

DISSERTATION ABSTRACTS

EGG QUALITY, NESTLING DEVELOPMENT AND DISPERSAL IN THE SPARROWHAWK (*Accipiter nisus*)

This study examines some aspects of egg quality [egg mass, shell thickness and strength, egg composition, porosity and pollutant levels (DDE, PCB, HEOD and Hg) in the egg content] and the relationships between egg mass, nestling development and dispersal. I examined eggs in 139 Sparrowhawk (*Accipiter nisus*) nests in Rockingham Forest, Northamptonshire, in 3 yrs; 78 of the clutches were studied during the incubation period and 47 during the nestling growth period; 33 radio-marked young were studied during the post-fledging period.

Eggs with cracked shells lost significantly more water than non-damaged eggs and failed to hatch. Water loss was positively correlated with log DDE level and was negatively correlated with shell thickness and Ratcliffe index. Shell thickness, Ratcliffe index and shell strength were all negatively correlated with pollutant (DDE, PCB, HEOD, Hg) levels. PCB levels accounted for a small, but significant, part of the variance in shell thickness, index and strength over and above that explained by DDE alone.

During an egg removal experiment, individual females laid up to 13 eggs. Results showed no evident decline in any of the egg components (shell mass, yolk and albumen) in the first 5 eggs. However, the quality of later eggs was poorer, especially in the amount of yolk and shell. In addition, the last egg in normal clutches tended to be lighter than the average of all previous eggs and the younger nestling had the lowest rate of tarsus growth.

Growth rates and final tarsus length were greater in young which hatched from large eggs than in young which hatched from small eggs. These results were supported by 2 independent experiments: (a) swapping experiment, in which some of the young from clutches with small eggs were exchanged with some others in clutches with large eggs, and (b) hand-rearing of young from different-size eggs. In addition, the second experiment showed that food consumption of males was correlated with the size of the eggs from which they came and that females consumed significantly more food than males. While males showed no differences in growth between years, in a poor year females had lower growth rates with greater variance and smaller tarsi.

Behaviour of young during the post-fledging period is described. Females dispersed later than males, and young from broods with supplementary food dispersed at an older age than young from non-experimental broods. Dispersal age was negatively correlated with the rate of weight gain during the nestling period. The advantages of early dispersal are discussed, including post-fledging brood parasitism which was found among early dispersed young. **Frumkin, Ron. Wolfson College, Oxford, and Edward Grey Institute of Field Ornithology. Thesis submitted for the degree of Doctor of Philosophy, Michaelmas Term 1988.**

TRENDS IN GEOGRAPHIC VARIATION OF COOPER'S HAWK AND NORTHERN GOSHAWK: A MULTIVARIATE ANALYSIS

Geographic variation was analyzed in Cooper's Hawk (*Accipiter cooperii*) and Northern Goshawk (*A. gentilis*) to determine if they varied concordantly. Adaptive significance of the observed variation is discussed. There was good concordance for size variation. Largest birds were from extreme SW, and size decreased clinally toward the Pacific NW where smallest individuals of both species occurred. From the Pacific NW, Goshawks increased in size northward into Alaska. Wing loading was lighter in western than in eastern hawks which may reflect greater migratory status. Goshawk populations that are considered most migratory had longer wing tips. Longer-toed Cooper's Hawks were in the east and probably reflect greater proportions of avian prey in the diet. Alaskan Goshawks had shorter toes and longer hind talons which reflects diets higher in mammalian prey. Small hawks of the Pacific NW are likely adapted to penetrating the dense rainforest. Larger size in the SW is likely a response to intraspecific competition with northern migrants, a size shift in prey species, nest defense and Bergamnn's rule adaptations. Allen's rule was not supported by the data. **Whaley, Wayne H. 1988. Ph.D. Dissertation, Department of Zoology, Brigham Young University, Provo, UT 84602, USA.**