

## THE MOLTS OF THE RUFOUS-WINGED SPARROW

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THE Rufous-winged Sparrow (*Aimophila carpalis*) is known only to a fortunate few. Its range is limited to a strip of country south from Pinal County, southern Arizona, to northern Sinaloa, México. In our country, the land-speculator, the military, and especially the stockman wage unending warfare on the few places where it still survives. Given a patch of grass and thorn-bushes, it can take good care of itself; but against short-sighted human greed and bulldozers it has no defense. One of the last species of United States birds to be discovered thus bids fair to be one of the first exterminated.

To the casual observer, the loss might seem of no consequence. Modest and retiring, the bird is no popular favorite. Its song is a plain, metallic trill. Other birds build more striking nests and have more engaging habits. Trim, slender and appealing perhaps, but by no means brightly colored: only a press agent could call it beautiful.

Why then, you ask, the "fortunate few?" Because our little subject is unique in some ways. The various other obscure sparrows of the Southwest nest in the spring, and in August and September have the usual complete postnuptial molt. Most of them have also, in March and early April, a partial prenuptial molt, this often being restricted to the chin or to the head and neck. But *Aimophila carpalis* does not nest in the spring. Though sexually active in spring and early summer, it delays its actual nesting until the summer rains. While waiting for these rains it has an almost complete prenuptial molt.

The molts of the Rufous-winged Sparrow have been known for some years; but little has been written about them, and even that little is not altogether correct. Van Rossem (1945: 275) mentioned casually that birds taken "in southern Sonora between May 6 and June 22, 1937 . . . all were in various stages of the complete prenuptial body and tail moult." Moore (1946: 118) discussed the molt at somewhat greater length. Referring presumably to birds taken in the Tropical Zone of México, he stated that "some individuals of *Aimophila carpalis* present feathers in process of molt in every month of the year . . ." Periods specifically mentioned included January, late February, July, August, late September, and October. A male with a new secondary in one wing on September 18 had fully developed testes. Moore stated that "new secondaries almost invariably develop before the new primaries" (p. 122).

The Rufous-winged Sparrow becomes badly worn on the exposed parts of its feathers, as is usual among grass- and cactus-haunting birds. In the closed wing, the tertials cover and protect the secondaries, while most of the primaries project at their tips. By July and August the primaries in the closed wing look frayed and faded, while the secondaries usually are still in good condition. This, plus the replacement of feathers accidentally lost, may lead the student to believe that a bird is molting when actually no molt is under way.

My studies have extended intermittently over 11 years. They have been greatly aided by the cooperation and suggestions of Lyndon L. Hargrave, Joe T. Marshall, Jr., Gale Monson, Milton B. Trautman, the late Charles T. Vorhies, and the authorities of the American Museum of Natural History, Cornell University, the Fish and Wildlife Service, the United States National Museum, and the University of Arizona. My findings agree in the main with van



Rossem's; they agree with Moore's in revealing that molt and sexual activity are not mutually exclusive, but disagree—in so far as Arizona and northern Sonora birds are concerned—in certain particulars.

#### POSTNUPTIAL MOLT

The postnuptial molt of the Rufous-winged Sparrow occurs rather late in the fall. An equally late molt occurs in such related forms as the Blue Grosbeak (*Guiraca caerulea*), Brown Towhee (*Pipilo fuscus*), Rufous-crowned Sparrow (*Aimophila ruficeps*), Cassin's Sparrow (*A. cassini*), and Black-throated Sparrow (*Amphispiza bilineata*), however; so *carpalis* is not unique in this regard. It is the tail molt that is odd, departing as it does from the orthodox pattern.

The postnuptial molt begins with the tertials, tail, coverts (both upper and under) of wing and tail, and in some cases the inner primaries. Soon it spreads to the head and sometimes the back. Of two adults taken in Arizona, September 11, the female shows no regular molt as yet, while the male has begun the molt of wing coverts, upper tail coverts, tertials, and inner primaries. On the other hand, three adults taken there as late as October 9 are not very far along in the molt. One, a female in the American Museum of Natural History, retains the longer wing and tail feathers of the old nuptial plumage, except for the tertials. The other pair (especially the male), though only *beginning* to renew the tertials, have new inner primaries that are already well grown. Molt, then, seems to begin in early or mid-September in males and perhaps two or three weeks later in females. None of the few specimens showing the tail in molt reveals any regular order of molting the feathers. In central Sonora and south, the molt may be even later, at least in some years (Pitelka, 1951).

An adult male, taken in Arizona on September 30 and examined in the flesh, had the tertials and inner five primaries nearly or quite full-grown. The outermost secondary also seemed full-grown, but the next was in a still unbroken sheath. Primary 7 was likewise in an unbroken sheath; 6 was about half grown; and old 8 and 9 had yet to be shed. Molt had begun in the inner secondaries, the innermost being nearly full-grown, but the rest were old feathers. Clearly, this male retained the old secondaries, as a group, and the outermost primaries the longest; and this appears to be the normal pattern. Other old feathers retained were the alula, two outer primary coverts, and the longer *under* primary coverts. The rest of the wing coverts had been renewed. The body was still in heavy molt, advanced especially on the tail, longer tail coverts, head and throat. The shortest obvious tail-feather was the outermost on the right side, but the adjacent two were full-grown, the succeeding one nearly full-grown, and the central four subequal, falling (in the closed tail) 25 to 29 millimeters short of the longest feather (third from right), which already showed a trace of wear. The fourth rectrix from the left was so short as to be barely out of its sheath; only by parting the feathers could it be found. The outer three feathers on the left formed a gently graded series falling 20, 26, and 31 millimeters, respectively, short of the longest rectrix. The shortest (outermost) of the three was almost as short as the right outermost.

The postjuvinal molt resembles the postnuptial, but is incomplete. Of the major flight-feathers, only the tertials are ordinarily molted; but in one Arizona female (U. S. National Museum 79616, September 11, 1874) the inner primaries and two outer pairs of rectrices are in molt. At this season, some birds have nearly finished the postjuvinal molt, while others are not yet full-grown. Most young October specimens from Arizona have some juvinal tail coverts (and often neck, flank, belly, and scapular feathers). Of two November birds, one (Granados, Sonora, November 12) still has a few juvinal upper tail coverts, while the other (Arizona, November 29) has apparently finished the postjuvinal molt.

#### PRENUPTIAL MOLT

I can detect no evidence of molt in series from Arizona and northern Sonora taken from December through April, nor in December and January birds from Álamos, Sonora, nor in



a March male from Sinaloa. Some late April birds look suspiciously unworn, as if recently molted, on the lower back and rump; but this I attribute to the protection afforded these feathers by the overlying wings. An adult male from near Estero de Tasiota, northwest of Guaymas, Sonora, May 3, and a female from nearby Ortiz, May 12, still have not begun the prenuptial molt, but it is evident in a male (probably young) from east of Ures, Sonora, May 5. In this bird the sides of the crown, the postocular portion of the pale superciliary stripe, and the outer tertials are in molt.

Van Rossem, as quoted above, recorded molt in southern Sonora birds from May 6 to June 22. An Arizona specimen taken May 7 is starting the molt of the outer tertials. A female from near Tucson, May 19, is molting over at least the dorsal surface, and has several subequal new rectrices as if it had lost the central part of its tail accidentally. Except in the tail, the molt is farther advanced in two males taken at the same time and place; each has the central pair of rectrices 21.5 millimeters long, while the outer five pairs are old; among the remiges, only the tertials are in molt. Such new feathers as I have seen seem to indicate that, in the spring molt, the tertials are the only remiges regularly replaced. Other fresh feathers at this season may be replacements for accidental losses.

All Arizona specimens taken from May 19 to June 10 are in heavy molt. Of two males taken June 1, one has the entire tail old; the other has the outer four pairs old, the central pair missing or shot out, and the next pair coming in very unevenly (one about two thirds grown, the other just emerging from its sheath). The latter male is well along in its body molt and is molting its tertials and their coverts, greater secondary coverts, and feathers along the radius and tibia.

The general sequence of the spring molt seems to be the same as that of the fall, but it involves the wings and tail less. The old secondaries, primaries, and primary coverts are retained; the other wing coverts seem to be molted rather irregularly, most but not all evidently being renewed. In some young birds, apparently, the alula feathers molt. The tail is partly retained, only the central pair (and occasionally one or two adjacent rectrices) being shed.

One of three specimens taken near Tucson on June 30 still has a central tail-feather only about three-quarters grown. This date marks about the end of the prenuptial molt. No molt was evident on the other two birds except that the female lost one pinfeather from the downy area near the flanks in skinning. About three ova were greatly enlarged (at least one was in the oviduct), and a nest which I found nearby held one egg. July and August specimens examined, few in number, show no regular molt. This is the nesting season in Arizona, the time of summer rains.

In a general way, then, the Rufous-winged Sparrow undergoes a regular sequence of alternate molting and nesting, or both, from early May continuously until November. Molting and sexual activity can and do overlap. During May and June the males sing freely and, in all probability, are mated and defending territory. These points need detailed study; but there is no doubt about the swollen testes, which measure from 4 by  $3\frac{1}{2}$  up to 6 by 4 millimeters during the spring molt. This is about maximum size for birds weighing 14.4 to 17.3 grams.

In the well-watered localities that once existed around Tucson, nesting probably began in late May. Stephens (Brewster, 1882: 196) found a nest and three eggs on May 25, 1881. Bendire (1882) found eggs about June 14, 1872, and believed the birds had commenced to breed "about a month earlier." Birds, grass, and water are nearly all gone from these stream-bottoms today; but it seems unlikely that there can have been much difference in the season of molt among different populations within the Tucson valley. Thus, laying and even incubation apparently occurred during molt.

#### SUMMARY

The Rufous-winged Sparrow has a late postnuptial molt differing from that of most birds in lacking a regular sequence of molting the tail-feathers. Again in May and June it undergoes



a nearly complete prenuptial molt. Parts of the wing and tail are not involved in this molt; in the tail it is limited usually to the middle pair of rectrices. It is later than the spring molts of other fringillids, and overlaps periods of sexual activity.

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