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Aggressive interactions in wintering House Finches and Purple Finches.—As a result of its introduction in 1940 and subsequent population expansion, the House Finch (*Carpodacus mexicanus*) is now widely sympatric in the eastern United States with the Purple Finch (*C. purpureus*) (Elliot and Arbib 1953, Bock and Lepthien 1976, Aldrich and Weske 1978). It seems possible that two such similar and closely related species may interact with each other in significant ways, particularly during the winter when both species are frequently foraging at bird feeders. This study reports the results of encounters between House and Purple finches at a bird feeder in Lynchburg, Virginia.

Methods.—From 23 December 1985 through 31 March 1986, dyad interactions resulting in displacement of the losing individual were recorded at a backyard bird feeder. A total of 1585 displacement interactions involving House Finches and Purple Finches in intra- or interspecific encounters were seen during 1065 minutes of observation (71 recording periods, each 15 min long). The feeder used was rectangular (22 × 30 cm) with a narrow (6 cm) shelf on each side that accommodated a total of approximately 10 birds. Food offered consisted exclusively of "oil" sunflower seed. Competition for space on the feeder was intense and the turnover of feeding individuals due to displacement was frequent. The loser of a displacement encounter was forced to relocate on the feeder, or more frequently, to leave the feeder. The winner and loser of each encounter was placed in one of four categories. Because adult female House Finches and adult female Purple Finches are difficult to distinguish from yearlings of both sexes (Bent 1968), these categories were: (1) male House Finch, (2) female-plumaged House Finch, (3) male Purple Finch, or (4) female-plumaged Purple Finch.

TABLE 1

FREQUENCIES OF MALE AND FEMALE-PLUMAGED HOUSE FINCHES AND PURPLE FINCHES ATTEMPTING TO USE FEEDER

Spp./sex	Total obs.	% Obs.	Mean/period	SD
House				
Male	781	21.8	11.0	3.11
Female	1235	34.5	17.4	3.44
Purple				
Male	454	12.7	6.4	2.27
Female	1108	31.0	15.6	3.17
	3578[a]			

[a] 3578 birds/71 periods = 50.4 birds/period, SD = 5.25.

The total number, as well as the relative frequency, of birds in a category are variables that potentially may affect the success of a bird in that category in a displacement interaction. The data for this study, however, were compiled from recording periods in which the numbers of birds in each category were fairly constant, both within each recording period and over the entire course of the study (Table 1).

The results of displacement interactions were analyzed for significance using chi-square tests.

Results.—About 38.6% of the observed interactions were between House Finches, 33.4% were between Purple Finches, and 28.0% were interspecific encounters. These observed frequencies differ significantly from the frequencies that could have been expected if birds of each species interacted in proportion to their frequency in the population attempting to use the feeder ($\chi^2 = 333.74$, df = 2, $P < 0.05$). Since interspecific interactions were 21.2% lower than expected, it appears that birds preferentially sought out members of their own species when making a displacement attack.

When interspecific interactions occurred, House Finches were likely to win at a rate greatly exceeding their frequency of occurrence in the population attempting to use the feeder (90.9% = 404/444 observations). Although Purple Finches made up 43.7% of the total birds competing for a place at the feeder, they were able to win only 9.0% of the interspecific displacement interactions, significantly less than expected ($\chi^2 = 217.1$, df = 1, $P < 0.05$).

In House Finches the frequency of intraspecific displacement interactions based on plumage type (male vs female-plumaged) did not differ significantly from the population frequencies for each plumage type (Table 2, $\chi^2 = 3.1$, df = 2, $P < 0.05$). The same was true for Purple Finches (Table 2, $\chi^2 = 0.8$, df = 2, $P < 0.05$).

In House Finches female-plumaged birds won intraspecific displacement interactions with males more frequently than would have been expected based on their frequency in the general population of House Finches (71.3% = 219/307 observations, vs 61.3% expected, $\chi^2 = 13.2$, df = 1, $P < 0.05$). The same was true to an even greater extent in Purple Finches (95.6% = 216/226 observations, vs 70.9% expected, $\chi^2 = 67.1$, df = 1, $P < 0.05$).

During interspecific displacement interactions, male and female-plumaged House Finches were about equally successful at displacing Purple Finches (males, 91.2% = 177/194 observations; females 90.8% = 227/250 observations). This was true even though male House Finches were outnumbered by female-plumaged Purple Finches.

TABLE 2

FREQUENCIES OF OBSERVED DISPLACEMENT INTERACTIONS COMPARED WITH EXPECTED DISPLACEMENT INTERACTIONS FOR ALL INTRASPECIFIC DYADS

Spp./sex	Obs. no.	% Obs.	Exp. no.	% Exp.
House Finch				
Male-male	96	15.7	92	15.0
Female-female	209	34.1	230	37.6
Male-female	307	50.2	290	47.5[a]
Total	612		612	
Purple Finch				
Male-male	47	8.9	45	8.5
Female-female	256	48.4	266	50.3
Male-female	226	42.7	218	41.3[b]
Total	529		529	

[a] $\chi^2 = 3.1 < 6.0$, 2 df, $P < 0.05$.
[b] $\chi^2 = 0.8 < 6.0$, 2 df, $P < 0.05$.

Discussion.—House Finches may be competitively superior to Purple Finches when foraging at bird feeders. Both male and female-plumaged House Finches won the great majority of their displacement interactions with Purple Finches. Also, although space at the feeder was very limited and competition for feeding places was strong, interspecific interactions were 21% lower than expected. The lower than expected percentage of interspecific interactions can mainly be accounted for by an unexpectedly high level of intraspecific Purple Finch interactions. Purple Finches may have been avoiding aggressive interactions with House Finches, choosing to attempt to displace members of their own species instead.

The intraspecific dominance displayed by female-plumaged House Finches in this study was also reported for House Finches by Brown and Brown (1988). Male House Finches, however, were as successful as female-plumaged birds at dominating Purple Finches. Also, preliminary analysis of data on House Finch displacement interactions with American Goldfinches (*Carduelis tristis*) indicate that male House Finches were actually somewhat more successful in dominating this species than were female-plumaged birds (males winning 61% displacement interactions to 48% for female-plumaged birds). Both of these results suggest that male House Finches were at least as aggressive as female-plumaged House Finches and, thus, may have actually been deferring to female-plumaged birds, rather than being defeated by them. Brown and Brown (1988) found similar evidence of male House Finches deferring to female-plumaged birds.

Since this behavior was even more pronounced in Purple Finches (males losing/deferring 95.6% of the time versus 71.3% in male House Finches), it may be typical of *Carpodacus* finches in general. The higher rate at which male Purple Finches lost/deferred to female-plumaged birds may have been the result of interspecific differences in the "female" plumage of yearling male Purple Finches and yearling male House Finches. Yearling male Purple Finches are indistinguishable from adult females (Bent 1968); yearling male House Finches, on the other hand, sometimes show traces of red (Michener and Michener 1931). Consequently, male Purple Finches may have more difficulty than male House Finches in distinguishing yearling males from adult females, leading them to lose/defer to a greater number of female-plumaged birds.

Brown and Brown (1988) cite Rohwer (1986), noting that if males defer to females during displacement encounters, it would be to the advantage of yearling males to have a plumage type similar to that of the females, thus gaining a competitive advantage during competition with males for resources. While Smith (1980) pointed out that females of many species are dominant to males during the breeding season, there is no apparent reason why males should defer to females during the winter (Brown and Brown 1988).

Brown and Brown (1988) suggest the possibility that male House Finches may remain paired with their breeding partners during the winter and defer to their mates at all times of the year. Males in the present study, however, deferred to many females, so this explanation seems unlikely. A more tenable hypothesis stems from the considerable variability in plumage that is typical of male House Finches, some of which is age-based (Michener and Michener 1931). If female House Finches learn to recognize individual males based on their plumage type and then avoid mating with males that have treated them aggressively during the winter, males would be subject to strong pressure to defer to females. Perhaps a male's willingness to defer to a female during the winter might also provide an indication of his willingness to defer during the breeding season.

Whether the increasing numbers of House Finches in Virginia will have any long term impact on the wintering numbers of Purple Finches in the state remains to be demonstrated. House Finches have become very abundant in Virginia. The species was first recorded in the state in 1962 (Murray 1963), and the first Christmas Bird Count record was made in 1966 (Scott 1967). House Finches have been breeding in Virginia since at least 1976 (Blem and Mehner 1979), and their numbers have increased greatly since then (Root 1988).

It is not possible at this point to show that the introduction of the House Finch into the eastern United States is causing a reduction in Purple Finch populations. It is possible, however, that the expanding House Finch population could have a negative impact on Purple Finch numbers, especially during particularly stressfull winters, when both species frequently forage at bird feeders. This may be particularly true, because as the relative frequency of House Finches increases at a feeder, Purple Finches may simply lose out by default, as they avoid interacting with the more numerous, and apparently more aggressive, House Finches.

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Nest-site selection of the Common Wheatear in high mountain areas of southeastern Spain.—The nest site and its surrounding microhabitat are two fundamental elements that act both as proximate factors in territorial establishment (Hildén 1965) and as ultimate factors conditioning reproductive success (Wray and Whitmore 1979). Despite the fact that the microhabitat may be as important to the bird as the nest site itself (Martin and Roper 1988), few works have concentrated on the characteristics of the microhabitat surrounding the nest (but see Mackenzie and Sealy 1981; Clark et al. 1983; Petersen and Best 1985a, b). This note describes the nest site and the immediate microhabitat surrounding the nests of the Common Wheatear (*Oenanthe oenanthe*).

Common Wheatear nests were found during a random survey carried out between 2000 and 2800 m a.s.l. in the pasture-scrubland of the high-mountain area of the Sierra Nevada in southeastern Spain (see Zamora 1988 for a detailed description of the habitat). Sampling of the nest microhabitat and the territorial habitat was carried out in the following manner: four lines, each 15 m long, were traced outwards from the nest, the first direction being chosen at random and the other three following successively at 90° angles. The first sample within each line was taken at 25 cm from the edge of the rock covering the nest and the next three at further 25-cm intervals up to 100 cm from the rock. In this way 16 samples were obtained of the microhabitat immediately surrounding the nest. Five more samples spaced at 3-m intervals were taken along the remaining 14 m of each line, giving a total of 20 samples of the sector of territory surrounding the nest. The data were obtained by sticking a round metal rod, 1 cm in diameter, vertically into the ground at each sample point and noting the type of substrate that touched the bottom of the rod and at 5-cm intervals throughout its height (as described by Wiens and Rotenberry 1981). The following variables resulted (the corresponding nomenclature used in Table 1 appears in brackets): (1) The main elements covering the habitat (in percent cover): herbaceous layer (GRASS); total shrub cover (SH.CO), including *Genista baetica* (GENI) and *Juniperus communis* (JUNI); bare ground (BARE); litter (LITTER); and rocks (ROCK). (2) Vegetation structure: HIT.$\bar{X}$ = average number of hits per sample; MAX.H = the height of the highest shrub encountered along all four sample lines; DIV.I = diversity index of the vertical profile of the shrub layer; and HET.I = horizontal heterogeneity index of the vegetation (Wiens 1974).