An Eccentric Preformative Molt in Eastern Towhees

ABSTRACT

*We describe an eccentric preformative molt in Eastern Towhees (*Pipilo erythrophthalmus*) based on one capture and two specimen records, out of 27 total formative-plumaged birds examined from Louisiana. The hypothesis that southern populations of birds may, on average, have more extensive preformative molts than in northern populations, is supported by our findings.*

The molt sequence in the Eastern Towhee (*Pipilo erythrophthalmus*) is in many ways similar to other sparrows (Emberizidae) and migratory passerines, with an inserted molt in the first cycle (the preformative molt, *sensu* Howell et al. 2003) that takes place soon after fledging. Pyle (1997a) and Greenlaw (1996), following Dwight (1900) and Sutton (1935), describe the preformative molt in Eastern Towhees as being partial to incomplete, including usually all greater coverts, often 1–3 tertials, and zero to all rectrices, but not including other secondaries, primaries, or primary coverts, resulting in molt limits between the tertials and secondaries, between the greater and primary coverts, and sometimes among rectrices. There are also often molt limits visible between the lesser and greater alula feathers (Mulvihill 1993). Here we describe a more extensive preformative molt in some Louisiana Eastern Towhees, involving an eccentric primary feather replacement pattern.

On 8 Oct 2012, we captured two Eastern Towhees, a male and a female, at Bluebonnet Swamp Nature Center in Baton Rouge, Louisiana. Both birds were aged as hatch-year (HY), in formative plumage using molt-limit criteria. The female had brown tones to the iris and had replaced all greater coverts, the lesser alula, tertials (= inner secondaries, s7-9), and all rectrices, but surprisingly had also symmetrically replaced the five outer primaries (p5-9), as in an eccentric pattern (Fig 1). These replaced primaries were clearly darker brown and fresher than the retained primary coverts, inner primaries, and outer secondaries. At least nine species of Emberizidae have been documented to have eccentric molt limits following a preformative molt (Pyle 1997b); therefore, it should not be unexpected to find this in other members of the family. To our knowledge, an eccentric pattern of molt has not been described for the Eastern Towhee, making our description the first confirmed example of eccentric molts found among towhees in the genus *Pipilo* (Pyle 1997a).

To explore how regular eccentric primary replacement might be in Eastern Towhees, we examined specimens at the Louisiana State University Museum of Natural Sciences, as Eastern Towhee is rarely captured at Bluebonnet Swamp. We examined 69 specimens collected in Louisiana, 25 of which were in formative plumage. These were collected in Louisiana in November (n = 2), December (n = 2). January (n = 5), February (n = 7), March (n = 2), April (n = 1), May (n = 1), June (n = 2) and July (n = 3). Specimens collected from March through July may have had some first alternate plumage, described to be limited to feathers of the throat and body and not affecting wing coverts or flight feathers (Pyle 1997a). Two of these 25 specimens (8.0%) showed the eccentric primary molt pattern (LSUMNZ 6706 and 162222), and like the captured bird at Bluebonnet Swamp but with slight differences in the number and extent of feathers replaced in the primaries and secondaries (Table 1). Like the captured bird, these specimens had replaced all greater coverts, the lesser alula, and all rectrices, but no primary coverts.

In total, three out of 27 (11.1%) formative plumaged Eastern Towhees captured or collected in Louisiana were documented to have undergone an eccentric preformative molt. We suggest banding stations that commonly capture Eastern Towhees begin recording incidences of molt extent because, unfortunately, our small sample of 27 birds (two captured and 25 specimens) is hardly sufficient to provide robust estimates of eccentric replacement pattern frequency. The Eastern Towhee is a short-distance migrant with most northern birds moving south in winter, but some individuals in the southern part of the range may be resident or move

Table 1. Variation in the extent of preformative molt by feather tract among 27 first-cycle Eastern Towhees captured in (n = 2) or specimens from (n = 25) Louisiana. Note: alula tracts not included as these were difficult to examine in specimens.

Replaced feathers on following feather tracts:				Number of Individuals
Gr coverts	Secondaries	Rectrices	Primaries	
all	none	none	none	1
all	s9	none	none	4
all	s8 and s9	none	none	9
all	s7-9	none	none	2
all	s7-9	unknown	none	2
all	s7-9	r1 and r6	none	1
all	s7-9	all	none	5
all	s7-9	all	p5-9(R), p7-9 (L)	1
all	s7-9	all	p5-9 (symmetrical)	1
all	s5-9	all	p4-9 (symmetrical)	1

Editor's note:This photo can be viewed in high resolution color at: http://ibbainfo.org/NABB.38.1.php Photo is ©Copyrighted

Fig. 1. A formative-plumaged Eastern Towhee captured 8 Oct 2012 at Bluebonnet Swamp Nature Center in Baton Rouge, Louisiana, showing an eccentric molt-limit pattern among the primaries.

very short distances (Dickinson 1952, Greenlaw 1996). Eastern Towhees are common throughout Louisiana, but less so during the breeding season in southern Louisiana, where many of the specimens we examined were collected in winter, including both with an eccentric primary molt pattern. Eastern Towhees do not breed at Bluebonnet Swamp, such that the captured individual with eccentric molt was a migrant. We, therefore, cannot be certain of the breeding origin of much of our sample, although they likely represent at least a combination of nominate migrants from the north and *P. e. canaster* (Pyle 1997a).

Southern populations of birds are suspected to have more extensive preformative molts than northern populations (Pyle 1997a,b, 1998), and detailed examinations and records of molt limits across large landscapes will facilitate more rigorous tests of this hypothesis. This pattern could result from differences in the length of the growing season, allowing breeding and, therefore, post-breeding molt to commence earlier and last longer (Ryder and Rimmer 2003), a response to habitats in southern ranges of these species that are generally harsher and harder on feathers (Willoughby 1991), and/or a response to increased amounts of solar exposure that southern populations endure during winter (Pyle 1998).

Our sample of formative-plumaged birds revealed more extensive molt among a higher proportion of birds than in those studies, consistent with predictions. Previous examinations of Eastern Towhee molt mostly involve northern populations, although there are suggestions that the molt is variable among populations, perhaps associated with latitude and migratory status (e.g., Dwight 1900, Sutton 1935, Mulvihill 1993, Greenlaw 1996, and Pyle 1997a). We suspect that further examination of especially southern populations of Eastern Towhee, as well as those of the closely related Spotted Towhee (*P. maculatus*), would reveal eccentric molt limits in at least a small percentage of birds.

ACKNOWLEDGMENTS

We thank the volunteers of the Bluebonnet Bird Monitoring Project who help keep the trails and net lanes maintained and assisted with data collection. Thanks to the Baton Rouge Office Parks and Recreation staff for providing us access to work on their property. The Louisiana State University Museum of Natural Sciences kindly provided access to their specimen collection. Comments by and discussions with Peter Pyle helped improve the quality of the manuscript. Financial support was provided by the Eastern Bird Banding Association's 2012 Research Grant, Louisiana Environmental and Education Commission's 2012 Research Grant, and Western Bird Banding Association's 2011 Research Grant.

LITERATURE CITED

Dickinson, J.C. 1952. Geographic variation in the Red-eyed Towhee of the eastern United States. *Bulletin of the Museum of Comparative Zoology* 107:273-352.

Dwight, J. 1900. The sequence of plumages and moults of the passerine birds of New York. *Annals of the New York Academy of Sciences* 13:73-360.

Greenlaw, J.S. 1996. Eastern Towhee (*Pipilo erythrophthalmus*). *In* A. Poole, editor. *The birds of North America online*. Cornell Laboratory of Ornithology, Ithaca, NY.

Howell, S.N.G., C. Corben, P. Pyle, and D.I. Rogers. 2003. The first basic problem: a review of molt and plumage homologies. *Condor* 105:635-653.

Mulvihill, R.S. 1993. Using wing molt to age passerines. *North American Bird Bander* 18:1-10.

Pyle, P. 1997a. Identification guide to North American birds, Part I. Slate Creek Press, Bolinas, CA.

Pyle, P. 1997b. Molt limits in North American passerines. *North American Bird Bander* 22:49-89.

Pyle, P. 1998. Eccentric first-year molts in certain tyrannid flycatchers. *Western Birds* 29:29-35.

Ryder, T.B. and C.C. Rimmer. 2003. Latitudinal variation in the definitive prebasic molt of Yellow Warblers. *Wilson Bulletin* 115:325-332.

Sutton, G.M. 1935. The juvenal plumage and postjuvenal molt in several species of Michigan sparrows. *Cranbrook Institute of Science Bulletin* 3.

Willoughby, E.J. 1991. Molt of the genus *Spizella* (Passeriformes, Emberizidae) in relation to ecological factors affecting plumage wear. *Proceedings of the Western Foundation of Vertebrate Zoology* 4:247-286.

Erik I. Johnson [1,2,4]
Dan Mooney [2]
Jared D. Wolfe [2,3]

[1] National Audubon Society, 6160 Perkins Road, Suite 135, Baton Rouge, LA 70808

[2] Bluebonnet Bird Monitoring Project, Bluebonet Swamp,10503 North Oak Hills Parkway, Baton Rouge, LA 70810

[3] School of Renewable Natural Resources, Louisiana State University Agricultural Center and Louisiana State University, Baton Rouge, LA 70803

[4] Corresponding author: ejohnson@audubon.org

Plasticity in the Swainson's Thrush (*Catharus ustulatus*) First Pre-basic Molt

Molt is a key component of the annual cycle of all birds (Dawson 2006). It functions to replace worn or damaged feathers thereby maintaining their usefulness; e.g., flight and thermoregulation (Payne 1972, Ginn and Melville 1983, Jenni and Winkler 1994). The timing of the various molts for any species, population or individual is often constrained by seasonal abundance of food and other events in the annual cycle, such as breeding and migration (Payne 1972). To understand the evolution and constraints on life history events across the annual cycle, it is necessary to document the timing, extent and variation of these events.

The Swainson's Thrush (*Catharus ustulatus*) breeds across the forested northern regions of North America and winters from Mexico to Bolivia (Mack and Yong 2000). These long-distance migrants undergo a single molt per year (Pyle 1997). In the hatching year, the young leave the nest with their juvenile plumage and shortly thereafter undergo their partial first pre-basic molt prior to or during the early autumn migration, i.e. July to October (Pyle 1997). This molt involves just the body and head feathers and zero to four inner greater coverts, whereas the adult pre-basic molt is complete (Pyle 1997).

During a recent study (7 -10 Jan 2013) of the winter ecology and migratory connectivity of Swainson's Thrushes in Sumaco, Ecuador (0.67167 S, 77.59812 W, WGS 1984), we encountered four second-year individuals out of 29 captured and banded presumably undergoing their partial first pre-basic molt. In two cases, we found extensive molt on the flanks, head, lesser and median coversts, with two to four inner greater coverts. In the other two, molt was limited to the flanks. This is unusual timing for the first pre-basic molt of this and most other migrant thrush species (Family Turdidae), as it typically occurs on or near the breeding grounds (Svensson 1992, Jenni and Winkler 1994, Pyle 1997).

Although the first pre-basic in the Swainson's Thrush can occur during post-fledging dispersal or early migration, it has not been documented on their Neotropical wintering grounds (Galindo et al. 1963, Wilson et al. 2008). The observation of the first pre-basic molt outside the natal grounds has been inferred from the presence of fewer retained juvenile wing coverts on individuals captured during spring migration than autumn migration (Collier and Wallace 1989). Stable isotope evidence demonstrates that feather isotope values from juveniles match that of adults with northern latitude signatures (Wilson et al. 2008).

The delay of the first pre-basic molt to the wintering grounds may simply be poorly documented due to limited winter banding efforts. These four individuals may have been from late clutches resulting in a trade-off between molt and migration.