New Terminology Will Help You Understand Molt

Peter Pyle

I've often wondered how fully banders understood molt in birds. This is not to be critical of banders; to be frank, it took me something like ten years of thinking about it before I even began to get a grasp. We have a good excuse: the terminology has been inexcusable. On my way to the WBBA meeting in Montana last August, I sat on the plane and listed all the molt terms that I could think of. Are you ready?

Abridged, Adult Nonbreeding, Arrested, Ascendent, Biannual, Centrifugal, Centripetal, Complete, Convergent, Definitive, Descendent, Distal, Divergent, Eccentric, Incomplete, Irregular, First Nonbreeding, First Prebasic, First-summer, First-winter, Limited, Partial, Postjuvenal, Postnuptual, Prealternate, Prebasic, Prebreeding, Prenuptual, Presupplemental, Protracted, Proximal, Seasonally Divided, Serially Descendent, Simultaneous, Suspended, Violent

It reminded me of using a Microsoft Windows Program (e.g. Word) when a simple old DOS version (PC-Write) would be much simpler to use and less dysfunctional. But, rest assured, help is on the way in the form of, if you can believe it, a **new molt term**. First, though, we need to discuss why the "Humphrey-Parkes" terminology should be used in place of older terminologies.

Traditional molt and plumage terminology was based on life-history events within the annual cycle of northern-hemisphere birds. Thus we had terms such as *post-juvenile, post-nuptial*, and *pre-breeding* molts and *immature, subadult, first-summer,* and *second-winter* plumages. On the surface this was fine, and fairly understandable. But as we learned more about different molt strategies and plumage sequences, serious problems began to arise.

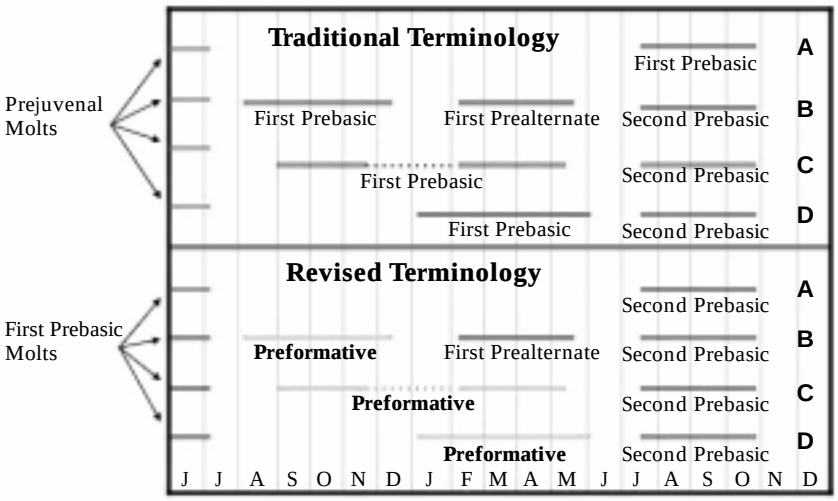

FIGURE 1. Traditional and revised (by Howell et al. 2003) H-P molt terminologies in A) Sooty Shearwater, B) Yellow Warbler, C) Swainson's Thrush, and D) Herring Gull. Note that the prejuvenal molt is now called the first prebasic molt, the variable (sometimes absent) molt within the first cycle is now called the "preformative" molt, and the complete or near-complete molt at about a year of age is now called the second-prebasic molt in all species.

Some of the above terminologies were originally proposed by Jonathon Dwight in the early 1900s based on studies of molt in passerines that occurred in New York. As it turns out, the species covered by Dwight seemed to have pretty conventional molt strategies, at least if you ignored (or in Dwight's case, lacked knowledge about) what happened on the winter grounds of neotropical migrants. But when ornithologists started investigating the molts and plumages of long-lived non-passerine species, equatorial species, and species that do not necessarily breed only once per year (some doves) or breed every other year (some albatrosses), they began to run into trouble. For example, the "post-breeding molt" of most North American landbirds often involves a complete molt of body feathers during the summer, after breeding. But in some species such as hummingbirds, kingbirds, swallows, and Red-eyed Vireos, adults fly south in worn plumage and the molt occurs in the tropics, sometimes during or spanning the first spring just before they fly north to breed again. Should this molt, then, be termed the "post-breeding" or the "pre-breeding" molt? And what plumages, exactly, are covered by terms such as "immature" and "subadult"? Furthermore, is a June Song Sparrow, hatched 1.3 years earlier in March of the previous year, in its "first-summer" or "second-summer" compared to one hatched nine months earlier in September? In a nutshell, the more we learned, the less tenable the traditional terminology became.

In 1959 Phil Humphrey and Ken Parkes proposed to fix things by coming up with an entirely new terminology. Their now-famous "H-P" terminology defines terms simply on the molt patterns of birds, irrespective of seasons, plumage coloration, and other life-history events. It also attempts to align the terminology of molts such that, when we compare molts in different species or different ages within a species, we know that we are talking about equivalent molts. Their goal was to standardize the terminology in order to study the evolution of molts and plumages in birds. Under the H-P system, all adult birds have a "prebasic molt" once per "molt cycle" in which most or all feathers are replaced. In most northern-hemisphere passerines this molt occurs in the late summer, just after breeding, and it is complete. In other groups, this molt may occur once every nine-months (e.g., Sooty Terns on the equator that breed at nine-month intervals), may occur just prior to breeding (as noted above), or may be suspended or incomplete based on the constraints of a long breeding season or migration (pelicans, raptors, and sapsuckers). But the building block is there, a prebasic molt and molting cycle, on which to base additional terms.

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Many species have a second molt within the molting cycle. Under H-P terminology this is called the "prealternate molt". In order to have a prealternate molt, some follicles have to be activated more than once within a cycle. Thus a bird, say a Peregrine Falcon, Common Nighthawk, Eastern Wood-Pewee, or Purple Martin, that begins its prebasic molt on the summer grounds, suspends molting for migration, and completes it on the winter grounds, without having replaced any feather more than once, does not have a prealternate molt. True prealternate molts occur in such species as Black-bellied Plovers, Bay-breasted Warblers, and Scarlet Tanagers (to replace drab camouflaged winter plumage with bright attractive breeding plumage) or in Marsh Wrens, Least Flycatchers, and Savannah Sparrows (to replace feathers that have become frayed or worn by harsh vegetation or intense exposure to the sun). In all of these cases, feathers that were replaced during a prebasic molt are replaced for a second time within the molt cycle, during the prealternate molt.

The H-P terminology has lived up to its billing and, despite the arguments of a few traditionalists, most ornithologists now recognize its value and have started to use it. But as it turns out, some tweaking was needed, as recognized by Humphrey and Parkes when they originally requested "that critics provide for us and for other students of plumage succession an improved conceptual and terminological framework within which we may all continue productive research in this promising and important field of ornithology." Well, OK, here goes.

The problem with the H-P system is that they based their entire terminology on the molt cycles of adult birds, where it worked well, but when they tried to apply it to the first molt cycle, it fell short. The issue involves how to treat the limited to partial (sometimes complete) "post-juvenile" molt that occurs in most but not all species and replaces a variable number of juvenal feathers at some time preceding the first complete molt. Because the timing of this molt was often similar to the timing of adult prebasic molts, and often resulted in similarly colored plumages, Humphrey and Parkes called it the "first prebasic molt". This turned out to be a mistake in several respects.

To begin with, the "post-juvenile" molt is so variable (Figure 1) that in most cases it cannot be compared at all with subsequent pre-basic molts of the same species, which usually are complete and occur at regular intervals. Second, some species such as seabirds and raptors lack a "post-juvenile" molt, which means that the first complete molt was termed the first prebasic molt, even though it appears to be homologous with the second prebasic molt of most other species. Third, terming this the "first prebasic molt" implies that the first molt cycle begins with this molt, even though birds molt feathers before this cycle, during the prejuvenal molt or, with some species such as Indigo Bunting, during a limited "presupplemental molt." Finally, in some species, e.g. among cormorants and gulls, the first ("post-juvenile") molt appears to be analogous to the prealternate molts of adult birds rather than to the prebasic molts, and so it should not be called the "first prebasic molt.".

Steve Howell and Chris Corben, while trying to figure out molt terminology in gulls, came up with a brilliant solution. Why not call the complete "prejuvenal" molt, during which a bird acquires its first full feather coat, the "first prebasic" molt. The only difficulties appear to be a need to switch mind sets, which in this age of planned obsolescence we all need to do frequently anyway, and the need for a term for the molts that occur within the first cycle. Howell et al. succinctly summarized the benefits of this new terminology in the Condor (105:635-653, November 2003), and proposed that all molts (usually just one but sometimes two) found within the first cycle but not within subsequent cycles can be termed **Preformative Molts**, producing **Formative Plumages.** As can be seen by looking at Figure 1, an order presents itself that was absent before.

I have taught a lot of banding workshops in the past several years. Before the new terminology, it seemed I was striking out when trying to teach concepts of molt to beginners in my classes. Over and over I would have to explain how, why, and where the "first prebasic molt" differed from the "second pre-basic molt." The fact that both of these entirely different phenomena were called "prebasic molts" left us all in a daze. But now, when I speak of the **preformative molt**, we are instantly on the same page, and it is remarkable how this one little change has helped foster an easier understanding of molts and plumages in birds. For passerine banders this is important, as all of the molt action resulting in our ability to accurately age birds SY and ASY in spring (see Maps Chat #5, April 2001, and James Saracco's article in this issue), occurs during the first cycle.

But now I'm hearing a new lament: "how can we teach molt to beginners when the Identification Guide uses the old terminology?" I recommend that banders 1) scratch out "first prebasic" and replace it with "preformative", and 2) change the first line under molt from, for example, "PB: HY partial... AHY complete" to "PF: HY partial..., PB: AHY complete." There is no need to change "Juvenal" to "First basic" as, under the new system, these terms are interchangeable, "Juvenal" remaining as previously defined. These steps will greatly help you understand molt and, thus, accurately age your birds.

Join Your Regional Banding Association

Are you familiar with your regional banding associations? The Western, Inland, and Eastern Bird Banding associations welcome you to join them and be part of the banding community in your region. Please visit their websites for more information:

Western Bird Banding Association:
http://www.westernbirdbanding.org

Inland Bird Banding Association:
http://www.aves.net/inlandbba/

Eastern Bird Banding Association:
http://www.hancock.net/~bpbird/

Changes in the Use of the "Adults Only" (Now Called "Molt Limits and Plumage") Fields: A More Intuitive and Informative Approach to Ageing Birds

James Saracco

The accurate ageing of birds is essential for deriving meaningful indices and estimates of population parameters from MAPS data. With some practice, MAPS banders that carefully consider molt limits and plumage patterns should be able to age many adult birds of most species as SY or ASY. By recording data on the specific feather tracts or non-feathered body parts used in making these age determinations, MAPS banders allow IBP staff to assess the reliability of ageing criteria and the accuracy of banding records. The MOLT LIMITS & PLUMAGE fields[1] of the MAPS banding-data sheets are used for this purpose – at least one of these fields *must* be filled in for all adult birds aged more specifically than AHY (i.e., SY, ASY, TY, or ATY), as well as for any birds (including birds aged AHY or HY) aged by molt limits or plumage (i.e., any time 'L' or 'P' is used in HOW AGED).

For 2004, IBP staff biologists have developed a new set of molt limit and plumage codes for use in the MAPS program. These are based on codes that have recently been employed in IBP's new winter banding programs (see article on page 5), MoSI (Monitoreo de Sobrevivencia Invernal in Mexico, Central America, and the Caribbean) and MAWS (Monitoring Avian Winter Survival in southern United States). The new codes, rather than designating *age-classes*, indicate the *feather generations* present within particular feather tracts (molt terminology follows Howell et al. 2003; see Peter Pyle's article on pg. 2 for more information). For non-feathered body parts, the new codes indicate whether adult or juvenal characteristics are suggested. Eight codes are possible.

During the MAPS season, the use of the following three codes for feather tracts found on an adult bird prior to its prebasic molt (= "adult prebasic molt" in Pyle 1997) indicates that it is a SY bird; the use of these codes to describe feather tracts on a young bird after its preformative molt (= "first prebasic molt" in Pyle 1997) confirms that it is a HY bird:

J – Juvenal. Feather tract comprised entirely of retained juvenal feathers or non-feathered body parts.

L – Molt limit. Molt limit within the feather tract between juvenal and formative feathers (note that "formative" = "first basic" in Pyle 1997).

F – Formative. Feather tract comprised entirely of formative feathers or a mix of formative and alternate feathers.

In previous years, when we coded an adult bird prior to is prebasic molt, we used a single code, "5" (to indicate SY), for each of the above three situations, although "1" (to indicate AHY) may have been used where we now use "F". The disadvantage of this former coding strategy is that information is lost as to whether any (or all) feathers within a tract were replaced during the preformative molt.

Three additional codes apply exclusively to older birds (ages indicated below):

B – Basic. Feather tract comprised entirely of basic feathers (or a mix of basic and alternate feathers). This code is also used for non-feathered body parts with characteristics indicative of an adult bird. The use of this code during the MAPS season for feather tracts on an adult bird prior to its prebasic molt would indicate that it is an ASY bird; the use of this code to describe feather tracts on an adult bird after its prebasic molt would

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EXAMPLE 1 – SY male Audubon's Warbler (right wing in Froehlich's Fig. 12)

		MOLT LIMITS & PLUMAGE							
AGE	HOW AGED	PRI. COVS	SEC. COVS	PRIMARIES	SECONDS	TERTIALS	RECTRICES	BODY PLUM.	NON-FEATH.
5	L	J	F	J	J	J			

Three feather generations are visible in this Audubon's Warbler wing: juvenal, formative, and alternate. The alternate feathers, however, are not useful for ageing because the prealternate molt is similar in both SY and ASY birds. The molt limit that allows us to confidently age this bird as SY is between the narrow, browner, and more heavily worn juvenal primary coverts (coded "J") and the outer formative greater coverts (coded "F"), which are fresher with duskier centers. The presence of these two feather generations is the result of a partial preformative molt, which is unique to HY/SY birds. The How Aged code for this bird is "L", due to the molt limit between feather tracts. Although a bit more difficult to see in this photo, the remiges (primaries and secondaries) are similar in gloss (dull) and color to the primary coverts. Thus, we code these three tracts "J", as well. Because this particular bird no longer has a body, the remaining fields are left blank.

only indicate an AHY bird. This code can be used in combination with "R" or "M" (below) in other tracts for more precisely aged birds.

R – Retained. Both juvenal and basic feathers are present within the tract (e.g., as occurs in many woodpeckers). The use of this code during the MAPS season on an adult bird prior to its prebasic molt would indicate a TY bird; after its prebasic molt, it would indicate a SY bird.

M – Mixed. Multiple generations of basic feathers are present in the tract (again, as might be the case for many non-passerines, such as woodpeckers). The use of this code during the MAPS season prior to the prebasic molt would indicate an ATY bird; after the prebasic molt, it would indicate an ASY bird.

The following code, which can be used during the MAPS season (prior to the prebasic molt) to distinguish adult (AHY) from young (HY) birds, is generally not useful for ageing adult birds to more specific age classes (i.e., SY, ASY, TY, ATY).

A – Alternate. *All* feathers in the tract are of alternate plumage; if *any* formative or basic feathers are present in the tract, use "F" or "B", respectively, instead.

Finally, the following code will be used for feather tracts examined, but not meeting any of the above criteria:

U – Unknown. Any feather tract or non-feathered body part that is examined, but that shows ambiguous characteristics or that cannot be coded with confidence.

To complement the new set of MOLT LIMITS & PLUMAGE codes, an additional HOW AGED code will be included in the MAPS protocol in 2004. The new code, "L" (for molt Limit), will be used for birds whose age is based on the *presence* of a molt limit. Birds without molt limits, but with

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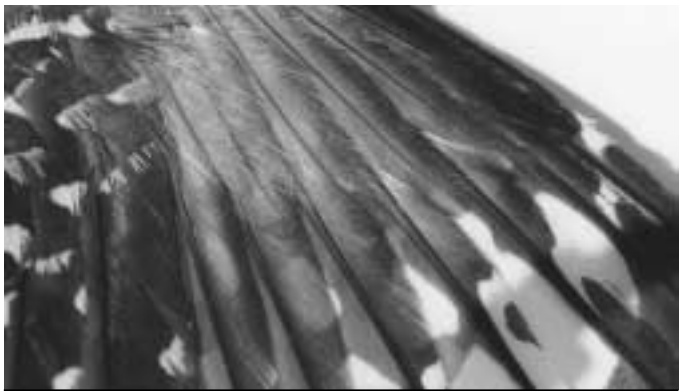
EXAMPLE 2 – SY male Indigo Bunting (Froehlich's Fig. 17)

		MOLT LIMITS & PLUMAGE							
AGE	HOW AGED	PRI. COVS	SEC. COVS	PRIMARIES	SECONDS	TERTIALS	RECTRICES	BODY PLUM.	NON-FEATH.
5	L	J	F	L	J	F			

As in Example 1, this Indigo Bunting shows a clear contrast between the juvenal primary coverts and the formative (and alternate) secondary coverts. As such, it can be aged SY by the molt limit (L) between feather tracts. In this bird, however, there are two other molt limits by which it could have been aged. First, due to an incomplete (eccentric) preformative molt there is a molt limit within the primaries. The outer five replaced primaries have dark shafts that clearly contrast with those of the inner retained primaries. Because both the juvenal and formative feather generations are present within the primaries, it is coded "L" to indicate a within-tract molt limit. Finally, there is a molt limit between the retained juvenal secondaries and the replaced formative tertials. Thus, this bird could have been aged by any of these three molt limits. Note that the innermost blue-edged alternate greater coverts are not recorded or used for ageing this bird.

EXAMPLE 3 – TY male Downy Woodpecker (Froehlich's Fig. 26)



		MOLT LIMITS & PLUMAGE							
AGE	HOW AGED	PRI. COVS	SEC. COVS	PRIMARIES	SECONDS	TERTIALS	RECTRICES	BODY PLUM.	NON-FEATH.
7	L	R	B	B					

Here we have another example of a bird with a molt limit within a feather tract. The pattern of primary covert replacement in this Downy Woodpecker is typical of all North American Woodpeckers. The retained juvenal inner primary coverts are easily distinguished from the molted basic outer two primary coverts. The two generations of feathers present in this tract are juvenal and basic (code "R"), not juvenal and formative (which would be code "L"), and indicate that the bird is in its third calendar year (age = 7). The primaries are basic feathers (code "B"), as are the secondary coverts (assuming that all secondary coverts have been replaced, as is typical according to Pyle 1997). As in the previous examples, this bird is aged by "L" due to the presence of a molt limit.

EXAMPLE 4 – ASY male Prothonotary Warbler (Froehlich's Fig. 20)

			MOLT LIMITS & PLUMAGE							
AGE	HOW AGED		PRI. COVS	SEC. COVS	PRIMARIES	SECONDS	TERTIALS	RECTRICES	BODY PLUM.	NON-FEATH.
6	P		B	B	B	B				

As a final example, consider this male Prothonotary Warbler. It is an adult that underwent a complete prebasic molt during the previous summer/fall. All feathers visible in this photo are relatively uniform in appearance, with similar gloss and wear, and with little color contrast. In addition, the feathers show typical adult-like characteristics. For example, the primary coverts are broad with distinct broad bluish edging. There are no molt limits evident. Thus the bird can be aged ASY by plumage, "P". All of the fields examined are coded with "B"s to indicate that they all are basic feathers.

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distinct age-specific plumages, will continue to be aged by the code "P" (plumage). Although this new system increases the number of potential codes to be considered by banders, its use should be more intuitive because it is based on familiar plumage cycles, rather than on descriptions in species accounts, which are incomplete (and variable) for some Nearctic-breeding species and non-existent for most Neotropical resident species. On pg. 3 and 4, I present a few example photos reproduced from Froehlich (2003) to illustrate the use of this new system for situations likely to be encountered by MAPS banders. All photos show birds captured in spring or summer prior to their preformative or prebasic molts.

These examples represent just a few of the situations that will be encountered by MAPS banders during a typical field season. I recommend coding the remaining photos in Froehlich (2003) to gain further practice using the new system. There are also many photos on the web that can be useful for this purpose (in particular, check out Powdermill Nature Reserve's website: www.westol.com/~banding/ index.htm). With a little practice, the transition to this new system should be relatively painless for most banders. Ultimately, we feel that the new codes will prove relatively simple for most banders to use and should encourage the collection of more consistent molt and plumage data.

[1]These fields were previously titled "ADULTS ONLY." On the 2004 MAPS banding-data sheets, the number of fields will be reduced from 10 to 8 (head, upperparts, and underparts will be combined into one field, "Body Plum.").

LITERATURE CITED

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AGEING NORTH AMERICAN LANDBIRDS BY MOLT LIMITS AND PLUMAGE CRITERIA
A Photographic Companion to the Identification Guide to North American Birds, Part I

by Dan Froehlich

Slate Creek Press, POB 219, Bolinas, California 94924.

This companion to the ID Guide contains 32 color photographs of landbird wings illustrating molt limits and ageing techniques. Pointers on each photograph indicate molt limits among and within the primary and secondary coverts, primaries and secondaries. See the IBP website, www.birdpop.org, for information on ordering this very useful photographic companion.

Several of the figures from the photographic companion are used in Jim Saracco's article on page 3, and the correct way of recording MAPS data is presented for each figure. We encourage you, if you have a copy of the photographic companion, to go through the remaining figures and record the data using the new system. It will give you an idea of what to expect in the field this coming summer. We can provide the correct data for all the figures in the photographic companion to anyone who requests them. Just email Danielle Kaschube, MAPS Coordinator, at dkaschube@birdpop.org.

Have You Heard About The North American Banding Council (NABC)?

Banders have come together in this organization to "promote sound and ethical banding principles and techniques." Who doesn't want to encourage that? Please visit the NABC website and find out more about this important organization, http://www.nabanding.net/nabanding/