

## COMMENTARIES

### Differential Perch-site Selection by Color Morphs of the Red-tailed Hawk (*Buteo jamaicensis*): a Response to C. R. Preston

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Preston (1980) found that wintering Red-tailed Hawks (*Buteo jamaicensis*) in Benton County, Arkansas, divided into three morph classes (light, intermediate, dark), showed statistically significant differences in perch-site preferences. Light birds occupied open perches, but dark morphs more frequently were observed on perches characterized by dense cover. The author suggested an adaptive morph-perch association: morphs select perches that best conceal them from prey. Hypothetically, this significant association could be achieved either by an innate, morph-specific perch preference (natural selection) or by individual experience with perch-site-specific hunting-success (trial and error). The question as to how necessary it is for a hawk to be concealed from prey is left unanswered.

Another explanation I should like to propose is habitat imprinting, corresponding to the differential geographic breeding distribution of the hawk morphs wintering in Benton County. Imprinted habitat schemes could easily include perch-site characteristics. It often has been suggested that habitat imprinting might act on habitat choice in birds (Hildén 1965, Braestrup 1968, Immelmann 1969, Mazzucco 1974, Berndt and Winkel 1974). In fact, early experience with a certain substrate enforces a preference for it. This phenomenon occurs in insects (Thorpe 1945, Cushing 1971), in fish (Gilbert 1918) in amphibia (Wiens 1970), in birds (Klopfer 1963), and in mammals (Wecker 1963, Anderson 1973). These studies revealed enforcement for the "naturally" preferred habitat by learning. Preference for the naturally less-favored habitat could not be achieved (Wecker 1963) or was replaced by "natural" preferences after a short time (Klopfer 1963). To my mind, the imprinted characteristics of a habitat can fall only within the range of innate demands. They are profitable because they enable the animal to recognize a suitable habitat by a few (and simple) cues. Habitat traditions are a good explanation for the phenomenon that some species [e.g. Dunnock (*Prunella modularis*) in Central Europe; Mazzucco 1974] settle in different habitats in different regions of a geographic range, regions that are too small to allow strong genetic differentiation. A change of habitat traditions is likely to lead to spreading and to spatial expansions in birds (Peitzmeier 1949, Hildén 1965, Mazzucco 1974).

Habitat learning is probably limited to a certain period of the lifetime. It is not necessarily the habitat in which a bird is reared that will be preferred during a whole life. Such an early preference cannot be expected, because the young bird has hardly any active experience with its place of birth, where it is passively led and fed by the parents. Habitat imprinting probably takes place during the first independent movements of juveniles (passage?). Such may be the case with Red-tails. Eastern Red-tails are light-bellied, whereas western ones tended to be dark. If eastern and western hawks have different imprinted experiences with "optimal" perches, Preston's (1980) findings would be upheld. The "optimal" perch is, to my mind, not the one that best conceals the hawk from its prey, because concealment does not seem to be necessary when ground-living mammals are taken from above. Perhaps dark (western) Red-tails have learned to use lower, less-exposed perches for other reasons: to escape excessive heat, strong winds, etc. In my opinion, imprinting works quicker and more accurately than morph-specific selection toward the evolution of optimal perch-site schemes. Imprinting of certain habitat properties within a broad, innate, habitat scheme should be advantageous if an animal's environment is changeable. This is the case in most birds living in cultivated land.

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### Response to H. Czikeli

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I agree with Czikeli (1984) that, at first glance, habitat imprinting is an attractive explanation for differential perch-site selection by wintering Red-tailed Hawk color morphs. His argument, however, rests on the assumption that dark morphs and light morphs breed in geographical and/or ecological isolation from each other. Although it is true that *Buteo jamaicensis borealis*, the eastern subspecies, and *B. j. kriderii*, the midwestern subspecies, are essentially monochromatic (light-bellied), *B. j. calurus*, the western subspecies, and possibly *B. j. harlani*, the northwestern subspecies, are polychromatic. *Buteo j. calurus* is especially variable, ranging from very light-bellied to black (Taverner 1936, Bent 1937). Representatives of each subspecies overwinter in northwestern Arkansas. It is likely that many of the light morphs included in my study were of western origin, having fledged alongside dark morphs. Therefore, a significant difference in perch-site selection between light and dark morphs does not necessarily translate into a difference between eastern and western birds. I must also emphasize that I could find no differences among morphs with respect to habitat selection (Preston 1980), contrary to what might be inferred from Czikeli's argument.

Many questions raised by my original study indeed remain unanswered. For example, the critical information regarding ecological affinities of the various western morphs is not yet available. It would also be useful to know what proportion of the light-bellied hawks overwintering in Benton County, Arkansas are of western origin. Ongoing research may yield some of the elusive answers. In any case, Czikeli's comments appropriately underscore the need for critical inquiry regarding the ecology of hawk polychromatism. One of the goals of my original paper was to foster this inquiry.

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