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THE PRACTICED EYE

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Changes in latitude, changes in plumage

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AMONG BIRDWATCHERS IT IS axiomatic that the bird you see in the field never looks quite like anything in the book. Unlike many a birding axiom, this one is actually true. The bird really *does* look a little different from its picture. However, this discrepancy is not the fault of the illustrators (or not entirely, anyway). It's just a fact of birdlife. Among birds, as among humans, no two individuals look exactly the same; so even if we had a perfect picture of one, it would not look quite like the rest.

On top of the differences among individuals, there are seasonal changes. Each bird is changing in appearance through the year The kind of change that is most universal among birds is fairly rapid at certain seasons, much more gradual and imperceptibly slow at most times, but it is quite predictable. I'm referring to the changes brought about by molt and wear of the plumage.

Birds are largely covered with feathers, of course. Feathers are incredible structures, very lightweight and very strong, far more complex than the reptile scales from which they probably evolved. But feathers do gradually wear out, and need to be replaced. Although there are exceptions, in general a healthy wild bird will replace each of its feathers at least once per year. The process of replacement is called "molt." This *Practiced Eye* looks at the visible results of plumage change, and at the timing of molt as it relates to the timing of migration.

Molt is a very orderly process. The feathers are replaced only a few at a time, not all at once (which is why we don't see a lot of naked birds wandering around). The all-important flight feathers of the wings and tail are replaced in a very precise sequence—especially the primaries, the longest feathers on the outer part of the wing. Molt of the primaries typically proceeds from the innermost to the outermost, and the next feather in line will not drop out until the previous one is partly re-grown, so that there is never more than a minor gap in the surface area of the wing. (However, in some birds, notably many of the ducks, all of the flight feathers are dropped at once, so that the birds become completely unable to fly until the new flight feathers grow in.)

A bird's body feathers and head feathers do not have such critical importance for flight. Birds wear those feathers for about the same reasons that humans wear clothes: for protection against the elements, and for looks. So the replacement of the head and body plumage does not have to be so carefully engineered, and it does not happen in such a precise feather-by-feather sequence. Still, the timing of the change is quite predictable.

What time of year does the molt take place? That varies by species. It depends, to some extent, on what else the bird has to do at a given season.

Molting—growing all those new feathers—apparently burns up a fair amount of energy. Raising young can also require a lot of energy (as many birders may know, from their own experience). And for those birds that are not permanently resident somewhere, migration is another big energy drain. It would not make sense for a bird to be involved in two of these energetically demanding activities at the same time. Thus, there is a strong tendency for birds not to molt while they are either nesting or migrating.

Any migratory bird, especially a long-distance migrant, has a lot of demands placed on its time and energy during the course of the year. Evolution has pulled off a pretty good juggling act, it seems, in arranging to fit the molt into the bird's busy schedule.

At this point the reader might say: Well, these questions of "molt strategy" may be all very interesting to the

Figure 1. The champion long-distance migrant among the warblers is also among the ones that show the greatest seasonal change in appearance. These two views of the same male Blackpoll Warbler will demonstrate that it looks like two entirely different species during spring migration (upper left) and fall migration (lower right). Just prior to its spring migration, it has gone through a partial molt: essentially all of the head and body feathers have been replaced. Just before its fall migration, it has gone through a complete molt: all of its feathers have been replaced, including the flight feathers of the wings and tail. Note that on the fall bird, the feathers of the wingtip are glossy black with narrow white tips. By spring, these feathers will have faded somewhat, and the white tips will be worn away.

biologist, but why is this important to the field observer? The reason is that the molt changes what the birds look like. This seasonal change can cause a lot of confusion for birders; but the situation becomes far less confusing if we understand some of the basic facts about molt and wear.

Every species has its own timing and pattern of molt. But for adult songbirds in North America, it's typical for a *complete* molt to take place in late summer or fall, after they are finished with the breeding season. The activities of raising young—nest-building, incubating, hustling about through the vegetation to find enough food for the young and for themselves—might produce more wear and tear on the plumage than any other season. Therefore, a new coat of feathers might seem like a good idea.

An adult of a species like the Blackpoll Warbler (*Dendroica striata*) (Figure 1) will go through a complete molt in late summer, replacing every one of its feathers over a period of a month or two. All of its flight feathers will be fresh and new for the long southward flight. All of its head and body feathers will be new, too. This will be apparent even to observers in the field, because the pattern shown by the bird in fall is strikingly different from that of spring and summer, especially in the male. (This should be a hopeful thought for anyone who feels daunted by "confusing fall warblers." Confusing they may be, indeed, but at least they are all in nice fresh plumage!)

This same Blackpoll Warbler will go through another molt in late winter, before migrating north. This molt is a partial one, involving all (or most) of the head and body feathers, but not the flight feathers on the wings and tail. As a result of this molt, the female becomes less yellowish (more olive-gray and white), and the male develops his striking black-and-white pattern (with the black crown that gives the species its English name). The spring bird

might seem more crisply patterned overall; but a careful look at the wings shows that they are a little less sharply contrasted in spring than in fall.

It may be coincidence, but the Blackpoll's most demanding flights of the year are in fall, when it makes a long overwater passage to northern South America. In spring, the bird seems to migrate in a series of shorter hops, stopping off in the Antilles and Florida as it moves north. So it seems that its flight feathers are in their very best condition precisely when they need to be.

This general type of molt—with a complete molt in fall, and a partial one in spring—happens in many species. Most birds that look distinctly different in summer and winter are acquiring their different plumages through this kind of molt. But this is not the only possible way.

To cite an exception involving a familiar bird, the European Starling (*Sturnus vulgaris*) has only one molt per year. Why, then, is it mostly solid black in summer, and profusely spotted with buffy-white in winter? Because those pale spots are at the tips of feathers. When the fresh new plumage grows in during early fall, those spots are big enough to cover a lot of the bird. But the pale area has a slightly different consistency from the rest of the feather, not as solid or durable. As the buffy-white tip of each feather wears away during the winter, the starling gradually shows more and more of the underlying glossy black of its spring finery. So the starling gets the equivalent of two plumages for the cost of one molt.

The Bobolink (*Dolichonyx oryzivorus*) is unusual among songbirds in having two complete molts per year, but the male Bobolink can give the impression of having three different seasonal plumages as a result (Figure 2). The winter pattern, buff with black streaks, is replaced in a com-

Figure 2. The Bobolink, another long-distance migrant, is among the few songbirds with two complete molts every year. Illustrated here are three different patterns that might be shown by the same male during the course of one year. Left: a typical fall male in September. This bird has gone through a complete molt before leaving the breeding grounds. Some adults, however, may go through a partial molt in late summer and then migrate south in a "patchwork" plumage, completing the molt on the wintering grounds. Center: a male in early April. It has just finished molting and has begun its northward migration. All the feathers are new, except for a few head feathers that will not be replaced until the bird arrives on the breeding grounds. Right: the same male in early June. A few brownish feathers on the head have been replaced by black ones. Most of the change, however, has come about as the buffy-white spots on the underparts and head have worn away during the spring.

plete molt in late winter. But the male's fresh new plumage does not look quite like the familiar summer pattern. Much of the black on the underparts, and much of the black and yellow on the head, are veiled with extensive buffy feather tips, which will gradually wear away during the long northward migration. In addition, some of the feathers may not be molted until the bird arrives on its nesting territory.

Up to this point, the birds I've used as examples all show obvious seasonal change. But every bird molts, so gradual wear and then fresh replacement of feathers should be visible on any bird that we watch through the year. Figure 3 shows two views of Hammond's Flycatcher (*Empidonax hammondii*) at different seasons to illustrate this point. In fresh plumage, the bird looks far more attractive and "colorful" than it does when it is heavily worn and faded.

Timing of molt can even contribute to field identification. Dusky Flycatcher (*Empidonax oberholseri*) overlaps in breeding range with Hammond's in the western mountains, and in mid-summer they look almost identical in color (or lack of it). But Dusky Flycatchers do not molt until they reach their wintering grounds; they slink southward in their drab, abraded plumage. Hammond's Flycatchers remain on the breeding range while they complete their molt in late summer, so they migrate south in their best-looking plumage of the year. Adult Hammond's and Dusky flycatchers in September look about as different from each other as any two species of Empidonax ever do.

Acknowledgments

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Figure 3. Even when a bird is not considered to have distinct seasonal changes in plumage, it may look noticeably different depending on whether the plumage is in fresh or worn condition. These two views of Hammond's Flycatcher illustrate that point. Top: adult in late June. The plumage is worn and faded, with no real colors remaining aside from shades of gray. In this stage, the bird looks so bad that it lives up to the nightmare image that many birders have of the Empidonax flycatchers! Actually, this bird will look even worse by mid-July, as the feathers become even more worn, and then the process of molt begins; unlike many flycatchers, Hammond's goes through a complete molt before migrating south. Bottom: adult in mid-September. With its molt completed, the flycatcher begins its southward migration in brand-new fresh plumage.