

Committee on Evolutionary Biology GAANN Retreat 2015
Chicago Botanic Garden
May 3rd, 2015

After a one-year hiatus, the Committee on Evolutionary Biology once more took up the job of organizing the 2015 GAANN Retreat. This 11th Annual Retreat was organized by Carolyn Johnson and Elizabeth Eakin and was hosted by the Chicago Botanic Garden. The event showcased the research of 16 graduate students from across the Darwinian Cluster. From oyster population genomics to mammal paleontology, the presentations spanned an impressive range of questions, study organisms and methodological approaches. A contingent of graduate students performed various ancillary duties, including introducing speakers, setting up the audiovisual equipment, putting together the program, and cleaning.

The morning session kicked off with Daniela Palmer's talk about her field-work in Singapore, where she sought to quantify the relationship between batesian mimicry and predation rates in female *P. polytes* butterflies. She now seeks to understand the chemical traces of palatability and is working on re-designing her field experiment. Daniel Hooper discussed the role that chromosomal inversions play in suppressing recombination and facilitating population divergence among Estrildid finches. He discovered that continental populations have a higher inversion fixation rate than island populations and that inversions fix at a higher rate on the sex chromosomes. Lu Yao's work addressed an evolutionary question that continues to haunt the field: the extent to which mammals tend toward dwarfism when they colonize islands. Her studies on South East Asian mammals revealed that not all taxa trend toward body size reduction on islands. She did, however, note that island pigs became more sexually dimorphic compared to their mainland relatives.. After a thorough and engaging comparative analysis of the masticatory apparatus of different rodents, Dallas Krentzel concluded, with a note of levity, that woodchuck jaw muscles would be pretty good for chucking (i.e. gnawing) wood. Finally, Brett Aiello discussed the evolutionary interplay between the biomechanical properties and the proprioceptive function of wrasse pectoral fins, differentiating between "rowers" and "flappers."

Joyce Pieretti's research looks at the evolution of the *cis*-regulatory architecture of the gene Sonic hedgehog (*Shh*) in order to better understand *Shh* contributions to the phenotypic evolution of complex traits. She uncovered differences in the gene regulation of *Shh* in the Zone of Polarizing activity (which is involved in limb bud development) between lampreys/amphioxus and other chordate clades that indicate a possible role in the evolution of paired fin appendages. Edna Davion described nocturnality in birds, which is a relatively uncommon trait in the group, and discussed its implications for the evolution of opsin genes. In a sobering presentation, Hussein Al-Asadi discussed how substitution rate heterogeneity can lead to high false positive rates in Dn/Ds based tests of positive selection. These positive selection tests form a major methodological component in many published papers on adaptive molecular evolution. To wrap up the morning sessions, Tim Sosa described how he combines molecular, morphological, and biogeographic approaches to understand the historical pattern of northward invasion by South American freshwater fishes after the formation of the Isthmus of Panama.

We then broke for an hour long lunch, during which there was much conversation, merriment and appreciation for the scenic beauty of the gardens on this fine spring day. After the break, Stewart Edie turned to bivalves to explain the necessity of understanding historical relationships to help detect the signature of character displacement or species sorting in modern populations. These mostly sessile but indubitably charismatic mollusks also starred in the following talk. Jonathan Mitchell discussed the dynamics of lineage survival and extinction in bivalves across the Cretaceous-Paleogene boundary. Peter Smits presented many equations in his talk reflecting his hierarchical bayesian models, which allow him to pinpoint if certain species traits affect extinction risk. In mammals, it is “very good to be a generalist,” something many of the participants displayed at lunchtime. Things took a turn for the microscopic, as Marites Villarosa Garcia described the biogeographic patterns of a group of calcium-carbonate-armored unicellular algae called the Coccolithophores. She seeks to understand if regional morphological disparity correlates with species diversity in these planktonic organisms.

After a thirty minute break, Chris Schell wowed us not only with adorable coyote pup pictures, but also with data showing that high-stress coyote mothers and fathers remain stressed from pre-partum to post-partum and from first litter to second litter, but individual fathers' levels of testosterone decrease over time. Next, Courtney Stepien gave us a quick lesson in how seaweed species utilize carbon in two forms - carbon dioxide and bicarbonate. The relative availability of these two carbon sources and species differences in carbon uptake efficiency play a role in structuring seaweed communities. Her research may help give us insight into what we should expect in an ocean that is currently becoming more acidic. Katherine Silliman presented her current and future use of population genomics to understand population divergence in Olympia Oysters, and perhaps detect cases of re-invasion, such as the potential one in the Puget sound population. In the final talk, Nicole Bitler presented her snail-collecting journey up the West coast of North America. She seeks to understand how range expansion, local adaptation and reduced gene flow have produced measurable morphological differentiation in shell shape in two intertidal snails.

In conclusion, the research spotlighted at the GAANN retreat 2015 revealed the disciplinary breadth, dynamism and high caliber of graduate research in the Darwinian Sciences cluster at the University of Chicago. We would like to extend our thanks to the Chicago Botanic Garden for hosting this symposium and to the faculty, staff, and students that made this event possible.