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).

GOALS 98.2, April 28, 1998, revised May 10,1998

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. For cell-mediated immunity we will measure response (swelling) to a foreign protein beginning with a sensitization injection at time of implant. For humoral immunity we will measure agglutination of sheep red blood cells (Casto). **

(2) Pursue efforts to compare treatment groups for blood profiles, hematozoa, coccidial infections (including response to late-season stress of captivity), refined measures of condition, and/or ectoparasites. @

(3) Compare levels of cortiocosteroid binding globulin (CBG) in free-living T- and C-males by collecting plasma at nest-leaving. @

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

(1) Make progress on documenting link between T- and C-males and offspring as described in grant proposal. To establish procedures,we can work with birds on 714 as well as the study area.

(2) Lots of possibilities: Compare treatment males for load size, actual feeding behavior at the nest, response to playback, response to temporary female removal. Video probably required

for load size or actual feeding. Compare treatment males for flexibility in their response to mating and parental opportunities by observing their behavior at the nest before and after there is a fertile female in the neighborhood [coordinate with Neudorf] or before and after their broods have been enhanced in size. Possibly compare the response of recently captured parental males from 714 to tapes of begging calls, then return to field @

(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? [coordinate with Neudorf]@

III. 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 and to the extent possible, degree of hatching asynchrony. Incubate eggs to see whether elevated progesterone in the last egg accelerates hatching.** Perhaps collect plasma hormones nest-building and laying females.@

(3) Impact of male's treatment on sex ratio of female's offspring. Will require measuring survival during the fledgling stage. **

IV. 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. @

V. 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. @

VI. 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.

VII. 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.