetically modified crops in the context of pest management in Brazil. **Carmen Pires** (carmen.pires@embrapa.br), Edison Sujii, and Eliana Fontes, Embrapa Genetic Resources and Biotechnology, Brasília, Brazil

3:30 **4424** Farm-level socioeconomics of adopting GM crops in Europe. **Ingeborg Menzler-Hokkanen** (ingeborg.menzler-hokkanen@helsinki.fi), Univ. of Helsinki, Helsinki, Finland

3:45 **4425** Bt cotton adoption promotes biocontrol services in agricultural landscapes. **Nicolas Desneux** (nicolas.desneux@sophia.inra.fr)<sup>1</sup>, Yanhui Lu<sup>2</sup>, and

Kongming Wu<sup>2</sup>, <sup>1</sup>INRA, Sophia Antipolis, France, <sup>2</sup>Chinese Academy of Agricultural Sciences, Beijing, China

4:00 **4426** Ecological network analysis for selection of indicator species for insecticide risk assessment. **Kelton Welch** (keltodouglaswelch@gmail.com) and Jonathan G. Lundgren, USDA - ARS, Brookings, SD

4:15 **4427** Risks of pesticidal RNAi to honey bees. **Christina Mogren** (cmogren@gmail.com), Louisiana State University AgCenter, Baton Rouge, LA

4:30 **4428** Modelling effects of Bt crops on non-target organisms at the landscape level: Implications for risk management and monitoring. **Antoine Messéan** (antoine.messean@grignon.inra.fr)<sup>1</sup>, Emily Walker<sup>2</sup>, Melen Leclerc<sup>3</sup>, Jean-François Rey<sup>2</sup>, Remy Beaudoin<sup>4</sup>, and Samuel Soubeyrand<sup>2</sup>, <sup>1</sup>INRA, Thiverval-Grignon, France, <sup>2</sup>INRA, Avignon, France, <sup>3</sup>INRA, Le Rheu, France, <sup>4</sup>INERIS, Verneuil en Halatte, France

4:45 **4429** Effects of GM crops on pollinators and pollination services in agro-ecosystems. **Ingolf Steffan-Dewenter** (ngolf.steffan-dewenter@uni-wuerzburg.de) and Stephan Härtel, Univ. of Würzburg, Würzburg, Germany

### Symposium: Globalizing Sustainable Pest Management in Agriculture

#### Room W224 A (Convention Center)

**Moderator and Organizer:** Ismaila Aderolu<sup>1,2</sup>, <sup>1</sup>Kwara State Univ., Ilorin, Nigeria, <sup>2</sup>Entomological Society of Nigeria, Ilorin, Nigeria

1:30 **4430** Prospects of botanical lures and dusts in sustainable management of field arthropod pests on white yam in Nigeria. **Eunice Okoroafor** (okoroafor.eunice@gmail.com)<sup>1</sup> and Isah Onu<sup>2</sup>, <sup>1</sup>Univ. of Agriculture, Makurdi, Nigeria, <sup>2</sup>Ahmadu Bello Univ., Zaria, Nigeria

1:45 **4431** Is organophosphate an answer to increasing insecticide resistance? Empirical evidence from the susceptibility status of *Anopheles coluzzi* mosquitoes in Lagos, Nigeria. **Adedayo Oduola** (oduola.ao@unilorin.edu.ng), Adeolu Ande, and James Adelaja, Univ. of Ilorin, Ilorin, Nigeria

2:00 **4432** Identification of members of *A. gambiae* complex and their role in *Plasmodium falciparum* transmission in selected rural communities in Ilorin West Local Government, Kwara State. **Adeolu Taiwo Ande** (andeolu@yahoo.com), Adedayo Oduola, and James Adelaja, Univ. of Ilorin, Ilorin, Nigeria

2:15 **4433** Influence of improved maize genotypes on the survival of maize weevil, *Sitophilus zeamais* (Motschulsky) (Coleoptera: Curculionidae), in storage. **Abdulrasak Musa** (akmusa2013@gmail.com), Univ. of Ilorin, Ilorin, Nigeria

2:30 **4434** Maximizing bee pollinator potentials for global environmental conservation, sustainability, and species diversity. **Ismaila Aderolu** (adeisma@yahoo.com)<sup>1</sup>, Ajao Adeyemi<sup>2</sup>, and Yusuf Oladimeji<sup>3</sup>, <sup>1</sup>Entomological Society of Nigeria, Ilorin, Nigeria, <sup>2</sup>Kwara State Univ., Ilorin, Nigeria, <sup>3</sup>Ahmadu Bello Univ., Zaria, Nigeria

- SD4435** Efficacy of two diatomaceous earths as dressing and admixture to protect cowpea against *Callosobruchus maculatus* (Chrysomelidae) infestation. **Moses Ogundare** (ogundaremoses@gmail.com)<sup>1</sup> and Robert Uddin<sup>2</sup>, <sup>1</sup>Nigerian Stored Products Research Institute, Ilorin, Nigeria, <sup>2</sup>Univ. of Ilorin, Ilorin, Nigeria
- SD4436** Species composition and seasonal abundance of anthropophilic malaria mosquitoes in Ilorin, North-Central Nigeria. **James Adelaja** (kayadelaja@gmail.com), Adeolu Ande, and Adedayo Oduola, Univ. of Ilorin, Ilorin, Nigeria
- SD4437** Comparative assessment of the insecticidal potentials of two diatomaceous earth powders against *Sitophilus zeamais* Motschulsky (Coleoptera: Curculionidae) on sorghum grains. **Grace O. Otitodun** (funkeotis@yahoo.com)<sup>1</sup> and Adeyinka Adesiyun<sup>2</sup>, <sup>1</sup>Nigerian Stored Products Research Institute, Ilorin, Nigeria, <sup>2</sup>Univ. of Ilorin, Kwara, Nigeria
- SD4438** Determination of insect pests associated with yam (*Dioscorea* spp.) in Guinea savanna zone of Nigeria. **Shatu Asala** (shatuasala@yahoo.com), Univ. of Abuja, Abuja, Nigeria
- SD4439** Susceptibility of the life stages of *Callosobruchus maculatus* (F.) in stored cowpea grains to fumigation with essential oil vapour of *Ocimum basilicum* leaves. Adebayo Ojumoola, **Adeyinka Adesiyun** (yinkussiyun@gmail.com), and Lamidi Usman, Univ. of Ilorin, Ilorin, Nigeria
- SD4440** Identifying the microbial population diversity in the gut of cashew stem girdler, *Analeptes trifasciata* Fabricius (Coleoptera: Cerambycidae). **Victor Oyedokun** (gokman.dee@gmail.com) and Dele Adeniyi, Cocoa Research Institute of Nigeria, Ibadan, Nigeria
- SD4441** Species richness, diversity, and molecular characterization of termites at the University of Lagos, Akoka, Lagos, Nigeria. **Shakirudeen Balogun** (shakbal2003@yahoo.com)<sup>1</sup>, Augustine Ohadwe<sup>1</sup>, Chuku Nwanade<sup>2</sup>, and Kayode Awolowo<sup>1</sup>, <sup>1</sup>Univ. of Lagos, Lagos, Nigeria, <sup>2</sup>Nigerian Stored Products Research Institute, Lagos, Nigeria
- SD4442** Comparative effectiveness of pirimiphos-methyl and Spintor 0.125D dusts in the management of *Sitophilus zeamais* Motch (Coleoptera: Curculionidae) attacking stored maize grains. **Yinus Umar** (abumar2003@yahoo.com)<sup>1</sup> and Kehinde Kemabonta<sup>2</sup>, <sup>1</sup>Bayero Univ., Kano, Nigeria, <sup>2</sup>Univ. of Lagos, Lagos, Nigeria
- SD4443** Food preference, growth, and damage of *Lasioderma serricornis* Fab. (Coleoptera: Anobiidae) on five packaged cereals in Nigeria. **Godwin Ihionu** (ghooziz@yahoo.com)<sup>1</sup>, Kehinde Kemabonta<sup>2</sup>, and Patricia Pessu<sup>1</sup>, <sup>1</sup>Nigerian Stored Products Research Institute, Lagos, Nigeria, <sup>2</sup>Univ. of Lagos, Lagos, Nigeria
- SD4444** Survey of the abundance of the larger grain borer, *Prostephanus truncatus* (Horn) (Coleoptera: Bostrichidae), in three south-western states of Nigeria. **Bukola Sadiku** (enitimi@gmail.com)<sup>1</sup>, Kehinde Kemabonta<sup>2</sup>, and Winifred Ayinke Makanjuola<sup>2</sup>, <sup>1</sup>Lagos State Agricultural Development Authority, Lagos, Nigeria, <sup>2</sup>Univ. of Lagos, Lagos, Nigeria
- SD4445** Estimates of genetic correlations of some important quantitative traits in cowpea, *Vigna unguiculata* (L.) Walp., under drought stress. **Amos Olajide** (olamosfolarin@yahoo.com)<sup>1</sup> and Christopher Ilori<sup>2</sup>, <sup>1</sup>Wesley Univ. of Science and Technology, Ondo, Nigeria, <sup>2</sup>Univ. of Ibadan, Ibadan, Nigeria
- 3:00 BREAK AND POSTER SESSION**
- 3:15 **4446** Diversity, nutritional characteristics, and associated pathogens of maggots (Diptera) with potential as feed supplement for livestock feed in Ibadan, Nigeria. **Adebayo Omoloye** (bayoomoloye@yahoo.com) and Olumide Ojelabi, Univ. of Ibadan, Ibadan, Nigeria
- 3:45 **4447** SpinTor™ dust: A substitute to Gammalin-20 in the control of major insect pests of stored kolanuts and dried fish in Nigeria. **Winifred Ayinke Makanjuola** (ayinkemaks@yahoo.com)<sup>1</sup>, Kehinde Kemabonta<sup>1</sup>, and Bukola Sadiku<sup>2</sup>, <sup>1</sup>Univ. of Lagos, Lagos, Nigeria, <sup>2</sup>Lagos State Agricultural Development Authority, Lagos, Nigeria
- 4:00 **4448** *Piper nigrum* (black pepper) and *Curcuma longa* (turmeric) extracts as insecticides in the control of *Anopheles gambiae*. **Kehinde Kemabonta** (kkemabonta@unilag.edu.ng)<sup>1</sup>, Kafayat Ajelara<sup>2</sup>, Olusola Yusuff<sup>1</sup>, and Babasola Adu<sup>3</sup>, <sup>1</sup>Univ. of Lagos, Lagos, Nigeria, <sup>2</sup>Entomological Society of Nigeria, Ojo, Nigeria, <sup>3</sup>Ondo State Univ. of Science and Technology, Okitipupa, Nigeria
- 4:30 **4449** Indigenous pesticidal plants: Status and future prospects in pest management in Nigeria. **Akeem Oyerinde** (oyerindehyphae2002@gmail.com), Univ. of Abuja, Abuja, Nigeria
- 4:45 **4450** Assessment of honey bee health stressors and suggested management strategies for sustainable pollination, improved crop yield, and food security in North-Central Nigeria. **Ajao Adeyemi** (adeyemi.ajao@kwasu.edu.ng)<sup>1</sup> and Yusuf Oladimeji<sup>2</sup>, <sup>1</sup>Kwara State Univ., Ilorin, Nigeria, <sup>2</sup>Ahmadu Bello Univ., Zaria, Nigeria
- 5:00 **4451** Bioecology, pest management, and control of insect pests of cotton, cowpea, groundnut, and cereal crops using IPM and botanicals for sustainable agriculture. **Anna Malgwi** (annamalgwi@yahoo.co.uk), Federal Univ. of Technology, Yola, Nigeria

### Symposium: Greenhouse Insect Management Around the World: Common Problems and Solutions from Scientific Collaborations

#### Room W223 A (Convention Center)

**Moderators and Organizers:** Luis A. Cañas<sup>1</sup> and Erfan Vafaie<sup>2</sup>, <sup>1</sup>The Ohio State Univ., Wooster, OH, <sup>2</sup>Texas A&M AgriLife Extension Service, Overton, TX

- 1:30 **4452** Silicon supplementation and its utility in IPM. **Daniel Klittich** (dsklittich@ucdavis.edu) and Michael P. Parrella, Univ. of California, Davis, CA
- 1:45 **4453** Developing an IPM strategy for a new scale pest of crapemyrtles in Texas, *Eriococcus lagerstroemiae*. **Erfan Vafaie** (erfan.vafaie@ag.tamu.edu)<sup>1</sup>, Michael Merchant<sup>2</sup>, Mengmeng Gu<sup>3</sup>, Xiaoya Cai<sup>3</sup>, John D. Hopkins<sup>4</sup>, and Jim Robbins<sup>4</sup>, <sup>1</sup>Texas A&M Univ.,



- Overton, TX, <sup>2</sup>Texas A&M AgriLife Extension Service, Dallas, TX, <sup>3</sup>Texas A&M Univ., College Station, TX, <sup>4</sup>Univ. of Arkansas, Little Rock, AR
- 2:00 **4454** Influence of fertilizer method on aphid population growth and biological control. **John P. Sanderson** (jps3@cornell.edu), Neil Mattson, Betsy Lamb, and Liza White, Cornell Univ., Ithaca, NY
- 2:15 **4455** Cashing in: The role of banker plants in greenhouse IPM. **Eric Rebek** (eric.rebek@okstate.edu), Oklahoma State Univ., Stillwater, OK
- 2:30 **4456** Rove beetle (*Dalotia coriaria*) predation on the fungus gnat, *Bradysia* sp. nr. *coprophila*. **Raymond Cloyd** (rcloyd@ksu.edu), Erik Echegaray, and Jim Nechols, Kansas State Univ., Manhattan, KS
- 2:45 **4457** System approaches to management of arthropod pests in ornamental crops. **Kevin Heinz** (kevin.heinz@ag.tamu.edu), Texas A&M Univ., College Station, TX
- 3:00 **BREAK**
- 3:15 **4458** Effects of various insecticides on common biological control agents used in greenhouses. **Nuris Acosta** (acosta.26@osu.edu)<sup>1</sup>, Luis A. Cañas<sup>1</sup>, and Nancy Rechcigl<sup>2</sup>, <sup>1</sup>The Ohio State Univ., Wooster, OH, <sup>2</sup>Syngenta Professional Products, Bradenton, FL
- 3:30 **4459** Improving the management of mite and other pests of greenhouses through enhanced natural enemies. **Phyllis G. Weintraub** (phyllisw@volcani.agri.gov.il)<sup>1</sup> and Eric Palevsky<sup>2</sup>, <sup>1</sup>Agricultural Research Organisation, Gilat, Israel, <sup>2</sup>Agricultural Research Organisation, Ramat Yishay, Israel
- 3:45 **4460** Production of biological control agents in Honduras. **Rogelio Trabanino** (rtrabanino@zamorado.edu), Escuela Agrícola Panamericana, Tegucigalpa, Honduras
- 4:00 **4461** Development of greenhouse biological control in Colombia. **Edison Torrado-León** (etorradol@unal.edu.co), National Univ. of Colombia, Cundinamarca, Colombia
- 4:15 **4462** New insights in side-effects of biological and chemical plant protection products on beneficial organisms in IPM greenhouses. **Guido Sterk** (guido.sterk@skynet.be), IPM Impact, Hasselt, Belgium
- 4:30 **4463** It started with thrips...and it didn't end there: The success of biocontrol-based IPM in Ontario greenhouse floriculture. **Rose Buitenhuis** (rose.buitenhuis@vinelandresearch.com), Vineland Research and Innovation Centre, Vineland Station, ON, Canada
- 4:45 **4464** Profitability and sustainability of IPM program in a large scale multi-crop greenhouse. **Renato Zardo** (rzardo@greencirclegrowers.com), Green Circle Growers, Oberlin, OH
- 5:00 **4465** Management of arthropods during shipping: A collaboration among entomologists associated with ornamental plant production. **James A. Bethke** (jabethke@ucanr.edu)<sup>1</sup>, Lance Osborne<sup>2</sup>, Arnold Hara<sup>3</sup>, and Cristi L. Palmer<sup>4</sup>, <sup>1</sup>Univ. of California Cooperative Extension, San Diego, CA, <sup>2</sup>Univ. of Florida, Apopka, FL, <sup>3</sup>Univ. of Hawaii, Hilo, HI, <sup>4</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ

- 5:15 **4466** Use of biological control in greenhouse ornamentals. **Suzanne Wainwright** (buglady@bugladyconsulting.com), Buglady Consulting, Slatington, PA

### Symposium: IPM: The Lucrative Bridge Connecting the Ever-Emerging Knowledge Islands of Genetics and Ecology

#### Room W231 A (Convention Center)

**Moderators and Organizers:** Xinzhi Ni<sup>1</sup>, Zhongren Lei<sup>2</sup>, and Kang-Lai He<sup>2</sup>, <sup>1</sup>USDA - ARS, Tifton, GA, <sup>2</sup>Chinese Academy of Agricultural Sciences, Beijing, China

*This symposium is generously sponsored by the USDA-ARS.*

- 1:30 **4467** BIK1, a *Botrytis*-induced kinase, modulates *Arabidopsis* resistance against aphids via PAD4. **Keyan Zhu-Salzman** (ksalzman@tamu.edu)<sup>1</sup>, Jiaxin Lei<sup>1</sup>, Scott A. Finlayson<sup>1</sup>, Ron Salzman<sup>1,2</sup>, and Libo Shan<sup>1</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Stoller Enterprises, Houston, TX
- 1:45 **4468** How do insect herbivores "spy" on their host plants? **Xianchun Li** (lxc@email.arizona.edu), Univ. of Arizona, Tucson, AZ
- 2:00 **4469** Interspecific competition and displacement between two invasive leafminer species in Hainan, China. **Zhongren Lei** (leizhr@sina.com)<sup>1</sup>, Haihong Wang<sup>1</sup>, Kaige Wang<sup>1</sup>, and Hao Yi<sup>2</sup>, <sup>1</sup>Chinese Academy of Agricultural Sciences, Beijing, China, <sup>2</sup>Shaanxi Normal Univ., Xi'an, China
- 2:15 **4470** Deducing the mechanism for elicitation of chlorotic foliar injury by the black pecan aphid. **Ted Cottrell** (ted.cottrell@ars.usda.gov), USDA - ARS, Byron, GA
- 2:30 **4471** Is stalk strength involved in maize resistance to Asian corn borer, *Ostrinia furnacalis* (Guenée) (Lepidoptera: Crambidae), injury? **Zhen-Ying Wang** (wangzy61@163.com)<sup>1</sup>, Jingfei Guo<sup>2</sup>, Kang-Lai He<sup>1</sup>, Richard Hellmich<sup>3</sup>, and Shaojiang Chen<sup>4</sup>, <sup>1</sup>Chinese Academy of Agricultural Sciences, Beijing, China, <sup>2</sup>Chinese Academy of Sciences, Beijing, China, <sup>3</sup>USDA - ARS, Ames, IA, <sup>4</sup>China Agricultural Univ., Beijing, China
- 2:45 **4472** Use of native genes to improve drought tolerance and insect resistance in corn. **Wenwei Xu** (we-xu@tamu.edu)<sup>1</sup>, Zhizhai Liu<sup>2</sup>, Xinzhi Ni<sup>3</sup>, Thomas Marek<sup>2</sup>, and Gary N. Odvody<sup>2</sup>, <sup>1</sup>Texas A&M AgriLife Research, Lubbock, TX, <sup>2</sup>Texas A&M AgriLife Extension Service, Lubbock, TX, <sup>3</sup>USDA - ARS, Tifton, GA
- 3:00 **BREAK**
- 3:15 **4473** Milestones in developing sorghum hybrids for midge resistance. **Mukesh Dhillon** (mukeshdhillon@rediffmail.com)<sup>1</sup> and Hari Sharma<sup>2</sup>, <sup>1</sup>Indian Agricultural Research Institute, New Dehli, India, <sup>2</sup>Dr. YS Parmar Univ. of Horticulture & Forestry, Nauni, Solan, India
- 3:30 **4474** Developing new maize germplasm lines with insect and disease resistance and reduced aflatoxin contamination. **Xinzhi Ni** (xinzhi.ni@ars.usda.gov)<sup>1</sup>, Alisa Huffaker<sup>2</sup>, Eric A. Schmelz<sup>3</sup>, Wenwei Xu<sup>4</sup>, and W. Paul Williams<sup>5</sup>, <sup>1</sup>USDA - ARS, Tifton, GA, <sup>2</sup>Univ. of California, La Jolla, CA, <sup>3</sup>USDA - ARS, Gainesville, FL,

- 4Texas A&M AgriLife Research, Lubbock, TX, 5USDA - ARS, Mississippi State, MS
- 3:45 **4475** Temperature and climatic effects on Hessian fly infestation and plant resistance of winter wheat in the Southeastern United States. **G. David Buntin** (gbuntin@uga.edu)<sup>1</sup>, Prem Woli<sup>2</sup>, Brenda Ortiz<sup>2</sup>, and Kathy Flanders<sup>2</sup>, <sup>1</sup>Univ. of Georgia, Griffin, GA, <sup>2</sup>Auburn Univ., Auburn, AL
- 4:00 **4476** Nutritional role of host plants in adult feeding preference of two invasive wood borers. **Yigen Chen** (ygchen2007@gmail.com)<sup>1</sup>, Therese Poland<sup>2</sup>, Tom W. Coleman<sup>3</sup>, Michael Jones<sup>4</sup>, and Steven Seybold<sup>5</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>USDA - Forest Service, Lansing, MI, <sup>3</sup>USDA - Forest Service, Albuquerque, NM, <sup>4</sup>State Univ. of New York, Syracuse, NY, <sup>5</sup>USDA - Forest Service, Davis, CA
- 4:15 **4477** Impact of transient high temperature during egg development on subsequent development, reproduction, and sex ratio in *Ostrinia furnacalis*. **Kang-Lai He** (klhe@ippcaas.cn)<sup>1</sup>, Yudong Quan<sup>2,3</sup>, Zhenying Wang<sup>2</sup>, and Hongyi Wei<sup>3</sup>, <sup>1</sup>Chinese Academy of Agricultural Sciences, Beijing, China, <sup>2</sup>Chinese Academy of Sciences, Beijing, China, <sup>3</sup>Jiangxi Agricultural Univ., Nanchang, China
- 4:30 **4478** Orchard-based IPM standardization served as the fruit safety insurance of apple production. **Xin Li** (lixin57@hotmail.com)<sup>1</sup>, Juntao Qu<sup>2</sup>, Jiamin Gan<sup>1</sup>, Shandong Meng<sup>1</sup>, and Chunyou Li<sup>3</sup>, <sup>1</sup>Northwest A&F Univ., Yangling, China, <sup>2</sup>Fruit Industry Bureau of Luochuan County, Luochuan, China, <sup>3</sup>Center of Zhouzhi County Agricultural Technique Extension, Zhouzhi, China
- 4:45 **4479** Candidate genes expressed in tolerant common wheat genotype XN98-10-35 with resistant to English grain aphid. **Kun Luo** (luok1985@nwfafu.edu.cn) and Huiyan Zhao, Northwest A&F Univ., Yangling, China

### Symposium: An Invasive Planthopper Goes Global: Shedding Light on the Spotted Lanternfly (*Lycorma delicatula*)

#### Room W232 C (Convention Center)

**Moderators and Organizers:** Gregory Setliff and Cathryn Pugh, Kutztown Univ., Kutztown, PA

- 1:30 **4480** Update on spotted lanternfly in Pennsylvania. **Sven-Erik Spichiger** (sspichiger@pa.gov), Pennsylvania Dept. of Agriculture, Harrisburg, PA
- 2:00 **4481** Using DNA sequence data to investigate the invasive spotted lanternfly's origin, parasitoids, and microbial associates. **Julie Urban** (julie.urban@naturalsciences.org)<sup>1</sup>, Julia Stevens<sup>1</sup>, and Heather Farrington<sup>2</sup>, <sup>1</sup>North Carolina Museum of Natural Sciences, Raleigh, NC, <sup>2</sup>Cincinnati Museum Center, Cincinnati, OH
- 2:15 **4482** Host alternation and dispersal of *Lycorma delicatula* in South Korea. **Kwang-Ho Kim** (ecomanager@korea.kr), National Academy of Agricultural Science, Suwon, South Korea

- 2:30 **4483** Potential impact and chemical control of spotted lanternfly in vineyards. **Erica Smyers** (ecs5026@psu.edu), Lindsay Erndwein, and Michael C. Saunders, Pennsylvania State Univ., University Park, PA
- 2:45 **4484** The comprehensive management of spotted lanternfly, *Lycorma delicatula* (Hemiptera: Fulgoridae), in Republic of Korea. **Myung-Kyu Song** (sinbaat@korea.kr)<sup>1</sup>, Jae-sung Park<sup>1</sup>, Seok-Ho Lee<sup>1</sup>, Jae-Wung Lee<sup>1</sup>, Seung-Duck Kim<sup>1</sup>, Won-Ho Choi<sup>1</sup>, Eui-Yon Hong<sup>2</sup>, Gil-Hah Kim<sup>3</sup>, and Jong-Ho Park<sup>4</sup>, <sup>1</sup>Chungbuk Agricultural Research and Extension Services, Okcheon, South Korea, <sup>2</sup>Chungbuk Agricultural Research and Extension Services, Chungju, South Korea, <sup>3</sup>Chungbuk National Univ., Cheongju, South Korea, <sup>4</sup>National Academy of Agricultural Science, Wanju, South Korea
- 3:00 **BREAK**
- 3:15 **4485** Strangers in strange lands: The spotted lanternfly and tales of other invasive planthoppers. **Stephen W. Wilson** (swwilson@ucmo.edu), Univ. of Central Missouri, Warrensburg, MO
- 3:30 **4486** A success story: State and federal agencies, universities, municipalities, and citizens working together. Dana Rhodes and **Alan Deppen** (adeppen@pa.gov), Pennsylvania Dept. of Agriculture, Harrisburg, PA
- 3:45 **4487** Biology and natural enemies of the spotted lanternfly, *Lycorma delicatula*, in North America. **Houping Liu** (hliu@pa.gov), Pennsylvania Dept. of Conservation and Natural Resources, Harrisburg, PA
- 4:00 **4488** Evolution and sexual dimorphism of antennal sensory units of the new invasive lanternfly, *Lycorma delicatula* (Hemiptera: Fulgoromorpha: Fulgoridae). Rong-Rong Wang<sup>1</sup>, Jia-Jia Liu<sup>1,2</sup>, Xin-yu Li<sup>1,2</sup>, Aiping Liang<sup>1</sup>, and **Thierry Bourgoïn** (bourgoïn@mnhn.fr)<sup>3</sup>, <sup>1</sup>Chinese Academy of Sciences, Beijing, China, <sup>2</sup>Beijing Forestry Univ., Beijing, China, <sup>3</sup>National Museum of Natural History, Paris, France

### Symposium: Pink Hibiscus Mealybug (*Maconellicoccus hirsutus*) Invasions: What We Have Learned...What We Need to Re-Learn

#### Room W331 C (Convention Center)

**Moderators and Organizers:** Juang Horng Chong<sup>1</sup> and Mark Culik<sup>2</sup>, <sup>1</sup>Clemson Univ., Florence, SC, <sup>2</sup>Incapar, Linhares, Brazil

- 1:30 **4489** Presentation withdrawn
- 1:45 **4490** Seasonal phenology and natural enemies of *Maconellicoccus hirsutus* in Australia. **John A. Goolsby** (john.goolsby@ars.usda.gov), USDA - ARS, Edinburg, TX
- 2:00 **4491** Management of pink hibiscus mealybug (*Maconellicoccus hirsutus*) with emphasis on biological control by parasitoids. **Shaaban Abd-Rabou** (shaaban1959@yahoo.com), Ministry of Agriculture, Dokki, Egypt
- 2:15 **4492** Invasive mealybugs in Tunisia: *Maconellicoccus hirsutus* (Green), *Phenacoccus peruvianus* (Granara de Willink), and *Phenacoccus madeirensis* (Green). **M. Halima-Kamel** (kamoniam\_tn@yahoo.fr) and L. Mdellel, Institute of Superior Agronomics, Chott Mariem, Tunisia



- 2:30 **4493** Status of biological control of pink hibiscus mealybug (*Maconellicoccus hirsutus*) in the Pacific Islands. **Gadi V. P. Reddy** (reddy@montana.edu)<sup>1</sup> and Rangaswamy R. Muniappan<sup>2</sup>, <sup>1</sup>Montana State Univ., Conrad, MT, <sup>2</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 2:45 **4494** Pink hibiscus mealybug in Hawaii: History and current status. **Arnold Hara** (arnold@hawaii.edu), Univ. of Hawai'i, Hilo, HI
- 3:00 BREAK**
- 3:15 **4495** Bugs without borders: Developing strategies to prevent the entrance and movement of invasive mealybugs in the greater Caribbean region. **Amy L. Roda** (amy.l.roda@aphis.usda.gov), USDA - APHIS, Miami, FL
- 3:30 **4496** Management of pink hibiscus mealybug on ornamental plants in the southern United States. **Juang Horng Chong** (juanghc@clemson.edu), Clemson Univ., Florence, SC
- 3:45 **4497** The pink hibiscus mealybug in Mexico: IPM and the biological control program. **Héctor González-Hernández** (hgzzhdz@colpos.mx)<sup>1</sup>, Hugo Arredondo-Bernal<sup>2</sup>, and Zulema Calleja-Gómez<sup>3</sup>, <sup>1</sup>Graduate College, Montecillo, Mexico, <sup>2</sup>Secretary of Agriculture, Livestock, Rural Development, Fishing, and Food, Tecoman, Mexico, <sup>3</sup>Jalisco State Committee of Plant Health, Guadalajara, Mexico
- 4:00 **4498** Pink hibiscus mealybug — how our regulatory response and understanding of PHM has changed over time. **Daniel Borchert** (daniel.m.borchert@aphis.usda.gov), USDA - APHIS, Raleigh, NC
- 4:15 **4499** Invasive potential of PHM for Chile: A quarantine pest at the edge. **Valentina Jara Contreras** (vijara@uc.cl), Pontifical Catholic Univ., Santiago, Chile
- 4:30 **4500** Pink hibiscus mealybug (*Maconellicoccus hirsutus*) and other invasive insects in Brazil: Can classical biological control help save Neotropical biodiversity? **Mark Culik** (markculik3@yahoo.com)<sup>1</sup>, José Ventura<sup>2</sup>, and David Martins<sup>2</sup>, <sup>1</sup>Incapar, Linhares, Brazil, <sup>2</sup>Incapar, Vitória, Brazil
- 2:15 **4504** Managing a weevil invader in south Florida: *Mylocherus undecimpustulatus undatus* Marshall. **Catharine M. Mannion** (cmannion@ufl.edu), Univ. of Florida, Homestead, FL
- 2:30 **4505** Alien invasive scolytines from old growth forest on the Osa Peninsula, Costa Rica. **Jhuni Morillo** (morillojhuni@gmail.com) and Amy Berkov, City College of New York, New York, NY
- 2:45 **4506** Biology, chemical ecology, and sexual dimorphism of the Sri Lankan weevil, *Mylocherus undecimpustulatus undatus* Marshall (Coleoptera: Curculionidae). **Justin George** (justin.george@ars.usda.gov) and Stephen L. Lapointe, USDA - ARS, Ft. Pierce, FL
- 3:00 BREAK**
- 3:15 **4507** Emergent and possible invasive pest species of weevils in Mexico. **Robert Jones** (rjones@uaq.mx)<sup>1</sup>, Carlos Illescas-Riquelme<sup>2</sup>, Víctor López-Martínez<sup>3</sup>, Néstor Bautista-Martínez<sup>2</sup>, and Charles W. O'Brien<sup>4</sup>, <sup>1</sup>Autonomous Univ. of Querétaro, Santiago de Querétaro, Mexico, <sup>2</sup>Graduate College, Montecillo, Mexico, <sup>3</sup>Autonomous State Univ. of Morelos, Mexico, <sup>4</sup>Univ. of Arizona, Tucson, AZ
- 3:30 **4508** Colonization of invasive weevils with different reproductive modes. **Viviana Confalonieri** (bibilu@ege.fcen.uba.ar)<sup>1</sup>, Marcela Rodruiguero<sup>1</sup>, Noelia Guzmán<sup>2</sup>, and Analia Lanteri<sup>3</sup>, <sup>1</sup>Univ. of Buenos Aires, Buenos Aires, Argentina, <sup>2</sup>Institute of Ecology, Genetics and Evolution (UBA-CONICET), Buenos Aires, Argentina, <sup>3</sup>Univ. of La Plata, La Plata, Argentina
- 3:45 **4509** Chinese weevils contributing to potential invasive weevil species of the world. **Zhiliang Wang** (zlwang@ioz.ac.cn) and Runzhi Zhang, Chinese Academy of Sciences, Beijing, China
- 4:00 **4510** Monitoring of activity patterns of early-instar *Rhynchophorus ferrugineus* (Olivier) and *R. cruentatus* (Fabricius) over multi-week periods: Implications for early detection of infestations. **Omotola Dosunmu** (toladosunmu@gmail.com)<sup>1</sup>, Johari Jalinas<sup>2,3</sup>, Berenice Agulló<sup>2,4</sup>, L. V. Lopez Llorca<sup>2,4</sup>, and Richard Mankin<sup>5</sup>, <sup>1</sup>Univ. of Florida, Gainesville, FL, <sup>2</sup>Univ. of Alicante, San Vicente del Raspeig, Spain, <sup>3</sup>Univ. Kebangsaan Malaysia, Bangi, Malaysia, <sup>4</sup>Glen Biotech, Alicante, Spain, <sup>5</sup>USDA - ARS, Gainesville, FL
- 4:15 **4511** A phylogenetic study delimiting the genus *Baris*. **Steve Davis** (sdavis@amnh.org), American Museum of Natural History, New York, NY
- 4:30 **4512** Potential geographic distributions of parthenogenetic broad-nosed weevils native to South America. **María Guadalupe del Rio** (guadalupedelrio@yahoo.com)<sup>1</sup>, Noelia Guzmán<sup>2</sup>, Analia Lanteri<sup>3</sup>, and Viviana Confalonieri<sup>4</sup>, <sup>1</sup>La Plata Museum, La Plata, Argentina, <sup>2</sup>Institute of Ecology, Genetics and Evolution (UBA-CONICET), Buenos Aires, Argentina, <sup>3</sup>Univ. of La Plata, La Plata, Argentina, <sup>4</sup>Univ. of Buenos Aires, Buenos Aires, Argentina
- 4:45 **4513** Easily ignored pest weevils with potential invasive ability: Entiminae in China (Coleoptera: Curculionidae). **Li Ren** (renl@ioz.ac.cn) and Runzhi Zhang, Chinese Academy of Sciences, Beijing, China

## Symposium: Potential Invasive Pest Weevil Species of the World

### Room W240 A (Convention Center)

**Moderators and Organizers:** Runzhi Zhang<sup>1</sup>, Muhammad Haseeb<sup>2</sup>, and Charles O'Brien<sup>3</sup>, <sup>1</sup>Chinese Academy of Sciences, Beijing, China, <sup>2</sup>Florida A&M Univ., Tallahassee, FL, <sup>3</sup>Univ. of Arizona, Tucson, AZ

- 1:30 **4501** Weevils, prime invasive pest species! Why? **Charles O'Brien** (cobrien6@cox.net), Univ. of Arizona, Tucson, AZ
- 1:45 **4502** Potential invasive pest weevil species of the world: Cooperative network for taxonomists. **Runzhi Zhang** (zhangrz@ioz.ac.cn), Chinese Academy of Sciences, Beijing, China
- 2:00 **4503** Cowpea curculio, *Chalcoedermus aeneus*, historical pest status, potential for spread, and current management. **David Riley** (dgr@uga.edu) and Alton N. Sparks, Jr., Univ. of Georgia, Tifton, GA

- 5:00 **4514** Potential invasive dryophthorines of the world – beyond the usual suspects. **Maria Lourdes Chamorro** (lourdes.chamorro@ars.usda.gov), USDA - ARS, Washington, DC
- 5:15 **4515** Potential invasive pest weevils from the Caribbean basin to the United States. **Muhammad Haseeb** (muhammad.haseeb@fam.u.edu), Florida A&M Univ., Tallahassee, FL

### Symposium: Anti-Tick Vaccine Development: Possibilities in the Post-Genomics Era

#### Room W224 F (Convention Center)

**Moderators and Organizers:** Albert Mulenga<sup>1</sup> and Itabajara Vaz<sup>2</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Federal Univ. of Rio Grande, Porto Alegre, Brazil

- 1:30 **4516** Presentation withdrawn
- 1:45 **4517** Tick vaccines: Current status and future directions. **Jose de la Fuente** (jose\_delafuente@yahoo.com)<sup>1,2</sup>, <sup>1</sup>Oklahoma State Univ., Stillwater, OK, <sup>2</sup>IREC, Ciudad Real, Spain
- 2:15 **4518** Identifying important molecular targets in *Amblyomma-Rickettsia* interaction and possibility of vaccine potential. **Khemraj Budachetri** (khem.bc@eagles.usm.edu) and Shahid Karim, Univ. of Southern Mississippi, Hattiesburg, MS
- 2:30 **4519** Identification of immunomodulatory factors in *Ixodes persulcatus* Schulze, the vector for Lyme disease and relapsing fever in Japan. **Satoru Konnai** (konnai@vetmed.hokudai.ac.jp)<sup>1</sup>, Shiro Murata<sup>2</sup>, Itabajara Vaz<sup>3</sup>, and Kazuhiko Ohashi<sup>2</sup>, <sup>1</sup>Hokkaido Univ., Sapporo, Japan, <sup>2</sup>Hokkaido Univ., Hokkaido, Japan, <sup>3</sup>Federal Univ. of Rio Grande, Porto Alegre, Brazil
- 2:45 **4520** Presentation withdrawn
- 3:00 BREAK**
- 3:30 **4521** Research on development of anti-tick vaccine against the Chinese dominant tick *Rhipicephalus haemaphysaloides*. **Jinlin Zhou** (jinlinzhou@shvri.ac.cn), Shanghai Veterinary Research Institute, Shanghai, China
- 4:00 **4522** Prediction and design of protective recombinant peptides to prevent infestations by the cattle tick *Rhipicephalus microplus* (Acari: Ixodidae). **Rodrigo Rosario-Cruz** (rockdrig@yahoo.com.mx)<sup>1</sup>, Delia Dominguez-Garcia<sup>1</sup>, Héctor Romero<sup>2</sup>, Moisés Velázquez<sup>3</sup>, and Rodolfo Quintanilla<sup>4</sup>, <sup>1</sup>Autonomous Univ. of Guerrero, Petaquillas, Mexico, <sup>2</sup>National Autonomous Univ. of México, Mexico City, Mexico, <sup>3</sup>Center of Research and Assistance in Technology and Design from the State of Jalisco, Guadalajara, Mexico, <sup>4</sup>National Center of Disciplinary Research in Veterinary Parasitology, Jiutepec, Mexico

### Symposium: Diptera Systematics: Deciphering Evolutionary Relationships with Diverse and Novel Data

#### Room W230 A (Convention Center)

**Moderators and Organizers:** Torsten Dikow<sup>1</sup> and Thomas Pape<sup>2</sup>, <sup>1</sup>Smithsonian Institution National Museum of Natural History, Washington, DC, <sup>2</sup>Natural History Museum, Copenhagen, Denmark

- 1:30 **4523** Old sources of information, new characters: Thorax and wings adding solutions for the basal Diptera phylogeny. **Dalton Amorim** (dsamorim@usp.br)<sup>1</sup> and Guilherme Ribeiro<sup>2</sup>, <sup>1</sup>Univ. of São Paulo, Ribeirão Preto, Brazil, <sup>2</sup>Federal Univ. of ABC, Santo Andre, Brazil
- 1:45 **4524** Phylogenomics of fly-microorganism relationships in the Bibionomorpha. **Seungwan Shin** (sshin4@memphis.edu), Keith Bayless, and Brian Wiegmann, North Carolina State Univ., Raleigh, NC
- 2:00 **4525** The transformation of head structures in dipteran larvae. **Katharina Schneeberg** (katharina.schneeberg@gmx.de)<sup>1</sup>, Stefan Löwe<sup>1</sup>, David Yeates<sup>2</sup>, Christine Mißbach<sup>3</sup>, Ewald Grosse-Wilde<sup>3</sup>, and Rolf Beutel<sup>1</sup>, <sup>1</sup>Friedrich Schiller Univ., Jena, Germany, <sup>2</sup>CSIRO, Acton, Australia, <sup>3</sup>Max Planck Institute for Chemical Ecology, Jena, Germany
- 2:15 **4526** Extraordinary diversity of Cretaceous Brachycera (Diptera) in Burmese amber. **David Grimaldi** (grimaldi@amnh.org), American Museum of Natural History, New York, NY
- 2:30 **4527** Reconstructing the phylogeny of the soldier flies (Diptera: Stratiomyidae). **Bryan Lessard** (bryan.lessard@csiro.au)<sup>1</sup>, Norman Woodley<sup>2</sup>, Martin Hauser<sup>3</sup>, and David Yeates<sup>1</sup>, <sup>1</sup>CSIRO, Acton, Australia, <sup>2</sup>USDA - ARS, Washington, DC, <sup>3</sup>California Dept. of Food and Agriculture, Sacramento, CA
- 2:45 **4528** Inferring the relationships of early brachyceran lineages with phylogenomic and comprehensive morphological data. **David Yeates** (david.yeates@csiro.au)<sup>1</sup>, Karen Meusemann<sup>1</sup>, Katharina Schneeberg<sup>2</sup>, Rolf Beutel<sup>2,3</sup>, and Bernhard Misof<sup>3</sup>, <sup>1</sup>CSIRO, Acton, Australia, <sup>2</sup>Friedrich Schiller Univ., Jena, Germany, <sup>3</sup>Zoological Research Museum Alexander Koenig, Bonn, Germany
- 3:00 BREAK**
- 3:15 **4529** Molecular phylogeny of asiloid flies based on target-enrichment methods. **Mauren Turcatel** (maturcatel@gmail.com) and Torsten Dikow, Smithsonian Institution National Museum of Natural History, Washington, DC
- 3:30 **4530** Anchored hybrid enrichment of world Syrphidae: New technologies produce a highly-resolved phylogeny. **Andrew Young** (ayoung@gmail.com)<sup>1</sup>, Jeffrey Skevington<sup>1</sup>, Ximo Mengual<sup>2</sup>, Gunilla Ståhls<sup>3</sup>, Menno Reemer<sup>4</sup>, Kurt Jordaens<sup>5</sup>, Scott Kelso<sup>1</sup>, Alan Lemmon<sup>6</sup>, Emily Lemmon<sup>6</sup>, Brian Wiegmann<sup>7</sup>, Martin Hauser<sup>8</sup>, Marc de Meyer<sup>5</sup>, and Bernhard Misof<sup>2</sup>, <sup>1</sup>Agriculture and Agri-Food Canada,



- Ottawa, ON, Canada, <sup>2</sup>Zoological Research Museum Alexander Koenig, Bonn, Germany, <sup>3</sup>Finnish Museum of Natural History, Helsinki, Finland, <sup>4</sup>Naturalis Biodiversity Center, Leiden, Netherlands, <sup>5</sup>Royal Museum for Central Africa, Tervuren, Belgium, <sup>6</sup>Florida State Univ., Tallahassee, FL, <sup>7</sup>North Carolina State Univ., Raleigh, NC, <sup>8</sup>California Dept. of Food and Agriculture, Sacramento, CA
- 3:45 **4531** Unravelling the phylogeny of the lower Cyclorrhapha using morphology, Sanger sequencing, and anchored phylogenetic data. **Jeffrey Skevington** (jeffrey.skevington@agr.gc.ca)<sup>1</sup>, Jeffrey Cumming<sup>1</sup>, Bradley Sinclair<sup>2</sup>, Brian Wiegmann<sup>3</sup>, Scott Kelso<sup>1</sup>, John Moulton<sup>4</sup>, Brian Cassel<sup>3</sup>, Emily Lemmon<sup>5</sup>, and Alan Lemmon<sup>5</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, Ottawa, ON, Canada, <sup>2</sup>Canadian Food Inspection Agency, Ottawa, ON, Canada, <sup>3</sup>North Carolina State Univ., Raleigh, NC, <sup>4</sup>Univ. of Tennessee, Knoxville, TN, <sup>5</sup>Florida State Univ., Tallahassee, FL
- 4:00 **4532** Bot fly ancestry – a calyptrate conundrum. **Thomas Pape** (tpape@snm.ku.dk)<sup>1</sup>, Sujatha Kutty<sup>2</sup>, Dong Zhang<sup>3</sup>, Liping Yan<sup>3</sup>, Brian Wiegmann<sup>4</sup>, and Rudolf Meier<sup>2</sup>, <sup>1</sup>Natural History Museum, Copenhagen, Denmark, <sup>2</sup>National Univ. of Singapore, Singapore, Singapore, <sup>3</sup>Beijing Forestry Univ., Beijing, China, <sup>4</sup>North Carolina State Univ., Raleigh, NC
- 4:15 **4533** Rogue taxa identification and exclusion in the molecular phylogeny of the hyperdiverse genus *Sarcophaga* (Diptera: Sarcophagidae). **Eliana Buenaventura** (elianabuenaventura@gmail.com)<sup>1</sup>, Daniel Whitmore<sup>2</sup>, and Thomas Pape<sup>1</sup>, <sup>1</sup>Natural History Museum, Copenhagen, Denmark, <sup>2</sup>The Natural History Museum, London, United Kingdom
- 4:30 **4534** Phylogeny and diversification of world Tachinidae (Diptera). **John Stireman III** (john.stireman@wright.edu)<sup>1</sup>, John Moulton<sup>2</sup>, Pierfilippo Cerretti<sup>3</sup>, James E. O'Hara<sup>4</sup>, Isaac Winkler<sup>5</sup>, and Jeremy Blaschke<sup>6</sup>, <sup>1</sup>Wright State Univ., Dayton, OH, <sup>2</sup>Univ. of Tennessee, Knoxville, TN, <sup>3</sup>Univ. of Padova, Legnaro, Italy, <sup>4</sup>Agriculture and Agri-Food Canada, Ottawa, ON, Canada, <sup>5</sup>Cornell College, Mount Vernon, IA, <sup>6</sup>Union Univ., Jackson, TN
- 4:45 **4535** The evolution of reproductive strategies in tachinid parasitoids (Diptera: Tachinidae). **Pierfilippo Cerretti** (pierfilippocerretti@yahoo.it)<sup>1</sup>, John Stireman III<sup>2</sup>, James E. O'Hara<sup>3</sup>, John Moulton<sup>4</sup>, Isaac Winkler<sup>5</sup>, and Jeremy Blaschke<sup>6</sup>, <sup>1</sup>Univ. of Padova, Legnaro, Italy, <sup>2</sup>Wright State Univ., Dayton, OH, <sup>3</sup>Agriculture and Agri-Food Canada, Ottawa, ON, Canada, <sup>4</sup>Univ. of Tennessee, Knoxville, TN, <sup>5</sup>Cornell College, Mount Vernon, IA, <sup>6</sup>Union Univ., Jackson, TN
- 5:00 **4536** From Malaise traps to phylogenetic diversity: Developing rapid biodiversity assessment techniques based on NGS. **Rudolf Meier** (meier@nus.edu.sg)<sup>1</sup>, Darren Yeol<sup>1</sup>, Wendy Wang<sup>1</sup>, Amrita Srivathsan<sup>1</sup>, and Patrick Grootaert<sup>2</sup>, <sup>1</sup>National Univ. of Singapore, Singapore, Singapore, <sup>2</sup>Royal Belgian Institute of Natural Sciences, Brussels, Belgium
- 5:15 **4537** Enhancing Diptera systematics: From single researcher to global specimen data network. **Torsten Dikow** (dikowt@si.edu), Smithsonian Institution National Museum of Natural History, Washington, DC
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- Symposium: Evolution, Classification, and Biology of Cucujoidea Beetles (Coleoptera: Cucujoidea)**
- Room W225 B (Convention Center)**
- Moderators and Organizers:** Adam Slipinski<sup>1</sup>, Richard A. B. Leschen<sup>2</sup>, and Joseph V. McHugh<sup>3</sup>, <sup>1</sup>CSIRO, Canberra, Australia, <sup>2</sup>Landcare Research, Auckland, New Zealand, <sup>3</sup>Univ. of Georgia, Athens, GA
- 1:30 **4538** Phylogeny and classification of Cucujoidea and the recognition of a new superfamily Coccinelloidea (Coleoptera: Cucujiformia). James Robertson<sup>1</sup>, Adam Slipinski<sup>2</sup>, Matthew J. Moulton<sup>3</sup>, Floyd Shockley<sup>4</sup>, Jose Adriano Giorgi<sup>5</sup>, Nathan Lord<sup>3</sup>, Duane D. McKenna<sup>6</sup>, Wioletta Tomaszewska<sup>7</sup>, Juanita A. Forrester<sup>8</sup>, Kelly Miller<sup>9</sup>, Michael F. Whiting<sup>3</sup>, and **Joseph V. McHugh** (mchugh.jv@gmail.com)<sup>10</sup>, <sup>1</sup>Univ. of Arizona, Tucson, AZ, <sup>2</sup>CSIRO, Canberra, Australia, <sup>3</sup>Brigham Young Univ., Provo, UT, <sup>4</sup>Smithsonian Institution National Museum of Natural History, Washington, DC, <sup>5</sup>Federal Univ. of Pará, Altamira, Brazil, <sup>6</sup>Univ. of Memphis, Memphis, TN, <sup>7</sup>Polish Academy of Sciences, Warszawa, Poland, <sup>8</sup>Chattahoochee Technical College, Canton, GA, <sup>9</sup>Univ. of New Mexico, Albuquerque, NM, <sup>10</sup>Univ. of Georgia, Athens, GA
- 2:00 **4539** Mesozoic cucujoid beetles from Northeastern China. **Hong Pang** (lssh pang@mail.sysu.edu.cn)<sup>1</sup> and Adam Slipinski<sup>2</sup>, <sup>1</sup>Sun Yat-sen Univ., Guangzhou, China, <sup>2</sup>CSIRO, Canberra, Australia
- 2:15 **4540** Developing novel nuclear markers for beetle phylogenetics, tested at both inter-family and intra-family levels. Li-Heng Che<sup>1</sup>, Shao-Qian Zhang<sup>1</sup>, Yun Li<sup>1</sup>, Dan Liang<sup>1</sup>, Hong Pang<sup>1</sup>, Adam Slipinski<sup>2</sup>, and **Peng Zhang** (alarzhang@gmail.com)<sup>1</sup>, <sup>1</sup>Sun Yat-sen Univ., Guangzhou, China, <sup>2</sup>CSIRO, Canberra, Australia
- 2:30 **4541** Presentation withdrawn
- 2:45 **4542** From Rhizophagidae to Monotomidae: Bringing clarity to a misunderstood family of beetles. **Thomas McElrath** (tmcelrat@uga.edu) and Joseph V. McHugh, Univ. of Georgia, Athens, GA
- 3:00 BREAK**
- 3:15 **4543** Update on the systematics and taxonomy of Phalacridae (Cucujoidea): Where are we now? **Matthew Gimmel** (phalacrid@gmail.com), Santa Barbara Museum of Natural History, Santa Barbara, CA
- 3:30 **4544** The genus *Pharaxanotha* (sensu lato), Erotylidae that pollinate cycads. **Paul Skelley** (paul.skelley@freshfromflorida.com), Florida State Collection of Arthropods, Gainesville, FL
- 3:45 **4545** Phylogeny and classification of Coccinellidae (Coleoptera) – where are we now? **Adam Slipinski** (adam.slipinski@csiro.au), CSIRO, Canberra, Australia



- 4:00 **4546** Phylogeny and classification of Coccinellini (Coleoptera: Coccinellidae). **Wioletta Tomaszewska** (wiola@wa.home.pl)<sup>1</sup>, Adam Slipinski<sup>2</sup>, Hermes Escalona<sup>2</sup>, Xingmin Wang<sup>3</sup>, and Jiahui Li<sup>4</sup>, <sup>1</sup>Polish Academy of Sciences, Warszawa, Poland, <sup>2</sup>CSIRO, Canberra, Australia, <sup>3</sup>South China Agricultural Univ., Guangzhou, China, <sup>4</sup>Hainan Univ., Haikou, China
- 4:15 **4547** Chrysomelidophagous ladybirds (Coleoptera: Coccinellidae: Coccinellini): You are what you eat. **Jose Adriano Giorgi** (coccinellid@gmail.com)<sup>1</sup> and Natalia J. Vandenberg<sup>2</sup>, <sup>1</sup>Federal Univ. of Pará, Altamira, Brazil, <sup>2</sup>USDA - ARS, Washington, DC
- 4:30 **4548** Can Brazilian Coccinellidae species be used as biological control agents? **Lucia de Almeida** (lalmeida51@gmail.com) and Camila Fediuk de Castro-Guedes, Federal Univ. of Paraná, Curitiba, Brazil
- 4:45 **4549** Systematics and natural history of Anamorphidae (Coccinelloidea): Seeking patterns of evolution within a heterogeneous assemblage of "little brown beetles". **Floyd Shockley** (shockleyf@si.edu), Smithsonian Institution National Museum of Natural History, Washington, DC
- 4:45 **4555** Impact of elevated insulin signaling on the growth potential of imaginal disc cells. Suzanna Hempel, Katarzyna Nowak, Elisabeth Fischer, Malgorzata Parniewska, Avantika Gupta, and **Hugo Stocker** (stocker@imsb.biol.ethz.ch), ETH Zürich, Zürich, Switzerland
- 3:00 **BREAK**
- 3:15 **4556** Role of insulin-like peptides in regulating reproduction and longevity in the ant *Harpegnathos saltator*. **Hua Yan** (hua.yan@nyumc.org)<sup>1</sup>, Comzit Opachaloemphan<sup>1</sup>, Giacomo Mancini<sup>2</sup>, Jürgen Liebig<sup>3</sup>, Shelley Berger<sup>4</sup>, Claude Desplan<sup>2</sup>, and Danny Reinberg<sup>2</sup>, <sup>1</sup>New York Univ. School of Medicine, New York, NY, <sup>2</sup>New York Univ., New York, NY, <sup>3</sup>Arizona State Univ., Tempe, AZ, <sup>4</sup>Univ. of Pennsylvania, Philadelphia, PA
- 3:30 **4557** Breath control: The hormonal regulation of growth in response to hypoxia in *Drosophila*. **Alexander Shingleton** (shingleton@lakeforest.edu)<sup>1</sup>, Yuying Zhu<sup>1</sup>, Hailey Broecker<sup>1</sup>, Parth Tank<sup>1</sup>, Christopher Petranek<sup>1</sup>, and Jon Harrison<sup>2</sup>, <sup>1</sup>Lake Forest College, Lake Forest, IL, <sup>2</sup>Arizona State Univ., Tempe, AZ
- 3:45 **4558** 20E-induced autophagy activates fat body lipid degradation for insect metamorphic development. **Ling Tian** (tianling@sibs.ac.cn) and Sheng Li, Chinese Academy of Sciences, Shanghai, China
- 4:00 **4559** Evolution of insect metamorphosis: Functional analysis of the metamorphic toolkit formed by E93, Krüppel homolog 1, and Broad-Complex transcription factors. Enric Ureña, Silvia Chafino, Elena Casacuberta, Xavier Franch-Marro, and **David Martin** (david.martin@ibe.upf-csic.es), Pompeu Fabra Univ., Barcelona, Spain
- 4:15 **4560** The MEKRE93 pathway in *Bombyx*. **Takaaki Daimon** (daimontakaaki@affrc.go.jp), Miwa Uchibori, and Tetsuro Shinoda, National Institute of Agrobiological Sciences, Tsukuba, Japan
- 4:30 **4561** How does juvenile hormone prevent pupal metamorphosis in holometabolous insects? Takumi Kayukawa and **Tetsuro Shinoda** (shinoda@affrc.go.jp), National Institute of Agrobiological Sciences, Tsukuba, Japan
- 4:45 **4562** Intermediate factors of juvenile hormone/methoprene-tolerant mediated gene repression: Evidence from adult female mosquito *Aedes aegypti*. **Tusar Saha** (tsaha001@ucr.edu)<sup>1</sup>, Sang Woon Shin<sup>1</sup>, Wei Dou<sup>1,2</sup>, Sourav Roy<sup>1</sup>, Bo Zhao<sup>1</sup>, Zhen Zou<sup>3</sup>, and Alexander Raikhel<sup>1</sup>, <sup>1</sup>Univ. of California, Riverside, CA, <sup>2</sup>Southwest Univ., Chongqing, China, <sup>3</sup>Chinese Academy of Sciences, Beijing, China
- 5:00 **4563** Molecular function of Kr-h1 in juvenile hormone-induced gene expression. **Reyhaneh Ojani** (reyhan@vt.edu) and Jinsong Zhu, Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 5:15 **4564** Exquisite ligand selectivity contrasts with broad agonist repertoire of the juvenile hormone receptor. Pavel Jedlicka<sup>1</sup>, Lenka Bittova<sup>2</sup>, Robert Hanus<sup>1</sup>, and **Marek Jindra** (jindra@entu.cas.cz)<sup>2</sup>, <sup>1</sup>Institute of Organic Chemistry and Biochemistry, Prague, Czech Republic, <sup>2</sup>Czech Academy of Sciences, České Budějovice, Czech Republic

## Symposium: Molecular Endocrinology

### Room W240 B (Convention Center)

**Moderators and Organizers:** Marek Jindra<sup>1</sup> and Tetsuro Shinoda<sup>2</sup>, <sup>1</sup>Czech Academy of Sciences, České Budějovice, Czech Republic, <sup>2</sup>National Institute of Agrobiological Sciences, Tsukuba, Japan

- 1:30 **4550** Neuroendocrine control of developmental transitions in *Drosophila*. Mary Jane Shimell, Xueyang Pan, and **Michael O'Connor** (moconnor@umn.edu), Univ. of Minnesota, Minneapolis, MN
- 1:45 **4551** A genome-wide *in vivo* RNAi screen in *Drosophila* identifies regulators of cholesterol trafficking and steroid production. Morten Moller<sup>1</sup>, Erik Danielson<sup>1</sup>, Naoki Yamanaka<sup>2</sup>, Kirst King-Jones<sup>3</sup>, Michael O'Connor<sup>4</sup>, and **Kim Rewitz** (kim.rewitz@bio.ku.dk)<sup>1</sup>, <sup>1</sup>Univ. of Copenhagen, Copenhagen, Denmark, <sup>2</sup>Univ. of California, Riverside, CA, <sup>3</sup>Univ. of Alberta, Edmonton, AB, Canada, <sup>4</sup>Univ. of Minnesota, Minneapolis, MN
- 2:00 **4552** The endocrine role of the POU factor ventral veins lacking in insects. CeCe Cheng<sup>1</sup>, Amy Ko<sup>1</sup>, Prioty Sarwar<sup>1</sup>, Victoria Wang<sup>1</sup>, Zhou Wang<sup>1</sup>, Wendy Smith<sup>2</sup>, Takashi Koyama<sup>3</sup>, and **Yuichiro Suzuki** (ysuzuki@wellesley.edu)<sup>1</sup>, <sup>1</sup>Wellesley College, Wellesley, MA, <sup>2</sup>Northeastern Univ., Boston, MA, <sup>3</sup>Gulbenkian Institute of Science, Oeiras, Portugal
- 2:15 **4553** Neural and endocrine control of mating-induced germline stem cell proliferation in female *Drosophila*. Tomotsune Ameku<sup>1</sup>, Yuto Yoshinari<sup>1</sup>, Shu Kondo<sup>2</sup>, and **Ryusuke Niwa** (ryusuke-niwa@umin.ac.jp)<sup>1,3</sup>, <sup>1</sup>Univ. of Tsukuba, Tsukuba, Japan, <sup>2</sup>National Institute of Genetics, Mishima, Japan, <sup>3</sup>PRESTO Japan Science and Technology Agency, Kawaguchi, Japan
- 2:30 **4554** Nutrition, insulin, and larval body growth: How is the fly insulin production regulated? **Naoki Okamoto** (naoki.okamoto@ucr.edu)<sup>1,2</sup> and Takashi Nishimura<sup>2</sup>, <sup>1</sup>Univ. of California, Riverside, CA, <sup>2</sup>RIKEN Center for Developmental Biology, Kobe, Japan



## Symposium: Molecular Pharmacology and Physiology of Membrane Transport and Signaling Processes

### Room W330 C (Convention Center)

**Moderators and Organizers:** Yoshihisa Ozoe<sup>1</sup>, Masaaki Azuma<sup>2</sup>, and Jeffrey R. Bloomquist<sup>3</sup>, <sup>1</sup>Shimane Univ., Matsue, Japan, <sup>2</sup>Tottori Univ., Tottori, Japan, <sup>3</sup>Univ. of Florida, Gainesville, FL

- 1:30 **4565** Molecular and functional characterization of histamine-gated chloride channels from the house fly, *Musca domestica*. **Yoshihisa Ozoe** (ozoe-y@life.shimane-u.ac.jp), Tomo Kita, Takahiro Irie, Kazuki Nomura, and Fumiyo Ozoe, Shimane Univ., Matsue, Japan
- 1:45 **4566** Voltage- and calcium-activated chloride channels in insect physiological systems. **Lacey Jensen** (ljensen@vt.edu)<sup>1</sup>, Troy Anderson<sup>1</sup>, and Jeffrey Bloomquist<sup>2</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>Univ. of Florida, Gainesville, FL
- 2:00 **4567** *Apis mellifera* voltage-gated Ca<sup>2+</sup> channels: Cloning and *in vivo* and *in vitro* characterization. **Pierre Charnet** (pierre.charnet@cbrm.cnrs.fr)<sup>1</sup>, Thierry Cens<sup>1</sup>, Matthieu Rousset<sup>1</sup>, Claudine Menard<sup>1</sup>, Jean-Baptiste Thibaud<sup>1</sup>, and Claude Collet<sup>2</sup>, <sup>1</sup>National Center of Scientific Research, Montpellier, France, <sup>2</sup>INRA, Avignon, France
- 2:15 **4568** Modulation of native ionic channels by nitric oxide and acetylcholine signaling pathways in Kenyon cells isolated from the mushroom body of the cricket brain. **Masami Yoshino** (myoshi@u-gakugei.ac.jp), Tokyo Gakugei Univ., Koganei, Japan
- 2:30 **4569** Comparative and evolutionary insights into physiology and neuroendocrine control of renal function. **Julian Dow** (julian.dow@glasgow.ac.uk) and Shireen Davies, Univ. of Glasgow, Glasgow, United Kingdom
- 2:45 **4570** The molecular physiology of inward rectifier potassium (Kir) channels in mosquitoes. **Peter Piermarini** (piermarini.1@osu.edu)<sup>1</sup>, Klaus Beyenbach<sup>2</sup>, and Jerod Denton<sup>3</sup>, <sup>1</sup>The Ohio State Univ., Wooster, OH, <sup>2</sup>Cornell Univ., Ithaca, NY, <sup>3</sup>Vanderbilt Univ., Nashville, TN
- 3:00 **BREAK**
- 3:15 **4571** V-ATPase and Na<sup>+</sup>/K<sup>+</sup>-ATPase energize postprandial fluid absorption from the isolated midgut of female yellow fever mosquitoes (*Aedes aegypti*). **Horst Onken** (horst.onken@wagner.edu)<sup>1</sup> and David Moffett<sup>2</sup>, <sup>1</sup>Wagner College, Staten Island, NY, <sup>2</sup>Washington State Univ., Pullman, WA
- 3:30 **4572** Epithelial and cellular mechanisms of aquaporins (AQPs) in lepidopteran caterpillar. **Masaaki Azuma** (azuma@muses.tottori-u.ac.jp), Tottori Univ., Tottori, Japan
- 3:45 **4573** G-protein-coupled receptor controls steroid hormone signaling in cell membrane. Di Wang, Wen-Li Zhao, Mei-Juan Cai, Jin-Xing Wang, and **Xiao-Fan Zhao** (xfzhao@sdu.edu.cn), Shandong Univ., Jinan, China

- 4:00 **4574** The roles of biogenic amine G-protein-coupled receptors in insect feeding behavior. **Hiroto Ohta** (hiohta@gpo.kumamoto-u.ac.jp), Kumamoto Univ., Kumamoto, Japan
- 4:15 **4575** Roles of biogenic amine receptors in insect hemocytes to regulate cellular immunity. **Jia Huang** (huangj@zju.edu.cn)<sup>1</sup>, Yi-xiang Qi<sup>1</sup>, and Shun-fan Wu<sup>2</sup>, <sup>1</sup>Zhejiang Univ., Hangzhou, China, <sup>2</sup>Nanjing Agricultural Univ., Nanjing, China
- 4:30 **4576** Cockroach GABA<sub>B</sub> receptor subtypes: Molecular characterization, pharmacological properties, and tissue distribution. **Wolfgang Blenau** (wblenau@uni-koeln.de)<sup>1</sup>, Stefanie Blankenburg<sup>2</sup>, and Arnd Baumann<sup>3</sup>, <sup>1</sup>Univ. of Köln, Köln, Germany, <sup>2</sup>Swedish Univ. of Agricultural Sciences, Alnarp, Sweden, <sup>3</sup>Jülich Research Center, Jülich, Germany

## Symposium: Neuro-Endocrine Regulation of Reproduction in Insects

### Room W224 B (Convention Center)

**Moderators and Organizers:** Jozef Vanden Broeck<sup>1</sup> and Neil Audsley<sup>2</sup>, <sup>1</sup>Catholic Univ., Leuven, Belgium, <sup>2</sup>The Food and Environment Research Agency, York, United Kingdom

- 1:30 **4577** Regulation of reproductive diapause in the linden bug, *Pyrrhocoris apterus*. **David Dolezel** (david.dolezel@entu.cas.cz), Czech Academy of Sciences, České Budějovice, Czech Republic
- 2:00 **4578** Male sex peptide and the behaviour of post-mated females of *Drosophila* species. Elwyn Isaac<sup>1</sup>, **Calum Ferguson** (c.t.j.ferguson@leeds.ac.uk)<sup>1</sup>, Tara O'Neill<sup>1</sup>, and Neil Audsley<sup>2</sup>, <sup>1</sup>Univ. of Leeds, Leeds, United Kingdom, <sup>2</sup>The Food and Environment Research Agency, York, United Kingdom
- 2:15 **4579** Origin and function of seminal-fluid derived adipokinetic hormone in *Aedes* mosquitoes. **Laura Sirot** (lsiro@wooster.edu), College of Wooster, Wooster, OH
- 2:30 **4580** Oxytocin-like neuropeptide signaling in invertebrates. **Christian Gruber** (christian.w.gruber@meduniwien.ac.at)<sup>1,2</sup>, <sup>1</sup>Medical Univ. of Vienna, Vienna, Austria, <sup>2</sup>Queensland Univ., St. Lucia, Australia
- 3:00 **BREAK**
- 3:30 **4581** Targeting reproduction and development as a control strategy for pest Diptera. **Neil Audsley** (neil.audsley@fera.co.uk) and Rachel Down, Fera Science, Ltd., York, United Kingdom
- 3:45 **4582** Cross-talk between the ecdysteroid, insulin, and juvenile hormone pathway in the desert locust, *Schistocerca gregaria*. **Elisabeth Marchal** (elisabeth.marchal@bio.kuleuven.be)<sup>1</sup>, Cynthia Lenaerts<sup>1</sup>, Marijke Gijbels<sup>2</sup>, Pieter Van Wielendaele<sup>1</sup>, and Jozef Vanden Broeck<sup>1</sup>, <sup>1</sup>Catholic Univ., Leuven, Belgium, <sup>2</sup>Univ. of Leuven, Leuven, Belgium

## Symposium: New Insights into Biology, Resistance Mechanisms, and the Management of the Modern Bed Bug

### West Hall F4 (WF4) (Convention Center)

**Moderators and Organizers:** Stephen Doggett<sup>1</sup>, Chow-Yang Lee<sup>2</sup>, Dini Miller<sup>3</sup>, and Changlu Wang<sup>4</sup>, <sup>1</sup>Westmead Hospital, Westmead, Australia, <sup>2</sup>Univ. of Science, Penang, Malaysia, <sup>3</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>4</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ

- 1:30 **4583** Behavioral ecology of the common bed bug, *Cimex lectularius*, and its implications in the management of bed bugs. **Richard Cooper** (rick.cooper.rutgers@cooperpest.com)<sup>1</sup> and Changlu Wang<sup>2</sup>, <sup>1</sup>Bed Bug Central, Lawrenceville, NJ, <sup>2</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ
- 2:00 **4584** Current bed bug (*Cimex* spp.) resurgence and management in China and US. **Changlu Wang** (cwang@aesop.rutgers.edu)<sup>1</sup>, Chen Zha<sup>1</sup>, Richard Cooper<sup>2</sup>, and Desen Wang<sup>3</sup>, <sup>1</sup>Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, <sup>2</sup>Cooper Pest Solutions, Lawrenceville, NJ, <sup>3</sup>South China Agricultural Univ., Guangzhou, China
- 2:15 **4585** Novel insecticide resistant mechanisms in the common bed bug, *Cimex lectularius*. **David Lilly** (david.lilly@ecolab.com), Ecolab Australia, Macquarie Park, Australia
- 2:30 **4586** Molecular mechanisms and detection of pyrethroid resistance in bed bugs (*Cimex* spp.). **Kai Dang** (kaidang@mail.nankai.edu.cn), Univ. of Science, Penang, Malaysia
- 2:45 **4587** Insecticide resistance in the common bed bug, *Cimex lectularius*, eggs and first instars. **Brittany Campbell** (bedelong@ufl.edu), Univ. of Florida, Gainesville, FL
- 3:00 BREAK**
- 3:15 **4588** Integrated insecticide resistance management in the common bed bug, *Cimex lectularius*. **Fang (Rose) Zhu** (fang.zhu@wsu.edu)<sup>1</sup> and Douglas Walsh<sup>2</sup>, <sup>1</sup>Washington State Univ., Pullman, WA, <sup>2</sup>Washington State Univ., Prosser, WA
- 3:30 **4589** Fitness costs associated with selection for insecticide resistance in the bed bug. **Jennifer Gordon** (jgord13@gmail.com), Univ. of Kentucky, Lexington, KY
- 3:45 **4590** Evaluating the efficacy of "Whole Home Heat Systems": Determining the bed bug (*Cimex lectularius* L.) time to mortality using different commercial heating systems in apartment units of difference size. **Ian Sandum** (celeborn@vt.edu) and Dini Miller, Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 4:00 **4591** The maligned human bed bug, a masterpiece in adaptation and survival. **Gale E. Ridge** (gale.ridge@ct.gov), Connecticut Agricultural Experiment Station, New Haven, CT

- 4:15 **4592** Systemic effects of ivermectin and moxidectin on the common bed bug, *Cimex lectularius* L. **Johnathan Sheele** (jsheele@gmail.com)<sup>1</sup> and Gale E. Ridge<sup>2</sup>, <sup>1</sup>Case Western Reserve Univ., Cleveland, OH, <sup>2</sup>Connecticut Agricultural Experiment Station, New Haven, CT
- 4:30 **4593** Observances of bed bugs in the real world. **Paul Bello** (paul.bello@att.net), PJB Pest Management Consulting LLC, Alpharetta, GA

## Contributed Papers: Apidology, Sericulture, and Social Insects: Management

### Room W314 B (Convention Center)

**Moderators:** Robert Coulson<sup>1</sup> and Dipali Devi<sup>2</sup>, <sup>1</sup>Texas A&M Univ., College Station, TX, <sup>2</sup>Institute of Advanced Study in Science and Technology, Guwahati, India

- 1:30 **4594** The social regulation of worker-reproductive transition in the eastern subterranean termite. **Qian Sun** (qian.sun@uky.edu), Kenneth F. Haynes, and Xuguo Zhou, Univ. of Kentucky, Lexington, KY
- 1:45 **4595** Quantification of the floral landscape in agro-ecosystems and its effect on bumble bee colonies. **Ellen Rotheray** (ellenrotheray@googlemail.com), Univ. of Sussex, Brighton, United Kingdom
- 2:00 **4596** Judging pesticide safety to honey bees (*Apis mellifera* L.): Environmental toxicology, risk assessment, and the regulatory process. **Vincent Kramer** (vjrkramer@dow.com), Dow AgroSciences, Indianapolis, IN
- 2:15 **4597** The transportation of fluids by capillary action in butterfly proboscises. **Matthew Lehnert** (mlehner1@kent.edu), Ashley Lash, Candace Oprien, Michael Cannon, and Kristen Reiter, Kent State Univ., North Canton, OH
- 2:30 **4598** Integument constitutes an active component of innate immunity in the silkworm, *Bombyx mori*. **Jinmei Wu** (jwuus@hotmail.com), Chinese Academy of Agricultural Sciences, Zhenjiang, China
- 2:45 **4599** A spatially explicit enterprise system for monitoring and evaluating diseases and pests of honey bees, *Apis mellifera*. **Robert Coulson** (r-coulson@tamu.edu) and Mark Dykes, Texas A&M Univ., College Station, TX
- 3:00 BREAK**
- 3:15 **4600** Primary polygyny in the honey ant, *Myrmecocystus mendax*. **Ti Eriksson** (th3@asu.edu), Bert Hoelldobler, and Jürgen Gadau, Arizona State Univ., Tempe, AZ
- 3:30 **4601** Pathogenicity of bacteria isolated from the gut of diseased silkworm *Antheraea assamensis* Helfer (Lepidoptera: Saturniidae). **Dipali Devi** (dipali.devi@gmail.com), Institute of Advanced Study in Science and Technology, Guwahati, India
- 3:45 **4602** TA/TYR regulates division of labor at both larval and adult stages. **Ying Wang** (ying.wang.6@asu.edu) and Robert E. Page, Jr., Arizona State Univ., Tempe, AZ



- 4:00 **4603** The evolution and reproductive consequences of queen cooperation in a harvester ant. **Brian Haney** (brhaney@asu.edu) and Jennifer H. Fewell, Arizona State Univ., Tempe, AZ
- 4:15 **4604** Pollination biology of bitter melon (*Momordica charantia* L.). **Tharini K. B.** (tharinikraj@gmail.com), Khan H. Khader, and Vasuki Belavadi, Univ. of Agricultural Sciences, Bangalore, India
- 4:30 **4605** Genetic diversity of Puerto Rican *Heterotermes* (Isoptera: Rhinotermitidae) revealed by phylogenetic analyses of mitochondrial and nuclear genes. **Susan C. Jones** (Jones.1800@osu.edu)<sup>1</sup>, Tyler D. Eaton<sup>1</sup>, and Tracie M. Jenkins<sup>2</sup>, <sup>1</sup>The Ohio State Univ., Columbus, OH, <sup>2</sup>Univ. of Georgia, Athens, GA
- 4:45 **4606** The Schmidt Sting Pain Scale: Is theoretical science of stinging insects compatible with public outreach? **Justin Schmidt** (ponerine@dakotacom.net), Southwestern Biological Institute, Tucson, AZ
- 5:00 **4607** Group size effects on social organization and productivity in cooperative associations of ant queens. **Jennifer H. Fewell** (j.fewell@asu.edu), Arizona State Univ., Tempe, AZ
- 5:30 **4615** Does landscape simplification shape community structure, trophic interaction, and traits of parasitoids in a tropical agricultural area? **Damayanti Buchori** (damibuchori@yahoo.com)<sup>1</sup>, Evawaty Ulina<sup>1</sup>, Pudjianto Pudjianto<sup>1</sup>, Sjafrida Manuwoto<sup>1</sup>, and Akhmad Rizali<sup>2</sup>, <sup>1</sup>Bogor Agricultural Univ., Bogor, Indonesia, <sup>2</sup>Univ. of Brawijaya, Malang, Indonesia
- 3:45 **4616** Presentation withdrawn
- 4:00 **4617** The diversity and conservation status of bees (Hymenoptera: Apoidea) in Canada. **Cory Sheffield** (cory.sheffield@gov.sk.ca), Royal Saskatchewan Museum, Regina, SK, Canada
- 4:15 **4618** Abundance and diversity of bees in pumpkin fields with and without an imidacloprid pre-bloom soil application in South Dakota. Allen Olmstead<sup>1</sup>, **Kimberly Huntzinger** (kim.huntzinger@bayer.com)<sup>2</sup>, and Morgan Scalici<sup>2</sup>, <sup>1</sup>Bayer CropScience, Research Triangle Park, NC, <sup>2</sup>Bayer CropScience, Durham, NC
- 4:30 **4619** An assessment of bee richness and guild structure across agroecosystems on the Southern High Plains (Texas, USA). **Scott Longing** (scott.longing@ttu.edu), Christopher Jewett, Bianca Rendon, Samuel Discua, Robert Cox, Cynthia McKenney, Nancy McIntyre, and Chuck West, Texas Tech Univ., Lubbock, TX
- 4:45 **4620** A comparison of old and new: Does historical land conversion to agriculture relate to bee diversity on the Southern High Plains of Texas, USA? **Samuel Discua** (samuel.discua@ttu.edu) and Scott Longing, Texas Tech Univ., Lubbock, TX
- 5:00 **4621** Native bee diversity in mid-Atlantic woodlands. **Grace Savoy-Burke** (gsburke@udel.edu)<sup>1</sup>, Deborah A. Delaney<sup>1</sup>, and Sam Droege<sup>2</sup>, <sup>1</sup>Univ. of Delaware, Newark, DE, <sup>2</sup>U.S. Geological Survey, Beltsville, MD
- 5:15 **4622** Bumble bee (*Bombus* spp.) distributions and foraging behavior across an urban-agricultural gradient. **Vera Pfeiffer** (vpfeiffer@wisc.edu) and Janet Silbernagel, Univ. of Wisconsin, Madison, WI

### Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Hymenoptera

#### West Hall F2 (WF2) (Convention Center)

**Moderators:** Damayanti Buchori<sup>1</sup> and Michael Orr<sup>2</sup>, <sup>1</sup>Bogor Agricultural Univ., Bogor, Indonesia, <sup>2</sup>Utah State Univ., Logan, UT

- 1:30 **4608** Preliminary results of Lagodekhi Reserves Hymenoptera diversity. **George Japoshvili** (giorgij70@yahoo.com), Invertebrate Research Center, Tbilisi, Georgia
- 1:45 **4609** Salvemos Nuestro Abejorro, a Chilean model of citizen science for the conservation of *Bombus dahlbomii* (Hymenoptera: Apidae). **Jose Montalva** (montalva.jose@yahoo.es)<sup>1,2</sup>, Lorena Viel<sup>1,3</sup>, Benjamin Castro<sup>1</sup>, Valeria Amigo<sup>1,4</sup>, and Joaquin Sepulveda<sup>1</sup>, <sup>1</sup>Salvemos Nuestro Abejorro, Chile, <sup>2</sup>International Union for Conservation of Nature, Chile, <sup>3</sup>Univ. of la Frontera, Temuco, Chile, <sup>4</sup>Univ. of Concepción, Concepción, Chile
- 2:00 **4610** Presentation withdrawn
- 2:15 **4611** Diversity and prevalence of pathogens in native bees in agricultural landscapes. **Sophie Cardinal** (sophie.cardinal@agr.gc.ca), Joel H. Kits, and Teresa Martin, Agriculture and Agri-Food Canada, Ottawa, ON, Canada
- 2:30 **4612** Presentation withdrawn
- 2:45 **4613** Genetic variation of an apterous parasitoid, *Haplogonatopus oratorius* (Hymenoptera: Dryinidae), affected by host's long-distance dispersal: The case of coastal areas around Japan (Hymenoptera: Dryinidae). **Toshiharu Mita** (t3mita@agr.kyushu-u.ac.jp), Kyushu Univ., Fukuoka, Japan
- 3:00 **BREAK**
- 3:15 **4614** Vespidae wasps (Hymenoptera: Vespidae) of Canada. **Robert Longair** (longair@ucalgary.ca)<sup>1</sup> and Matthias Buck<sup>2</sup>, <sup>1</sup>Univ. of Calgary, Calgary, AB, Canada, <sup>2</sup>Royal Alberta Museum, Edmonton, AB, Canada

- 4:45 **4620** A comparison of old and new: Does historical land conversion to agriculture relate to bee diversity on the Southern High Plains of Texas, USA? **Samuel Discua** (samuel.discua@ttu.edu) and Scott Longing, Texas Tech Univ., Lubbock, TX
- 5:00 **4621** Native bee diversity in mid-Atlantic woodlands. **Grace Savoy-Burke** (gsburke@udel.edu)<sup>1</sup>, Deborah A. Delaney<sup>1</sup>, and Sam Droege<sup>2</sup>, <sup>1</sup>Univ. of Delaware, Newark, DE, <sup>2</sup>U.S. Geological Survey, Beltsville, MD
- 5:15 **4622** Bumble bee (*Bombus* spp.) distributions and foraging behavior across an urban-agricultural gradient. **Vera Pfeiffer** (vpfeiffer@wisc.edu) and Janet Silbernagel, Univ. of Wisconsin, Madison, WI

### Contributed Papers: Biodiversity, Biogeography, and Conservation of Arthropods: Novel Methods

#### West Hall F1 (WF1) (Convention Center)

**Moderators:** Joel Gibson<sup>1</sup> and Robert Kula<sup>2</sup>, <sup>1</sup>Royal British Columbia Museum, Victoria, BC, Canada, <sup>2</sup>USDA - ARS, Washington, DC

- 1:30 **4623** antmaps.org: An interactive client-server mapping application for visualizing the ants of the world. **Julia Janicki** (jhanicki@gmail.com)<sup>1,2</sup>, Nitish Narula<sup>1</sup>, Matt Ziegler<sup>2</sup>, Benoit Guénard<sup>3</sup>, and Evan Economo<sup>1</sup>, <sup>1</sup>Okinawa Institute of Science and Technology, Onna, Japan, <sup>2</sup>Univ. of Wisconsin, Madison, WI, <sup>3</sup>Univ. of Hong Kong, Hong Kong, China
- 1:45 **4624** Using museums and molecules to advance insect biodiversity science. **Joel Gibson** (jfgibson@uoguelph.ca), Royal British Columbia Museum, Victoria, BC, Canada
- 2:00 **4625** Identifying insects by specimen image and machine learning method. **Jiangning Wang** (wangjn@ioz.ac.cn), Aiping Liang, and Liqiang Ji, Chinese Academy of Sciences, Beijing, China

- 2:15 **4626** Cryptic diversity in the globally invasive greenhouse thrips. **Paul F. Rugman-Jones** (paulrj@ucr.edu), Mark S. Hoddle, and Richard Stouthamer, Univ. of California, Riverside, CA
- 2:30 **4627** Surveying insects in the Atlantic Coastal Plain of the U.S., an underappreciated biodiversity hotspot. **Michael Caterino** (mcateri@clermson.edu)<sup>1</sup>, Robert Kula<sup>2</sup>, Jason Cryan<sup>3</sup>, Jon K. Gelhaus<sup>4</sup>, Joseph V. McHugh<sup>5</sup>, Brian G. Scholtens<sup>6</sup>, Charles R. Bartlett<sup>7</sup>, Michael Gates<sup>2</sup>, John C. Morse<sup>1</sup>, and Peter Adler<sup>1</sup>, <sup>1</sup>Clemson Univ., Clemson, SC, <sup>2</sup>USDA - ARS, Washington, DC, <sup>3</sup>North Carolina Museum of Natural Sciences, Raleigh, NC, <sup>4</sup>Drexel Univ., Philadelphia, PA, <sup>5</sup>Univ. of Georgia, Athens, GA, <sup>6</sup>College of Charleston, Charleston, SC, <sup>7</sup>Univ. of Delaware, Newark, DE
- 2:45 **4628** Australian jumping plant lice and lerp insects (Hemiptera: Psylloidea): Species richness, systematics, invasives, and conservation. **Gary Taylor** (gary.taylor@adelaide.edu.au)<sup>1</sup>, Erinn Fagan-Jeffries<sup>1</sup>, Melinda Moir<sup>2</sup>, Martin Steinbauer<sup>3</sup>, and Andrew Austin<sup>1</sup>, <sup>1</sup>The Univ. of Adelaide, Adelaide, Australia, <sup>2</sup>Dept. of Agriculture and Food, South Perth, Australia, <sup>3</sup>La Trobe Univ., Melbourne, Australia
- 3:00 BREAK**
- 3:15 **4629** MAD and the Malagasy Micropezidae. **Stephen Marshall** (samarsha@uoguelph.ca), Univ. of Guelph, Guelph, ON, Canada
- 3:30 **4630** Biodiversity project at the Central Florida Zoo. **Robert Belmont** (rbelmont@massey-services.com), Massey Services, Inc., Orlando, FL
- 3:45 **4631** Diversity, distribution, and horizontal transmission to a parasitoid of symbionts in the *Bemisia tabaci* whitefly complex. **Yin-Quan Liu** (yqliu@zju.edu.cn), Zhen Zhang, Yu-Heng Lu, Hong-Wei Shan, and Shu-Sheng Liu, Zhejiang Univ., Hangzhou, China
- 4:00 **4632** The influence of community biodiversity on species interactions: *Drosophila* and their *Leptopilina* parasitoids as a study system. **Chia-Hua Lue** (chia3@umbc.edu)<sup>1</sup>, Matthew L. Buffington<sup>2</sup>, and Jeff Leips<sup>1</sup>, <sup>1</sup>Univ. of Maryland, Baltimore, MD, <sup>2</sup>USDA - ARS, Washington, DC
- 4:15 **4633** Presentation withdrawn
- 4:30 **4634** "Green to brown": Quantifying shifts in arthropod trophic structure following plant invasion. **Adam Mitchell** (mitchell.adam.b@gmail.com) and Douglas W. Tallamy, Univ. of Delaware, Newark, DE
- 4:45 **4635** Juniper-infesting *Rhagoletis* (Diptera: Tephritidae): Potential new North American species and establishment of a worldwide juniper-collecting network. **James Smith** (jimsmith@msu.edu) and Daniel Hulbert, Michigan State Univ., East Lansing, MI
- 5:00 **4636** Museum specimens document historical changes in stonefly (Plecoptera) assemblages: Fixed sites lose both species and traits. **R. Edward DeWalt** (dewalt@illinois.edu) and Yong Cao, Univ. of Illinois, Champaign, IL
- 5:15 **4637** Cross-pollination in the 21st century: Integrating entomologists and botanists to explore the island biogeography and conservation of Caribbean orchids. **Peter Houlihan** (phoulihan@ufl.edu), Florida Museum of Natural History, Gainesville, FL

### Contributed Papers: Insect-Plant Interactions in a Changing Climate: Host Plant Interactions

#### Room W232 B (Convention Center)

**Moderators:** Dayna Collett<sup>1</sup> and Elsa Youngsteadt<sup>2</sup>, <sup>1</sup>Oklahoma State Univ., Stillwater, OK, <sup>2</sup>North Carolina State Univ., Raleigh, NC

- 1:30 **4638** Reducing urban tree pests through data-driven planting: What can we learn from municipal tree inventories? **Elsa Youngsteadt** (ekyoungs@ncsu.edu), Kristi Backe, and Steven Frank, North Carolina State Univ., Raleigh, NC
- 1:45 **4639** Molecular detection of seed DNA in regurgitates of granivorous carabid beetles. **Corinna Wallinger** (corinna.wallinger@uibk.ac.at), Daniela Sint, Rebecca Mayer, Florian Baier, and Michael Traugott, Univ. of Innsbruck, Innsbruck, Austria
- 2:00 **4640** Isolation, identification, and characterization of Cerambycid beetles and their bacterial symbionts in three New York City urban parks. **Olga Calderon** (ocalderon@lagcc.cuny.edu), City Univ. of New York, Long Island City, NY
- 2:15 **4641** Oviposition-induced indirect defence trait in wild and cultivated maize against spotted stemborer (*Chilo partellus*). **Daniel Mutyambai** (dmutyambai@icipe.org)<sup>1</sup>, Toby Bruce<sup>2</sup>, Charles Midega<sup>1</sup>, Johnnie VanDenBerg<sup>3</sup>, John Pickett<sup>2</sup>, and Zeyaur Khan<sup>1</sup>, <sup>1</sup>International Centre of Insect Physiology and Ecology, Nairobi, Kenya, <sup>2</sup>Rothamsted Research, Harpenden, United Kingdom, <sup>3</sup>North-West Univ., Potchefstroom, South Africa
- 2:30 **4642** Effects of larval rearing, temperature and host plant quality on development, growth, and survival of nutgrass armyworm, *Spodoptera exempta* Walker (Lepidoptera: Noctuidae). **Dianne Joy Aguilon** (ddaguilon@up.edu.ph), Univ. of the Philippines, Los Baños, Philippines
- 2:45 **4643** *In vitro* assessment of food consumption, utilization indices, and losses promises of leafworm, *Spodoptera litura* (Fab.), on okra. **Ahmad Nawaz** (nawazrajpoot@yahoo.com)<sup>1</sup>, Muhammad Arif<sup>1</sup>, Muhammad Dildar Gogi<sup>1</sup>, Muhammad Sufyan<sup>1</sup>, Fatima Mustafa<sup>1</sup>, Sana Shokat<sup>1</sup>, Imran Khan<sup>1</sup>, and Muhammad Binyameen<sup>2</sup>, <sup>1</sup>Univ. of Agriculture, Faisalabad, Pakistan, <sup>2</sup>Bahauddin Zakariya Univ., Multan, Pakistan
- 3:00 BREAK**
- 3:15 **4644** The butterfly plant arms-race escalated by gene and genome duplications. **Christopher Wheat** (chris.wheat@zoologi.su.se), Stockholm Univ., Stockholm, Sweden



- 3:30 **4645** Standardizing laboratory rearing protocols for the bird cherry-oat aphid (*Rhopalosiphum padi* L.): Incorporation of heteroecious behavior to improve fitness. **Dayna Collett** (dayna.collett@okstate.edu) and Kris Giles, Oklahoma State Univ., Stillwater, OK
- 3:45 **4646** Application of phytohormone based induced resistance and biological control agents reduces the population of aphids on *Brassica napus* L. **Samina Ahmad** (saminatmalik@yahoo.com) and Jam Ahmad, Univ. of Agriculture, Faisalabad, Pakistan
- 4:00 **4647** Plant response to sucking insects: The redox reaction of *Arabidopsis thaliana* to *Myzus persicae*. **Junhuan Xu** (Junhuanxu@uark.edu) and Fiona Goggin, Univ. of Arkansas, Fayetteville, AR
- 4:15 **4648** A salivary protein of the whitefly, *Bemisia tabaci*, affects its phloem-feeding on host plants. **Hong-Xing Xu** (x.h.xing1983@163.com), Yue Hong, Ruo-Xuan Shao, Xing-Wei Wang, Shu-Sheng Liu, and Xiao-Wei Wang, Zhejiang Univ., Hangzhou, China
- 4:30 **4649** Comparative transcriptome elucidates the molecular basis underlying adaptation of whitefly, *Bemisia tabaci*, to novel host plants. **Wen-Qiang Xia** (wqxia.zj@gmail.com), Xin-Ru Wang, Xiao-Wei Wang, and Shu-Sheng Liu, Zhejiang Univ., Hangzhou, China
- 4:45 **4655** Role of public sector in dissemination of plant protection technologies through participatory extension among maize growers. **Ijaz Ashraf** (gilluaf707@uaf.edu.pk), Univ. of Agriculture, Faisalabad, Pakistan
- 3:00 BREAK**
- 3:15 **4656** Minimizing insect infestations in grain storage facilities prior to harvest. **Edmond L. Bonjour** (edmond.bonjour@okstate.edu) and Carol Jones, Oklahoma State Univ., Stillwater, OK
- 3:30 **4657** Climate change and pest management: Impact network analysis to evaluate adaptation strategies. **Karen Garrett** (karengarrett@ufl.edu), Univ. of Florida, Gainesville, FL
- 3:45 **4658** Evolution of resistance of fall armyworm (*Spodoptera frugiperda* Smith) to Cry1F protein in Argentina. Nicholas Storer<sup>1</sup>, Desmi Chandrasena<sup>1</sup>, Florencia Figueroa Bunge<sup>2</sup>, Dwain M. Rule<sup>1</sup>, Ana Signorini<sup>2</sup>, Magdalena Lopez Olaciregui<sup>2</sup>, **Carlos Vassallo** (cvassallo@dow.com)<sup>2</sup>, Analiza P. Alves<sup>3</sup>, Clinton D. Pilcher<sup>3</sup>, Gustavo Abratti<sup>4</sup>, and Andres Beibe<sup>5</sup>, <sup>1</sup>Dow AgroSciences, Indianapolis, IN, <sup>2</sup>Dow AgroSciences, Buenos Aires, Argentina, <sup>3</sup>DuPont Pioneer, Johnston, IA, <sup>4</sup>DuPont Pioneer, Pergamino, Argentina, <sup>5</sup>DuPont Pioneer, Buenos Aires, Argentina
- 4:00 **4659** Presentation withdrawn
- 4:15 **4660** Development of near real-time weather-based insect pest forecasting system for Alberta, Canada. **Swaroop Kher** (swaroop.kher@gov.ab.ca)<sup>1</sup>, Daniel Itenfisu<sup>1</sup>, and Scott Meers<sup>2</sup>, <sup>1</sup>Government of Alberta, Edmonton, AB, Canada, <sup>2</sup>Alberta Agriculture and Rural Development, Brooks, AB, Canada
- 4:30 **4661** Potential of the growth-inhibiting activity of *Datura innoxia* Mill. (Solanaceae) in the management of tobacco caterpillar, *Spodoptera litura* (Fab.) (Lepidoptera: Noctuidae). **Anupam Sharma** (avsharma@hindu.du.ac.in), Vagisha Rawal, Ashok Singh, and Tarun Vats, Univ. of Delhi, New Delhi, India
- 4:45 **4662** Presentation withdrawn
- 5:00 **4663** The ecological control of citrus pests based on predatory mites and bio-rational insecticides. **Xiaoduan Fang** (fangxiaoduan@163.com)<sup>1</sup>, Gecheng Ouyang<sup>1</sup>, Huilin Lu<sup>1</sup>, Yulu Xia<sup>2</sup>, Mingfang Guo<sup>1</sup>, and Weinan Wu<sup>1</sup>, <sup>1</sup>Guangdong Academy of Agricultural Sciences, Guangzhou, China, <sup>2</sup>National Science Foundation Center for Integrated Pest Management, Raleigh, FL
- 5:15 **4664** Monitoring of insecticide resistance in different populations of pink mealybug, *Maconellicoccus hirsutus*, from India and quantification of detoxifying enzymes involved in resistance. **Prathibha Mruthunjayaswamy** (pratiba.wodeyar@gmail.com), Venkatesan Thiruvengadam, Sushil Jalali, and Abraham Verghese, National Bureau of Agricultural Insect Resources, Bangalore, India
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- Contributed Papers: Integrated Pest Management and Sustainable Agriculture**
- Room W225 A (Convention Center)**
- Moderators:** Anthony S. DiMiglio<sup>1</sup> and Carlos Vassallo<sup>2</sup>, <sup>1</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>2</sup>Dow AgroSciences, Buenos Aires, Argentina
- 1:30 **4650** Plant-derived volatile essential oils and western flower thrips, *Frankliniella occidentalis*. **Nathan Herrick** (nherrick@ksu.edu) and Raymond Cloyd, Kansas State Univ., Manhattan, KS
- 1:45 **4651** Sterile Insect Technique (SIT) and Unmanned Aircraft Systems (UAS): Applications and limitations in Area-Wide Integrated Pest Management (AW-IPM). **Nathan Moses-Gonzales** (nmosesgo@m3cg.us), M3 Consulting Group, Dayton, OH
- 2:00 **4652** Evaluation of insecticide delivery methods for management of cabbage maggot (*Delia radicum*) in the central coast of California. **Shimat Villanassery Joseph** (svjoseph@ucdavis.edu)<sup>1</sup>, Larry Godfrey<sup>2</sup>, and Christopher Bettiga<sup>1</sup>, <sup>1</sup>Univ. of California, Salinas, CA, <sup>2</sup>Univ. of California, Davis, CA
- 2:15 **4653** Marking and retention of harlequin bug, *Murgantia histrionica* (Hahn) (Hemiptera: Pentatomidae), on pheromone-baited and unbaited plants. **Guillermo Cabrera Walsh** (gcabrera@fuedei.org)<sup>1</sup>, Donald Weber<sup>2</sup>, Ashot Khimian<sup>2</sup>, and Anthony S. DiMiglio<sup>3</sup>, <sup>1</sup>Foundation for the Study of Invasive Species, Hurlingham, Argentina, <sup>2</sup>USDA - ARS, Beltsville, MD, <sup>3</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA
- 2:30 **4654** Survival and reproductive performance of *Diaeretiella rapae* exposed to two narrow-spectrum insecticides. **William Jessie** (w.jessie@okstate.edu) and Kris Giles, Oklahoma State Univ., Stillwater, OK

## Contributed Papers: Integrated Pest Management and Sustainable Agriculture: Behavioral Pest Management

### Room W223 B (Convention Center)

**Moderators:** Louis E. N. Jackai<sup>1</sup> and Kamal Gupta<sup>2</sup>, <sup>1</sup>North Carolina A&T State Univ., Greensboro, NC, <sup>2</sup>Univ. of Delhi, New Delhi, India

- 1:30 **4665** Developing attract-and-kill strategies to manage spotted wing drosophila, *Drosophila suzukii* Matsumura, in organic raspberry and blueberry. **Peter Jentsch** (pj5@cornell.edu)<sup>1</sup> and Timothy Lampasona<sup>2</sup>, <sup>1</sup>Cornell Univ., Highland, NY, <sup>2</sup>Univ. of Nebraska, Lincoln, NE
- 1:45 **4666** Raspberry ketone as a promising pre-release supplement for Sterile Insect Technique programs of Queensland fruit fly, *Bactrocera tryoni*. **Humayra Akter** (humayra.akter@students.mq.edu.au) and Phillip W. Taylor, Macquarie Univ., Sydney, Australia
- 2:00 **4667** Semiochemical-based pest insect management in strawberry and raspberry. **Atle Wibe** (atle.wibe@norsok.no)<sup>1</sup>, Catherine Baroffio<sup>2</sup>, Anna-Karin Borg-Karlson<sup>3</sup>, Jerry Cross<sup>4</sup>, Michelle Fountain<sup>4</sup>, David Hall<sup>5</sup>, Raimondas Mozuraitis<sup>3</sup>, Baiba Ralle<sup>6</sup>, Lene Sigsgaard<sup>7</sup>, and Nina Trandum<sup>8</sup>, <sup>1</sup>NORSØK Norwegian Centre for Organic Agriculture, Tingvoll, Norway, <sup>2</sup>Agroscope, Conthey, Switzerland, <sup>3</sup>KTH Royal Institute of Technology, Stockholm, Sweden, <sup>4</sup>East Malling Research, Kent, United Kingdom, <sup>5</sup>Natural Resources Institute, Kent, United Kingdom, <sup>6</sup>Latvian Plant Protection Research Centre, Riga, Latvia, <sup>7</sup>Univ. of Copenhagen, Frederiksberg, Denmark, <sup>8</sup>Norwegian Institute of Bioeconomy Research, Ås, Norway
- 2:15 **4668** Evaluating the implementation of trap crops to manage thrips populations in strawberries. **Janine Spies** (jrazze@ufl.edu) and Oscar Liburd, Univ. of Florida, Gainesville, FL
- 2:30 **4669** Effect of extremely low frequency electromagnetic fields on oviposition and development of *Drosophila suzukii*. **Brian Little** (balittle@uga.edu) and Ashfaq Sial, Univ. of Georgia, Athens, GA
- 2:45 **4670** From lab to field: Development of a pheromone trap for saddle gall midge (*Haplodiplosis marginata*) in the UK. **Charlotte Rowley** (crowley@harper-adams.ac.uk)<sup>1</sup>, Tom Pope<sup>1</sup>, Andrew Cherrill<sup>1</sup>, Simon Leather<sup>1</sup>, G Mandela Fernandez-Grandon<sup>2</sup>, and David R. Hall<sup>2</sup>, <sup>1</sup>Harper Adams Univ., Newport, United Kingdom, <sup>2</sup>Univ. of Greenwich, Kent, United Kingdom
- 3:00 BREAK**
- 3:15 **4671** Mustards are veritable “femmes fatales” for the harlequin bug (*Murgantia histrionica*): Exploiting the interaction between mustards, glucosinolates, and trap cropping to protect collard. **Louis E. N. Jackai** (lejackai@ncat.edu), Beatrice Dingha<sup>1</sup>, Thomas P. Kuhar<sup>2</sup>, Anthony S. DiMeglio<sup>2</sup>, Donald Weber<sup>3</sup>, and Huiping Zhou<sup>1</sup>, <sup>1</sup>North Carolina A&T State Univ., Greensboro, NC, <sup>2</sup>Virginia Polytechnic Institute and State Univ., Blacksburg, VA, <sup>3</sup>USDA - ARS, Beltsville, MD

- 3:30 **4672** Food-based semiochemicals as a potential tool to assess cutworm moth (Lepidoptera: Noctuidae) diversity in prairie agro-ecosystems. **Ronald Batallas** (batallas@ualberta.ca) and Maya L. Evenden, Univ. of Alberta, Edmonton, AB, Canada
- 3:45 **4673** Greenhouse pest control takes a new push-pull approach. **Ian Scott** (ian.scott@agr.gc.ca)<sup>1</sup>, Abdelali Hannoufa<sup>1</sup>, Mark Sumarah<sup>1</sup>, and Tyler Wist<sup>2</sup>, <sup>1</sup>Agriculture and Agri-Food Canada, London, ON, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Saskatoon, SK, Canada
- 4:00 **4674** Sperm activity and mating competence as crucial attributes of irradiated males and their F<sub>1</sub> progeny in ‘Inherited Sterility’ tactic for suppression of a tropical pest, *Spodoptera litura* (F.) (Lepidoptera: Noctuidae). **Rakesh Kumar Seth** (rkseth57@gmail.com), Zubeda Khan, Dev Kant Rao, Mahtab Zarin, and Ranjana Seth, Univ. of Delhi, New Delhi, India
- 4:15 **4675** Influence of plant volatiles on mating behaviour and reproductive fitness of *Dysdercus koenigii*. **Kamal Gupta** (kamal\_suyash@yahoo.com) and Sunil Kayesth, Univ. of Delhi, New Delhi, India
- 4:30 **4676** Response of *Contarinia nasturtii* (Diptera: Cecidomyiidae) to host plant defense elicitors. **Ross Pillischer** (ross.pillischer@uvm.edu), Rebecca Roman, Chase Stratton, Elisabeth Hodgdon, and Yolanda Chen, Univ. of Vermont, Burlington, VT
- 4:45 **4677** Use of companion plants for management of key insect pests and viral incidence in organic squash. **Lorena Lopez** (lorelopezq.257@ufl.edu)<sup>1</sup> and Oscar Liburd<sup>2</sup>, <sup>1</sup>Univ. of Florida, Wimauma, FL, <sup>2</sup>Univ. of Florida, Gainesville, FL

## Contributed Papers: Urban Entomology in a Changing Environment: Unique Challenges

### Room W230 B (Convention Center)

**Moderators:** Ryan Leonard<sup>1</sup>, Nguyen Hoa<sup>2</sup>, and Michael Merchant<sup>3</sup>, <sup>1</sup>The Univ. of Sydney, Sydney, Australia, <sup>2</sup>Laboratory of Behavior and Ecology, Seoul, South Korea, <sup>3</sup>Texas A&M AgriLife Extension Service, Dallas, TX

- 1:30 **4678** Making scents of urban pollination: Does air pollution alter honey bee memory? **Ryan Leonard** (ryan.leonard@sydney.edu.au), Dieter Hochuli, Clare McArthur, and Vanina Vergoz, The Univ. of Sydney, Sydney, Australia
- 1:45 **4679** Down the 3D rabbit hole: How staring at ticks led me to an Ed-Tech Wonderland. **Joyce Sakamoto** (jms1198@psu.edu), Pennsylvania State Univ., University Park, PA
- 2:00 **4680** A tale of two studies of cities: Synthesizing arthropod responses to urbanization with complementary meta-analyses. **Holly Martinson** (hmartins@umd.edu) and Michael J. Raupp, Univ. of Maryland, College Park, MD
- 2:15 **4681** Science outreach to elementary schools: Evaluating impacts of the insect discovery program. **Benjamin Beal** (bdbeal@email.arizona.edu), Peter Warren, Wendy Moore, and Kathleen Walker, Univ. of Arizona, Tucson, AZ



- 2:30 **4682** Presentation withdrawn
- 2:45 **4683** Adopting IPM for public school settings: The Texas, USA, model. **Michael Merchant** (m-merchant@tamu.edu) and Janet Hurley, Texas A&M AgriLife Extension Service, Dallas, TX
- 3:00 **BREAK**
- 3:15 **4684** Relationship between urban heat island effect and cicada density in metropolitan Seoul. **Nguyen Hoa** (hoanq8x@gmail.com) and Jang Yikweon, Laboratory of Behavior and Ecology, Seoul, South Korea
- 3:30 **4685** The value of urban greenspaces for conservation: Ground beetle (Coleoptera: Carabidae) and rove beetle (Coleoptera: Staphylinidae) communities in Cleveland, Ohio. **Yvan Delgado de la Flor** (delgadodelaflor.1@osu.edu), The Ohio State Univ., Wooster, OH
- 3:45 **4686** Arizona school IPM inside and out: Implementation of school integrated pest management programs in Arizona schools. **Shaku Nair** (nairs@email.arizona.edu)<sup>1</sup>, Dawn Gouge<sup>1</sup>, Al Fournier<sup>1</sup>, Kai Umeda<sup>2</sup>, David Kopeck<sup>3</sup>, Ursula K. Schuch<sup>3</sup>, Shujuan Li<sup>1</sup>, Peter Warren<sup>3</sup>, and Michael Wierda<sup>1</sup>, <sup>1</sup>Univ. of Arizona, Maricopa, AZ, <sup>2</sup>Univ. of Arizona, Phoenix, AZ, <sup>3</sup>Univ. of Arizona, Tucson, AZ
- 4:00 **4687** Water limitation alters arthropod protein and lipid intake targets. **Jamie Becker** (jambeck@bgsu.edu) and Kevin McCluney, Bowling Green State Univ., Bowling Green, OH
- 4:15 **4688** Direct treatment and residual efficacy of Fendona™ CS insecticide, a new insecticide from BASF, on striped bark scorpions, *Centruroides vittatus*. **Robert Davis** (robert.davis@basf.com)<sup>1</sup>, Robert Hickman<sup>2</sup>, Joseph Schuh<sup>3</sup>, and Matthew Lee<sup>4</sup>, <sup>1</sup>BASF, Pflugerville, TX, <sup>2</sup>BASF, Maitland, FL, <sup>3</sup>BASF, Research Triangle Park, NC, <sup>4</sup>Entomology Consultants, Mesilla Park, NM
- 4:30 **4689** Toward a broad spectrum insect granular bait. **Courtney Capobianco** (courtney@apexbait.com) and Dangsheng Liang, Apex Bait Technologies, Inc., Santa Clara, CA
- 4:45 **4690** Global uses for sulfuryl fluoride (Vikane®/ProFume® gas fumigants) for control of structural and public health pests. **Barb Nead-Nylander** (barb.neadnylander@douglasproducts.com)<sup>1</sup> and Ellen Thoms<sup>2</sup>, <sup>1</sup>Douglas Products, Rancho Santa Margarita, CA, <sup>2</sup>Douglas Products, Gainesville, FL
- 5:00 **4691** Prevalence of infestation with head lice, *Pediculus humanus capitis* (De Geer), in primary school children in the center of Erbil city, Kurdistan region, Iraq. **Wand Ali** (wand2iq@gmail.com), Univ. of Salahaddin, Erbil, Iraq

## Friday, September 30, 2016 • Evening

## ESA Closing Plenary Session

## Chapin Theater (Convention Center)

**Moderators and Organizers:** C. David Gammel<sup>1</sup> and Susan J. Weller<sup>2</sup>, <sup>1</sup>Entomological Society of America, Annapolis, MD, <sup>2</sup>Univ. of Nebraska, Lincoln, NE

5:30 PM - 6:00 PM

## ICE Closing Plenary Session

## Chapin Theater (Convention Center)

**Moderators and Organizers:** Walter S. Leal<sup>1</sup> and Alvin M. Simmons<sup>2</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>USDA - ARS, Charleston, SC

- 6:00 **4692** Closing Remarks by ICE 2016 Co-Chairs. **Walter S. Leal** (wsleal@ucdavis.edu)<sup>1</sup> and Alvin M. Simmons<sup>2</sup>, <sup>1</sup>Univ. of California, Davis, CA, <sup>2</sup>USDA - ARS, Charleston, SC
- 6:10 **4693** Closing Remarks by ESA Past President. **May R. Berenbaum** (maybe@illinois.edu), Univ. of Illinois, Champaign, IL
- 6:15 **4694** Announcement of the host for ICE 2020. **James Ridsdill-Smith** (james.ridsdill-smith@csiro.au), CSIRO, Wembley, Australia
- 6:20 **4695** Invitation for ICE 2020 by the Host Society. **James Ridsdill-Smith** (james.ridsdill-smith@csiro.au), CSIRO, Wembley, Australia
- 6:30 **4696** Closing Remarks by ICE Council Chairman. **Hari Sharma** (h.sharma@cgiar.org), Dr. YS Parmar Univ. of Horticulture & Forestry, Nauni, Solan, India



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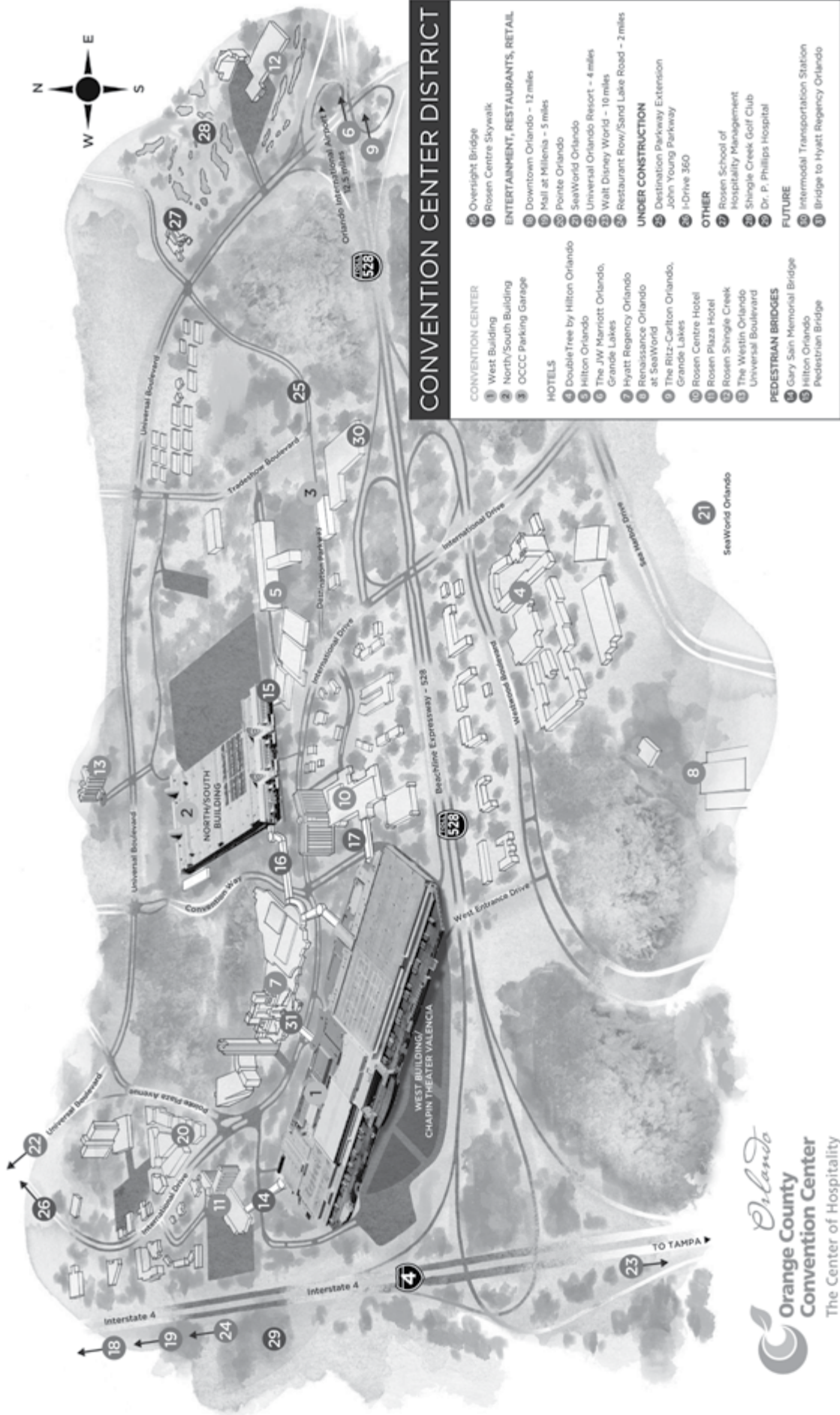
Thysanoptera Thripidae <i>Frankliniella fusca</i> .....	1064, 1503, 1609, 2061, 2953, 2954, 2955, 2956, 2957, 2959, 3998, D3199, D3754	Thysanoptera Thripidae <i>Scirtothrips citri</i> .....	2497
Thysanoptera Thripidae <i>Frankliniella invador</i> .....	D3436	Thysanoptera Thripidae <i>Scirtothrips dorsalis</i> .....	1843
Thysanoptera Thripidae <i>Frankliniella occidentalis</i> .....	0057, 0528, 0631, 1509, 1617, 2062, 2648, 2649, 2741, 2776, 2960, 3200, 3370, 3373, 3598, 3610, 3782, 4367, 4463, 4650, D3142, D3487	Thysanoptera Thripidae <i>Stenchaetothrips biformis</i> .....	2547
Thysanoptera Thripidae <i>Frankliniella schulzi</i> .....	0310	Thysanoptera Thripidae <i>Thrips palmi</i> .....	0126, 2631, 2958
Thysanoptera Thripidae <i>Frankliniella tritici</i> .....	2960	Thysanoptera Thripidae <i>Thrips tabaci</i> .....	1611, 1617, 2499, 2915, 2961, 3610, 4366
Thysanoptera Thripidae <i>Frankliniella williamsi</i> .....	1613, 3610	Thysanura Lepismatidae <i>Ctenolepisma longicaudata</i> .....	2994
Thysanoptera Thripidae <i>Heliethrips haemorrhoidalis</i> .....	4226, 4626	Trichoptera.....	4279, 4282, D3170, D3176
Thysanoptera Thripidae <i>Mycterothrips glycines</i> .....	4364	Trichoptera Glossosomatidae.....	4095
Thysanoptera Thripidae <i>Neohydatothrips variabilis</i> .....	D3089	Trichoptera Hydroptilidae.....	4095
Thysanoptera Thripidae <i>Pezothrips kellyanus</i> .....	4221, 4224	Trichoptera Philopotamidae <i>Dolophilodes distinctus</i> .....	1941
		Trichoptera Rhyacophilidae <i>Rhyacophila fasciata</i> .....	4095

## COMMON ABBREVIATIONS

AB = Alberta	ICE = International Congress of Entomology	NE = Nebraska
AK = Alaska	ID = Idaho	NF = Newfoundland
AL = Alabama	IL = Illinois	NH = New Hampshire
APHIS = Animal and Plant Health Inspection Service	IN = Indiana	NIFA = National Institute of Food and Agriculture
AR = Arkansas	INDICASAT = Institute for Scientific Research and High Technology Services	NIH = National Institute of Health
ARS = Agricultural Research Service	INRA = National Institute of Agronomic Research	NJ = New Jersey
BC = British Columbia	INRIA = French Institute for Research in Computer Science and Automation	NM = New Mexico
<i>Bt</i> = <i>Bacillus thuringiensis</i>	INTA = National Agricultural Technology Institute	NS = Nova Scotia
CA = California	IPM = Integrated Pest Management	NV = Nevada
CABI = Centre for Agriculture and Bioscience International	IRD = Research Institute for Development	NY = New York
CGIAR = Consultative Group for International Agricultural Research	IRISA = Research Institute of Computer Science and Random Systems	OH = Ohio
CIRAD = Centre for International Cooperation in Agronomic Research for Development	IRTA = Institute for Food and Agricultural Research and Technology	OK = Oklahoma
CO = Colorado	KS = Kansas	ON = Ontario
CONICET = National Scientific and Technical Research Council	KY = Kentucky	OR = Oregon
CSIRO = Commonwealth Scientific and Industrial Research Organisation	LA = Louisiana	PA = Pennsylvania
CT = Connecticut	MA = Massachusetts	PEI = Prince Edward Island
DC = District of Columbia	MB = Manitoba	PR = Puerto Rico
DE = Delaware	MD = Maryland	QC = Québec
EPA = Environmental Protection Agency	ME = Maine	RI = Rhode Island
ESA = Entomological Society of America	MI = Michigan	SC = South Carolina
FAO = Food and Agriculture Organization	MN = Minnesota	SD = South Dakota
FL = Florida	MO = Missouri	SK = Saskatchewan
FS = Forest Service	MS = Mississippi	TN = Tennessee
GA = Georgia	MT = Montana	TX = Texas
GU = Guam	NARO = National Agriculture and Food Research Organization	USDA = United States Dept. of Agriculture
HI = Hawaii	NB = New Brunswick	UT = Utah
IA = Iowa	NC = North Carolina	VA = Virginia
IAEA = International Atomic Energy Agency	ND = North Dakota	VI = Virgin Islands
		VT = Vermont
		WA = Washington
		WI = Wisconsin
		WV = West Virginia
		WY = Wyoming



# ORANGE COUNTY CONVENTION CENTER



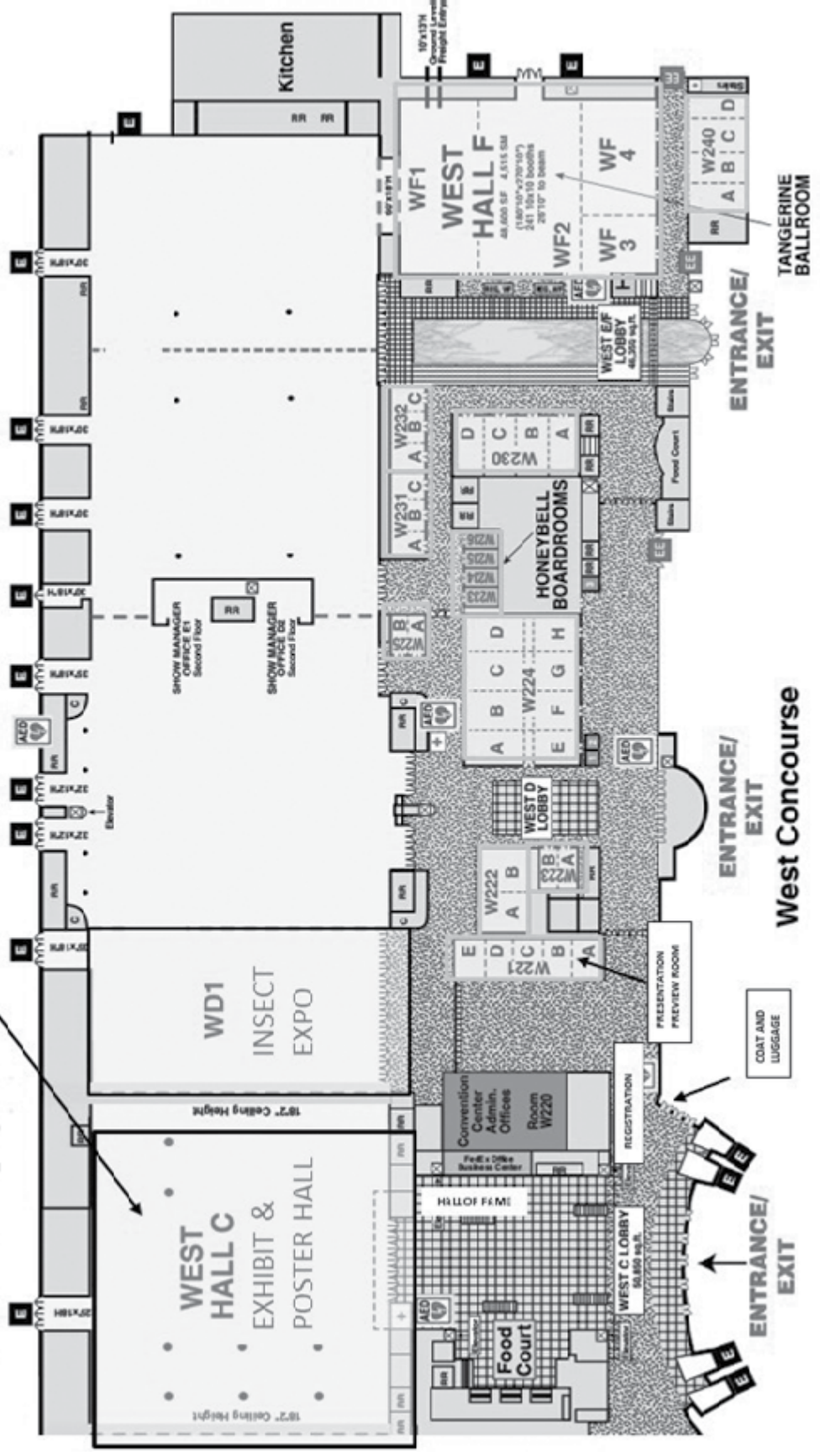
# ORANGE COUNTY CONVENTION CENTER MAP • 2nd Level •



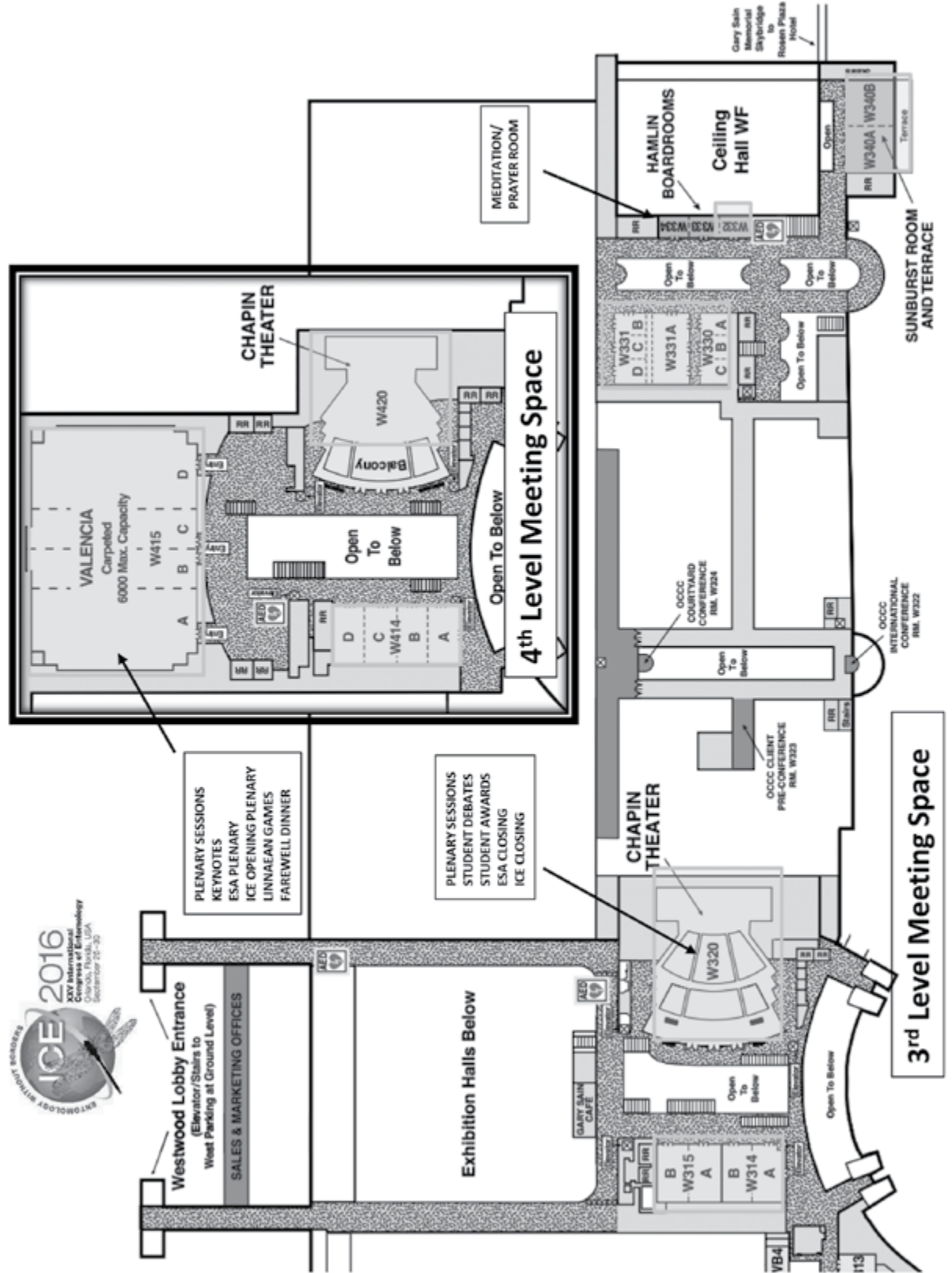
2nd Level Meeting Space

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September 25<sup>th</sup> – October 1<sup>st</sup>, 2016



# ORANGE COUNTY CONVENTION CENTER MAP • 3rd and 4th Levels •

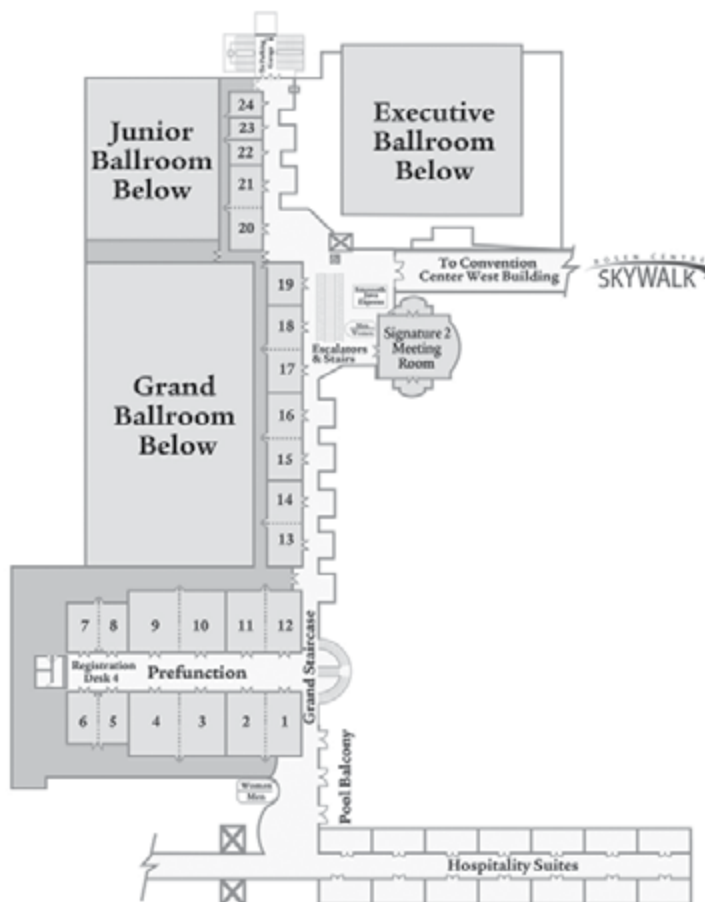




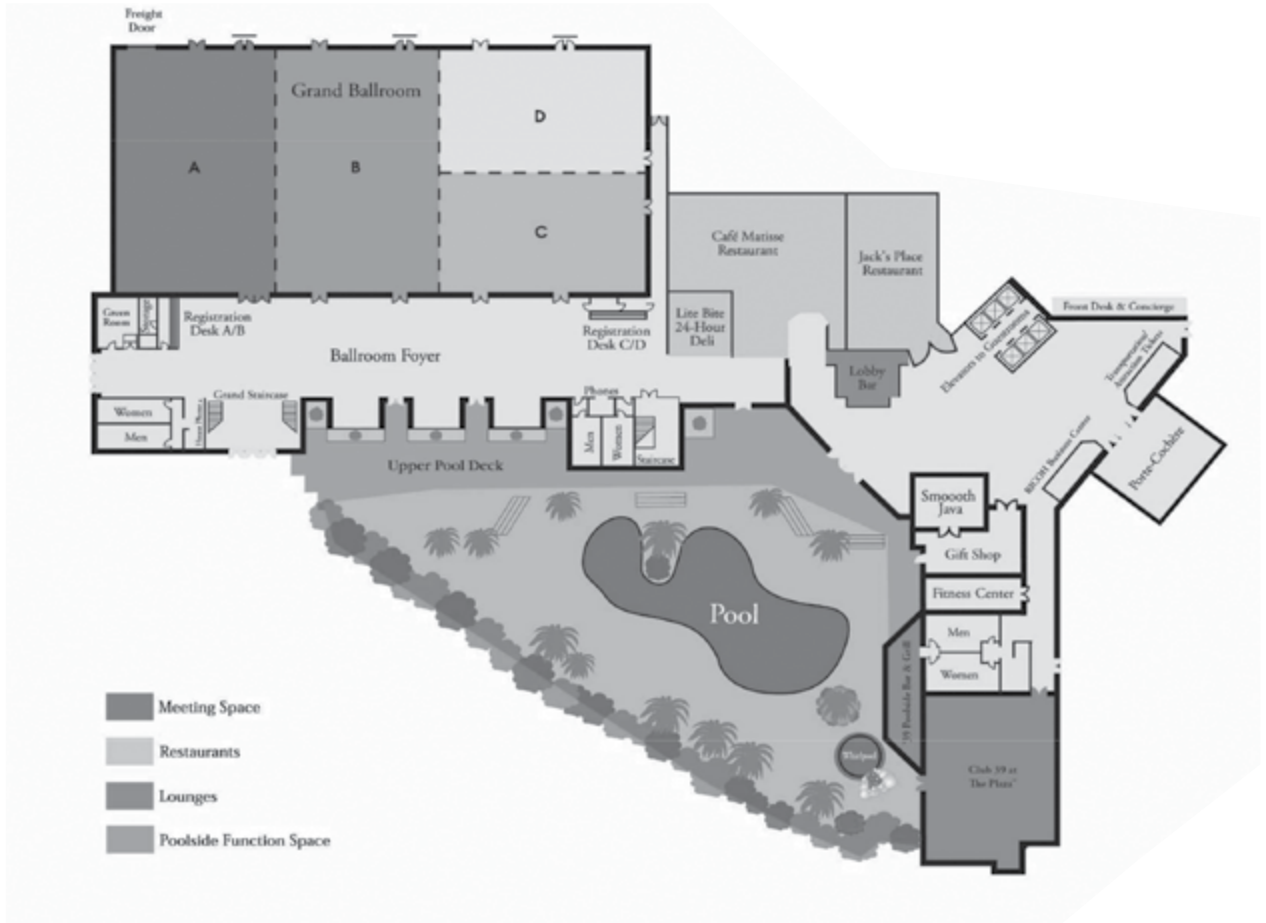
# ROSEN CENTRE HOTEL • Ground Level •



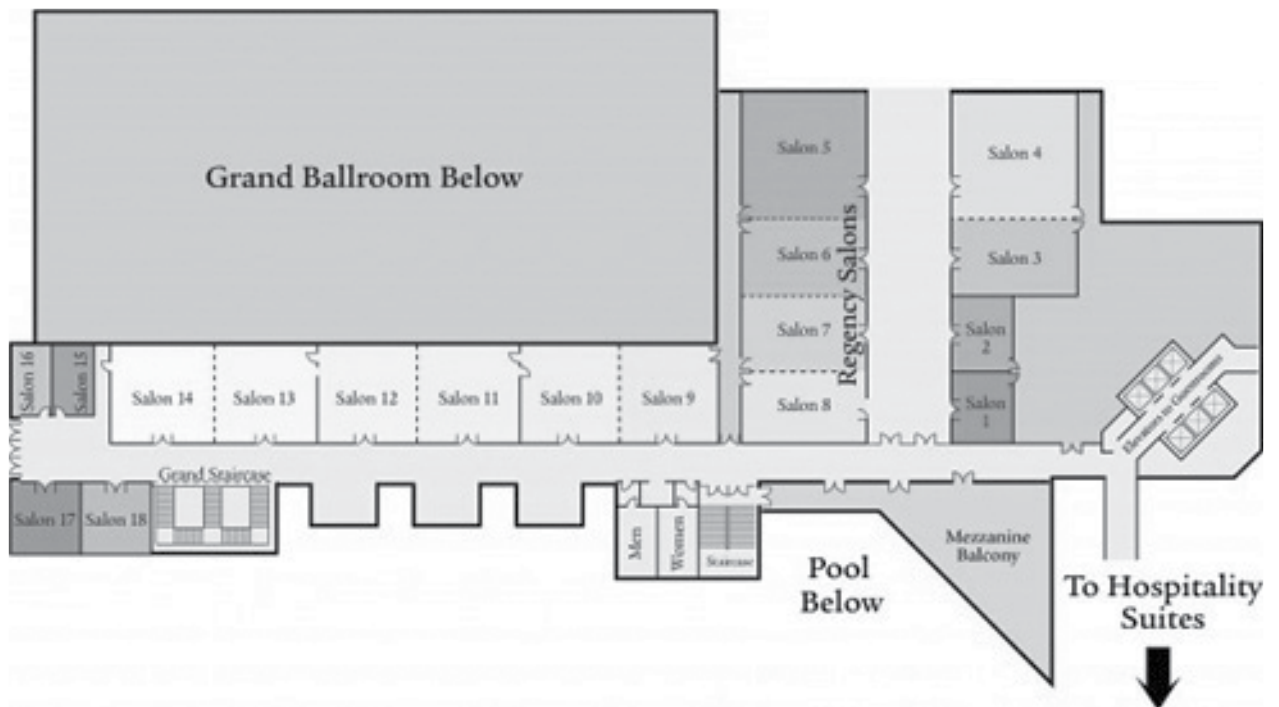
# ROSEN CENTRE HOTEL • Level 2 •



# ROSEN PLAZA HOTEL • Ground Level •



# ROSEN PLAZA HOTEL • Level 2 •



MAPS AND FLOOR PLANS







**NOTES:** \_\_\_\_\_

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# The XXV International Congress of Entomology 2016



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*I-Drive / Convention Center*
2. Days Inn  
*Convention Center / I-Drive*
3. Hyatt Regency Orlando
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5. Rosen Center Hotel
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1128B

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2883

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1013AFP

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1010CMP

Cal. Academy Drawer, poplar



1014AM

USNM Drawer, basswood



1132BQ

Mosquito Dipper



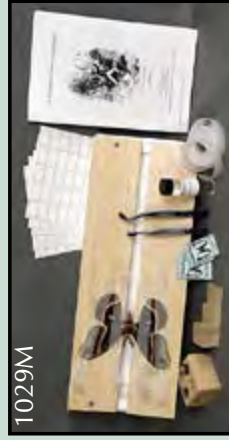
1450DS

Collapsible Cages



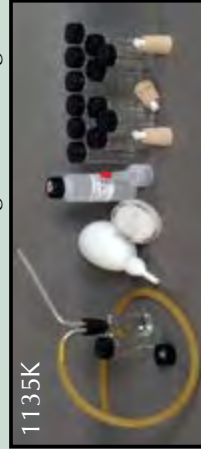
1138P

Advanced Collecting & Mounting Kit



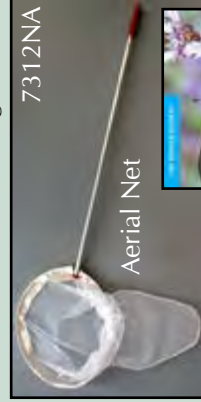
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