ALBINISM IN SLATE-COLORED JUNCOS

By Richard D. Brown

According to geneticists any lack of pigmentation in an organism is called albinism. Birds normally containing white in their plumage are not classified as albinos by ornithologists until additional white occurs where it is not normally found.

Albinism is frequent among birds. Over ninety years ago Deane (1876, 1879, 1880) indicated that although pure albinism was rare, partial albinism was a more common occurence than generally supposed. Since then numerous specimens have been collected and many reports have been published. Gross (1965, 1967) states that records of albinism are available for "each of the 20 orders and 54 of the 75 families of North American Birds." In the past few decades only noteworthy records of albinism have been added to the avian literature with only a few giving causal explanations (e.g. Phillips, 1954; Whitaker, 1960; Sage, 1962; Gross, 1964). In this paper I propose to submit two additional records of partial albinism in the Junco *(Junco hyemalis)* for the purpose of illustrating [1] the dearth of causal explanations in the literature due to our lack of knowledge of partial albinism and [2] the importance of banding programs in collecting data which could lead us to a greater understanding of the partial albinism problem.

Sage (1963) found that the bulk (67%) of the 3134 records of albinism in British birds occurred in the Turdidae (29%), Corvidae (11%), Hirundinidae (7%), Ploceidae (7%), Sturnidae (7%), and Fringillidae (6%). Most of the records of albinism in North American birds given by Gross (1965) occurred in the Fringillidae (16%), Turdidae (12%), Icteridae (10%), Anatidae (8%), Corvidae (6%), Ploceidae (6%), Phasianidae (5%), and Mimidae (4%). In both reports the Fringillidae are found to contain a relatively high incidence of albinism. Why the incidence of albinism is greater in some families than others is not clearly understood. (Gross, 1964: 69; Sage, 1963: 412)

Albinism in juncos has been reported by several authors. The Slate colored Junco comprise 24 (1.29%) of the 1847 cases of albinism compiled by Gross (1965). Ross (1963) reported eight partial albino specimens from museums (one almost white) and eleven other records. Milton B. Trautman (*pers. comm*) observed a junco with an all white tail and Ernie Limes (*pers. comm.*) observed one with larger white eyerings.

Robinson (1888) reported a partial albino with scattered white feathers. A junco described by Bowdish (1932: 73) had a "faint sprinkling of white feather-tips among the slaty breastfeathers and in the same way, a narrow faintly traced collar of whitish appearance." In addition he reported an asymmetrical partial albino, mostly white with slate in the wings. On later observation this junco was commencing to show a slight peppering of slate over the white plumage. Brownlee (1961: 66) photographed a junco whose "head and other parts normally black, were white and peppered with black on a white background." Olyphant (1970) mentioned Slate-colored Juncos having white around the eyes. Twelve of her juncos had narrow, white eye rings (7 distinct, complete; 3 distinct, incomplete; 2 indistrict, incomplete); one junco had a distinct white spot over the right eye and another junco had a white spot on the right cheek (*pers. comm.*). These fourteen partial albinos representing approximately one per cent of her juncos banded over a five year period. In addition, four records of partial albinism exist for the Oregon Junco *(Junco Oreganus)* (Ross, 1963); two had white collars and another had a white throat spot. No doubt other reports of albinism occur for the Slate colored Junco which have not been included.

Partial albinos may cause identification problems either in the field (Sage, 1962) or in the bander's hand. Shelley (1931: 169) was concerned with "efforts to determine the status of such abnormally colored birds, that is whether all or any of the reported occurences of aikeni in the East are valid or are merely those of common Slate-colored Juncos having narrow fringes of white terminating the greater or middle coverts, or both coverts. It is of course well known that such fringes occur occasionally on hyemalis and are usually regarded as albinistic in nature...."

The following personal records are presented here in support of the argument that symmetrical partial albinism is most likely hereditary in origin: On 28 December 1968 while participating in the 69th Audubon Christmas Bird Count, I saw an unusual partial albino Slate-colored Junco (Fig. 1A) near Clearfork Reservior, Richland Co., Ohio. The bird was with a small flock of juncos at a feeding station. At first sight the bird appeared to be a possible hybrid. It had white eyerings which were complete and broad, giving a spectacled appearance. The white throat was similar to that of a White throated Sparrow *(Zonotrichia albicollis)*. The white outer rectrices, general coloration, and behavior, however, indicating that it was a junco. The bird was looked for, but

not seen on subsequent days.

On 27 October 1969 on the campus of Garden State Academy near Tranquility, Sussex Co., New Jersey, I observed another partial albino Slate colored Junco with a conspicuous pattern on its head (Fig. 1B). This bird was with a large flock of migrating juncos which had stopped to feed at the banding station. Judging from the amount of brown in the plumage I assumed the bird to be immature. The junco was active and appeared to be normal in behavior. The best I could do was to field-sketch the unusual head pattern during my short observation. No doubt other observers have seen partial albino Slate-colored Juncos having striking symmetrical characteristics which can make proper identification difficult. Neither of the two variants described here immediately appeared to be Slate-colored Juncos.

Albinism has been classified into four groups (Pearson et al., 1911-1913; Mueller and Hutt, 1941): total albinism, a complete lack of pigmentation; incomplete albinism, pigment lacking in the eyes, integument or plumage, but not in all three; imperfect albinism, a partial loss, reduction or dilution of pigment in any or all three areas; and partial albinism, a complete or partial loss of pigment from localized areas of the body. This latter type, being the most frequent, often involves only certain feathers and is sometimes symmetrical (Ross, 1963). Nero (1954) further separated partial albinism into random, occurring in dissimilar areas from bird to bird, and specific, occurring in approximately the same area from bird to bird. I would suggest the usage of two additional terms in discussing partial albinos: symmetrical, each side of the bird being affected in a similar way, and asymmetrical, which Sage (1962) stated to be the most frequent. These terms may aid in observing, describing, and suggesting the cause of albinism.

Sage (1962) indicated that albinism in birds can occur as a result of heredity, inbreeding, diet, senility, shock, disease, and injury. It is impossible to determine which of these factors was involved in the two partial albinos reported here. Nevertheless, it is enticing to consider the possibilities that they are hereditary in origin by deduction from the following.

Singleton (1962) described the interaction of different genes to give a diversity of coat colors in mice, rabbits, dogs, and horses in which the amount and distribution of white is controlled genetically.

Plumage and color patterns are known to be genetically controlled for most of the domesticated birds(e.g. chickens, quail, pheasants, pigeons, doves, parakeets, canaries, etc.) Chickens have numerous color varieties and special feather and plumage patterns. According to Davenport (1909: 71)"all of these color characteristics are inherited each in its own definite fashion." In a study of the inheritance of plumage color in canaries, Davenport (1908) gave his principle of localization of the unit-characters of a complex plumage: pigments are "laid down only over more or less circumscribed areas of the body" according to Mendelian fashion. Levi (1941) gave a historical account of studies leading to an understanding of the variation and inheritance of color and plumage patterns in pigeons. A genetic explanation was given by Parkes (1951) for the color and plumage patterns in the Golden-winged X Blue-winged Warbler *(Vermivora chrysoptera X V. pinus)* complex and by Brush and Seifried (1968) for mutants of the Gouldian Finch *(Poephila gouldiae)*.

Genes determine not only the presence or absence of pigmentation in the plumage, but also the distribution of the pigments resulting in a symmetrical pattern characteristic of the species. For example, whitethroats and eyerings are normally found in birds. Complex head patterns found in a number of genera (e.g. *Calcarus, Zonotrichia,* and *Chondestes)* are characteristic of each species. The white wingbars and the extensive white in the outer rectrices are undoubtedly gene-determined characters of the White-winged Junco *(Junco aikeni)*. Many examples of symmetrical color and plumage patterns can be seen in pigeons (Levi, 1965). It seems likely, that since hereditary factors determine the symmetrical occurences of white inmany species of birds, and that the occurrence of pigmentation and white on both partial albinos was symmetrical, hereditary albinism could well have been the causal factor.

It can be hypothesized that the albinistic pattern of the juncos reported in this paper is a result of change in a gene or genes at the loci responsible for the placement of pigment on definite body areas. Whether early somatic mutation or germ-line mutation had occurred is impossible to know. Perhaps some genetic or genetic-environmental interaction was involved. To go farther than speculation with respect to genetics of albinism, it is essential to capture birds, make a thorough inspection of the plumage, and/or rear progeny.

Albinism in birds is a subject for research. Bird banders are in a good position to examine the plumage of a

large number of birds for albinism. By collecting the following data banders could greatly aid our understanding of albinism and possibly shed more light on its causal factors.

1. Species; 2. Sex; 3. Age; 4. Date; 5. Locality. 6. General condition of the bird (i.e. healthy, sick, injured, etc.). 7. Body areas albinistic; 8. any evidence of injury to the skin underlying the albinistic areas? 9. type of albinism (i.e. total, partial, imperfect, incomplete). 10. symmetrical or asymmetrical. 11. Changes in albinism upon return, recovery or observation.

Sage (1962), Ross (1963), and Gross (1965) are excellent references which should be in the possession of banders interested in albinism.

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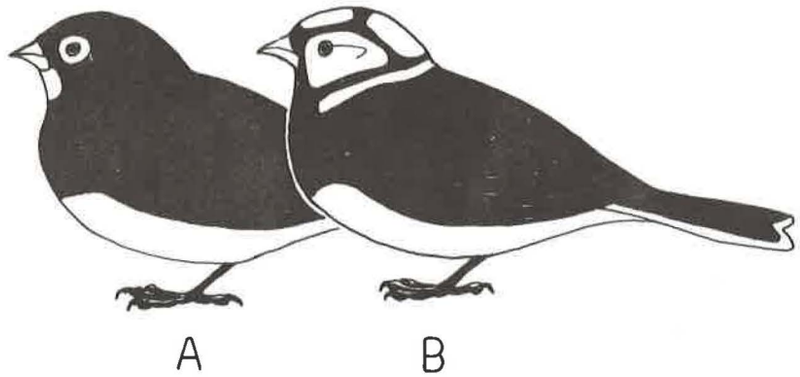

Figure 1. Two unusual partial albino Junco hyemalis sketched from field observations.

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