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RTD10 Life history strategies of tropical and temperate birds

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1 Issues

Traditionally, temperate breeding birds, especially passerines, were thought to have life history strategies characterized by low annual survival rates, high reproductive rates and early maturity, while tropical birds had high survival rates, low reproductive rates, protracted parental care, and delayed breeding. These differences have been attributed to differences in seasonality of food supply, migratory behavior and rates of nest predation. Recent studies suggest, however, that the pattern is more complex. Karr et al. (1990; American Naturalist 136:277–291) found that survival rates of tropical birds in Panama, based on capture-recapture estimates, were no higher than those in a suite of species breeding in North America. Several subsequent capture-recapture analyses from other tropical areas found higher survival rates than those in Panama, but nevertheless provided estimates lower than expected from life history models. At the same time, many north temperate breeding species have been found to have higher adult survival rates than previously assumed. Recent work also suggests that latitudinal variation in nest predation cannot explain clutch size patterns, counter to long-standing beliefs (Martin et al., 2000; Science 287: 1 482–1 485). Furthermore, south temperate breeding species in Africa, Australia and southern South America appear to have life history traits that more closely resemble those of tropical birds. Thus, despite clear latitudinal gradients in clutch size from north temperate to tropical regions, supposedly associated traits, such as survival and predation, do not co-vary in such a simple way, obscuring the definition of differences in life history patterns and their causes.

Accordingly, we convened an RTD to review current knowledge on geographic variation in life history traits and to identify research priorities in the field. The session, which was attended by researchers from around the world, led to a focus on several key questions:

(1) Are tropical-temperate life history strategies a result of a trade-off between survival and reproduction, or are these parameters largely constrained independently by external factors such as food supply and predation?

(2) How important is dispersal, both of young and adults, in the demography of tropical species?

(3) What factors influence the evolution of clutch size in tropical birds?

(4) How does the unpredictability of environments, especially for xeric species, affect avian life history strategies?

(5) How much can be understood about demographic patterns from periodic mist-netting and banding, as opposed to long-term observational studies of marked birds?

2 Outcomes

The discussion highlighted the need for further field research to address some of these questions. It was felt particularly important to gather more information on the following:

(1) geographical variation in the availability and seasonality of food, particularly invertebrates, and the impact of food supply on clutch size

(2) heritability of clutch size in tropical species

(3) changes in demographic parameters of species that have been introduced into new environments

(4) metabolic rates of tropical birds in relation to energetic requirements

(6) natal and breeding dispersal of tropical birds, including how this differs between sexes and after mate loss

(7) estimates of age-specific survival rates (both breeding and out-of-breeding), based on multiple methods from the same population (e.g., capture-mark-recapture, and resightings of color-marked birds)

(8) annual variation in survival rates and dispersal of tropical birds in relation to environmental factors, such as El Nino events

Long-term studies that consider many factors simultaneously (e.g. food availability, clutch size, survival) are clearly needed to address many of these questions, particularly to understand the impact of supra-annual variation on demographic parameters.