FRIDAY, APRIL 7TH

SESSION I ECOLOGY & EVOLUTION I: SEX DIFFERENCES AND REPRODUCTION

11:15 – 11:30 **MALE MATE CHOICE UNDER POLYGYNY IS NOT MAINTAINED BY FEMALE GOOD GENES ALONE: A MATHEMATICAL MODEL**

Courtney L. Fitzpatrick
Postdoctoral Fellow, Department of Biology, Indiana University

Condition-dependent models of display trait/preference co-evolution have long been established in the sexual selection literature. These models offer an explanation for the widespread observation of female mate choice for male display traits: female preferences can be maintained in a population when male display traits are condition-dependent (i.e. reduce survival but can indicate heritable variation in genetic quality). However, the potential for this "good genes" scenario to explain the seemingly mirror image phenomenon of *male preferences* and *female display traits* remains unexplored, even as male mate choice in polygynous species is now recognized as common. Indeed, as empirical evidence of male mate choice accumulates, the "good genes" hypothesis for the evolution of male mate choice and female ornamentation is increasingly invoked as a potential explanation. Here we use a mathematical model to investigate the logic of this hypothesis and show that, unlike the canonical scenario of female choice, male mate choice is not maintained under polygyny by condition-dependent female traits alone. When taken together with previous theoretical research on the evolution of male mate choice, an empirical expectation emerges from our results. That is, when male mate choice and female display traits co-exist in species with traditional sex roles, we should expect the female traits to signal variation—not in overall heritable genetic quality—but in fecundity or reproductive readiness.

11:30 – 11:45 **MAKING SENSE OF SCENTS: MICROBIAL VARIATION NEAR ODOR PRODUCING GLANDS**

Stephanie Michelle Campos
Graduate Student, Department of Biology, Indiana University

An animal's microbiome can influence its social and sexual behavior, and can be associated with its health and survival. For example, the metabolic activities of host-associated microbes may influence behavior of an animal host directly or indirectly, such as through the gut-brain axis or by modifying odor signals that mediate social interactions. Fence lizards *Sceloporus undulatus* secrete waxy chemical signals from specialized scent glands on the leg that are used in territorial interactions. Males boost production of these secretions in breeding season so that femoral pores become enlarged. To ask whether the microbial environment associated with these odor signals differs between adult males and females, we collected microbes from the femoral pores of wild-caught *S. undulatus* using sterilized swabs. We extracted total DNA at Indiana University, then used a 16S rRNA amplicon approach to characterize the bacterial community associated with these samples. We present a characterization of these microbes and discuss future work focused on identifying any influence of these microbes on odor signal production.

11:45 – 12:00 **SOCIAL INFLUENCES ON VARIATION OF FEMALE MATING PREFERENCES IN THE AMERICAN GOLDFINCH *SPINUS TRISTIS***

Donella S. Bolen

Graduate Student, Department of Evolution, Ecology, and Organismal Biology, The Ohio State University

Social factors, such as the mate choice decisions of others, may influence a female's preference for a particular male. Mate choice copying occurs when a female is more likely to choose a male as a mate if he has been observed with other females. The objective of this project was to examine how the social environment influences female preferences for mates. We presented female American Goldfinches with a choice between two potential mates in a series of preference trials using a custom-built arena. The male in the section of the arena where the female spent the most time was designated as the preferred male. The female was then allowed to see the non-preferred male with a female goldfinch, male goldfinch, or female House Finch, while the preferred male remained alone. After, the female was tested again to see if her preference for the previously non-preferred male had changed. We found that over eighty percent of the females increased time spent with the previously non-preferred male after observing him with another bird. Younger females increased time spent with the previously non-preferred male after observing him with any other bird. Older females, however, increased time spent with the previously non-preferred male more when the other bird was a female goldfinch than when a male goldfinch or a female of a different species. The social nature of goldfinches may explain why most of the females were attracted to the previously non-preferred male after observing him with another bird. However, once they gain some experience with age, the influence of the social environment on changing mate preferences is limited to observations involving females of the same species, who can potentially provide the most useful information on a potential mate. These results suggest that not only does a female's social environment play a potentially important role in influencing her preferences for mates but that the expression of this influence can vary with the female's age.

SESSION II PHYSIOLOGICAL MECHANISMS OF BEHAVIOR

12:15 – 12:30 **EFFECTS OF CHARGED PARTICLE IRRADIATION ON SHORT-TERM MEMORY IN A MURINE MODEL**

Frederico C. Kiffer

Graduate Student, Division of Radiation Health, University of Arkansas for Medical Sciences

Exposure to space irradiation presents a significant risk to flight crews in the course of prolonged space exploration. One of the greatest concerns is a possibility of radiation-induced deterioration to central nervous system functions. Two main sources of radiation exposure to astronauts are solar particle events (SPE) and galactic cosmic rays (GCR). High-energy protons constitute ~85% of space radiation with the high-energy charged nuclear particles, such as heavy ions, comprising the rest. While previous studies have been devoted primarily to the effects of single source irradiation, there is an imperative need to utilize exposures to two or more sources to better simulate the occupational exposure that will be encountered by astronauts. The aim of the current study is to assess whether glutamate receptor gene expression (i.e., AMPA and NMDA receptor subunits), Pre/Post synaptic markers or dendritic structure in the hippocampus are altered following early exposure to ^{1}H and ^{16}O in mice. 3 months post-irradiation animals were euthanized and the brains were dissected and flash frozen or fixed for structural analysis. Glutamate receptor and synaptic marker gene expression was measured with real-time PCR, and dendritic spine morphology will be assessed in Golgi-stained tissue sections. To simulate exposure to GCR, mice were first exposed to 150 MeV/n protons and 600 MeV/n 16O. Mice expose to ^{1}H and ^{16}O were impaired, they were not able to distinguish between the three arms and spending approximately the same amount of time in all three arms during the retention trial of the radial Y-maze paradigm. Exposure to ^{1}H and ^{16}O significantly altered NMDA and AMPA receptor subunit and Pre/Post synaptic marker mRNA expression. We are currently performing morphometric analysis to quantify changes in the complexity of dendritic spines and arborization.

12:30 – 12:45 BEHAVIORAL EFFECTS OF FOCAL RADIATION IN A JUVENILE MURINE MODEL

Tyler C. Alexander

Graduate Student, Division of Radiation Health and Department of Pharmaceutical Sciences, University of Arkansas for Medical Sciences

Chemotherapy has been successfully used to reduce radiation dose and volume for most pediatric patients. However, due to the difficulty with chemotherapeutic agents failing to cross the blood brain barrier and the lack of response in some brain tumors, radiation therapy is still used to treat many childhood cancers. A serious complication from cranial irradiation is cognitive impairment, which can develop without overt tissue injury, and is known to involve the hippocampus, a structure critical for learning and memory. Patients experience symptoms associated with normal tissue damage, which can manifest at any point during the course of therapy or months even years later. The aim of our study is to investigate the radiation effects on cognition and dendritic structure in the hippocampus in juvenile male mice. Twenty-one- day old male C57BL/6 mice were irradiated with the Small Animal Radiation Research Platform. Animals were given either a single 10 Gy dose or 2 x10 Gy fractionated radiation. Five weeks following irradiation, animals were tested for hippocampus-dependent cognitive performance in the Morris water-maze. All animals were able to locate the visible and hidden platform locations in the water maze; however, treatment effects were seen when spatial memory retention was assessed in the probe trials (no platform). A significant impairment in spatial memory retention was observed in the probe trial after the first day of hidden platform training (first probe trial) in animals that received 10 Gy or 2 x 10 Gy fractionated radiation. However, by day 5 animals that received 10 Gy showed spatial memory retention in the probe trials whereas the 20 Gy mice remained impaired. In addition, radiation significantly compromised dendritic complexity in the dentate gyrus and CA1 regions of the hippocampus. This work was supported by Pilot Grant under NIH P20 GM109005 (ARA).

12:45 – 1:00 SOCIAL CASTE DETERMINATION IN HONEY BEES VIA GENOME-EDITING

Hongmei Li-Byarlay

Postdoctoral Fellow, W. M. Keck Center for Behavioral Biology and Department of Entomology, North Carolina State University

Honey bees (*Apis mellifera* L.) are one of the best systems to study behavioral ecology and social evolution, as they exhibit compelling traits such as caste determination among queens and workers. Integrating recombinant DNA into a host genome has proved to be a powerful tool for evolutionary studies. Genome editing via CRISPR/Cas9 is developing at a fast pace in recent few years. By taking advantage of this technology, we can study bees with altered DNA in order to investigate their complex biological systems. Royal jelly as an environmental nutrition factor determines the destiny of female larvae in a natural colony. Diploid female larvae can develop either into queen bees or worker bees. If no queen is needed then the larvae develops into a worker bee. If a new queen is needed then workers select a number of female larvae for queen rearing and feeds them royal jelly. It is known that knockdown of the DNA methyltransferase 3 (dnmt3) gene by RNA interference induces female larvae development from the worker bee to the queen-like phenotype, a similar role as royal jelly. The mechanism of how dnmt3 affects caste determination during larval development is still not clear. We report here the development of a new method to achieve genome editing and functional genomic analysis of dnmt3. We will report both in vivo and in vitro in the field and cell line studies. Our ultimate goal is a mechanistic understanding of the regulation of caste determination in social insects. Caste determination is a necessary requirement for the evolution of sociality.

1:00 – 1:15 **SEX DIFFERENCES IN THE EFFECTS OF THE SELECTIVE SEROTONIN REUPTAKE INHIBITOR, FLUOXETINE, ON RESISTANCE TO SOCIAL STRESS IN SYRIAN HAMSTERS**

Joseph Ignazio Terranova

Graduate Student, Neuroscience Institute and Center for Behavioral Neuroscience, Georgia State University

Social stress is one of the most common stressors experienced by humans and is an important risk factor for debilitating psychiatric disorders, such as post-traumatic stress disorder (PTSD) and major depressive disorder. However, only a subset of individuals who experience stressful life events will develop psychiatric disorders such as PTSD and major depressive disorder. An important question is why are some individuals resistant to the negative effects of social stress and others are more susceptible? In rodents, increased aggression and dominance is associated with increased resistance to social stress, suggesting that the neural mechanisms that mediate aggression and dominance contribute to resistance to social stress. Recently, our lab has shown that there are sex differences in how serotonin controls aggression and dominance in Syrian hamsters; serotonin increases aggression and dominance in females, whereas it decreases aggression in males. Given that there are sex differences in how serotonin regulates aggression and dominance, we investigated whether there are sex differences in how serotonin regulates resistance to social stress. Female and male hamsters were socially defeated on the first day of behavioral testing by a larger, same sex conspecific. The following day, both sexes were injected intraperitoneally with fluoxetine or vehicle and then tested for social avoidance with a caged intruder. While fluoxetine did not affect social avoidance in the females, it increased social avoidance in the males, suggesting that serotonin facilitates increased susceptibility to social stress in males (vehicle avoidance: 116 sec +/- 16 sec; fluoxetine avoidance: 215 sec +/- 32 sec, $t(19) = 2.556$, $p < 0.05$) but not in females (vehicle avoidance: 133 sec +/- 26 sec; fluoxetine avoidance: 168 sec +/- 25 sec, $t(17) = 0.743$, $p > 0.05$). This work is supported by MH11978526.

SESSION III COGNITION

2:45 – 3:00 **CIRCADIAN DISRUPTION AFFECTS INITIAL LEARNING BUT NOT COGNITIVE FLEXIBILITY IN AN AUTOMATED SET-SHIFTING TASK IN ADULT LONG-EVANS RATS**

Rekha C. Balachandran

Graduate Student, Department of Comparative Biosciences, College of Veterinary Medicine, University of Illinois at Urbana-Champaign

Circadian disruption is caused by misalignment of innate rhythms to external cues such as light, sleep and food intake. Chronic circadian disruption negatively affects both physiology and cognition. We investigated the effects of circadian disruption on cognition in a rodent model. Adult Long-Evans rat were tested on an automated operant behavior task for 3 months under 12:12 h light: dark cycle, with testing occurring either 4h after lights-on or lights-off. This resulted in day-tested rats realigning their activity patterns to become diurnal, whereas night-tested rats remained nocturnal. Rats then transitioned to an automated set-shifting (SS) task to assess cognitive flexibility, the ability to adapt to changing situational demands. We hypothesized that circadian disruption would result in the day-tested rats being slower to adapt to task transitions as compared to the night-tested rats. Contrary to our hypothesis, night-tested rats took longer to reach criterion performance in the visual-cue detection stage of the SS task compared to day-tested rats. However, there were not differences between the two conditions in subsequent transitions to an egocentric-cue based phase or a reversal phase. We speculate that night-tested rats experienced a form of circadian disruption when they were exposed to ambient light during the testing procedure, and that this form of circadian disruption impaired initial task acquisition, but not actual cognitive flexibility, to a greater extent than testing during the day.

3:00 – 3:15 HOW EUROPEAN STARLINGS SEE THEIR WORLD: A NOVEL FIXATION STRATEGY

Shannon Rhey Butler

Graduate Student, Department of Biological Sciences, Purdue University

Maintaining the gaze on an object (i.e., visual fixation) is an essential process that animals use to interact with their environment. Although extensively studied in humans and other primates, fixation strategies in animals with laterally placed eyes (birds, fish, reptiles, etc.) have received less attention. We quantitatively tested three fixation strategies proposed in the literature for birds using European starlings (*Sturnus vulgaris*) and did not find strong support for any of them, despite high statistical a-priori power (93%). However, we did observe a new visual fixation strategy that we labelled monocular alternating fixation, whereby starlings moved their heads to make multiple fixations with a single eye before switching to the other eye and repeating the same process. This newly observed fixation strategy may be associated with the high level of intra-retinal variation in the density of photoreceptors and retinal ganglion cells, retinal ganglion cell size, and sensitivity and distribution of cones. From a functional perspective, the monocular alternating fixation strategy may help integrate the different types of spatial information that are gathered by each retina. Starlings may be using this particular fixation strategy to help cope with the constraints of limited attention by selectively attending to a single dimension with full attention for a brief period of time before the head moves and a different dimension becomes the focus of visual attention.

3:15 – 3:30 TEMPERATURE AND EXPLORATION INFLUENCE LEARNING RATE IN THE CICHLID FISH, *JULIDOCHROMIS ORNATUS*

Elizabeth A. Hoskins

Graduate Student, Department of Evolution, Ecology, and Organismal Biology, The Ohio State University

Learning can be beneficial; for example, learning can help animals find new foods or mates. However, despite the benefits, there is often variation in how quickly animals learn a task. Variation in personality, or the constancy in an animal's behavior over time, may correlate with variation in learning rate. Carere & Locurto (2011) hypothesized that the speed at which proactive and reactive individuals learn is based on whether or not the task is novel; proactive fish are expected to learn novel, but not non-novel, tasks more rapidly. Reactive individuals are predicted to learn non-novel tasks quickly, but novel tasks more slowly. We tested these predictions in the African cichlid fish, *Julidochromis ornatus*. Fish used in this experiment had been acclimated to two different temperatures. We used this temperature variation opportunistically to explore the role of temperature on learning rate in addition to personality. Each fish was assayed for aggressiveness, exploration, and boldness, then performed a novel and non-novel learning task. We found a negative correlation between exploration and learning rate. More exploratory individuals learned the novel association task in fewer days than less exploratory individuals. We found no other correlations between personality measurements and learning rate. We also found that fish in the high temperature treatment completed the non-novel learning task more quickly. We suggest that temperature influences learning rate by influencing the motivation to perform the food-related learning task. Fish living in higher temperatures may show different food related behaviors due to differences in learning rate.

3:30 – 3:45 MULTIMODAL SENSORY PROCESSING INFLUENCES MATING PREFERENCES IN A SONGBIRD SPECIES

Kelly L. Ronald

Postdoctoral Fellow, Department of Biology, Indiana University, and Department of Biological Sciences, Purdue University

Multimodal signalling is nearly ubiquitous in animal taxa. While we know much about male variation in signal production, relatively less is known about female variation in signal processing. This is an important gap in animal communication because individual differences in processing could underlie individual variation in mate-choice. I tested whether female multimodal sensory processing could change her preference for male signals. I examined how auditory sensitivity and temporal resolution affect her preference for song, and how visual spatial and temporal resolution affect her preference for a visual display. I used female brown-headed cowbirds Molothrus ater as males give an audiovisual courtship display. I found that females with better visual temporal resolution preferred males with less intense visual displays and females with better auditory temporal resolution preferred shorter, less entropic, and higher-frequency songs. My findings suggest that females vary in their multimodal sensory processing and that this can affect their mate preferences; male signals, therefore, may be designed to advertise to a female population that differs in how they process and respond to signals.

2017 EXEMPLAR AWARDEE AND PLENARY SPEAKER

4:00 – 5:00 THE FAMILY LIFE OF BIRDS: AN INTEGRATIVE REVIEW

Elizabeth Adkins-Regan

Cornell University

The mating and parental care systems that have evolved to aid reproduction are both diverse and conserved across animal species. Most but not all birds have some kind of socially monogamous mating system combined with biparental care of offspring. Experiments with zebra finches have supported the prevailing hypothesis for the evolution of their permanent pairbonds, have revealed some of the neuroendocrine and developmental mechanisms and processes that underlie those male-female relationships, and are beginning to address whether the hormone prolactin is involved in biparental care. An exciting opportunity for the future is to discover the developmental mechanisms for the evolution of the diversity seen in avian mating and parental systems.

SATURDAY, APRIL 8TH

SESSION IV ECOLOGY & EVOLUTION II: GROUP DYNAMICS AND MIGRATION

10:00 – 10:15 **HOW URBANIZATION INFLUENCES SEASONAL MOVEMENTS OF WHITE-TAILED DEER IN SOUTHERN INDIANA**

Garrett Clevinger
Graduate Student, Department of Biology, Ball State University

In recent years, the movement patterns of urbanized populations of White-tailed deer Odocoileus virginianus (hereafter WTD) have become a major area of interest to wildlife professionals. Although a handful of studies have focused on movement characteristics of either the urban or rural populations of this species, few if any have ever compared these parameters between both populations on a localized scale to help identify the effect of urbanization on WTD behavior. By examining the effects of urbanization on WTD, wildlife biologists and other stakeholders gain an understanding about WTD behavior that can be used to inform management decisions for the benefit of both the deer and the impacted citizens. This study was conducted in three counties in southern Indiana: Morgan, Monroe, and Brown. The city of Bloomington, Indiana has a healthy population of urban deer. We free darted WTD from a distance or captured them using dropnets, Clover traps, or suspended net guns. Once immobilized, WTD were equipped with GPS or VHF collars and monitored using satellite or radio telemetry to obtain location data. From January-July 2015-16 a total of 86 WTD was captured consisting of 45 urban individuals and 41 rural individuals. We used occupancy modeling to determine excursion probability using sex, season, and locality as covariates of detection. Our results suggest that rural WTD were more likely to be observed while on an excursion than their urban counterparts, however the influence of sex did not seem to affect excursion probability.

10:15 – 10:30 **SEDENTARY DARK-EYED JUNCOS (JUNCO HYEMALIS) MAINTAIN HIGHER PREVALENCE OF HAEMOSPORIDIAN INFECTIONS THAN MIGRATORY JUNCOS DURING SEASONAL SYMPATRY**

Samuel P. Slowinski
Graduate Student, Department of Biology, Indiana University

Long-distance migration is found in all major animal groups and can profoundly affect the parasites that infect animals. In order to assess how the migratory behavior of animal hosts affects the prevalence, parasitemia, community composition and diversity of their parasites, and the timing of parasite life cycles, we compared haemosporidian parasite infections between two closely related seasonally sympatric populations of dark-eyed juncos, a common North American sparrow. Juncos in one population are sedentary; they winter and breed in the Appalachian Mountains in Virginia. Juncos in the other population are migratory; they winter in the Appalachian Mountains in Virginia and then fly North to Canada to breed. We found a significantly higher prevalence of haemosporidian parasite infections in the sedentary population, suggesting that long distance migration may reduce the prevalence of parasite infections. We found no evidence for seasonal cycling of parasitemia in the blood in either host population. Our results are consistent with the Migratory Culling hypothesis, which posits that heavily infected animals are less likely to survive the physiological stresses of long-distance migration, and with the Migratory Escape hypothesis, which posits that long-distance migration allows host populations to seasonally escape areas that have become heavily infested with parasites.

10:30 – 10:45 **GROUP BEHAVIORAL COMPOSITION INFLUENCES SOCIAL NETWORK STRUCTURE AND INFORMATION FLOW IN GUPPY SHOALS**

Matthew J. Hasenjager

Graduate Student, Department of Biology, University of Louisville

Individual-level personality traits can influence leadership tendencies, social information use, and network connectivity, while group-level outcomes – such as how rapidly information (or disease) spreads through a group – are often dependent on within-group behavioral variation. We examined whether the mixture of personalities within guppy Poecilia reticulate shoals influenced their social network structure, as well as how rapidly, and by what pathways, information regarding the solution to a novel foraging task flowed through them. Female guppies were exposed to a simulated aerial predation event to assess their boldness before constructing groups of ten fish with one of the following compositions: (i) bold-dominated (80% bold), (ii) mixed (50% bold), or (iii) shy-dominated (20% bold). There was an overall tendency for disassortment with regards to boldness, such that individuals were more likely to associate with group members whose personalities differed from their own. Fish were more likely to solve the foraging task as the number of knowledgeable individuals in their group increased, suggesting social transmission of information. Bold individuals were faster to solve the foraging task, while shy individuals were more strongly influenced by the behavior of knowledgeable group members. Social transmission was strongest in mixed groups, suggesting that synergistic effects between personality types facilitated more effective leadership by knowledgeable individuals.

10:45 – 11:00 **OCCUPANCY & LOCOMOTOR BEHAVIOR IN SCHIZOCOSA OCREATA: PRELIMINARY ANALYSIS & VISUALIZATION IN R**

Salvatore Anthony Sidoti

Graduate Student, Department of Evolution, Ecology, and Organismal Biology, The Ohio State University

In many experimental designs, researchers are interested in tracking and quantifying the movement and/or behavior of animal subjects. Several systems are available for purchase that are capable of such tracking (e.g. Ethovision© by Noldus), but those systems are often proprietary and expensive. We used BuriTrack, an open-source video capture application, as a base system for capturing spider movements and digitizing their location within an arena on a very fine scale relative to time. In our preliminary studies, 15-minute open field exploration trials each generated a robust data set including thousands of time-stamped x, y coordinates. Unfortunately, BuriTrack is not capable of converting positional information into distance or speed calculations, nor is it able to statistically examine the differences between experimental treatments. We used R, an open source software program, to build script that is able to automatically convert position and time data to more meaningful forms included travel distance, mean travel direction, speed, proportion of time engaged in thigmotaxis, and visualization of arena occupancy via spatial histograms. Many of these functions are not included in base R or found in any of its packages. The R scripts we developed will be made freely available to the scientific community for verification and further development.

SESSION V DEVELOPMENT

11:15 – 11:30 **AN ACUTE SOCIAL DEFEAT STRESSOR DURING PUBERTY INCREASES SUSCEPTIBILITY TO CONDITIONED DEFEAT IN ADULTHOOD**

Anna M. Rosenhauer

Graduate Student, Neuroscience Institute, Georgia State University

Syrian hamsters readily display territorial aggression and, if they lose an agonistic encounter, show striking decreases in aggression and increases in submission, a behavioral change termed conditioned defeat. Because the behavioral change occurs after a single defeat in both males and females, and this stressor is primarily psychological with no tissue damage or inflammation, this is an ideal model for studying social stress. Our lab has made significant progress delineating the neural circuit involved in conditioned defeat, but all research to date has been in adults. However, social stress experienced during puberty is a known risk factor for the development of stress-induced disorders in adulthood. Therefore, we expanded the conditioned defeat model to include social defeat in early puberty. Hamsters exposed to a single social defeat exhibited significantly increased social avoidance 24 hrs later when compared to no defeat controls. Pubertal stress and no defeat control animals were then subjected to a single social defeat in adulthood and were tested for social avoidance 24 hrs later to determine if the pubertal social defeat increased vulnerability to social stress in adulthood. Indeed, hamsters that experienced pubertal social stress responded to the adult social defeat with increased social avoidance when compared with hamsters that were only defeated in adulthood or with no defeat controls. Thus, a single social stressor in puberty increased susceptibility to acute social stress in adulthood. This pubertal social defeat and adult re-defeat protocol is a promising model with which to explore the long term effects of adolescent social stress and may shed light on how stress during development contributes to the increased risk of developing psychopathology in adulthood.

11:30 – 11:45 **PRAIRIE VOLE SOCIAL DEVELOPMENT AFFECTED BY PRENATAL OXYTOCIN EXPOSURE**

William M. Kenkel

Postdoctoral Fellow, The Kinsey Institute and Department of Biology, Indiana University

The hormone oxytocin is widely prescribed for the induction and/or augmentation of labor in contemporary obstetric practice for its ability to augment uterine contractions. However, oxytocin is also a neuroactive peptide, with a diverse set of actions throughout the brain and body. Here, we tested whether maternally administered oxytocin on the expected day of delivery would affect offspring development using the monogamous prairie vole as a model. Vole pups were studied from birth to adulthood in a battery of behavioral tests that examined aspects of temperament and social behavior potentially affected by changes to the oxytocin system. Here, we present preliminary findings from tests in early-life and adolescence, including isolation-induced vocalizations, huddling/thermoregulation and social play. Differences brought on by prenatal oxytocin exposure in this model have translational relevance to human behavior with regards to this widespread medical practice.

11:45 – 12:00 **PRENATAL THYROID HORMONE INSUFFICIENCY DIMINISHES SHORT-TERM OBJECT RECOGNITION MEMORY IN LONG-EVANS RATS**

Megan L. Seig

Graduate Student, Department of Comparative Biosciences, College of Veterinary Medicine, University of Illinois at Urbana-Champaign

Children whose mothers are severely hypothyroid during pregnancy exhibit learning and memory deficits. Fortunately, overt maternal hypothyroidism is usually recognized and treated. Yet, many women who are subclinically hypothyroid (SCH) are asymptomatic and are therefore never diagnosed or treated. The prevalence of SCH is thought to be higher in pregnant women than in the general population, but little is known of the effects of maternal SCH on the neurobehavioral outcomes of children. To model maternal SCH, we exposed pregnant rat dams to a low dose of propylthiouracil (3 ppm in drinking water) from gestation day 6 through postnatal day 14, and pups were cross-fostered at postnatal day 2, resulting in four treatment groups: control, prenatal exposure, postnatal exposure, and perinatal exposure. Rats were tested on the novel-object recognition paradigm at 36-38 weeks of age to examine effects of maternal SCH on short-term memory. Rats were allowed to investigate two identical objects, and then, one hour later, they were allowed to explore one of the prior objects and one novel object for 3 minutes in order to assess short-term object recognition memory. Prenatal exposure resulted in decreased time and decreased percent time exploring the novel object, decreased total time exploring both objects, and fewer entries to the novel object in the first minute of exploration. These results demonstrate that maternal hypothyroidism during the prenatal period, but not during the postnatal period, negatively affects short-term object recognition memory. Now that we have narrowed the sensitive period for the effect of thyroid hormone on development of short-term memory, as assessed by the novel-object recognition task, we will begin exploring underlying mechanisms.

SESSION VI CONSERVATION

2:00 – 2:15 **HARPY EAGLE HARPIA HARPYJA CONSERVATION: JUVENILE BEHAVIOR AND DIET AT A NEST NEAR PIJIBASAL, DARIEN**

Hannah R. Rodgers

Undergraduate Student, Department of Biology, Oberlin College, and Panama Program, School of International Training

The Harpy Eagle Harpia harpyja, the largest and most powerful bird of prey in the Americas and the national bird of Panama, is declining throughout its range in Neotropical forests. Hunting and deforestation threaten populations in the most important remaining eagle habitat in Central America, the Darien province of Panama. These eagles may have the longest post-fledging juvenile dependency of any raptor, though juvenile behavior during this period is poorly studied. This study monitored an 11-month-old juvenile for 7 days at a nest near the indigenous community of Pijibasal in order to study behavior and diet. I recorded the juvenile's location and behavior, studied prey remains and wildlife in the area, and witnessed 2 prey deliveries from the parent birds. The juvenile depended on the parents for food, but had begun exploring the area around the nest and practicing hunting motions. No behavioral information on wild H. harpyja at this age has been published, although the findings from this study agree with the hypothesis that juveniles progressively gain independence and disperse from the parental territory during their first 2 years. The nest-monitoring project began several years prior to this study, involving members of Pijibasal as well as other organizations such as ANCON and Fondo Darién. Interviews were conducted with community members to learn about local involvement and perceptions on conservation. Judging by interviews, tourism and research projects in Pijibasal successfully reconcile local needs with biodiversity conservation. H. harpyja conservation efforts should focus on preserving H. harpyja habitat, studying juvenile dispersal, and involving local communities, particularly given the potential of this flagship species to promote tropical forest conservation by attracting international support.

2:15 – 2:30 ASSESSING REPRODUCTIVE COMPETITIVENESS BETWEEN WILD AND LABORATORY MICE

Megan Serr

Graduate Student, W. M. Keck Center for Behavioral Biology and Genetic Engineering and Society Center, North Carolina State University; Genetic Biocontrol of Invasive Rodents Program, Island Conservation

House mice are significant invasive pests, particularly on islands, where they often reach high densities in the absence of natural predators. As part of a multi-institutional project involving North Carolina State University, we are investigating the potential of genetic methods for suppressing invasive mouse populations on islands by creating heavily male-biased offspring sex ratios with the goal of eradication. Successful implementation of this approach will depend on engineered hybrid males mating successfully in complex environments. We are characterizing genetic and behavioral differences between Mus musculus strains in terms of mating and fecundity using wild house mice derived from an invasive population on the Farallon islands (MmF), a laboratory strain C57BL/6 x 129 (tw2), and hybrid wild-lab offspring. Mice with the 't allele' (tw2) have a naturally occurring gene drive system. To assess fertility in hybrid crosses, tw2 males were paired with wild-derived females from the Farallon islands (MmF). Results indicate litter sizes are comparable (MmF [7.4] SEM=.35 MmF x tw2 [7.5] SEM=.84). Next, we used larger (3 m2) enclosures to increase environmental complexity. We introduced both an MmF and a tw2-bearing male to two MmF females to assess female mate choice. Results of these experiments show none of the offspring carried the t-allele. However, performing the same experiment with F1 hybrid males instead of a pure lab background resulted in 78% of resultant offspring carrying the tw2- allele thus far. This indicates that hybrid males may be able to successfully compete against wild males and current experiments are aimed at determining what characteristics contribute to this success. Assessing and selecting for characteristics contributing to male mating success in increasingly complex and naturalistic environments will be critical to determine the overall prospects for success of a gene-drive based eradication approach for invasive mice on islands.

2:30 – 2:45 P-WELL: DESIGNING AN ORANGUTAN WELFARE ASSESSMENT INDEX

Anna Christina Sernau

Undergraduate Researcher, Center for the Integrative Study of Animal Behavior, Indiana University

Animal welfare is a topic of growing concern for members of the scientific community and public alike. Zoos are at the forefront of public perception about animal welfare, yet are frequently over-looked when it comes to welfare research. They are often home to cognitively complex and endangered animals – both of which are priorities for conservation and welfare effort. One such example is the orangutan (Pongo spp.), a highly intelligent and critically endangered animal. This thesis acted as a pilot study for the creation and implementation of a comprehensive orangutan welfare assessment index. The P-Well, short for "Pongo Welfare Assessment," was modeled on the C-Well, "Cetacean Welfare Assessment" – a welfare assessment index designed for bottlenose dolphins (Tursiops truncatus). Following the creation of the index, it was tested for viability with 14 orangutans at two locations – the Woodland Park Zoo in Seattle, Washington and the Indianapolis Zoo in Indianapolis, Indiana. The results of this pilot study indicate that the P-Well serves as a useful assessment of welfare and is able to identify key areas that require improvement.

Following page: Keynote seminar

KEYNOTE SEMINAR

3:00 – 4:00

WHAT'S IN A SQUEAK? MECHANISMS OF MEANING IN CONTEXT-DEPENDENT COMMUNICATION

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Like people, animals must make sense of potentially ambiguous social signals in a confusing world. One resolution to ambiguity is to use information on external context and internal state to determine the best way to respond to a given signal. Sensory systems, as the gateways to social information, play an important role in this process, but the neural mechanisms that convey contextual information to sensory systems are not well-understood. To investigate these issues, we use the model system of lab mice, which communicate using a wide range of acoustic signals. The type of mouse vocalization most commonly encountered by human listeners, a 'squeak', is one of the least understood. It is produced in a variety of contexts, including by females interacting with males. For a listening male, this ambiguity may be resolved by multimodal signals from his female social partner. These cues, as well as information about internal state or past experience, converges on neurochemical pathways in the brain such as the serotonergic system, which then conveys this contextual information back to auditory regions. Emerging from these findings is a model of neuromodulatory feedback from social integrative centers of the brain to sensory systems, which could have the effect of coordinating ascending sensory information with context.