

MOLT AND RENEWAL.

The single annual molt, which is complete, occurs directly after the breeding season in the manner described by Prof. Lynds Jones for this paper: The molt of our common Flicker, as illustrated by four specimens, follows the general law of our smaller land birds, with the differences peculiar to the Pici. In these four specimens there are exhibited some individual peculiarities of no importance except as illustrating the principle stated by Witmer Stone, in his admirable paper on the molting of birds, that there are likely to be individual peculiarities of molt within the species. It is well known that among the Woodpeckers, whose tail is used as a support in clinging to perpendicular surfaces, that the middle pair of tail feathers are the last to be lost, and that they are retained until the next pair has grown to a functional length. Apparently the middle feathers, rather than the outer ones, are retained because they are the strongest and are therefore the best able to sustain the weight of the body unaided by the others. Of the four specimens, two are males and two females. I am unable to decide whether they are birds of the year or old ones. There is no apparent difference in the process of molting of the sexes. In common with most other small land birds, the Flicker first molts the middle row of the abdominal tracts, followed almost immediately by the innermost—the 10th—primary and the outermost greater wing-covert. The 9th primary is next shed, and with it the middle row of the pectoral tracts, the two rows next the middle row of the dorsal tract, the middle of the humeral tract and the lower row of the femoral tract. Next the 8th primary, throat, sides of crown and scattering feathers on the thighs. At this stage the regions of first molt are beginning to show new feathers and the molt of the contour feathers has spread somewhat in all directions. With the 7th primary the next to the middle pair of tail feathers, the whole head except the middle of the crown.

Enough old feathers remain in the crown to form a covering. With the 6th primary the next pair of tail feathers, the outer rows of ventral tracts, middle wing-coverts. With the 5th primary the next to the outer pair of tail feathers, next to the inner secondary, middle of crown. With the 4th primary the outer tail feathers, inner secondary, lower row of lesser wing-coverts, two outer pairs of upper and under tail-coverts. With the 3rd primary the remaining upper and under tail-coverts, outer rows of dorsal tracts. At this point the plumage assumes a smooth, clean appearance, the new feathers almost completely hiding the old ones. With the 2nd primary the middle tail feathers, outer secondary, and inner tertiary drop. With the 1st primary the remaining inner rows of the abdominal tracts and humeral tracts, the remaining lesser wing-coverts, with any other unmolted feathers, are lost, completing the molt. With their renewal the plumage is again complete. The last three primaries—1st, 2nd and 3rd—are molted in rapid succession, the third one being but half grown when the first one breaks its sheath. The slow molt of the tail is characteristic of this order, and is a necessity, as hinted above. As a rule among the small birds the tail feathers are molted practically simultaneously. Almost everywhere over the body some old feathers remain unmolted until the new ones are nearly or quite grown. The old plumage presents a much faded appearance, lacking the marked contrast of the new, and appearing much harsher and coarser, due to the worn tips and edges. At no stage of the molt is there any part of the body entirely bare, nor are the flight feathers molted rapidly enough to hinder flight. During the molt the birds seem to feed largely upon such insects as can be easily caught upon the ground or in the grass, indicating a relatively low state of vital force. As to the time of molt: One of the specimens before me which has the molt fully half complete, was taken on July 5th. Another with the molt complete but with the first primary about two thirds grown, was taken on October 17th. This specimen does not seem to be a bird of the year, the other may be. It is hardly possible that one bird requires all the time from the last week in June to the third week in October to complete the molt and renewal. Probably half that time is amply sufficient.

My series of adult birds relates more to the renewal than to the earlier stages of the molt, and in nearly every particular attest to the correctness of the sequence revealed by Prof. Jones' minute examination. The middle rectrices grow more slowly than the first, second and third primaries, which are shed almost simultaneously and grow rapidly. Three specimens taken on September 26th, two on October 3rd and one October 10th—all at Berwyn, Penna.—show the middle feathers from half grown to almost equal to next pair, while the primaries are complete, although the last sheath has not always disappeared. Of two Georgia specimens taken September 10th, the first shows the 3rd primary three-quarters, the 2nd two-thirds grown and the 1st not shed, central tail-feathers dropped and pin feathers on chin and throat; the other shows the 3rd primary four-fifths, the 2nd and 1st one-half grown, middle pair tail feathers one-half grown, also pin feathers in malar and chin. A June 10th specimen from the same locality, varies in having the outer rectrices one-fourth and four-fifths grown, otherwise apparently complete renewal. This bird must surely have remained unmated or lost its mate early in the season, otherwise it could scarcely have been in so fine a dress at that date. Another peculiar state is represented by a hybrid from Santa Cruz, California, September 3rd, with the 3rd primary one-half, outer secondary three-fourths grown at the same time, next to middle pair of tail feathers molted, malar and forehead just renewed. Apparently the feathers about the head and throat begin to drop early but new feathers develop slowly. The central rectrices are the last important feathers to attain their growth.

The juvenile Flicker molts and renews its entire plumage the first year in common with all Woodpeckers, which are numbered with the few groups among the *Altrices* doing so. It varies little if at all from the adult. Seven Georgia birds but a few weeks at most out of nests, taken between June 28th and July 18th, are in various stages of molt and renewal; the red cap often confined to the forehead. A bird taken July 10th had commenced to molt on nape, malar, breast and rump, the 6th primary almost complete, top of head renewed except forehead, a pair of new feathers of the autumnal dress had appeared on either side of the breast, and all signs of the red

cap had vanished. This bird is in a very ragged condition. I am inclined to ascribe the early disappearance of the red cap to growth and abrasion in a similar manner to the small patches of natal down in which many of the *Altrices* appear, i. e. : the gray feathers growing beneath on the same stem push the red tips upward where they become dead and brittle, rapidly crumbling away. The forehead does not always show signs of molt and possibly may occasionally remain until the following fall.

In Pennsylvania the renewal is complete by the first of October usually, often a week or so earlier.