93.1 POSTAVA-DAVIGNON, Marielle A.*; FULLER, Claire A.; STILLER, John W.; WADDLE, Erica; ROSENGAUS, Rebeca B.; Northeastern University, Murray State University, East Carolina University, East Carolina University; *postava-davig.m@neu.edu*

Fungal pressures within and surrounding nests of the arboreal termite species Nasutitermes acajutlae

Samples were collected from nests of *Nasutitermes acajutlae* in St. John, USVI. *Nasutitermes acajutlae* nest in various habitats (woodland, sparse, mangrove, dry forest, moist forest) on the island that differ in their abiotic attributes. Variables such as ambient temperature and humidity, nest temperature and humidity, light, soil moisture and pH were measured and analyzed for their influence on fungal amounts and diversity in each habitat, as well as within a nest. Washes of core and trail nest material, soil from underneath the nest, and cuticular washes of worker and soldier termites were plated on Potato Dextrose Agar with 25 ug/mL of the antibiotic Thiostrepton. Two plates of each sample were incubated at 25C and 35C for five days and fungal colony forming units (CFUs) counted. Cultured fungi were identified using environmental PCR. Results show that fungal growth is highest in the nest material and soil samples at 25C, and very little grows from the cuticular washes. The CFUs of core material, trail material, and soil samples all differed significantly between habitats, and core samples had the fewest fungi. The lack of growth at 35C may indicate the effectiveness of the high internal temperature of *N. acajutlae* nests for reducing fungal growth. Termites live in microbe-rich environments, many of which could be pathogenic. These results have strong implications from the role of fungal communities in nest site selection, and the influence of fungal pressures on the evolution of termite nest architecture.

97.3 POWERS, DR*; GETSINGER, PW; WETHINGTON, SM; TOBALSKE, BW; George Fox University, Newberg, OR, Hummingbird Monitoring Network, Patagonia, AZ, University of Montana, Missoula, MT; *dpowers@georgefox.edu*

Respiratory Evaporative Water Loss During Hovering Flight in Hummingbirds

Evaporation of water across body surfaces is an important method for heat dissipation in vertebrates. Hummingbirds (family Trochilidae) are among the smallest vertebrate endotherms resulting in extremely high rates of metabolism evaporative water loss (EWL). High rates of EWL contribute to water turnover rates that are as much as 5X their body mass. In this study, we made the first respiratory evaporative water loss (REWL) measurements for free-living hummingbirds during unencumbered hover flight. Measurements were made on 6 species ranging in mass from 3-8 g to determine the impact of REWL on their daily heat and water budgets. All measurements were obtained using a negative-pressure, open-flow respirometry system attached to a drip-free feeder at which the birds hover fed. REWL ranged from 80-150 mg $g^{-1}h^{-1}$ (8-15% of body mass) which is 50 times higher than REWL measured in resting birds, and 2-15 times higher than that measured in other birds during forward flight. Heat dissipated by REWL is about 0.36 kJ $g^{-1}h^{-1}$ which is about 35% of their hovering metabolic rate. Thus, REWL is a notable contributor to water turnover and heat dissipation during hovering in hummingbirds. Since hovering is the most energetically expensive activity for hummingbirds, these data further our understanding of water and heat budget management by a tiny endotherm during intense activity. Supported in part by NSF IOB-0615648.

75.2 PRATT, K L*; WILSON, R S; BLOMBERG, S P; FRANKLIN, C E; University of Queensland, Australia; *k.pratt@uq.edu.au*

Diving and digestion - the effect of an elevated metabolic rate on submergence in an aquatic ectotherm

Diving vertebrates submerge for varying durations, the extent to which is determined primarily by oxygen stores and metabolic rate (calculated aerobic dive limit). Environmental and physiological factors determine oxygen stores and metabolic rate; including temperature and aquatic PO_2, the effects of which are well understood. Almost completely overlooked is digestion, a physiological process which dramatically increases metabolism particularly in infrequently feeding ectotherms (eg. snakes) and the consequences for dive duration are untested. This study aimed to determine changes in metabolic rate and dive duration in response to the combined effects of temperature and aquatic PO_2 and to digestion in the fully-aquatic Arafura filesnake (*Acrochordus arafurae*). In the first experiment, three temperatures (20C, 26C, 32C) were used under aquatic normoxia and hypoxia. Metabolic rate increased with temperature (Q10 = 2.2) but was not affected by PO_2. Snakes used aquatic respiration during normoxia but lost oxygen to the water during hypoxia, increasing aerial respiration to maintain a constant metabolic rate. As temperature increased, maximum dive time under normoxia decreased from 77 min at 20C to 28 min at 32C with hypoxia further reducing dive time to 21 min at 32C. Digestion was more energetically demanding and enduring than changes with temperature and PO_2. Metabolic rate increased with meal size and digestion of the largest meal (15% body mass) resulted in an 11-fold increase in metabolic rate. Aquatic respiration increased three fold during digestion. Dive duration reduced to below 20% of fasting times (< 5 min) with the largest meal and the smallest meal (1.6%) halved maximum dive time.

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Photoperiodic Regulation of Reproduction and Immunity

Research in our lab focuses on understanding the neuroendocrine and neuroimmunological mechanisms by which seasonally-breeding animals engage annual changes in the activity of the immune system. Of particular interest are the interactions between seasonal changes in the reproductive system and their causal role in seasonal changes in the immune system. Insights into these mechanisms stand to inform questions about trade-offs between reproduction and immunity that occur as animals engage seasonal phenotypic change. Recent and current research projects will be presented, including studies that examine the role of gonadal hormones on behavioral responses to infection and studies assessing the role of naturalistic changes in photoperiod on immune function in a laboratory setting.