S5.8 DAVIDSON, Brad*; SWEENEY, Sarah; ZHEN, Yisong; RAGKOUSI, Katerina; Univ. of Arizona; *bjd18@email.arizona.edu*

Exploring the role of cell fate specification in chordate heart evolution.

Chordate heart evolution appears to involve a gradual increase in complexity; from the simple peristaltic tubes of basal chordates to the four-chambered hearts of amniotes. To better understand this process, we study heart development in the basal chordate *Ciona intestinalis*. We have previously shown that Fibroblast Growth Factor (FGF) signaling plays a crucial role in *Ciona* heart specification. Targeted manipulations of this specification event increase heart cell progenitor number. Surprisingly, this increase in progenitor cells can result in the emergence of a novel, functional two-compartment heart phenotype. To better understand this intriguing result, we are analyzing two interlinked roles for FGF in *Ciona* heart specification; regulation of cell polarity and gene expression. Our data indicates that FGF initially regulates cell polarity thereby refining the transcriptional response of cells to subsequent FGF signaling. This dual role for FGF may provide a robust yet flexible mechanism for cell fate specification.

9.7 DAVIS, J.E.*; FOLTZ, S.L.; QI, X.; LEI, F.; WINGFIELD, J.C.; Radford University , University of California, Davis, Qinghai University, Chinese Academy of Sciences, Institute of Zoology; *jasdavis@gmail.com*

Hormones, Habitats and Habits up on the Roof: Stress Modulation across Species and Life History Stages in the Passerines of the Tibetan Plateau

At an average elevation over 3000 meters, the Tibetan Plateau is a uniquely harsh environment in which resident passerines deal with the challenges of low oxygen, low precipitation, low temperatures, and limited food sources. In addition, winter migration from the plateau is relatively uncommon in native passerines, as moving sufficiently far south to escape low winter temperatures requires birds to traverse the formidable barrier of the Himalayas. A recent increase in the human population on the plateau has resulted in heavy grazing of the grasslands, massive expansion of urban centers, increased pollution and disturbance of native habitats. However, such habitat modification also provides additional sources of food and novel locations for refuge and nesting, encouraging both invasion by non-native species and the expansion of native species into new, urban, niches. Both native and invasive birds exhibit a range of behavioral and ecological adaptations that may facilitate survival on the plateau, including modulation of reproductive timing, sociality, modulation of the adrencortical response to stress, aggression, and flexibility to make use of the "human habitat." Here we present initial results of comparative analysis of hypothalamo-pituitary-adrenal activity in endemic and invasive passerine species from January through August of 2008.

10.8 DAVIS, JS*; NICOLAY, CW; Ohio University, Univesity of North Carolina, Asheville; *jillian_davis.chiroptera@yahoo.com*

Biomechanical and Functional Analysis of the Jaws of Vampire Bats (Chiroptera: Phyllostomidae)

The three species of vampire bats (Phyllostomidae: Desmodontinae) are the only mammals that subsist on a diet consisting almost exclusively of blood. Due to the demands of obtaining their unusual diet, these bats are characterized by a highly specialized cranial morphology. Among other unique characteristics is a protruding jaw which extends beyond the anterior tips of the extremely large upper central incisors. When the jaw is closed, the upper incisors project into bony pits in a mandibular shelf behind the lower incisors. In spite of these apparent dietary and morphological similarities, preliminary data, including linear measurements from osteological specimens, scanning electron microscopy, and microCT analysis, demonstrate differences in fusion of the two dentary bones at the mandibular symphysis. The symphyses of the common vampire bat, *Desmodus rotundus*, and the white winged vampire bat, *Diaemus youngi*, remain unfused, whereas the hairy-legged vampire bat, *Diphylla ecaudata*, fuses its symphysis completely during development. Initial results suggest that *Desmodus rotundus* has a larger symphyseal area relative to its mandible than does *Diphylla ecaudata*. The volume and orientation of the mandibular pits are being quantified using high resolution microCT scanning to determine the relationship between fusion of the mandibular symphysis and the relative volume and orientation of the bony pits.

10.7 DAWSON, M.M.*; METZGER, K.A.; BAIER, D.B.; BRAINERD, E.L.; Brown University, Touro University College of Medicine; *megan_dawson@brown.edu*

Kinematics of the Quadrate Bone During Feeding in Mallard Ducks

The avian quadrate is complex in both its shape and kinematics, making it a difficult bone to describe and understand functionally. Because the quadrate plays a central role in feeding mechanics, particularly in the elevation of the upper bill, understanding its kinematics and interaction with other bones is important for more general analysis of feeding function. It has been hypothesized that the movement of the quadrate is transferred primarily through the pterygoid and palatine bones to the upper bill. Despite being key to upper bill movement, previous studies have not been able to adequately describe the movements of the quadrate. It has been suggested that the quadrate swings anteriorly and medially about its articulation with the braincase during upper bill elevation, but has not been demonstrated *in vivo*. Here, we use X-ray Reconstruction of Moving Morphology (XROMM) to study the movements of the quadrate and their effects on articulating bones during filter feeding in mallard ducks, *Anas platyrhynchos*. Rather than swinging in a single plane, the quadrate rotates about several axes during a bill elevation cycle. To describe this complex motion, we use a combination of axes defined by anatomical landmarks and helical axes. We found, as expected, that quadrate movement correlates with upper bill elevation. During upper bill elevation, the quadrate rotates anteriorly at the quadrate-braincase joint about a mediolateral axis and medially about a rostrocaudal axis. These rotations act to produce anterior and medial movement of the articulation between the quadrate and pterygoid. In addition, the quadrate rotates clockwise (viewed from above) about a dorsoventral axis during upper bill elevation, contributing to the medial and anterior movement.