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SEQUENCE OF PLUMAGES; ILLUSTRATED BY THE MYRTLE WARBLER (*DENDROICA CORONATA*) AND THE YELLOW-BREASTED CHAT (*ICTERIA VIRENS*).

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Plate III.

THE young birds figured on the accompanying plate illustrate a plumage that is common, not only to all North American Warblers, but to many other species of birds at the time of leaving the nest. It is but one stage in a series, and by tracing the development of successive plumages in the two species before us, we shall be able to grasp the idea of sequence, which underlies a true understanding of the relation plumages bear to each other.

There is a downy stage antecedent to the one figured. The young of the Myrtle Warbler (*Dendroica coronata*) while in the nest are scantily clothed with downy filaments, the fore-runners of true feathers, which grow from definite parts of the feather tracts. These are rapidly displaced by new feathers, to the tips of which they adhere for some time. This second stage, generally known as the 'first' or 'nestling' plumage, in the case of the Myrtle Warbler, happens to bear a strong superficial resemblance to that of the adult Pine Finch (*Spinus pinus*), which is heightened by the spray of evergreen on which the artist has posed the bird. The plumage of all young birds is, however, always weak

and soft at this stage, even the flight-feathers being less compactly rounded out terminally and deficient in pigment as compared with those of adults.

Within a few weeks, the plumage of the third stage, commonly known as the 'autumnal,' has replaced that of the second, which is in most species quite evanescent. The flight-feathers, however, are retained throughout the following winter and summer and are not renewed until the first postnuptial molt occurs, about a year after the birds have left the nest. The primaries, their upper coverts, the secondaries (usually the tertiaries), the alulæ, and the rectrices are the only feathers retained of the 'first' plumage. The body feathers assumed resemble closely in structure and pattern those of the adult at the same season, and are worn during the winter until the end of March or April, when together with the wing-coverts they are renewed by a prenuptial molt, young and old becoming indistinguishable except by the worn, dingy wings and tail of the young bird.

The young bird has now reached a fourth stage, the plumage of the first breeding season, which in the Myrtle Warbler is made up of parts of three, — the flight-feathers, matured in the second stage, a few of the third stage, retained chiefly on the posterior parts of the body, and the new feathers assumed in spring.

At the end of the breeding season, the first nuptial, a complete postnuptial molt occurs which renders old and young indistinguishable, adults entering a fifth stage separable from the third chiefly by the blacker wings and tail, and brighter wing edgings, a difference that holds good for a twelvemonth, although it is not infallible and cannot always be made out. The fifth stage of plumage is worn until the following spring when the prenuptial molt occurs, involving only the body plumage and wing-coverts, as in the young bird.

A sixth stage, the adult breeding plumage, is the last one recognizable in the Myrtle Warbler, although it is well to bear in mind that a seventh, corresponding to winter plumage, and an eighth, corresponding to summer plumage, occurs, and so on until the death of the bird. Fortunately this species passes both winter and summer mostly within the borders of the United States so that I have been able to examine large numbers of specimens

taken every month in the year. The sequence of plumages is beautifully shown, and it is time it should be more widely recognized as a concrete fact.

The Yellow-breasted Chat (*Icteria virens*) is in some respects apparently unique among our Warblers. There is the first or downy stage, and the second, which is the one figured on the plate. The yellow spots represent the coming feathers of the third stage, the autumnal or winter plumage. Unlike the Myrtle Warbler, a complete molt, judging from the few specimens available, takes place, including the wings and the tail. No other Warbler of nearly forty species examined exhibits this peculiarity, although it is common enough in other families. This plumage assumed is practically indistinguishable from that of the adult, the black of the lores and suborbital region being as a rule less intense. It is worn without molt throughout the following winter and summer.

Consequently the fourth stage of plumage is simply the third plus a certain amount of inconspicuous wear.

The fifth stage follows the postnuptial molt, and the sixth is the fifth modified by molt. All of these stages may not be traced in all individuals, for the depth of the black of the lores is a variable and slender character, but it will be observed that the sequence of plumages obtains even when we cannot distinguish with certainty one from another.

The lesson to be learned from these two species is a valuable one, and many other species teach the same thing, namely, that plumages succeed each other in definite sequence, those of young birds overlapping in their development. To number the different stages consecutively has obvious disadvantages, and the terms now in common use are inexact, so that some new scheme should be devised to meet the exigencies of the case. As a solution of the difficulty, I offer the following names which conform, so far as is compatible with clearness, to every-day usage already sanctioned.

1. *Natal Down.* This is a first stage, no matter whether the covering of the young bird in the nest be downy or hairy, scanty or abundant, evanescent or persistent.

2. *Juvenal Plumage.* The name I propose as a substitute for 'first' or 'nestling' plumage is definite and suggestive of the

stage it represents, and may not be confused with the 'first winter' and the 'first nuptial' plumages, which seem to be fitting antitheses to 'adult winter' and 'adult nuptial.' At all events, *juvenal* marks a second stage, which is ill suited by the adjective 'first.' It is doffed by a postjuvenal molt.

3. *First Winter Plumage.* In this third stage feathers of adult structure are first assumed, the wings and tail of the juvenal plumage being retained in the majority of our species. It is the 'autumnal' plumage.

4. *First Nuptial Plumage.* This is the breeding dress of young or 'immature' birds and it may be merely the first winter plumage plus wear, or it may be wholly or in part acquired by a prenuptial molt which very rarely includes the flight-feathers, although the tail may be renewed when the wings are not.

5. *Adult (or Second) Winter Plumage.* A complete molt always follows the breeding season and distinctions between young and old birds usually vanish at this time, unless they have done so earlier. In most species, the differences between first and second (adult) winter plumages are inconsiderable, in some the plumage differs widely and several molts occur before the young bird acquires full adult dress.

6. *Adult (or Second) Nuptial Plumage.* This may be acquired every year in exactly the same way as the first nuptial, but there are some species that, after one prenuptial molt, undergo only the postnuptial in succeeding years.

There are many species in which these six plumages or stages may be clearly recognized,—usually less than six can be made out, and very rarely more. 'Third Winter' and 'Third Nuptial' will indicate later plumages, but 'adult' may naturally be substituted as soon as differences between young and old are obliterated.

My scheme, with proper modifications for certain groups of birds, will apply to all North American species, and, with a clear understanding of the process of molt, will explain the puzzling combinations of plumage that are as yet unsolved.



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