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**Female Hooded Warbler plumage does not become more male-like with age.**—Dwight (1900:284-285) provided two hypotheses to explain the variable amount of black plumage in female Hooded Warblers (*Wilsonia citrina*): "The adult winter plumage . . . shows a variable amount of black about the head and throat. How much of the black is due to individual vigor and how much to successive postnuptial moults is a question not easily answerable. We know that some females in the breeding season are almost indistinguishable from males, and there are all sorts of intermediates from these mature birds down to those of the worn first winter dress, which are guiltless of black."

Dwight's description of the variable black coloration in adult female Hooded Warblers was apt, although we are not likely to accept his suggestion that female "vigor" is defined by comparison with the male plumage color. However, his suggestion that females might attain more melanism with each molt is often repeated. Chapman (1917:270) also suggests that the development of the "hood" in the female is dependent upon age.

Lynch et al. (1985) classified female plumages into 6 classes ranging from no black (class 0) to male-like in hood development (class 5). Class 5 females were rare, constituting about 1-6% of eighty museum skins examined, a figure reasonably representative of the proportion of this female plumage class in their field observations of wintering birds in Mexico. They suggested that this rarity of melanistic females would be predicted if females increase in melanism as they become older, and supports the hypothesis that female plumage melanism is age-related.

I tested the hypothesis that female Hooded Warblers become more melanistic with age

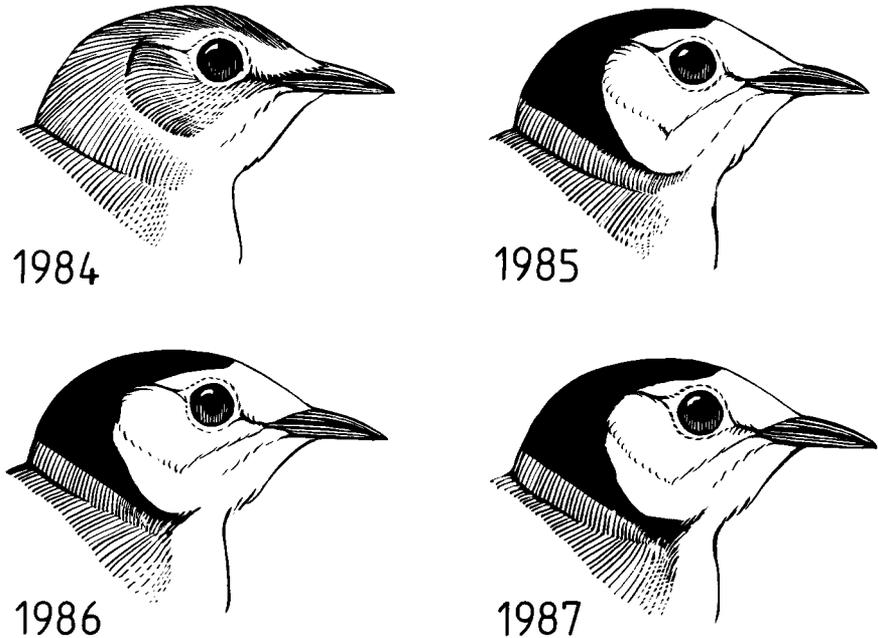


FIG. 1. Sketches of the same captive female Hooded Warbler over the first four years of life from photographs obtained in late September of each year. Although not shown, upon completing her fifth molt in 1988, she remained unchanged.

by maintaining five females in captivity for from one to five years. Four of the captive females were killed accidentally in June of their second calendar year of life, and before molting. The surviving captive female underwent the second prebasic molt, when the adult plumage is attained. This individual was photographed after each prebasic molt for the next three years. In addition, four wild females in adult plumage were recaptured after one to two years and their degree of melanism sketched in the field. The field observations were made in northwestern Pennsylvania, which was also the origin of the captive birds.

These observations showed that the degree of melanism does not increase with age in female Hooded Warblers. The five hand-raised females, after completing the first prebasic molt, were either devoid of black feathers (4) or had four black feathers scattered inconspicuously in the superciliary region (1). This conforms to the description for females in their first winter (Lynch et al. 1985). However, the surviving hand-raised female attained a class 2 plumage score which was then retained for the life of the bird (Fig. 1).

The recaptured wild females also showed no change with age. One remained class 4 when captured for two subsequent years. One class 3 had a slight outline of black on her throat when first captured. In two subsequent years, she retained this black outline but became neither more nor less melanistic. Two females captured in class 2 plumage had not changed upon recapture in one more year of life.

I conclude that these observations provide no support for the often cited hypothesis that melanism increases with age after the first prebasic molt in Hooded Warbler females. Instead,

the adult plumage is likely retained unchanged for the life of the individual. The biological significance of this highly variable adult female plumage is unknown but may be unique among passerines. The possibility exists that highly melanistic females select more male-like habitat in the nonbreeding season (habitats described in Lynch et al. 1985). In this case, the melanism might function as a threat and be displayed in aggressive situations, as is the case with males (Rappole and Warner 1980). However, more recent studies of territorial female Hooded Warblers in Mexico indicate that males and females prefer different habitat in the nonbreeding season and do not compete with each other for territories. Moreover, females exhibiting all plumage classes were seen in the same habitat (Morton et al. 1987). Furthermore, we found no evidence that subadult female plumage or degree of melanism exhibited by individual adult females was related to winter territory habitat quality, although this possibility needs further testing. The existence of both a distinctive subadult female plumage, a rarity among passerine birds (Stutchbury and Robertson 1987), and a highly variable adult female plumage, suggests that more study of the Hooded Warbler is warranted throughout its annual cycle.

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**The impact of male parental care on female Eastern Kingbird reproductive success.**—Male parental care generally is assumed to improve survival of nestlings and increase female reproductive success (fitness). Consequently, the need for male assistance is considered by some to be responsible for the evolution of monogamy when the investment of the male is