



**Department of Entomology  
Texas A&M University**

**Eighth Annual  
Graduate Student Forum**

Tuesday, August 23, 2005  
Minnie Belle Heep Center, Room 103

Texas A&M University Department of Entomology  
Eighth Annual Graduate Student Forum

## Committee Members

Dr. Patricia Pietrantonio, Chair  
Dr. Keyan Zhu-Salzman  
Chair Assistant: Teresa Gold  
Co-Chair Assistant: Dawn Hearn

Dr. Jim Olson  
Dr. Craig Coates  
Jeremy Hudgeons

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## Evaluators

Dr. Hisashi Koiwa  
Associate Professor  
Department of Horticulture

Dr. Albert Mulenga  
Assistant Professor  
Department of Entomology

Dr. Fred Smeins  
Professor  
Department of Rangeland  
Ecology and Management

Dr. Jeff Tomberlin  
Assistant Professor and Extension  
Specialist  
Department of Entomology

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## Graduate Student Forum Previous Award Recipients

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Year	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>
2004	Darren Hagen	Jeremy Hudgeons	Michael (Walker) Hale
2003	Mei-Er Chen	Andrea Julian	Jared Burks
2002	Mei-Er Chen	Christine E. Gray	Steven P. Holmes
2001 (Three way tie)	Christine E. Gray (Three way tie)	Steven P. Holmes (Three way tie)	Ronald D. Weeks (Three way tie)
2000	Jarrad Prasifka	Robert Kula	Ahmed Mohammed
1999	Carlos Bogran	Jarrad Prasifka	Karol Burns
1998	Carlos Bogran	Richard Houseman	Jim Martin

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*Reflections from the Chair*



Patricia V. Pietrantonio  
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**Where are the symbols that also matter? (At least to me!)**

A few years ago I heard a lecture about cultures: groups of people are defined, united and self-identified, mainly by their symbols, their cultural objects, their beliefs and their language. I just came back from my third visit to Greece and a short overnight stay in Amsterdam, The Netherlands. Every time I visit Greece I feel an instant connection to some of the cultural elements in the society even though I do not speak more than 3 or 4 words of Greek. Perhaps because the Buenos Aires Cathedral and the University of Bs. As. School of Law building are reminiscent of Greek temples, or because I studied the Greek mythology and yes, ate some variation of Greek food or because many Greeks have olive skin and black eyes just as I do...I do not know, could not pinpoint it until I went to Amsterdam!

I had only 3 hours and decided to visit the Royal Palace. When I entered the main hall I was overwhelmed and fascinated by the setting. I was literally standing on the world, the two hemispheres painted on the floor. All around me there were statues: symbols that surely were intended to influence and inspire the judges, visitors and inhabitants of that palace. There were Greek, Roman, even from the Old Testament... In various rooms justice was administered, including the death penalty that was executed in front of the building, in *Dam Square*. There it was the statue of "Justice", represented by a woman with the scale and blindfolded to indicate that justice should not be influenced by the trivial, there it was, Kronos or Saturn, the God that governed Time and Agriculture. In the sentencing room there was "Discretion", represented by a woman with her fingers covering her lips, there were also skeletons representing death and also "Punishment" for those that broke the law. However, there were also symbols of "Compassion" to remind judges that the penalty should be proportional to the crime...

*Then, I realized it!* I did understand and believed in their symbols! The Greeks believed in principles of advanced societal organization; they had scientific knowledge that applied to the arts and sciences as well as religious beliefs that guided them, as I could see here in the Palace, in the administration and interpretation of the law. There was "Strength", and at her right, Athena, "*the one with the eyes of the owl*", the Goddess of "Wisdom", the protector of arts, sciences and of the city of Athens; dressed in warrior's clothing to remind us that the best weapon is indeed Wisdom...

The physical space in this Palace reflected the beliefs of the Greeks, accepted by the people of the City of Amsterdam since 1650. All was already familiar to me, part of my western culture. When I look around me, here in this University and in West Campus I see mainly a sterile ground of cement, uninspiring buildings and a few trees, the railroad. ***Where are these other symbols?*** Where are those visuals that have meaning, that will inspire me, and thousands of students and faculty that acquire and create knowledge on a daily basis? As a scientist and teacher I do miss here the symbols of science, of truth, of enlightenment, of hard work, of justice, of knowledge...I am a "Highlander" from the University of California (Riverside), and I take refuge in a symbol that has always inspired me and I could share if you are in need of one: the seal says "**Let there be light!**"

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*Keynote Speaker*

Dr. A. Gene Nelson  
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Dr. A. Gene Nelson, long-time head of Texas A&M University's department of agricultural economics, has been named executive associate dean for the College of Agriculture and Life Sciences.

He will lead the administration of the academic programs within the college, which includes 6,300 graduate and undergraduate students in 15 academic departments. Nelson will also head the college's initiatives to improve curriculum relevance and teaching effectiveness, enhance learning excellence, and recruit a more diverse population of students.

"Gene brings a wealth of experience and professionalism to this position and has already proven to be an invaluable member of our administrative team," said Dr. Elsa Murano, vice chancellor and dean of agriculture and life sciences. "He has the confidence of our faculty and staff, loves working with students, and has a vision for how to take our academic programs to the next level of excellence."

"I am excited about the opportunity to work with the faculty, staff and students in advancing goals and implementing a roadmap to make the nation's best agriculture and life sciences college even better," Nelson said.

Nelson has been professor and head of agricultural economics since 1990. He came to Texas A&M from Oregon State University, where he was head of the department of agricultural and resource economics from 1981 to 1990. His research and extension programs have focused on risk analysis in farm decision-making.

His professional activities have included top leadership positions in the Western Agricultural Economics Association, the Southern Regional Advisory Committee for Agricultural Economics Research, and the Council on Food, Agricultural and Resource Economics. Both of Nelson's advanced degrees are in agricultural economics from Purdue University.

The College of Agriculture and Life Sciences is one of the largest in the country and ranks among the top producers of future leaders for the multibillion-dollar food and fiber industry. With 28 major undergraduate courses of study, the college offers nationally recognized teaching and research programs in food systems, natural resources and the environment, and life sciences technology.

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*Department Head*



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Graduate students within Entomology are creating knowledge that will affect the lives of others. Their new scientific discoveries and contributions in solving problems through goal oriented research are invaluable to improving the human condition. Today seventeen of the Department's graduate students will impact the lives of others by sharing their latest research discoveries; and as a result they will likely change an attitude, perspective, or understanding of the world around us.

The value of a scientific discovery is often judged over time on the levels of positive change exerted on various disciplines. Yet too, incremental steps of change are obtained through every written, visual, or oral communication each student has with the public. With every opportunity, *Leave A Legacy!* Census Bureau statistics for 2004 reveal that less than 7% of the U.S. population possess either a Master's or Doctoral Degree. A fraction of that percentage possesses a graduate degree in Entomology. Thus, Master's- and Doctoral-level entomologists are an elite group of students and it is imperative they do indeed Leave A Legacy! Entomology, a discipline with global significance, has provided leadership in filling the nation's growing need for advanced expertise in the life sciences and allied careers. The abilities to discover, understand, and apply science to the maximum benefit of society demands that scientists be versatile. This emphasis on versatility is necessary in making students more adaptable to changing conditions. Leave A Legacy! Change the World!

The 2005 Entomology Annual Graduate Student Forum is a showcase of student imagination, initiative, intellect, and dedication. In listening to the various presentations, continue to question how you as an individual may reshape graduate education to meet students' career needs better and to ensure the vital role of Entomologists in creating knowledge that positively affects the lives of others.

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*Associate Department Head for Academics*



Pete D. Teel  
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The Annual Graduate Student Forum is a terrific showcase of graduate student research achievements. The forum provides a glimpse of the outstanding quality and excellence of our current graduate students and allows incoming graduate students the opportunity to gain perspectives of a diversity of research topics and to assess the high expectations we have of all of our students.

Graduates of our programs distinguish themselves in leadership roles and achievements at state, national and international levels and in all entomological venues. From teaching, research and extension, to public and private enterprises, to professional school admissions, our former students continue to be in high demand and bring positive recognition to our department.

Twelve new graduate students will be joining the department this September and they will be immersed in university and departmental orientation activities in preparation for the fall semester. Please join me in welcoming these students to our department as we learn about and celebrate the achievements of our current students through the forum.

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**Amy E. Bader**

Major Professor: Dr. Kevin Heinz

M.S. Candidate

“Impact of Interspecific Interactions Among Parasitoids on Inoculative Biological Control of Leafminers Attacking Chrysanthemum.”

Competitive interactions of two commercially available natural enemies were studied and the feasibility of producing a marketable crop using these parasitoids either alone or in tandem was determined. Studies were conducted in a simulated, field-grown, cut chrysanthemum (*Asteraceae: Dendranthema grandiflorum* va. *polaris*) production system in the fall of 2003 and 2004. The parasitoids *Diglyphus isaea* (Walker) (Hymenoptera: Eulophidae) and *Dacnusa sibirica* Telenga (Hymenoptera: Braconidae) attacking the leafminer *Liriomyza langei* Frick (Diptera: Agromyzidae) were used as the model insect system. As for the type of data collected, we examined the occurrence of interspecific competition, the influence of interactions among parasitoids in the field and the effect of releasing a second parasitoid when a population of another already existed. There was no detectable occurrence of interspecific competition; parasitoid interactions did not influence leafminer suppression, and the release of a second parasitoid where one already existed did not influence parasitoid or host population dynamics.

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**Bradley W. Hopkins**

Major Professor: Drs. Julio Bernal and Allen Knutson

M.S. Candidate

“Species Composition and Seasonal Abundance of Stink Bugs in Cotton in the Lower Texas Gulf Coast and the Virulence of *Euschistus* species to Cotton”.

Stink bug damage has only recently been considered a serious problem in cotton production. For many decades, stink bugs were coincidentally controlled by insecticide applications made for the boll weevil and the tobacco budworm/bollworm complex. With the combination of boll weevil eradication programs, use of selective insecticides that have little to no effect on piercing/sucking insects, and wider adoption of Bt cotton cultivars, stink bugs have been allowed to establish themselves as annual mid- to late-season cotton pests.

A survey was conducted to determine the species composition, relative distribution, and seasonal abundance of stink bug species infesting cotton in the Lower Gulf Coast of Texas. Results indicate the stink bug complex in Lower Gulf Coast cotton to be different than that of other states. Preliminary data suggest *Euschistus servus* (Say) and a complex of smaller *Euschistus* species, including *E. quadrator* (Rolston) and *E. obscurus* (Palisot), to be the dominant pests, along with some populations of *Nezara viridula* (L.) and *Acrosternum hilare* (Say).

A boll cage study was conducted to determine the virulence of *E. servus* and *E. quadrator*, including boll susceptibility, amount of boll damage, and overall yield/quality loss. Preliminary data suggest both species cause significant boll damage; however, *E. servus* may cause more damage than *E. quadrator* and prefer larger bolls.

Two studies were conducted to compare insecticide efficacy against *E. servus* and *E. quadrator* in cotton. Results indicated dicofen (0.5 ai/a) provided the best control of both species, followed closely by bifenthrin (0.1 ai/a) and zeta-cypermethrin (0.0225 ai/a). Although not as effective as the three aforementioned treatments, other insecticides included in these tests did provide significant levels of stink bug mortality.

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### **Darren E. Hagen**

Major Professor: Dr. Craig Coates

Ph.D. Candidate

“Identification of Endogenous Germline-specific Promoters in the Mosquitoes, *Aedes aegypti* and *Anopheles gambiae*.”

*Aedes aegypti* and *Anopheles gambiae* are vectors for pathogens that have a dramatic effect on world health. Currently, methods of transformation are being developed for these species in order to create transgenic lines incapable of transmitting disease-causing pathogens. The creation of genetic transformants relies on the expression of a transposase protein in the germline cells to promote integration of transgenes into the insect chromosomes. The creation of a line of transgenic mosquitoes that will be capable of producing germline-restricted transposase will be of great importance to the disease vector research community. The use of endogenous germline tissue-specific promoters within *Ae. aegypti* and *An. gambiae* will allow for increased rates of transcription as well as ensuring germline specificity of the transposase. This will lead to increased transformation efficiency along with increased remobilization of integrated elements within the mosquito genome, creating a drive mechanism required for future successful integration into large populations.

My work is directed towards the identification of genes expressed strictly within the cells of the germline. By identifying these genes, the promoters can then be cloned and used to drive transposase expression.



### **Lara E. Lewey**

Major Professor: Dr. Craig Coates

Ph.D. Candidate

“Differential Gene Expression in the European Honey Bee, *Apis mellifera*, Due to Exposure to *Varroa destructor*.”

The European honey bee, *Apis mellifera*, is important to the agriculture industry because it pollinates billions of dollars worth of crops each year. Recently the Varroa mite, *Varroa destructor*, shifted hosts from the Asian hive bee to the European honey bee. The mite has done considerable damage to *Apis mellifera* populations because the bee has no natural defenses against the mite. Honey bee hives struggle to flourish when challenged with mite infestation and beekeepers have a hard time protecting their hives from the mite. The Varroa mite has developed resistances to chemical treatments used by beekeepers to combat the mite in an apiary. Better understanding of the molecular impact of the mite on the bee may lead to an increased ability to combat the mite. We investigated differential expression of mRNA transcripts between parasitized bees and non-parasitized bees to determine the transcriptional influence of the mite on the bee.

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### **Jeremy L. Hudgeons**

Major Professor: Dr. Kevin Heinz  
M.S. Candidate

“Assessment of the Biological Control of the Saltcedar on the Colorado River of Texas.”

Like many riparian systems of the southwestern United States, the Colorado River of Texas has been severely infested with saltcedar (*Tamarix* spp.), an invasive species from the Old World. Saltcedar increases soil salinity, displaces native plant communities, degrades wildlife habitat and consumes significant quantities of groundwater. Biological control using exotic insect herbivores is proposed as a highly specific and inexpensive tactic to reduce saltcedar infestations. The leaf beetle *Diorhabda elongata* (Coleoptera: Chrysomelidae) has been released at locations along the Upper Colorado River watershed in Texas. For the beetle to be an effective biological control agent, it must be able to establish in and disperse from release areas and have an adverse effect on the growth of the saltcedar trees. Transects have been created and a GIS is being employed to document beetle establishment and dispersal at each release site. To measure the effects of beetle feeding on saltcedar survivability, total non-structural carbohydrates from the root crown of the trees are being quantified using an enzymatic method of analysis. An understanding of the efficacy of this biological control agent in Texas is necessary for the coordinated management of saltcedar in the United States.



### **Maria A. Blandon**

Major Professor: Dr. Patricia Pietrantonio  
M.S. Candidate

“Target Validation of a Myokinin Receptor from the Southern Cattle Tick *Boophilus microplus* (Canestrini).”

The Southern cattle tick *Boophilus microplus* (Canestrini) is a vector for the *Babesia* protozoan species that cause cattle tick fever. This disease causes great economic loss for the cattle industry worldwide. An eradication program for this tick is ongoing in the U.S., at the Texas-Mexico border. Pesticide resistant ticks have been discovered in Mexico causing serious concern of reintroduction of this vector population in the United States. Therefore, developing novel methods to control these vectors is essential to prevent tick reinfestation.

A novel approach to control *microplus* is to disrupt the physiological function of an endogenous receptor. A myokinin receptor from the *microplus* tick has been previously cloned in our laboratory. Our hypothesis is that this myokinin receptor might be a suitable target for development of a novel acaricide. In order to test this hypothesis, one approach to validate this target is the immunological disruption of this receptor. Peptides corresponding to the sequence of the extracellular loops of this receptor were synthesized and linked to Limpet keyhole hemocyanin, a carrier protein. A mixture of these linked peptides was injected into Hereford cattle to induce an immunological response. The antibodies produced by the calves should recognize and bind to the receptor in the tick. This binding is expected to disrupt the receptors physiological function. Immunological tests (ELISA) were conducted to determine antibody titers in these animals. The calves that showed appropriate antibody titers were transported to the USDA Cattle Tick Research laboratory in Edinburg, TX to be challenged with ticks. Inoculated and control cattle were infested with 20,000 tick larvae. Two weeks after the initial attachment, the metanymphs were collected and incubated in ideal conditions to record the time of survival off the host. Three weeks after the initial attachment the ticks that dropped were collected, counted, weighed, and examined for physical damage. They were incubated in ideal conditions for another three weeks to examine egg laying capacity and egg viability as well as weight after egg laying. Planned statistical analysis on these data using t test and ANOVA will be performed and reported.

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### **Sonia A. Kjos**

Major Professor: Drs. Jim Olson and Craig Coates  
Ph.D. Candidate

“Geospatial Analysis of Chagas Disease Vectors in Texas.”

Chagas disease, caused by the hemoflagellate protozoan parasite, *Trypanosoma cruzi*, continues to be an important public health threat on the American continent. The organism and its triatomine insect vectors have been discovered in diverse ecological niches throughout North and South America. Eleven of the Triatominae species considered potential *T. cruzi* vectors have been reported in the United States, 7 in Texas. The present study applied geospatial tools to the study of vectorborne Chagas disease in Texas, resulting in a vector transmission risk map that incorporates locations of infected vectors, canines, and humans. The insect vectors are widely distributed across Texas with specimens reported from at least 86 counties and prevalence of *T. cruzi*-infected vectors ranging from 17-48%. In the past 10 years, there have been 426 confirmed cases reported among domestic dogs from 42 counties in Texas. Based on recent seroprevalence studies, the actual number of canine cases is likely much higher. This study underscores the significant impact of Chagas disease on canine populations over a broad ecologic range in Texas and further elucidates the existence of active peridomestic transmission cycles and their relevance to public health.

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### **Glené Mynhardt**

Major Professor: Drs. Anthony Cognato and Marvin Harris  
M.S. Candidate

“Population Genetics of the Pecan Weevil, *Curculio caryae*, Based on Mitochondrial DNA analysis.”

The pecan weevil, *Curculio caryae* Horn, is an economically important pest that causes millions of dollars of damage to pecan and all 13 other North American hickory (*Carya*) species each year. We can predict potential dispersal rates of the pecan weevil by estimating gene flow among populations and the degree of genetic variation within populations. Currently, we have performed cladistic analyses of 33 individuals from 8 populations using mitochondrial DNA cytochrome oxidase I sequence data. A simple parsimony analysis has revealed three distinct haplotype lineages, or clades. These clades do not appear to be associated with particular geographic regions. This result suggests that there is sufficient gene flow among populations; however, additional specimens from within the pecan weevil's range are required for further investigation. Once additional specimens have been collected and sequenced, we will be able to conduct thorough analyses including nested clade analyses to identify population structure. In addition, several analyses of molecular variance will allow us to determine the genetic variation within pecan weevil populations.

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### **Christopher L. Jagge**

Major Professor: Dr. Patricia Pietrantonio  
Ph.D. Candidate

“Identifying a Diuretic Hormone Receptor from the Mosquito *Aedes aegypti*.”

The female of the mosquito *Aedes aegypti* is the vector of yellow fever and dengue fever. No vaccine to prevent dengue fever or its associated syndromes has been developed. Dengue disease prevention and control depends on vector control.

Insecticide resistance in mosquito populations is of great concern in the USA and worldwide. Novel insecticides with selective modes of action that could control mosquitoes resistant to the traditionally-applied insecticides are urgently needed.

“G protein”-coupled receptors offer great promise as targets for the development of mosquitocidal agents with novel and selective modes of action because they are proven “drug” targets.

In response to the rapid volume increase from acquiring a blood meal, hormone signaling through “G protein”-coupled receptors in the digestive organs maintains fluid homeostasis by excreting water. Research into the physiological process of excretion signaled by these receptors will lead to the identification of synthetic agonists/antagonists --“lead” compounds in the discovery of additional mosquitocidal agents.

I have identified and cloned a diuretic hormone (DH<sub>44</sub>; diuresin) receptor from *A. aegypti* Malpighian tubules. I will analyze the expression pattern, express and functionally characterize the receptor from this mosquito using methods established in our laboratory.



### **Takesha Henderson**

Major Professor: Dr. Marvin Harris  
M.S. Candidate

Ground Spider Diversity In Lick Creek Park

Lick Creek is a local nature park acquired in 1987 by the City of College station, Texas. It is comprised of 515 acres. The site has a variety of indigenous plant and animal species and is an important natural resource of citizens of the region. Knowledge of its biodiversity provides enjoyment and education for present and future generations. Annually, Bioblitz takes place here, attracting many hundreds of people that join biologists to learn and share experiences about the fauna and flora of this particular ecosystem. There is a long-term commitment to inventory this natural park to monitor the changes as our urban community expands to surround the park. My focus is on improving our spider inventory at Lick Creek. There are 965 species of spiders currently recorded from Texas with 213 from Brazos County. Spider collection for the expanded inventory was made using pitfall traps distributed evenly within three different habitats. Reviewing previously collected material and small collections from spring of 2004, 70 species are presently known from Lick Creek Park, with 25 new records for Brazos County and one new species to Texas. Little was known about the spiders in Lick Creek Park before my preliminary study in the spring of 2004. Many additional species can be expected to be found in these habitats with additional collecting. This inventory of spiders at Lick Creek will provide a basis for further studies on biodiversity and the assessment of human impact on the environment.

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**Katrina Menard**

Major Professor: Dr. Anthony Cognato  
Ph.D. Candidate

“Using Molecular Haplotype Diversity to Assess Dispersal and Phylogenetic History of *Conophthorus* sp.”

Pine-cone beetles (*Conophthorus* sp.) are major pests to the forest industry because adult feeding in immature pine cones causes subsequent abortion of the plant's reproductive tissue. Severe reduction of pine-seed orchard fecundity has prompted increased study of these pests. In particular, an understanding of the phylogeography and host-plant fidelity may aid in the control of pest populations. This study tests two hypotheses: 1. What is the dispersal ability of *Conophthorus* inferred from DNA haplotype data (mtDNA) variation among beetle populations; and 2. What is the relative influence of geography or host plant use on the speciation of *C. ponderosae*, one of the most common and destructive species. Preliminary analyses find that *Conophthorus* species have a relatively high dispersal capability. Also, *C. ponderosae* is paraphyletic, and the diversification of lineages appears to be influenced more by geographic range as compared to host use. These findings support earlier studies.

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**Paul D. Barron**

Major Professor: Dr. Craig Coates  
Ph.D. Candidate

“Orpahn Transcripts Induced by Hemophagy Discovered within the Lone Star Tick, *Amblyomma americanum*.”

*Amblyomma americanum* (Acari: Ixodidae) has long been recognized as a significant vector of pathogens affecting humans. The physiology and molecular genetics of ticks relative to life stage, development, hemophagic diet, long periods of non-feeding and vector/parasite interactions are poorly understood. Histological and molecular examinations during feeding show that feeding induces *de novo* synthesis of RNA, including mRNA. Thus, feeding induces gene expression. Studying differential gene expression among *A. americanum* provides the basic research necessary for examining processes underlying blood feeding, growth, and development. Our experiments elucidate novel sequences associated with blood feeding among nymphs. Subsequent cloning, isolation, and sequence analysis of these differentially expressed genes in response to feeding will be discussed. Additionally problems encountered when in silico analysis fails, due to a lack of orthologous sequences among public databases, will be discussed.

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### **Luis A. Espino**

Major Professors: Dr. Jim Olson and M.O. Way  
Ph.D. Candidate

“Spatial Pattern and Development of a Visual Sampling Method for the Rice Stink Bug, *Oebalus pugnax* (Hemiptera: Pentatomidae), in Texas.”

The objective of this study was to develop a reliable visual sampling methodology and a sequential sampling program for the rice stink bug (RSB), *Oebalus pugnax* (F.).

Three different visual sampling methods were compared to the standard sweep net method. Commercial rice fields in the Texas Rice Belt were sampled during 2003 and 2004 and a total of 1036 visual samples were compared to an equal number of sweep net samples (10 sweeps per sample). Fields were sampled at different stages of panicle development and had different RSB population levels. Analysis of covariance revealed that sweep net sampling could be replaced by visual sampling using the “sweep stick”. Taylor’s equation was used to determine the variance-mean relationship for the sweep net and the sweep stick, which showed that the RSB has a clumped or aggregated distribution pattern in Texas rice fields. Using the spatial pattern and current damage thresholds, sequential sampling plans were developed for the sweep stick and the sweep net. Validation of the sequential sampling plans will be conducted during the 2005 growing season.

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### **Robert T. Puckett**

Major Professor: Dr. Marvin Harris  
Ph.D. Candidate

“Compensatory Foraging Strategy in Red Imported Fire Ant, *Solenopsis invicta* (Hymenoptera: Formicidae), Colonies Exposed to the Dipteran Parasitoid, *Pseudacteon tricuspis*.”

The presence of the parasitic fly, *Pseudacteon tricuspis* (Diptera: Phoridae), influences the outcome of competitive interactions among red imported fire ants (*Solenopsis invicta*) and other ant species by reducing the foraging effort of *S. invicta*. These flies are diurnal while *S. invicta* are known to forage both diurnally and nocturnally. Nocturnal foraging by *S. invicta* potentially presents a temporal escape from the parasitism pressure of *P. tricuspis*. This study assessed the effects of *P. tricuspis* on foraging patterns of *S. invicta* colonies in the absence of resource competition.

Ten treatment (flies present) and ten control (flies absent) colonies were maintained in separate greenhouse units attached to the ERL building. A food source of known mass was offered to both groups and weighed after a 24hr period. Foraging observations were made daily and nightly while food was present. Diurnal foraging intensity was significantly less ( $P < 0.05$ ) in treatment colonies relative to control colonies. However, the amount of food consumed over a 24hr period was not significantly different ( $P = 0.114$ ). In fact, the average amount of food consumed was greater in the treatment group (0.205g) relative to controls (0.175g). Nocturnal foraging intensity was significantly greater ( $P < 0.05$ ) in the treatment group. The results of this study appear to demonstrate a compensatory nocturnal foraging strategy among colonies that are challenged by this parasitoid.

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### Alejandro Calixto

Major Professor: Dr. Marvin Harris

Ph.D. Candidate

“Species Turnover in Local Ant Assemblages Following Fire Ant Reduction.”

*Solenopsis invicta* Buren, the red imported fire ant (RIFA), is an invasive species that negatively impacts ant diversity. Alpha diversity ( $\alpha$ ) and interactions of ant assemblages with RIFA were studied for two years in a pecan orchard in central Texas. The investigation focused on the response of ant species when RIFA is treated and reduced with granular bait insecticides (an insect growth regulator (IGR), s-methoprene). The bait treatment and respective control were randomly assigned to 1.33 ha blocks, replicated four times, and periodically monitored using pitfall traps, baited vials, manual collection of ants, and nest surveys. Field observations were also made to determine the species foraging on IGR granules. Sixteen ant species were found among the treatments. The IGR treatment consistently reduced RIFA and several ant species showed a significant density increase following RIFA reduction (species turnover), indicating a reorganization of the hierarchy in the ant assemblage. The pyramid ant, *Dorymyrmex flavus* McCook showed the most significant increase in IGR blocks; it persisted for more than two years after the last IGR treatment and was observed accumulating RIFA carcasses on its middens. Interspecific competition is often the major factor limiting ant populations. A recent field study conducted in Brazil found that interspecific competition with other ants appeared to be a much stronger factor regulating *Solenopsis* populations, as opposed to effects of parasitism from phorid flies. These results suggest that a selective management of RIFA with baits and subsequent conservation of ant assemblages may delay RIFA re-infestations and allow longer intervals between treatments.



### Jiri Hulcr

Major Professor: Dr. Anthony Coganto

Ph.D. Candidate

“Community of Bark and Ambrosia Beetles in a Tropical Rainforest of Papua-New Guinea.”

Bark beetles (Curculionidae: Scolytinae & Platypodinae) are one of the most diverse and economically important groups of beetles. However, quantitative data about the structure of the tropical bark beetle community are very limited. We attempted to describe important ecological variables characterizing a population of bark and ambrosia beetles in the tropical rainforest of Papua-New Guinea utilizing local parataxonomists, entomological collections worldwide, and DNA-based taxonomy.

The field activities are based in the New Guinea Binatang Research Center, Madang, which provided the help of parataxonomists. Here we rear bark and ambrosia beetles from host tree species selected according to their phylogenetic relationships. Taxonomic sorting is being performed at the Holistic Insect Systematic Laboratory, Dept. Entomol., TAMU, and in several major entomological collections worldwide. DNA samples are being taken from every species in order to establish a basis for DNA taxonomy of scolytids. In morphospecies displaying variation or reared from multiple hosts, DNA from more specimens will be sequenced in order to detect cryptic species. So far, 3 replications of 8 tree species have been processed, 28,650 specimens of bark and ambrosia beetles of more than 60 species have been reared. Analysis of this material will focus on the following topics:

- Host specificity of tropical scolytids; the effect of host phylogenetic position on the composition of scolytid assemblage.

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# Texas A&M University Department of Entomology

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- Other ecological characteristics such as species (alpha) diversity, abundance distribution and distribution within a host tree. Do these variables differ in bark and ambrosia beetles?
  - Differences between the ecological characteristics of scolytids and those of other tropical insect herbivorous guilds.
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**Alexandra Gomezplata**

Major Professor: Dr. Marvin Harris

M.S. Candidate

“Report on the Pecan Survey of 2004.”

Surveys are techniques for gathering information from producers. This allows for improving communication of producer's needs, documentation of successes and helping guide future plans. The 2004 Pecan Survey conducted in Texas shows that producers are using less insecticide sprays and timing the applications better, whether they identify themselves as conducting a full spray or IPM program. Survey results show there has been a reduction of producer reliance on application of organophosphates and carbamates (At-risk insecticides subject to EPA action due to the FQPA of 1996) from 91% (in 1996) to 71% of sprays by the 2003 season (this is due to both substituting the IGR mimic CONFIRM and spraying less overall). The average producer reports using four IPM tactics (pest density, pheromone, traps, self-scouting, prediction model, etc.), in their management program. Spray/no spray decisions regarding treatment with the minor nutrient zinc, fungicide, or insecticide result in no-spray decisions 65% of the time. The remaining 35% of decisions occur in conjunction with high risk windows from rosette, pecan scab and nut-feeding insects, indicating producers are surgically applying sprays when needed. Overall we can safely conclude that Texas Pecan growers are increasing their adoption of IPM, reducing reliance on At-risk pesticides and targeting needed sprays better. These practices will reduce economic loss, risk of resistance and move pecan producers toward better compliance with the Congressional Food Quality Protection Act of 1996 and the IPM compliance goals of several U.S. Presidents.

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