The Department of Ecology and Evolutionary Biology Spring 2018 Seminar Series

Getting to the good stuff: bioinformatics answers for a few hard speciation questions

Traditional bioinformatics methods have mostly been ill equipped when applied to closely related, non-model species of insects given their confounding genomic features and the need for more coverage and/or samples. In this talk I will present published work on apple maggots (Rhagaletis; Ecology Letters) and malaria mosquitoes (Anopheles; 2X Science) and focus on how my group overcame these issues in unique ways. Because identifying sequence-based markers is highly valuable for characterizing field samples and ultimately helping understand speciation, I will also discuss recent work in my group on predicting ecotype-correlated inversions, including a novel interpretation of association mapping/testing. This new genomic approach can assign a p-value to observed differences while more effectively modeling heterozygous alleles. When applied to the most ecologically important arm of Anopheles gambiae, the most, third most and fifth most significant position among 522 significant predictions ($p<0.01$ after correction) were located within the strongest region of differentiation: an insecticide resistance gene (Rdl) with different compensatory mutations. Further, these significant loci mostly cluster at well-characterized inversion breakpoints even though only one analyzed species is fixed for the inverted karyotype. Consistent with prior work, over 1,600 single base differences (SNPs) were 100% different between populations and highly noisy; only 20 were uncovered under our model, including the most significant ones in Rdl. If there is time, I will conclude with some ongoing unrelated work hoping that our broad bioinformatics expertise could be useful in seeding new collaborations.

Join us in welcoming
Dr. Scott Emrich
Tickle College of Engineering
University of Tennessee

Friday, January 19, 2018
SERF 307 - 3:30 PM
Pre-talk Reception 3:00 PM in Dabney 575