SHORT COMMUNICATIONS

Prealternate Molt in Nuthatches

RICHARD C. BANKS
Division of Cooperative Research,
U.S. Fish and Wildlife Service, Washington, D.C. 20240 USA

Nuthatches of the genus *Sitta* constitute one of the passerine groups in which prealternate (prenuptial) molt is generally believed not to occur. Dwight (1900: 298) discussed this genus with the family Paridae and stated: "All the members of this family have only the annual moult. They are peculiar in assuming a juvenal plumage closely resembling the pale nuptial plumage which results from extreme fading of the winter dress." Witherby (*in* Witherby et al. 1938: 244) remarked that in *S. europaea* the summer plumage is attained by abrasion rather than by molt. Following Dwight's analysis, Bent (1948) recorded that the prenuptial molt did not occur in *S. carolinensis* or *S. canadensis*. Although Norris (1958: 246) found several females of *S. pygmaea* that were replacing feathers in the nuchal region in March and April, he regarded this as a regrowth of feathers lost in social interactions rather than as prealternate molt; the replacement of contour feathers "over nearly every part of the body" in early April by one female of that species was considered to be "an aberrant instance of prenuptial molt." Norris (op. cit.) stated categorically that "There is no prenuptial molt in *Sitta pusilla*." For most species in the genus, however, I have been unable to find any statement, even a negative one, concerning the occurrence of this molt. On the other hand, there is a partial prealternate molt in the seasonally dimorphic *Tichodroma muraria*, usually considered a member of the family Sittidae but in a different subfamily.

While studying Red-breasted Nuthatches, *S. canadensis*, for other reasons (Banks 1970), I noticed a spring-taken female that was replacing several ventral feathers. Examination of additional specimens revealed that a partial prealternate molt is of common occurrence in that species. To determine the occurrence, extent, and timing of the molt in the genus *Sitta*, I subsequently examined most of the seasonally appropriate specimens of nuthatches in the U.S. National Museum of Natural History and the American Museum of Natural History. Through the courtesy of George Watson, I was able to examine specimens from the Yale Peabody Museum that he had collected in the Mediterranean region. Additional specimens were studied at the Musée Royal d'Historie Naturelle in Brussels.

A combination of several problems necessarily makes a survey such as this less complete than is desirable (Lanyon 1975). Relatively few persons collect extensively in the months just prior to the onset of breeding, so that population samples are small in the months when prealternate molt might be expected. For some species the material available is too scanty to permit any conclusions to be drawn. Pin feathers are often lost as a specimen is prepared, and if only a few feathers are involved in a partial molt, as seems often to be true in nuthatches, this loss may obscure the occurrence of the molt.

Lack of precise information on the time of breeding and of the annual prebasic molt in a species renders it impossible to look specifically for prealternate molt; this situation occurs particularly where there is reason to believe that the onset of breeding is determined by factors other than those that operate in the temperate Palearctic regions. In general, I examined birds taken in the months of February through May for evidence of prealternate molt. This selection of dates proved inadequate for some nuthatch populations of southern Asia and the Philippine Islands, where the nesting season differs from that of nuthatches in temperate areas.

Where prealternate molt occurs in a very small proportion of a population, and where it may involve only a few feathers in the molting individuals, it is difficult to distinguish between a true molt and the replacement of feathers fortuitously lost. Some errors of judgement may have resulted from this difficulty, particularly in species represented by small samples.

For the reasons mentioned, and various combinations thereof, the fact that I did not find evidence of prealternate molt in certain species or populations of nuthatches should not be taken as a definitive statement that no such molt occurs. It is hoped that the preliminary results reported here will stimulate study by those who have access to appropriate material.

The arrangement of the species in the accounts that follow is not meant to be phylogenetic or to imply any concept of relationship. For convenience and because the information is more complete, North American species are listed first. Not all forms in the genus were examined. Species listed by Greenway (1967) but not in this paper are considered to be races of species discussed.

Sitta canadensis.—Prealternate molt in the Red-breasted Nuthatch varies from slight (perhaps none in some individuals) to extensive. Most feather replacement occurs on the ventral surface, with the malar

region, lower throat and upper breast being the main areas affected. In only a few specimens were back feathers being replaced. This molt occurs between mid-March and mid-May. A higher proportion of females than males molt in this period, and the molt is generally more extensive in the former.

Sitta pygmaea.—Pygmy Nuthatches were found in stages of prealternate molt from February through May. There is considerable variation in the timing of the molt, apparently correlated with latitude, although this tentative conclusion is based at least in part on the seasonal distribution of available specimens. In general, prealternate molt occurs earlier to the south in the Rocky Mountain and Mexican mainland populations, but earlier to the north in the more westerly California-Baja California populations.

Sitta pusilla.—Norris (1958) stated that this species has no prealternate molt. I examined a total of 105 birds taken from December through April, and found four birds, two in January and two in February, which have feathers in sheath. A large number of other specimens, particularly from February and March, have patches of suspiciously clean and new looking feathers on the throat and breast, and I feel certain that most of these individuals had replaced the feathers of these areas.

Sitta carolinensis.—There is slight indication of prealternate molt in the White-breasted Nuthatch. Of 127 birds taken in the months of February, March, and April, only six show any evidence of regrowing feathers, four in February and two in March.

Sitta europaea.—The Common Nuthatch has the widest distribution and the greatest degree of geographical variation in the genus (Greenway 1967). Except for the forms of southeastern Asia, however, the seasons of breeding and of molt seem to be fairly constant. Nesting occurs from late March through May, and the annual molt from June to August. If prealternate molt occurs, it would be expected from February to April, depending on the population involved. I examined over 200 specimens including examples of most races. Evidence of prealternate molt is very scanty and is not conclusive. Certainly this molt is not common in this species.

Nuthatches of *S. e. nagaensis* from southern Viet Nam, which Vaurie (1959) puts in the *sinensis* group (but given specific status by Greenway 1967) apparently nest quite early in the year, probably in relation to cycles of rainfall. A series taken in the months May through July 1961 is in the complete annual molt. One October or November bird from southern Viet Nam is undergoing a slight body molt, which may be an example of prealternate molt.

Sitta tephronota.—Vaurie (1950) indicated that the breeding season of this species extends from mid-February to late March. If a prealternate molt occurs it would be expected in the period from January to mid-March, depending on the population. Five birds from the appropriate season were examined, but no evidence of prealternate molt was found.

Sitta neumayer.—According to Vaurie (1950), the breeding season of this Rock Nuthatch is in March and April. Prealternate molt, if any, should occur in January and February. Of 13 specimens of the race *Sitta neumayer tschitscherini* taken in those months, one bird (January 25) has a few feathers in sheath on the throat. Of two specimens of the subspecies *S. n. plumbea* taken on 9 and 10 February, the one of the latter date has a few sheaths on the throat. Presumably these examples are indicative that a partial prealternate molt does occur in at least some individuals of this species. Specimens of other races from the appropriate time of year were not available for examination.

Sitta krueperi.—A series of 14 birds from Turkey indicates that breeding begins in early April. In this same series, which spans the period 23 February to 1 May, two male birds, dated 8 and 24 March, each have a few white breast feathers in sheath at the edge of the red breast patch. This suggests that a very slight prealternate molt may occur occasionally in this species.

Sitta whiteheadi.—Three birds taken in April and May, one in June, and one in October show no sign of molt.

Sitta yunnanensis.—One of a series of seven birds taken "Jan.— Feb." 1929 at Likiang, in northwest Yunnan, has a few breast feathers in sheath. This is perhaps indicative of a prealternate molt. Twelve specimens from March through May are not molting.

Sitta himalayensis.—There was no evidence of a prealternate molt in 35 specimens taken from January to May.

Sitta leucopsis.—Of two April specimens examined, one taken 28 April has a few feathers in sheath on the throat, breast, and nape. Two birds from May showed no sign of molt.

Sitta villosa.—Ten specimens, taken from November through March, show no evidence of molt.

Sitta magna.—One November bird has a few feathers in sheath on the throat and nape, and one bird from December has a single sheath on the nape. These may be examples of prealternate molt. Other individuals from November (1), December (1), February (1), April (1), and May (3) show no sign of molting.

Sitta formosa.—Specimens were not available to indicate periods of molt.

Sitta azurae.—Individuals of *S. a. expectata* from 22 February and 16 March have feathers in sheath on the throat and on the throat, breast, and back, respectively, although six other specimens taken from February to May are not molting. Four specimens of the race *S. a. azurae* are molting body feathers in March and April, although one from April and one from September are not in molt. The spring-taken molting birds seem to indicate a well-marked prealternate molt in this species.

Sitta frontalis.—Two male specimens (*S. f. frontalis*) taken 5 and 18 April in Tenasserim, Burma, have incoming feathers on the mid-back. Preparation of these specimens is poor and signs of possible molt on the ventral surface may have been lost. There is no molt of remiges, and these high altitude birds may be in a prealternate molt.

Discussion

A partial prealternate (prenuptial) molt occurs in at least some individuals of many species of nuthatches in the genus *Sitta*. There appears to be a correlation in the proportion of individuals of a species which undergo this molt and the extent of the molt in an individual bird. Thus, many individuals of *S. canadensis* molt prior to the onset of the breeding season, and the replacement of feathers by each bird may be quite extensive. On the other hand, a small proportion of *S. carolinensis* molt, and only a few feathers are replaced in those individuals.

The species of *Sitta* can be grouped tentatively according to the extent of the prealternate molt, as follows: (1) Molt extensive and occurring in a large proportion of individuals—*canadensis, pygmaea, azurae, frontalis*; (2) Molt slight and occurring in a small proportion of individuals—*pusilla, carolinensis, neumayer, europaea, yunnanensis, leucopsis, krueperi, magna*; (3) Apparently no molt—*tephronota, himalayensis*. In the remaining species—*whiteheadi, villosa, formosa*—the occurrence of this molt was not determined.

By virtue of their habits and manner of feeding, nuthatches are subject to considerable wear, and indeed the ventral plumage, particularly in species which dwell largely in pines, becomes quite abraded by the time that nesting begins. It is probably significant that where some prealternate molt occurs it is chiefly the ventral body feathers that are affected.

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