

Definitions for Understanding Molt

Information From Peter Pyle's Identification Guide to North American Birds Volumes I & II.

Extent of Molt

Complete – All feathers replaced

Incomplete – Most to all body feathers and coverts and some flight feathers

Partial – Most to all body feathers and some to all coverts

Limited – Some body feathers, but no coverts or flight feathers

Other important terminology

Plumage – One or more generations of feathers following a molt for which the plumage is typically named after (i.e., definitive prebasic molts produce definitive basic plumages).

Plumage aspect – General appearance of given plumage (i.e., fresh/worn, bright/dull).

Molt cycle – Period of time between initiation of one prebasic molt and the initiation of the subsequent prebasic molt (*see molt cycles*).

Definitive basic plumage – The basic plumage for which the aspect doesn't discernibly change further with age (typically after second prebasic molt in songbirds).

Molt Limit - A boundary between two feathers produced by two different molts. This can occur between or within feather tracts.

Pseudolimit - A gradient or sharp change in colour between two or more feathers within a single tract that looks like a molt limit, but is not.

Molt Patterns and Sequences

Typical Sequence - The molt begins with the tertials, greater coverts (more or less all at once) inner primaries (and corresponding primary coverts) proceeding distally (*away from the body*). Once the tertial molt has been completed, the secondaries begin molting proximally (*towards the body*) starting from the outermost secondaries. Rectrices are replaced centrifugally (from central to outer feathers) during primary and secondary molt.

Arrested Molt - This molt occurs when a typical sequence is followed but stopped before all flight feathers are replaced. This generally leads to retained consecutive inner secondaries and outer primaries. An arrested molt is stopped permanently until the next molt begins while molts being suspended are halted temporarily. In some species that undergo arrested molts (e.g., woodpeckers) primary coverts may not be replaced with corresponding primaries as is common in the typical molt sequence.

Eccentric Molt - An incomplete preformative molt pattern where replacement of flight feathers starts mid primaries and mid secondaries, with molt centers typically between p3-p7 and s2-s5. Flight feather replacement then proceeds distally in the primaries and proximally in the secondaries. This results in a block of retained inner primaries and outer secondaries (e.g., some Wrens and Flycatchers).

Suspended Molt - Molt stopped before it has been completed and continued at a later date, but generally before the start of the next molt. This can occur over a period of breeding, migrating or when conditions do not allow it (i.e., not enough food). Some staging species, Crossbills & Mourning Doves can do this.

Staffelmauser Pattern - A pattern common in birds with long wings or birds that can't afford to significantly impede their flying abilities. In this pattern two or more simultaneous replacement sequences, or "waves" take place within the primaries and/or secondaries. The typical pattern begins with the second prebasic molt commencing at s1 and s5 (and continuing proximally) and from p1 (and continuing distally) and *arresting* before it has completed. The third prebasic molt then begins where the second left off and additional waves start at the molt centres s1, s5 and p1. Subsequent molts continue where the last left off with additional waves beginning at s1, s5 and p1 molt centers.

Molt Cycles

Basic molt cycle (simplified to molt cycle) – The time periods between the beginning of one prebasic molt and the beginning of the next.

First molt cycle – Period between initiation of first prebasic molt* (prejuvinal molt) and initiation of second prebasic molt.

Second molt cycle – Period between initiation of the second prebasic molt and the initiation of the third prebasic molt.

Definitive molt cycle – Period between definitive prebasic molts that produce definitive basic plumages (i.e., plumages with aspects that do not discernibly change further).

Molt types

Prebasic molts (produce basic plumages) – The molts that are present, and delineate molt cycles in, all birds (typically complete in songbirds). These include the (i) prejuvinal molt {first prebasic molt}, (ii) second prebasic molt and (iii) definitive prebasic molts.

(i) *Prejuvinal {first prebasic} Molt* (produces juvenal {*first basic*} plumage)* - The first molt that all birds go through. This molt is complete and is generally conducted at a faster pace than other molts. This results in poorer quality feathers that are susceptible to wear.

(ii) *Second prebasic molt* (produces second basic plumage) - First molt in the second molt cycle. Typically complete and the first definitive molt in songbirds.

(iii) *Definitive prebasic molt* (produces definitive basic plumage) - A prebasic molt that results in a basic plumage for which the aspect doesn't discernibly change further with age. Typically second prebasic molts, along with the subsequent prebasic molts (third, fourth...etc). are considered definitive as they produce basic plumages that cannot be identified to cycle (i.e., can't be told apart).

Inserted Molts (produce inserted plumages) - A molt Inserted into molt cycles over evolutionary time that are typically less than complete. Inserted molts include (i) prealternate molts, which produce alternate plumages, (ii) preformative molts*, which produce formative plumages and (iii) presupplemental** molts, which produce supplemental plumages.

(i) *Prealternate molt* - A common inserted molt that, in many taxa (including songbirds), has evolved to produce a showy 'breeding plumage' for display purposes. Typically limited to partial it takes place during the spring for temperate, northern hemispheric breeding songbirds.

(ii) *Preformative molt** - An inserted molt within the first cycle that is present in most species. It serves to replace weaker juvenal feathers with stronger and more durable formative feathers. Preformative molts are typically partial to incomplete in songbirds.

(iia) An *auxiliary preformative molt*** is a molt inserted into the first cycle of some species that undergo a preformative molt. This isn't a common molt in songbirds.

(iii) *Presupplemental molt*** - A molt typically inserted into definitive cycles that can be hard to distinguish from prealternate molts.

Molt Strategies

At BBO we typically encounter CBS & CAS

Simple Basic Strategy (SBS) - No inserted molts (only prebasic molts)

Complex Basic Strategy (CBS) - Only one inserted molt (during the first cycle)

Simple Alternate Strategy (SAS) - Equal number of molts, and more than one molt, in all cycles

Complex Alternate Strategy (CAS) - More molts in the first cycle than in subsequent cycles, and more than one molt in all cycles

Footnotes:

*In Pyle I (and literature published prior to 2003) the *Prejuvenal Molt (First Prebasic Molt)* is referred to only as the *Prejuvenal Molt*. Instead, when the *First Prebasic Molt* is mentioned, these resources are in fact referring to the *Preformative Molt*.

**In Pyle I (and literature published prior to 2003) *Presupplemental Molt* refers to *Auxiliary Preformative Molt*. *Presupplemental Molts* (in their current understanding) aren't mentioned in Pyle I, but are instead detailed in Pyle II.