Title: Trait divergence and speciation: Tempo, mode, and mechanism

Organizers:

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Ben Winger, University of Michigan, wingerb@umich.edu

Speakers and talk titles:

1. **Ben Winger**, Univ. of Michigan: Consequences of secondary gene flow for trait divergence in Andean birds
2. **Jay McEntee**, Univ. of Florida: Tempo and timing of ecological trait divergence in bird speciation
3. **Sara Lipshutz** (slipshut@tulane.edu) or **Elizabeth Derryberry** (ederrybe@tulane.edu), Tulane Univ.: Song as a reproductive isolating mechanism in a hybrid zone of two White-crowned Sparrow subspecies.
4. **Nick Mason** (nicholas.albert.mason@gmail.com), Cornell Univ.: Phenotypic evolution and diversification among tanagers (Thraupidae) at multiple evolutionary scales
5. **Haley Kenyon** (haley.kenyon@queensu.ca), Queens Univ.: Why do avian signals differ in sympatry?
6. **Jason Weir** (Jason.weir@utoronto.ca), Univ. of Toronto: Evolutionary rates of passerine pre-mating isolation across latitudinal gradients

Symposium type: Half-day, afternoon, regular-style talks

Description Understanding how traits diverge, especially during speciation, has long been a fundamental issue in evolutionary biology. There are many issues that remain unresolved for most of bird diversity. Does social/sexual selection or local adaptation more commonly drive trait divergence during speciation? How fast does trait divergence happen across the avian tree of life in different geographic theatres? Does trait divergence precede or follow secondary sympatry? Though these issues have always been of central importance in evolutionary biology, recent years have brought a flood of new insight to these questions from studies in molecular ecology, phylogeography, and macroevolution. The main objective of this symposium would be to communicate and synthesize the progress that has been made on these subjects. We would seek to achieve this main objective by 1) establishing what the current viewpoints on the subject are; 2) providing information on the array of methodologies currently being used to investigate pertinent questions; 3) identifying the most pressing conceptual issues in making future progress; 4) identifying the resources that investigators need to make progress; and 5) giving researchers, especially early-career investigators, a forum to share recent findings and discoveries.

The advantages to investigating these questions in birds are myriad, but among the most important advantages are 1) that bird species-level diversity is relatively well characterized, which provides important context for studying trait divergence, and 2) there is a long history of studying trait divergence across scales of avian biological organization and diversity. The latter is important because understanding trait divergence along the speciation continuum involves reconciling apparently conflicting results between scales. For example, several recent genomic studies of young hybridizing taxa indicate that only a small number of loci are sometimes involved in phenotypic divergence among incipient species, but it remains unclear whether broader, multifarious genomic and phenotypic evolution is necessary for the completion of speciation. Population-level studies across animals have suggested that stasis or bounded evolution are the norm for quantitative traits over shorter time scales, yet instances of rapid trait divergence of magnitudes typical of species differences have occurred over timescales on the order of thousands of years or less. This conflict has been noted across diverse taxa, but one that we are especially well poised to address in birds because of the ease and history of population-level studies, the successful characterization of so much geographic variation, and the tools to perform phylogenetically informed macroevolutionary studies.

In lining up speakers for the event, we have endeavored to achieve a balanced gender mix, and have investigated recent literature to seek potential contributors who could provide perspectives from underrepresented groups.

Rationale We believe this symposium would be of broad interest to the ornithological community. In addition to the many relevant recent papers, a recent perspective piece in PNAS (Zamudio et al. 2016) has highlighted that there is a treasure trove of relevant data from phylogeographic studies to exploit in making inferences about the timing, mode, and mechanism of phenotype evolution. We suggest that this symposium will remind researchers of the value of collecting high-quality phenotypic data while pursuing genetic/genomic or ecological studies, and will also remind researchers to maintain organismal perspectives on bird evolution during the era of advanced genomic techniques. Lastly, gaining further understanding of the tempo of phenotypic divergence in particular may help to shed light on how birds may respond to rapid global change. Synthesizing our understanding of trait evolution across multiple scales (populations, geographic variation, species, etc.) may provide us with greater insight than examining one scale in isolation.

Reference:

Zamudio, K.R., Bell, R.C. and Mason, N.A., 2016. Phenotypes in phylogeography: Species' traits, environmental variation, and vertebrate diversification. *PNAS*, *113*(29): 8041-8048.