PROGRAM
&
PROCEEDINGS

of the

63rd ANNUAL MEETING

of the **SOUTHWESTERN BRANCH** of the

ENTOMOLOGICAL SOCIETY OF AMERICA

and the **ANNUAL MEETING** of the

SOCIETY OF SOUTHWESTERN ENTOMOLOGISTS

23-26 FEBRUARY 2015

HARD ROCK HOTEL & CASINO

TULSA, OK

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We thank the following people and organizations for their generous donations in support of Insect Expo and other functions of the SWB-ESA meeting.

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2015 MEETING

November 15-18 | Minneapolis, MN

Connect with 8,000 leading scientists in academia, government, and industry who will share the latest research, industry advances, and product development related to entomology and the agricultural sciences. The American Society of Agronomy, the Crop Science Society of America, the Soil Science Society of America, and the Entomological Society of America will co-locate their annual meetings in the Midwest's cultural capital—Minneapolis, Minnesota.

This important event offers you valuable opportunities to gain exposure for your research, learn what's new and exciting, and make valuable one-on-one connections with the top scientists from all four societies.

- **Plan your presentation topics now**
- **Secure your travel funding early**
- **Prepare to share, learn, and make valuable connections!**

Mark your calendar for these important dates:

Paper/poster submission site opens . . . . . April 13, 2015
Paper/poster submission deadline . . . . . June 12, 2015
Virtual poster deadline . . . . . July 31, 2015

Stay tuned to eNews and to ESA's website for program information.

www.entsoc.org/entomology2015

M I N N E A P O L I S

Easily-accessible, with award-winning dining, favorite attractions, world-class museums, a plethora of options for shopping and theatre, and beautiful natural spaces—Minneapolis has it all—and is host to this exciting meeting. It's a center for culinary prowess, and boasts three James Beard award-winning restaurants for Best Chef in the Midwest. And with no sales tax on clothing, you'll save $$ when shopping at the Mall of America's 500+ stores.

Submit a Symposium Today!

2016

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

PRESENT YOUR RESEARCH to the largest gathering of scientists and experts in the history of the entomological sciences

Hosted by ESA and with an anticipated attendance of over 6,000 delegates, ICE 2016 will provide a dynamic forum for the exchange of the latest science, research and innovations among entomologists and others from around the world.

IMPORTANT DATES:

- **Symposia submissions close March 2, 2015**
  All are encouraged to submit, including students and early professionals
- **Paper & Poster submissions close February 1, 2016**

Contact Cindy Myers for information on exhibits, sponsorships, and advertising
cmyers@entsoc.org
+1-301-731-4535 x3001.

Under the theme, "Entomology without Borders", research shared will cover every aspect of the discipline. Prepare now to participate in this once-in-a-lifetime event!

- Make important connections with entomologists and scientists on all levels from around the world
- Present to this global audience and compete in global competitions
- Participate in forums and discussions covering every aspect of the discipline
- Build global networks and collaborative research with others in your field of interest
- Showcase your products and services to an important global audience

ICE 2016 takes place in fun and easily-accessible Orlando, Florida, USA

www.ice2016orlando.org

Sharing Insect Science Globally
www.entsoc.org

Meeting Information

HOTEL POLICY ON ATTENDEE PRESENCE ON CASINO FLOOR:

Must be at least 21 years of age and have valid photo ID to game or be on the casino floor. Anyone under 21 years of age must be accompanied by someone 21 or older to walk through the casino floor to reach other hotel attractions / restaurants.

REGISTRATION:

All persons attending the meetings or participating in the program must register. On-site registration fees for the meeting are:

Full meeting

Active ESA member	$195
Student ESA member	$90
Non-member	$250
Spouse/Guest	$50
Honorary/Emeritus	$60

The full-meeting fee includes admission to all functions, including the banquet.

HOTEL ACCESS:

After exiting Interstate 44 onto 193rd Avenue, take a left at West Cherokee Street and continue towards the west side of the property. The hotel has two towers for lodging – Hard Rock Hotel Tower and Cherokee Hotel Tower. The main entrance to the facility is located at the Cherokee Hotel Tower on the west side.

TRAVEL INFORMATION:

Tulsa International Airport is located 9 miles from the hotel, which is a 10-20 minute taxi or shuttle ride, dependent on traffic. The Hard Rock Hotel & Casino Tulsa offers a complimentary shuttle service for transport to and from the airport. The shuttle runs every hour, on the hour, upon request from 5 AM to 10 PM. **It is best to arrange pick-up in advance.** To arrange a pick-up, call the Hard Rock Hotel & Casino Tulsa valet service at 918.384.7673.

PROGRAM SCHEDULE AND MODERATORS:

Speakers are limited to the time indicated in the schedule, and moderators have the responsibility and authority to enforce restricting time to that in the schedule. Moderators sign in at the Presentation Preview Room before the session.

AUDIOVISUAL & UPLOAD of PRESENTATIONS:

ONLY digital projectors with computers will be provided for oral presentations. Speakers must submit their presentations as Power Point files to the Upload / Presentation Preview Room one day before the session during which they will present.

POSTER PRESENTATION INFORMATION:

Poster Size: Each poster must be contained within the 46 × 46 inch (117 × 117 cm) space provided. One poster will be displayed on each side of a single board (two posters per board). The poster must NOT exceed the size limit.

Set Up: Your poster must be placed in the assigned space in the exhibit hall the night before your poster is scheduled, i.e., Monday and Tuesday, 6:00 – 8:00 PM. **Bring your own Velcro strips or tacks to secure your display to the poster board**.

Author Presence: All **Student competitors are to stand next to their posters during designated BREAK times on Tuesday, February 24.** Regular member presenters should similarly be present at their posters during designated BREAK times on Wednesday, February 25.

ESA CERTIFICATION BOARD INFORMATION:

Information regarding the ESA Certification Board is available at the Registration Desk.

JOB OPPORTUNITY BOARD:

The Student Affairs Committee will host a Job Opportunities Board during the meeting. Employers are encouraged to post copies of available opportunities for prospective students. Prospective employees/students should bring multiple copies of CV or résumé to the Board for review by potential employers. Volunteers operating the Board will serve as liaisons to arrange interviews if needed.

LOST AND FOUND:

Articles should be turned in or reported to the Registration Desk or hotel main desk.

MESSAGES:

A message board is at the Registration Desk.

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Program Information

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robert.davis@basf.com

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Past-Presidents & Chairmen of the Southwestern Branch

President	Year	Location
Jesus Esquivel	2013-14	San Antonio, TX
Scott Bundy	2012-13	Las Cruces, NM
Allen Knutson	2011-12	Little Rock, AR
Tom Royer	2010-11	Amarillo, TX
Carlos Blanco	2009-10	Cancun, Mexico
Bonnie Pendleton	2008-09	Stillwater, OK
Greg Cronholm	2007-08	Ft. Worth, TX
David Thompson	2006-07	Corpus Christi, TX
Bart Drees	2005-06	Austin, TX
Phil Mulder	2004-05	Albuquerque, NM
John D. Burd	2003-04	Lubbock, TX
Terry Mize	2002-03	Oklahoma City, OK
W. Pat Morrison	2001-02	Guanajuato, Mexico
Jim Reinert	2000-01	San Antonio, TX
James A. Webster	1999-00	Ft. Worth, TX
Carol Sutherland	1998-99	Las Cruces, NM
Ann Weise	1997-98	Corpus Christi, TX
Pete Lingren	1996-97	Oklahoma City, OK
Charles L. Cole	1995-96	Austin, TX
J. Terry Pitts	1994-95	Dallas, TX
Sidney E. Kunz	1993-94	Monterrey, Mexico
John G. Thomas	1992-93	Albuquerque, NM
Don Bull	1991-92	Tulsa, OK
Aithel McMahon	1990-91	College Station, TX
Russel E. Wright	1989-90	San Antonio, TX
Joyce Devaney	1988-89	El Paso, TX
Russ Andress	1987-88	Dallas, TX
Don Rummel	1986-87	Austin, TX
John E. George	1985-86	Monterrey, Mexico
Paul D. Sterling	1984-85	San Antonio, TX
H. Grant Kinzer	1983-84	Oklahoma City, OK
James R. Coppedge	1982-83	Corpus Christi, TX
Bill C. Clymer	1981-82	El Paso, TX
Horace W. VanCleave	1980-81	San Antonio, TX
Robert L. Harris	1979-80	Brownsville, TX
Jimmy K. Olson	1978-79	Houston, TX
J. Pat Boyd	1977-78	Lubbock, TX
Robert A. Hoffman	1976-77	Guadalajara, Mexico
Weldon H. Newton	1975-76	Oklahoma City, OK
Harry L. McMenemy	1974-75	El Paso, TX
Roger O. Drummond	1973-74	Dallas, TX
Dieter S. Enkerlin	1972-73	San Antonio, TX
Stanley Coppock	1971-72	Mexico City, Mexico

Chairman	Year	Location
C.A. King, Jr.	1970-71	El Paso, TX
Ted McGregor	1969-70	Brownsville, TX
Neal M. Randolph	1968-69	Dallas, TX
Walter McGregor	1967-68	Oklahoma City, OK
Harvey L. Chada	1966-67	San Antonio, TX
R.L. Hanna	1965-66	El Paso, TX
H.E. Meadows	1964-65	Austin, TX
Dial E. Martin	1963-64	Monterrey, Mexico
Manning A. Price	1962-63	Houston, TX
Sherman W. Clark	1961-62	Oklahoma City, OK
O.H. Graham	1960-61	San Antonio, TX
Clyde A. Bower	1959-60	El Paso, TX
Paul Gregg	1958-59	Dallas, TX
C.R. Parencia	1957-58	Houston, TX
J.C. Gaines	1956-57	San Antonio, TX
D.C. Earley	1955-56	Ft. Worth, TX
John M. Landrum	1954-55	Houston, TX
D.E. Howell	1953-54	Dallas, TX
P.J. Reno	1952-53	Galveston, TX
R.C. Bushland	1951-52	San Antonio, TX
H.G. Johnston*	1950-51	Dallas, TX

*** Southwestern Branch, American Association of Economic Entomologists**

Plenary Session Schedule

TUESDAY, FEBRUARY 24, 2015

8:00 AM – 10:00 AM **PLENARY SESSION**
Room: Sequoyah V

8:00 AM – 8:10 AM **Call to Order and Welcome**
Bob Davis, President – Southwestern Branch of ESA

8:10 AM – 8:20 AM **Welcome from the Society of Southwestern Entomologists**
Scott Bundy, President – Society of Southwestern Entomologists

8:20 AM – 8:40 AM **ESA Presidential Address**
Phillip Mulder, Jr., ESA President

8:40 AM – 8:50 AM **ESA Society Update**
Debi Sutton, ESA Director of Membership & Marketing

8:50 AM – 9:00 AM **ESA Governing Board Report**
David Ragsdale, Branch Representative

9:00 AM – 9:10 AM **International Congress of Entomology (ICE) 2016 Update**
Alvin Simmons, ICE 2016 Co-Chair

9:10 AM – 9:20 AM **Entomological Foundation Update**
Andrine Shufran, Member – Board of Counselors

9:20 AM – 9:30 AM **Certification Board Report**
Molly Keck, Branch Representative

9:30 AM – 9:45 AM ***In Memoriam* Committee Report**
Phillip Mulder, Jr., Chair

9:45 AM – 9:50 AM **Nominating Committee Report**
Jesus Esquivel, Chair

Program Announcements
Blake Bextine and Jesus Esquivel,
Co-chairs

9:50 AM – 10:00 AM **Local Arrangements Announcements**
Jackie Lee and Tom Royer, Co-chairs

10:00 AM – 10:20 AM **Break**
Room: Sequoyah IV

Program Summary

SUNDAY, FEBRUARY 22, 2015		
Program	**Time**	**Location**
Presentation Upload, Job Search & ESA Staff	12:00 PM - 6:00 PM	Wolf
Insect Expo Staging	3:00 PM - 8:00 PM	Deer II

MONDAY, FEBRUARY 23, 2015		
Program	**Time**	**Location**
Breakfast on your own	6:30 AM - 8:00 AM	
Insect Expo Staging	7:00 AM - 5:00 PM	Deer II
Meeting Registration	7:00 AM - 5:00 PM	Convention Sales Office
Presentation Upload, Job Search & ESA Staff	7:00 AM - 5:00 PM	Wolf
Silent Auction	7:00 AM - 5:00 PM	Wolf
Insect Expo	9:00 AM - 1:00 PM	Sequoyah IV, V and VI
Southwestern Branch Executive Committee Meeting	10:00 AM - 12:00 PM	Boardroom at 7th Floor
Lunch on your own	12:00 PM - 1:00 PM	
Society of Southwestern Entomologists - Executive Committee Meeting	2:00 PM - 3:30 PM	Deer I
Society of Southwestern Entomologists - General Membership Meeting	4:00 PM - 5:00 PM	Deer I
Welcome Social	5:00 PM - 7:00 PM	Sequoyah V
Student Competition Poster Set-up	5:00 PM - 8:00 PM	Sequoyah IV
Student Affairs Committee & Insect Photo Salon	8:00 PM - 10:00 PM	Boardroom at 7th Floor

TUESDAY, FEBRUARY 24, 2015		
Program	**Time**	**Location**
Breakfast on your own	6:30 AM - 8:00 AM	
Master's Posters	7:00 AM - 4:30 PM	Sequoyah IV
Ph.D. Posters	7:00 AM - 4:30 PM	Sequoyah IV
Undergraduate Posters	7:00 AM - 4:30 PM	Sequoyah IV
Meeting Registration	7:00 AM - 5:00 PM	Convention Sales Office
Presentation Upload, Job Search & ESA Staff	7:00 AM - 5:00 PM	Wolf
Silent Auction	7:00 AM - 5:00 PM	Wolf
Plenary Session	8:00 AM - 10:00 AM	Sequoyah V
BREAK	10:00 AM - 10:20 AM	Sequoyah IV
Ph.D. Ten-Minute Papers	10:20 AM - 11:20 AM	Sequoyah V
Master's Ten-Minute Papers	10:20 AM - 2:25 PM	Sequoyah VI
Undergraduate Ten-Minute Papers	11:20 AM - 12:00 PM	Sequoyah V

TUESDAY, CONT'D

Program	Time	Location
Lunch on your own	12:00 PM - 1:00 PM	
An Integrated Regional Response to an Invasive Aphid Pest of Sorghum	1:00 PM - 4:30 PM	Sequoyah V
BREAK	2:20 PM - 2:40 PM	Sequoyah IV
IPM of Emerging and Resilient Insect and Mite Pests in Texas	2:40 PM - 5:00 PM	Sequoyah VI
Student Competition Poster Removal	4:30 PM - 6:00 PM	Sequoyah IV
Linnaean Games - Preliminary Round	5:00 PM - 7:00 PM	Sequoyah V
Regular Posters Set-up	6:00 PM - 8:00 PM	Sequoyah IV
Student Social	7:00 PM - 10:00 PM	Sky Room at 18th Floor

WEDNESDAY, FEBRUARY 25, 2015

Program	Time	Location
Breakfast on your own	6:30 AM - 8:00 AM	
Meeting Registration	7:00 AM - 2:00 PM	Convention Sales Office
Silent Auction	7:00 AM - 2:50 PM	Wolf
Regular Poster Session	7:00 AM - 4:00 PM	Sequoyah IV
Presentation Upload, Job Search & ESA Staff	7:00 AM - 5:00 PM	Wolf
Update on Research of Blood Feeders with Veterinary, Medical, and Urban Importance in the Southwest	8:00 AM - 10:05 AM	Sequoyah V
Urban Research and Outreach Programs in the Southwest	8:00 AM - 11:10 AM	Sequoyah VI
BREAK	10:05 AM - 10:25 AM	Sequoyah IV
Regular Ten-Minute Papers - Session 1	10:25 AM - 11:50 AM	Sequoyah V
Lunch on your own	12:00 PM - 1:00 PM	
Regular Ten-Minute Papers - Session 2	1:00 PM - 2:25 PM	Sequoyah V
Invasive Species in the Southwest and Beyond our Horizon	1:00 PM - 3:50 PM	Sequoyah VI
BREAK	2:25 PM - 2:45 PM	Sequoyah IV
Regular Posters Removal	4:00 PM - 5:00 PM	Sequoyah IV
Linnaean Games - Final Round	5:00 PM - 7:00 PM	Sequoyah V
Banquet, Awards & Final Business Meeting	7:30 PM - 10:00 PM	Sky Room at 18th Floor

THURSDAY, FEBRUARY 26, 2015

Program	Time	Location
Breakfast on your own	6:30 AM - 8:00 AM	
ESA Staff	8:00 AM - 11:00 AM	Wolf
Southwestern Branch Executive Committee Closing Meeting	8:00 AM - 10:00 AM	Wolf

Oral & Poster Presentation Schedule

TUESDAY, FEBRUARY 24, 2015, MORNING

Ph.D. Ten-Minute Papers

Sequoyah V (Hard Rock Hotel and Casino)

Moderator: Erfan Vafaie, Texas A&M Univ., Overton, TX

10:20 AM 1-1 **Taxonomic and functional characterization of mosquito microbiome by both metagenome and single genome sequencing data.**
***Dong Pei**, Phanidhar Kukutla and Jiannong Xu, New Mexico State Univ., Las Cruces, NM*

10:32 AM 1-2 **The effect of in-hive miticides on honey bee (*Apis mellifera*) queen retinue response and queen mandibular pheromone.**
***Elizabeth Walsh** and Juliana Rangel, Texas A&M Univ., College Station, TX*

10:44 AM 1-3 **Estimating the population density of American burying beetle (*Nicrophorus americanus*) on the McAlester Army Ammunition Plant in SE OK.**
***Kyle Risser**, Kris Giles and Carmen Greenwood, Oklahoma State Univ., Stillwater, OK*

10:56 AM 1-4 **Roadside surveys to assess the persistence of bumble bee species (*Bombus* spp.) in northeast Texas.**
***Jessica Beckham**[1], Sam Atkinson[1] and Michael Warriner[2], [1]Univ. of North Texas, Denton, TX, [2]Texas Parks & Wildlife Department, Austin, TX*

11:08 AM 1-5 **Nested kin clusters within leks of the prairie mole cricket (*Gryllotalpa major*).**
***Kit Keane**, Peggy Hill and Warren Booth, Univ. of Tulsa, Tulsa, OK*

Undergraduate Ten-Minute Papers

Sequoyah V (Hard Rock Hotel and Casino)

Moderator: Erfan Vafaie, Texas A&M Univ., Overton, TX

11:20 AM 2-1 **Seasonal stoichiometric variation within dynamic aquatic plant communities (Lemnaceae) and an oligophagous insect herbivore (*Tanysphyrus lemnae*).**
***Jared Nenninger**[1] and Philip K. Morton[2,3], [1]Murray State College, Wapanucka, OK, [2]Murray State College, Tishomingo, OK, [3]Univ. of Oklahoma Biological Station, Kingston, OK*

11:32 AM 2-2 **Genetic assessment of *B. hilaris* populations in North America.**
***MacKenzie F. Patton**[1], Chris M. Powell[1], Daymon Hail[1], Thomas M. Perring[2], Darcy A. Reed[2] and Blake R. Bextine[1], [1]Univ. of Texas at Tyler, Tyler, TX, [2]Univ. of California, Riverside, CA*

11:44 AM 2-3 **Comparison of bacterial communities of potato psyllids (*Bactericera cockerelli*) and thrips (*Frankliniella tritici*) collected from insect colonies.**
***Chris M. Powell** and Blake R. Bextine, Univ. of Texas at Tyler, Tyler, TX*

11:56 AM **Break for Lunch**

Master's Ten-Minute Papers

Sequoyah VI (Hard Rock Hotel and Casino)

Moderators: Andrine A. Shufran, Oklahoma State Univ., Stillwater, OK and **Danny McDonald**, Sam Houston State Univ., Huntsville, TX

10:20 AM 3-1 **Effectiveness of the fungus gardens of *Trachymyrmex septentrionalis* as an ecological bioreactor.**
***Alexandria DeMilto** and Jon Seal, Univ. of Texas at Tyler, Tyler, TX*

10:32 AM 3-2 **RNA interference: potato/tomato psyllid, *Bactericera cockerelli,* oral delivery of double – stranded RNAi constructs.**
***Bijaya Sharma**[1], Wayne B. Hunter[2] and Blake R. Bextine[1], [1]Univ. of Texas at Tyler, Tyler, TX, [2]USDA-ARS, Ft. Pierce, FL*

10:44 AM 3-3 **Sequenced mitogenome of two kissing bug species.**
*Blake R. Bextine and **Chissa-Louise Rivaldi**, Univ. of Texas at Tyler, Tyler, TX*

10:56 AM 3-4 **Extensive mitochondrial heteroplasmy in natural populations of a resurging human pest, the bed bug, *Cimex lectularius*.**
***Grant Robison**[1], Coby Schal[2], Edward Vargo[3] and Warren Booth[1], [1]Univ. of Tulsa, Tulsa, OK, [2]North Carolina State Univ., Raleigh, NC, [3]Texas A&M Univ., College Station, TX*

11:08 AM 3-5 **The mitochondrial genome of the potato psyllid *(Bactericera cockerelli* Sulc.*)*.**
***Amalia Lopez**, Daymon Hail and Blake R. Bextine, Univ. of Texas at Tyler, Tyler, TX*

11:20 AM 3-6 **Does parasitism of monarch butterflies (*Danaus plexippus*) differ with land use?**
***Shannon Andreoli** and Kristen Baum, Oklahoma State Univ., Stillwater, OK*

11:32 AM **3-7** **Toxicity of essential oil components in the Turkestan cockroach, *Blatta lateralis* (Blattodea: Blattidae).**
Sudip Gaire *and Alvaro Romero, New Mexico State Univ., Las Cruces, NM*

11:44 AM **3-8** **Risk of exposure to ticks and tick-borne pathogens in state parks in Oklahoma.**
Jaclyn Martin *and Bruce Noden, Oklahoma State Univ., Stillwater, OK*

11:56 AM **Break for Lunch**

1:00 PM **3-9** **The varying influence of abiotic factors on physiological processes of the invasive tawny crazy ant (*Nylanderia fulva*).**
Lance Umlang*, Danny McDonald and Jerry L. Cook, Sam Houston State Univ., Huntsville, TX*

1:12 PM **3-10** **Manipulation of the *Solenopsis invicta* Virus-1 titers by RNA interference in the red imported fire ant (*Solenopsis invicta*).**
Patrick Rydzak[1]*, Blake R. Bextine*[1] *and Wayne B. Hunter*[2]*,* [1]*Univ. of Texas at Tyler, Tyler, TX,* [2]*USDA-ARS, Ft. Pierce, FL*

1:24 PM **3-11** **Honey bee (*Apis mellifera*) drone reproductive health.**
Adrian Fisher II *and Juliana Rangel, Texas A&M Univ., College Station, TX*

1:36 PM **3-12** **County scale distribution of Oklahoma tick species of medical and veterinary importance.**
Jessica Mitcham *and Bruce Noden, Oklahoma State Univ., Stillwater, OK*

1:48 PM **3-13** **Finding the sweetest smell of death: Artificial stink bait attracts less carrion beetles than rotten mice.**
Theresa E. Andrew*, W. Wyatt Hoback, Phillip G. Mulder and Andrine A. Shufran, Oklahoma State Univ., Stillwater, OK*

2:00 PM **3-14** **Effects of quebracho (*Schinopsis balansae*) on stable fly development in dairy cattle manure.**
Samantha Hays*, Tarleton State Univ., Stephenville, TX*

2:12 PM **3-15** **An analysis of the pollen collected by honey bees (*Apis mellifera* L.) in developed areas.**
Pierre Lau[1]*, Juliana Rangel*[1]*, Ana Cabrera*[2]*, Daniel Schmehl*[2]*, Zachary Y. Huang*[3] *and Joseph Sullivan*[4]*,* [1]*Texas A&M Univ., College Station, TX,* [2]*Bayer CropScience, Research Triangle Park, NC,* [3]*Michigan State Univ., East Lansing, MI,* [4]*Ardea Consulting, Woodland, CA*

TUESDAY, FEBRUARY 24, 2015, AFTERNOON

Program Symposium: An Integrated Regional Response to an Invasive Aphid Pest of Sorghum

Sequoyah V (Hard Rock Hotel and Casino)

Moderators and Organizers: Michael Brewer, Texas A&M AgriLife Research, Corpus Christi, TX and **Tom Royer**, Oklahoma State Univ., Stillwater, OK

1:00 PM **4-1** **Not an apocalypse: perspectives on pest potential of aphids.**
Bonnie Pendleton*, West Texas A&M Univ., Canyon, TX*

1:20 PM **4-2** **Identification, spread, and regionwide perspective on sorghum damage by sugarcane aphid.**
Robert Bowling*, Texas A&M AgriLife Extension, Corpus Christi, TX*

1:40 PM **4-3** **From seedling to harvest protection: insecticide use strategies and use considerations.**
David L. Kerns *and Sebe Brown, Louisiana State Univ., Winnsboro, LA*

2:00 PM **4-4** **Regional thresholds for IPM decision-making: balancing aphid control, costs, and natural enemy potential.**
Michael Brewer[1] *and David L. Kerns*[2]*,* [1]*Texas A&M AgriLife Research, Corpus Christi, TX,* [2]*Louisiana State Univ., Winnsboro, LA*

2:20 PM **Break**

2:40 PM **4-5** **Tracking and counting aphids using web-based applications and mobile technologies.**
Brian McCornack*, Kansas State Univ., Manhattan, KS*

3:00 PM **4-6** **Approaches to management of sugarcane aphid on sorghum: host plant resistance sources and potential.**
Gary C. Peterson[1]*, J. Scott Armstrong*[2]*, William Rooney*[3] *and Lloyd Mbulwe*[3]*,* [1]*Texas A&M Univ., Lubbock, TX,* [2]*USDA-ARS, Stillwater, OK,* [3]*Texas A&M Univ., College Station, TX*

3:20 PM **4-7** **Natural enemy recruitment to artificial infestations of sugarcane aphid and greenbug on sorghum.**
J.P. Michaud[1] *and Felipe Colares*[2]*,* [1]*Kansas State Univ., Hays, KS,* [2]*Universidade Federal Rural de Pernambuco, Dois Ir, Recife, Brazil*

3:40 PM **4-8** **Panel Discussion: Approaches to grower education: current needs and looking forward.**
Tom Royer[1], *David W. Ragsdale*[2], *Charles Allen*[3], *James VanKirk*[4] *and Norman Elliott*[5], [1]*Oklahoma State Univ., Stillwater, OK,* [2]*Texas A&M Univ., College Station, TX,* [3]*Texas A&M Univ., San Angelo, TX,* [4]*Southern Region IPM Center, Raleigh, NC,* [5]*USDA-ARS, Stillwater, OK*

Program Symposium: IPM of Emerging and Resilient Insect and Mite Pests in Texas

Sequoyah VI (Hard Rock Hotel and Casino)

Moderators and Organizers: Juliana Rangel[1], **Suhas Vyavhare**[1] and **Charles Allen**[2], [1]Texas A&M Univ., College Station, TX, [2]Texas A&M Univ., San Angelo, TX

2:40 PM **5-1** **IPM programming in subtropical South Texas.**
Raul Villanueva *and Danielle Sekula, Texas A&M Univ., Weslaco, TX*

3:00 PM **5-2** **How an IPM program changes as pest issues change and during drought.**
Tommy Doederlein*, Texas AgriLife Extension Service, Lamesa, TX*

3:20 PM **5-3** **Unique problems in a drip irrigated cotton production area.**
Bradley Easterling*, Texas A&M AgriLife Extension Service, Garden City, TX*

3:40 PM **5-4** **IPM issues and solutions in far West Texas.**
Salvador Vitanza*, Texas A&M Univ., El Paso, TX*

4:00 PM **5-5** **Changes in field-specific IPM in Texas and the southern US.**
Charles Allen*, Texas A&M Univ., San Angelo, TX*

4:20 PM **5-6** **Redbanded stink bug: an emerging soybean pest in the southern region.**
Suhas Vyavhare*, Texas A&M AgriLife Research, Beaumont, TX*

4:40 PM **5-7** **Alternative IPM methods for control of *Varroa destructor* mites in Texas apiaries.**
Juliana Rangel*, Texas A&M Univ., College Station, TX*

TUESDAY, FEBRUARY 24, 2015, POSTERS

Ph.D. Posters

Sequoyah IV (Hard Rock Hotel and Casino)

P1-1 **Influence of fire and ground cover on insect community composition in mesquite dominated Texas rangelands.**
Britt Smith *and Robin M Verble, Texas Tech Univ., Lubbock, TX*

P1-2 **The rate and pattern of genome size evolution in Drosophilidae and Formicidae.**
Carl Hjelmen *and J. Spencer Johnston, Texas A&M Univ., College Station, TX*

P1-3 **Development of sequential sampling plans for aphids infesting winter canola in the Southern Plains.**
Aqeel Alyousuf[1], *Kris Giles*[1], *Mark Payton*[1], *Norman Elliott*[2] *and George Opit*[1], [1]*Oklahoma State Univ., Stillwater, OK,* [2]*USDA-ARS, Stillwater, OK*

Undergraduate Posters

Sequoyah IV (Hard Rock Hotel and Casino)

P2-1 **MicroRNA fold expression in red imported fire ant (*Solenopsis invicta*) development.**
Ryan Brunson*, Juan F. Macias Velasco and Blake R. Bextine, Univ. of Texas at Tyler, Tyler, TX*

P2-2 **Establishing a biological inventory of mosquitos (*Culex*, *Aedes*, and *Anopheles*) and their pathogen loads in East Texas.**
Mikayla Adkison[1], *Chris M. Powell*[1], *Melinda Hergert*[2] *and Blake R. Bextine*[1], [1]*Univ. of Texas at Tyler, Tyler, TX,* [2]*Texas Department of State Health Services, Tyler, TX*

P2-3 **Evaluating the effects on natural enemies from insecticides used to control sugarcane aphid on grain sorghum.**
William Ahrens[1], *Darwin J. Anderson*[2], *Michael Brewer*[2] *and Jonda Halcomb*[1], [1]*Del Mar College, Corpus Christi, TX,* [2]*Texas A&M AgriLife Research, Corpus Christi, TX*

P2-4 **Impact of flonicamid on potato psyllid (*Bactericera cockerelli*) feeding behavior.**
Katrina Tilaon[1], *Sean Whipple*[2], *Chris M. Powell*[1] *and Blake R. Bextine*[1], [1]*Univ. of Texas at Tyler, Tyler, TX,* [2]*ISK Biosciences Corporation, Kearney, MO*

P2-5 **Efficacy of insecticidal ear tags and the new VetGun™ application for horn fly (*Haematobia irritans*) control in Oklahoma cow/calf operations.**
Kylie Duggan *and Justin L. Talley, Oklahoma State Univ., Stillwater, OK*

P2-6 **Evaluating pest risk in cotton along the Texas Gulf Coast by using spatial mapping tools.**
Amandah Reyes[1], *Michael Brewer*[2], *Darwin J. Anderson*[2], *Alby L. Cartwright*[2] *and Jonda Halcomb*[1], [1]*Del Mar College, Corpus Christi, TX,* [2]*Texas A&M AgriLife Research, Corpus Christi, TX*

P2-7 **Daily fluctuations in local leafhopper (Hemiptera: Cicadellidae) diversity.**
***Natalie Gahm**, W. Wyatt Hoback and A. Wayadande, Oklahoma State Univ., Stillwater, OK*

P2-8 **Determining the cold tolerance of the American cockroach, *Periplaneta americana*.**
***David Bradt** and W. Wyatt Hoback, Oklahoma State Univ., Stillwater, OK*

P2-9 **Habitat modification as a means of managing the ear tick, *Otobius megnini*.**
***Victoria Cruz**, Tarleton State Univ., Stephenville, TX*

Master's Posters

Sequoyah IV (Hard Rock Hotel and Casino)

P3-1 **Identification and assembly of an alimentary track –associated bacterium in the Asian citrus psyllid (*Diaphorina citri*).**
***Gretta Sharp**[1], Carol Lauzon[2], Wayne B. Hunter[3], Daymon Hail[1] and Blake R. Bextine[1], [1]Univ. of Texas at Tyler, Tyler, TX, [2]California State Univ. East Bay, Hayward, CA, [3]USDA-ARS, Ft. Pierce, FL*

P3-2 **Downregulation of short Neuropeptide F Receptors (sNPFRs) using RNA interference in *Nylanderia fulva*.**
***Megan Rudolph**[1], Danny McDonald[2] and Blake R. Bextine[1], [1]Univ. of Texas at Tyler, Tyler, TX, [2]Sam Houston State Univ., Huntsville, TX*

P3-3 **Manipulation of natural enemies of key arthropod pests in Oklahoma vineyards.**
***Shane McMurry** and Eric Rebek, Oklahoma State Univ., Stillwater, OK*

P3-4 **Use of lepidoptera body size class distribution as a method for inferring secondary productivity.**
***Virginia Brown**, Texas State Univ., Austin, TX*

P3-5 **Elytron-branding as a permanent marking technique for *Nicrophorus* beetles (Coleoptera: Silphidae).**
***Tanner Jenkins**, W. Wyatt Hoback and Phillip G. Mulder, Oklahoma State Univ., Stillwater, OK*

P3-6 **Evaluation of the effectiveness of the Zerofly® Storage Bag to prevent stored-product insect pest infestation.**
***Sulochana Paudyal**, George Opit and Sandipa G. Gautam, Oklahoma State Univ., Stillwater, OK*

P3-7 **CO_2 and CH_4 emissions from soils and termites (Isoptera: Rhinotermitidae) on the Oklahoma Tallgrass Prairie Preserve.**
***Charles Konemann** and Brad Kard, Oklahoma State Univ., Stillwater, OK*

WEDNESDAY, FEBRUARY 25, 2015, MORNING

Program Symposium: Update on Research of Blood Feeders with Veterinary, Medical, and Urban Importance in the Southwest

Sequoyah V (Hard Rock Hotel and Casino)

Moderator and Organizer: Alvaro Romero, New Mexico State Univ., Las Cruces, NM

8:00 AM **Introductory Remarks**

8:05 AM **6-1** **Regulation of tick genes in response to *Ehrlichia chaffeensis* infection.**
***Deborah Jaworski**, Chuanmin Cheng, Arathy Nair and Roman Ganta, Kansas State Univ., Manhattan, KS*

8:25 AM **6-2** **Life on the edge: investigations into herbicide effects on mosquito life history traits.**
***Bruce Noden**[1], Xandra Robideau[2], Talan Klein[2] and Ebony Murrel[3], [1]Polytechnic of Namibia, Windhoek, Namibia, [2]Oklahoma State Univ., Stillwater, OK, [3]Pennsylvania State Univ., University Park, PA*

8:45 AM **6-3** **Chagas disease in New Mexico: a new risk?**
***Jane Breen Pierce** and Stephen J. Hanson, New Mexico State Univ., Las Cruces, NM*

9:05 AM **6-4** **Experimental infection and transmission of *Trypanosoma cruzi* by bed bugs: something to worry about?**
***Alvaro Romero**, Brittny Blakely and Stephen J. Hanson, New Mexico State Univ., Las Cruces, NM*

9:25 AM **6-5** **How molecular ecology is advancing our understanding of cimicid insects.**
***Warren Booth**[1], Charles Brown[1], Grant Robison[1], Coby Schal[2] and Edward Vargo[2], [1]Univ. of Tulsa, Tulsa, OK, [2]North Carolina State Univ., Raleigh, NC*

9:45 AM **6-6** **Demand for Extension-delivered information on bed bugs from homeless and community shelters.**
***Michael Merchant**[1], Paul Nester[2], Elizabeth Brown[3], Molly E. Keck[4] and Charles Helpert[1], [1]Texas A&M Univ., Dallas, TX, [2]Texas A&M AgriLife Extension Service, Houston, TX, [3]Texas A&M Univ., Austin, TX, [4]Texas A&M Univ., San Antonio, TX*

Program Symposium: Urban Research and Outreach Programs in the Southwest

Sequoyah VI (Hard Rock Hotel and Casino)

Moderators and Organizers: Wizzie Brown, Texas A&M AgriLife Extension, Austin, TX and **Molly E. Keck**, Texas A&M Univ., San Antonio, TX

8:00 AM **Introductory Remarks**

8:05 AM **7-1** **Fire ant management for Corpus Christi ISD.**
Paul Nester[1] *and Janet Hurley*[2]*, [1]Texas A&M AgriLife Extension Service, Houston, TX, [2]Texas A&M AgriLife Extension, Dallas, TX*

8:20 AM **7-2** **A sigh of relief: efficacy of Topchoice® against the tawny crazy ant, *Nylanderia fulva* (Hymenoptera: Formicidae).**
Danny McDonald*, Sam Houston State Univ., Huntsville, TX*

8:35 AM **7-3** **PT® Alpine® pressurized fly bait: a new, non-pyrethroid product for fast control of flies associated with structures.**
Robert Davis*, BASF Corporation, Pflugerville, TX*

8:50 AM **7-4** **Crape myrtle bark scale and other urban invasives appearing in Arkansas in 2014.**
John Hopkins*, Univ. of Arkansas, Little Rock, AR*

9:05 AM **7-5** **Determining genetic variability and geographic diversity of the common bed bug populations using microsatellite markers.**
Shripat Kamble*, Ralph Narain and Sreedevi Lalithambika, Univ. of Nebraska, Lincoln, NE*

9:20 AM **7-6** **The Insect Adventure Recommends: Excellent Entomology Curricula.**
Andrine A. Shufran*, Oklahoma State Univ., Stillwater, OK*

9:35 AM **7-7** **Youth outreach: what are the impacts?**
Molly E. Keck*, Texas A&M Univ., San Antonio, TX*

9:50 AM **7-8** **Working with Master Gardeners in the Travis County demonstration garden.**
Wizzie Brown*, Texas A&M AgriLife Extension, Austin, TX*

10:05 AM **Break**

10:25 AM **7-9** **Web-based outreach and social media for urban entomology.**
Michael Merchant*, Texas A&M AgriLife Extension, Dallas, TX*

10:40 AM **7-10** **Urban entomology at Texas A&M University: past, present, and future.**
Robert Puckett*, Texas A&M Univ., College Station, TX*

10:55 AM **Discussion**

Regular Ten-Minute Papers - Session 1

Sequoyah V (Hard Rock Hotel and Casino)

Moderator: Ann B. Mayo, Univ. of Texas, Arlington, TX

10:25 AM **8-1** **What's up, Docs? Your Insect Detection, Evaluation & Prediction Committee Report.**
Carol Sutherland[1]*, Richard Grantham*[2] *and Mark Muegge*[3]*, [1]New Mexico State Univ., Las Cruces, NM, [2]Oklahoma State Univ., Stillwater, OK, [3]Texas A&M Univ., Fort Stockton, TX*

10:37 AM **8-2** **Defining the neighborhood: factors determining the spatial relationships among Comanche harvester ant colonies, *Pogonomyrmex comanche* (Hymenoptera, Formicidae).**
Ann B. Mayo*, Univ. of Texas, Arlington, TX*

10:49 AM **8-3** **Hilltopping and territorial behavior of *Polistes* paper wasp (Hymenoptera: Vespidae) sexuals atop tall buildings.**
Hal Reed*, Oral Roberts Univ., Tulsa, OK*

11:01 AM **8-4** **Landscape effects on parasitism of aphids in wheat by *Lysiphlebus testaceipes*.**
Norman Elliott[1]*, Michael Brewer*[2]*, Kris Giles*[3] *and Georges Backoulou*[3]*, [1]USDA-ARS, Stillwater, OK, [2]Texas A&M Univ., Corpus Christi, TX, [3]Oklahoma State Univ., Stillwater, OK*

11:13 AM **8-5** **Conservation considerations for the monarch butterfly (*Danaus plexippus*) in the southern Great Plains.**
Kristen Baum*, Elisha Mueller, Shannon Andreoli and Shaun McCoshum, Oklahoma State Univ., Stillwater, OK*

11:25 AM **8-6** **A bioinformatics pipeline for wild mosquito NGS data mining with ecological genomics perspective.**
Jiannong Xu[1]*, Dong Pei*[1]*, Jacob Crawford*[2] *and Michelle Riehle*[3]*, [1]New Mexico State Univ., Las Cruces, NM, [2]Univ. of California, Berkeley, CA, [3]Univ. of Minnesota, St. Paul, MN*

WEDNESDAY, FEBRUARY 25, 2015, AFTERNOON

Program Symposium: Invasive Species in the Southwest and Beyond our Horizon

Sequoyah VI (Hard Rock Hotel and Casino)

Moderators and Organizers: Eric Rebek and **Jackie Lee**, Oklahoma State Univ., Stillwater, OK

1:00 PM **Welcoming Remarks**

1:05 PM **9-1** **The green menace: emerald ash borer threatens the Southwest.**
Eric Rebek*, Oklahoma State Univ., Stillwater, OK*

1:25 PM **9-2** **Seeing spots in the Southwest: what have we learned about spotted wing drosophila in Oklahoma?**
***Jackie Lee**, Oklahoma State Univ., Stillwater, OK*

1:45 PM **9-3** **A new invasive bug affecting vegetables in the Rio Grande Valley.**
***Raul Villanueva**, Texas A&M Univ., Weslaco, TX*

2:05 PM **9-4** **Biological control efforts for musk thistle in Oklahoma.**
***Tom Royer**, Oklahoma State Univ., Stillwater, OK*

2:25 PM **Break**

2:45 PM **9-5** **Tawny crazy ant and brown marmorated stink bug: plans, research, and programs in Texas.**
***Bill Ree**, Texas A&M AgriLife Extension, Bryan, TX*

3:05 PM **9-6** **Biological control efforts for saltcedar in Texas.**
***Allen Knutson**, Texas A&M Univ., Dallas, TX*

3:25 PM **9-7** **Emerging invasive species: importation biological control is still the best management tool in our box.**
***Timothy J. Kring**, Univ. of Arkansas, Fayetteville, AR*

3:45 PM **Concluding Remarks**

Regular Ten-Minute Papers - Session 2

Sequoyah V (Hard Rock Hotel and Casino)

Moderator: Abdul Hakeem, Texas A&M Univ., Lubbock, TX

1:00 PM **10-1** **Management of western flower thrips in the Texas High Plains.**
***Abdul Hakeem** and Megha N. Parajulee, Texas A&M Univ., Lubbock, TX*

1:12 PM **10-2** **Efficacy of Apta insecticide against citrus pests in Florida and Texas.**
***Scott W. Ludwig**[1], Botond Balogh[2] and James Adams[3], [1]Nichino America, Inc, Arp, TX, [2]Nichino America, Inc, Apollo Beach, FL, [3]Nichino America, Inc, Wilmington, DE*

1:24 PM **10-3** **Phosphine resistance in *T. castaneum* collected from almond storage facilities in California.**
***Sandipa G. Gautam** and George Opit, Oklahoma State Univ., Stillwater, OK*

1:36 PM **10-4** **Keys to improving phosphine fumigations in stored grain facilities.**
***Edmond L. Bonjour**, Carol Jones and Randy Beeby, Oklahoma State Univ., Stillwater, OK*

1:48 PM **10-5** **Understanding the taxonomy of vectors: first description of the pupa of *Culicoides sonorensis* (Diptera: Ceratopogonidae), vector of bluetongue and epizootic hemorrhagic disease.**
***Phillip Shults**[1], Art Borkent[2] and Roger Gold[1], [1]Texas A&M Univ., College Station, TX, [2]Royal British Columbia Museum, Salmon Arm, BC, Canada*

2:00 PM **10-6** **Nature's clean-up crew: late-season dung beetle activity in north-central Oklahoma.**
***Austin Voss**, W. Wyatt Hoback and Theresa E. Andrew, Oklahoma State Univ., Stillwater, OK*

2:12 PM **10-7** **Diggin' in: daily diapause burial depth differs among *Nicrophorus* species.**
***W. Wyatt Hoback**[1] and Jess T. Lammers[2], [1]Oklahoma State Univ., Stillwater, OK, [2]Univ. of Nebraska, Kearney, NE*

2:25 PM **End of Session & Break**

WEDNESDAY, FEBRUARY 25, 2015, POSTERS

Regular Poster Session

Sequoyah IV (Hard Rock Hotel and Casino)

P4-1 **Aphid and parasitoid activity in Oklahoma winter wheat-canola landscapes.**
***William Jessie**[1], Kris Giles[1], Aqeel Alyousuf[1], Brian McCornack[2], Timothy J. Kring[3] and Casi N. Jessie[1], [1]Oklahoma State Univ., Stillwater, OK, [2]Kansas State Univ., Manhattan, KS, [3]Univ. of Arkansas, Fayetteville, AR*

P4-2 **Development of a binomial sampling plan for yellow aphids in pecans.**
***Mark Muegge**, Texas A&M Univ., Fort Stockton, TX*

P4-3 **Shift in biotypic diversity of Russian wheat aphid (Hemiptera: Aphididae) populations in the United States.**
***Gary J. Puterka**[1], Kris Giles[2], Mike Brown[1], Scott Nicholson[1], Robert Hammon[3], Frank B. Peairs[4], Terri L. Randolph[4], G. J. Michels[5], E. D. Bynum[6], Tim Springer[7], J. Scott Armstrong[1] and Dolores Mornhinweg[1], [1]USDA-ARS, Stillwater, OK, [2]Oklahoma State Univ., Stillwater, OK, [3]Colorado State Unverisity, Grand Junction, CO, [4]Colorado State Univ., Fort Collins, CO, [5]Texas AgriLife Research Center, Bushland, TX, [6]Texas AgriLife Extension Service (TAES), Amarillo, TX, [7]USDA-ARS, Woodward, OK*

P4-4 **The genome of *Diuraphis noxia*, a global aphid pest of small grains.**
***Scott Nicholson** and Gary J. Puterka, USDA-ARS, Stillwater, OK*

P4-5 Coccinellidae activity in Oklahoma winter wheat-canola systems.
Casi N. Jessie[1], *Kris Giles*[1], *Timothy J. Kring*[2], *William Jessie*[1] *and Brian McCornack*[3], [1]*Oklahoma State Univ., Stillwater, OK,* [2]*Univ. of Arkansas, Fayetteville, AR,* [3]*Kansas State Univ., Manhattan, KS*

P4-6 Seasonal variability of insecticidal activity of essential oils of *Peumus boldus* Mol., *Laurelia sempervirens* L. and *Laureliopsis phillipiana* Rut et. Pau. against *Acanthoscelides obtectus* Say.
Gonzalo Silva[1], *Angelica Urbina*[1], *Ines Figueroa*[1] *and J. Concepcion Rodriguez*[2], [1]*Univ. of Concepcion, Chillan, Chile,* [2]*Colegio de Postgraduados en Ciencias Agrlas, Texcoco, Mexico*

P4-7 Impact of cold on the salvinia weevil, *Cyrtobagous salviniae*, a biological control agent of giant salvinia in north Texas.
Allen Knutson[1], *Piyumi Obeysekara*[2], *Abhishek Mukherjee*[3] *and Kevin Heinz*[2], [1]*Texas A&M Univ., Dallas, TX,* [2]*Texas A&M Univ., College Station, TX,* [3]*Indian Statistical Institute, Giridih, Jharkhand, India*

P4-8 Insects involved in mammalian decomposition in north-central Nebraska: a baseline study.
Kenwyn Cradock[1] *and Jill Kurzenberger*[2], [1]*Eastern New Mexico Univ., Portales, NM,* [2]*Univ. of Nebraska Weslyan, Lincoln, NE*

P4-9 Phenology and ecology of tick species parasitic on cattle and wildlife.
Trisha Dubie*, Bruce Noden and Justin L. Talley, Oklahoma State Univ., Stillwater, OK*

P4-10 Host seeking behavior in *Triatoma rubida*: short range responses to heat.
Andres Indacochea *and Alvaro Romero, New Mexico State Univ., Las Cruces, NM*

P4-11 Sentinel egg predation in glandless cotton in New Mexico.
Jane Breen Pierce[1], *Patricia E. Monk*[1] *and John Idowu*[2], [1]*New Mexico State Univ., Artesia, NM,* [2]*New Mexico State Univ., Las Cruces, NM*

P4-12 Insecticide efficacy for sugarcane aphid *Melanaphis sacchari* (Zehntner) on grain sorghum S*orghum bicolor* (L.).
Ali Zarrabi*, Tom Royer, S. Seuhs and Kris Giles, Oklahoma State Univ., Stillwater, OK*

P4-13 Insecticide efficacy and genetic evaluations for insect resistance on Oklahoma crops and livestock.
Tom Royer*, Ali Zarrabi, Kris Giles, Phillip G. Mulder, Eric Rebek, S. Seuhs and Justin L. Talley, Oklahoma State Univ., Stillwater, OK*

P4-14 Using environmental scanning electron microscopy to predict resistance of sorghum to storage weevils.
Bonnie Pendleton[1], *Michael Pendleton*[2], *Gary C. Peterson*[3] *and Suhas Vyavhare*[4], [1]*West Texas A&M Univ., Canyon, TX,* [2]*Texas A&M Univ., College Station, TX,* [3]*Texas A&M AgriLife Research, Lubbock, TX,* [4]*Texas A&M AgriLife Research, Beaumont, TX*

P4-15 Observations of the predatory mite *Stratiolaelaps scimitus*: a potential biocontrol agent of *Varroa destructor*.
Lauren Ward *and Juliana Rangel, Texas A&M Univ., College Station, TX*

P4-16 Survey of mosquito fauna and updated checklist of the mosquitoes of Oklahoma including new state records, updated distribution of *Aedes albopictus*, and potential vectors of West Nile virus.
Bruce Noden[1], *Lisa Coburn*[1], *Russell E. Wright*[1] *and Kristy Bradley*[2], [1]*Oklahoma State Univ., Stillwater, OK,* [2]*Oklahoma Department of Health, Oklahoma City, OK*

Oral Abstracts

Student Ten–Minute Paper Competition

Ph.D. Ten-Minute Papers

1-1. **Taxonomic and functional characterization of mosquito microbiome by both metagenome and single genome sequencing data**

Dong Pei, *Phanidhar Kukutla and Jiannong Xu, New Mexico State University, Las Cruces, NM*

The mosquitoes host a symbiotic gut microbial flora containing diverse microbes. Bacterial 16S rDNA based profiling has been widely used for elucidating the taxonomic composition of various mosquito associated microbial community. To uncover genetic repertoire of a metagenome, short gun sequencing is needed. However, a comprehensive metagenomic profiling requires deep sequencing and low abundant taxa have less chances to be retrieved. Moreover, most metagenomic assembly is fragmented regarding a member species in the metagenome. As a complement approach, individual bacterial genome sequencing can provide complete genome information for bacteria that are culturable. Here we present the metagenomics characterization by both metagenomic and single genome approaches. First, we conducted a metagenome shot gun sequencing and *de novo* assembly, which resulted in a metagenomic reference with 44.2 Mbp. Approximately 160 taxa were assigned, most of taxa belong to families Enterobacteriaceae, Flavobacteriaceae, Acetobacteraceae and Pseudomonadaceae. The annotation includes 29,500 CDS, 42% of which were assigned into 738 subsystems. In the meantime, we isolated and sequenced 9 bacterial genomes, including *Elizabethkingia anophelis, Enterobacter* sp., *Pseudomonas* sp., *etc.*. We then mapped those genomes to the metagenomics reference. The matched regions totaled 17.9 Mbp, indicating that these single genomes accounted for 41% of the metagenome. Among them, *Elizabethkingia, Serrata,* and *Pseudomonas* are abundantThe genome annotation of *Elizabethkingia* revealed rich TonB dependent transporters. In the *Serratia* genome, there are two CRISPR loci and several phage related genes. A large genetic capacity of antibiotic resistanceThe data suggest that single genome annotation would enhance the understanding of metagenome characterization.

1-2. **The effect of in-hive miticides on honey bee (*Apis mellifera*) queen retinue response and queen mandibular pheromone**

Elizabeth Walsh *and Juliana Rangel, Texas A&M University, College Station, TX*

Honey bee *(Apis mellifera)* populations continue to decline in part due to the ectoparasite *Varroa destructor*, which often causes colonies to collapse and die. Varroa mites were initially controlled with two in-hive miticides: the organophosphate coumaphos (Checkmite+) and the pyrethroid fluvalinate (Apistan). Sublethal in-hive levels of these miticides have been shown to cause colony-wide health problems. In this study, we explored whether the presence of coumaphos and fluvalinate in the queen-rearing beeswax environment has an effect on queen attractiveness to workers by raising queens in miticide-free beeswax or beeswax containing known concentrations of both coumaphos and fluvalinate. The size of each queen's retinue was measured and conducted a cage experiment whereby five-day old workers were exposed to queen mandibular gland extracts from both queen types. Comparisons of both the average worker retinue size per queen type and the average number of workers attracted to mandibular gland extracts showed that queens reared in miticide-free beeswax attracted a significantly larger retinue than queens reared in miticide-laden beeswax. Significance was determined using a matched-pair t-test. Mandibular gland extracts were then examined using a GC/MS analysis to detect differences in the pheromone chemistry of queens in each treatment group. Our results indicate that exposure to miticides during queen development severely alters retinue behavior by impacting the queens' pheromones, which are what the queens use to attract a retinue. This has important implications regarding the potential synergistic effects of the in-hive miticides on colony health.

1-3. **Estimating the population density of American burying beetle (*Nicrophorus americanus*) on the McAlester Army Ammunition Plant in SE OK**

Kyle Risser, *Kris Giles and Carmen Greenwood, Oklahoma State University, Stillwater, OK*

Burying beetles in the genus *Nicrophorus* are carrion feeding beetles that display cooperative brood care behavior. Historically, the American Burying Beetle (ABB) (Olivier) (Coleoptera; Silphidae) was found across the eastern United States but is currently limited to three viable populations: Southeast OK, Block Island, RI, and Central NE. Based on baited trap capture data, the McAlester Army Ammunition Plant (McAAP), located in SE OK, continues to have high ABB activity levels within its boundaries. Adult ABB are being sampled at McAAP over a 3yr period using intensive mark and recapture techniques in an effort to more accurately estimate the population density (using the program MARK) of this endangered beetle.

1-4. **Roadside surveys to assess the persistence of bumble bee species (*Bombus* spp.) in northeast Texas**

Jessica Beckham[1], *Sam Atkinson*[1] *and Michael Warriner*[2], [1]*University of North Texas, Denton, TX,* [2]*Texas Parks & Wildlife Department, Austin, TX*

Bumble bees (*Bombus* spp.) pollinate a variety of flowering plants in both natural and agricultural systems; declines in many bumble bee species worldwide have underscored the need to develop conservation initiatives. In order to implement and evaluate a conservation plan, current populations must be identified and subsequently monitored. Two bumble bee species historically found in northeast Texas, *B. pensylvanicus* and *B. fraternus*, have shown evidence of population declines in other parts of the United States, but information on the current status of this region's populations is scarce. Roadside field survey methods were used to assess bumble bee species presence and abundance in 2013 and 2014 across 16 counties of northeast Texas in an effort to aid in the construction of conservation measures. The two most common species of bumble bee along roadsides across the study region are *B. pensylvanicus* and *B. fraternus*. This indicates that Texas roadsides are a potential starting point for implementing conservation actions for declining bumble bees.

1-5. Nested kin clusters within leks of the prairie mole cricket (*Gryllotalpa major*)

Kit Keane, *Peggy Hill and Warren Booth, University of Tulsa, Tulsa, OK*

Lekking is a unique mating system where males aggregate to display for females, but do not provide any resources or direct benefits. Although several insect taxa are now known to include lekking members (best known in the Diptera), research continues to focus mainly on avian systems, for which the term was originally coined. For this reason, and because tests of several hypotheses have yielded mixed results, explanation for why such a system should occur is still unclear. Here, we have developed genetic tools and combined them with behavioral observations to evaluate models of lek formation in the prairie mole cricket *Gryllotalpa major*. Results support the potential for kin selection as a driving force behind aggregation, but not at the scale of the entire lek. Instead, highly related kin clusters exist that show elevated levels of cooperation, effectively operating as individual units. These findings highlight the need for continued research on non-model systems in order to refine theories that bridge taxa.

Undergraduate Ten-Minute Papers

2-1. Seasonal stoichiometric variation within dynamic aquatic plant communities (Lemnaceae) and an oligophagous insect herbivore (*Tanysphyrus lemnae*)

Jared Nenninger[1] *and Philip K. Morton*[2,3], [1]*Murray State College, Wapanucka, OK,* [2]*Murray State College, Tishomingo, OK,* [3]*University of Oklahoma Biological Station, Kingston, OK*

It is well known that plant growth is influenced, and limited, by the availability of nutrients in the environment, particularly nitrogen (N) and phosphorous (P). Likewise, insect herbivores are limited by the nutrients available from their host plant. One plant family, Lemnaceae; however, thrives in aquatic environments that often contain an overabundance and/or deficiency of available nutrients. While nutrient limitation can negatively impact herbivore growth, nutrient excess can also have growth limiting effects. Furthermore, the aquatic environments inhabited by Lemnaceae often have dynamic changes in nutrients, or are even toxic, and thus this plant family is known for its ability to adapt to a wide range of environmental conditions. *Tanysphyrus lemnae, an oligophagous weevil*, is a leaf-mining specialist on Lemnaceae as larvae. Our study focuses on the ability of this insect herbivore to adapt to variances in the available nutrients. Nutrient availability to the host plants varies due to seasonal and environmental factors; however, it is unknown if this nutrient variability translates to similar variation in *T. lemnae*. This study sought to quantify the nutrient availability of *T. lemnae* in two distinct environments. Cowan Creek, a creek with continuously flowing water, was selected as a low nutrient environment and Wilson Creek, a primarily stagnant lagoon, as a high nutrient environment. Host plants and weevils were collected periodically over the course of the season to measure carbon (C), N, and P content. Nutrient content in the weevils and host plants are compared between the high and low nutrient environments over the course of the season. The data will be used to ask if weevil stoichiometry mirrors that of its host plant, and if the seasonal variation of the host plant is tracked within weevil populations.

2-2. Genetic assessment of *B. hilaris* populations in North America

MacKenzie F. Patton[1], *Chris M. Powell*[1], *Daymon Hail*[1], *Thomas M. Perring*[2], *Darcy A. Reed*[2] *and Blake R. Bextine*[1], [1]*University of Texas at Tyler, Tyler, TX,* [2]*University of California, Riverside, CA*

Bagrada hilaris (Hemiptera: Pentatomidae) is an agricultural pest with a wide range of host plants that causes economically substantial damage to several crops. These infestations, mainly on cole crops, have resulted on average, a 10% yield loss of crops in multimillion dollar industries. *B. hilaris* originated from Africa and India and came to the United States in 2008; then, expanded its range as far south as New Mexico. Understanding of genetic variation within and between *B. hilaris* populations is unknown. Little genomic data exists, making evaluation of genetic structure impossible; therefore sequencing data attributed to different populations is needed. In this study, an array of genetic characteristics including cytochrome oxidase subunit 1, 16S rRNA, and partial mitochondrial sequencing were utilized to determine variance between different communities of *B. hilaris*. Roche 454 pyrosequencing, Sanger Sequencing, and Miseq information was generated to establish a baseline of molecular data for this newly imported cole crop pest and to provide a foundation for future studies.

2-3. Comparison of bacterial communities of potato psyllids (*Bactericera cockerelli*) and thrips (*Frankliniella tritici*) collected from insect colonies

Chris M. Powell *and Blake R. Bextine, University of Texas at Tyler, Tyler, TX*

The potato psyllid (*Bactericera cockerelli*) is the primary insect vector of the bacterial pathogen *Candidatus Liberibacter* solanacearum (*CL*so), the causal agent of Zebra Chip disease in solenaceious crops. The biology of phloem feeding insects is heavily influenced by their bacterial communities, which are largely determined by their food sources. Horizontal transmission of bacteria between individuals of the same species and insects of different species, with their host plants as reservoir has been demonstrated in several plant insect systems. *CL*so has a symbiotic role in potato psyllid and can colonize plants before being passed to its next insect host. Interestingly, thrips (*Frankliniella tritici*) that co-colonize plants have tested positive for the presence of *CL*so, though vector status is unknown. In this study, the total bacterial community of thrips co-colonizing *CL*so plants was analyzed and compared to potato psyllids maintained on the same plants. Samples were then subjected to bacterial community sequencing via the Illumina miSEQ platform and analyzed with the macQIIME.

Master's Ten-Minute Papers

3-1. Effectiveness of the fungus gardens of *Trachymyrmex septentrionalis* as an ecological bioreactor

Alexandria DeMilto *and Jon Seal, University of Texas at Tyler, Tyler, TX*

Fungus gardening ants exhibit a unique interaction with specific fungi in an obligatory symbiosis; ants feed and prune their fungal symbiont in exchange for nourishment. While recent studies show that leaf-cutting (*Atta* and *Acromyrmex*) ants' fungus is unable to digest cellulose, there has been little or no comparison to the other higher attine (family Myrmecinae) fungus gardening ants. Colonies of *Trachymyrmex septentrionalis* were fed two different diets to assess the ability of the symbiosis to digest plant-based carbohydrates. Fiber digestion techniques were used to evaluate the differences in cellulose, hemicellulose and lignin content of *T. septentrionalis* diets before and after assimilation in the fungus garden. The results suggest that the fungus of *T. septentrionalis* ants are more readily able to digest cellulose compared to leaf-cutting ant fungus.

3-2. RNA interference: potato/tomato psyllid, *Bactericera cockerelli,* oral delivery of double – stranded RNAi constructs

Bijaya Sharma[1], *Wayne B. Hunter*[2] *and Blake R. Bextine*[1], [1]*University of Texas at Tyler, Tyler, TX,* [2]*USDA-ARS, Ft. Pierce, FL*

Potato psyllids, *Bactericera cockerelli*, are economically important pest of the potato, tomato and other solanaceous crops. This insect is the primary vector of the phytopathogenic bacterium *Candidatus* Liberibacter solanacearum which causes Zebra Chip of potato. This disease has caused millions of dollar loss to the potato industry. Management of this pest by down-regulation of endogenous mRNA using RNAi technology is an environmentally friendly and species specific approach to pest management. In this study, a feeding assay has been developed for the oral delivery of dsRNA (RNAi constructs). Down - regulation of α - tubulin was attempted by introducing novel double stranded RNAi constructs (dsRNA) coded for α - tubulin. The introduction of dsRNA could able to cause the significant mortality of the psyllids and also, down - regulation of targeted gene has been achieved overtime as monitored by RTPCR.

3-3. Sequenced mitogenome of two kissing bug species

Blake R. Bextine and **Chissa-Louise Rivaldi***, University of Texas at Tyler, Tyler, TX*

The mitochondrial genomes of two species of kissing bugs (Family: Reduviidae, Subfamily: Tritominae) were sequenced using the Illumina MiSeq platform. In Texas, the genus Triatoma singularly represents members of this subfamily. *Triatoma gerstaeckeri* and *Triatoma lecticularia* are both important vectors of the kinetoplastid protozoan pathogen *Trypanosoma cruzi,* the etiologic agent of Chagas disease. The mitogenomes of each species are approximately the same length (17k bp). The GC content for the mitogenome of each species are similar within one percent (30.3%, 30.4%). Phylogenies constructed with the mitogenomes were constructed between the two species and compared to existing *Triatoma* phylogenies, although the sequencing of the mitogenomes of other members of this subfamily is necessary for a more complete comparison.

3-4. Extensive mitochondrial heteroplasmy in natural populations of a resurging human pest, the bed bug, *Cimex lectularius*

Grant Robison[1], *Coby Schal*[2], *Edward Vargo*[3] *and Warren Booth*[1], [1]*University of Tulsa, Tulsa, OK,* [2]*North Carolina State University, Raleigh, NC,* [3]*Texas A&M University, College Station, TX*

Homoplasmy, the occurrence of a single mitochondrial DNA haplotype within an individual, has been the accepted condition across most organisms in the animal kingdom. In recent years, a number of exceptions to this rule have been reported, largely due to the ease with which single nucleotide polymorphisms can be detected. Evidence of heteroplasmy – two or more mitochondrial variants within a single individual – has now been documented in a number of invertebrates; however when present, heteroplasmy usually occurs at low frequencies both within individuals and within

populations. The implications of heteroplasmy may be far reaching, both to the individual in relation to its health and fitness, and when considering the evolutionary dynamics of populations. We present novel evidence for frequent mtDNA heteroplasmy in the bed bug, *Cimex lectularius* L. (Hemiptera: Cimicidae). Our findings show that heteroplasmy is common, with 5 of 29 (17%) populations screened exhibiting two mitochondrial variants in approximately a 1:2 ratio within each individual. We hypothesize that the mechanism underlying heteroplasmy in bed bugs is paternal leakage because some haplotypes were shared among unrelated populations and no evidence for NUMTs was detected.

3-5. The mitochondrial genome of the potato psyllid *(Bactericera cockerelli* Sulc.*)*

Amalia Lopez, *Daymon Hail and Blake R. Bextine, University of Texas at Tyler, Tyler, TX*

The potato psyllid, *Bactericera cockerelli* Sulc. (Hemiptera: Psyllidae) is an important economic pest. This insect transmits the pathogen that causes Zebra Chip of potato. While the vector is native to the United States and northern Mexico, different insect haplotypes have been differentiated by analysis of the mitochondrial gene cytochrome oxidase I (COI). In this study, the complete mitochondrial genome for the potato psyllids from populations occurring in North America: Texas, Nebraska, California, Washington, Northwest and Southwest, were sequenced using next generation Illumina's sequencing technology. The sequencing data resulted on an average of 1,804,810 reads with a gene content that included: the16S and 12S ribosomal RNAs; 21 of the 22 tRNAs and the genes that encode for the 13 proteins: COI-III, Cytb, ND1-6, ND4L, ATP6, and ATP8. Also, mitochondrial genome analysis showed that potato psyllids populations from Texas, Nebraska and Southwestern are related, while the populations from Washington and California (Western populations) are distinctly differentiated. Most closely, the population from the Northwestern region seems to be a new population originating from the Western populations.

3-6. Does parasitism of monarch butterflies (*Danaus plexippus*) differ with land use?

Shannon Andreoli *and Kristen Baum, Oklahoma State University, Stillwater, OK*

The annual monarch butterfly (*Danaus plexippus*) migration from overwintering areas in Mexico to the northern U.S. and southern Canada is a threatened phenomenon, and population numbers are decreasing annually. Possible reasons include habitat loss, reduced nectar and host plant availability, and climate change. Monarchs migrate through central Oklahoma during their spring and fall migrations, and use *Asclepias viridis* as a larval host plant in a variety of landscapes. Land use may influence host-parasite interactions between monarchs and two of their parasites: *Lespesia archippivora,* a tachinid fly, and *Ophryocystis elektroscirrha,* a spore-forming protist. We evaluated three land use types present in Central Oklahoma (managed grasslands, rangeland, and roadsides) and if monarch parasitism rates varied among these landscapes. Fourth and fifth instar larvae were collected and raised in the lab to determine parasite infection by *L. archippivora* or *O. elektroscirrha*. We found that monarch parasitism rates did indeed vary with land use type. This suggests some land use types may serve as sources or sinks for monarchs. However, these patterns may vary among years with climate and associated differences in management practices. Additional research is needed at broader spatial and temporal scales to evaluate the overall effects of land use on monarch populations and to develop informed conservation strategies.

3-7. Toxicity of essential oil components in the Turkestan cockroach, *Blatta lateralis* (Blattodea: Blattidae)

Sudip Gaire *and Alvaro Romero, New Mexico State University, Las Cruces, NM*

The Turkestan cockroach has become an important invasive species throughout the Southwestern United States. This peridomestic cockroach has been reported invading human dwellings as well as animal facilities in California, New Mexico, Arizona and Texas. Our study aims to evaluate ecofriendly management strategies that help manage this urban pest. We evaluate the toxicity of various botanical-derived components against late instar nymphs of Turkestan cockroaches. Compounds were diluted in acetone and nymphs were treated topically between the metathoracic legs. Mortality data from each essential oil component were assessed after 24 hours post-application and subjected to Probit analysis to estimate LD_{50} values. Thymol was found to be the most toxic compound with a LD_{50} of 0.39 mg/cockroach followed by eugenol, geraniol and methyl eugenol with LD_{50} values of 1.66, 2.41 and 3.72 mg/cockroach, respectively. These results indicated that essential oil plants with a high content of thymol are promising candidates for the management of Turkestan cockroaches.

3-8. Risk of exposure to ticks and tick-borne pathogens in state parks in Oklahoma

Jaclyn Martin *and Bruce Noden, Oklahoma State University, Stillwater, OK*

The Oklahoma state park system ranks 15th in the United States for usage by the public. While providing diverse recreational activities, these state parks also provide an excellent environment for risk of acquiring arthropod pests, especially ticks. Many of these tick species are hosts to pathogenic organisms that can be transmitted to humans through a bite. Major pest species include *Amblyomma americanum*, *Dermacentor variabilis*, and *Ixodes scapularis*. Two pathogens carried by ticks cause a great impact on human and companion animal health in the state of Oklahoma. *Ehrlichia chaffeensis* is responsible for Ehrlichiosis and *Rickettsia*

spp. are responsible for Rocky Mountain Spotted Fever. To date, no studies have evaluated risk of acquiring a tick-borne disease from recreational activities in the Oklahoma state park system. During May, June, and July 2014, ticks were collected in eight state parks in Oklahoma using vegetation flagging and carbon dioxide traps. It was hypothesized there would be a higher risk for exposure to ticks and therefore, infection risk in state parks in the eastern part of the state. Of a total of 755 ticks collected, 752 were *A. americanum*. Risk of encountering a questing tick in eastern central state parks was 9-18x higher than in parks in the central and western regions. On-going studies will test the collected ticks using PCR primers to detect *E. chaffeensis* and *Rickettsia spp*. Once tested, a risk analysis for tick-borne illnesses in Oklahoma state parks will be calculated. The results will provide valuable information to the Department of Tourism and Recreation for future vector control efforts as well as information to disseminate to those using park trails.

3-9. The varying influence of abiotic factors on physiological processes of the invasive tawny crazy ant (*Nylanderia fulva*)

Lance Umlang, *Danny McDonald and Jerry L. Cook, Sam Houston State University, Huntsville, TX*

Temperature is perhaps the most pervasive abiotic factor contributing to the success of an invasive species due to its direct effects on the biochemical processes of all organisms. Data concerning the influence of changing temperature on certain physiological parameters can be useful for predicting future range distributions of an invading species such as the tawny crazy ant (*Nylanderia fulva*), however such data are unavailable at present. Here, data on two physiological processes necessary for this species' survival and reproduction within an invaded territory are presented for the first time. Critical thermal maxima and minima (CTMax/Min) were determined for workers and variations in egg production rates established for queens, using polygynous colonies collected from three locations in southeastern Texas. CT and oviposition testing were performed following seven day acclimation periods at one of six randomly assigned treatment temperatures: 10, 15, 20, 25, 30 and 35°Celcius. Mean CT limits for this species ranged from 49.98°C (CTMax) – 5.22°C (CTMin). These values are approximately 5-10°C greater than CT limits reported for other invasive ant species such as the red imported fire ant (*Solenopsis invicta*) and Argentine ant (*Linepithema humile*) potentially explaining the observed competitive dominance of *N. fulva*. While temperature and location were each found to highly influence CT values of workers, these same factors had no significant influence on the observed variations in the mean egg production rates of queens. While more work is required to fully understand the influences of abiotic factors on *N. fulva*'s physiology, these findings represent an improved understanding of the unique ecological niche currently being exploited and threatened by the tawny crazy ant along the Gulf Coast of the United States.

3-10. Manipulation of the *Solenopsis invicta* Virus-1 titers by RNA interference in the red imported fire ant (*Solenopsis invicta*)

Patrick Rydzak[1], *Blake R. Bextine*[1] *and Wayne B. Hunter*[2], [1]*University of Texas at Tyler, Tyler, TX,* [2]*USDA-ARS, Ft. Pierce, FL*

Solenopsis invicta Buren (red imported fire ant) is an economically important urban pest native to South America that has few natural enemies in the southern United States. *Solenopsis invicta* virus-1 (SINV-1) is a picorna-like single stranded positive sense virus only known to affect *S. invicta*. RNA interference (RNAi) is a known regulator of RNA viruses in biological systems and is an emerging biologically based insect control method. The purpose of this study was to increase, then decrease viral titers of SINV-1 in *S. invicta* colonies over a period of one month. Manipulation of SINV-1 viral titers was attempted by first exposing *S. invicta* colonies to SINV-1, then after fifteen days, exposing the same colonies to novel double stranded RNA (dsRNA) coded for SINV-1 viral capsid genes. *S. invicta* colony mortality was monitored over the one month period, and significant increases and decreases in viral titers were noted. In conclusion, RNAi was used to manipulate viral titers of SINV-1 in populations of *S. invicta.*

3-11. Honey bee (*Apis mellifera*) drone reproductive health

Adrian Fisher II *and Juliana Rangel, Texas A&M University, College Station, TX*

Honey bee (*Apis mellifera*) drones are haploid males produced seasonally for the sole purpose of mating to disperse colony genes. Because drones do not contribute to other colony services such as food collection, brood rearing, or defense, they are often overlooked in honey bee research. However, the study of drone reproductive quality is receiving increasing attention in apiculture given that the alarming drop in queen longevity might be related to her mating with drones of poor reproductive quality. A recent examination of drone spermatozoa viability (i.e., the proportion of total spermatozoa in a drone's seminal vesicles that is viable and can fertilize and ovule) found significant variation in spermatozoa viability between apiaries in East Texas apiaries. Possible environmental influences on the observed variation have not been established yet, but pesticides, especially beekeeper-applied miticides used in the treatment of the ectoparasitic mite Varroa destructor, have been found in high concentrations in wax samples and other bee products across the United States and seem to be aiding in the decline of honey bee populations nationwide. To assess the potential effect of exposure to in-hive miticides during development on drone spermatozoa viability, we compared the viability of spermatozoa collected from drones reared in miticide-free wax to that of drones reared in wax contaminated with field-relevant doses of miticides. Using a standard sperm

staining technique, live spermatozoa were stained with Sybr 14 die while unviable spermatozoa were died with propidium iodide. The samples were then run through a calibrated flow cytometer, which separates viable versus non-viable sperm in a sample. Our preliminary results suggest a possible significant negative effect of miticide exposure during development on drone spermatozoa viability; and thus, reproductive quality.

3-12. County scale distribution of Oklahoma tick species of medical and veterinary importance

Jessica Mitcham *and Bruce Noden, Oklahoma State University, Stillwater, OK*

The American Dog tick (*Dermacentor variabilis*) transmits a variety of zoonotic pathogens, including *Rickettsia rickettsii*, the cause of Rocky Mountain spotted fever (RMSF). The published distribution of this tick in the United States, however, is inaccurate and is often based on reports from past literature. While Oklahoma is reported to have one of the highest incidence rates of RMSF in the United States, the only geographic distribution record for the American Dog tick in Oklahoma at the county scale is from 1940. As part of a project to document the presence of important tick species in Oklahoma, reports from peer-reviewed literature, published USDA reports, VectorMap, and K.C. Emerson Entomology museum specimens were reviewed. Furthermore, active sampling including dry ice, tick drags, and collecting from harvested deer during the Summer/Fall 2014 was also used. Together, *Dermacentor variabilis* was identified in 32 counties throughout Oklahoma. Other ticks collected included the Lone Star tick (*Amblyomma americanum*); Black-legged tick (*Ixodes scapularis*), the Gulf Coast tick (*Amblyomma maculatum*) and the Winter tick (*Dermacentor albipictus*). Our active surveillance efforts identified a possible westward movement of *Ix. scapularis* in the state when compared with reports in the earlier literature. As tick-borne diseases continue to impact the Great Plains, the results of this study support that the use of active surveillance is advantagous to enhance an understanding of disease epidemiology and risk throughout the region.

3-13. Finding the sweetest smell of death: Artificial stink bait attracts less carrion beetles than rotten mice

Theresa E. Andrew*, W. Wyatt Hoback, Phillip G. Mulder and Andrine A. Shufran, Oklahoma State University, Stillwater, OK*

Carrion beetles (Coleoptera: Silphidae) utilize vertebrate carcasses for feeding and reproduction. Silphids find these carcasses using chemoreceptors located on their antennae which detect volatiles released during decomposition. Surveys for carrion beetles, including the federally endangered American burying beetle, *Nicrophorus americanus*, utilize liver or whole carcasses that are rotted at warm temperatures for several days. Because of environmental variability, consistency of bait is not possible and it likely has substantial effects on survey outcomes. In this study, we compared capture rates for commercially available stink baits (a potential artificial and consistent bait) and rotten mouse or liver baits. Between September 8 and November 11, 576 burying beetles, *Nicrophorus* sp., were captured. Two types of stink bait caught no burying beetles. Danny King's Catfish Punch Bait and rotten liver caught 95 and 30 respectively, and traps baited with whole rotten mice caught 451. From these results, whole animal carrion appears best, but captures utilizing artificial bait was documented. Future research will examine differences among the artificial baits as a step towards isolating compounds that are attractive to burying beetles that can be produced artificially.

3-14. Effects of quebracho (*Schinopsis balansae*) on stable fly development in dairy cattle manure

Samantha Hays*, Tarleton State University, Stephenville, TX*

The stable fly (*Stomoxys calcitrans*) is an important pest of livestock in confined animal feeding operations. The biting habit of the stable fly can alter behavior of dairy cattle resulting in lower milk production. These pests develop within confined dairy operations near manure, lagoons, and feeding sites. In recent laboratory studies, condensed tannins (CTs) mixed with manure have suppressed stable fly development. Condensed tannins are water soluble polyphenolic secondary plant compounds found in some broadleaf plants, such as herbaceous forage legumes. This study was designed to determine how varying levels of powder and solution-based quebracho (a commonly available source of CTs) affect the development of stable flies in dairy manure from a confined dairy operation. For this study, 100 g of fresh dairy manure was treated topically with a 0, 1, 3 or 5% quebracho/manure concentration (w/w from quebracho) and inoculated with 50 stable fly eggs. The quebracho was applied either as a powder or supernatant from 500 mL of tap water mixed with 4, 7, or 10g of quebracho powder, which was determined prior to the experiment to be used in a commercial dairy operation setting. Our study determined how varying levels of quebracho in powder or solution-based form affected 1) percent pupae emergence 2) pupae weight and 3) percent adult emergence of stable flies. There were differences ($P \leq 0.05$) between the control (0% CT) and powder quebracho (3 & 5% CT). Manure treated with the quebracho supernatants resulted in insignificant results from each concentration indicating that the supernatants had no effect on stable fly development. These results indicate that topically applied powdered quebracho at 3 and 5% may be an effective suppressant of stable flies in confined animal feeding operations. Post experimentation, a protein precipitable phenolics (PPP) assay was used to determine the CT level in the three supernatants. The PPP assay tests the binding ability of the tannins-to-proteins to measure tannin content. Statistical analysis determined that the CT content in each level of supernatant was significantly lower

than a standard quebracho solution with a 44% CT content, thus the overall effect of the supernatant on suppressing stable fly development was minimal, given the insignificant results.

3-15. An analysis of the pollen collected by honey bees (*Apis mellifera* L.) in developed areas

Pierre Lau[1], *Juliana Rangel*[1], *Ana Cabrera*[2], *Daniel Schmehl*[2], *Zachary Y. Huang*[3] *and Joseph Sullivan*[4], [1]*Texas A&M Univ., College Station, TX,* [2]*Bayer CropScience, Research Triangle Park, NC,* [3]*Michigan State Univ., East Lansing, MI,* [4]*Ardea Consulting, Woodland, CA*

Honey bee (*Apis mellifera* L.) colony maintenance depends on foraging workers to obtain nutrients from flower and water sources year round. Each worker dedicates most of her foraging career specializing in the collection of nectar, pollen, or water. While nectar provides the carbohydrates needed for the colony's energetic needs, pollen is the main source of protein, providing them with essential amino acids and proteins critical for growth and development. Studies indicate that a polyfloral diet is a large factor on improving colony immunocompetence. In addition, pesticides are commonly applied throughout the city. The goal of this project is to identify the floral sources urban bees are foraging on and to determine the pesticide residue bees collect in the foraging process. Pollen and nectar samples are being collected once a month from fifteen sites in Florida, Michigan, California, and Texas. Pollen is then sent to Texas A&M University for identification using standard acetolysis procedures. Nectar samples and a subset of the pollen are sent to USDA-ARS-NSL (Gastonia, NC) for pesticide residue screening. This knowledge will help us better understand the floral ecology of four major developed areas in the United States, understand general bee floral preferences, and gain a better understanding of the pesticides urban bees are bringing back to the hive.

Regular Oral Submitted Abstracts

Regular Ten-Minute Papers - Session 1

8-1. What's up, Docs? Your Insect Detection, Evaluation & Prediction Committee Report

Carol Sutherland[1], *Richard Grantham*[2] *and Mark Muegge*[3], [1]*New Mexico State University, Las Cruces, NM,* [2]*Oklahoma State University, Stillwater, OK,* [3]*Texas A&M University, Fort Stockton, TX*

The authors will summarize entomological news from 2014 that occurred in NM, OK and TX, respectively, focusing on new state and county records as well as unusual developments, damage or host relationships.

8-2. Defining the neighborhood: factors determining the spatial relationships among Comanche harvester ant colonies, *Pogonomyrmex comanche* (Hymenoptera, Formicidae)

Ann B. Mayo, *University of Texas, Arlington, TX*

The Comanche harvester ant, *Pogonomyrmex comanche*, demonstrates some characteristics of a dominant species and yet is not found throughout its habitat. This restricted distribution raises questions concerning the factors that impact its spatial distribution and relationships among colonies. The impact of environmental factors, colony interactions, and the presence of other ant species on colony locations for *P. comanche* was investigated. The percentage of cover contributed by litter and soil drainage were the most relevant environmental factors. However, only weak support for aggression in colony interactions contributing to a neighborhood structure. *P. comanche* did not have an impact on the occurrence of other ant species.

8-3. Hilltopping and territorial behavior of *Polistes* paper wasp (Hymenoptera: Vespidae) sexuals atop tall buildings

Hal Reed, *Oral Roberts University, Tulsa, OK*

Large numbers of male paper wasps (*Polistes* spp.) congregate atop tall structures and buildings during the fall after their annual colonies have disintegrated. Males mark perches and defend their territorial spaces from other males. Two species, *Polistes metricus* and *Polistes fuscatus*, were found to swarm atop the roofs of two dorms on the ORU campus from late September through early November. Female sexuals also arrive at these sites and enter inside the top floors of the buildings creating a stinging hazard to residents. *Polistes metricus* was the most prevalent species of males on the rooftops while *P. fuscatus* was the most prevalent species of females inside the 12th floors of the dorms. Specific behaviors of males on and near their perches were observed. Although male behaviors indicate a role in attracting females, no mating was observed at these sites.

8-4. Landscape effects on parasitism of aphids in wheat by *Lysiphlebus testaceipes*

Norman Elliott[1], *Michael Brewer*[2], *Kris Giles*[3] *and Georges Backoulou*[3], [1]*USDA-ARS, Stillwater, OK,* [2]*Texas A&M University, Corpus Christi, TX,* [3]*Oklahoma State University, Stillwater, OK*

The native parasitoid *Lysiphlebus testaceipes* was investigated for effects of landscape context on parasitism rates of cereal aphids in wheat fields in central Oklahoma. Several measures of landscape context were found to affect parasitism rates. These measures are presented and their importance to cereal aphid ecology and management is discussed.

8-5. Conservation considerations for the monarch butterfly (*Danaus plexippus*) in the southern Great Plains

Kristen Baum, *Elisha Mueller, Shannon Andreoli and Shaun McCoshum, Oklahoma State University, Stillwater, OK*

Monarch butterflies (*Danaus plexippus*) are known for their long-distance migration from summer breeding sites in the upper Midwest and Canada to overwintering grounds in Mexico. The size of the overwintering population has steadily declined over the past two decades, with declines attributed to loss of milkweed throughout their breeding range and logging and forest degradation at their overwintering sites. Monarchs pass through the southern Great Plains during both their spring and fall migrations, and this region is important for both early and late season reproduction and providing floral resources during migration. Land use and management practices can influence milkweed availability (both quantity and quality), floral resource availability, and habitat suitability for monarchs. We provide an overview of current information about the effects of land use and management practices on resources for monarch butterflies in North Central Oklahoma, with an emphasis on *Asclepias viridis*. We also provide data on the effects of land use on monarch density and reproductive success, including consideration of the parasites *Ophryocystis elektroscirrha* (a spore-forming protist that specializes on monarchs and queens) and *Lespesia archippivora* (a tachinid fly which is considered a generalist on lepidopteran larvae). The implications for monarch butterflies in the context of the overall population are discussed.

8-6. A bioinformatics pipeline for wild mosquito NGS data mining with ecological genomics perspective

Jiannong Xu[1], *Dong Pei*[1], *Jacob Crawford*[2] *and Michelle Riehle*[3], [1]*New Mexico State University, Las Cruces, NM,* [2]*University of California, Berkeley, CA,* [3]*University of Minnesota, St. Paul, MN*

Mosquitoes are ecologically associated with various organisms during their life history. Carbohydrates and amino acids in the nectar of flowers or plant sap are main nutrient and energy source to maintain mosquito life and power flight and host-hunting activities. Female mosquitoes take vertebrate blood for egg production. In addition to relying on those plant and vertebrate organisms, the mosquito also accommodate a symbiotic microbiome in the gut. Ecological interactions of mosquitoes and associate organisms play critical roles in various mosquito life traits, such as behavior, fecundity and immunity. Next Generation Sequencing (NGS) based ecological genomics is an emerging approach to elucidate the ecological interactions at genome level. Individual mosquito genome sequencing as a population genomic approach has been widely used to study population genetics. These NGS data include genome information from organisms that are ecologically associated with mosquitoes. However, this type of data is usually overlooked. Here we report a bioinformatics pipeline to extract genomic information to determine the taxonomic identities of mosquito associated organisms. We applied the pipeline to analyze the NGS data from 19 wild mosquito specimens of *Anopheles gambiae* and *An. arabiensis* collected in Africa. First the sequencing reads were mapped to the mosquito genome references to sort out mosquito reads. Non-mosquito reads were then *de novo* assembled into contigs/scaffolds. The taxonomic identities were assigned to the contigs based on similarity search against nr database. Finally, the individual NGS reads were mapped back to the references to reveal the abundance of associated organisms for each individual. The pipeline recognized sequences from human, cow, tomato, *Plasmodium*, microsporidia and bacteria. The findings of these organisms depicted a picture of ecological connections of mosquito life associated nutrient sources, vertebrates, pathogens, and symbiotic microbes. In summary, the individual NGS mapping pipeline is a valuable genomics tool to apprehend the ecological interactions of mosquitoes and associated organisms.

Regular Ten-Minute Papers - Session 2

10-5. Understanding the taxonomy of vectors: first description of the pupa of *Culicoides sonorensis* (Diptera: Ceratopogonidae), vector of bluetongue and epizootic hemorrhagic disease

Phillip Shults[1], *Art Borkent*[2] *and Roger Gold*[1], [1]*Texas A&M University, College Station, TX,* [2]*Royal British Columbia Museum, Salmon Arm, BC, Canada*

Species of *Culicoides* (Diptera: Ceratopogonidae) are of enormous economic importance as vectors of many disease pathogens affecting livestock worldwide. Despite their importance, there are still huge taxonomic gaps in our understanding of this genus. Of the 1,355 known species, only 13% and 17% are known as larvae and pupae, respectively. For the first time, this study describes the pupa of *Culicoides sonorensis*. This species is responsible for the transmission the Bluetongue virus (BTV) and Epizootic Hemorrhagic Disease (EHD) in North America, which causes the loss of an estimated $3 billion USD a year worldwide. The pupa of *C. sonorensis* can now be recognized in the field, which will aid in future biological and systematic studies as well as control efforts. This study also provides the first complete Scanning Electron Microscope (SEM) imaging of any species in this genus. An SEM and a compound microscope were used to obtain digital images of the defining characteristics of this species, and illustrations were used to supplement difficult to interpret structures. This research can be used as a template for future descriptions of *Culicoides* pupae and will enhance our overall understanding of the taxonomy, habitat, and phylogenetic relationships of this important vector species.

10-6. Nature's clean-up crew: late-season dung beetle activity in north-central Oklahoma

Austin Voss, *W. Wyatt Hoback and Theresa E. Andrew, Oklahoma State University, Stillwater, OK*

Dung Beetles (Coleoptera: Scarabaeidae) exploit decomposing feces from the ecosystem for feeding and reproduction purposes. Dung beetles are divided into three behavioral groups: rollers, tunnelers, and dwellers based on adult behavior in response to dung resources. By removing dung, dung beetles improve pasture health and reduce pest fly populations saving ranchers an estimated $380 million annually. Despite their general importance, region surveys have not been conducted and species composition and late season activity are unknown for Oklahoma. In this study, we sampled at the Cross Timbers Range Research station in Payne County, Oklahoma using pit fall traps baited with pig dung. Between October 16 and October 31, 2014. 130 dung beetles belonging to three genera, tunnelers (*Geotrupes* sp.), dwellers (*Onthophagus* sp.), and rollers (*Canthon* sp.) were captured. Sampling will be continued in the early spring and summer with the goal of determining seasonal activity pattern and diversity of the dung beetles in Payne County, OK.

10-7. Diggin' in: daily diapause burial depth differs among *Nicrophorus* species

W. Wyatt Hoback[1] *and Jess T. Lammers*[2], [1]*Oklahoma State University, Stillwater, OK,* [2]*University of Nebraska, Kearney, NE*

Burying beetles, *Nicrophorus* sp. exhibit strong circadian rhythms and bury into soil when not active. This study tested burial depth by males and females of three diurnal and two nocturnal species of burying beetles including the endangered American burying beetle, *Nicrophorus americanus*. In the laboratory, 1.2 meter modified polyvinyl chloride (PVC) tubes containing sandy loam soil were used to assess burial depths during periods of inactivity. For all diurnal species, females buried to significantly greater depths than males with female *N. carolinus* burying to 68 ± 8.7 cm (Mean ± 1 SE) compared to males at 36.5 ± 6.14 cm. Males and females of nocturnally active *N. orbicollis* and *N. americanus* buried to similar depths at approximately 20 cm. The results of this study reveal that burying beetles tunnel into soil during periods of inactivity and suggest that preconstruction activities that only affect soil surfaces should pose little risk to buried beetles in areas where the endangered *N. americanus* occur. The research further reveals an unexpected difference in burial depths by activity pattern and by beetle sex.

Poster Abstracts

Student Poster Competition

Ph.D. Posters

P1-1. Influence of fire and ground cover on insect community composition in mesquite dominated Texas rangelands

Britt Smith *and Robin M Verble, Texas Tech University, Lubbock, TX*

On rangelands of north central Texas, prescribed fire is a tool used improve forage and limit the dominance of honey mesquite. Fire results in changes to vegetation that can subsequently influence animal populations and communities. Insect communities play large roles in ecosystem dynamics from nutrient cycling to habitat manipulation. Also, due to their often high diversity and numerous abundance, insect communities provide an ideal response variable to examine the influence of land management decisions. Our study was conducted on privately-owned rangelands in north central Texas where we applied dormant season prescribed fire treatments and examined the influence on ground-dwelling insects. Insects were sampled by means of five pitfall traps for each of eight sites, four treatment and four control. Pitfall traps were collected weekly for four weeks between late-July and early-August. Insects were later identified to taxonomic family and counted. In addition, we measured foliar ground cover within 1 m^2 square frames along two transects in each site for a total of 20 plots per site. We analyzed the influence of fire and ground cover on the insect community using a canonical correspondence analysis using the package VEGAN in the program R. A total of 41 insect families were identified and used for analysis. Families with less than five individuals were removed from analysis. Environmental variables were selected *a priori* and included fire treatment, % live vegetation, % dead vegetation, % litter, and % bare ground. Our first two constrained axes explained 86.7% of the inertia in the data. We conducted a permutation test on the global model and rejected the null hypothesis (p = 0.004, F = 2.6079). We also conducted a permutation test on the individual environmental variables and found all environmental variables to be significant (p < 0.05) except for fire treatment (p = 0.116, F = 1.7628). The results of our study suggest that we did not see a clear influence of fire on the insect community. This is in contrast to many studies suggesting that fire can influence different insect populations and communities. A possible explanation is due to the low number of replications in our study. However, we can infer a relationship between the insect community and the foliar ground cover estimates. Since prescribed fire influences vegetation cover, it may in turn influence the insect community in our study area given more replicates to detect such an effect.

P1-2. The rate and pattern of genome size evolution in Drosophilidae and Formicidae

Carl Hjelmen *and J. Spencer Johnston, Texas A&M University, College Station, TX*

Genome size variation across species has been found to be 18,900 fold in arthropods to date. Even though much data has been accumulated about genome sizes, the ever present variation has been largely ignored from a phylogenetic standpoint. This has resulted in a lack of knowledge about how the changes in genome sizes have occurred throughout evolutionary history. Here, we address the question, "Where during the phylogenetic process does genome size change?" Does it change during speciation when species effective population size is small and drift drives the process? Alternatively, is it a very gradual process due to equilibrium between insertion and deletion rates? Lastly is it different for different taxa, with each taxa evolving at its own rate in response to different environmental conditions? Fundamentally, the first two hypotheses provide the possibilities of finding phylogenetic signal in genome size, whereas the third hypothesis only has low potential for this phylogenetic signal. These hypotheses were analyzed by constructing Bayesian phylogenies of Drosophilidae and Formicidae with taxa that are represented in the genome size database. Genome size is then analyzed comparatively using BayesTraits to determine the presence of a continuous or variable rate in genome size evolution. The approach is demonstrated here with genome size data for Drosophilidae and Formicidae. As larger sets of genome size estimates become available for additional arthropod species, this approach will provide a powerful tool for comparison of genome size evolution rates and trends among an even wider range of taxa.

P1-3. Development of sequential sampling plans for aphids infesting winter canola in the Southern Plains

Aqeel Alyousuf[1]*, Kris Giles*[1]*, Mark Payton*[1]*, Norman Elliott*[2] *and George Opit*[1]*,* [1]*Oklahoma State University, Stillwater, OK,* [2]*USDA-ARS, Stillwater, OK*

The most important insect pests of winter canola in the Southern Plains are aphids that sporadically attack winter canola *Brassica napus* throughout the growing season and ultimately reduce seed yield. Three aphid species commonly infest canola fields: the cabbage aphid, *Brevicoryne brassicae* L., green peach aphid, *Myzus persicae* (Sulzer) and the turnip aphid, *Lipaphis pseudobrassicae* (Davis). Integrated pest management (IPM) programs are being developed to assist Oklahoma producers who grow canola, and judicious management of insect pests requires efficient sampling of target species. Sequential sampling plans, especially binomial plans, allow producers to quickly classify pest status and are important tools for sustainable IPM programs. The goal of this research is to develop and validate efficient sequential sampling plans for aphids that infest winter canola in the Southern Plains.

Undergraduate Posters

P2-1. MicroRNA fold expression in red imported fire ant (*Solenopsis invicta*) development

Ryan Brunson*, Juan F. Macias Velasco and Blake R. Bextine, University of Texas at Tyler, Tyler, TX*

The Red Imported Fire ant (RIFA) *Solenopsis invicta* is an invasive species which causes $6 billion per year in damage in the U.S. As a social holometabolist with 4 distinct life stages and multiple castes, it is important to understand their development and differentiation. Transitions between these groups is mediated by microRNAs, small (~22 nt) non-coding RNAs that are a pivotal component of post-transcriptional regulation. In this study, the fold expression of 3 microRNAs aimed at metabolism, development and differentiation of castes and life stages was studied. The microRNAs Let-7, miR-92a, and miR-14 were selected because they regulate metabolism, mediate development and caste differentiation within another hymenopteran, *Apis mellifera*. Fold expression was measured using real time quantitative PCR for queens, alaetes, large workers, small workers, larvae, and pupae. Fold expressions in Let-7 and miR-14 were observed as expected resulting in the regulation of metabolism and differentiation respective of the 6 categories. No conclusive expression fold difference was seen for Let-7 between the life stages and castes. MiR-14 was expected to regulate RIFA life stages and was supported by a higher fold expression in the pupae life stage, when body segmentation begins. A higher than expected fold expression in the larval life stage was observed for miR-92a requiring further study to understand its regulatory behavior.

P2-2. Establishing a biological inventory of mosquitos (*Culex*, *Aedes*, and *Anopheles*) and their pathogen loads in East Texas

Mikayla Adkison[1]*, Chris M. Powell*[1]*, Melinda Hergert*[2] *and Blake R. Bextine*[1]*,* [1]*University of Texas at Tyler, Tyler, TX,* [2]*Texas Department of State Health Services, Tyler, TX*

West Nile Virus (WNV) is a mosquito-borne pathogen of medical and veterinary concern which is transmitted primarily by the mosquito vector of the order *Culex*. In 2014 one case of West Nile was documented in Smith County with cumulative statewide number reported as 353 cases. Observation of East Texas vector mosquitoes, such as *Culex*, *Aedes*, and *Anopheles*, was conducted by surveying and collecting mosquitos from 13 sites in Smith County over a 3 week period using gravid and light traps. This was done in order to establish an up to date biological inventory of mosquitos in East Texas and concurrently analyze the mosquitos'

pathogen loads. Utilizing a standard RNA extraction protocol and an established PCR detection method, WNV was detected through a population pooling method with the mosquitos collected.

P2-3. Evaluating the effects on natural enemies from insecticides used to control sugarcane aphid on grain sorghum

William Ahrens[1], *Darwin J. Anderson*[2], *Michael Brewer*[2] *and Jonda Halcomb*[1], [1]*Del Mar College, Corpus Christi, TX,* [2]*Texas A&M AgriLife Research, Corpus Christi, TX*

The sugarcane aphid *(Melanaphis sacchari)* has become a major pest in grain sorghum in the southern United States over the last two years. This is due to its rapid expansion and rapid reproduction which causes yield loss if not controlled. The sudden need to control this new pest comes with the challenge of ensuring the insecticides work well to kill the aphids but also do not greatly affect natural enemies of the aphid. In an efficacy and economic threshold study conducted at Texas A&M AgriLife Research in Corpus Christi Texas, we collected data on the number of parasitoids (Aphelinidae) and the number of ladybird beetles (Coccinellidae) along with the number of sugarcane aphids after the foliar application of insecticides. The economic threshold study evaluated four aphid density action threshold levels, 50,100, 250, and 500 aphids per leaf plus an untreated control. The insecticide efficacy study evaluated 5 insecticides: Endigo ZC (thiamethoxam+lamda-cyhalothrin), Transform WG (sulfoxaflor), Sivanto (flupyradifurone), chlorpyrifos, and dimethoate. In both studies, we not only recorded data on the number of sugarcane aphids post treatment but we also recorded data on the frequency of occurrence of parasitoids and ladybird beetles. From these data, we evaluated which insecticide and treatment thresholds are best at conserving natural enemies of sugarcane aphid.

P2-4. Impact of flonicamid on potato psyllid (*Bactericera cockerelli*) feeding behavior

Katrina Tilaon[1], *Sean Whipple*[2], *Chris M. Powell*[1] *and Blake R. Bextine*[1], [1]*University of Texas at Tyler, Tyler, TX,* [2]*ISK Biosciences Corporation, Kearney, MO*

The potato psyllid, *Bactericera cockerelli*, is the primary vector for the bacterium Candidates Liberibacter *solanacearum* the causal agent of zebra chip of potato. This costly disease has caused millions of dollars of loss to the potato industry in the United States and Mexico. Currently neonicotinoids are used to manage potato psyllid populations, resulting in disease prevention. However, potato psyllid populations, primarily in South Texas, have shown resistance to this group of insecticides. Flonicamid is a novel anti-feedant compound that belongs to the class of pyridincarboxamids used to control hemipterous pests, including potato psyllids. In repeated trials, feeding behavior was observed using time laps photography for five days and image analysis to assess the affectiveness of the compound. Reduction of feeding duration and higher rates of mortality were observed in insects feeding on treated plants.

P2-5. Efficacy of insecticidal ear tags and the new VetGun™ application for horn fly (*Haematobia irritans*) control in Oklahoma cow/calf operations

Kylie Duggan *and Justin L. Talley, Oklahoma State University, Stillwater, OK*

The horn fly, *Haematobia irritans* (L.), is a significant economic pest of cattle found throughout North America. The economic losses associated with horn fly infestations are attributed to irritation and blood loss of cattle leading to decreased milk production, decreased weaning weights of calves, and decreased weight gains in growing cattle. Estimates of annual losses due to horn fly damage and control costs exceed $1 billion in the U.S. Insecticide resistance in horn fly populations can result in up to a 90% reduction in product efficacy. Since the adult horn fly spends almost its entire life on livestock, the majority of insecticides and application techniques have been successful in controlling horn flies at some point in time. The products that were compared were VetGun®, XP820®, Warrior®, Corathon®, CyLence Ultra®, and Python Magnum®. The objective of this study was to determine the efficacy of commonly used insecticide treatments on horn fly populations and determine the influence of various horn fly control tactics. All insecticidal ear tags kept the horn fly population below the recommended threshold of 200 flies per animal through 8 weeks post treatment. The VetGun® initially kept the horn fly population below the threshold 3 weeks post treatment and then retreatment was applied with only 2 weeks of suppression below the recommended threshold. This study indicates that insecticidal ear tags are still a viable option for horn fly control in cow/calf operations.

P2-6. Evaluating pest risk in cotton along the Texas Gulf Coast by using spatial mapping tools

Amandah Reyes[1], *Michael Brewer*[2], *Darwin J. Anderson*[2], *Alby L. Cartwright*[2] *and Jonda Halcomb*[1], [1]*Del Mar College, Corpus Christi, TX,* [2]*Texas A&M AgriLife Research, Corpus Christi, TX*

The possibility of using GIS spatial mapping tools to estimate the risk of cotton damage from the verde plant bug was evaluated. Using ArcGIS spatial mapping tools and crop data layers imported into the spatial mapping software, we related crop diversity (Shannon's Diversity Index [SDI]) and other selected landscape features to verde plant bug (*Creontiades signatus*) density. Data used came from observations collected from several south Texas cotton fields from 2010-2013. We will review the data that we have collected over this four year period.

P2-7. Daily fluctuations in local leafhopper (Hemiptera: Cicadellidae) diversity

Natalie Gahm, *W. Wyatt Hoback and A. Wayadande, Oklahoma State University, Stillwater, OK*

Leafhoppers (Hemiptera: Cicadellidae), are one of the ten largest families of insects in the world. Although they can cause significant damage to numerous plants and crops, leafhoppers can also serve as indicators of prairie and grassland health. Sampling for leafhoppers can be problematic because they are thought to move up and down within the plant canopy as ambient temperatures fluctuate. We hypothesized that leafhoppers would be least abundant at midday when temperatures are highest and humidities are lowest. To test this, we sampled for leafhopper richness and abundance at three daily time points, morning, midday, and evening during May, June, and August of 2014. Our study site was a mixed grass-forb field at the Oklahoma State Botanic Garden. The field was sweep sampled at 08:00, 13:00 and 20:00 twice per week.48 total samples over 16 days were collected and all adult leafhoppers were identified to genus/species. There were no significant differences among time of day or throughout the season, but there were some clear trends. June experienced the highest number of leafhopper genera and vector species. *Aceratagallia* sp. were most abundant in May and June yet absent in August, while *Balclutha* sp. were in great abundance in August yet absent in May and June. *Aceratagallia sp.* and *Exitianus exitiasus* had the highest number of individuals present at midday, while *Polyamia* sp. had the most individuals present in the evening. Although our hypothesis that leafhoppers would be least abundant at midday was not supported by the data, clear seasonal differences in species composition and trends in overall numbers and could facilitate future grassland health or cropping system research.

P2-8. Determining the cold tolerance of the American cockroach, *Periplaneta americana*

David Bradt *and W. Wyatt Hoback, Oklahoma State University, Stillwater, OK*

American cockroaches (*Periplaneta americana)* are a common pest of human dwellings and structures. The species is native to Africa, but was introduced to North America and elsewhere in the world in the 1600s. This species is detrimental to humans because they contaminate food items through secretions, and can vector bacteria and other pathogens on their body and in their saliva. The American cockroach is commonly found outdoors in Southern states but is rarely observed away from heated dwellings in more temperate zones, including Oklahoma. Recently, a related species, *Periplaneta japonica*, was found in New York and can reportedly survive cold temperatures. Even though cold temperatures are anecdotally reported to be detrimental to their survival, there are little published data and natural conditions (soil or presence of mulch) that may improve survival have not been tested. This study tested *P. americana* under laboratory and field conditions to determine survival in cold temperatures. Under field conditions, adult *P. americana* died when air temperatures were below freezing regardless of the presence of insulating soil or mulch. In refrigerated conditions (4° C), specimens died within 10 days. Additional testing of nymphal survival is being conducted. Results from this study provide information that can help manage the spread of American cockroaches by refrigerating materials or leaving them in unheated areas during shipping.

P2-9. Habitat modification as a means of managing the ear tick, *Otobius megnini*

Victoria Cruz, *Tarleton State University, Stephenville, TX*

Otobius megnini (Dugès), often referred to as the spinose ear tick, is a one-host tick infesting the ear canal of a variety of ungulate species. As many of these animals are wild and not subject to regular manipulation by humans, long-term management of this parasite may be accomplished by the modification of off-host habitats thereby making it unsuitable for tick development. Animal shelters at Fossil Rim Wildlife Center (Glen Rose, TX, USA) are known areas where the ear ticks are in high concentrations. Hay is typically applied to the floor of these sheds as bedding for the wildlife during winter months. The objective of this study was to determine the effect of the presence or absence of this material on ear tick density. Three shelters were selected and the bedding was randomly removed from half the floor surface of each shed. Ear tick larvae were collected between 28 March and 23 May 2014 using the Niebuhr/Kattes CO_2 method. The data suggests that the removal of the bedding material did not significantly affect ear tick numbers.

Master's Posters

P3-1. Identification and assembly of an alimentary track –associated bacterium in the Asian citrus psyllid (*Diaphorina citri*)

Gretta Sharp[1], *Carol Lauzon*[2], *Wayne B. Hunter*[3], *Daymon Hail*[1] *and Blake R. Bextine*[1], [1]*University of Texas at Tyler, Tyler, TX,* [2]*California State University East Bay, Hayward, CA,* [3]*USDA-ARS, Ft. Pierce, FL*

The Asian citrus psyllid (*Diaphorina citri*) is an invasive plant pest in the United States and a vector for the bacterium *Candidatus Liberibacter asiaticus (Las)*. This bacterium is the primary causal agent of Huanglongbing, a major threat to the citrus industry in the United States. Traditional pest management protocols have not adequately managed the spread of the pathogen. Therefore, quarantine efforts have been hindered. Because this is a relatively new problem in the United States limited information is available on the hosts interaction with its micro-biome. In this study, an alimentary track-associated bacterium was recovered from (Las)

positive and negative insects. The genome of this bacterium and associated plasmids were sequenced, assembled, and annotated. Predicted contributions to the survival of the Asian citrus psyllid were identified. With this information transgenesis of the alimentary tract-associated bacterium is possible and paratransgenesis becomes a viable option for controlling the spread of the pathogen.

P3-2. Downregulation of short Neuropeptide F Receptors (sNPFRs) using RNA interference in *Nylanderia fulva*

Megan Rudolph[1], *Danny McDonald*[2] *and Blake R. Bextine*[1], [1]*University of Texas at Tyler, Tyler, TX,* [2]*Sam Houston State University, Huntsville, TX*

The tawny crazy ant (*Nylanderia fulva*) is a highly invasive ant species from Brazil that has caused extensive damage across the southern United States. High population densities, lack of natural enemies, and superior competition abilities make this ant a severe ecological and economic threat. Currently, Termidor® SC (fipronil), a non-specific insecticide that affects the insect's central nervous system, is the main control method. Alternatively, RNA interference (RNAi) is a potential method of control by blocking the translation of a specific protein. In this study, cuticular application of RNAi is used to downregulate short Neuropeptide F Receptor (sNPFR), and changes in gene activity were observed in *N. fulva* larvae over a period of 24 hours. We hope this process can serve as a viable method of control for this invasive ant species.

P3-3. Manipulation of natural enemies of key arthropod pests in Oklahoma vineyards

Shane McMurry *and Eric Rebek, Oklahoma State University, Stillwater, OK*

A variety of arthropod pests are economically important to Oklahoma grape production, including those that sometimes serve as vectors of plant pathogens like *Xylella fastidiosa*. Integrated pest management (IPM) strategies include conservation of natural enemies (predators and parasitoids) via habitat manipulation, including incorporation of plants between vine rows that serve as refugia and pollen/nectar sources for adult natural enemies. This study has two primary objectives. First, we attempted to manipulate the diversity and abundance of natural enemies using ornamental plants between rows. We compared predator and parasitoid abundance and diversity in response to three treatments of between-row plantings: 1) native flowering perennials, including *Achillea millefolium*, *Monarda punctata*, *Asclepias tuberosa*, and *Coreopsis lanceolata*; 2) Upright grass, *Pennisetum villosum* or *Miscanthus sinensis*; and 3) pre-existing bermudagrass as a control. Our second objective is to gain a better understanding of the natural enemy activity in the vineyard using sentinel egg masses of black cutworm (*Agrotis ipsilon*) placed on vines in the flower, grass, and control treatments. We hypothesize that we will see more natural enemies in the flowering plant treatment compared to the upright grass treatment and bermudagrass control. We also expect to see differences in parasitism and predation rates on sentinel egg masses among planting treatments.

P3-4. Use of lepidoptera body size class distribution as a method for inferring secondary productivity

Virginia Brown, *Texas State University, Austin, TX*

The energy that plants produce through photosynthesis is positively correlated with the amount of plant and animal biomass in ecosystems. Growth of herbivores is affected by the quality and quantity of the plant material they consume. Lepidopteran larvae (caterpillars) are generally herbivorous in nature, with only a few exceptions. Due to this dependent relationship, we hypothesize that there should be a positive correlation between plant productivity and the diversity and biomass of Lepidoptera in a given area. Moths were collected in the Chihuahuan desert and Edwards Plateau grassland ecosystems between which annual precipitation differs by a factor of five. Using a UV light trap, adult Lepidoptera and other flying nocturnal insects at both sites have been sampled monthly for an hour and a half between the full moon and the new moon lunar phases. Samples are sorted to morphospecies, dried and weighed to allow analyses by size classes. Use of size classes for analysis is intended to standardize variability due to different species composition between sites. Preliminary results indicate that both the total weight of all insects and the average size of individual insects is greater in the desert ecosystems than in the grassland, contrary to expectations based on the rainfall.

P3-5. Elytron-branding as a permanent marking technique for *Nicrophorus* beetles (Coleoptera: Silphidae)

Tanner Jenkins, *W. Wyatt Hoback and Phillip G. Mulder, Oklahoma State University, Stillwater, OK*

Population estimates often employ the use of permanent marks that do not alter the survival or behavior of marked individuals. A number of marks have been developed to monitor populations of federally endangered American burying beetles, *Nicrophorus americanus* Olivier; however, studies have revealed problems with mark retention or damage to tested individuals from permanent marks. In this study, we tested elytron branding using a surgical cauterizer. The cauterizer was used to ablate one of the orange maculations on the elytron of Nicrophorus beetles. We found that the marking technique was rapid compared with other techniques, permanent, easily interpreted by a blind reader, and did not cause apparent changes to elytral integrity compared to clipping. Although untested in this study, branding with a cauterizer is likely usable for marking other beetle species that have maculation patterns on the elytra.

P3-6. Evaluation of the effectiveness of the Zerofly® Storage Bag to prevent stored-product insect pest infestation

Sulochana Paudyal, *George Opit and Sandipa G. Gautam, Oklahoma State University, Stillwater, OK*

The Zerofly® Storage Bag, which is an insecticide-incorporated polypropylene bag, is a novel and innovative tool that can be used to reduce postharvest losses caused by stored-product insect pests. The objective of this experiment was to evaluate the efficacy of the Zerofly Storage Bag to prevent infestation by *Rhyzopertha dominica* (F.), *Sitophilous oryzae* (L.), and *Tribolium castaneum* (Herbst). The experiment had four treatments, namely, miniature Zerofly Storage Bags, unlaminated polypropylene (PP) bags, laminated PP bags, and jute bags. Twenty adult insects were introduced into each of the experimental plastic boxes containing a miniature bag with a small amount of clean diet outside the bag. The number of insects outside the bag was determined after 0.5, 1, 5, 10, 14, and 28 days. For all three species, data showed that in the Zerofly Storage Bag treatment, all 20 insects introduced were killed outside the bag after 24 h. For the unlaminated PP bag, laminated PP bag, and jute bag, live insects were found after 28 d, for all the three species. However, none of the live insects were found inside the PP bags. Live insects were found inside jute bags. Data from this test show that the Zerofly Storage Bag is highly effective at preventing insect infestations from outside the bag. Future studies will focus in replicating this test and on evaluating the efficacy of the Zerofly Storage Bag to control insects in commercial warehouses.

P3-7. CO_2 and CH_4 emissions from soils and termites (Isoptera: Rhinotermitidae) on the Oklahoma Tallgrass Prairie Preserve

Charles Konemann *and Brad Kard, Oklahoma State University, Stillwater, OK*

Carbon dioxide (CO_2) and methane (CH_4) emissions on the Oklahoma Tallgrass Prairie Preserve from non-disturbed soils and foraging termites (*Reticulitermes flavipes* Kollar) were compared to estimate the atmospheric contributions of both locally. Gas samples were taken from flux chambers containing termites and wood billets, as well as non-disturbed soil plots, and two control plots (flux chambers containing wood billets with termites excluded, or sterilized soil only). During May through December 2013, gas samples were extracted at 0-, 30-, and 60-minutes after installing flux chambers. CO_2 from flux chambers containing termites was greater (P<0.0001) compared with other treatments during May, June, August, and October. CO_2 flux was not significantly different between termite-infested chambers and non-disturbed soil during July. However, flux from these two treatments was significantly greater compared with both control treatments. CO_2 flux in December was lowest compared with other months, and was similar among all treatments. CH_4 flux from chambers containing foraging termites was greatest in May, followed by August, July, and October, while June and December were lowest. CH_4 above normal atmospheric levels (≈1.90 ppm) was not detected in the wood control, sterile soils flux chambers or non-disturbed soils. Additional research concerning soil-termite gas dynamics is needed.

Regular Poster Submitted Abstracts

P4-2. Development of a binomial sampling plan for yellow aphids in pecans

Mark Muegge, *Texas A&M University, Fort Stockton, TX*

Two common yellow aphids, yellow pecan aphid (*Monelliopsis pecanis* (Bissel)) and blackmargined pecan aphid (*Monellia caryella* (Fitch)), occur in pecan that can indirectly cause significant injury to pecan nut quality and yield. Sampling aphids to determine if threshold has been reached is currently done by enumerative sampling. This sampling method is time consuming and tedious especially when thresholds are relatively high and the pest is small and difficult to see. Binomial or presence/absence sampling can reduce sample time and effort relative to enumerative sampling plans. The goal of this research is to develop a more cost efficient reliable sampling plan for yellow aphids in pecans. Sampling for yellow aphids was conducted in a 2200 acre pecan orchard just West of Fort Stockton, TX. A single sampling bout consisted of 30 adjacent trees within a row. Alate and apterous aphids were counted and recorded separately from each of 4 compound leaves selected from each of the trees in the sample bout. Multiple sample bouts were conducted in 2014. Sample data were fit to Taylor's Power law and values for Taylor's parameters *a* and *b* were used to develop enumerative and binomial sampling plans based on equations presented by Wilson et al. (1983b). Taylor's power function effectively modeled the variance to mean relationship, with coefficients of determination exceeding 94% for all yellow aphid classes (Alate, Apterous and Pooled). Alate aphids contributed relatively little to the overall yellow aphid population densities recorded in this study (<8.5%) and had no significant affect on spatial aggregation when pooled with the apterous aphid class. However, alate aphids do contribute to the overall damage caused by yellow aphids in pecan, thus the sampling plans were developed for the pooled alate and apterous aphid classes. Alate and apterous yellow aphid populations displayed an aggregated dispersion pattern. Apterous aphid populations were significantly more aggregated than Alate aphid populations. When sample plans were developed at a precision level of D=0.2 the bionomial sample

plan only required 4 samples to estimate the economic threshold of 25 yellow aphids per leaf (Texas ET) while the enumerative sample plan required 28 samples. Based on these results the binomial sample plan requred 85% fewer samples to make a management decision for yellow pecan aphids relative to the enumerative sample plan, thereby making the binomial sample plan a more practical sample plan for making informed management decisions of yellow aphids in commercial pecan production. Future efforts will be to collect additional data to increase reliability of the sample plans, determine time needed to take samples and field evaluate the binomial sample plan.

P4-3. Shift in biotypic diversity of Russian wheat aphid (Hemiptera: Aphididae) populations in the United States

Gary J. Puterka[1], *Kris Giles*[2], *Mike Brown*[1], *Scott Nicholson*[1], *Robert Hammon*[3], *Frank B. Peairs*[4], *Terri L. Randolph*[4], *G. J. Michels*[5], *E. D. Bynum*[6], *Tim Springer*[7], *J. Scott Armstrong*[1] *and Dolores Mornhinweg*[1], [1]*USDA-ARS, Stillwater, OK,* [2]*Oklahoma State University, Stillwater, OK,* [3]*Colorado State Unverisity, Grand Junction, CO,* [4]*Colorado State University, Fort Collins, CO,* [5]*Texas AgriLife Research Center, Bushland, TX,* [6]*Texas AgriLife Extension Service (TAES), Amarillo, TX,* [7]*USDA-ARS, Woodward, OK*

A key component of Russian wheat aphid (RWA), *Diuraphis noxia* (Kurdjumov), management has been through planting resistant wheat cultivars. A new biotype, RWA2, appeared in 2003 which caused widespread damage to wheat cultivars containing *Dn*4 gene. Biotypic diversity in RWA populations has not been addressed since 2005 when RWA2 dominated the biotype complex. Our objectives were to determine the biotypic diversity in the Central Great Plains and Colorado Plateau at regional (2010, 2011, 2013) and local (2012) levels and detect the presence of new RWA biotypes. Regional and within-field aphid collections were screened against RWA resistant wheat genotypes containing genes *Dn*3, *Dn*4, *Dn*6, *Dn7*, *Dn*9, CI2401; and resistant barley STARS 9301B. In 2010, all aphid collections from Texas were avirulent to the *Dn*4 resistance gene in wheat. Regional results revealed *Dn*4 avirulent RWA6 was widespread (55-84%) in populations infesting wheat in both regions. Biotypes RWA1, 2 and 3/7 were equally represented with percentages < 20% each while RWA8 was rarely detected. Combining percentages of RWA1, 6, and 8 across regions to estimate avirulence to *Dn*4 gene revealed high percentages for both 2011 (64-80%) and 2013 (69-90%). No new biotypes were detected, therefore, *Dn*7, CI2401, STARS9301B remained resistant to all known RWA biotypes. This study documents a shift to *Dn*4 avirulent biotypes and serves as a valuable base-line for biotypic diversity in RWA populations prior to the deployment of new RWA-resistant wheat cultivars.

P4-4. The genome of *Diuraphis noxia*, a global aphid pest of small grains

Scott Nicholson *and Gary J. Puterka, USDA-ARS, Stillwater, OK*

The Russian wheat aphid (*Diuraphis noxia*) is the world's most destructive grain aphid, producing unique phytotoxic damage symptoms that result directly from salivary proteins injected into the host plant while feeding. We sequenced and assembled the genome of *D. noxia* Biotype 2, the most widely destructive *D. noxia* strain, with an assembly spanning 393 MB, or 93%, of its 421 MB genome. The genome assembly contains 19,097 protein-coding genes, including previously-identified salivary genes, defensive protein-coding genes, short RNA pathway genes, and 94% of the ultra-conserved gene set. *D. noxia* has the most AT-rich genome sequenced to date (70.9%), and displays evidence of an incomplete divergence between heavily-methylated and lightly-methylated gene pools, potentially due to the primacy of anholocyclic parthenogenetic reproduction. The *D. noxia* genome possesses a lower percentage of transposable elements and repeats than Pea aphid, suggesting a basal position in the aphid lineage. The basal position of *D. noxia* is also suggested by phylogenetic analysis of concatenated conserved single-copy proteins and of single proteins in comparison to their orthologs in related species. The *D. noxia* genome reveals limited evidence of horizontal gene transfer from the endosymbiotic *Buchnera aphidicola* bacteria. The *D. noxia* genome will provide a crucial component of functional genomics studies, analysis of the genetic basis of aphid feeding, damage induction, and plant defense evasion, and will allow development of genetically-based aphid control methods.

P4-6. Seasonal variability of insecticidal activity of essential oils of *Peumus boldus* Mol., *Laurelia sempervirens* L. and *Laureliopsis phillipiana* Rut et. Pau. against *Acanthoscelides obtectus* Say

Gonzalo Silva[1], *Angelica Urbina*[1], *Ines Figueroa*[1] *and J. Concepcion Rodriguez*[2], [1]*University of Concepcion, Chillan, Chile,* [2]*Colegio de Postgraduados en Ciencias Agrícolas, Texcoco, Mexico*

The Bean weevil (*Acanthoscelides obtectus* Say) is the main pest of common beans (*Phaseolus vulgaris* L.). Its control is usually performed by means of synthetic insecticides, leading to important problems such as the presence of toxic residues on food and the development of resistance to insecticides such as phosphine, organophosphates and pyrethroids. Essential oils are among the best-known oils assessed against insects. These compounds act as fumigants, contact insecticides, repellents and antifeedants. The aim of this study was to evaluate the effect of seasonal variability of chemical compounds in the essential oils of *Peumus boldus* Molina, *Laurelia sempervirens* L. and *Laureliopsis phillipina* Rut et. Pau. on

the insecticidal activity against *A. obtectus*. The essential oils were extracted from the leaves field-collected during fall, winter and spring time from Los Lleuques zone (36°51'18"S, 71°38'34"W, 286 MASL), Ñuble province foothills for *P. boldus* and *L. sempervirens* and from the foothills of Maullín province (41°41´S, 73°25´W, 28 MASL) for *L. philippiana*. Once in the laboratory, only mature and whole leaves were washed with distilled water and dehydrated for 48 hours at 40°C in a stove. The essential oils were obtained by steam distillation during 4 h using distilled water in a Clevenger type apparatus. Subsequently, the oil was treated with sodium sulphate to eliminate water traces and stored in amber-colored glass containers at 4.5 °C. Essential oils of three species of leaves collected in fall, winter and spring caused a mortality greater than 80% with at the concentration of 2.0 and 4.0% (v/v), but the highest toxicity was exhibited by oils collected in winter with an estimated LC_{50} of 0.14, 0.09 and 0.009 mL essential oil kg^{-1} grain for *L. phillipiana*, *P. boldus* and *L. sempervirens*, respectively. The essential oils from fall and spring exhibited an LC_{50} over 1.0 mL essential oil kg^{-1} grain. We concluded that essentials oils from winter have the highest contact insecticidal activity against *A. obtectus*.

P4-8. Insects involved in mammalian decomposition in north-central Nebraska: a baseline study

Kenwyn Cradock[1] *and Jill Kurzenberger*[2], [1]*Eastern New Mexico University, Portales, NM,* [2]*University of Nebraska Weslyan, Lincoln, NE*

This baseline observational study serves as a survey of the variety of insects involved in decomposition on two adult female hogs in north-central Nebraska, near Springview. One specimen was exposed to full sun, with the other exposed to full shade. The carcasses were observed for a period of 22 days. Typical fauna were observed colonizing the carcasses, including the dipterans *Phormia regina* and *Cochliomya* sp. and coleopterans from the genera *Necrodes* (Silphidae) , *Nicrophorus* (Silphidae)*, Oiceoptoma* (Silphidae), *Ormorgus* (Trogidae), *Creophilus* (Staphylinidae), *Phanaeus* (Scarabaeidae), and *Dermestes*(Dermestidae). Temperature, both ambienet and maggot mass, was higher for the carcass exposed to sunlight. The rate of decompsotion was faster in the sun-exposed carcass. The results of this study will advance our understanding of insect succession associated with mammalian decomposition in Nebraska.

P4-9. Phenology and ecology of tick species parasitic on cattle and wildlife

Trisha Dubie*, Bruce Noden and Justin L. Talley, Oklahoma State University, Stillwater, OK*

Pastured cattle are parasitized by several different species of ticks. Most of these tick species are capable of transmitting pathogens that impact veterinary and human health. Understanding the ecology and seasonal fluctuations of tick populations is essential to the development of programs aimed at ectoparasite control and disease prevention. In the United States, limited research has focused on the activity of tick species, specific life stages and abundance of ticks on both cattle and pastureland. Several US-based studies have directly examined ticks on cattle without addressing differences in the diversity and abundance of ticks retrieved from the surrounding vegetation within select months of the year. Additionally, there is limited information on wildlife hosts, their interactions within cattle pastures, and the effects of wildlife on tick populations. Wild animal hosts may influence both the distribution and number of ticks on vegetation in pastures, and these factors could affect the abundance of ticks on cattle. Other studies have examined ticks on wildlife hosts in woodland *Ixodes scapularis* ecosystems in the Northeastern United States but no association was made within the landscape such as those grazed by cattle. There is a need for current data on the phenology and ecology of tick species found in pastures and on cattle throughout the year in the Great Plains region.

P4-11. Sentinel egg predation in glandless cotton in New Mexico

Jane Breen Pierce[1]*, Patricia E. Monk*[1] *and John Idowu*[2], [1]*New Mexico State University, Artesia, NM,* [2]*New Mexico State University, Las Cruces, NM*

Cotton glands produce gossypol, a natural defense against insect pests. Glandless cotton varieties are available, but losses from pests have prevented commercial development. Some areas of New Mexico have lower insect pressure, with high predation and desiccation suppressing pest populations. With appropriate management and monitoring of insect pests, growers could potentially produce glandless varieties as a niche crop with greatly added seed value. Field to lab trials were conducted on New Mexico State University farms to evaluate predation rates in glandless vs. glanded cotton in an effort to develop pest management strategies for glandless cotton protection. Sentinel cotton bollworm eggs were attached to glanded and glandless cotton plants on multiple dates in 2011-2013 to evaluate potential differences in predation. Insects were also sampled from plots weekly using sweep nets. Total predation was 56% and 53% in glanded and glandless cotton respectively in 2011, but 71% and 79% in 2012. Damage to eggs was classified as being from predators with chewing or sucking mouthparts. Predators were generally collected in similar numbers in glanded and glandless cotton plots both years. However, there were significantly more spiders and ladybugs in glanded cotton plots early season in 2011 and significantly more spiders season long in glanded cotton plots in 2012. Predation by predators with chewing mouthparts was also significantly higher in 2012 with an average 78% vs 47% predation of sentinel eggs in glanded vs glandless plots. Overall similarity in predation rates in glanded and glandless cotton suggests that predation will be an important source of control of insect pests in glandless cotton.

P4-12. Insecticide efficacy for sugarcane aphid *Melanaphis sacchari* (Zehntner) on grain sorghum S*orghum bicolor* (L.)

Ali Zarrabi, *Tom Royer, S. Seuhs and Kris Giles, Oklahoma State University, Stillwater, OK*

A field trial was conducted at the West Watkins Agricultural Research and Extension Center, in Lane, Oklahoma in 2014 to evaluate the efficacy of different insecticides against sugarecane aphids (SA), *Melanaphis sacchari* (Zehntner) on grain sorghum.

P4-13. Insecticide efficacy and genetic evaluations for insect resistance on Oklahoma crops and livestock

Tom Royer, *Ali Zarrabi, Kris Giles, Phillip G. Mulder, Eric Rebek, S. Seuhs and Justin L. Talley, Oklahoma State University, Stillwater, OK*

Scientists in the Department of Entomology and Plant Pathology at Oklahoma State University are involved in insecticide efficacy and genetic evaluations for insect resistance on various crops and livestock for decades.

P4-14. Using environmental scanning electron microscopy to predict resistance of sorghum to storage weevils

Bonnie Pendleton[1], *Michael Pendleton*[2], *Gary C. Peterson*[3] *and Suhas Vyavhare*[4], [1]*West Texas A&M University, Canyon, TX,* [2]*Texas A&M University, College Station, TX,* [3]*Texas A&M AgriLife Research, Lubbock, TX,* [4]*Texas A&M AgriLife Research, Beaumont, TX*

Selection of sorghum, *Sorghum bicolor* (L.) Moench, genotypes should include determination of resistance of grain to weevils during storage. Morphological features were observed using environmental scanning electron microscopy (ESEM) to predict resistance of sorghum grain to maize weevil, *Sitophilus zeamais* Motschulsky. The prediction method was validated against the percentage of weight loss of samples of different sorghum genotypes infested with maize weevils for 105 day. Damage to each sorghum genotype also was visually scored daily on a scale from 1-5 during the 105 days. Ultramicrotomy of nondamaged grains of the sorghum genotypes was done before observation and measurement by ESEM of the distance from the pericarp to the aleurone layer, where starch is concentrated. Distance to the aleurone layer of the grain was positively correlated with resistance to maize weevils. Observations by ESEM of new genotypes of sorghum can be used to predict resistance of grain to storage weevils.

P4-16. Survey of mosquito fauna and updated checklist of the mosquitoes of Oklahoma including new state records, updated distribution of *Aedes albopictus*, and potential vectors of West Nile virus

Bruce Noden[1], *Lisa Coburn*[1], *Russell E. Wright*[1] *and Kristy Bradley*[2], [1]*Oklahoma State University, Stillwater, OK,* [2]*Oklahoma Department of Health, Oklahoma City, OK*

The mosquito fauna of Oklahoma has not been evaluated since 1965 and little has been published concerning species associated with urban areas and disease transmission in the state. Between 1991 and 2007, a series of statewide surveys identified the distribution of *Aedes albopictus* and monitored urban areas as part of a West Nile virus (WNV) surveillance program. A total of 74,756 adults were collected in 26 urban centers in 16 counties of Oklahoma. A total of 62 mosquito species were identified including 9 genera and 18 subgenera. New state records included three species: *Aedes muelleri*, *Anopheles perplexens*, and *Culex coronator*. *Aedes albopictus* was identified in 69 of 77 counties. Of 12 species of mosquitoes tested for WNV, 21.3% (259/1216) of the *Culex pipiens quinquefasciatus* pools were WNV positive followed by 10.3% (25/243) of *Aedes albopictus* and 6.7% (13/193) of *Cx. tarsalis*. Infected pools of *Cx. pipiens q.* were more prevalent in the eastern and central areas of Oklahoma; whereas infected pools of *Cx. tarsalis* were found mainly in western areas of the state. This distinct geographical difference needs to be monitored in context of human and animal mosquito-borne disease risk. The widespread presence of *Ae. albopictus* in Oklahoma has important present and future public and veterinary health implications for mosquito-borne disease surveillance and control, including chikungunya virus and canine heartworm.

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Maps & Floor Plans

Fig. 1. Floor plan of the Hard Rock Hotel & Casino Floor – host hotel for the 2015 Annual Meeting of the Southwestern Branch of the ESA.

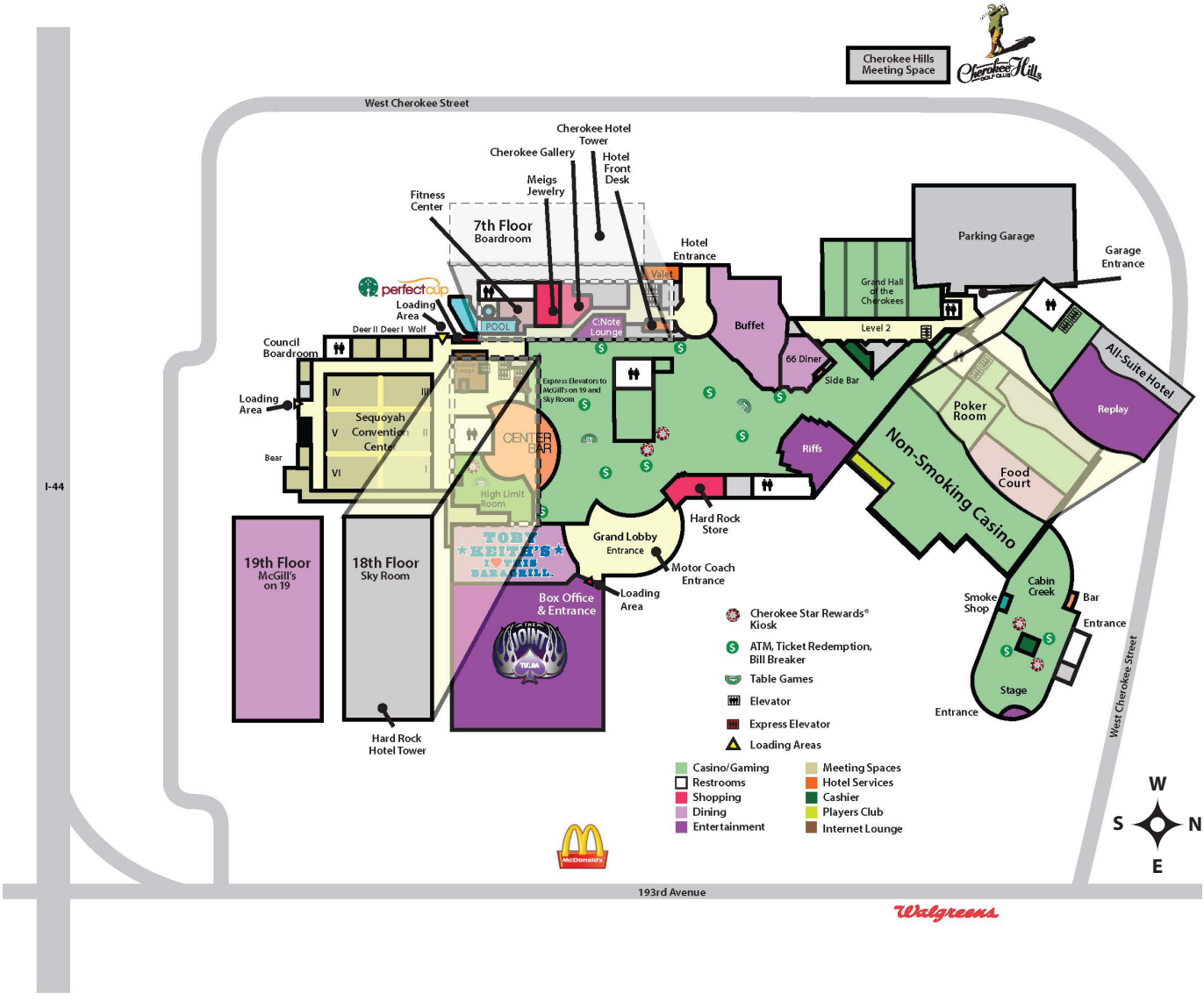
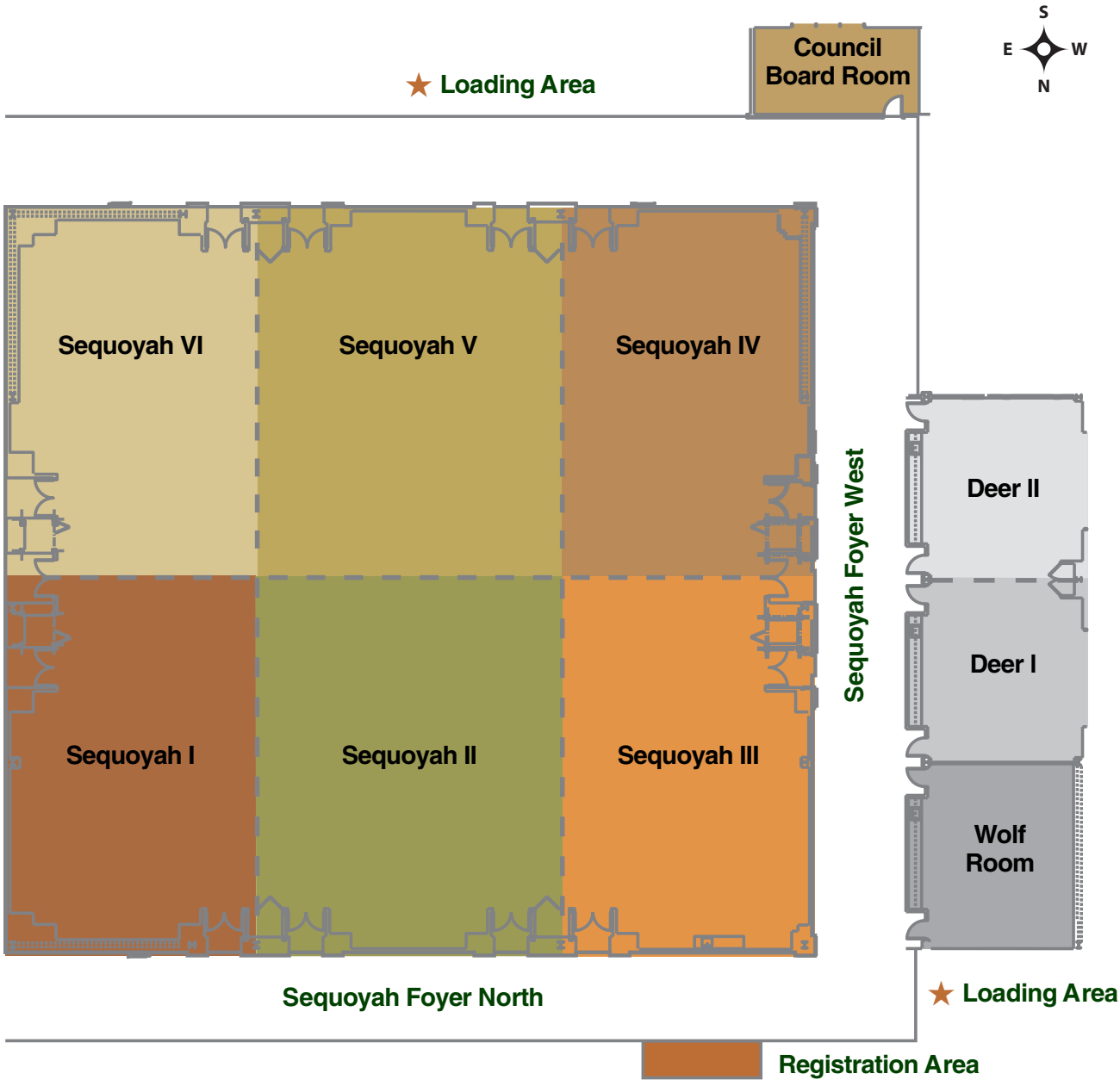


Fig. 2. Meeting rooms for the 2015 Annual Meeting of the Southwestern Branch of the ESA.



Notes