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Molt Strategies in Alaskan Arctic Warblers

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ABSTRACT

While banding Arctic Warblers (*Phylloscopus borealis*) in western Alaska, I found a more extensive replacement pattern in the tertial feathers than what the literature suggests. I banded a total of 34 Arctic Warblers with symmetric molt in the tertial feathers, 11 of which were actively replacing three tertials on at least one wing. I posed the molt question to Peter Pyle, who made preliminary examinations on adult Arctic Warbler specimens from Alaska and found that the tertials were noticeably more worn than other secondary flight feathers. These observations indicate that a complete prealternate molt does not occur in this species as previously reported. Instead, it appears that adult Alaskan Arctic Warblers go through a complete molt in the fall that is suspended during migration. I suggest a revised molt and plumage terminology for Arctic Warbler, and I suggest work on the winter grounds to determine whether or not a partial prealternate molt occurs.

INTRODUCTION

Arctic Warbler (*Phylloscopus borealis*) is a predominantly Old World species with a limited breeding range in western Alaska (subspecies *P. b. kennicotti*; Lowther 2001). Very little is known about subspecies *P. b. kennicotti* and published descriptions of molt patterns draw from European sources (Cramp 1992; Svensson 1992) that describe the Palearctic subspecies *P. b. borealis* (Pyle 1997; Lowther 2001).

In particular, Pyle (1997) and Lowther (2001) infer that adult Arctic Warblers undergo a partial prebasic molt on the summer grounds that can include up to two tertial feathers (s8 and s9), and a complete prealternate molt on the winter grounds. However, in 2007 I banded several Arctic Warblers that were replacing all three tertial feathers (s7, s8, and s9). (The tertials are referred to as s7-s9, although some refer to these feathers as secondary feathers, hence "s" 7-9). According to Humphrey and Parkes (1959), prebasic molts are typically complete and prealternate molts are typically partial, and thus the current descriptions of molt in Arctic Warblers may be terminologically incorrect and need revision.

METHODS

As part of an early detection effort for highly pathogenic avian influenza, I banded Arctic Warblers between 10 Jun and 25 Jul 2007. I used a target netting strategy of playing song recordings with a Western Rivers mp3 player to attract territorial males into a small mist net (6 x 2.8 m, 36 mm mesh). I banded birds with U.S. Fish and Wildlife Service aluminum bands, took avian influenza samples, and took basic measurements on morphology, age and sex, and molting remiges and rectrices, according to protocols established for the Monitoring Avian Productivity and Survivorship (MAPS) program by the Institute for Bird Populations (DeSante et al. 2007).
I used the road system that radiates east, north, and west from Nome, Alaska, to access areas for target netting. The most productive areas were willowy river bottomlands along the Snake and Nome Rivers, and adjacent slopes with a mix of scrubby willow patches and open tundra. Common willow species in Arctic Warbler territories included *Salix alaxensesis*, *S. planifolia*, and *S. glauca*. Price and Beck (1989) provided valuable information for finding productive habitats with Arctic Warbler nests.

RESULTS

During the summer of 2007, I banded a total of 53 adult Arctic Warblers, all of which I aged as after hatch year (AHY) according to age codes presented by Pyle (1997). None of the birds had any retained juvenal or definitive secondary flight feathers, the characteristic currently described in the literature for differentiating second year (SY) from after second year (ASY) birds (Pyle 1997). The majority of Arctic Warblers were males that I banded in their breeding territories, although later in the season I did band three females with brood patches and 10 birds whose sex was undeterminable.

On 1 Jul, I banded the first Arctic Warbler that was molting one or more tertial feathers symmetrically. Between 1 and 25 Jul, I banded a total of 34 Arctic Warblers showing tertial molt. I found that approximately one third (32 %; 11 out of 34 birds) were molting three tertial feathers on at least one wing. Specifically, eight of the eleven birds showed symmetric molt, with all three tertials on both wings molting (the other three birds were actively molting three tertials on one wing, and one to two tertials on the other wing). This is a more extensive molt pattern than what has previously been reported (Pyle 1997; Lowther 2001)

Based on the length of molting tertials, I determined that the typical molt sequence begins with s8 (33 out of 34 birds). However, it was not as clear which feather molted second and third. Among the 11 Arctic Warblers molting three tertials, four showed more growth in s7, two showed more growth in s9, and five birds showed roughly even growth lengths between s7 and s9.

DISCUSSION

It is interesting that several Arctic Warblers appeared to have started molting s7 before s9. Most passerines molt s9 before s7 (Jenni and Winkler 1994) so the apparent molting of s7 before s9 in some birds may indicate exceptions to the normal molt sequence, or that either sequence is possible in Arctic Warblers.

Of particular interest is that 11 Arctic Warblers were molting three tertial feathers instead of two, which differs from current molt descriptions (Pyle 1997; Lowther 2001). I posed the molt terminology question to Peter Pyle and his response (pers. comm.) was as follows: "*The European literature (e.g., Svensson 1992) indicates that the fall molt is partial and the winter molt is complete, implying two molts per year in Arctic Warbler. Accordingly, I made the mistake of calling the fall molt prebasic and the spring molt prealternate, which follows molt timing employed by wood-warblers and most other North American passerines with prealternate molts but does not make sense when considering molt homologies with related or ancestral species. It would appear that the correct way to apply the terminology of Humphrey and Parkes (1959) would be to assume that the prebasic molt is complete and begins on the summer grounds, suspends for migration, and finishes on the winter grounds. I would then question whether or not there is a prealternate molt on the winter grounds, which would require some feathers replaced during the summer to be replaced for a second time within the molt cycle. Preliminary specimen examination I recently performed on adult Arctic Warblers from*

*Alaska suggested that the tertials were significantly more worn than the other secondaries, indicating that they are replaced only once on the breeding grounds and that only one molt occurs per year. A similar situation appears to occur with Red-eyed Vireo (*Vireo olivaceous*); see Pyle (1997:289)."*

Work on the winter grounds could help determine whether or not a partial prealternate molt may occur in Arctic Warblers, perhaps overlapping with the completion of the complete prebasic molt, as occurs in some Charadriiformes and other migrant waterbirds (Pyle 2008).

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Frequency of Supernumerary Remiges in White-eyed and Black-capped Vireos

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ABSTRACT

Supernumerary flight feathers have been noted for a variety of avian species. However, the frequency that such feathers occur has been seldom reported because large numbers of birds are examined rarely for this condition. During three summers, I captured White-eyed and Black-capped vireos (*Vireo griseus* and *V. atricapilla*) in central Texas. I examined the number of remiges on the right wings of each bird and found supernumerary remiges on two adult White-eyed Vireos (0.9%, n = 230) and one hatching-year Black-capped Vireo (0.4%, n = 275). I determined that the extra feathers of these birds were among secondaries 1 - 6, but was unable to determine their exact positions. None of the three birds had an unusually low mass, suggesting that the extra feathers may have had no severe cost.