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THE POSTJUVENAL MOLT OF THE GRASSHOPPER  
SPARROW<sup>1</sup>BY GEORGE MIKSCH SUTTON<sup>2</sup>

In a recent paper<sup>3</sup> I called attention to certain current misconceptions concerning the juvenal plumage, the postjuvenal molt, and the first winter plumage of the Eastern Grasshopper Sparrow, *Ammodramus savannarum australis* Maynard. My findings, therein discussed at some length, may be summarized as follows: (1) The juvenal plumage of the Grasshopper Sparrow is not "worn a long time"<sup>4</sup> as a complete plumage by the individual, though young of second broods in juvenal plumage doubtless are to be seen in late summer and early fall. (2) The postjuvenal molt begins in late June or early July in young of normal first broods—weeks earlier than "about the middle of August."<sup>5</sup> (3) A yellow superciliary spot, acquired with

<sup>1</sup> Contribution from the Edwin S. George Reserve.

<sup>2</sup> I wish to thank Dr. Josselyn Van Tyne, Curator of Birds, Museum of Zoology, University of Michigan, for his assistance in the preparation of this paper.

<sup>3</sup> George Miksch Sutton, "The Juvenal Plumage and Postjuvenal Molt in Several Species of Michigan Sparrows," *Cranbrook Institute of Science, Bull.*, No. 3, 1935: 1-36, Pls. 1-8.

<sup>4</sup> Quotation from Jonathan Dwight, Jr., "The Sequence of Plumages and Moults of the Passerine Birds of New York," *Annals New York Acad. Sci.*, 13, 1900: 189.

<sup>5</sup> *Ibid.*

the postjuvinal molt, is part of the first winter plumage. (4) If there is any prenuptial molt in early spring it probably is a "casual replacement of accidentally lost feathers" rather than a "molt in the true sense."<sup>6</sup>

During the summer of 1935, again at the invitation of the Cranbrook Institute of Science, I had opportunity to resume a study of the plumages and molts of young sparrows at the Edwin S. George Reserve maintained by the Museum of Zoology of the University of Michigan near Pinckney, Livingston County, Michigan. With the help of Mr. and Mrs. Lawrence Camburn, I undertook the rearing of several young birds in order to be able to observe changes in plumage that took place from day to day.

Owing to destruction by natural enemies of nest after nest<sup>7</sup> that was under observation, I failed to obtain any young Grasshopper Sparrow of definitely known age. A well-feathered male bird, just out of the nest and barely able to fly, was, however, captured and successfully reared. This individual's flight feathers were only partly grown, the rectrices being about 11 mm. in length at the time it was caught. Since the young of ground-nesting Fringilline species frequently are obliged to leave the nest at an earlier age than that at which tree-nesting species customarily leave, I cannot be sure just how old my captive was; but, basing an estimate upon experience with other young sparrows whose age was definitely known, I believe he was not less than eight, nor more than twelve, and therefore approximately ten days old.

The bird was captured on July 12, kept alive until August 17, observed carefully, and daily record was made of feather growth and change. For about twenty-four hours he refused to eat. Thereafter he took small grasshoppers that were offered to him. Within a week or so he learned to feed by himself on insects, and later on seeds, and he became quite a pet. He was

<sup>6</sup> Quotation from a letter of John Zimmer. See my paper, *op. cit.*: 23.

<sup>7</sup> Four Grasshopper Sparrow nests, each with five eggs or small young, were discovered on the George Reserve between July 8 and 25. All these were destroyed, presumably by spermophiles, foxes, skunks, snakes, or crows.

in perfect condition at the time of his death which resulted from flying, full-speed, into the wire screen inclosing the porch that was used as a flying cage.

Plate I, Figure 1, shows the bird in what I feel should be called the full juvenal plumage of the Grasshopper Sparrow, in spite of the fact that at this stage the rectrices are not by any means of full length. The portrait was made direct from life on July 13, when the individual was about eleven days old. The scapular and dorsal pterylae at this stage are wholly devoid of feathers "tipped with spots of russet" such as Dwight describes; the breast and sides of the chest are strongly streaked with dusky; and there is a hint of buffy yellow in the region above and in front of the eye. The postocular region or, more precisely, that part of the superciliary line which extends back of the eye, is sharply streaked.

My bird held this rather handsome plumage (the flight feathers meanwhile growing rapidly) until July 18. On this date a change was noticed resulting from the appearance of new, buffy, unstreaked feathers on the chest and sides. Whether these new feathers were replacing streaked juvenal feathers that had dropped out I cannot say, for deeming it desirable to let the bird fly about with other young sparrows, I found it impossible to ascertain that loose feathers found here and there on the porch were from this particular bird. Although the captive's back and scapulars showed no russet-tipped plumage at this time, I had collected two days previously (July 16) a full-fledged juvenal bird (rectrices of full length) in which there was much russet-tipping above. This bird was of a normal first brood, whereas the captive was probably of a second or of a considerably delayed first brood.

On July 19 (my bird was now seventeen days old) incoming, fully-sheathed feathers on the back were noted, but again it was not certain that any of these evinced a dropping out of feathers. They might have been belated feathers of the juvenal plumage arriving as growth of the bird increased the dermal area upon which feathers could develop.

On July 22 (the bird was twenty days old) russet-tipped feathers for the first time appeared on the back. On this date the rectrices measured 37 mm., though they were sheathed at the base, and the superciliary line was still sharply streaked, as in the eight- or nine-day-old bird.

On July 25 careful examination disclosed the fact that the rectrices were still slightly sheathed at the base; that russet-tipped feathers had become more noticeable on the back and posterior part of the scapulars; and that additional buffy, unstreaked feathers had appeared on the chest and sides.

By July 31 (though not necessarily *on* this date) the first proximal primary of each wing had dropped out; many juvenal feathers, *all without russet-tipping*, had definitely disappeared from the middle of the back; and many juvenal feathers of the crown and superciliary region had dropped out. Just when this dropping out actually began is uncertain, for on July 31 the molt appeared all at once to be well under way. The bird was now twenty-nine days old.

On August 7 (the bird was thirty-six days old) the dorsal pteryla was thickly set with incoming, fully-sheathed feathers; the buff-margined, plumulaceous, juvenal feathers were practically all gone from this region; many of the streaked, juvenal chest feathers had dropped out; and new lesser wing coverts of a strongly yellowish cast had appeared.

On August 12 (the bird was forty-one days old) I found a greater covert on the right wing whose length and pattern made it clear that it belonged to some plumage other than the juvenal, but whose position was such that at first I did not know whether to call it a tertial or a greater covert. The point of insertion of its calamus was very close to that of the tertials, and its pattern was wholly different from that of the other greater coverts among which it had developed. The fact that this feather appeared only on the right wing showed it to be somewhat abnormal. On August 10 a young female bird (U.M.M.Z. No. 85954) was collected whose *left wing* had exactly the same sort of feather. The wing of this bird is shown in Plate I, Figure 2. Examination of it will show how very

different the pattern of this long greater covert is from that of any juvenal greater covert or tertial.

By August 17, the date on which my bird met its death, the postjuvenal molt was well started. In the specimen (U.M.M.Z. No. 85964) many buffy feathers of the first winter plumage are present on the chest, sides, flanks, and lower throat, though streaked juvenal feathers also are present. First winter feathers are observable in the crown, but much of the head plumage is juvenal. Not many strictly juvenal feathers remain in the back, and the rump plumage is almost completely that of the first winter. All but three of the juvenal rectrices have dropped out, but new rectrices have not yet put in their appearance. Molting of the remiges has begun, the first proximal primary of each wing having dropped out.

On August 13 two young Grasshopper Sparrows were collected in which the postjuvenal molt was well under way. In one of these, a female weighing 15.3 grams (U.M.M.Z. No. 85962), seven of the rectrices are missing; the first proximal primary in each wing has dropped out and been replaced by a wholly sheathed new feather about 10 mm. long; and new feathers are appearing on the forehead, in the superciliary region, among the lesser wing coverts, and throughout the back and rump. No juvenal coverts nor tertials are missing, however, and the chest is streaked about as in the "full" juvenal.

In the other specimen, a male weighing 18.6 grams (U.M.M.Z. No. 85963), the top of the head, forehead, and facial region are thickly set with incoming feathers, most of them sheathed; a patch of fully-sheathed feathers is present on each side of the chest; seven juvenal rectrices have dropped out; the first and second proximal primaries of each wing have dropped out and been replaced (the second much the shorter and completely sheathed); several of the distal greater coverts have dropped out (three of these have been replaced, one of which, the most distal, is somewhat unsheathed at the tip); two proximal primary coverts in each wing have dropped out; many new lesser wing coverts are putting in their appearance; the middle tertial

in each wing has dropped out and been replaced with the merest stub of a blood quill; and many of the streaked feathers of the chest have disappeared. The areas of principal interest in this specimen are, however, the lower back and rump which are thickly set with sheathed first winter feathers all along the median line. The upper tail coverts are missing. Many new feathers are appearing in the upper back. The neck feathers are thin and worn and come out easily, even in the prepared specimen. The general appearance of the upper parts leads me to think that some russet-tipped feathers, such as are not found in the nestling bird, are dropping out and being replaced. The incoming first winter primaries are not margined with white or grayish white as are the juvenal primaries. In neither of the specimens just discussed is there a long greater covert such as is shown in Plate I, Figure 2. In both specimens some incoming feathers of the superciliary region, though very small, are definitely and clearly yellow.

In the series of twenty-two young Grasshopper Sparrows at hand, only one is largely in first winter plumage. This specimen (U.M.M.Z. No. 72474) was taken by Mr. Norman A. Wood at Portage Lake, Livingston County, Michigan, on September 16, 1933. The juvenal rectrices have dropped out and the incoming ones are all of about the same length. No streaked feathers are present anywhere on the chest. The new feathers above and in front of the eye are strong, deep yellow. All the feathers of the hind neck are red-brown medially, rather than fuscous as they are in the juvenal plumage. The pattern of the greater coverts is exactly that of the longish feather shown in Plate I, Figure 2, but the postocular region is streaked, and a few of the juvenal remiges are present.

In the series of eleven juvenal males, several show a yellow or yellowish superciliary spot. In some of these certain of the yellow feathers are probably of the first winter plumage. In others, however, they appear to be of the *juvenal* plumage, and are of a dull and buffy cast. This tendency toward a yellow superciliary spot in the juvenal male apparently has not been mentioned in the literature pertaining to the species, and it

makes any study of the molt of this region difficult. The series plainly shows that a yellow superciliary spot is acquired long before the "prenuptial molt in early spring."

#### SUMMARY

The young Grasshopper Sparrow at the time it leaves the nest has no "russet-tipped feathers" on its back or scapulars. These appear when the bird is about three weeks old. Whether they should be called of the juvenal, of some incomplete postjuvenal, or of the first winter plumage, I am not at present able to say.

Dropping out of juvenal feathers begins when the bird is about four weeks old. The postjuvenal molt begins in late June or early July in young of normal first broods.

A dull, yellow, superciliary spot is present in some *juvenal* males. It apparently is not present in juvenal females. A yellow superciliary spot is acquired by *both male and female birds*, however, with the postjuvenal molt in the latter part of the summer or in early fall.

The juvenal rectrices drop out almost simultaneously when the bird is about six weeks old. The molt of the juvenal primaries is from the innermost outward.

*George Miksch Sutton*

PLATE I

Drawings in water color by the author.

FIG. 1. Portrait from life of a male Eastern Grasshopper Sparrow approximately eleven days old. No "russet-tipped" feathers are visible in the back or scapulars. Pinckney, Livingston County, Michigan, July 13, 1935.

FIG. 2. Left wing of female Eastern Grasshopper Sparrow in "full" juvenal plumage, showing long greater covert of incoming first winter plumage. Pinckney, Livingston County, Michigan, August 10, 1935.





FIG. 1,

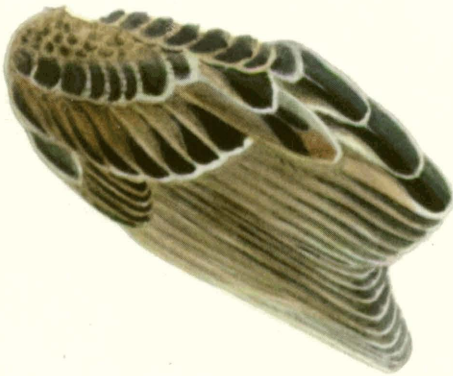


FIG. 2

