

## **Biology (and Biology related collaborations) student abstracts 2011**

**(Use the Ctrl + F keys to search for particular keywords or faculty)**

### **Antihypertensive Treatment Improves Cognition and Delays Alzheimer's Disease Related Pathology in Tg Hypertensive/AD Model Mice**

Grace Balinda, Jeanette Runquist, and Inga Kadish

Hypertension is a risk factor for stroke and vascular dementia, and the incidence of these diseases grows with increasing blood pressure. Recent studies have shown that hypertension is a risk factor for Alzheimer's disease (AD) and that long-term untreated hypertension leads to perturbed vascular function which, in turn, leads to increased cognitive dysfunction and pathology in Tg AD model mice. In the present paper, we hypothesized that hypertensive AD model mice treated with an antihypertensive drug would show less AD pathology and cognitive deficits compared to untreated hypertensive mice. Blood pressure, cognitive performance, A $\beta$  deposition and inflammation were quantitatively assessed in two groups of Tg Hypertensive/AD model mice (LZM line mated with APPswDI), after being orally treated with the blood pressure lowering drug, Losartan (30mg/kg/day) from 5 months of age. The non-treated group served as control. At 8 months of age the animals (n=20/group) were tested in an array of behavioral tests to determine their cognitive status. Following the behavioral analysis, the animals were anesthetized, direct blood pressures were recorded, and the animals were sacrificed for biochemical and histopathological analysis. The treatment with Losartan significantly decreased blood pressure. The non-treated Hypertension/AD mice were cognitively impaired compared to treated Hypertensive/AD mice, and they showed a significantly higher A $\beta$  load and increased inflammation in the brain. We concluded that midlife hypertension leads to cognitive deficits and increased Alzheimer's pathology, and that treating hypertension prevents these changes, indicating that treatment of hypertension is important for preventing Alzheimer's disease.

## **The Persistence and Durability of the Absence of the Galactose- $\alpha$ 1,3-galactose Epitope in the Galsafe® Pig Line**

Anthony Bianchi, Peter Van Zandt, and John Bianchi

In 2010, over 100,000 people needed organ transplant in the United States, but approximately 10,000 received one. This disparity is expected to grow. One possible solution to this crisis is xenotransplantation. The pig is anatomically similar to humans and could be used in xenotransplantations. However, it like most mammalian species express galactose- $\alpha$ 1,3-galactose (gal) on cells and tissue surfaces. Gal is absent in humans resulting in 1%-3% of blood titer containing antibodies to gal. Recently, Rivivacor has created a genetically modified pig lacking gal (Galsafe®). In order to assess the persistence and durability of the Galsafe® pig, blood samples were collected and analyzed using flow cytometry with fluorescent antibodies specific to gal. Samples from unmodified animals were run with (positive control) and without antibodies (negative control), and samples from the Galsafe® pigs were compared to the negative control. Analysis of the flow cytometry data to assess the expression level of gal in 103 genetically modified animals and 7 unmodified animals resulted in a significant difference between the two groups ( $p < 0.01$ ). The mean expression level of gal in the positive controls and Galsafe® was 96.7% and 0.0%, respectively. The flow cytometry data indicates the absence of gal is persistent and durable in the Galsafe® pigs across age, gender, and generation.

## **Slope-dependent Tree Distribution and Mortality in Montane Longleaf Pine Ecosystems**

Conrad Blunck and R. Scot Duncan

The health of longleaf pine (*Pinus palustris*, PIPA) ecosystems are dependent on recurring, low-intensity fire. PIPA forests have experienced large reductions in acreage and fire-suppression. Restoration of PIPA ecosystems has included fire reintroduction via control burns. The steep slopes of montane regions may affect PIPA distribution and survivability during burns differently than more level terrain. We hypothesize that slope and slope position influence the density, size (diameter at breast height), and survivability of longleaf pines during restoration burns of montane ecosystems. We surveyed stand structure and individual trees in 10x10-m blocks prior to and after a control burn in a montane PIPA ecosystem in Oak Mountain State Park. PIPA density was high on ridge and mid-slope positions, and significantly lower on toe slopes. Following the burn, 41% of PIPA trees experienced mortality. There was a trend for greater proportional mortality on ridge and mid-slopes than toe-slopes, but this trend was marginally nonsignificant. At block level, the proportional mortality of PIPA on mid-slopes increased with slope and PIPA density. For individual PIPA trees on the ridge, greater PIPA density and dbh improved survival, while greater slope decreased the chance of survival. On mid-slopes, greater dbh improved survival. Overall, high PIPA mortality in the restoration burn was driven by tree size, while block slope and PIPA density were good predictors of mortality in select cases. We recommend low-impact fuel reduction, including litter and invasive trees, prior to restoration burns in order to reduce PIPA mortality during restoration burns in montane PIPA ecosystems.

## **The Effect of Herbivory on Maternally-Induced Defenses in *Brassica rapa* Progeny**

Stephen David Browne and H. Wayne Shew

Every year large percentages of crops are lost to insect herbivores and the use of pesticides to keep them at bay has been shown to be harmful to humans and the environment. As a result, scientists are investigating induced defenses and particularly maternally-induced defenses as a way to protect crops without harming the environment. Induced defenses are the natural defenses that are activated in the plant as a result of previous herbivory or damage caused by an herbivore. Maternally-induced defenses are those that are triggered by herbivory on the maternal generation of plants and are then passed on to offspring in the form of activated genes. Some previous experiments have shown that herbivory on maternal generations has resulted in less herbivory on progeny generations and other experiments have not supported those results. In this experiment I will use a bioassay of the relative growth rate of *Pieris rapae* caterpillars to measure the amount of herbivory on maternally-induced and control groups of fast-growing *Brassica rapa* plants. I hypothesize that caterpillars feeding on the progeny of the maternally-induced plants will experience less growth than the caterpillars feeding on the progeny of control plants.

## **Drug Pumps Regulate Resistance to the Anti-cancer Ruthenium Complex KP1019 (Presented Fall 2010)**

Mark Burroughs and Pamela Hanson

One mechanism for drug resistance is the efflux of the drug out of the cell before the drug can work. In the yeast model *Saccharomyces cerevisiae*, mutations in the Pleiotropic Drug Resistance Network can cause some drugs to be effluxed at a greater rate. However, the anticancer Ruthenium Complex KP1019 has shown to be more effective when these mutations are present. The studies presented here look at the *PDR1-3* and *PDR1-11* mutations and the effect KP1019 has on them alone and when other drugs are present. Where the *PDR1-11* mutation has already been seen to be more sensitive to KP1019, increased sensitivity is not observed with the *PDR1-3* mutant. When Verapamil is present, a known drug pump inhibitor, KP1019 is less effective. Synergistic effects of KP1019 with the substrate inhibitors Cycloheximide and Ketoconazole were tested for but not seen. Finally, atomic absorption spectrophotometry was implemented to measure the cellular accumulation of KP1019 into *S. cerevisiae*; however, time constraints did not allow for a protocol to be created that gave successful results.

## **An Acetylcholine-induced Negative Feedback Response in *Bufo marinus* Neuromuscular Junction**

Clifton Byrd and Andrew Gannon

Neostigmine (NEO) is a reversible acetylcholinesterase (ACh) inhibitor that is known to inhibit tetanic contraction in skeletal muscle. In the present study, this drug is used to analyze the inhibitory response in *Bufo marinus* gastrocnemius muscle by inducing tetanic fade. Such anticholinesterase agents are thought to create an accumulation of ACh in the synapse which proceeds to inhibit sustained muscle contraction. At  $5 \times 10^{-5} \text{M}$ , NEO did not significantly reduce the percent decrease in tetanic force (paired t-test;  $n = 5$ ;  $p = 0.309$ ). Higher concentrations and a larger sample size should result in significant tetanic fade. A similar inhibitory response may be observed when injecting high concentrations of acetylcholine into the gastrocnemius muscle. This will provide evidence supporting the hypothesis that anticholinesterase agents cause an acetylcholine-induced negative feedback response.

## **Human Pheromones: Determining the Cardio-respiratory Effects in Females Smelling 5- $\alpha$ -androst-16-en-3 $\alpha$ -ol (Presented Fall 2010)**

Tyler Byrd and Andrew Gannon

The compound, 5- $\alpha$ -androst-16-en-3 $\alpha$ -ol (androstenol), is a testosterone metabolite that is emitted in the sweat of post-pubescent males. Androstenol has been considered to be a mood enhancing/anti-anxiety pheromone in females for over thirty years, because numerous studies have suggested that smelling androstenol caused an increase in mood and a decrease in anxiety levels in heterosexual women. The non-sexual nature of this pheromone came into question in 2010, however, when results from a study suggested that androstenol caused activation in the anterior hypothalamus, which, according to animal studies, could suggest arousal. Therefore, I measured whether smelling androstenol would also cause an increase in sympathetic nervous system activation, which would also suggest arousal. Specifically, fluctuations in blood pressure, ventilation rate, and heart rate were examined after participants watched an arousing video clip. After the testing, participants answered a questionnaire which asked: whether they found the video to be arousing, and if so, whether they found it to be powerfully arousing. I hypothesized that smelling androstenol would cause arousal in females, and would therefore experience a significant increase in blood pressure, heart rate, and ventilation rate. The results, however, suggested that smelling androstenol caused a significant decrease in the systolic blood pressure, when compared to those in the control group. Also, 46.2% fewer females in the experimental group found the video to be arousing, and only in the control group did participants find the video to be powerfully arousing. These results suggest that, in females, smelling androstenol causes a decrease in film-induced arousal.

## Characterization of Fluorescent Ruthenium Compound Uptake in *Saccharomyces cerevisiae*

David Carroll and Pamela Hanson

Due to the pre-clinical success of several ruthenium based anti-cancer drugs, researchers have shown increasing interest in transition metal based chemotherapeutics. Though there have been large amounts of research conducted on them in recent years, relatively little is known about how these compounds enter cells or where they go once inside. One compound, *bis* 4,7-diphenyl-1,10-phenanthroline dipyrrophenazine ruthenium(II) ( $\text{Ru}(\text{DIP})_2\text{dppz}^{2+}$ ) has recently been shown to fluoresce in the cytoplasm of HeLa cervical cancer cells, allowing researchers to study uptake mechanisms. These researchers found that the compound's uptake depended not on active transport or cation transporters, but passive diffusion. Here, I determine if  $\text{Ru}(\text{DIP})_2\text{dppz}^{2+}$  exhibits similar uptake and intracellular fluorescence when applied to budding yeast *Saccharomyces cerevisiae*. Results indicate that the complex does in fact enter *S. cerevisiae* and can fluoresce once activated with 488nm light.  $\text{Ru}(\text{DIP})_2\text{dppz}^{2+}$  was applied to a wild type yeast in concentrations ranging from 1 $\mu\text{M}$  to 10 $\mu\text{M}$ . These yeast exhibited weak fluorescence with the best seen in 10 $\mu\text{M}$  treatment groups. Because previous studies indicated  $\text{Ru}(\text{DIP})_2\text{dppz}^{2+}$  entered HeLa cells via passive diffusion, the compound was applied to an *erg6 $\Delta$*  mutant strain of yeast which lacks the *ERG6* gene required for the production of ergosterol, an analog to animal cholesterol, resulting in increased membrane fluidity and permeability. Preliminary results suggest that fluorescence in the *erg6 $\Delta$*  mutant was slightly stronger than the original wild type, with the best *erg6 $\Delta$*  fluorescence seen in the 10 $\mu\text{M}$  treatments. Intracellular fluorescence in some wild type and *erg6 $\Delta$*  cells was punctate, a pattern characteristic of possible endosomal localization, a hypothesis to be addressed in future studies.

## **Correlation of Female Body Size to Clutch Size for Ovigerous Females of *Orconectes virilis***

Caroline Couch and Megan Gibbons

When a dam was removed from Roebuck Spring in Jefferson County, AL in 2008, it caused detrimental water-loss and a devastating decline in one of only three populations of the endangered watercress darter (*Etheostoma nuchale*). The invasive Northern crayfish (*Orconectes virilis*) is found abundantly throughout the spring and was unaffected by the dam removal. Because *O. virilis* may pose a threat to remaining darters and may outcompete the native Hay crayfish (*Cambarus striatus*), an immediate effort was made to remove as many as possible. To assist in conservation of the darter and native crayfish, we have been conducting studies to better understand the invasive crayfish. Since October 2008-July 2010, invasive crayfish have been removed from Roebuck Spring. While we continued to monitor changes in population dynamics (including body size, catch rates, and sex ratio) of the invasive crayfish that we removed, as a side project, we wanted to determine the relationship between body length and clutch size of ovigerous females. This is important to understand so we know what impact we have by removing ovigerous females of different sizes. Catch rates were cyclic and the population is not yet decreasing as a result of trapping. Sex ratio was also cyclic, with more males caught in spring and summer, and more females caught in fall and winter. Trapping has led to decreased body size in trapped individuals, with female body length decreasing more rapidly than males ( $p=0.001$ ). There was no significant correlation between female body size and clutch size ( $p=0.137$ ).

## **Regulation by Phosphorylation of NKCC1 and KCC1 and its Effects on Glioma Migration, Invasion, and Volume Regulation**

Tiffany Dy, Jeannette Runquist, Brian Haas, and Harald Sontheimer

Gliomas are primary brain tumors of glial origin and with a poor prognosis, possibly because of their ability to make dynamic shape and volume changes to navigate narrow extracellular spaces of the surrounding brain tissue. These volume changes occur via the efflux of ions, primarily  $K^+$  and  $Cl^-$ , followed by water. Sodium-Potassium-Chloride Cotransporter Isoform-1 (NKCC1) and Potassium-Chloride Cotransporter Isoform-1 (KCC1) are the transporters responsible for creating concentration gradients for the ions. This study examined the effects of phosphorylation of NKCC1 and KCC1 on glioma migration, invasion, and volume regulation. To do this, the phosphatase inhibitor calyculin A and the protein kinase C inhibitor chelerythrine were administered to D54-MG (glioblastoma multiforme) glioma cell lines in volume regulation assays. In addition, Western blot analysis was used to examine the presence of the NKCC1 regulatory kinases SPAK, OSR1, and WNK (isoforms 1-4) in glioma cell lines and patient biopsies. The results for the volume regulation assays were unexpected, indicating that the mechanism of phosphorylation on the transporters may be more complicated than anticipated. However, the presence of all six NKCC1 regulatory kinases in the examined cell lines and biopsies suggests that phosphorylation plays some role in glioma activity via the cotransporters. Further research is being conducted to determine the mechanisms for phosphorylation of NKCC1 and KCC1, which could aid in the treatment of gliomas.

## **The Inhibitory Properties of Cutaneous Bacteria of Two Salamander Species on the Growth of the Chytrid JEL 142**

Michael Franklin and H. Wayne Shew

*Batrachochytrium dendrobatidis* is responsible for causing chytridiomycosis in amphibians, which has led to large amphibian population declines in recent years. Recent studies have shown that some of the cutaneous bacteria present on some salamander species in the Plethodontidae family produce compounds that inhibit growth of *B. dendrobatidis*. It is possible that cutaneous bacteria present on other Plethodontid salamanders also will inhibit the fungus. In this study, the antifungal properties of the cutaneous bacteria isolated from two common species of Plethodontid salamanders were tested against the chytrid JEL 142, the nearest neighbor to *B. dendrobatidis* in the phylogenetic tree. Based on previous research and the relatedness of JEL 142 to *B. dendrobatidis*, it was hypothesized that some of the cutaneous microbial flora present on *Plethodon mississippi* and *Desmognathus fuscus* will inhibit the growth of JEL 142. In this study, species of cutaneous bacteria from *P. mississippi* and *D. fuscus* were isolated and grown in pure culture. As many as possible of the isolated bacteria were identified using a variety of microbiological techniques. A bioassay was conducted to determine if any of the isolated bacteria inhibited JEL 142 *in vitro*. Findings from this study hopefully will contribute to the effort to contain the spread of *B. dendrobatidis* in ecosystems.

## **Investigation of Knowledge, Worry, and Decision-Making Following Cancer Genetic Counseling Involving an Educational Video**

Anice Freeman, Andrew Gannon, Christina Hurst and Merideth Sanders

Educational videos are being used as teaching tools in genetic counseling settings to introduce patients to genes, gene mutations and inheritance. Previous research has shown that these types of videos can shorten the amount of time that the patient spends with the genetic counselor, allowing the counselor to see more patients. The goal of this research was to determine the effectiveness of an educational video used to introduce genetic counseling patients to hereditary breast cancer. In addition, the video's effect on overall patient worry, knowledge and perceived risk was determined. Pre-video and post-video surveys were used to evaluate the overall effectiveness of the video. In agreement with previous research, it was determined that the video increased the patient's ability to answer fact-based questions correctly and had little effect on patient worry or perceived risk. In addition it was determined that patients tend to overestimate their risk of developing cancer due to inherited gene mutations.

## **Effect of Salinity on the Oxygen Affinity of Hemocyanin Isolated from the Freshwater Prawn, *Macrobrachium rosenbergii***

Michael Georgescu, Scott Dorman, and Andrew Gannon

The giant freshwater prawn, *Macrobrachium rosenbergii* migrates between fresh and salt water environments throughout its life cycle and the salinity of its blood (hemolymph) changes commensurately. As a result, the oxygen carrying protein, hemocyanin, is exposed to varying salinities. Hemolymph was extracted from prawns and the hemocyanin was isolated through a series of centrifugation steps. To determine the effect of increased salinity on the oxygen affinity of hemocyanin of the freshwater prawn, the osmolality was set at 350, 470, and 700 mOsm/kg for each sample. Oxygen affinity measurements were made by use of the tonometer and the diode array spectrophotometer. Air was added to the tonometer in varying increments with a syringe, and absorbances were recorded with each injection of air. An oxygen dissociation curve was generated in which the percent saturation of the hemocyanin was plotted against the partial pressure of oxygen. On average, from 350 to 470 mOsm/kg, the p50 value decreased by 66.8% and 57.0% from 470 to 700 mOsm/kg. p50 values are inversely correlated to oxygen affinity. Oxygen solubility of water is lower in high salinity aqueous environments. Therefore, an increase in oxygen affinity is advantageous for survival. In vivo, oxygen affinity probably increases by a smaller amount due to the counter balancing effect of the hemolymph pH in higher salinity environments.

## **The Study of Eastern Redcedar (*Juniperus virginiana*) Invasion in the Bibb County Glades Preserves**

Wil Gilmore and Peter Van Zandt

The protection of glades and other forest openings is important to biodiversity because they are home to numerous endemic and endangered plant species. Many forest openings are widely thought to be shrinking due to the invasion by the surrounding forest, primarily by the Eastern redcedar (*Juniperus virginiana*). Several studies have focused on the disappearing forest openings but little research has been done on the cedar glades in the Southeastern U. S. This research has consisted of determining whether or not forest openings are being replaced by mature forest in the local cedar glades in central Alabama. We cut redcedars along transects ten meters in length and five meters in width in two separate glades in the Bibb County Glades Preserve. In addition, we measured the dbh of each tree in the field, then prepared maps based on the position of each tree or stump along the transect. In the laboratory, tree cookies were leveled using an electric planing device, and both sand paper and a hand chisel were used to give cookies a smooth surface. We then aged the samples by counting the annual bands under a microscope. We minimized errors due to missing and false rings by skeleton plotting. Cedar invasion was determined by incorporating the relative position of each tree along the transect with its age. While this research is still under way, preliminary data suggest that redcedars are overtaking these glades through the gradual colonization of trees along the glade edge.

**A Comparison of Genotypic and Phenotypic Differentiation of Breast Epithelial Cells Grown in 2-Dimension (plastic tissue culture flask) and 3-Dimension (Embedded in ECM Derived from Placenta Tissue) (Presented Fall 2010)**

Aly Goldfarb, Jeannette Runquist, Vincenzo Guarcello, and Holly Thomas

In the most common form of breast cancer, ductal breast cancer, tumors develop in the ducts of the mammary gland. A novel three dimensional (3-D) cell culture model is necessary to study the development of ductal breast cancer and the terminal differentiation of breast epithelial cells, because most two dimensional (2-D) models do not allow for the formation of the ductal or acinar structures seen *in vivo*. The 3-D model should more closely resemble the microenvironment found *in vivo*, allowing the cells to undergo differentiation as they would in the mammary gland. Using the MCF-10A immortalized cell line, the effects of the culture environment on cell growth was studied. Cells were cultured in a 2-D plastic flask and a novel 3-D matrix derived of human placental tissues. The purpose of this research was to see if cells grown in the novel 3-D matrix displayed terminal differentiation, and if so, how gene expression differs among differentiated and undifferentiated cells. Microscopy was used to determine the phenotype of the cells and RT-PCR analysis was performed to determine any gene expression variation. A total of 14 previously studied genes were examined. Terminal differentiation was evident in the 3-D matrix by the presence of acinar and ductal structures, while the 2-D model only produced basal (undifferentiated) cells. There were significant differences in gene expression levels, but no clear trends were evident. Statistically significant differences in expression levels were determined using advanced relative quantification analysis of the gene expression cross points and a Student's t-test.

## **Agonistic Behavior, Dominance, and Competition for Food and Shelter between the Sexes in an Invasive Species of Crayfish at Roebuck Spring**

Brooke Hand and Megan Gibbons

Invasive species have negative economic, environmental, or ecological impacts on their habitat. Commonly, aquatic environments are negatively impacted by invasive species of crayfish, which consume certain macrophytes and this result in the elimination of other species (e.g., snails) that depend on them. This project focuses on the outcome of agonistic interactions between males and females of an invasive (*Orconectes virilis*) species of crayfish to determine if the male crayfish are limiting the female crayfish access to food and shelter. This was done by investigating 1) dominant behavior between male and female crayfish pairs 2) the outcome of competition for food resources and 3) the outcome of competition for shelter resources. We found that males do not significantly limit female's access to food, but they are significantly more dominant than females and limit their access to shelter. I will also report on current efforts to remove the invasive crayfish from a site in Birmingham, Alabama. Roebuck Spring, where this crayfish species occurs, supports one of the only five known populations of the endangered watercress darter (*Etheostoma nuchale*); for this reason, it is important to understand how the invasive *Orconectes virilis* is influencing community structure.

## **Classification of Watercress Darter (*Etheostoma nuchale*) Microhabitats within Roebuck Springs**

Caitlin Hodges and R. Scot Duncan

*Etheostoma nuchale*, the watercress darter, has one of the most restricted distributions of any vertebrate in Alabama. Located in five springs in Jefferson County, the species has been nearly extinguished as a result of the urbanization of Birmingham and is now considered highly endangered. Stormwater toxins and sediments, reduced spring recharge, water withdrawal, and toxins from adjacent areas are just a few threats that urbanization has imposed. The darter population at Roebuck Spring is surrounded by a golf course, roads and an interstate, and two governmental facilities. Previous studies found that the darter prefers deep, slow-moving habitats with an abundance of aquatic vegetation. However, the species is also known to inhabit the streams, or runs, that flow from the spring, but little is known about the fish's use of the run at Roebuck Spring. We are studying habitat availability and darter usage in the spring run. These habitats are classified along transects stretching across the spring run. Classification is based on vegetation presence or absence, plant species, and sediment type. Additionally, stream width, depth, and current speed are being measured on each transect. Habitats will be related to stream structure using multiple regressions, and habitat frequencies will be compared with chi square analyses. Data collection is currently ongoing. This study, in conjunction with an ongoing study of darter abundance, will help us estimate the density of darters within each habitat, provide information on habitat preference, and enable an estimation of population size.

## **Investigating Associations of the Fungal Spore Genus, *Alternaria*, with Asthma Exacerbations in Birmingham, Alabama**

Margaret Johnson and Peter Van Zandt

Asthma is one of the most common and costly chronic diseases in America, affecting over 20 million adults and children. Allergic asthma, the most common form, is caused by the inhalation of allergens that trigger airway constriction and inflammation, resulting in difficulty breathing and in severe cases respiratory arrest. Common outdoor triggers of asthma include pollen, air pollution, and fungal spores. Fungal spore associations with asthma have been incompletely explored because of the high geographic variability of fungal spore distributions. *Alternaria spp.*, a common fungal spore type, is commonly associated with severity of asthma exacerbations, especially in the United States. The purpose of this study was to investigate the effects outdoor concentrations of the fungal spore genus *Alternaria* have upon asthma exacerbations in *Alternaria*-sensitive children and adults in Birmingham, AL. Patient data were provided by Alabama Allergy and Asthma Center from May 2010 to October 2010, analyzed against mean *Alternaria* concentrations a week prior to the patient visit date. Asthma severity was measured as a function of FEV1 and FEF 25-75 scores from spirometry tests in both adults and children, measuring overall lung function. An ANCOVA statistical test compared the rates of sensitization for *Alternaria*-sensitive patients against *Alternaria*-insensitive patients. *Alternaria*-sensitive subjects should show greater positive associations between outdoor *Alternaria* concentrations and asthma exacerbation severity than *Alternaria*-insensitive subjects for both children and adults. A more complete understanding of fungal spores- asthma severity relationships could enable the development of meaningful large-scale regional patterns. Results pending.

## **Relative Importance of Photoperiod and Tide Cycle to Periodicity of Feeding and Locomotor Activity in the Fiddler Crab, *Uca pugilator* (Presented Fall 2010)**

Kahla H. Jones and Andrew Gannon

Certain environmental stimuli, zeitgeber, synchronize the internal clock of an organism, creating endogenous rhythms in their behavior and physiology. Feeding and locomotor activity have been shown to follow these endogenous rhythms in the fiddler crab *Uca pugilator*. They feed during low tide and are primarily nocturnal, having the most activity during the night when there are fewer risks for being consumed by aquatic and visual predators. Therefore, tide and light cycles are shown to be important external cues for feeding and locomotor activity in fiddler crabs. Previous studies have used light and tide as separate zeitgeber, but this is the first experiment to use the two as *conflicting* zeitgeber. Lab conditions, including the salinity of artificial seawater (27 grams of salt per liter of water) and tide cycles, initially matched the conditions present in Panacea, FL - the location at which the crabs were collected. Baseline activity levels of feeding and locomotor activity were measured for 24 hours to serve as base values for measurements following a three hour and six hour tide shift. This tide shift was implemented by shifting the tide cycle backwards one hour for six consecutive days. Because there are two high tides and two low tides daily, the tide cycle was completely opposite of what would naturally occur after three days. After six days, tide cycle is essentially returned to where it initially was, except the first high tide has switched places with the second high tide of the day, and likewise with the low tides. Baseline activity levels were shown to be significantly higher than measurements following the tide shift ( $p \leq .05$ ). Additionally, photoperiod was determined to be the most influential zeitgeber on activity levels as activity levels were consistently higher during the nighttime hours throughout the entire experiment despite the tide that was occurring. The zeitgeber most influential on feeding patterns was inconclusive.

## **Epigenetic Reactivation of *p21* Expression in Prostate Cancer Cells by a Green Tea Polyphenol**

Robert Kadish, Pamela Hanson, and Syed Meeran

It is suspected that genes related to cancer are being epigenetically modified in an aberrant fashion by DNA methylation and other processes, leading to tumorigenesis. One of the genes modified in prostate cancer, *p21*, is an important inhibitor of cyclin-dependent kinase (CDK) activity and is linked to cell cycle arrest and cell senescence, two characteristics exhibited by healthy cells. Previous research has shown that compounds that inhibit DNA methyltransferases (DNMTs) can cause the reactivation of the tumor suppressor *p21* in lung and esophageal cancers. Epigallocatechin-3-gallate (EGCG), a major polyphenol in green tea, is especially interesting in cancer research because it has been linked to DNMT inhibitory potential and other anti-cancer properties. The effects of EGCG on the epigenetic reactivation of *p21* expression and other cellular activities will be explained from the perspective of possibly using EGCG as a prostate cancer treatment.

## **Determining the Effects of Exotic Invasive Species on Native Plant Communities at Ruffner Mountain Nature Preserve**

Drew Kilgore and Peter Van Zandt

Exotic invasive plants are species that are nonnative to any location that harm and disrupt native plant communities. Native plant communities are important because they provide diversity and are important in recreational use. Invasive species outcompete native species by negatively impacting their growth, reproduction, and survival rates. Invasive species are notorious competitors that are able to grow and reproduce quickly while rapidly dispersing, which creates a larger area inhabited by invasive plant species. Knowledge gained by studying the effects invasive species have on native plant communities is necessary for developing plans to maintain biological diversity. In 2007, a weed removal program was enacted and each invasive species was removed by use of chemicals and removal tools. In Birmingham, Alabama, Ruffner Mountain has encountered invasions by multiple invasives including *Ligustrum sinense* (Chinese privet) and *Lonicera japonica* (Japanese honeysuckle). The purpose of this study was to provide data to show the recovery of native plant communities. Sixty quadrats were setup in three large areas representing different habitats and geographic regions where invasives have been removed and areas where invasive plant species remain. Quadrats were used to gather information on native plants and were setup using random sampling techniques to avoid bias. Diversity indices were measured in order to determine the difference in native plant cover in removal and control quadrats. Early results show an increase in native plant coverage after removing invasive species.

## **A Pilot Study Evaluating the Effectiveness of the Tools and Techniques used in an Exergame Interventional Study Coupled with Educational Information on Healthy Eating**

Rachael Lewis, Peter Van Zandt, and Patricia Pearce

Obesity has grown to be one of the largest public health issues of our time, with Alabama having the highest percentage of overweight or obese individuals in the country. Many risk factors such as race, ethnicity, and socioeconomic status increase a person's risk to becoming obese. Two of the greatest and most easily controlled risk factors are physical inactivity and poor eating habits. Individuals who are overweight or obese are more likely to develop cardiovascular disease, diabetes, hypertension, and many other health problems. It is important to determine new ways of motivating and encouraging adolescents to become physically active and make healthy eating choices. One alternative that has shown some effectiveness in combating obesity is creating an intervention program that focuses on physical activity and nutrition. This pilot study aims to determine the validity, reliability, and usability of materials such as accelerometers, Dance Dance Revolution, healthy eating information, and hand-manipulables, such as a fat vest and salt and sugar test tube kits. Adolescents between the ages of twelve and fifteen will participate DDR sessions, focus groups, and educational classes on healthy eating. Through surveys, focus group discussions, and data collected from the accelerometers, the effects of the program will be determined. Additionally, accelerometers will be placed in controlled environments allowing for reliability and validity to be determined. The long term goal of this study is to determine whether this program increases adolescents' physical activity and healthy eating habits, which to help lower their risk for health problems associated with obesity.

## **Habitat Complexity and Cover for the Critically Endangered Species, *Etheostoma nuchale*, Watercress Darter in Roebuck Spring Located in Jefferson County, Alabama**

Ashley Lovell and R. Scot Duncan

The watercress darter, *Etheostoma nuchale*, is found in five springs in Jefferson County, Alabama, the most urbanized county in the state. The fish was discovered in 1965 and listed as endangered in 1970. Urbanization has led to habitat loss and degradation within the springs and the spring runs flowing from them. Historically, Roebuck Spring was home to the largest darter population, one that was genetically distinct. In 2008 a dam at the spring pool was illegally removed. Dewatering of the spring occurred in hours and resulted in a loss of over half the pool's darter population. This event brought attention to the fact that the size of the population in the spring run has never been estimated, though this information is now needed to assess the entire population's viability. We are assessing darter habitat types and their coverage in Roebuck Spring run. In addition, we are estimating how habitat type and structure (biomass) are influenced by stream speed, width, and depth. Biomass data will be compared among habitats using an ANOVA, and the relationship of stream variables to biomass will be assessed with linear regression. Data collection is ongoing at the time of this writing. These data will complement a parallel study of habitat use and darter abundance at Roebuck Spring.

## Characterization of the Role of *YORI* in Resistance to the Anti-Cancer Ruthenium Complex KP1019

Emily Moore and Pamela Hanson

A major problem in cancer chemotherapy is multi-drug resistance (MDR) which is often mediated by overexpression of pumps that remove drugs from the cell. *Saccharomyces cerevisiae*, a budding yeast that is a good model for cancer research, has an analogous phenotype called Pleiotropic Drug Resistance (PDR), which is caused in part by the gene *YORI*, which encodes an ATP-Binding Cassette (ABC) transporter that pumps drugs-especially oligomycin-out of the cell. Although overexpression of efflux pumps increases a cell's resistance to many drugs, surprisingly some MDR cancer cell lines and some PDR yeast strains are more sensitive to the anti-cancer drug indazolium-trans-tetrachlorobis(1*H*-indazole) ruthenate (III), also known as KP1019. In order to determine whether this paradoxical sensitivity to KP1019 is caused by ABC transporter expression in yeast, I looked at yeast lacking the ABC transporter gene *YORI* and yeast overexpressing the ABC transporter gene *YORI*. A wild-type strain was compared to a *YORI* null strain to test whether deletion of *YORI* increases resistance to KP1019. Wild-type yeast were also compared to a strain overexpressing *YORI* to determine whether KP1019 more successfully inhibits cell growth when there are several copies of the *YORI* gene present. If *YORI*, in fact, increases sensitivity to KP1019, this novel and atypical role for a drug pump could hold important implications in the medical world, especially when determining proper chemotherapy regimens for cancer patients.

## **Investigating a Role for ClC-3 and CaMKII in Glioblastoma Multiforme Proliferation**

Lindsay Moore, Jeanette Runquist, Harald Sontheimer, and Vishnu Cuddapah

Malignant gliomas are the most lethal primary brain tumor and carry a poor prognosis due to the ability of the cells to volume-regulate in order to invade and proliferate in the narrow confines of the brain. Glioma volume regulation is believed to be facilitated by ion channels that extrude osmotically active ions, leading to the loss of water and reduction in cell volume. Chloride Channel 3 (ClC-3) is one ion channel thought to be responsible for facilitating cell volume-regulation. Studies have shown that ClC-3 is activated by CaMKII, suggesting that ClC-3 and CaMKII may interact and play a role in migration and proliferation. This study explored the role of ClC-3 and CaMKII in glioma proliferation by determining where these two proteins are expressed in dividing cells and if either affects proliferation. Immunocytochemistry was used to provide a visual representation of where ClC-3 and CaMKII are expressed in dividing cells. Proliferation assays were utilized in which ClC-3 and CaMKII were inhibited pharmacologically and with genetic knock-downs (ClC-3 only). This study confirms previous findings that ClC-3 colocalizes with CaMKII, and provides evidence of colocalization in M-phase cells and, interestingly, on the mitotic spindle. Strong labeling of activated CaMKII was also found in M-phase cells. Inhibition of chloride channels and CaMKII decreased the rate of cell proliferation. These findings suggest that glioma cell proliferation mediated by volume regulation is facilitated by ClC-3 activity via CaMKII phosphorylation. Understanding the mechanisms of glioma cells may lead to more effective treatments that target gliomas' unique biology.

## **The Distribution of the Amphibian Chytrid Fungus *Batrachochytrium dendrobatidis* across North-Central Alabama**

Zachery Napier and Megan E. Gibbons

A pathogenic fungus known as *Batrachochytrium dendrobatidis* or Bd has been credited with significant declines and extinctions of amphibian populations across the world. More than 200 species are now considered extinct due to the disease associated with Bd. This disease (Chytridiomycosis) targets the amphibians' keratinized layers of epidermis in adult and metamorphs, and other structures such as tooth rows and jaw sheaths in larvae and tadpoles. We surveyed five different ponds in north central Alabama from June 2010 to April 2011, and analyzed the inhabiting amphibian communities for Bd. Amphibians from the families Ambystomatidae, Salamandridae, Plethodontidae, Hylidae, Microhylidae, and Ranidae. All samples were tested for Bd by swabbing individuals, amplifying DNA (polymerase chain reaction), and gel electrophoresis. Updated results show Bd positive samples in only one of the five sites. However all samples have not been analyzed at this point.

## **Effects of Companion Animal Interaction on Human Anxiety and Cardiovascular Activity Levels**

Carion Neal and Megan Gibbons

Social support, including animal companionship, has been shown to positively influence mental and cardiovascular health. The field of Animal-Assisted Therapy (AAT) utilizes animals in therapy to enhance observed effects compared to therapy with no animal present. I plan to determine whether there is a measurable change in short-term health parameters, specifically blood pressure and anxiety levels, resulting from interaction with a pet dog. I will investigate the hypotheses that pet owners will exhibit lower blood pressure and more dramatically reduced state anxiety levels than non pet owners, and that dog owners will exhibit lower blood pressure and more dramatically reduced anxiety levels than non-dog pet owners. Also I will investigate the hypotheses that interaction with companion animals will reduce short-term anxiety levels and blood pressure, and that the influence of human-dog interaction as indicated by measurements of the change in blood pressure and anxiety levels before and after treatment will differ in pet owners and non pet owners. I expect that interaction with a friendly pet dog will cause a general reduction in anxiety levels and blood pressure among subjects, and that pet owners will exhibit lower blood pressures and anxiety levels than non-pet owners. Also, I expect to find that dog owners will exhibit lower blood pressures and anxiety levels than non-dog pet owners. This research will attempt to determine whether there are health benefits from human-dog interaction on human health and if pet ownership categories influence the intensity of those benefits on human health.

## **Analysis of the Regulation of KLF5 by Angiotensin II in Glomerular Mesangial Cells**

Daniel Osula, Peter Van Zandt, and Edgar Jaimes

Angiotensin II (Ang II) is a potent vasoconstrictor that plays an important role in cardiovascular remodeling and the pathogenesis of chronic kidney disease (CKD). KLF5 is a transcription factor implicated in cardiovascular remodeling, hypertension and vascular injury. While the link between Ang II and KLF5 has been studied in vascular smooth muscle cells, it has yet to be examined in glomerular mesangial cells. In this study, western blots were used to determine that KLF5 expression in rat mesangial cells increased after treatment with Ang II. Furthermore, we found that the Ang II type 1 receptor (AT1) antagonist Losartan, blocked the upregulation of KLF5 by Ang II, suggesting that these effects were mediated via AT1. Lastly, we used a siRNA sequence to successfully knock out KLF5 expression. We attempted to determine the role of KLF5 in Ang II induced production of fibronectin, an important extracellular matrix protein that plays a major role in the development of glomerulosclerosis in CKD. Transfection with a specific siRNA to knock out KLF5 successfully downregulated the expression of KLF5, but reduced only in part the expression of fibronectin. We speculate that the prolonged incubation time required for these transfection experiments made the cells over-confluent and unresponsive to subsequent stimulation with Ang II. Additional studies utilizing mesangial cells derived from KLF5 knockout mice will be utilized to better assess the role of KLF5 on Ang II induced fibronectin expression.

## **Effects of the AChE Inhibitor Aldicarb and Exogenous ACh on Skeletal Muscles During Tetany**

Frederick Owens and Andrew Gannon

Addition of acetylcholinesterase (AChE) inhibitors to the synapse before stimulation of tetanic contractions has been shown to cause tetanic fade, the inability of muscles to maintain the strength of tetanic contractions. It is believed that this mechanism is controlled by either acetylcholine (ACh) receptor desensitization or the negative feedback of ACh release into the synapse. We investigated the effects of the AChE inhibitor Aldicarb, ACh, and a combination of both on the gastrocnemius of the cane toad (*Bufo marinus*) to determine the mechanism behind tetanic fade. The data obtained from the addition of Aldicarb to the synapse showed significant tetanic fade at various concentrations. The data obtained from the addition of ACh to the synapse will determine if ACh receptor desensitization is a probable cause of tetanic fade.

## **Differential MicroRNA Expression During Runx2 Regulated Chondrocyte Differentiation**

Kristen Poole, Jeannette Runquist, and Amjad Javed

Runx2 is a nuclear transcriptional factor that is necessary for the proper control of chondrocyte and osteoblast differentiation, two vital processes involved in bone formation and post-natal growth. The complete mechanism of chondrocyte and osteoblast regulation, however, is still unknown. Recently, microRNA has emerged as a new potential regulator of both osteogenic and chondrogenic processes. MicroRNA expression and control relies heavily on interactions with transcription factors, such as Runx2, in order to elicit a cellular response. To determine if Runx2 regulates microRNA expression during chondrocyte differentiation, we isolated RNA from wild-type and Runx2 deficient cartilage in mice and then performed a focused gene microarray. We then analyzed the array for differential microRNA expression between wild-type and Runx2 deficient cartilage. We found four microRNA that were down-regulated by 4-fold or greater in Runx2 deficient cartilage, eleven that were up-regulated between 2-fold and 4-fold, and two that were up-regulated by 4-fold or greater. To confirm our results, we chose the two most up-regulated and down-regulated microRNA, miR-451, miR-370, miR-33, and miR-301a respectively, and performed real-time PCR again. A significant up-regulation in miR-451 expression in Runx2 deficient mice was confirmed but unclear results for the other three microRNA were obtained. As a result, we concluded that differential microRNA expression is found in Runx2 deficient mice and micro-RNA may potentially be used as a means to control bone formation.

## A New *osm-3* Missense Allele is a Specific Genetic Modifier of *nphp-4* Cilia Phenotypes

Kelly Roszczynialski, Jeannette Runquist, Svetlana Masyukova, Corey Williams, and Bradley Yoder

Ciliopathies are disorders of primary cilium. Nephronophthisis (NPHP) and Meckel-Gruber syndrome (MKS) are ciliopathies characterized by midgestation lethality, skeletal abnormalities, cystic kidneys, and CNS malformations. *NPHP4* patients can present with renal dysfunction or additionally retinal degeneration, without genotype-phenotype correlation. Many NPHP and MKS causative genes encode proteins that localize to the cilia base, most are conserved in *Caenorhabditis elegans*. Simultaneous mutations in *C.elegans nphp* and *mks* genes cause severe cilia defects leading to inability to absorb lipophilic dye DiI into the sensory neurons (Dyf phenotype). Previously a chemical mutagenesis screen was performed on *nphp-4* mutants to identify new genes producing synthetic Dyf. This study aimed to identify and characterize one of the isolated Dyf mutations. Interval mapping and gene rescue experiments on YHW66 mutant line identified a new missense mutation in *osm-3* gene encoding kinesin motor protein required for building of ciliary distal segments in certain neurons. Similarly, *Zebrafish* homolog of *osm-3* Kif17 is essential for photoreceptor sensory outer segment development. The position of the new mutation is also conserved in humans. Dye-filling and osmotic avoidance experiments showed that this new allele does not produce noticeable cilia defects. However, combination with *nphp-4* mutation caused severe Dyf and osmotic avoidance defects. Further, OSM-3::GFP containing the new missense mutation properly localizes to the cilium in wild type background, yet in YHW66 background it abnormally accumulates at the ciliary base. Our data suggest that NPHP-4 helps to regulate OSM-3 ciliary entry. This can potentially explain retinal degeneration in a subgroup of NPHP4 patients.

## **Identification by Secondary Sexual Characteristics of Male and Female Juvenile Diamondback Terrapins, *Malaclemys terrapin***

Lexi Sack, Megan Gibbons, and Thane Wibbels

The Diamondback Terrapins, (*Malaclemys terrapin*), once common along the Atlantic and Gulf coasts of the United States are now declining or endangered in much of this range due to habitat destruction, egg predation, and crab trapping. Diamondback Terrapins have a number of sexually dimorphic traits; adult females are larger and have larger heads, and adult males have larger claws and longer tails. In this study, two year old juvenile Diamondback Terrapins were measured to determine if a model could be constructed to identify the sex of juveniles in the field using formerly identified secondary sexual characteristics. First, it was determined if two year old juveniles had developed these secondary sexual characteristics. Our results demonstrate that while two-year-old females have on average 8.6% wider heads and are 2.5% larger in body size than males, there was no significant difference in tail length. There was too much overlap in these traits for a reliable method to be constructed for this age group. However, when we limited analyses to juveniles over 9 cm plastron length, a clearer pattern emerged, with females demonstrating consistently wider heads and shorter pre-anal tail lengths than males. This suggests that sexually dimorphic traits could potentially be used to determine the sex of juveniles in the field, as long as the individuals are greater than 9 cm. Once tested on a wild population, this method would help the monitoring of critical populations by providing a way to determine the sex of juveniles without dissection.

## The Practicality of Fossil Papionin Sex Prediction

Curtis Schultz and Jason Heaton

This analysis was performed in order to determine if craniodental characters could be used to predict sex in papionins and therefore, possibly applied to fragmentary fossil specimens of closely related taxa. Data (242 craniodental measures) were collected on 120 specimens from the Florida Museum of Natural History and the National Museum of Natural History (Smithsonian Institution). This analysis focused upon finding those dental features that would be most sexually dimorphic among extant species. As a result, this analysis concentrated upon the canine shearing complex. Using 56 measurements of these extant species, it was determined that features related to canine size – flange length and diastema – might be best at predicting sex. Additionally, two extant taxa, *Lophocebus* and *Papio*, were chosen for more detailed analyses, as these are considered to be the groups most similar in size and phylogeny to the South African fossil species to be predicted. Results showed that for large-bodied taxa (e.g. *Papio*) predictions were possible while in the case of smaller taxa (e.g. *Lophocebus*), the lower degree of dimorphism, and therefore greater overlap, made predictions tenuous. Even when adjusted for body size (i.e. allometric) differences, the results were the same – predictions were best for large taxa with higher degrees of dimorphism. Our results may have wide ranging implications for biodiversity during the Plio-Pleistocene in South Africa with consequences for primate (and possibly hominid) evolution during this period.

## **Influence of Social Dominance on Resource Use in *Macrobrachium rosenbergii***

Angee Stevens and Andrew Gannon

In crustaceans, such as crayfish or prawns, social hierarchies can form due to conflict over resources. Among rusty crayfish, *Oroconectes rusticus*, social ranks are divided among dominant and subordinate individuals that exhibit differences in behavior. These individuals acquire their social rank based on physical characteristics that help with fighting, or by qualities that are associated with dominance. Once these social ranks are established, there is a difference in the distribution of the resources based on the hierarchy. Because of the similarities in dominance systems between crayfish and prawns, we investigated how social dominance affects resource use in two morphotypes of giant freshwater prawns, *Macrobrachium rosenbergii*: blue claw male (BC) and orange claw male (OC). Interactions between the two males were videotaped and focal sampling was used to determine the dominant and subordinate morphotype, and which morphotype spent more time feeding and in shelter. It was confirmed that the BC male won 100% of aggressive interactions confirming that it is the dominant and the OC male is the subordinate (chi square test,  $n = 74$ ,  $p < 0.0001$ ). In addition, it was determined that the BC male morphotype has greater access to food (paired t-test,  $p = 0.02$ ). However, there was no significant difference in shelter access between the two morphotypes. This research is an important step in understanding the social hierarchies in dominance systems. Also, this study shows the comparison between the prawn dominance system involving dimorphic males and the crayfish dominance system involving one morphotype.

## **Evaluation of Maternal and Incubation Temperature Influences on Growth Rates in a Conservation Head-Start Program for the Diamondback Terrapin**

Nicole White, Megan Gibbons, and Thane Wibbels

Diamondback terrapins, *Malaclemys terrapin*, have experienced population decline throughout their range in the United States as a result of numerous stressors. Such decline has been observed in Alabama, once a site of terrapin abundance and an important site of commercial terrapin harvesting. The diamondback terrapin is now legally protected by the state of Alabama, designated as a species of highest conservation concern. The purpose of this study is to investigate maternal and incubation temperature effects on clutch size, egg size, initial hatchling size, and growth rates of terrapin hatchlings. Other studies have shown evidence of incubation temperature effects on growth rates in several populations *M. terrapin* and other species; although few have investigated the effects of maternal factors such as age and size on initial hatchling size or hatchling growth rates. We hypothesized that maternal factors and/or incubation temperature may significantly affect these aspects of terrapin ontogeny. Eggs were collected from gravid females near Dauphin Island, Alabama, and reared at the University of Alabama at Birmingham (UAB). Weekly measurements of hatchling size were taken for approximately one year. Pearson's correlations and two-way ANOVA were used to analyze the data. The results provide insight on the developmental biology of the diamondback terrapin. Additionally, these findings will help develop optimal conservation strategies for this protected species.

## **Role of Mitochondrial Genetic Background on Liver Histology and Levels of UCP-2**

Paul Williams, Peter Van Zandt, Angela Betancourt

Non-alcoholic fatty liver disease (NAFLD) is a condition linked to obesity and the cardiometabolic syndrome. It is hypothesized that defects in the mitochondria play a role in the progression of NAFLD. High fat diets (HFD) were used to induce mitochondrial defects in resistant and susceptible mice bearing different mitochondrial haplotypes (C3H<sub>mtDNA</sub> C57<sub>nDNA</sub> and C57<sub>mtDNA</sub> C3H<sub>nDNA</sub>). The proteins located in the electron transport chain (ETC) in the mitochondria are coded for by nuclear (nDNA) and mitochondrial (mtDNA) DNA. Mixing susceptible and resistant mitochondrial haplotypes will allow for the determination of whether nDNA or mtDNA is more important in regulating mitochondrial function. Determining whether nDNA or mtDNA has a greater effect on mitochondrial function will allow for further experiments to understand the precise mechanism of liver disease. Levels of UCP-2 were measured using Western blot analysis to determine the influence of mitochondrial-nuclear genetic background. The extent of liver disease was determined by measuring percent macrosteatosis and inflammation.

## **Influence of Intrinsic Factors on Self-reported Collegiate Track & Field Sprinters and Jumpers' Injuries at a Private Liberal Arts College**

LaDarius Woods, Pamela Hanson, Jeannette Runquist, and Lydia Thurston

Injuries are a prevalent problem in track and field programs as well as in other sports. Some authors have suggested an injury occurrence rate of nearly 60% among sprinters (ages 14-32), while others have suggested a rate near 10% with professional athletes. To date, no study has specifically focused on the transition between amateurism and professionalism, collegiate track and field. The goals of this study were: 1) to determine if collegiate sprinters and jumpers at a DIII level exhibited a 30% injury rate, 2) to determine if hamstring injuries were most common, followed by back, shin, and foot injuries, and 3) to determine if intrinsic factors affects injury occurrence. Over the indoor and outdoor 2011 track and field season, collegiate sprinters at Birmingham-Southern College, were asked to chronicle any injuries and time missed due to injury ( $n = 21$ ). Measures of three intrinsic factors, popliteal angle, straight leg raise, and navicular angle, which have been linked to hamstring, back, and shin and foot injuries respectively, were obtained. Sprinters and jumpers exhibited a 20% injury occurrence rate, while hamstring strains (66%) were the most common injury followed by foot injuries (14%). Participants did not experience back or shin injuries. Linear regression indicated none of the measured intrinsic factors were linked to a specific injury (popliteal angle,  $r = .23$ ; straight leg raise,  $r = .11$ ; navicular angle,  $r = .19$ ). These results suggest that as athletes progress toward professionalism, injuries decline. Our results also suggest intrinsic factors alone are not adequate indicators of a predisposition to injuries. Similar studies of athletes at other DIII schools are needed to determine if these results are consistent with other DIII athletic programs.