S2-6 SILVESTRE, F*; CARION, A; CHAPELLE, V; VOISIN, A-S; FELLOUS, A; SUAREZ-ULLOA, V; MARKAY, A; HETRU, J; GOUJON, V; WAUTHIER, E; CHATTERJEE, A; EARLEY, RL; University of Namur, Belgium, University of Otago, Dunedin, New Zealand, University of Alabama, Tuscaloosa, USA; *frederic.silvestre@unamur.be*

The Self-Fertilizing Mangrove Rivulus as a Model Species in Environmental Epigenetics

There is an increasing body of evidence that epigenetic variation can contribute to phenotypic changes in a population. A deeper understanding of the roles of epigenetics in phenotypic diversity and in organism adaptation and evolution can only be achieved in individuals that are genetically identical but naturally exhibit a range of heritable phenotypes. For that purpose, the mangrove rivulus, *Kryptolebias marmoratus*, is a precious model. Closely associated with red mangroves from Florida to South America, it shows numerous adaptations that facilitate survival in environments with considerable variability. Its main biological particularity is its mixed-mating reproductive system wherein hermaphrodites can either fertilize their own eggs or mate with males. Depending on the geographical region, the ratio between hermaphrodites and males varies alongside selfing rates, which directly affects genetic diversity. Here, we characterized DNA methylation in adults and during embryogenesis. Differentially methylated fragments were associated with specific behavioral traits such as boldness and aggressiveness. Effects of exposure to different environmental contaminants, such as neurotoxic compounds or endocrine disrupting chemicals were assessed to investigate relationships between DNA methylation and phenotypic variation. Collectively, our research has demonstrated extensive opportunity for epigenetic change during early life, which might underlie the diversity of phenotypes exhibited both within and among genotypes.

105-3 SIMON, MN*; BRANDT, R; KOHLSDORF, T; MARROIG, G; University of Sao Paulo; *monique.simon@usp.br*

Linking Phenotypic Modularity to Directional Selection on Multiple Functional Performances

A better comprehension of the evolution of complex multivariate phenotypes can be achieved by unravelling the factors that shape trait correlations and modularity. An underexplored question is how directional selection on multiple functions contributes to phenotypic modularity. We hypothesized that combinations of traits describing the pattern of trait modularity would be under directional selection associated with performance, reflecting potential functional trade-offs. We tested this hypothesis using the lizard *Tropidurus catalanensis*, for which four locomotor performances were measured - climbing, grasping, sprinting and exertion - and a trade-off between grasping and exertion was found. We estimated selection as linear performance gradients of hindlimb traits (bones and muscles) on the four performances, using original traits and eigenvectors of the phenotypic correlation matrix (P-matrix). We expected the same eigenvector to show significant performance gradients for grasping and exertion, but with opposing signs. We found that two eigenvectors of the P-matrix, allometric size and a contrast involving the thigh muscle, are under significant directional selection associated with grasping, sprinting and exertion. Also, allometric size shows opposing signs of performance gradient associated with grasping and exertion, indicating conflicting selection. However, the most apparent modular signal (bone x muscle contrast) was not under significant directional selection, but instead seems to match developmental processes. Our results indicate that directional selection on different performances can reduce or increase phenotypic modularity depending on which combinations of traits affects each performance.

113-6 SIMONITIS, LE*; MARSHALL, CD; Texas A&M University at Galveston, Texas A&M University at Galveston, Texas A&M University; *laureneve@tamu.edu*

A Natural Occurring Shark Repellent: Ink has a Negative Effect on Shark Swimming Behavior

Inking is an antipredator defense system which affects predators visually (as a smoke screen) and chemically (as a deterrent). As a chemical deterrent, ink is thought to either disrupt the reception of chemicals or act aversively to a predator's chemosensory systems. The use of ink as a defense is known for a variety of animals such as sea hares, cephalopods, and even whales. We hypothesized that ink acts as a chemical deterrent, negatively impacting the normal swimming behavior of bonnethead sharks. To determine how ink acts as a chemical deterrent, ink from California sea hares (*Aplysia californica*), common cuttlefish (*Sepia officinalis*) and pygmy sperm whales (*Kogia breviceps*) were introduced into the path of free swimming bonnethead sharks (*Sphyrna tiburo*). Sharks (n=7) were individually placed in a circular mesocosm with a GoPro camera mounted overhead. Locomotory kinematic variables (e.g. angular velocity, angle of deviation, seconds to max deviation, distance of max deviation, etc.) were recorded in response to each of the experimental treatments: the three inks, food odor (to test for a positive response), food coloring (to control for color), and sea water (to control for mechanosensory stimulation). Food odor provoked a significantly positive effect while all three inks elicited significant negative responses in at least one of the kinematic variables. These data confirm that ink negatively impacts shark swimming behavior. Future studies will address the ability of ink to deter a predation event, the chemical makeup of the ink, and the electrophysiological reaction of shark olfactory systems to ink.

36-6 SIMPSON, DY*; TELEMECO, R; LANGKILDE, T; SCHWARTZ, TS; Auburn University , California State University, Fresno, Pennsylvania State University; *dys0004@tigermail.auburn.edu*

Differential Gene Expression to heat or fire ant envenomation in Sceloporus undulatus

Environmental stressors can negatively affect an organism's performance, survival, growth rate, and ultimately its fitness. The underlying molecular mechanisms of how organisms respond to diverse stressors are still poorly understood. *Sceloporus undulatus*, the eastern fence lizard, has become an ecological model organism for addressing questions in ecology, and life history evolution. We have developed a high-quality reference genome that furthers the utility for investigating molecular and physiological mechanisms. We are interested in understanding how stress responses may vary when an organism is exposed to diverse environmental stressors such as an extreme heat event as predicted by climate change, or attack by an invasive predator such as a fire ant. In this study we test whether stress response to either acute heat or fire ant attack diverges at the endocrine level (plasma corticosterone levels) or at the gene expression level. We found that male *S. undulatus* (n = 24) who were either exposed to heat (43C) for up to 3 hours or fire ant envenomation (receiving ~10 stings) each had the same response in corticosterone levels, with an increase relative to the control. Liver RNA seq data are being analyzed to test whether the gene expression response to acute heat and fire ant envenomation is also highly similar or is divergent. These results will bring further insight into the similarity of molecular responses to ecologically relevant stressors.