guttata) as a model species. Finches exposed to dietary methylmercury throughout their lifespans displayed impaired spatial learning and increased perseveration in a five-step spatial memory task. The hippocampus is a region of the brain related to spatial learning and memory, thus we hypothesize methylmercury is impairing neural function in the hippocampus. We observed neither a significant difference in hippocampus-to-telencephalon volume ratios between treatments nor a significant difference in density of immature or mature hippocampal neurons. However, in the finches exposed to methylmercury, we observed increased immunolabeling of doublecortin - a protein expressed in immature neurons - in the ventricular area, where hippocampal neurons are generated. Because birds exposed to methylmercury show increased immunoreactivity against doublecortin, yet display no difference in neuron number in the hippocampus, cellular migration could be hindered. Additionally, neurons may have increased damage and/or cellular death that was not observed with our methods. These results suggest mercury contamination could have severe implications for songbird conservation, particularly migratory and/or food-caching species with stronger demands on spatial memory.

1365 Sarah Britton, Goggy Davidowitz

Context Dependent Benefits of Melanism Explain Pigmentation Plasticity

Plasticity is the ability of a genotype to produce multiple phenotypes in response to environmental stimuli. Adaptive plasticity is expected to evolve when different phenotypes are optimal in different environments. In order to understand the evolution of plasticity we need to understand costs and benefits of trait expression across environments. In Hyles lineata, the white-lined Sphinx moth, melanin pigmentation is a plastic trait. Maximal melanization is induced in response to seasonal cues, including low temperatures and short photoperiods, and is expected to be beneficial in cold environments due to its ability to absorb radiant heat. In this study we test the hypothesis that melanin pigmentation plasticity is an adaptive response to temperature variation. We induced melanic versus non-melanic larvae of H. lineata and raised them in cold (21°C) versus warm (33°C) environments under a source of radiant heat. We measured survival, growth rate, and development time in the 5th instar. In cold environments melanic larvae grow significantly faster than non-melanic larvae and had lower mortality. In the warm environment, however, growth rates, development periods, and mortality of the two morphs were similar. These results suggest that melanic individuals have an advantage over non-melanic individuals in cold environments but not warm environments, consistent with the hypothesis that melanin plasticity is adaptation to temperature variation. This study contributes to our understanding of the evolution of phenotypic plasticity.

1245 Robert Brocklehurst, Magdalen Mercado, Stephanie Pierce

Adaptive landscapes reveal complex evolution of forelimb posture in stem mammals (Synapsida)

The 'sprawling–parasagittal' transition was a major postural shift during mammal evolution, but 'when' and 'how' it occurred has been debated for decades. Previous work focused on a few exceptional fossils from discrete points in time, but broader studies of individual limb elements may provide a more comprehensive evolutionary perspective. Here we address when and how parasagittal forelimb posture evolved in the ancestors of mammals, the non-mammalian synapsids (NMS), using functional adaptive landscape analysis of the humerus bone, incorporating data from morphology, function, and phylogeny, to assess forelimb evolution in deep time. The humerus is subjected to different functional stresses in parasagittal vs. sprawling limbs, and so its morphology is expected to reflect postural differences. We measured humerus shape and various functional traits on a large sample of NMS ($n = 61$), with a diverse array of extant taxa ($n = 140$) serving as a robust comparative dataset. We recover distinct adaptive landscapes for extant sprawling and parasagittal taxa, highlighting functional specialization of the humerus associated with different postures. The landscapes for NMS had distinct adaptive peaks from extant sprawlers. While there is repeated evolution of humeri representing 'transitional' postures in NMS, humeri consistent with parasagittal posture do not appear until the crown group. Our data reveal the complexity of postural evolution within Synapsida, with the 'sprawling-parasagittal' transition typified by considerable homoplasy, and postural variation within individual synapsid clades.

916 Lance Brooks, Peter Weyand

From humans to hounds: gravity and balance limit sprint running acceleration

Maximal sprint accelerations by humans are far less rapid than those of the swiftest quadrupedal runners despite both being subject to the same mechanical constraints which impose a theoretical maximal acceleration capability of 1 G. This constraint is a direct result