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BOOK REVIEW

Nests, Eggs, and Incubation: New Ideas about Avian Reproduction

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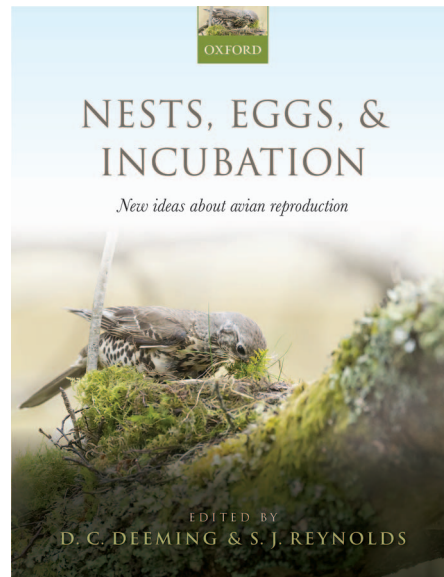
Elucidation of the complex linkages among nests, eggs, and incubation has increased considerably in the past two decades, which has led to their increasing foregrounding in life history studies and physiological ecology. *Nests, Eggs, and Incubation* provides an excellent summary of the state of knowledge at this moment in time. In particular, the edited volume links together two important underpinnings of the field. First, the work is dedicated to Amos Ar, whose seminal physiological studies have greatly influenced conceptual and technical approaches to the integrative studies of embryos. Second, the authors have explicitly intended to update the field since Deeming's (2002) seminal book *Avian Incubation*.

Following an initial chapter that provides a framework for the entire volume, Chapter 2 provides an evolutionary perspective of avian egg nesting and incubation from the fossil record. An ambitious review of current research on fossil evidence, it provides enduring information in Table 2.1 and a narrative review of our current understanding of where the precursors of modern avian behavior are found in avian ancestors. The volume then moves forward in rough sequence to the stages of an avian reproductive bout—nest building, nest characteristics, eggs, and finally incubation. The first two chapters on nests, which deal with nest construction behavior and functional properties of nests, concisely and comprehensively outline the state of current research and will be required reading for new

and veteran researchers of avian nests. For example, Chapter 3 by Healy et al. nicely summarizes historical studies on nest construction behavior before laying out the proximate and ultimate factors driving how birds produce the intricate extended phenotype we call a nest. Deeming and Mainwaring's Chapter 4, on functional properties of nests, similarly builds from historical studies to an insightful summary of geographic variation in nest characters, helping keep our focus on the range of phenotypic plasticity shown in nest form and function. Another early chapter of note is Chapter 6, Mainwaring's provocative weaving of functional, ecological, and macroscopic studies demonstrating the myriad effects of a warming climate on avian life histories.

Edited volumes help summarize understudied areas. This book's reviews of current microbiology (Chapter 7, by Cassey and Thomas) and of nest invertebrates (Chapter 8, by López-Rull and Garcia) provide such summaries quite nicely. Both chapters overview the main players involved in influencing avian ecology and evolution and provide key studies revealing how birds deal with microbiological and invertebrate threats. These two chapters will be an essential starting place for researchers seeking to better understand the complex biological interactions that play a key role in influencing a range of life history traits, especially egg survival and nestling growth and physiology.

In places, the volume shifts gears from review-style chapters that will serve as solid references for years to more directed empirical assessments that suffer a bit in comparison. An example of this is the ambitious



regression-model-driven approach to egg allometry by Birchard and Deeming in Chapter 9. Although the chapter is rigorous, a detailed methods section is needed to better assess the statistical approach and assumptions used to fit models, control for phylogeny, and deal with covariance among measures, which suggests that a journal article would have been a better venue. Such focused statistical analyses feel out of place in this book.

For the most part, chapters are embedded in one of the three main topics of the book: nests, eggs, and incubation. Other chapters are intended to bridge the gap and integrate factors across stages. Such integrative thinking best exemplifies the complex cascading biophysical and physiological interaction across life history stages and will best move the field forward. In Chapter 10, [T. D.] Williams and Groothuis take such a clear, synthetic, and insightful approach, revealing the complicated interplay of how egg constituents influence embryonic metabolism (and thus development), with resultant short- and long-term effects on posthatching phenotype. For new graduate students seeking to find fertile ground in integrative biology, this chapter is highly recommended. Another chapter destined to be of great influence on starting (and experienced) investigators is Chapter 13, Nord and [J. B.] Williams's comprehensive chapter on the energetics of incubation. Their cogent and clear framing reveals convincingly the important driving force of energetics in integrating egg production, incubation in a changing climate, and the resultant effects of such expenditures on parents and offspring.

Another major benefit of an edited volume is that it allows researchers to cut through the posturing of research papers that propose single hypotheses to explain phenomena clearly underlain by multiple factors. Brulez et al. (Chapter 11) do so at a high level by tackling egg coloration and signaling, providing a refreshing overview of the range of hypotheses (and their support) proposed to explain egg signaling.

Selecting and implementing appropriate field methods can limit new researchers entering the field. In Chapter 15, Smith et al. do a great service for the field in a concise yet detailed summary of the costs and benefits of different methodologies, including a very helpful flowchart for novices. There is a rich history of amateurs studying nests and eggs with results that are powerful in spatial and temporal resolution. Caren Cooper, a pioneer in citizen science, and her colleagues update the state of the field and the power of a citizen-based approach in the historical and forward-looking Chapter 17. They provide persuasive

evidence of the role of historical collections in helping test hypotheses about global change and make a convincing case for more of us to work directly with motivated amateurs to increase the state of our knowledge.

While this is an excellent volume that I highly recommend for both professionals and amateurs, there are a few minor shortcomings that slightly diminish the book's effectiveness, especially given that another version is not likely to come out for a decade or more. Some chapters are too focused on a single study system, and consequently an opportunity to summarize the state of a field is missed. There were a number of chapters authored by the same individuals, perhaps diminishing the diversity of perspectives that the book provides. Reflecting on my own biases, I would have liked to see a more explicit comparative approach, especially along the altricial-precocial spectrum. Similarly, nests, eggs, and incubation are underlain by biophysical principles (as examined, e.g., in the work of Ar). There are places in the book where more attention to biophysical mechanisms would have helped move a summary of our state of knowledge to a more integrative foundation.

Because peer-reviewed publications are the currency by which most researchers are evaluated, and because online access leads to fewer books on shelves, the role of an edited volume is evolving. Given the enormous work put into it by editors and authors, it is critical to take stock of the impact of their effort. I feel that a book provides the chance to give a moment-in-time assessment of the state of a field, especially by providing, through hard archival work, a summary of previous scholarship. In almost every chapter of the present volume, we see such effort pay off wonderfully; three outstanding examples are Table 4.1 (nest materials across species), Table 7.1 (major antimicrobial compounds), and Table 13.2 (energetic cost of incubation). Similarly, an edited volume can provide the synthesis and integration to move a field forward by summarizing hypotheses and framing future work. This book, with only a few exceptions, accomplishes all of these tasks and will fill an excellent niche into the future.

LITERATURE CITED

Deeming, D. C. (Editor) (2002). *Avian Incubation: Behaviour, Environment, and Evolution*. Oxford University Press, Oxford, UK.

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