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### DELAYED PREFORMATIVE MOLT IN THE BARN SWALLOW

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The Barn Swallow (*Hirundo rustica*) is among those passerines whose molt follows the “complex basic strategy” (Howell et al. 2003). This means that adults have only a single (prebasic) molt each plumage cycle, whereas first-year birds have an additional preformative molt (traditionally termed the first prebasic molt) in their first plumage cycle, bridging the period between juvenal plumage and entry into the adult cycle. In most passerines the preformative molt is partial, but in swallows it is complete, or nearly so. That is, the young birds replace all of their feathers with a plumage essentially identical to that of the adult, and this plumage is worn through their first breeding season. In North American Barn Swallows (*H. r. erythrogaster*) both the definitive prebasic and preformative molts take place primarily on the winter grounds, the former between August and February, the latter between October and April (Pyle 1997). Thus the latest first-cycle birds should complete growth of their outer primaries in April.

On 11 April 2004, Howell observed a first-cycle Barn Swallow that was just starting its preformative molt. The bird was at the Bolinas sewer ponds, Marin County, California, with a mixed-species flock of other swallows that included another ten Barn Swallows, all of which were in fresh adult or adultlike plumage, as expected at this time of year. The molting bird was mostly in very worn and faded juvenal plumage: the upperparts were dull, brownish blue with scattered whitish spots on the back that may have represented shed feathers; the underparts were dirty whitish overall, with a few blotches of darker, cinnamon feathering (i.e., fresher and incoming feathers); the tail was forked but lacked adultlike streamers (i.e., a typical juvenal tail); and, perhaps most conspicuously, the wings were in molt, with the inner two or three primaries just shed or possibly starting to grow anew. The outer seven or eight primaries were old and faded juvenal feathers.

On 17 April 2004, at Warm Beach, Snohomish County, Washington, Barry with Steve Mlodinow observed a flock of roughly 30 Barn Swallows that included two distinctly worn first-cycle birds that stood out from the other, fresh-plumaged individuals. The most evident characters of birds were their washed-out, almost white underparts, tattered rectrices, and frayed primaries; no evidence of molt was apparent.

From 25 March to 16 June 2004, Pike observed and photographed numbers of worn and molting first-cycle Barn Swallows in the Prado Basin, which straddles the borders of Riverside and San Bernardino counties, California. On 25 March, the flock comprised at least 27 birds: 17 worn and molting first-cycle birds and ten nonmolting birds in fresh plumage. On 27 April the bird shown in the upper back cover photo (in Riverside County) had the outer three primaries old, the inner primaries new, and the middle primaries growing. On 27 May (when newly fledged juveniles of the year were also present), two individuals still had the outer 2-3 primaries old and unmolted. On 2 June the bird in the lower back cover photo (in San Bernardino County) had the outermost primary old, the outermost rectrices not fully grown, and active molt on the head. On 16 June, at least one bird still had the outermost primary, as well as the outermost rectrices, growing.

## FEATURED PHOTO

To check for historic evidence of this phenomenon, Howell and Barry examined specimens of Barn Swallows collected in western North America (southern British Columbia and Nevada south to southern California and Arizona). Of 95 specimens collected 25 March to 9 July (not including young of the year), none showed any sign of molt in their flight feathers. None of these specimens was collected in the last 25 years, however, so they predate the recent upsurge of Barn Swallows wintering in the West (Hamilton and Willick 1996, Marshall et al. 2003, Opperman 2003, Patten et al. 2003, Unitt 2004). And the aversion of most collectors to molting passerines should also be considered. Thus, the absence of molting birds in museum collections may offer little evidence for evaluating the extent of delayed molt by first-cycle Barn Swallows.

To the best of our knowledge, the only specific winter records of Barn Swallows molting primaries in North America are of a flock at Mecca, north of the Salton Sea, California, on 31 January 1998 (Patten et al. 2003), and a flock at Kent Ponds, King County, Washington, on 6 February 2005 (Barry pers. obs.). This latter flock, perhaps involving early spring migrants (cf. Marshall et al. 2003), comprised both adults and first-cycle birds, with both age classes in primary (P) molt. Of about ten adults, most were molting their middle to outer primaries (P5–P9), and one had completed molt; of about 15 first-cycle birds, some had not started molt (and were very worn and faded), but most were molting P1–P3.

Few species molt their flight feathers during midwinter in western North America, and constraints of climate and food supply may cause northerly wintering Barn Swallows to delay their molt. An individual Barn Swallow may take 150–185 days to molt its primaries (Ginn and Melville 1983), so delaying molt probably precludes breeding in the following season; yearlings of both sexes typically breed (Brown and Brown 1999). Thus it is difficult to postulate an evolutionary benefit to northerly wintering by first-cycle Barn Swallows. Perhaps they gain advantages in their second and subsequent breeding seasons?

A less likely explanation for some of the spring-molting Barn Swallows in North America is that they are migrants from a southern-hemisphere breeding population. In 1981, Barn Swallows were first found nesting in Buenos Aires province, Argentina, where they were present from October to April (Martínez 1983). However, that breeding schedule seems unlikely to be responsible for heavily worn and molting first-cycle Barn Swallows in western North America as early as February to April, and we suggest that the occurrence of such birds is linked to the trend of northerly wintering. Conversely, perhaps late-molting first-cycle Barn Swallows from North America migrate in their second winter to South America and at the age of a year and a half are physiologically able to start breeding in the austral summer?

In Europe, Barn Swallows (*H. r. rustica*) undergoing limited body molt during fall migration showed poorer body condition than birds not molting (Pérez-Tris et al. 2001, Rubolini et al. 2002). Those authors interpreted this observation as implying a physiological trade-off between molt and migration, although they did not test how food limitation relates to this scenario (the abundance of aerial insects declines in fall in western Europe). In any case, these European observations relate to molt at a season different from the observations we report from North America.

Simple field observations often generate more questions than answers. To document the trade-off between northerly wintering and molt further, observers seeing wintering Barn Swallows in western North America should note the age and molting status of all birds they see. Additional records of molting individuals during spring and summer would also be of interest, to determine the duration of the delayed molt at different latitudes.

We thank Peter Pyle, Steve Mlodinow, Michael A. Patten, Cameron Cox, and Dan Froehlich for discussion of this phenomenon, company in the field, and comments on the manuscript. We thank Carla Cicero at the Museum of Vertebrate Zoology,

## FEATURED PHOTO

University of California, Berkeley, Maureen Flannery and Douglas J. Long at the California Academy of Sciences, San Francisco, and Sievert A. Rohwer at the University of Washington Burke Museum for access to specimens. This is PRBO contribution number 1055.

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