

## **Bird colors as signals of health and sexual attractiveness**

Our lab investigates the mechanisms and functions of brilliant coloration in birds. We determine how species use bright colors as a means of communicating to conspecifics their potential worth as a mate or their ability to compete for access to food, space, or mates. We also identify the means by which birds acquire these colors (e.g. the use of different types of pigments) and the nutritional, immunological, and energetic difficulties that individuals face trying to acquire the richest colors. The ability of birds to show their 'true colors' and meet these physiological and health-related challenges ultimately determines their mating success.

We are currently studying a local songbird species-the house finch (*Carpodacus mexicanus*)-in which males display colorful and sexually attractive carotenoid-based plumage pigmentation. Carotenoids are known to play important antioxidant and immunomodulatory roles in many animals, and thus individuals who accumulate more of these molecules that are derived from the diet may in fact be healthier and thus serve as better mates. This has yet to be demonstrated in any species of wild bird, however.

A sophomore or junior undergraduate student will participate in field and/or laboratory studies testing the relationship between carotenoid pigments, health, and coloration in house finches. Field research will include trapping finches at local bird feeders, drawing blood for laboratory analyses, and measuring the intensity of feather coloration using reflectance spectrophotometry. Laboratory work will involve quantifying levels of antioxidant carotenoids in blood samples using liquid chromatography, testing the strength of finch immune systems by assaying the bacterial-killing properties of immune cells in the blood, along with conducting experiments on caged finches where dietary carotenoid levels are manipulated and their effects on immunocompetence examined. Applicants should have a general educational background in biology and chemistry and an interest in ecological, evolutionary, physiological and/or immunological research; they will be trained in all field and laboratory techniques by members of our lab. Students will be expected to work no less than 10 hours per week on this project; this includes background readings, actual field/lab research, and attendance at weekly lab meetings where we discuss our own research and other topics on bird coloration. The convenience of working on a campus population of birds and the multi-dimensional nature of this project allow for flexible and long-term work on aspects of the project that most interest the student.

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