Ned K. Johnson Young Investigator Award, 2011

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Alice Boyle

Alice Boyle near Ithaca, New York, April 2010.
(Photograph by Lisa Kennedy.)

The Ned K. Johnson Young Investigator Award was created to recognize outstanding and promising ornithological research contributions made by persons early in their careers, with the hope and expectation that such individuals will provide future leadership in ornithology within and beyond North America. The AOU is proud to announce that the 2011 Ned K. Johnson Young Investigator Award goes to Dr. W. Alice Boyle, a postdoctoral fellow in the Department of Biology at the University of Western Ontario, where she has worked with Chris Guglielmo and Ryan Norris (another Ned K. Johnson Award winner, in 2006) since 2007.

Boyle conducts exciting and original research on the evolution and ecology of migration in birds. In her short career, she has already made significant contributions in her field. During her Ph.D. work, Boyle sought to understand the ecological and behavioral characteristics of tropical migrant species that made them the evolutionary precursors for long-distance temperate migrants. She made great progress in this area and elegantly tested long-standing hypotheses using extensive phylogenetic comparative analyses. She then conducted a series of detailed (and arduous) field studies in Costa Rica on altitudinal migration. It was there that she tested competing hypotheses about the ecological factors that contribute to the evolution of migration between high-elevation breeding areas and low-elevation non-breeding areas. Using artificial nests, she was first able to rule out the hypothesis that high nest-predation risk at low elevation leads to migration. What she found next was even more interesting. It had long been held that because most altitudinal migrants are frugivorous or nectarivorous, their movements must track the availability of fruits and flowers. In a massive study of seasonal fruit production, Boyle found that migrants leave high-elevation sites in the rainy season despite there being greater food availability higher up than down slope. These findings led her to formulate the "limited foraging opportunity" hypothesis, which posits the novel idea that severe multiday rain events at high elevations can reduce the foraging ability of birds, such that they have lower apparent food availability and migrate to avoid these bottlenecks. This new perspective was a major

shift in thinking about tropical migration and foreshadows important consequences of climate change.

Boyle's other studies have contributed solid support for the limited foraging opportunity hypothesis. While working in Costa Rica, Alice discovered that the White-ruffed Manakin (*Corapipo altera*) is a partial migrant (i.e., only some individuals in the population migrate) and that migration is sex- and condition-dependent (males and low-condition individuals of both sexes are more likely to migrate). Her postdoctoral research has been directed at the ecological, behavioral, and physiological mechanisms that maintain partial migration in this species. She has learned a variety of new approaches, such as using physiology to understand condition-dependent behavior, and stable isotope analysis of claws to infer altitudinal movement history. Her first paper from this work definitively showed that the arrival of major rainfall events causes the down-slope migration of manakins and that there are significant physiological costs to individuals that remain at high elevation. This study was published as a cover story in the *Proceedings of the Royal Society B*. It also resulted in widespread press coverage in *Science Now* and the Canadian Broadcasting Corporation's weekly national science radio show "Quirks and Quarks." The second part of the study, now in review at *Biology Letters*, shows for the first time a direct fitness tradeoff between reproduction and migration in birds. Male manakins that migrate down-slope in the rainy season pay a reproductive cost by losing their status at lekking logs. Males that remain at high elevation (and risk perishing) benefit by increasing their status at lekking logs, and attract and mate with more females. We are very excited about these findings, which are a major contribution to our understanding of the evolution of migration in birds.

This past spring, Boyle initiated a new collaboration with David Winkler at Cornell University to study interactions among migration arrival date, physiological condition, and reproductive performance in Tree Swallows (*Tachycineta bicolor*). She is using novel methods, such as magnetic resonance body composition analysis and plasma metabolites, to understand how arrival condition and severe weather events affect reproductive investment by adults and growth allocation in nestlings.

Boyle's work integrates advances from the fields of ecology, physiology, and behavior to answer evolutionary questions. Thus, her work is filled with strong empirical data that fit together into a theoretical context. Furthermore, there is a very real application of her findings. As climate changes, the incidence and severity of rainfall in the tropics are predicted to change from current patterns. Because many altitudinal migrant birds are frugivorous, they are the major seed dispersers for woody plants in tropical communities. Changes in rains will likely alter the movements of these birds and change the ecosystem functions they serve. Her work will have far-reaching implications for both basic and applied research in ornithology.

Alice Boyle has already established a strong record of accomplishment, and her reputation will continue to grow. The AOU believes that her body of work is exemplary, showing how a promising researcher skillfully uses birds to study important basic and applied questions in ecology and evolution. She is therefore the recipient of the Ned K. Johnson Young Investigator Award.

Award criteria.—The Ned K. Johnson Young Investigator Award recognizes outstanding and promising work by a researcher early in his or her career in any field of ornithology. Candidates should excel in research and show distinct promise for leadership in ornithology within and beyond North America. Each candidate is required to have received a doctorate degree within 5 years of being nominated and must be a member of the AOU at the time of nomination. Candidates cannot have received the award previously. The award consists of a framed certificate and an honorarium provided through a gift to the endowment of the AOU honoring Ned K. Johnson, a lifelong supporter and former president (1996–1998) of the AOU. This award, presented for the first time in 2005, is funded by the Ned K. Johnson Fund of the AOU.