Plumages and molts in the Long-billed Marsh Wren.—During a study of the ecology and bioenergetics of a population of Long-billed Marsh Wrens (*Telmatodytes palustris griseus*) at Sapelo Island, Georgia (Kale, *Publs. Nuttall Orn. Club*, no. 5, 1965), more than 200 specimens were collected from 1958 through 1962 and approximately 25 nestlings were raised to maturity, 10 of which were maintained in captivity for more than two years. In addition, more than 40 specimens of *T. p. palustris, waynei*, and *dissaeptus* were examined; these were collected on Sapelo Island by me or at the WCTV tower, Leon County, Florida, during spring and fall migration by Herbert L. Stoddard, Sr. It was thus possible to make observations on the sequence of molts and plumages, particularly in *griseus*, and compare these with earlier studies by J. W. Dwight, Jr. (*Ann. New York Acad. Sci.*, 13: 296, 1900), and W. A. Welter (*Wilson Bull.*, 48: 256–269, 1936) on *T. p. dissaeptus* in New York.

The sequence of plumages and molts in the Long-billed Marsh Wren is indicated below. The terminology of Humphrey and Parkes (*Auk*, 76: 1–31, 1959) appears in parentheses. Where my exposition differs from that of Dwight's, his version is appended.

1. Natal down.
2. Juvenal plumage, acquired by a complete postnatal (prejuvenal) molt.
3. First winter (first basic) plumage, acquired by a complete postjuvenal (first prebasic) molt. Dwight stated that this plumage was acquired by a partial molt which involved the body plumages, the wing coverts, and the tertiaries, but not the rest of the wings nor the tail.
4. First nuptial (first alternate) plumage, acquired by a complete prenuptial (first prealternate) molt. Dwight stated that he did not have any positive evidence of this molt, but concluded that it occurred by the relatively unworn condition of the feathers when the birds arrived in New York in May.
5. Adult winter (second basic) plumage, acquired by a complete postnuptial (second prebasic) molt.
6. Adult nuptial (second alternate) plumage, acquired by a complete prenuptial (second prealternate) molt as in the first nuptial (alternate) plumage.

Welter (*op. cit.*) disagreed with Dwight concerning the manner of acquiring the first winter (first basic) and the nuptial (alternate) plumages. He noted that juveniles collected in the fall show a molting of both rectrices and remiges, and he stated: "I can find no evidence of a prenuptial molt in the series of specimens examined." He thus concluded that the first winter plumage was acquired by a complete postjuvenal molt and the first nuptial and adult nuptial plumages were not in fact new plumages but aspects resulting from wear only.

In his discussion of *T. p. iliacus*, Bent (*U. S. Natl. Mus., Bull.* 195, 1948; see p. 255) says: "The plumage of birds living in such dense vegetation must be subjected to rather severe abrasion, which might require the renewal of plumage oftener than once a year; and it may be that the prenuptial molt takes place during the late winter or very early spring, before the birds arrive on their breeding grounds. Dr. Witmer Stone (1896) agrees with Dr. Dwight's view, and I have seen some half a dozen specimens, taken in North and South Carolina, Florida, New Mexico, and Mexico, between February 23 and March 28, that show various stages of a complete prenuptial molt. Whether these are adults or young birds I do not know." (The Stone reference cited by Bent is as follows: *Proc. Acad. Nat. Sci.*, Philadelphia, 1896, pp. 108–167.)

Welter does not indicate how many specimens he examined or the localities or dates of their collection. Since the prenuptial (prealternate) molt is completed, or almost

so, prior to northward migration, wrens collected upon arrival on their breeding grounds will provide little, if any, direct evidence of a prenuptial molt, although one may conclude from the unworn appearance of the plumage, as Dwight did, that such a molt exists.

Immature *T. p. griseus* on Sapelo Island begin molting from mid-August to early September and undergo a complete molt at this time. Adults begin their molt in early August. Completion of molts requires three to four weeks and varies from bird to bird. The nuptial (alternate) plumage begins to be acquired in late January or early February by young and adult wrens. This molt is also complete, involving all feathers.

The salt marsh environment is extremely harsh on feathers, especially for a bird that spends more time moving through the salt-encrusted grass than flying over it. The evolution of two complete molts indicates that selection in this environment favored two annual molts over one annual molt, if indeed, the ancestral marsh wren ever underwent a single molt only. Another inhabitant of the same environment, the Seaside Sparrow (*Ammospiza maritima*), undergoes only one annual molt—the postjuvenal or postnuptial (prebasic) and has a single plumage (the basic). By May or June its feathers are extremely worn and tattered. On the other hand, a congeneric relative, the Sharp-tailed Sparrow (*A. caudacuta*), does undergo two complete molts (Dwight, *op. cit.*). The evolution of dissimilar molting patterns in ecologically similar and phylogenetically related species is intriguing.

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