

Studying Mechanisms of Population Differentiation in Andean Birds

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The Tropical Andes region, where I conduct my field research, is an exciting place to work because it contains the largest diversity of plant and vertebrate species on Earth. This “biodiversity hotspot” includes the Northern Andes in Colombia, Ecuador, and Venezuela, and large portions of the Central Andes in Peru and Bolivia.

Although the Tropical Andes make up less than 0.7% of the earth’s surface, the part of the Northern Andes located in Colombia is home to approximately 20% of global avian fauna. During the six months I spent in Colombia in 2008, I obtained more than 800 samples of roughly 10% of the bird species in Colombia. Fieldwork is a fundamental component of my Ph.D. project at UCLA, which is focused on studying mechanisms of local population differentiation in Andean birds. Whether or not mechanisms of local population differentiation are mediated by gene flow is a central question that I am addressing using coalescent approaches to understand ecological and evolutionary processes in a region that is a top global conservation priority.



Left: *Flame-faced Tanager* (*Tangara parzudakii*). Right: *Glistening-green Tanager* (*Chlorochrysa phoenicotis*).

The aim of my study is to evaluate avian phylogeography in latitudinal and altitudinal gradients in the Tropical Andes. I will also be examining how past climatic fluctuations may have shaped phylogeographic patterns. To determine which mechanisms played a role in promoting population differentiation, I will be modeling the evolution of phenotypic traits, species distributions, and phylogeographic patterns.



Left: *View of the Andean highlands (3,000 m)*. Right: *Andean foothills (1,180 m)*.

An accelerated increase in global temperatures is creating a serious threat to avian populations in the Andean region. Studying past warming trends from the last time that the glacial sheets started retreating in the Northern Andes around 18,000 years ago will provide pertinent information that will greatly enhance our ability to predict responses to future climate change and assist conservation efforts.

Fieldwork in Colombia's rugged mountains, with their wide variety of climatic regimes, is far from simple. I was able to successfully obtain samples due to the participation of six outstanding and enthusiastic young Colombian scientists who voluntarily participated in eight fieldwork operations from the foothills up to treeline elevations. A number of local people assisted our research team, contributing their knowledge of the areas we visited. Everyone received training in bird sampling techniques, which will assist them in developing future research projects.



Left: Research team members R. Sedano, J. Posada, C. Certuche, and H. Rodriguez. Right: O. Cortes, D. Molano, J. Zuluaga, and C. Certuche. (Team members not shown: D. Lopez, N. Myleidi, C. Florez, A. Rodriguez, Y. Rosero, and J. Calderon.)

I am particularly grateful to the curators of the avian collections at the Instituto de Ciencias Naturales-Universidad Nacional de Colombia, the Universidad de Nariño, and the molecular biology laboratory at the Alexander von Humboldt Biological Resources Research Institute for giving me access to their collections. I was also assisted by two non-governmental organizations (NGOs), Grupo de Amigos para la Investigación y Conservación de las Aves (GAICA) and Grupo de Observadores de Aves del Tolima (GOAT), who invited me to give presentations on my research while I was in Colombia.

I will continue doing fieldwork during the next few years in the Northern Andes, and I look forward to developing collaborations with more NGOs and university students.

Photo credits: H. Rodriguez, J. Posada, and R. Sedano.