

NOTES ON THE MOLTS AND PLUMAGES OF THE SPARROW HAWK

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EXAMINATION of the Carnegie Museum's series of 126 specimens of the North American Sparrow Hawk, *Falco sparverius sparverius* Linnaeus, has shown that some recent authors have been confused about certain of the molts and plumages of this little falcon. As is well known, individual variation in color and pattern in this species is so marked that the selection of characters for criteria of age and of geographic variation must be made with great caution. This variability shows its extreme development in the rectrix pattern of males, no two birds being exactly alike in this respect.

Bond (1943), in an otherwise excellent treatment of geographic variation in the Sparrow Hawks of western North America, has made several statements concerning molts and plumages that call for comment, especially as some are in direct contradiction to Bent (1938) and other authorities. On p. 174 Bond states "I can see no evidence that any fall molt of the young takes place. All changes in appearance are attributed to wear and fading. Immature specimens are not always certainly distinguishable even in fresh plumage." Bond then lists several "useful criteria of immaturity," ending with the sentence "Immature females are much more difficult to distinguish than immature males." This is the only one of his statements that I can endorse. Bond also presents a bar graph which purports to illustrate his statement that "First-year birds disappear rapidly after reaching a peak of about two-thirds of the population in August." Bond would have us believe that young Sparrow Hawks suffer a 75 per cent mortality (i.e., from two-thirds down to one-third of the total population) between August and November, a rate which seems excessive for a predator which "has not been reported as a major item in the diet" of any other predator (Clay, 1953:131). Actually, as I shall show, his graph of the "disappearance" of first-year birds is nothing but a representation of the schedule of the post-juvinal molt which Bond claims is non-existent.

Bent (1938:112) states of the young Sparrow Hawk ". . . early in fall changes begin to take place, by fading and by a gradual molt of the body plumage, during September and October; by midwinter great progress has been made toward maturity." This coincides exactly with my own findings; note how the progress of the molt corresponds with Bond's "disappearance" of first-year birds.

CRITERIA OF IMMATUREITY IN MALES

As to the actual criteria for recognizing juvenile birds, Bent apparently

based his rather detailed description on only a single specimen of either sex. Many of the plumage characters he ascribes to young birds are merely those of individual variation. To take these up in order, Bent claims that the young male has "only a hidden trace of the rufous crown patch and . . . larger black spots on the [wing] coverts than in the adult." Neither of these conditions is a character of immaturity. The rufous crown patch varies in our juvenile males from about one-fourth (reference specimen 36146, Malheur Co., Oregon) to about three-fourths (4380, Sheep Creek, Wyoming) of the entire crown area. The Oregon specimen mentioned has heavy black spotting on the wing coverts, while no. 114114, from Marathon, Texas, has these feathers almost immaculate. The series shows all stages of intermediacy in these two characters.

The great variation in the tail pattern of males, referred to earlier, renders meaningless Bent's description of a supposed pattern typical for immature birds. His mention of a single color for the underparts ("pinkish buff") is also without significance, since the color of this portion of the young bird may vary greatly. Specimen no. 36146 (Malheur Co., Oregon) has the breast feathers of a color between the Vinaceous Cinnamon and Orange Cinnamon of Ridgway (1912), while in no. 126043 (Alpine, Arizona) this area is nearly white, though the plumage is fresh and unbleached. There is no correlation between the color of the underparts and geographic distribution among these juvenile specimens of *sparverius*.

By far the best criterion for recognizing juvenile males as such is the heavy marking of the underparts. Only a few adult males exhibit any streaks or spots on the upper breast; this area in fall immature birds is invariably marked with longitudinal black streaks which widen into broad spots along the flanks. Even those few adults which retain some spotting on the chest seldom if ever match the juvenile birds in this respect. Such spotted birds may account for the supposed worn spring immature birds described by Bond (1943:175). Some exceptional individuals may actually retain some of the spotted feathers of the chest, but these normally disappear in the ordinary post-juvinal molt, as described beyond.

Another excellent character for recognition of young male Sparrow Hawks is the more extensive black barring of the dorsum. In adult males the anterior one-third (and sometimes more) of the scapular-interscapular area is immaculate; in juvenile birds the bars extend almost to the posterior edge of the gray of the crown. In most specimens examined, the post-juvinal molt of these dorsal feathers occurred later than that of the ventral plumage, allowing the dorsal pattern to be used as a criterion of immaturity for a longer period.

In juvenile males the light tips of the rectrices are usually washed with

a pinkish buff color, although this may be quite pale on the lateral pairs. In adults these tips are either white or gray. There is occasionally a light buffy wash, but the tips of the central pair of rectrices are apparently always gray.

Friedmann (1950:724) and others have indicated that young males usually exhibit dark shafts on the crown feathers. This statement is true, but must be somewhat modified. Some adult males may have well-marked shaft-streaks in the blue-gray areas of the head, especially toward the forehead (reference specimen 12063, Cochise, Arizona). However the brown crown patch of adults is seldom invaded by these shaft-streaks, while in young birds the brown crown feathers have well-marked gray centers.

The material I have examined does not confirm Clay's statement (1953: 130) that the nuchal region which resembles a pair of ocelli or "false eyes" is whiter in young birds than in adults. The pigmentation of this area in *sparverius* appears to be a matter of individual variation, although it is subject to geographic variation in some of the southern subspecies.

The post-juvinal molt of the body feathers in the male Sparrow Hawk takes place primarily in September and October, as amply illustrated by Carnegie Museum specimens. Such molting birds are instantly recognizable in a tray of specimens by the mottled appearance of the chest region. The streaked feathers, usually quite bleached by the time of molt, are replaced by immaculate feathers whose bright color contrasts plainly with the juvenal plumage. A specimen taken at Kenton, Oklahoma, September 22, 1932, (no. 113229) is molting the interscapular feathers, replacing barred with unbarred feathers in the anterior portion of this area. The shaft-streaks of the crown are also a short-lived criterion of immaturity, as illustrated by two specimens which have almost finished the post-juvinal crown molt; no. 4847 taken in Coahuila, Mexico, October 31, 1899, and no. 122283 from Santa Clara, Utah, October 23, 1937. Completion of the molt of these contour feathers leaves the color of the tips of the rectrices as the best indication of age by late fall and winter. This character, of course, is obscured by wear and fading, but this in itself is a clue to the age of a given specimen, since the tails of birds of the year are often quite worn by midwinter while those of adults may be relatively fresh.

CRITERIA OF IMMATUREITY IN FEMALES

As mentioned previously, recognition of immaturity in Sparrow Hawks is far more difficult in females than in males. There are ten female Sparrow Hawks in the Carnegie Museum collection which are either obviously young birds (fledglings) or have been marked "juv." or "imm." by the collector. These have been used as a standard to try to determine which characteristics

are held in common by young birds and not by adults. Unfortunately none of the three major criteria of immaturity in males — streaking of the chest, extensive dorsal barring and brownish tail-tips — applies to females. The color of the ventral streaks of females of all ages is so variable that I am unable to verify the statements of Bent (1938:112) and Friedmann (1950:724) to the effect that these streaks are darker in young birds. Bent's statement that the ventral streaks of adults are narrower than those of juveniles is, on the average, true, but variation in this character is so great as to make it undependable as a primary criterion of immaturity.

I have found two characters which appear in most of the young birds, and are possibly diagnostic of immaturity, although not certainly so. The tails of all female Sparrow Hawks are brown, heavily barred with black. Since the tail-tip in unworn birds is brown, the distal black bar across the rectrices may be considered as a subterminal band. In almost all of the young birds examined, this subterminal band is broader than the anterior black bands only, if at all, on the central pair of rectrices. On the remaining rectrices there is no difference in the width of the subterminal and adjacent black bands. In adults, on the other hand, the subterminal band is decidedly wider than the remaining bands on the tail (except, usually, on the outermost pair of rectrices, where all of the bands are much reduced). There is much individual variation in the width of these tail bands, but in adults with wide bands the subterminal one is particularly wide, while in those with reduced tail bands the subterminal one may be quite narrow, but always wider than the adjacent ones.

The crowns of all immature female birds examined bore heavy shaft-streaks, and the gray and brown areas were poorly defined and somewhat blended. In many adult birds the two colors of the crown are bright and clearly defined, with little or no shaft-streaking. However, some adult specimens do approach the young birds in this crown character. One of the specimens examined, from Lake Chapala, Jalisco, was just beginning the post-juvinal crown molt when collected on November 11, 1899. I hesitate to make any generalization from this single specimen to the effect that the post-juvinal molt is later in females than in males.

The Lake Chapala specimen just cited is also beginning to replace the barred feathers of the interscapular region. Comparison of the old and new feather refutes Bent's belief that the black bars are relatively broader in young birds (Bent, 1938:112).

Very young Sparrow Hawks have a rather silky sheen which is quite characteristic of their plumage, but which quickly wears away. It is of little or no use as a criterion of first-year birds, since it disappears while the birds are manifestly young by several other criteria. I am unable to

detect any special consistency of the breast feathers as described by Bond (1943:174-175), and Bond admits that this supposed character of immaturity disappears with wear.

Many of the above conclusions concerning the juvenal plumage and post-juvenal molt of Sparrow Hawks conform with the findings published many years ago by Mearns (1892). Although Mearns' paper is listed in Bond's bibliography, Bond apparently consulted only the taxonomic portion, since he cites it only in connection with Mearns' description of the races *deserticolus* and *peninsularis*.

PLUMAGE CHANGES IN ADULTS

I have little to add to our knowledge of the molts and plumages of the adult Sparrow Hawk. Bent (1938:112) stated "I believe that the full perfection of plumage is not acquired until the bird is two years old, or more. The oldest males have the least spotting on the scapulars, a clear white or cinnamon breast, with only a few round black spots on the flanks, and the most rufous in the tail; probably successive annual molts are required to reach this perfection." I have already indicated my belief that there is no correlation between age and the color pattern of the tail. That this "perfection of the plumage" theory does not hold for other parts of the bird as well is indicated by specimen no. 131283, taken August 10, 1946, at Entrance, Alberta. This bird is an adult male beginning its post-nuptial molt. On the posterior two-thirds of the interscapular area many new heavily-barred feathers are replacing unbarred old ones, indicating that this particular adult is reversing the trend postulated by Bent. As in all adult males, both the old and the new feathers in the anterior one-third of the scapular region of no. 131283 are unbarred.

SUMMARY

1. In spite of assertions to the contrary in the literature, *Falco sparverius sparverius* has a post-juvenal body molt. This occurs mostly in September and October, at least in males.
2. Certain characters which have been proposed as age criteria by various authors do not appear to have any significance in this respect. These include the size of the rufous crown patch, amount of spotting on the wing coverts of males, tail pattern of males, ground color of underparts, ground color of the ocelli of the nuchal region, width of dorsal bars of females, and consistency of breast feathers.
3. Immature males may be recognized by a combination of several characters, including spotting and streaking of the breast, barring of the anterior one-third of the scapular-interscapular region, brownish tips to rectrices, and dark gray shaft-streaks in the brown crown patch.

4. All of these characters except that of the tail-tip normally disappear during the post-juvenal molt. Young males in late winter or early spring may still be recognizable by the relatively greater wear of their rectrices.
5. Recognition of immature females is difficult. Two suggested criteria are the lack of a well-defined subterminal band on the tail and a crown with heavy shaft-streaking and poorly-defined brown and gray areas.
6. Adult males do not necessarily become less barred or spotted with successive annual molts.

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