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### Dominance Structuring of a Red-winged Blackbird Roost: A Comment

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Weatherhead and Hoysak (1984) recently tested one aspect of Weatherhead's (1983) hypothesis concerning the structure of Red-winged Blackbird (*Agelaius phoeniceus*) roosts. They predicted that hatching-year (HY) males should be encountered in more vulnerable roosting sites in peripheral positions, over shallower water, and in sparser vegetation than after-hatching-year (AHY) males. The 1984 results are viewed as "consistent with the predictions." After reviewing the methods and results of Weatherhead and Hoysak (1984), I submit that this claim is not justified.

According to Weatherhead and Hoysak (1984), roost structuring is achieved through dominance of AHY over HY birds, dominance being expressed through aggressive displays. I see several difficulties with this reasoning. First, aging the birds is difficult, especially as the daylight decreases, and some proportion of HY birds may have been classified as AHY. The authors maintained that this did not exceed 15%, but the basis for this claim is not stated clearly. Second, the act of chasing represented less than 3% of all the observations, which made this behavior a rare event and thus susceptible to observer-expectancy bias (Balph and Balph 1983). This is especially pertinent because Red-winged Blackbirds were aged *after* their behaviors were noted. Considering the small sample size, only a few misclassifications are needed to alter the significance of the results. Third, the authors failed to identify the age of both birds implicated in aggressive encounters: "Because only the age of the focal bird was recorded, we do not know the age of the other birds involved in observations of chasing."

This is particularly important because the number of observations that involved chases was very small: 7 of 330 (2%) observations for AHY and 6 of 180 (3%) observations for HY. The time devoted to the observations was clearly insufficient (16 observation periods lasting 1-2 h each) to record an adequate number of observations involving chases. In fact, it is quite possible that some of the observations included HY being chased by other HY, as well as AHY chasing other AHY. *Dominance* refers to a relationship between two individuals that may have different attributes, such as different age or plumage coloration

(Bernstein 1980, C. Barrette and D. Vandal pers. comm.). During an encounter between two individuals, it is essential to record the attributes of the initiator *and* the receptor to establish the relationship as dominant-subordinate (Lehner 1979); otherwise, the application of the concept of dominance is not appropriate. I consider that the conclusion reached by Weatherhead and Hoysak (1984: 553) is unacceptable based on the available data and especially on the procedures used to gather the information: "Consistent with our predictions, HY males were chased more often than AHY males and chased other males less often. The combined differences are significant . . . and indicate that HY males were subordinate to AHY males."

Weatherhead and Hoysak (1984) concluded that an interior roosting position appeared to be microclimatically superior and less vulnerable to predation. This is speculative because no measure was taken to substantiate this contention. The relative position of the birds was recorded relative to the *nearest edge of the patch of vegetation* and not relative to the *position within the entire roost*. Moreover, the difference in the distance between a central and an edge position was only 50 cm. AHY were found in a more central position within a patch than HY, but that patch may have been on the periphery of the roost near the mainland shore, therefore increasing vulnerability to predators and unfavorable climatic conditions.

HY blackbirds were found over deeper water than AHY, which was contrary to the predicted pattern. The authors explained this result on the basis that HY were observed more frequently along the edge of vegetation adjacent to the open water. In their Fig. 1 it would appear that this may be the most secure roosting site because if potential predators such as raccoon (*Procyon lotor*) and domestic cats (*Felis catus*) come from the nearest land, they would have to wade or swim in at least 30 cm of water and cross the entire stand of cattail before reaching HY birds. Moreover, they would encounter AHY on their way before reaching the HY blackbirds.

Finally, Weatherhead and Hoysak (1984) concluded that AHY were found in denser vegetation than HY, which supports their initial predictions. However, the average density of stems of *Typha* per 0.25 × 0.25-m quadrat (total area of 0.0625 m<sup>2</sup>, and not 0.625 m<sup>2</sup> as reported in the paper) was 2.31 for

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AHY vs. 2.13 for HY. This represents 37 vs. 34 stems/m<sup>2</sup>! Despite the statistical difference, I have reservations about the ecological significance of such a subtle difference in terms of cover from potential predators or microclimatic conditions.

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### Response to J.-F. Giroux

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Based on a variety of criticisms of our study of roosting Red-winged Blackbirds (*Agelaius phoeniceus*; Weatherhead and Hoysack 1984), Giroux (1985) has argued that we were unjustified in concluding that the roost was structured due to dominance interactions between age classes. We find his argument unpersuasive. First, we are puzzled by a number of his criticisms of our methods because those criticisms were answered in the original paper. For example, Giroux suggested that aging birds was difficult as light decreased. We continued observations "only until poor light conditions precluded distinguishing birds by age class." Giroux claimed that we did not clearly state why some hatching-year (HY) birds might be misclassified as after-hatching-year (AHY) birds. We stated that it was "because the plumage of some HY males was very similar to that of AHY males." Because we discarded observations where we were unsure of a bird's age, we are confident that all males identified as HY were correctly classified. We conceded in the original paper that a small proportion of birds classified as AHY could have been HY individuals. Thus, our conclusion that our data are consistent with predictions is conservative.

Giroux questioned whether our data showed roost structuring as predicted by Weatherhead's (1983) two-strategies hypothesis. For that prediction to be met, two conditions are required. First, there should be differences in the average roosting positions of younger and older birds, and second, the positions occupied by younger birds should be those considered more vulnerable to predators. The first requirement clearly was met, with significant differences between age classes for every feature of roosting position we measured. These included proximity to vegetation

edge, water depth, and two independent measures of vegetation density. Giroux criticized the results for one of the measures of vegetation density because the difference was very small. He did not mention that that result was corroborated by a more substantial difference in vegetation density using an independent method of assessment.

The question of which roosting positions were less vulnerable to predation was less clear because the marsh in which the birds roosted did not allow individuals to achieve simultaneously an interior position, in dense vegetation, over the deepest water. On average, older males roosted in interior positions in dense vegetation but over shallower water than younger males. Younger males roosted in edge positions in sparser vegetation, and because some of those positions were on the outer edge of the vegetation, their positions were on average over deeper water. We considered the positions occupied by older males to be superior for two reasons. First, we assumed that a bird is less vulnerable to predators if surrounded by other individuals than if on the periphery of a group, even if the peripheral position is over water a few centimeters deeper. Second, we assumed that interior positions in dense vegetation would be less exposed to wind than edge positions in sparse vegetation, thereby giving older males an energetic advantage due to less convective heat loss. Although Giroux was critical of these assumptions, we still consider them reasonable. Our disagreement over the predation assumption points to the need for studies designed specifically to determine the nature and pattern of predation on roosting birds.

In addition to testing the prediction that the roost should be structured, we also tested the prediction that dominance of older birds over younger birds would be the mechanism producing the structure. Giroux criticized our data that showed a significant difference in chasing behavior between age classes

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