

RECENT LITERATURE

Edited by Sabrina S. Taylor
staylor@lsu.edu

BOOK REVIEWS

Molt in Neotropical Birds: Life History and Aging Criteria

Erik I. Johnson and Jared D. Wolfe. 2018. *Studies in Avian Biology*, A Publication of the American Ornithological Society, Volume 51, CRC Press, Boca Raton, FL. xii + 400 pages, > 950 photographs, > 75 figures and graphs, and > 175 tables and data summaries. ISBN 9781498716116. \$144 (Hardcover).

When I first unpackaged *Molt in Neotropical Birds*, I was a bit puzzled by the cover photograph. It shows a representatively exotic and clandestine-looking Amazonian species, a Collared Puffbird (*Bucco capensis*) as I later learned from page 119, with intricate orange, rufous, and black plumage and a large, bright orange bill. However, it appeared to be in the hand and not happy about it, looking a bit disheveled, only partially framed, and obliquely staring at the photographer, displaying both an annoyed and an amusingly evil look to its partially cloaked, orange-yellow eye. Wouldn't having one of its wings nicely spread, so emblematic of bird molt study these days, been preferable? However, immediately afterwards, I asked myself what any of the ± 10 of us in the world who are passionate about bird molt would ask: "What the heck are the molt strategies of this creature?" Crickets. Well, I guess I will just have to turn to page 119 to find out. It then hit me that perhaps the cover image perfectly epitomized this work's essence and fundamental necessity. The look in that eye: a bit annoyed that we will learn something about its molt patterns as they apply to Neotropical birds, but derisive because we have such a long way to go.

Indeed, there are 4000+ species of Neotropical birds, and we know nothing about molt patterns for 90% of them. As often repeated, the study of avian molt strategies has lagged well behind those of

avian taxonomy, breeding systems, migration, behavior, and so on. Historically, molt and plumage terminologies applied by ornithologists were so diverse and confounding as to make understanding the complexity of bird molt nigh impossible. The eyes of experts glazed over, and students in ornithology sought less impenetrable arenas. Furthermore, because these molt and plumage nomenclatures were based on boreal-centric, seasonal, or breeding terms, their application to less-seasonal tropical species was illogical. Very slowly, however, over the past century, the terminology has been improved. A large step was the introduction by P. Humphrey and K. Parkes, in 1959, of their now widely used and regarded "H-P" molt and plumage terminology, and its subsequent successful application to Holarctic and Australasian species. Meanwhile, a few intrepid souls began to cautiously approach molt in Neotropical species, and we now have a patchwork of locations with published information on molt strategies among avian communities, starting with El Salvador (Dickey and van Rossem 1938), and including Trinidad (Snow and Snow 1964), Costa Rica (Foster 1975, Wolfe et al. 2009), Cuba (Pyle et al. 2004), central Mexico (Guallar et al. 2009), Colombia (Hernández 2012), Chile (Pyle et al. 2015), Venezuela (Lentino 2016), and Nicaragua (Tórriz and Arendt 2016). *Molt in Neotropical Birds*, although based primarily on data from one location in Amazonian Brazil, not only plugs a huge hole in our knowledge void, but provides a timely and comprehensive update on where the subject stands to date.

The book is divided into 39 chapters, an introduction, directions for use, and 37 chapters consisting of family accounts covering 186 Neotropical species (including a few Nearctic-Neotropical migrants) found in the Amazon Basin. I found the introductory chapter, basically a treatise on bird molt and its application in the Neotropics, thorough,

concise, and clear. H-P's evolutionary approach to bird molt is nicely capsulized, e.g., by "...modifications to the sequence, timing, and frequency of feather replacement over the last 150 million years have been molded and crafted, with inserted molts blinking on and off across families, genera, and species, thus highlighting the wonderful plasticity of molt despite being grounded on an annual ritual of full feather replacement" (p. 5). Such lucid but comprehensive prose accurately convinces readers that H-P terminology provides the only plausible way forward in our understanding of molts in tropical and equatorial regions. The authors then adeptly apply this terminology to the cycle-code system for aging birds, of which they were instrumental in deriving, again confirming this classification system as the only feasible one for Neotropical birds. The five pages devoted to coverage of this system, along with coherent tables and effectively simple molt diagrams, is a mandatory study for all students working on bird molt in the Neotropics. The categorization strategy for the application of these codes, including eight groups defined on pages 11–13, should become a standard for applying this system to birds worldwide.

We students of bird molt love to niggle, and I cannot resist pointing out a couple of minor disagreements. Defining all single inserted first-cycle molts under the Simple Alternate molt strategy as "first alternate" (p. 6) defeats the intent of the H-P schema. Some, if not many, of these molts undoubtedly evolved, at least in part, from preformative rather than first prealternate molts of ancestral species, and it should be up to us to figure this out, rather than homogenizing the terminology "for convenience" ("convenience," it should be pointed out, is what disoriented traditional molt terminologies in the first place). Few if any Neotropical landbirds undergo the Simple Alternate Strategy, so this distinction is not important here. On the other hand, the authors' redefining of the H-P term "definitive" to apply to molt cycles rather than plumages (p. 7) seems utterly unhelpful, if not detrimental, to our understanding of the process. It appears to have been crafted to fit a few manakin species that follow unusual sex-specific plumage-maturation strategies not found among the remaining 10,000 or so

species of birds. Although we all recognize the drawbacks of "definitive" as defined by H-P, replacing this term with "adult" does not solve anything, and the carefully crafted and considered aging cycle codes would no longer apply to the terminology, e.g., "Second Prebasic Molt (SPB)" would be replaced by "Definitive Prebasic Molt (DPB)," whereas the latter would be replaced by "Adult Prebasic Molt (APB)." I cannot help but generally liken this change to "upgrades" of computer software we have all had to suffer through, designed purely to make money, whereby functionality usually decreases in favor of a completely unfamiliar look and maddeningly unnecessary changes to keyboard strokes (for more on this subject see our debate in *The Auk*: Wolfe et al. 2014, Howell and Pyle 2015). Yet, I must also stress how minor these fusses are in the overall enterprise. Collectively, it feels like we H-P adherents are making steady progress in defining the world's bird molts, and the authors have greatly expanded the frontier regarding Neotropical species.

The family accounts are not really bedtime reading, although I would recommend so for the introductions to each chapter, where general descriptions include unique physical characteristics of each family, flight-feather counts, and very complete and well-referenced summaries on molt strategies, in virtually all cases including knowledge advancements. In many cases, these represent the first time molt has been directly considered within a family, e.g., for Psophiidae (trumpeters), Nyctibiidae (potoos), Bucconidae (puffbirds), Capitonidae (New World barbets), Ramphastidae (toucans), Cotingidae (cotingas and allies), and Tityridae (tityras). These were my favorite sections, and I applaud the authors for including summaries for all central Amazonian families, even though little direct data were added for a few of them. The accounts for most families and species, however, were based on an extensive database of > 65,000 mist-netted birds, as part of the incredible Biological Dynamics of Forest Fragmentation Project, initiated in 1979 by Thomas Lovejoy near Manaus, Brazil, and for which both Johnson and Wolfe completed their Ph.D. research. These data were supplemented and confirmed by the authors' examination of > 1000 specimens. Each account draws extensively from this database and includes measurements by sex, species

identification criteria, molt strategies, and age/sex-determination criteria. Hundreds of sharp and well-produced photographs are sprinkled throughout the accounts, often including one or more illustrative images per age-cycle class per species (and, yes, many are of spread wings, allowing detailed study of molt limits). The captions to these photos include appropriate uncertainty, along with proposals that reflect full consideration of every angle regarding potential molt strategies within each species. For species with larger numbers of captures, the accounts include very informative bar charts illustrating seasonal molt and breeding patterns from capture data, and in some cases, scatterplots or frequency distributions, based on measurements, to help separate species or sexes within monochromatic species. In sum, these accounts present an incredible resource for those taking the next steps in understanding Neotropical bird molt, in particular, for resident tropical species within large and variable families such as hummingbirds, antbirds, ovenbirds, tyrant flycatchers, manakins, and tanagers.

At the risk of revealing the punch line of the book (spoiler alert!), a key overall finding is that molt patterns of Neotropical birds share many fundamental consistencies with those of better-known temperate species, both within and among families and genera. In turn, this strongly indicates, as the authors point out, that the information provided here should apply to most or all of the remaining 4000 species of Neotropical birds. For this and many other reasons, I consider this an “absolute must” for any student of either avian molt or avian tropical systems, and it has already become one of the eight or so most critical molt-reference works within immediate reach of my desk.

*Peter Pyle, The Institute for Bird Populations,
Point Reyes Station, CA, USA,
ppyle@birdpop.org*

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