

Biology Seminar



Western
UNIVERSITY · CANADA

12:30 - 1:30 pm
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BGS 0153



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The evolution of complex courtship traits: covariation and interactions between hummingbird displays, plumage, and color appearance

Animals have evolved a diversity of signaling traits, and in some species, they co-occur and are used simultaneously to communicate. Although much work has been done to understand why animals possess multiple signals, studies do not typically address the role of inter-signal interactions, which may vary intra- and inter-specifically and help drive the evolutionary diversity in signals. I tested how angle-dependent structural coloration, courtship displays, and the display environment interact and co-evolved in hummingbird species from the “bee” tribe (Mellisugini). Most “bee” hummingbird species possess an angle-dependent structurally colored throat patch and stereotyped courtship (shuttle) display. For 6 U.S. “bee” hummingbird species, I filmed male shuttle displays and mapped out the orientation- and position-specific movements during the displays. With such display paths, I was able to then recreate each shuttle display in the field by moving plucked feathers from each male as if they were displaying in the field, in order to measure each male’s color appearance during their display (i.e. the interactions between male hummingbird plumage, shuttle displays, and environment) from full-spectrum photographs. I tested how these interactions varied intra- and inter-specifically, and which of these originating traits might explain that variation. I first found that the solar-positional environment played a significant role in explaining variation in male color appearance within two species (*Selasphorus platycercus* and *Calypte costae*), and that different combinations of color-behavior-environment interactions made some males (in both species) appear bright, colorful, and flashy (i.e. their color appearance changes throughout a display), while other males maintained a consistent (non-flashing) color display. Among species, I found that plumage flashiness positively co-varied with male display behaviors, while another measure of male color appearance (average brightness/colorfulness) co-varied with the feather reflectance characteristics themselves. Additionally, species that had more exaggerated plumage features had less exaggerated shuttle displays. Altogether, this work illustrates the complexity of multiple signal evolution and how color-behavior-environment interactions are vital to understanding the evolution of colorful and behavioral display traits.

