

Measuring stress levels of juvenile mice using social defeat assessments

Poster (Friday, April 20, 2018)

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Behavioral and chemical assessments were conducted on male and female juvenile mice to determine potential differences in their stress levels after undergoing social defeat tests. This research consisted of using a social defeat test to be the initial stress inducer, followed by weight assessments over the 10-day experiment, sucrose versus water consumption levels, and a final corticosterone blood assay. The purpose of the tests was to look at juvenile stress levels and specifically whether females have a higher likelihood of showing measurably higher levels of stress than males, as has been shown in past research on humans. Results showed the experimental male and female juvenile mice consumed less sucrose and massed in at a lower level when compared to the control mice, with no correlation being observed between mass and sucrose consumption. Corticosterone results indicated higher averages among experimental males versus control males with a p value of 0.18. Additionally, corticosterone results among experimental males versus experimental females indicated higher averages for males with a p value of 0.10. In conclusion, the induced stress had a greater average effect on the corticosterone levels for the juvenile male mice than female mice, but the difference was not statistically significant.

Biogeography of Southwestern Pocket Gophers in the Genus *Geomys*

Poster (Friday, April 20, 2018)

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Species status between interconnected and closely related species can be difficult to discern. The southwest United States is home to several species of pocket gophers (*Geomys*), including the northern species, *G. arenarius* and *G. bursarius major*, and southern *G. bursarius knoxjonesi*. Current biogeographic hypotheses for this assemblage involve a population of *G. bursarius* using one of several potential colonization routes across the arid region between the Pecos River and the Rio Grande Valley, which ultimately led to isolation and the speciation of *G. arenarius*. My project aimed to test 3 likely colonization routes using comprehensive geographic samples of the aforementioned pocket gopher species. Genetic sequences of the COX1 mitochondrial gene offer insight into the evolutionary relationships between the species and, when combined with geographic data, a story of colonization. A clear route has been mapped based on the genetic data, and further support has been compiled in support of the gophers' status as three independent species.

Antimicrobial Metabolite Analysis of Sub-Antarctic Mosses Found in Bird Nests

Poster (Friday, April 20, 2018)

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Bryophytes have been largely studied in phytochemistry due to their high diversity of secondary metabolites, which play key roles in bryophyte survival under extreme conditions. These metabolites have also displayed antioxidant responses and microbial growth inhibition factors. These properties could be useful for bird nesting, and are found to contribute to the mechanical insulation properties of bryophyte-plant materials. Ornithologists at the Omora Park Long-Term Socio-Ecological Research center, Chile, have observed the presence of bryophytes in bird nests of different species. In a previous ornithological study, most nests surveyed had variable construction material proportions of the mosses *Lepyrodon lagurus* and *Acrocladium auriculatum*. This project analyzed the presence and diversity of flavonoids and other phenolics in bryophytes used in nest construction. Samples were collected along Wulaia Trail, Navarino Island, Chile, transported back to the United States, and analyzed at BVU using GC/MS applications. Results indicated antimicrobial properties found to be present in both *Lepyrodon* and *Acrocladium*. Future studies will evaluate potential microbial growth inhibition of each bryophyte against the two bird-pathogenic bacterial strains *Staphylococcus* and *Enterococcus*. The expected results will unravel the ecological relationships between birds and bryophytes in these remote regions and set a precedent for potential biotechnological applications

Enrichment of Captive Canids at Fontana Nature Center

Poster (Friday, April 20, 2018)

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Captive wildlife are important for many aspects of conservation such as rehabilitation, breeding, and education. However, these captive animals are often restricted in their ability to move or exhibit stress because of changes in their environment, and as a result can act in a self-destructive manner. Enrichment activities can help to alleviate this. We examined different forms of enrichment and their effects on the behavior of two species of captive canids, coyote (*Canis latrans*) and red fox (*Vulpes vulpes*) housed at Fontana Nature Center, Hazleton, Iowa in the spring of 2018. Animals were exposed to four types of enrichment and their responses recorded. The enrichments included a Kong[®] dog toy with dog treat, cardboard egg carton with food inside (e.g. dry dog food), three different scent items (e.g. lemon) around the enclosure, and a duck wing. The recorded behaviors included stereotypy (e.g. pacing), human or animal interference, inactive/disinterest (e.g. sleeping), active engagement (e.g. sniffing), locomotion (e.g. walking), and fear (e.g. avoidance). The enrichment activities rotated through the week over the course of the study to minimize daily variation in weather. Preliminary results indicated differences in the responses of not only the two species but differences between the two conspecifics.

Nonlethal Long-Term Effects of Styrofoam Consumption on Beetle Larvae

Poster (Friday, April 20, 2018)

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Previous research has shown that mealworms (beetle larvae) are capable of eating and digesting Styrofoam, creating a biodegradable product. We investigated if a similar and larger beetle species, *Zophobas morio* ("superworms"), was capable of doing the same thing. Superworms were fed either their typical bran food or Styrofoam, and observed over a 7 week period. Activity of a separate group of worms was recorded over a 10 week period, and the activity of bran fed vs. styrofoam fed worms was compared. At the end of the experiment the condition of the worms was analyzed in g/cm to give an indication of the nutritional value of the Styrofoam compared to bran. Mortality was low across all treatments, and Styrofoam was readily consumed by *Z. morio*. Condition of superworms fed Styrofoam was lower than bran-fed individuals, and activity also decreased. Overall, while beetle larvae are able to survive long-term diets of Styrofoam they exhibit heavy costs to performance.

Effects of Different Fertilizer Methods on Nitrate Concentration in Roots and Leaves of Beets

Poster (Friday, April 20, 2018)

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Nitrogen is a factor limiting plant growth and various crops require additional fertilizer to ensure efficient growth. Certain plants take up and store nitrogen as nitrate in different tissues. Previous studies have shown differences in nitrate concentration in crops grown with conventional versus organic methods. However, it is not clear whether organic farming practices (compost) or organic fertilizers would lead to nitrate concentrations more similar to conventional fertilizer rates. We studied Detroit Dark Red beets (*Beta vulgaris*) because they are grown for both their leafy tops and their roots and are known to have high nitrate concentrations. We hypothesize that the nitrate concentrations of beets grown with compost will differ from those that have been grown using conventional and organic fertilizers. Beets grown in potting soil amended with conventional Miracle-Gro® organic Miracle-Gro® and compost fertilizers will be analyzed to compare the biomass and nitrate concentration in roots and in shoots. Finding the optimum growing method could help reduce high levels of nitrates in beet crops.

Population genomic structure in a widespread reptile, the painted turtle (*Chrysemys picta*)

Oral (Saturday, April 21, 2018)

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In wide-ranging species, population genomic structure is anticipated due to limits of dispersal, particularly in conjunction with local adaptation. However, turtles evolve slowly relative to other lineages, and the painted turtle expressed little genetic variation across its entire range in a previous study. We tested the hypothesis that painted turtles exhibit population genetic structure across the range west of the Mississippi River, an area encompassing enormous temperature and precipitation gradients, using a GBS approach. We sequenced 164 individuals representing seven populations spanning the western range of the painted turtle (northwestern border of Illinois, northern Minnesota, central Kansas, western Nebraska, southern New Mexico, northern Idaho, and northwestern Oregon) and processed SNPs according to GATK Best Practices. We assessed population genomic structure across the seven focal populations and tested key demographic hypotheses associated with glaciation and aridification during the Pleistocene, such as the extinction and recolonization of painted turtles in the Great Plains region. Analyses of population structure indicate that populations are genetically distinct and that populations are experiencing different selective pressures, contrary to prior results from a single mitochondrial locus study. These population genomic patterns may reflect limited dispersal, different population histories, and local adaptation to varied environmental conditions.

When the Midnight Snack Attacks: Prevalence of *Toxoplasma gondii*

Oral (Saturday, April 21, 2018)

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Toxoplasma gondii is an intracellular protozoan whose definitive host is the *Felis catus* (domestic cats) and has a range of intermediate host including rodents and humans. Behavioral changes in the host have been correlated with the *T. gondii* infection. Our research includes blood samples from various cat and rodent species using PCR to determine the infection rates. We report the prevalence of *T. gondii* in the local area.