

The final chapter is entitled "Sexual Size Dimorphism and Feeding Ecology in Birds of Prey with Special Reference to Goshawk and Sparrowhawk." Three general categories of theories on sexual dimorphism are broached, namely, (1) niche-differentiation hypothesis, (2) ethological-function hypothesis, and (3) hypotheses emphasizing energetic advantages for efficient foraging during reproduction. These hypotheses each incorporate the main questions, Why do the sexes differ in size? Why do the species differ in the amount of dimorphism? Why is the female the largest? Opdam's discussion on the niche-differentiation hypothesis, for accipiters at least, concludes it is unlikely that for Goshawks and Sparrowhawks food will regularly be in short supply during the breeding season whereas during winter limited food may cause competition and reinforce size differences. His analysis supports the conclusion that bird-eating accipiters show the greatest dimorphism, and reptile, amphibian, or insect eaters least. Twelve forms of predominantly bird-eating accipiters had an average sexual dimorphism index of 15.8 percent, 12 forms with mixed prey choices an index of 12.4 percent, and 6 species of predominantly reptile, amphibian, insect, or small mammal eaters an index of 8.5 percent. Opdam then points out problems or exceptions to the three main hypotheses centered around the ethological function proposals for dimorphism and the four main hypotheses that argue for an energetic benefit to sexual dimorphism.

In conclusion, he postulates that for *A. nisus* and *A. gentilis*, and perhaps the entire genus *Accipiter*, the following four processes determine dimorphism: (1) intraspecific competition for food resulting in sexual size differences, (2) interspecific competition for food to help set limits to the amount of dimorphism, (3) different mortality rates resulting from intraspecific niche differences also helping to set limits to the amount of dimorphism, and (4) energetic factors setting limits to the amount of dimorphism. The one glaring error is the spelling *tung* for *tongue*, but this volume is certainly a contribution to the library of any serious student of falconiforms.

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## ABSTRACTS OF THESES AND DISSERTATIONS

### THE ECOLOGY AND STATUS OF THE HARRIS' HAWK (*PARABUTEO UNICINCTUS*) IN ARIZONA

#### *Abstract*

The Harris' Hawk was studied in Arizona from January 1976 to October 1977. Its past and present status and distribution are described. Where two separate populations once resided in Arizona, one now remains and occupies 3,880 sq km of the Arizona Upland subdivision of the Sonoran Desert.

Nests were built or old nests repaired from January to August, and eggs were set from mid-January to mid-August. Extra clutches were documented in fifty nesting ranges. Occasionally second clutches were laid before young of first broods were fledged. Fledging dates ranged from April to October. At nine locations active nests were .8 km apart, and at two locations nests were just .5 km apart. Within two study areas nesting density was 2.5 sq km per active nest. The mean distance between nests was 1.8 km. In 1977 Harris' Hawks reoccupied 91 percent of the nesting ranges used in 1976. More than two adults were observed at 46 percent of 227 nesting ranges.

Productivity was ascertained for 396 nesting attempts. The average clutch contained 3.16 eggs (range 1-5) and an average 1.62 young fledged per nesting attempt. Seventy-four percent of the nesting attempts were successful.

Food habits, mortality, and factors influencing frequency of double broods and the

timing and longevity of the breeding season are discussed. The pejorative implications of excessive disturbance to nesting birds, habitat loss, and electrocution mortality are discussed. Management recommendations are given.

*Literature Cited*

Whaley, W. H. 1979. The ecology and status of the Harris' Hawk (*Parabuteo unicinctus*) in Arizona. M.S. thesis, University of Arizona, Tucson. 119 pp.

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**ECOLOGY AND BEHAVIOR OF THE GYMNOGYNE (*POLYBOROIDES TYPUS*)**

Observations made during this study provided data on general nesting biology, parental behavior, and feeding ecology of two pairs of Gymnogyne or African Harrier Hawk (*Polyboroides typus*) throughout most of the 1978 breeding season. The nests were attended by at least one of the pair 98 percent of the daytime, with both parents participating in the 35-36-day incubation period. Changes in facial color and exchange of nesting material were apparently stimuli necessary for cooperative transfer of egg possession during incubation. After chicks had hatched, the male returned to the nest only to deliver prey to the female. Changes in male's facial color were also incorporated into food transfers. By the fourth week the female began hunting, and the male no longer approached the nest but transferred prey to her away from the nest site.

Four general hunting methods were used: low soaring, high soaring, perch hunting and canopy-ground hunting. Of 85 prey items identified during this study 33 percent were birds (primarily nestlings), 41 percent reptiles and amphibians, 15 percent small mammals, and 11 percent insects. Most prey can be characterized as defenseless or inactive at the time of capture.

The Gymnogyne is characterized by some specialized morphological adaptations: long, broad wings and tail; lightweight body; long tarsi; modified intertarsal joint; and a bare-faced, diminutive head. The unfeathered facial skin changes color ranging from light yellow to dark red. I hypothesize that these traits reflect behavioral adaptations relating to hunting and communication. The objectives of this study were to describe hunting strategies; identify prey captured; study behavior associated with changes in coloration of the adult facial skin (hereafter referred to as flushing); and describe parental activity and characteristics of the nesting cycle.

Prior to this study the most detailed record of the Gymnogyne was based on scattered observations in Kenya. Other reports in the literature are generally anecdotal. The Gymnogyne is most common in tropical western Africa, but its distribution includes sub-Saharan woodland habitats south to the Cape of South Africa (Brown and Amadon 1968).

*Literature Cited*

Thurrow, Thomas L. 1979. Ecology and behavior of the Gymnogyne (*Polyboroides typus*). M.S. thesis, Brigham Young University, Provo, Utah. 28 pp.

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