

16th Annual

Ecological Integration Symposium

*Ecological & Evolutionary Perspectives on One
Health*



Texas A&M University
26-27 March 2015

ABSTRACT BOOK

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9:15 – 10:00am

Public Health and Disease

T1. Michael Sanders

THE EFFECT OF VOLATILES PRODUCED BY BURULI ULCER'S MYCOBACTERIUM EXOTOXIN ON HOST-SEEKING BEHAVIOR OF Aedes Aegypti Aegypti (LINNAEUS) (DIPTERA: CULICIDAE)

An emerging tropical disease, Buruli Ulcer (BU), affects thousands of individuals throughout the world with West Africa being an area most devastated. From 2005-2010 nearly 30,000 cases were reported from this region of the world. This disease is caused by the mycobacterium, *Mycobacterium ulcerans*, which unlike other species of mycobacterium produces a mycolactone. This mycolactone is considered an immunosuppressive polyketide-derived macrotoxin that can diffuse through plasma membranes. This disease has novel clinical symptoms that consist of a skin ulcer that is painless. The ulcer may be painless but has negative affects, such as bone deformation, and possible secondary infections that can often lead to death. How this pathogen is transmitted is currently not known. This study examined if the mycolactone serves as an attractant of the yellow fever mosquito *Aedes aegypti aegypti* (Linnaeus) (Diptera: Culicidae) to hosts. We examined the responses of adult mosquitoes to blood sources treated with one of three doses (0.05µg/mL), (0.5µg/mL), (1.0µg/mL) of the mycolactone or a control. We determine 63.18% of the mosquitoes were attracted to the blood-feeder treated with the middle dose (0.5µg/mL) over the control. These data indicate that the mycolactone could serve as an attractant of mosquitoes to hosts, which could result in transmission of the pathogen responsible for BU as well as enhance the transmission of other mosquito-related pathogens such as malaria.

T2. David M Poché, William E. Grant, Hsiao-Hsuan Wang

VISCERAL LEISHMANIASIS IN BIHAR, INDIA: SIMULATING ALTERNATIVE CONTROL STRATEGIES USING FIPRONIL ORALLY ADMINISTERED TO LIVESTOCK

Visceral leishmaniasis (VL) is the second (behind malaria) most deadly parasitic vector-born disease worldwide, resulting in over 500,000 cases and 50,000 deaths annually. Approximately 67 percent of these cases occur in Northern India and bordering regions of Nepal and Bangladesh, where the disease is spread by sand flies (*Phlebotomus* spp.) that take blood meals from hosts (including livestock and humans), lay eggs in organic matter, particularly feces, upon which the larvae feed, pupate, and subsequently emerge as adult flies, completing the life cycle. Recent research in Northern India has indicated that the systemic insecticide fipronil orally administered (once) to cattle can kill 100% adult flies feeding on fipronil-treated cattle and all larvae feeding on feces from fipronil-treated cattle. To evaluate the potential efficacy of fipronil treatment, we developed a quantitative model representing the sand fly lifecycle and including the various vector life stages (egg, larva, pupa, adult) and the host (livestock) in a typical rural village in the state of Bihar, India, and simulated a variety of control strategies in which we varied the frequency of treatment as well as the proportion of livestock treated. Simulation results suggest that the frequency of treatments and proportion of livestock treated can have a variety of impacts on the sand fly population and that fipronil treatment has the potential to reduce and eliminate sand fly populations in villages in Bihar.

9:15 – 10:00am

Hybrid Zones & Selection

T3. Mattie Squire

ASSORTATIVE MATING WITHIN HYBRID GENOTYPE-CLUSTERS IN A FRESHWATER HYBRID ZONE

Studying hybrid zones has allowed for greater understanding of the process of hybridization itself, the generation of species, and how natural and sexual selection operate on species that hybridize (and their hybrids). Most research has thus far focused on consequences of hybridization for the parental species; the dynamics within hybrid populations themselves have received less study. An under-examined topic, specifically, is population structure and population structure diversity within hybrid zones. Here, we present a population of hybrid swordtail fish (*Xiphophorus malinche* X *X. birchmanni*) from a stream reach where hybrid populations follow a bimodal structure—that is, hybrid individuals belong to two distinct genetic clusters vs. a hybrid swarm. We hypothesize that this population structure could be due to assortative mating and that hybrid females mate within their own genetic cluster more frequently than outside of it. Paternity analysis with microsatellite markers revealed that females in this population all have multiply sired broods. Ancestry assignment on females and offspring using MSG allowed us to determine the ancestry of putative sires and thus discover that almost all successful matings are within the same hybrid genetic clusters. Simulations done in admix'em showed that 100% assortative mating would be required to generate the patterns we see in our population. Thus, we have strong support for assortative mating between hybrid genetic clusters in this population.

T4. Gaston Jofre

USING CLINE THEORY TO TEST FOR SELECTION IN NATURAL HYBRID ZONES

Hybrid zones are a natural laboratory to get insights from evolutionary processes. Clines theory provides a network to characterize genomic heterogeneity, genetic architectures, and patterns of introgression. Geographic clines describe the transition of genes and traits through hybrid populations, from one parental species to another. Genomic clines compare the genotype frequencies at each locus to the genome-wide average representation of the ancestry of a population. Both methods are complementary to understand the speciation process, where species boundaries can be porous and create introgression. In my talk I will define these two methods and describe how to characterize introgression in multiple natural hybrid zones of fresh water fish in Mexico.

T5. Pablo Delclós

CONDITIONAL DIET EFFECTS ON SEXUAL COMMUNICATION IN HYBRIDIZING SWORDTAILS

Mate choice depends on the structure of both courter traits and chooser preferences, both of which are strongly shaped by their environment. Environmental differences during development can have reproductive implications upon maturation. Thus, habitat effects could be important in structuring certain context-dependent behaviors, such as female mating preferences. The goals of this study were to compare the phenotypic distribution of male traits within a genetic population of *Xiphophorus* divided

between two adjacent pools of the same small stream, and to determine the interaction effects of site and recent diet on female preferences for male pheromones associated with nutritional condition. While recent diet has been shown to affect the strength of female swordtail preferences, it is unknown whether this behavior is sensitive to developmental history. We found notable differences in female reproductive allotment, male condition and the distribution of male traits between pools. Furthermore, we found a significant interaction effect between pool and recent diet on female preference, highlighting the importance of both developmental and recent history in mate choice dynamics. Small-scale spatial and temporal ecological variables may thus provide a rich source of variation in female mating preferences and thereby in male traits, and may account for the maintenance of heritable variation in sexually-selected traits in the face of minimal genetic variation in preferences.

9:15 – 10:00am

Honey Bees

T6. Adrian Fisher II

HONEY BEE (*APIS MELLIFERA*) DRONE REPRODUCTIVE HEALTH

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. The study of drone reproductive quality, however, 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 can fertilize an ovule) found significant variation in spermatozoa viability between drones in East Texas apiaries (Rangel et al. 2013, unpublished data). Possible environmental influences on the observed variation have not yet been established, 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 (Mullin et al. 2010). To assess the potential effect of exposure to in-hive pesticides during development on drone spermatozoa viability, we compared the viability of spermatozoa collected from drones reared in pesticide-free wax to that of drones reared in wax contaminated with field-relevant doses of pesticides. Using a standard sperm staining technique, live spermatozoa were stained with Sybr 14 dye while unviable spermatozoa were dyed with propidium iodide. The samples were then run through a calibrated flow cytometer, which separated the viable and non-viable sub-populations in each sample. Our preliminary results suggest a possible significant negative effect of pesticide exposure during development on drone spermatozoa viability, and thus, reproductive quality.

T7. Pierre Lau

AN ANALYSIS OF POLLEN COLLECTED BY HONEY BEES (*APIS MELLIFERA* L.) IN DEVELOPED AREAS

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. Thus, having a diverse food source available to bees can greatly improve their health. In addition, honey bees in urban settings may be exposed to pesticides applied in home and gardens through the pollen and nectar they bring back to their hives. 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 from Austin will be 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.

T8. Elizabeth Walsh

THE EFFECTS OF IN-HIVE MITICIDES ON QUEEN (*APIS MELLIFERA*) RETINUE RESPONSE AND MANDIBULAR GLANDS

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 the individual use of one of two in-hive miticides: the organophosphate coumaphos (Checkmite+) or the pyrethroid fluvalinate (Apistan). Sublethal in-hive levels of each 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 a synergistic effect on queen attractiveness to workers. We tested this by raising queens in miticide-free beeswax or beeswax containing known concentrations of both coumaphos and fluvalinate. We measured the size of each queen's retinue 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 collaboratively examined using 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, which may have further repercussions on the one health of our ecosystems and world.

11:00 – 12:00pm

Changing Landscapes

T9. Jessica Gilbert

OVERGRAZING AND AFFORESTATION IN THE HUASCARAN BIOSPHERE RESERVE, PERU: IMPLICATIONS FOR MANAGEMENT

High altitude Andean ecosystems are faced with a multitude of threats that are compounded by the effects of global climate change. Overgrazing, afforestation of non-native tree species, and agricultural expansion are few of the many pressures contributing to land cover change in high altitude Andean landscapes. The Huascarán Biosphere Reserve is a UNESCO World Heritage Site encompassing an area of 1,155,800 ha, including the 340,000 ha Huascarán National Park, ranging from 2,500 to 6,768 masl. Direct uses within the boundaries of Huascarán National Park include grazing by surrounding indigenous communities in designated special use areas. Although a strict grazing management plan was created in 1975 with the creation of the protected area, weak enforcement has led to issues of overgrazing, contributing to degraded grasslands and a reduction of available pasture land. As a result, livestock climb higher to search for palatable pasture, including strict protection areas and protected forests. Previous LANDSAT analysis has identified an increase of forest cover in this region, however this is attributed to the plantation of non-native commercial species, particularly *Eucalyptus* sp. and *Pinus* sp., which reduce the provision of ecosystem services and provide poor habitat for native species. From 2009-2011 in coordination with Huascarán National Park staff we observed various cases of livestock encroachment onto strict protection areas and degraded pasture as a result of overgrazing. We recommend further studies to adequately assess the impacts of overgrazing in this region as well as identify sustainable management practices to support long term grazing activities. We recommend the modification and enforcement of the existing management plan of the protected area to support the livelihoods of subsistence grazing communities as well as protect suitable habitat for endangered and threatened species.

T10. Louis Addae-Wireko, Luke Scroggs, Andrea Fonseca, Sarah Ajayi, Thomas Galland
EFFECTS OF WILDFIRE DAMAGE ON VEGETATION RECOVERY AND RIO GRANDE WILD TURKEY DISTRIBUTIONS

In April 2011, a high severity wildfire burned close to 200,000 acres of northern Texas, destroying about 168 homes and large tracts of vegetation in the process. To assess the effects of the wildfire on land cover and vegetation recovery, we conducted supervised classifications of one pre-fire (2011) and two post-fire (2011, 2014) Landsat images of the surroundings of the Possum Kingdom Lake, then conducted post-classification change detection analysis and generated fire burn severity maps based on the difference Normalized Burn Ratio (dNBR). From our results, high severity burn areas constituted only 0.7% (6,328 acres), with unburned and low to moderately high burn severity areas constituting 84.7% and 14.6% of the study area respectively. Three years after the fire,

there has been a net loss of 3,128 acres of vegetated land to other cover classes (bare/builtup) with coverage extent changes within land cover types in the study area ranging from a loss of 16% in forests to gains of 8% in Grasslands and 336% in barelands/builtup comparing to pre-fire conditions. Analysis of the GPS-tagged Rio Grand turkeys data together with the burn severity maps produced and the land cover classes of the NLCD 2011 showed that the turkeys spent 54% of their time during the day in grasslands/herbaceous cover and 24% within evergreen forests. However the time spent within these cover classes changed during the night spending 46% of time in the evergreen forest and 38% in grasslands/herbaceous cover. The turkeys spent most time in the unburned areas during the days and nights; 61% and 56% of time spent respectively. Time spent in the high severity burn areas for both day and night were less than 1%. Both male and female turkeys spent most time in unburned areas (74% and 48% respectively) during the day.

T11. Pedro Afonso Leite, Rodolfo Jaffé

LANDSCAPE STRUCTURE INFLUENCES THE CONTROL OF A COFFEE PEST BY SOCIAL WASPS

Many studies indicate that biodiversity is correlated to the provision of ecosystem services. However, the influence of landscape structure on the processes underlying these services is still poorly understood. Here we assessed the relationship between two aspects of landscape structure (forest cover and distance from forest patches) and the biological control of the coffee leaf miner (*Leucoptera coffeella*, Lepidoptera) by social wasps (*Hymenoptera*, Vespidae, Polistinae). Ten landscapes located in Minas Gerais and São Paulo - Brazil were analyzed, each containing coffee plantations and different amounts of Atlantic Forest remnants. Pest predation rates and wasp diversity were assessed in each landscape. Predation rates were found associated with both landscape structure (forest cover) and wasp diversity. Our results show that farms surrounded by higher amounts of forest also had higher rates of pest control. Additionally, we found that the average distance from forest patches had an inverse relationship with wasp richness and diversity, indicating the dependence of these predators on the natural habitats surrounding the coffee farms. Several studies have already documented the importance of social wasps in the control of the coffee leaf miner, but this is the first study to link the control of this pest with the forest cover in a landscape scale. Our study contributes to the rationale for forest preservation in this highly deforested landscapes, showing that farmers might directly benefit from an ecosystem service provided by these forests.

T12. Amelia Min-Venditti

IMPACT OF TROPICAL FOREST CONVERSION TO CROPLAND ON LEAF WETNESS DURATION IN COSTA RICA

Vegetated surfaces interact with the water cycle by intercepting water on the canopy, effectively preventing it from reaching the ground surface and becoming runoff that contributes to stream flow. Vegetation can also reduce stream flows by using soil water via transpiration. Both interception and transpiration are altered when humid tropical forests are converted to short-statured crops, as a result of reductions in total canopy surface area and alterations in the atmosphere-canopy interface. As a result, different types of crops varying in height and structure will potentially have different

impacts on evaporation of intercepted moisture. To examine potential differences between tropical montane forest in north central Costa Rica and three crop types (papaya, taro, and sweet potato), we compared the time of drying following saturating rain events. A much longer mean wetness duration was seen in mature forest (487 ± 41 minutes) than crops (94 ± 37 minutes) ($p \leq 0.002$). Papaya is taller than and has a distinctive crown architecture when compared with the other two crops, and was shown to dry significantly slower (137 ± 51 versus 73 ± 23 minutes) ($p \leq 0.006$). These results suggest the possibility of higher runoff following tropical forest conversion to cropland, which may cause stream bank erosion and channel widening. Additionally, this process may alter rainfall recycling in the humid tropics, since air above crops is drier more of the time as compared to forests.

11:00 – 12:00pm From Communities to Populations

T13. Daniel Fitzgerald

FOOD WEB STRUCTURE OF THE LOWER XINGU RIVER: A UNIQUE AND IMPERILED ECOSYSTEM IN THE LOWER AMAZON BASIN

The Xingu River is a large, clear water tributary of the lower Amazon, distinguished by a 130 km system of rapids and a highly diverse, endemic fish fauna. As with other high-gradient rivers throughout the world, the Xingu faces substantial pressure from hydroelectric development. Construction is nearly completed on the Belo Monte Hydroelectric Complex, which is set to be the third largest hydropower complex in the world. This complex will impound a major river segment, may dewater the Volta Grande rapids between Pimental diversion dam and Belo Monte, and will drastically change aquatic habitats and ecological dynamics in the lower Xingu. In addition to potential impacts on the endemic fauna of the rapids, the change from lotic to lentic habitats may alter the flow of energy through the aquatic food web. In order to develop baseline understanding of food web structure within the Xingu prior to completion of the Belo Monte Dam, we are using carbon and nitrogen stable isotope ratios to estimate the principal basal production sources supporting fish diversity, and how assimilation of these sources into biomass of species and functional groups changes seasonally. Here we present preliminary findings from an analysis of 21 fish species collected during the 2012 dry season. Results indicate that the most important primary production sources supporting fishes in the dry season are epilithic algae and C3 riparian plants. Despite their generalized body form adapted to scraping benthic algae, species of the family Loricariidae appear to occupy the largest and most tightly packed trophic niche of the dominant fish families.

T14. Anthony Rodger

FLOW DYNAMICS AND TEMPORAL VARIATION IN FISH ASSEMBLAGE STRUCTURE IN TWO TEXAS GULF COAST RIVERS

Given increasing human demands for freshwater, it is imperative to identify environmental flows that maintain native species, their habitats, and key ecosystem dynamics. A major challenge is determining requirements for seasonal flow pulses that promote fish spawning, early life stage survival, dispersal, and other processes that maintain native stocks. Our study investigated hydrology, fish reproduction, larval

abundance, survivorship, and community assemblage in the lower Brazos and middle Trinity rivers in Texas. From March 2013 to March 2014, abiotic environmental data were collected along with data on fish abundance, reproduction, and recruitment. Larval fish were collected bimonthly at night using three arrays of stationary driftnets arranged along transects perpendicular to the shoreline. Seine nets were used to sample fish assemblages in shallow littoral habitats. Multivariate statistical analyses based on seine samples revealed that hydrological variables were associated with temporal variation of fish assemblages. Multivariate analyses of driftnet data indicated that temperature had the strongest association with patterns of larval fish abundance, based on evaluations at the family level. Cyprinid protolarvae, in aggregate, did not seem to be constrained by hydrology, as evidenced by their high abundance throughout the reproductive season (April–September). Ongoing work to identify larval fish to species level will elucidate how flow regime components influence reproduction and recruitment of fluvial specialists, such as *Macrhybopsis hyostoma*, *Notropis shumardi* and *Notropis buchani*. This information will significantly augment our currently limited knowledge of the life histories of minnows inhabiting Gulf coastal rivers, which in turn will assist in evaluating environmental flow regimes.

T15. Can Zhou

FINDING REGULATION AMONG SEEMINGLY UNREGULATED POPULATION: A PRACTICAL FRAMEWORK FOR ANALYZING MULTIVARIATE POPULATION TIME SERIES

Patterns in ecological communities often are interpreted as being strongly influenced through trophic interactions, traditionally labeled as bottom–up and top–down control. Previous approaches to identify these processes often assume each population of the community is itself regulated, i.e., it follows a stationary process. However, complex community structure and a lack of regulation in individual population dynamics can result in inappropriate inferences based on traditional approaches. Here, we introduce a statistical framework to analyze potentially non–stationary time series that are collectively regulated, and demonstrate the method with catch–per–unit–effort (CPUE) time series data of selected populations in the Gulf of Mexico. In the Gulf, we found that most of the time series data, which span 26 years, were individually unregulated. Species interaction patterns were location–dependent, but where brown shrimp interacted significantly with other species, we identified significant bottom–up forcing. On the other hand, we find weak evidence of top–down forcing throughout the study areas.

T16. Cyrenea Piper

DETECTING DENSITY DEPENDENCE IN A BROWN SHRIMP POPULATION

Density dependence is assumed in fishery populations and is fundamental to understanding population dynamics and in making management decisions. Estimation of density dependence, however, is difficult because of inadequate data and the presence of process and observation errors. The fine temporal and spatial scale of my brown shrimp abundance by length data, which was collected over 11 years in Galveston Bay, Texas, and the use of the state-space method, which accounts for both process and observation errors, will make unbiased detection of density dependence more likely. The best estimator of brown shrimp year-class adult abundance is juvenile abundance. Marsh edge, which provides refuge from predation and harbors a greater abundance of prey, is an important

factor affecting juvenile mortality. If access to marsh edge is limited at high densities, intraspecific competition for marsh edge may result in density dependent regulation of juveniles. I will incorporate juvenile survival, growth, and recruitment into a stage-structured matrix and use the state-space method to estimate demographic parameters. I will use cross-validation to test for model adequacy and BIC to compare the size-dependent and density-dependent models to the null, density-independent, model. The density-dependent model will use the logistic equation to model survival and test the null hypothesis of no density dependence. I will conduct an impact analysis to estimate the effect of any significant density dependence on offshore recruitment. I expect density dependence to be weak, but still significant, because juvenile brown shrimp are subject to a highly variable environment. This study is a first step in identifying the presence and mechanisms of density dependence in brown shrimp and determining how future marsh loss may impact brown shrimp abundance by reducing the environmental carrying capacity.

11:00am – 12:00pm Entomology

T17. Ordomb Huot

Plants are adapted to reduce damages imposed by pathogens and insects. To mitigate incidences of herbivory and disease, plants induce specific responses. Plant responses to the pathogen '*Candidatus Liberibacter solanacearum*' and its vector *Bactericera cockerelli* are not well understood. However, the salicylic acid (SA) defense pathway in plants has been associated with induced systemic acquired resistance against phloem-feeding herbivores like *B. cockerelli*. Here, we applied an elicitor, acetylsalicylic acid (ASA), to induce SA defense pathway in tomato plants to (1) study the effects of ASA on the expression genes associated with the SA defense pathway, (2) investigate the effect of induced genes on plant induced resistance to psyllid and associated pathogen. The results showed that the higher the concentration of ASA solution applied on plants the lower the number of vectors colonized plants. ASA elicited genes for plant defense and enhanced plant resistance by reduced the total number of vectors infesting the plants. The result also showed that low concentration of ASA did not affect plant overall biomass when compared to the control. Furthermore, plants treated with ASA had lower incidence of pathogen infection when exposed to vectors harboring Lso. This indicates that ASA can enhance plant resistance by lowering pest number and reducing incidence of pathogen infection. Thus, ASA can be used as plant defense elicitors to induce plant resistance for future study associated with the management of pests and diseases.

T18. Meaghan Pimsler

WHY SO AGGRESSIVE? MOLECULAR ECOLOGY OF FACULTATIVE PREDATION IN A BLOW FLY

Unlike other flies which have heteromorphic sex chromosomes and a sex determination system based on embryonic genotype, *Ch. rufifacies* has homomorphic sex chromosomes and a monogenic system of sex determination in which the sex of her

offspring is a phenotype of the mother. This species is also one of only three blow flies known to engage in facultative predation in which the larvae will switch from consuming carrion to attacking and consuming other larvae. It is currently unknown what stimulates this potentially costly and expensive behavior. Furthermore it is unclear whether males and females are equally likely to engage in predation. Through leveraging this species' unusual sex determination mechanism, a de novo transcriptome of male and female predators and their non-predatory siblings was constructed. Additional behavioral assays to assess relative rates of predation, and whether such behavior was required for survival, were conducted. Predation was not required for survival, as there was no significant difference between the treatment and control groups. Several genes were differentially expressed between predators and non-predators, and a few genes were discovered to be sexually dimorphic in expression. Using sequence homology with *Drosophila melanogaster*, the gene identity of these homologous genes were explored to generate new hypotheses on the conditions that stimulate predation. Discussion of pertinence of these findings to the molecular ecology of this species and application to the forensic field follows.

T19. Le Zheng

EVALUATION OF STERILIZED DIETARY AND DENSITY EFFECTS ON DEVELOPMENT OF LUCILIA SERICATA (DIPTERA: CALLIPHORIDAE)

Blow fly of *Lucilia sericata* have wide applications and importance in studies of medical science as the agent for maggot debridement therapy, forensic entomology as an indicator species for PMI estimation, veterinary entomology as a vermin for causing myiasis on livestock, and chemical ecology as a model species for interkingdom communication study. However, there is currently no standard sterilized diet for rearing *Lucilia sericata* in laboratory. This research is focusing on evaluation for development of *Lucilia sericata* at different density on 6 sterilized diets comparing with fresh beef liver diet. Total number of 7350 individuals of *Lucilia sericata* has been evaluated at 3 density levels on 6 dietary treatments, decomposed liver diet, powdered liver diet, powdered fish diet, blood based diet, milk based diet, and chemical defined diet. There is a trend of increasing pupation proportion as well as average lifespan from low-density group to high-density group. The decomposed liver diet and blood-based diet are more consistent and similar to fresh beef liver. The high-density group, 40 larvae per 20g diet, is the suggested density for *Lucilia sericata* involved experiment. This research provide a baseline measurement and evaluation for density and dietary effects, and offer a guideline for density and diet setting in *Lucilia sericata* experiments.

T20. Chong Chin Heo, S.N. Thornton, J.K. Tomberlin

INHIBITING COLONIZATION OF VERTEBRATE CARRION BY PIONEER ARTHROPOD SPECIES INDICATES LIMITED ECOSYSTEM RESILIENCE BY ASSOCIATED MICROBIAL FUNCTION

Carrion is an unpredictable and ephemeral resource pulse for a wide array of scavengers and predators. This sapronecrophagous guild includes vertebrates, invertebrates and microorganisms. Arthropod succession on vertebrate carrion has been examined extensively and is expected to have top down effect through manipulations of associated microbial communities. However, limited information is available on the impact of delayed arrival of pioneering species of arthropods, namely blow flies, to carrion on the

associated microbial succession trajectory and level of resilience. We tested this question during two field trials during the summers of 2013 and 2014 in Snook, Texas. For each year, nine pig carcasses were assigned to one of three groups: control (immediate access to blow flies) and two treatments designated as post-7 and post-14. The treatments represented carrion where the pioneering species, blow flies, were denied access to feed and colonize the carrion for either 7 days or 14 days post death. To determine if the delayed colonization impacted microbial community function, ability to recover to expected succession trajectory (resilience), swabs were obtained from oral, skin and anal of the pig carcasses while soil samples were collected from beneath, at the side and 5-meter distant away from the carrion for time period of Day 0 (initial day of trial), 7, 14, 21 and 40 for all groups. Bacterial functions were examined using Biolog EcoPlate™ and the respective spectrometry data were analyzed using Vegan packages in R statistical program. Results showed that there was significant difference in microbial function between control and post-14 group on pig carcasses, indicating loss of bacterial resilience in metabolism by delaying fly colonization. In contrast, soil samples demonstrated no significant change in soil metabolic profiles tempo-spatially, representing a higher resilience capacity in soil biome. However, year-to-year comparison showed significant difference in patterns among bacterial metabolism profiles and this could be due to significant change in the abiotic climatic condition which may indicate microbes associated with vertebrate carrion better fit the Gleasonian model of succession.

1:00 – 2:15pm

Ecosystem Ecology

T21. Caitlyn Cooper

EFFECT OF DROUGHT ON THREE OAK SPECIES

The physiological response of plants to water stress provides insights into which species may survive in exceptional drought conditions. This study conducted on a remnant post oak savanna site in College Station, Texas, examined how drought affected the physiology of three native oak species. In June 2014, after a period of equal watering, we subjected three year old *Quercus shumardii* (Shumard oak; SO), *Q. virginiana* (live oak; LO), and *Q. macrocarpa* (bur oak; BO) saplings to one of two watering treatments: 1) watered, which received the equivalent of normal precipitation and 2) droughted, in which we reduced precipitation by 100%. Drought stress responses were evident after only one month of induced drought. Droughted trees displayed reduced ($P \leq 0.05$) predawn and midday leaf water potential (LWP), photosynthesis and transpiration rates, stomatal conductance, and leaf internal CO₂ concentration in comparison to watered trees of the same species. LO saplings exhibited greater ($P \leq 0.05$) gas exchange but similar LWP to their respective watered and droughted BO and SO counterparts. Droughted LO exhibited gas exchange similar ($P \leq 0.05$) to watered BO and SO, and watered LO adjusted gas exchange rates best to changes in water availability during short-term drought. Results suggest LO may be more likely to withstand mortality in the face of drought than BO or SO. During drought leaf soluble sugar (SS) concentration may increase as consumption of SS for growth declines. SS concentration was greater ($P \leq 0.05$) in droughted than watered saplings, possibly confirming this phenomenon. Although SO and BO demonstrated similar

photosynthesis rates, SS concentration was greatest ($P \leq 0.05$) in SO and least in BO. By displaying the greatest ($P \leq 0.05$) average photosynthesis rate, LO should have accumulated the greatest amount of carbon, but had an intermediate SS concentration. Results suggest species may differ in carbon allocation strategies.

T22. Luiza Aparecido

TREE TRANSPIRATION RESPONSE TO WET AND DRY CANOPY CONDITIONS IN A MONTANE TROPICAL FOREST

Spatial and temporal variation in wet/dry forest canopy conditions following precipitation events can influence processes such as photosynthesis and growth. Upper canopies contribute a disproportionately large fraction of transpiration and carbon assimilation relative to lower canopy layers as exposed leaves dry more rapidly following each rain event. As part of a larger study aimed at improving land-surface modeling of evapotranspiration processes in wet tropical forests, we compared transpiration among trees with exposed and shaded crowns under both wet and dry canopy conditions in central Costa Rica, which has an average 4200 mm annual rainfall. Transpiration was estimated for 5 months using 44 sap flow sensors data in 26 trees (9 dominant and co-dominant, 9 mid-story, and 8 suppressed) in a mature forest stand surrounding a 40-m tower equipped with micrometeorological sensors. Dominant and co-dominant trees contributed around 67% to total transpiration at this site (25% mid-story, 8% suppressed). Under dry conditions, sap flow rates of dominant and co-dominant trees were similar to mid-story trees, and were about double that of suppressed trees. On wet days, all of the categories were suppressed and that resulted in similar rates between them. On days when only the upper canopy was dry ("half-wet" days), all trees respond much the same as on dry days with only slightly lower values. Although, dominant and co-dominant trees exhibited higher sap flow rates than mid-story trees. This behavior is due to rapid tree responses to the transition between wet and dry conditions, indicating that persistently wet tropical environments are uniquely adapted to short-term dryness. Therefore, it's necessary to accurately capture wet-dry canopy dynamics and feedbacks in land-atmosphere models, which should ultimately improve accuracy of predictions of water recycling over tropical forests.

T23. Ignacie Tumushime, Eric J. Jokela, Jason G. Vogel

EFFECT OF NUTRIENT AVAILABILITY AND COMPETITION CONTROL ON END OF ROTATION C, N, AND P ACCUMULATION AND RETENTION IN LOBLOLLY PINE FORESTS IN NORTH-CENTRAL FLORIDA

The end of rotation effects of fertilization and weed control on C, N, and P accumulation and retention was examined for a managed loblolly pine (*Pinus taeda* L.) forest in central Florida. The objective of this study was to determine the effect of fertilization with different nitrogen and phosphorus fertilizers (diammonium phosphate (FDAP; 250 kg N ha⁻¹, 90 kg P ha⁻¹); triple superphosphate (FTSP; 200 kg N ha⁻¹, 90 kg P ha⁻¹)), weed control (W) and the combined application of these treatments (FDAPW or FTSPW) on C accumulation, and N and P accumulation and retention for a managed forest. The soils at the site are classified as sandy, siliceous, hyperthermic Ultic Alaquods. The forest was harvested at age 25 years and tree and understory biomass sampled. The forest floor and four soil depth intervals (0-10 cm, 10-20 cm, 20-50 cm, and 50-100 cm) were also

sampled. FDAPW and FTSPW significantly increased total aboveground biomass by 20% and 18%, respectively, above the control. These combined treatments also had greater accumulation of N and P than the control in plant tissues, but not for the forest floor. For plant tissues, the type of fertilizer was not significant for any treatment although nutrient concentrations were increased by all fertilizer combinations. Soil extractions of NH₄⁺ and NO₃⁻ (KCl) and PO₄³⁻ (Mehlich III) indicated few significant differences among treatment except for PO₄³⁻, which was significantly greater in the FDAPW than the FTSPW treatments in the 20-50 cm soil layer. This suggests greater PO₄³⁻ movement to deeper depths with the use of DAP than TSP, which might indicate varying levels of P retention. Ongoing mass balance analysis is being used to determine how intensive silvicultural treatments will affect N and P retention

T24. Huy Vu

BIOPHYSICAL FEEDBACKS IN TIDAL CREEK FORMATION ON SINKING SALT MARSHES

Salt marshes provide many ecosystem services to humanity, but are threatened by sea-level rise. Many studies examining the impacts of sea-level rise neglect the role of the marsh biota. In some areas, sea-level rise is leading to rapid headward erosion of marsh creeks, which are characterized by dense crab populations. The herbivorous crab, *Sesarma reticulatum*, is common at creek heads but rare on the marsh platform (>35 vs. ~1 crabs/m²). These crabs can have significant effects on marsh vegetation and soil. *Sesarma* herbivory and burrowing activities in laboratory experiments provide plausible mechanisms connecting crabs to creek growth. Whether crab herbivory and burrowing mediate creek growth in the field, however, is unknown. In addition, the mechanisms driving high *Sesarma* densities at creek heads are currently unclear. We are conducting two field experiments to directly link *Sesarma* to creek growth. In the first experiment, we are removing *Sesarma* at two pairs of creek heads using pitfall traps to test the hypothesis that *Sesarma* facilitates creek growth by bioturbating sediment and removing stabilizing vegetation. The removal creek had significantly more standing *Spartina alterniflora* biomass (~150g/m²) than the control creek (~50g/m²). In the second experiment, we are mimicking the high water flow typical of natural creeks using 3" PVC pipes to test the hypothesis that hydrological conditions at creek heads stimulate *Sesarma* recruitment. The treatment with the PVC pipe had significantly more burrows (~90 burrows/m²) than the controls (~40 burrows/m²). These results suggest that there are reciprocal feedbacks in creek formation. Hydrological conditions at creek heads drive the recruitment of *Sesarma* crabs. In turn, crab herbivory and burrowing remove plants and loosen soils, leading to rapid creek growth.

T25. Yang Zhang

EFFECTS OF CLIMATE CHANGE AND FOREST MANAGEMENT ON WOOD MASS LOSS IN SOUTHEASTERN US LOBLOLLY PINE FORESTS

Wood debris is an important C pool in forest ecosystems. Studying the mechanisms of wood decomposition will improve understanding of forest carbon cycling. The productivity of managed pine forests in the southeastern US has been improved in part through nutrient management over the past 50 years. Although significant uncertainty exists, climate change may drive a reduction of rainfall of 10%-30% by 2080 for the region. In managed forests that undergo periodic harvesting, the forest can become a source of C

when decomposer activity increases C loss from residual wood. Two questions motivated this research. How does reduced precipitation, interacting with fertilization, affect wood decomposition in managed pine forests? And how does wood decomposition vary among and within forest ecosystems? To address these questions, we analyzed the mass loss of southern pine wood substrate under a factorial combination of two treatments: soil moisture (30% throughfall removal) and nutrient addition (224 kg/ha N, 64 kg/ha P and 67 kg/ha K). Our early results showed that fertilization tended to stimulate wood decomposition in OK site but inhibited wood decomposition at the FL site. Higher woody mass loss in FL compared to OK may be explained by higher temperature and precipitation. However, fertilization reduced and rain out increased the difference of wood decomposition between OK and FL. Our data indicated that in OK future drought might cause slower substrate decomposition but higher substrate mass loss by fertilization. In FL, fertilization may cause lower substrate mass loss. Decomposition also showed a spatial pattern where wood substrate close to the tree decayed faster than wood far from the tree both in OK and FL. High spatial variability exists among or within sites, indicating the complexity of wood decomposition at both macro and micro scales.

1:00 – 2:15pm Phylogenetics & Evolution

T26. Jerry Huntley

EXPLORING AVIAN CRYPTIC DIVERSITY IN AFROTROPICAL FORESTS: THE TAXONOMY AND PHYLOGEOGRAPHY OF THE GENUS BLEDA

The genus *Bleda*, commonly known as the Bristle-bills, are birds endemic to African lowland forests. Members of this genus live on or near the ground and typically lack substantial plumage variation, with all species showing olive-green above and yellow below. Little research has been undertaken to define species limits and intra-specific relationships within *Bleda*. In addition, avian genetic diversity in lowland forest habitats of Sub-Saharan Africa has received little interest from scientists due to early research which classified lowland forests as "evolutionary museums", regions with relatively little genetic diversity as compared to nearby montane forests. The aim of this study is two-fold. First, I use five molecular markers to undertake the first full assessment of the taxonomy of *Bleda* and elucidate the intra-specific relationships within the genus. Secondly, I focus on geographic structuring of genetic diversity in this lineage, investigating the long held view of African lowland forests as "evolutionary museums". This study finds evidence for at least five species, with the potential for two more given further research. Genetic diversity in the genus *Bleda* is found to be much deeper than previously thought and displays remarkable geographic structuring across western and central Africa. It is clear that the understudied Africa lowland forests may be harboring more diversity than previously thought, including the potential for the discovery of many cryptic species.

T27. Johanna Harvey

AVIAN MALARIA DIVERSIFICATION IN WEST AFRICA: FROM HOST TO HABITATS

Avian haemosporidians, the broad suite of malaria and related parasites (*Plasmodium*, *Leucocytozoon* and *Haemoproteus*), demonstrate a high degree of

diversification, with 1,873 currently known unique molecular haplotypes (Malawi database; Bensch 2009). Despite this diversity little is known about their distributions and host associations, particularly in underexplored regions like Africa. Our research examines malaria parasites sampled from avian hosts collected in Benin (n=211 hosts), where no avian malaria parasite sampling has been done. Benin has sharply contrasting habitat types with some subtropical forest along with savanna and savanna forest mosaics. We collected mitochondrial DNA sequence data from the Cytb gene of infected hosts. We use maximum likelihood and Bayesian analyses to reconstruct a phylogenetic hypothesis and provide estimates of support for haemosporid diversification and relationships. Further, we assess the diversity across contrasting sampling regions, habitats and in the context of the already known haemosporid diversity to inform the broader avian haemosporid phylogeny.

T28. Carl Hjelman

SIZE DOES MATTER: FINDING PHYLOGENETIC SIGNAL IN DROSOPHILA GENOME SIZE

Genome size is a unique character, peculiar to each organism, as it spans the intersection of phenotypic and genotypic value. As more data is being accumulated for genome size, extreme variation has been found, as much as 7,000 fold in animals, yet this variation has largely been ignored from a phylogenetic aspect. This has resulted in a lack of knowledge about how genome size has changed through evolutionary history. Here, we address the question “Where and how in the phylogenetic process does genome size change?” Does drift drive genome size change during speciation when species effective population sizes are low? Alternatively, it is a very gradual process due to a mutational equilibrium between insertion and deletion rates? Lastly, is it different for taxa, evolving at its own rate in response to different environmental conditions? Fundamentally, the first two hypotheses suggest finding phylogenetic signal in genome size, whereas the third hypothesis only has low potential for phylogenetic signal. These hypotheses were analyzed by constructing Bayesian phylogenies for *Drosophila* and closely related species. Genome sizes were then analyzed using comparative methods, determining levels of phylogenetic signal and the mode and rate of evolution. This method, paired with broad taxon sampling, could provide a powerful tool for comparison of genome size evolution across an even wider range of taxa.

T29. Chang Wang

THE ORIGIN OF AN INVASIVE ISOPOD (LIGIA EXOTICA): THE STORY BEHIND EVOLUTIONARY HISTORY

Cryptogenic species describes a widely distributed species whose original native range is in dispute or not entirely known. *Ligia exotica* is a good example of a cryptogenic species, which is a cosmopolitan introduced species inhabiting the harbors and ports in the tropical and semi tropical zones. The ambiguous origin and intricate lineages of *L. exotica* cause difficulties for classification and biogeographic studies. Genetic information provides sound evidences for taxonomic verification, differentiating cryptogenic taxa, and assessing the impacts of invasion. Herein, I reconstructed the phylogeny of *L. exotica* to recover the origin of the non-native invaders especially focused on the biota in the Gulf of Mexico, the invasive events, and evolutionary history.

1:00 – 2:15pm

Habitat & Spatial Ecology

T30. Kelsey Neam

THE SPATIAL ECOLOGY OF A DISPERSAL LIMITED VERTEBRATE ON A MOSAIC LANDSCAPE

Analyses of the International Union for Conservation of Nature (IUCN) Red List criteria have revealed that the conversion of complex natural ecosystems into high-intensity agroecosystems is among the leading drivers of species endangerment for mammals, particularly in the tropics. The behavioral responses of mammals to land-use change are often influenced by the structure and composition of the resulting landscape mosaic, as well as their ability to move throughout the landscape. Few studies, however, consider species' responses to habitat structure across multiple spatial scales. This study aims to assess how the spatial distribution of a dispersal-limited mammal, the brown-throated sloth (*Bradypus variegatus*), is shaped by differences in habitat structure and configuration of a mosaic landscape in Costa Rica, using a multi-scale framework. Data on sloth occurrence was collected from repeated line-transect surveys conducted across six sites in two land-use types: mixed-use areas and tree plantations. Characteristics of the habitat structure surrounding 18 sloth localities and 15 random sites were measured both in situ (tree height, canopy cover, basal area etc.) and from satellite imagery (patch area, patch shape, degree of isolation etc.) using ArcMap 10.2 and FRAGSTATS 4.2. Preliminary results indicate that regardless of land-use type, sloths are more likely to be present in more structurally complex habitats, specifically areas that are heterogeneous in tree height and area. This suggests that while sloths may be found in different habitats, they seek out the most highly structured areas within each habitat type. One strategy for promoting the conservation of this species may be to incorporate more structurally diverse sections of habitat in tree plantations and mixed-use areas.

T31. Wesley Vermillion

THE EFFECTS OF CLIMATE CHANGE ON SHELL MORPHOLOGY AND GEOGRAPHIC DISTRIBUTION OF MEMBERS OF THE CHRYSSEMYD COMPLEX

Freshwater aquatic turtles have great promise as paleoclimatic indicators. Their ectothermic physiology gives them sharp geographic boundaries defined by winter cold, and their freshwater environment and diet give the isotopic signature in their bones a clear relationship to the signature of precipitation within their environment. *Chrysemys picta* originated in the Miocene and persists to the present day, with its northern boundary following isothermic lines around New Brunswick, along the northern Great Lakes, and into southern Saskatchewan and Manitoba. This species is not homogenous; it is divided into 4 subspecies- *C. picta picta* (Atlantic seaboard), *C. p. marginata* (Midwest), *C. p. bellii* (upper Great Plains), and *C. p. dorsalis* (southern Mississippi River drainage). The latter group has an entirely different climatic regime, as well as some behavioral and genetic differences, and has been considered a distinct species by many authors. *C. picta* is one of the most cold-tolerant and ubiquitous North American turtle species found today. Its fossil record extends back into the Miocene. These facts make *C. picta* an excellent organism for study. The possibility of distinguishing these four groups, especially, *C. p. dorsalis*, based on its shell morphology, was examined in this study by means of geometric morphometrics

(GMM). Since the phylogeographic groups are currently separated primarily by climatic factors, this investigation can also be used to study the effects of climatic factors on morphology within the *Chrysemys* complex. Species distribution models (SDM) were constructed for each member of the *Chrysemys* complex. SDMs were constructed for contemporary climatic conditions as well as climatic conditions during the Last Glacial Maximum (~22000 ya). Fossil occurrences of *C. picta* were then compared with these models. These models indicate that members of this complex spread north and west as climatic trends shifted from glacial conditions to contemporary ones.

T32. Wei-Ting Lin

SPATIAL SCALES OF PREDATOR-PREY INTERACTIONS IN MODEL AND EXPERIMENTAL LADYBUG-APHID SYSTEMS

Ecological processes operate at a variety of spatial-temporal scales. Therefore, our understanding about a system may depend on the scale at which we make observations. Predator-prey interaction include top-down control (TD; negative effect of predator on prey) and bottom-up control (BU; positive effect of prey on predator). I hypothesized that the signal of TD and BU effects would depend on spatial scales: (i) TD effects are stronger at smaller scales, and (ii) BU effects are stronger at larger scales. I tested these predictions using an experimental ladybug-aphid system and a computer simulation. The experimental system consisted of 81 potted plants, their aphid herbivores, and ladybug predators. The plants were arranged in a triangular array, and the populations of ladybugs and aphids on each plant were recorded daily. Indices of TD and BU effects were calculated from the time-series data for each plant (1-plant scale) and for larger scales after summing over 3-plant, 9-plant, and 27-plant sets. Results suggested that TD effects are significant at all spatial scales, whereas BU effects are only significant at smaller spatial scales. This was contrary to my hypothesis, probably because demographic processes, which were included in prediction (ii), were not important in the experiment. The observed BU effect may be caused by localized dispersal of ladybugs. This explanation was supported by the simulation: the model that did not include predator demographic terms showed qualitatively similar results as the experiment. In conclusion, interactions between ladybugs and aphids are dependent on spatial scale: interpretation of their dynamics in terms of top-down and bottom-up effects differs if we focus on different scales. Understanding the mechanisms creating scale-dependency provides an avenue for linking behavioral processes with community consequences.

T33. Marisa Martinez

POST-FLEDGING HABITAT USE AND MOVEMENT OF BLACK-CAPPED VIREOS

Although the post-fledging period is a critical component of the avian life stage, knowledge of the habitat needs during this time is limited for most avian species. This is particularly the case for migratory songbirds, like the endangered black-capped vireo (*Vireo atricapilla*; hereafter vireo), as fledglings must forage sufficiently to accumulate fat reserves for migration. I monitored vireo fledglings from May to August of 2013 and 2014 to assess habitat use at a landscape scale (>100 ha) and local scale (0.04 ha circular plot) across 9 sites with high, medium and low woodland cover. I compared woodland used with what was available at the site and determined if woodland use changed with fledgling age and time of season. I also measured fledglings' distances from woodland to identify

movement patterns over age and season. As the proportion of available woodland increased from 0.059 to 0.89, post-fledging proportional use of woodland increased about sixfold from 0.052 to 0.321. Post-fledging use of woodland did not change significantly with age or time of season across all sites or among high, medium, and low woodland cover. Fledglings' distance from woodland did not change with age or time of season across all sites or among high, medium, and low woodland cover. These results will uncover potential changes in habitat associations in fledgling vireos over space and time, which can help refine management practices to effectively meet the needs of the species during the critical post-fledging stage.

T34. Adriana Méndez-Jiménez

HUMAN HEALTH IMPACTS OF LOW-LEVEL CHRONIC EXPOSURE TO CYANOTOXINS VIA DRINKING WATER: CONNECTIONS BETWEEN WATER POLICIES, AFFLUENCE, AND PUBLIC HEALTH

Toxic cyanobacterial blooms (TCBs) have become a public health concern since cyanobacteria produce toxins that affect humans. Globally, algal toxins cause over 60,000 human intoxications per year. Assessing the human health risks associated with TCBs is critical to develop adequate regulatory measurements. Because TCBs are recurrent, people might be constantly exposed to cyanotoxins, through drinking water, ingestion of contaminated food, recreational water or hemodialysis. Though extensive work has been developed on the acute effects of high-level exposure to cyanotoxins. Little research has been done in exposure to low-levels, despite the fact that chronic low-level exposure to microcystins is known to contribute to the development of primary liver cancer (PLC). In spite of the increased global awareness of the environmental, and public health importance of cyanotoxins. In some regions of the world, little is known about their diversity and distribution. And non-biological variables (e.g. water policy and wealth) that might be affecting differential exposure to cyanotoxins have not been addressed yet. Our main objective is to assess the relation between low-level exposure to cyanotoxins via drinking water and PLC, and the impact of affluence in the development and enforcing of water treatment policies. Economic inequity in Brazil, results in differential access to environmental resources and services. Therefore, it is possible that water treatment policies vary as a function of affluence, which will in turn influence the quality of drinking water available in poor states. Determining human exposure to microcystins, and PLC incidence in least affluent cities. Under these circumstances, an environmental issue becomes a public health and an environmental justice issue. Here we present a review of the occurrence of TCBs and microcystins poisonings in Brazil, and its relationship to water treatment policies.

10:00 – 11:00am

Poster Session

P1. Breanna Breaux

UNDERSTANDING MANATEE IMMUNOGENETICS AND THE IMPLICATIONS FOR CONSERVATION

The completion of the genome draft of the Florida manatee (*Trichechus manatus latirostris*) in 2012 made immunogenetic exploration of the Sirenia order more feasible. The endangered manatees are sentinel species for coastal ecosystems and their evolutionary origins are complex. It is believed that they evolved from a wading terrestrial mammal that became fully aquatic, which suggests distinctive adaptations for transitioning to a new environment. Discovering the genetic details of their immune system will help understand manatee evolution and allow species-specific diagnostic tools to be developed. Due to bottleneck signatures at other loci, the genetic diversity of the major histocompatibility complex (MHC) is expected to be low. This could pose problems for conservation efforts because low diversity can increase the chance of extirpation. The primary focus of this project is to determine the immune robustness of manatees by looking at their antibody repertoire and MHC polymorphism. Two species will be compared: the West Indian manatee (*T. manatus*) and the Amazonian manatee (*T. inunguis*). Using next generation sequencing, we will robustly sample the IgH and IgL rearrangements contributing to the antibody repertoire, and identify dominant MHC alleles and estimate their frequencies. The allelic distribution between the species could reveal clues to their evolutionary relationship and aid conservation efforts to help this species become more stable in their environment.

P2. Grace C. Smarsh, Michael Smotherman

CARDIODEMA COR, THE HEART NOSED BAT, SINGS TEMPORALLY COMPLEX SONGS ON FORAGING TERRITORIES

Although singing is typically associated with birds, evidence suggests that singing may play an important role in the ecology and behavior of many bats. Singing behaviors and repertoires vary wildly across bat species, as in birds. Mostly studies of singing bats have focused on species that use song in the roost to attract and defend mates, but little is known about how song is used in other social and spatial contexts. The East African heart-nosed bat, *Cardioderma cor*, roosts communally in baobab trees. Unlike other singing bat models, individuals of this species disperse each night to exclusive areas, whereupon they move about foraging and singing. This study used radiotelemetry, audio recordings and playback experiments to examine how singing varied within and across individuals acoustically, temporally and spatially. Singing in this species is seasonal, and tends to be budgeted toward the later hours of the night. Individuals move about on their territories, stopping at favorite perches where they broadcast loud, low-frequency songs that transmit well across the bush habitat. Song playbacks elicit aggressive reactions, confirming the songs' primary role in territory defense; however, song variability within and across individuals may be used for discrimination of neighboring territory holders, or potential mates. Continuing to study singing in this species can give us greater insight into the factors of natural and sexual selection that drive evolution of singing in mammals.

P3. Kendra Williamson

INTERACTIONS BETWEEN THE EXOTIC ANIMAL MARKET AND THE ENDANGERED SPECIES ACT: SOMETIMES SALES SAVE SPECIES

While much research has been done on the perverse incentives created by the Endangered Species Act regarding habitat destruction, little has focused on perverse incentives regarding captive breeding. Some exotic species not endemic to the United States are being bred in captivity here, which prevents species extinction and allows for potential reintroduction into their native habitats in the future even as wild populations decline. The regulation such as the Endangered Species Act seek to protect wild populations from illegal taking by restricting trade, but captive breeders may be reluctant to maintain endangered species in a regulation-heavy environment. We have created a model to capture the decision-making of breeders of endangered species, decision making of smugglers, and the effects on population size over time. This model allows us to determine under what circumstances regulation leads to extinction, and under what circumstances regulation is beneficial to population sizes.

P4. Taylor Williamson

PRINCIPLE ABIOTIC FACTORS INFLUENCING THE STRUCTURE AND FUNCTION OF PINUS HALEPENSIS FORESTS IN ISRAEL

Environmental variables play a central role in determining the structure and function of forests. For example, Mediterranean forests are water limited systems and their growth and survival is strongly related to rainfall amount. However, the effects of rainfall amount with other edaphic and topographic factors and the importance of these environmental variables compared to human related factors are less clear. To assess how rainfall amount and other abiotic factors – elevation, bedrock type and aspect – affect the structure and function of Mediterranean forests we analyzed inventory data on 132 mature *Pinus halepensis* stands that were planted throughout Israel along a precipitation gradient. The majority of Israel's conifer forests were planted within a limited time frame (1950s–1980s) and treated uniformly by the Israel Forest Service. We hypothesized that the studied environmental factors will influence forest structure and function through their effects on soil water-availability and that these effects will be evident in spite of the strong human influence under which these systems developed. Using stepwise multiple regression analysis we analyzed individual tree - height (H), stem diameter at 1.37m (DBH), and stand level - density (D) and basal area (BA) characteristics. Rainfall amount was the strongest predictor of forest growth and structure with a significant positive effect on H, DBH and BA. In addition, elevation was found to be important showing a significant negative effect on individual tree growth (H and DBH) but a positive effect on stand density. Northern vs. southern aspect was only significant for BA (N>S) while bedrock type (hard, medium, soft) was only significant for DBH (hard+soft > medium). We conclude that water availability is the major factor driving forest performance throughout the entire studied rainfall gradient but emphasize the need to better understand how different abiotic factors interact in shaping forest structure and function.

P5. Rosaleen March

USE OF MODERATE RESOLUTION IMAGERY TO DETECT DIFFUSE TREE MORTALITY FROM LARGE-SCALE DROUGHT

Drought encompassed all of Texas in 2011, causing, among other related catastrophes, trees dying in great numbers across the state. Large-scale droughts such as this pose a particular difficulty with detecting associated tree mortality with remote sensing, as this type of mortality tends to be diffuse across a landscape, and it is not always feasible to analyze fine-resolution imagery across a large geographic area. Our aim was to test the ability to detect diffuse tree mortality using moderate-resolution satellite products and determine which methods are most promising for use in large-scale droughts. State-wide field sampling of tree mortality due to the 2011 drought were used as calibration data for various remote sensing products to build predictive models of mortality. These included both MODIS- and Landsat-derived NDVI change, the Vegetation Drought Response Index, and forest cover change maps produced with spectral unmixing techniques. We also tested a maximum entropy modeling approach. For each method, 30% of plots were used for validation. The accuracy of the different approaches were compared across a) techniques where product resolution was similar; and b) products of different resolutions but produced with similar techniques. Results using MODIS-derived NDVI show that Texas lost an estimated 6.2% of all trees with the Brazos Valley suffering the largest proportion of this loss. This drought resulted in a nearly 9x greater than normal mortality rate. Comparison of methods showed that spatial resolution does affect the accuracy of detection; however, depending on the end-purpose and the spatial scale of interest, estimation using larger resolution products may provide satisfactory information. As increases in extreme drought events are predicted to occur with climate change, it is important to establish methods for detecting drought-induced tree mortality.

P6. Tess Doumas

NUTRITIONAL INFLUENCES ON SEXUAL TRAIT EXPRESSION IN A SULFUR BUTTERFLY (EUREMA LISA)

Studies of sexual selection and trait expression become ecologically explicit when addressed using an elemental framework. My ultimate goal is to investigate how nutrient availability affects the expression of sexual traits, and how these nutrient-altered traits in turn influence mate choice dynamics. Using sexually dimorphic butterflies where both sexes invest heavily in reproduction, I am investigating how male and female butterflies differ in their reproductive investment at the elemental level, and how they alter this investment when resources are limited. For most lepidopterans, non-carbon nutrients [nitrogen (N) and phosphorus (P)] are acquired during feeding at the larval stage, so any N and P that individuals can invest in reproduction they have to obtain while larvae. However, females acquire nuptial gifts during mating, which is a chance for them to gather extra nutrients (i.e. a second foraging opportunity). This should relax selection on female upfront reproductive investment when larval nutrients are limited. In order to explore this prediction, I am verifying some basic assumptions in this fairly unexplored system. Preliminarily, I am measuring the N and P content of butterfly ovarioles, testes, and spermatophores to see whether these elements might be important to reproductive traits, while also verifying the N and P content of male and female non-reproductive traits (head, eyes) to see whether there are measurable differences between the sexes. I am also

measuring the elemental composition of wings to see if N and P levels predict secondary sexual trait expression, suggesting that these signals may act as nutritional indicators.

P7. Xochitl De La Rosa

CONTRIBUTION OF THE GENETIC EVALUATIONS IN THE MANAGEMENT OF WILD AND DOMESTIC STOCKS OF CHANNEL CATFISH (ICTALURUS PUNCTATUS)

Channel catfish is one of the most economically important species in farming and sport fishing in the US. In Texas, channel catfish has been restocked since 1941. Restocked fish are recognized as the Imperial strain, characterized by fast growing and good food conversion. Since evolutionary potential of a species depends of its genomic variation, this knowledge is critical in species management and conservation. The aim of this research is the assessment of the genetic variability of channel catfish restocked in reservoirs and wild populations. In Texas, the Imperial strain confined in two different hatcheries and 12 reservoirs were sampled. From Tamaulipas samples were obtained from one reservoir and four rivers. A total of 150 animals were genotyped with 12 microsatellites. In each population, we calculated parameters of genetic variability and inbreeding coefficient (FIS). For the inference of genetic cluster, a Bayesian method was used. On average, an effective number of alleles of 10 was observed. Our results show deviations from HWE in all populations for all markers.

P8. James Tracy

USE OF A NOVEL ENVELOPE SCORE FUZZY PARALLELEPIPED CLASSIFIER IN DISTINGUISHING RIPARIAN TAMARISK/WILLOW AND MESQUITE HABITATS FOR ENDANGERED BIRD SPECIES WITH HIGH RESOLUTION MULTISPECTRAL IMAGERY

Substantial to excellent classification accuracies were obtained for riparian tamarisk/willow and mesquite woodland habitat of endangered birds in the southwestern US, using widely available USDA NAIP 1 m resolution, four spectral band, Digital Orthophoto Quarter Quad imagery. Riparian woodland classification accuracies within critical habitat of the federally endangered Southwestern Willow Flycatcher and federally threatened Western Yellow-Billed Cuckoo at Tonto Creek, AZ using a novel supervised Envelope Score fuzzy parallelepiped classifier compared favorably with those using a standard maximum likelihood classifier. Overall accuracies ranged from about 88% to 92% and kappa ranged from 0.86 to 0.90. An optimal producer's/user's accuracy index for tamarisk/willow and mesquite classes ranged from 84% to 91%. Addition of vegetation and texture indices produce d fair to marginal improvement in kappa and overall accuracy.

P9. Aida Guhlin

EBOLA, RABIES, MERS – WHAT MAKES A BAT SUCH A GREAT CARRIER OF THEM ALL?

Bats affect the spread of disease through their migration, feeding, and roosting behavior. With the boundaries of anthropogenic development spreading every year, bats often take up roosts near or within human habitation. I have performed a literature review of over 40 papers in order to determine what aspects of bats enable them best to spread disease and identified several examples and key characteristics. Considering bat ability to carry several diseases, many of which are transmissible to humans (zoonotic), their increased proximity poses a serious human health concern. Several key human activities are known to affect this risk, including agricultural practices, transportation, and land

development. As bats and humans continue to collide, determining which of these human activities and what natural variables increase the risk of bat disease transmission is of utmost importance to public health and safety.

P10. Lilianna Krisko Wolf, Rebecca Langley
SMALL MAMMAL DIVERSITY AND VARYING HABITAT

Few studies have been conducted related to mammalian diversity in the transitional montane cloud forest region of Costa Rica. It is critical that the void in available data be filled in order to support future research efforts. In the summer of 2014 data collection was completed for a population density analysis of small and medium mammals in four different habitat zones of the montane cloud forest. The purpose of this research is to determine what differences exist in species richness and population density between residential, tree plantation, secondary forest, and primary forest habitats in the area. The four habitats represent different stages of human development on forested land. Primary forest being historical undegraded habitat, secondary forest being formerly degraded habitat, plantation representing an agroforested crop land, and residential being completely human-controlled degraded habitat.

P11. Andrea Martinez Aguirre
EFFECT OF FEMALE SIZE ON OFFSPRING GROWTH AND SURVIVORSHIP IN THE GULF PIPEFISH SYNGNATHUS SCOVELLI

While maternal investment in many fish species is well studied, the effect of maternal investment on offspring quality in the sex-role-reversed pipefish *Syngnathus scovelli* has not been determined. Previous studies in other species of pipefish have looked at egg size and components of an egg's makeup as indicators of offspring quality and have found conflicting results. In my study, I will compare growth and survivorship of offspring from females of different sizes by mating a controlled sized male with a large or small female and measuring growth every ten days. I will use the number of eggs transferred as a predictor of female reproductive success and I will compare growth and survivorship when offspring of large and small females are put into resource limited environments by having three levels of feeding for offspring from each brood.

P12. Chelsea Acres
TESTING FOR PREDATOR-PREY INTERACTIONS AMONGST WHITE SHRIMP, BROWN SHRIMP, SPOTTED SEATROUT, RED DRUM, AND SOUTHERN FLOUNDER IN TEXAS COASTAL BAYS

This study investigates potential predator-prey interactions among White Shrimp (*Litopenaeus setiferus*), Brown Shrimp (*Farfantepenaeus aztecus*), Spotted Seatrout (*Cynoscion nebulosus*), Red Drum (*Sciaenops ocellatus*), and Southern Flounder (*Paralichthys lethostigma*) in Texas coastal bays. White and Brown Shrimp make up a large portion of Texas shrimp fishery, which is the most valuable fishery in the state. Spotted Seatrout, Red Drum, and Southern Flounder are important to Texas recreational fishery, and are known to prey upon White and Brown Shrimp. Data for statistical analysis was obtained from the Texas Parks and Wildlife Coastal Fisheries Department. The data were collected from inshore fishery-independent surveys that spanned from 1987 to 2014. Monthly bay trawls were used to survey catch per unit effort of the selected penaeid

shrimp species, while bi annual gill nets were used to survey catch per unit effort of the selected fish species. Sampling was conducted in these Texas coastal areas: Sabine Lake, Galveston Bay, Cedar Lakes, East Matagorda Bay, West Matagorda Bay, San Antonio Bay, Aransas Bay, Corpus Christi Bay, Upper Laguna Madre, and Lower Laguna Madre. The catch per unit effort data obtained was analyzed using the co-integration method. The preliminary result from the co-integration analysis shows White Shrimp and Southern Flounder were found to have statistically significant interaction. Because of this result, we suggest the value of White Shrimp fishery is most likely undervalued as a whole, because in addition to having commercial value, White Shrimp are also providing value to recreational fishery by serving as forage for Southern Flounder.

P13. Paulino Ramirez

DOES THE BACTERIUM SPIROPLASMA PROTECT DROSOPHILA MOJAVENSIS AGAINST PARASITIC WASPS?

Several strains of the bacterial genus *Spiroplasma* (Class Mollicutes) are maternally transmitted endosymbionts of 20 species in the fly genus *Drosophila*. A mutualistic relationship has been reported between three strains of *Spiroplasma* and their respective *Drosophila* hosts (*D. neotestacea*, *D. hydei*, and *D. melanogaster*), whereby *Spiroplasma* confers protection to its host against parasitic nematodes or parasitic wasps. The three *Spiroplasma*-defensive strains of *Drosophila* reported to date fall within one lineage of *Spiroplasma* (i.e., the *poulsonii* clade), but several independent lineages of *Spiroplasma* are heritable endosymbionts of *Drosophila*. The purpose of this study was to investigate whether a *Spiroplasma* strain (*moj*) from a different clade (the *citri* clade) confers protection to its host *Drosophila mojavensis* against parasitoid wasps. We compared the fitness (i.e., larva-to-adult survival) of *Spiroplasma*-infected and *Spiroplasma*-free flies in the presence and absence of two different wasps: *Leptopilina heterotoma* (strain Lh14; family Figitidae); and *Asobara* sp. (strain W35; family Braconidae). The results will contribute to understanding the phylogenetic distribution of protection in *Drosophila-Spiroplasma* associations.

P14. Alyssa Pope

EVOLUTIONARY RELATIONSHIPS OF SOUTHERN AFRICAN PIPIT SPECIES

We seek to examine the evolutionary relationships of the southern African members of the avian genus, *Anthus* (pipits). Pipits are speciose with approximately 40 identified species, which together have a cosmopolitan distribution (Sibley and Monroe, 1990; Voelker, 1998). Although a phylogeny of most pipit species exists (Voelker, 1998) that study was unable to support many branches, leaving relationships unresolved. As a whole most pipit species have highly conserved morphology with subtle plumage variations, making them physically difficult to distinguish in both the field and in research collections (Ridgway, 1904; Hall, 1961; Clancey, 1990; Voelker, 1998). In southern Africa, one field character that has been used to distinguish between these cryptic phenotypes is lower mandible color (yellow versus pink), but this defining character has never been independently assessed. This study had two goals: 1, to better resolve the relationships between pipit species and 2, to determine if phenotypic characters such as mandible color are indeed useful for identifying species. To achieve our goals, we sequenced the mitochondrial cytochrome b gene from 120 southern African pipits and used this data to

reconstruct a phylogeny that showed the species relationships. On this phylogeny, we mapped mandible color and body mass (where noted on specimens). Results indicated eight genetic lineages; however there are only seven available names for these lineages, based on current taxonomy. This suggests the possibility of a cryptic species. Results further indicated that mandible color is a poor field identification tool, as none of our larger clades possessed a single unifying color. Body mass may have better identification utility, for birds that can be live captured. Future research will include sequencing a nuclear gene to increase the relationship resolution.

P15. **Sarah Molina**, Mattie K. Squire, Gil G. Rosenthal

The distinct reproductive roles in mate preference have been a central focus of biology and sexual reproduction. It is widely known that males and females invest different amounts of energy when rearing and caring for their young; as a result, both sexes have evolved certain strategies to maximize reproductive success. Although fish are generally known to prefer conspecifics to heterospecifics, there has been recorded evidence of the opposite occurring. Female choice has been a subject of high importance; however, there have been situations in which the males are the choosier sex, alluding to the importance of male mate choice. Recently due to environmental disturbances, there has been a hybridization of *Xiphophorus malinche*, found in highland streams, and *Xiphophorus birchmannii*, found in lowland warm waters of Mexico, specifically in the area of Rio Calnali and Arroyo Xontla. Chemical and visual trials were performed to determine the preferences of male *X. malinche* for females of both species.