***P1-152*** LUDINGTON, SC*; MCKINNEY, JE; O'CONNELL, LA; Stanford University, Stanford, CA; *sarahl21@stanford.edu*

***Role of Transcription Factor FOXP2 in Tadpole Social Communication***

Communication of hunger during infancy is our first social interaction, laying the foundation for a healthy life by acquiring nutrition and establishing strong social bonds with caregivers. However, the neural basis of neonate social communication is not well understood. The Forkhead Box P2 (FOXP2) protein has been implicated in several human communication disorders, including deficits in language through abnormal development of motor neural circuits. This protein has also been linked to communication in songbirds, honeybees, and rodents. We studied the neural basis of neonate communication of nutritional need in Mimetic poison frog (*Ranitomeya imitator*) tadpoles. In this species, mothers feed tadpoles unfertilized eggs after the tadpole performs a begging display characterized by vigorously dancing back and forth. Preliminary data from our lab suggested that FOXP2-positive neurons are active during these tadpole begging displays. In this study, tadpoles were placed individually in an arena for 30 minutes with either an adult female, a conspecific tadpole, or a novel object as a non-social control. After quantifying the begging behavior displayed by the tadpoles, the tadpole brains were isolated and immunohistochemistry was used to visualize a marker of neural activation (pS6) and FOXP2. FOXP2 was widely distributed in the brain, with FOXP2-positive cells in the striatum, hypothalamus, and spinal cord, among other brain regions. In particular, FOXP2 colocalized with a marker of neural activation predominantly in the cerebellum and the thalamus. Current work involves generating brain-specific knockdowns of FOXP2 to functionally test the role of this protein in amphibian communication. Overall, this work points to a conserved role for FOXP2 in social communication and thus provide important insights into how infants convey their nutritional needs.

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***How Predators and Conspecifics Influence Crayfish Shelter Preference?***

In the natural environment, there are varying levels of complexity of resources such as food, shelter, and mates. Previous studies have shown that crayfish exhibit preferences for shelters, and these preferences have typically been examined in the context of aggressive interactions. However, it is unknown how external stimuli such as the presence of predators, naïve conspecifics, and status specific crayfish influence the focal animal's preference in the absence of physical interactions. Shelter-seeking behavior of male rusty crayfish, *Faxionus rusticus*, was examined in relation to stimuli from a crayfish counterpart as well as a largemouth bass predator, *Micropterus salmoides*. Five different experiments were performed with a naïve focal crayfish: 1) a control, 2) exposure to a naïve conspecific, 3) a dominant crayfish, 4) a subordinate, and 5) a largemouth bass. Individual crayfish were presented with four variable PVC shelters, consisting of one, two, three, or four openings inside a transparent chamber physically isolated from the external stimulus. The first two experiments consisted of 16 trials, while the last three each had five trials, all of which were recorded for 24 hours under a 12:12 hour light-dark cycle. Each trial was analyzed by observing shelter type and the duration of time spent in that shelter. Focal animals exhibited preference in the presence of naïve conspecifics, but they did not exhibit preference in the control experiment. External stimuli altered crayfish shelter use and preference, but further trials are necessary to understand the broader influence of varying stimulus types.

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***Ecogeographic variation and phylogenetic signature in rodent respiratory turbinates***

Among mammals, harsh environments, such as deserts or tundra, pose physiological challenges for their inhabitants. In particular, relatively arid or cold environments present unique challenges for the respiratory system. Therefore, mammals living in these regions often have adaptations for enhanced air conditioning such as relatively large respiratory turbinates, sinuses, or nasal fossae. However, these adaptations have been noted primarily in relatively large bodied mammals (e.g. carnivorans, hominins). Here, we test whether the same patterns in environmental adaptations may be applied to smaller bodied mammals by testing for their presence in Rodentia, an order of mammals that includes those at small body sizes. We used computed tomography scans from 66 rodent species, including representatives from Anomaluromorpha, Castorimorpha, Hystricomorpha, Myomorpha, and Sciuromorpha, to quantify the respiratory turbinate surface area, a proxy for respiratory epithelial surface area, scaled relative to skull length. We found a strong linear relationship between skull length and respiratory turbinate surface area but also noted substantial differences in respiratory turbinate morphology when comparing sciuromorphs with other rodent suborders included in this analysis. Despite these morphological differences, when controlling for phylogenetic relatedness, there are no statistically significant differences between biome groups. These results suggest that alternative behavioral strategies (e.g. burrowing or hibernating) may be used to cope with these environmental challenges, creating microclimates thus ameliorating the survival of the animals inhabiting those regions.

***42-7*** LUNGMUS, JK*; ANGIELCZYK, KD; LUO, ZX; University of Chicago, Field Museum of Natural History; *jlungmus@uchicago.edu*

***Limb Ecometrics Show Limited Applicability for Quantifying Ecological Novelty in the Deep Evolution of Synapsida***

Mammalia are the only living members of the larger clade known as Synapsida, which has a fossil record spanning from 320mya to today. Despite the fact that much of the ecological diversity of mammals has been considered in light of limb morphology, the origin of broader synapsid limb diversity and its influence on ecological diversity has received less attention. Here we present shape analyses of the forelimbs of the multiple fossil synapsid radiations in comparison to a broad sample of extant Mammalia. Previous work by the authors has shown that shape broadly is not informative of specific locomotor ecomorphologies in earliest fossil Synapsida. Considering the broader scientific use of limb morphology in testing for fossil ecomorphologies, we sought to better understand at what juncture in synapsid evolutionary history do limb metrics begin to show utility in ecomorphological analyses. Shape data on humeri and ulnae elements from an extant sample representing known ecomorphologies provided the framework for a comparative study of extinct ecomorphologies, associated specifically with locomotion. We conducted linear and geometric morphometric comparisons between the extant sample and five taxonomic subsampled radiations moving crown-ward along the synapsid lineage. Taxonomic designations were the PermoCarboniferous "pelycosaurs”, both Permian and Triassic therapsids, "Non-mammaliaforme cynodonts”, and "Mammaliaformes”. Results show that many limb ecomorphological metrics commonly used are not effective designators until close to the origin of crown Mammalia, as late as the Jurassic. This brings into question the overall utility of using extant analogues to test for ecological signal in a given tetrapod group's deepest fossil ancestors.