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Prof. Daniel Cadena, Universidad de los Andes, Colombia.

Switches in Migratory Behaviour, Asynchrony of Breeding Seasons, and Speciation in the Neotropics

An adequate understanding of tropical biodiversity requires linking ecology and evolutionary biology to consider mechanisms promoting species coexistence as well the influence of processes of speciation, extinction, and dispersal. I will present examples of my studies on biogeography and speciation of Neotropical vertebrates to illustrate historical processes that may have led to their high diversity, focusing on analyses testing whether evolutionary differentiation of populations of birds may be caused by changes in migratory behaviour or breeding seasons. Dominant paradigms in tropical speciation research emphasize the role of physical barriers and of changes in the landscape as main drivers of speciation. Our work shows that switches in behaviour potentially mediated by phenotypic plasticity as well as spatial variation in breeding phenology in response to contemporary climate may also lead to population differentiation and to the buildup of diversity in the tropics.

Prof. Janette Boughman, Michigan State University, USA.

The ecological stage maintains preference differentiation and promotes speciation

Observations of divergent sexual signals and mate preferences among closely related species contrast sharply with influential theoretical models of speciation by sexual selection, which posit a single shared preference for a single display trait expressed only when males are locally adapted and hence in high condition. We present a novel hypothesis to address this disconnect, built on empirical evidence that sexual selection depends on local ecological conditions and that categorically different types of signals may honestly indicate local adaptation in distinct environments. We develop a population genetic model whereby condition-dependent signals and preferences for them differ categorically between closely related species inhabiting distinct environments, for example a signal and preference for red color instead of large size. Separate loci control female preference in each of two populations (*e.g*., locus for color preference and locus for size preference), and separate loci control the male displays (*e.g*., locus for color and locus for size). This makes our model more realistic than many previous models. We find that under fairly broad conditions, female preference differentiation can be maintained upon secondary contact, keeping hybridization low and fostering reproductive isolation. Divergence occurs because display trait expression depends on male condition and local ecology, and the primary selective agents differ between environments, favoring different indicator traits and preferences. Preference differentiation occurs with, and even requires, modest search costs. Moreover, preference divergence can occur from standing variation, and is facilitated when male traits are also newly-diverging, broadening the biological contexts in which our model could apply. Our model points to a widespread way in which ecological and sexual selection may interact to generate new species. Given the ubiquity of ecological differences among environments, our model could help explain the evolution of striking radiations of display traits seen in nature.