



## Patuxent Wildlife Research Center Science Brief for Resource Managers

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## Endocrine baseline values in songbirds and a cowbird-host comparison

### Description:

EPA and DOI have made it a priority to investigate how environmental contaminants may mimic vertebrate hormones and compromise endocrine functions at several life states, including embryonic development, sexual differentiation, mating behavior, and reproduction. One major component of endocrine disruptor research is the establishment of baseline endocrine values at key life stages so that future contamination can be recognized. Songbirds are one group for which almost no baseline data exist. We propose to measure levels of testosterone and estradiol in eggs of 10 songbird species collected in the eastern, central, and western US. One of the species we will study is the brood parasite, the Brown-headed Cowbird, and we propose to compare relative hormone levels in cowbirds and their hosts. Conservation biologists have identified a mechanism that may explain why brown-headed cowbirds are so successful and may also identify which species are most at risk. Ornithologists have long been aware anecdotally that cowbird chicks are particularly aggressive and competitive at feeding time (Friedmann 1929, Nice 1937, Payne 1977). However, until recently there was no quantitative behavioral study of competition between cowbird and host nestlings similar to the many within-species studies that established the importance of begging vigor and feeding hierarchy to chick survival (e.g. Hahn 1981, Smith and Montgomerie 1991, Price and Ydenberg 1995). Now Lichtenstein and Sealy (1998) have used video cameras at the nests of yellow warblers to document that brown-headed cowbird nestlings were fed significantly more often than host chicks due to their greater begging vigor and more frequent begging calls. Concurrently, Schwabl (1993, 1996, 1997) discovered that female canaries deposit increasing levels of testosterone in successive eggs in a clutch, such that the fourth egg contained a dose level three times the level in the first egg. Schwabl also manipulated testosterone levels and showed that

level of testosterone is directly related to three traits that fundamentally affect survival: the begging vigor, rate of growth, and relative dominance as a juvenile (see OConnor 1984, Ricklefs 1994). We propose to examine whether this mechanism is also the basis for the unusual competitiveness observed in cowbird nestlings. Our proposed study is the first to examine whether such differences in embryonic hormone levels are exploited between species. We hypothesize that the brood parasitic cowbird uses this hormonal mechanism to give its offspring behavioral dominance.

### Progress to Date:

1) Data collected during field seasons in 2000 and 2001. First radioimmunoassays conducted on yolk samples, winter 2000. 2) Results analyzed statistically, and draft manuscript prepared. Results showed (i) similar hormone levels in all cowbird populations regardless of geographic region; and (ii) significant differences between cowbirds and two of five host species. 3) Manuscript on first dataset submitted to *J. Avian Biology* March, 2002. 4) Second set of radioimmunoassays scheduled for completion summer 2003.

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