

Ketterson / Nolan Research Group Collection

This document is part of a collection that serves two purposes. First it is a public archive for data and documents resulting from evolutionary, ecological, and behavioral research conducted by the Ketterson-Nolan research group. The focus of the research is an abundant North American songbird, the dark-eyed junco, *Junco hyemalis*, and the primary sources of support have been the National Science Foundation and Indiana University. The research was conducted in collaboration with numerous colleagues and students, and the objective of this site is to preserve not only the published products of the research, but also to document the organization and people that led to the published findings. Second it is a repository for the works of Val Nolan Jr., who studied songbirds in addition to the junco: in particular the prairie warbler, *Dendroica discolor*. This site was originally compiled and organized by Eric Snajdr, Nicole Gerlach, and Ellen Ketterson.

Context Statement

This document was generated as part of a long-term biological research project on a songbird, the dark-eyed junco, conducted by the Ketterson/Nolan research group at Indiana University. For more information, please see IUScholarWorks (<https://scholarworks.iu.edu/dspace/handle/2022/7911>).

License/Disclaimer Statement

By downloading this document or using any information contained therein, you agree to the license terms outlined at <https://scholarworks.iu.edu/dspace/handle/2022/15257>, which explain terms governing use, creation of derivative research, and requirements for citing the document.

GOALS 98, April 28, 1998

Each year we prepare and monitor the study area by creating T- and C-males, thereafter following their relative reproductive success and survival. This work, done by the group as a whole, allows us to monitor annual variation in the impact of testosterone on components of fitness (EPF rates, predation rates, survival of adults, mass of nestlings at fledging, etc.). To this end, we all implant birds, map territories, find nests, bleed band and weigh nestlings, enter data into the computer, and take a hand at the daily list.

Each year we also pursue sub-projects that serve to document the multiple effect of T on the phenotype. These often lead to publishable papers or lay the groundwork for future studies.

In 1998, we will continue to quantify effects of testosterone on male behavior and physiology and their relationship to fitness. We will also measure aspects of the male's 'extended phenotype' in his neighbors, mate, and offspring. Simultaneously we will analyze demographic and other kinds of data collected since 1994.

Listed here are possible projects for the summer, not all of which we will be able to pursue. Much will depend on how many birds we implant, whether predators are abundant this year, and the interests of members of the crew. Projects marked with ** are must do. Those followed by an @ are tentative or on hold. Please read the list and offer suggestions.

I. Male phenotype: Susceptibility to disease and survival

- (1) Compare treatments with respect to cell-mediated and humoral immunity in captives and cell-mediated immunity only in free-living juncos. Will measure response (swelling) to a foreign protein beginning with a sensitization injection at time of implant and the ability to agglutinate sheep red blood cells (Casto). **
- (2) Pursue efforts to compare treatment groups for blood profiles, hematozoa, coccidial infections, refined measures of condition, and/or ectoparasites. @
- (3) Compare levels of corticosteroid binding globulin (CBG) in free-living T- and C-males by collecting plasma at nest-leaving. @

I. Male phenotype: Mating effort, parental effort, and reproductive fitness

- (1) Document link between T- and C-males and offspring as described in grant proposal. Compare response of recently captured males with nestlings to tape-recorded calls of young. Tentatively, see whether some response (e.g., tendency to gather food, activity level) differs according to whether young were fed or deprived when recorded [coordinate with Casto?]. **
- (2) Compare treatment males for flexibility in their response to mating and parental opportunities by observing their behavior at their nests when there are fertile females in the

neighborhood or when their broods have been enhanced in size. [coordinate with Neudorf?]. Possibly compare the response of recently captured parental males to offspring vs. an estrogenized female. @

- (3) Compare treatment males for copulation frequency: do sperm reserves re-fill more rapidly in T- than C-juncos? Are T-males more likely to mount a stuffed female either in captivity or in the field? @

II. Extended phenotype: females

- (1) Impact of mate's treatment on movements by females when they are fertile (Neudorf).**
- (2) Impact of male's treatment on female egg dimensions and mass. Incubate eggs to see whether elevated progesterone in the last egg accelerates hatching. Perhaps collect plasma hormones nest-building and laying females. Perhaps attempt to document any treatment-related differences in incubation behavior or degree of hatching asynchrony. @
- (3) Impact of male's treatment on sex ratio of female's offspring. Probably will require measuring survival during the fledgling stage. **

III. Extended phenotype: offspring

- (1) Complete an earlier project by comparing vocalizations of fed and deprived nestlings from T- and C-nests, especially with respect to duration and amplitude of begging.** Obtain footage of parental behavior at the nest while determining whether one group of males is more responsive to begging calls than the other. @

IV. Establish colony in Bloomington

- (1) Males caught for the captive portion of Joe's work and females caught for KJ's mate choice studies will be transported to Bloomington to help found a colony of juncos there.** In addition, we may try to hand-rear fledglings for later transport to Bloomington to lay groundwork for measures of heritability of T and T-mediated traits. @

V. Demography and data analysis

- (1) Continue to compare treatments with respect to reproductive success, including paternity.
- (2) Analyze data from nest watches from 96 and 97, evening, inter-feeding intervals (IFIs).
- (3) Demographic data, 94-present, return rates of adults and young, mate fidelity, fledgling mass and numbers, annual variation in rates of predation, opportunities for EPFs, etc.

- (4) Keep up with USFWS banding schedules, fitness correlates sheets, and other summary sheets as we go.
- (5) Compare tail white measurements in males that return from having been T- and C- in a previous year. Compare hematocrit. Compare molt in males whose implants were not removed. Compare pox.

VI. Possible additional sub-projects @

- (1) Assess importance of early condition to later fitness by obtaining plasma hormone samples from juveniles to see whether cort or T predicts which return.
- (2) Measure begging response of hand-reared young to simulated treatment-specific feeding schedules. Would require analyzing data already collected that compare T- and C-males for the schedules on which they feed their young.
- (3) Attempt to document natural co-variation between control levels of plasma T and behavior. Attempt to determine repeatability of plasma T levels within control individuals across conditions and similarities in T-levels among relatives.
- (4) Does experience with having been mated to a T-male affect whether a female finds T-males more attractive than C-males?
- (5) Compare attractiveness of T- and C-males to females when males have been temporarily muted (by piercing air sac).
- (6) Etc., etc., etc.