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SPECIES ASSOCIATION IN WINTER GROUPS

BY LEONARD WING

In the course of winter bird trips, particularly those taken in the mountains of the West, I have been attracted by the relationship among birds of several species that flock together in winter. My interest has been aroused especially by multispecies groups observed on Christmas-census trips in the conifers adorning a ridge in Latah County, Idaho, variously known as Moscow Mountains and Thatuna Hills. These impressions have been strengthened further by some observations made during field work last spring (1945) in the Grand Ronde River country along the eastern side of the Blue Mountains of Washington and Oregon.

Among the most intriguing of all winter birds are the forest dwellers that associate together in winter: Black-capped Chickadee, Mountain Chickadee, Chestnut-backed Chickadee, Red-breasted Nuthatch, White-breasted Nuthatch, Pygmy Nuthatch, Brown Creeper, White-headed Woodpecker, and Downy Woodpecker. I am not sure whether the White-headed Woodpecker, Downy Woodpecker, and Brown Creeper really form a part of the company that works the woods in concert. They are often found with it, but even so, they do not give the appearance of being wholly a part of the company. Hairy Woodpeckers, too, occasionally associate with it, as do our Golden-crowned Kinglets and Arctic Three-toed Woodpeckers.

One can hardly help wondering at the seeming constancy with which a mixed assemblage from this group feeds and moves about as a unit. I have no exact data to support the belief, but it seems to me that the company sticks together day after day. I rather feel that all

species concerned must have substantially the same daily and winter range, for they appear so regularly to move about together. If they had different territories, would they not be apart more of the time? But until banding studies are made, we have no way of knowing with certainty how constant is the association.

The flocking calls and twitters that hold the birds together seem to be understood readily by all species; yet it may be that actually they are understood chiefly by birds of the same kind in auditory contact with the group. I have observed Black-capped Chickadees to stop feeding at the 'query call' of a detached Red-breasted Nuthatch and, it appeared to me, to listen for a moment before responding with the *chick-a-dee* call. If the Red-breasted Nuthatch continues to call as it moves to rejoin the group, the chickadee may continue to respond. There may be another explanation; yet it appears to me that chickadees respond nearly as freely to the location notes of their associate species as to the calls of their own kind. Several times I have watched some member of a multispecies group remain behind to finish a special morsel. The lone bird may look up as though suddenly aware of separation from its fellows, then give a location call and dart off to rejoin the flock. On several occasions I failed to detect any call from the flock itself that could be assigned to the species in question. Likewise, a bird sometimes starts off on a tangent of its own, and then calls before returning to the flock.

My impression of the flock continuity is so great that whenever I hear a member of a multispecies flock call in a loud tone—I cannot describe the call, but it is that which we recognize so clearly from a 'lost' bird or one left behind—I mentally picture a lone bird. Investigation in the direction of the call usually confirms this. I recall one case two winters ago when I heard a loud *yank, yank, yank* of the Red-breasted Nuthatch. I can best describe it as an 'excited call.' I finally located the bird nearly two hundred yards away on the very top of a tall, open-growing Engelmann Spruce tree. Nuthatches in company with other nuthatches or with associated species do not call so loudly, and, moreover, I have never seen them stay long on open perches characteristic of flycatchers.

How many of the calls of these birds when together we can ascribe to the purpose of maintaining contact is a moot question. Some of them seem more like "keep-away-from-my-vicinity" calls than "come-where-I-am." Perhaps the same call serves both to separate the feeding individuals within the immediate flock and to maintain the general flock association.

One becomes aware of the interspecific relationship in a multi-species flock just as he becomes aware of intraspecific relationship in a unispecies flock. Although it would be a poetic thought that the species mingle in complete harmony, it is not so in nature. The members of a unispecies flock do not live in complete and angelic accord, and so we can hardly feel surprised if a multispecies flock does not also. How complete is the order of dominance in multi-species flocks, I cannot say. I have observed a number of interspecific contacts, and they seem to evidence a series of relationships analogous to those in unispecies flocks. Whether they are in a straight-line, species-to-species order only or variable as to individuals, I do not know.

It hardly seems more than suggestive, but I have recorded some contacts between individuals of different species in the forest-type multispecies flock. In this list, the second-named individual retreated from the first when they met; hence, the first-named dominated the contact:

White-headed Woodpecker *vs.* Downy Woodpecker
 Black-capped Chickadee *vs.* Brown Creeper
 Mountain Chickadee *vs.* Black-capped Chickadee
 Mountain Chickadee *vs.* Chestnut-backed Chickadee
 Mountain Chickadee *vs.* Brown Creeper
 Pygmy Nuthatch *vs.* Mountain Chickadee
 Pygmy Nuthatch *vs.* Red-breasted Nuthatch
 White-breasted Nuthatch *vs.* Red-breasted Nuthatch
 Red-breasted Nuthatch *vs.* Black-capped Chickadee
 Hairy Woodpecker *vs.* Downy Woodpecker

Birds of the several species concerned are gregarious during most of the year. It is only during the season of reproduction that they, like other birds, exhibit a general and continued hostility to others of their kind and sometimes to associates, although the latter are generally ignored. May it not be that the gregariousness of the non-breeding season is the usual condition? Because gregariousness is associated with the breeding season, we can assume that it is a function of the psychology of reproduction. We do not know what the controlling agent is nor how it influences bird psychology, but studies of the endocrine glands and their effects indicate an endocrine base for its operations.

The mixing of winter species into multispecies flocks may involve many species. Among common land birds in the north are several groupings in winter, among which I have noticed the following:

Mountain Chickadee	Black-capped Chickadee
Chestnut-backed Chickadee	Tufted Titmouse
Pygmy Nuthatch	White-breasted Nuthatch
White-breasted Nuthatch	Brown Creeper
Red-breasted Nuthatch	
Downy Woodpecker	Horned Lark
White-headed Woodpecker	Lapland Longspur
Brown Creeper	Tree Sparrow
	Snow Bunting
Hudsonian Chickadee	
Black-capped Chickadee	Red-winged Blackbird
White-breasted Nuthatch	Cowbird
Downy Woodpecker	Grackle
Brown Creeper	Starling
Red-winged Blackbird	Slate-colored Junco
Brewer's Blackbird	Tree Sparrow
Cowbird	
Red Crossbill	Bohemian Waxwing
White-winged Crossbill	Cedar Waxwing

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THE RACES OF THE SCARLET MINIVET
[*PERICROCOTUS FLAMMEUS* (FORSTER)]¹

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THE most recent relatively complete treatments of the races of the Scarlet Minivet have been those of Stresemann (*Mitteil. Zoolog. Mus. Berlin*, 15: 637-639, 1930), Ticehurst (*Jour. Bombay Nat. Hist. Soc.*, 34: 906-907, 1931), and Whistler and Kinnear (*Ibid.*, 36: 340-341, 1933). To account for the phenomena of variation exhibited by this species, particularly in the Indo-Chinese Subregion, not one of these is satisfactory; indeed, so insufficient was the material from critical areas available at that period to revisers that they could scarcely fail to be led into error. Since the present writer has been able to add to the series in the United States National Museum all the material deposited in the American Museum of Natural History, the Academy of Natural Sciences of Philadelphia, and the Museum of Comparative Zoölogy, to make a grand total of 408 specimens (with the majority from just the regions most poorly represented in the

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