

Book Reviews

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EDITED BY R. TODD ENGSTROM

The following critiques express the opinions of the individual evaluators regarding the strengths, weaknesses, and value of the books they review. As such, the appraisals are subjective assessments and do not necessarily reflect the opinions of the editors or any official policy of the American Ornithologists' Union.

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Ecological and Environmental Physiology of Birds.—

J. Eduardo, P. W. Bicudo, William A. Buttemer, Mark A. Chappell, James T. Pearson, and Claus Bech. 2010. Oxford University Press, New York. x + 328 pp., 60 illustrations. ISBN 978-0-19-922844-7 (Cloth, \$125.00), ISBN 978-0-19-922845-4 (Paper, \$65.00).—The need to better understand how birds work—their physiology and anatomy in relation to their ecology—continues to grow as environmental challenges such as climate change demand reliable predictions of how birds may respond to relatively dramatic changes in the environment. Their cosmopolitan and mobile nature makes birds ever popular as well as excellent bio-indicators for the health of our planet's ecosystems. Thus, those of us who study birds must continue to learn more about them, as attention on birds seems well placed and growing. How can we make sure that our understanding of the basic biology of birds stays current in the face of the burgeoning literature? How about having some of our trusted colleagues provide us with a state-of-the-art review that summarizes recent advances, provides us with an entry into the primary literature on the topics, and points out unknowns that require further study.

Oxford University Press bets that we would appreciate (and purchase) these types of reviews and has begun publishing, under the watchful editorial eye of Warren Burggren, a series of volumes that provide an overview of the ecological and environmental physiology of different taxa. The first volume focused on amphibians, and this second one focuses on their more distant and popular relatives, the birds. The series is designed to provide state-of-the-art reviews on the physiological ecology of key taxa that should be of interest to graduate students and researchers. *Ecological and Environmental Physiology of Birds* accomplishes this state-of-the-art review and provides a worthy supplementary text for those teaching various “-ology” courses (e.g., ornithology, comparative physiology, vertebrate biology, and wildlife ecology) as well as for researchers who would appreciate a book-length review of key topics in avian physiological ecology.

The importance of a bird's physiology and anatomy was appreciated even in the first ornithology texts, although it was typically presented from a functional-morphology perspective—for

example, the four-chambered heart provided separation of oxygenated and deoxygenated blood, the air sacs of birds enabled a flow-through respiratory system, the digestive system was relatively simple and was distinctive from that of mammals in having a gizzard that replaced functional teeth. We have entered a new age in our understanding of avian physiology that acknowledges the merits of functional morphology while highlighting the impressive phenotypic flexibility of physiological systems and the tight linkages between avian ecology and physiology. This new textbook, co-authored by some very qualified ornithologists and physiologists from throughout the globe, is firmly consistent with this contemporary perspective of avian physiology.

The book begins with a “Blueprint of a bird,” a summary of the functional morphology of birds, including the evolution of birds and adaptations for flight, and a second chapter that describes basic physiological principles (i.e., gas and heat exchange, energy flow, and water and ion fluxes) and their implications for birds. Summarizing such far-reaching topics in a concise manner is a formidable challenge, and I found these first two chapters to be unsuccessful primarily because the author(s) did not find the right balance between dense descriptions of key topics, effective visuals to depict key concepts, and eclectic yet intelligibly detailed descriptions of key concepts. I suspect that many readers who are unfamiliar with the topic or have forgotten the traditional physiological principles that they learned in a basic vertebrate physiology course will consult other fine textbooks for figures and descriptions that clarify these concepts. On the other hand, these chapters provide a succinct, factual, well-referenced, and contemporary review of these topics so that the interested reader can easily delve deeper into topics of particular interest.

The next five chapters focus on important contemporary topics in avian physiological ecology: the physiological basis for fecundity–longevity tradeoffs; nutritional ecology and digestive physiology; physiological adaptation associated with living in arid, cold, and high-altitude environments; neural and sensory physiology; and developmental physiology. These five chapters constitute more than 60% of the book volume, are the heart of the book, and warrant the price of admission. As promised, these chapters

provide state-of-the-art reviews on these key topics in physiology that should be helpful to graduate students and researchers who appreciate a succinct synthesis that provides key inroads into the literature on these topics.

The eighth chapter provides an overview of contemporary methods for measuring energy expenditure and movement patterns of birds, and a reminder of many of the new stable-isotope and molecular methods that avian physiologists and ecologists have at their disposal. The brave new world of ornithology is incredibly bright if we all embrace these new technologies and understand both their promise and limitations. The book ends with a concluding chapter on selected future directions that highlights several of the current “hot” topics in avian physiological ecology, although within this final six pages the authors have tried to inspire us rather than provide details about fruitful future directions.

In general, this book achieves the goal of this series in providing a succinct state-of-the-art review on the physiological ecology of birds. Graduate students and researchers interested in updating their knowledge of this field will be well served by this book. The lack of figures and other illustrations to depict key concepts, and the relatively brief reviews of key topics, make the book less appealing for use as a textbook for an upper-division course. However, it has much value when placed next to your favorite ornithology and physiology text(s) so that you can use it as a fine supplement as you prepare your lectures, when you need reminders of the breadth and depth of a key topic, or as you plan your next research project.—SCOTT R. MCWILLIAMS, *Program in Wildlife & Conservation Biology, Department of Natural Resources Science, University of Rhode Island, Kingston, Rhode Island 02881, USA. E-mail: srmcwilliams@uri.edu.*

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Living on the Edge: Wetlands and Birds in a Changing Sahel.—Leo Zwartts, Bob G. Bijlsma, Jan van der Kamp, and Eddy Wymenga. 2009. KVN Publishing, Zeist, The Netherlands, 564 pp. ISBN 9789050112802. Hardcover, \$130.—Most North American ornithologists know that the Sahel is that semitropical zone between the Sahara and tropical Africa, and that R. E. Moreau's classic early-70s book on bird migration in Africa identified this then little-known area as of importance to wintering Palearctic migrants. They may also recall it as the site of massive human suffering in the drought of a couple of decades ago. Beyond that, unless one is studying the birds that use the zone or has wanted to visit Timbuktu, most North Americans don't know much more and haven't much compulsion to learn. Palearctic ornithologists know and care more, but their source materials have been limited. For those not working on Palearctic migrants, why should precious time be spent on a book that is essentially regional in focus and outlook? The reasons are several: it is a wonderful book, well written, well illustrated, well presented, and that is a rare joy;

it is an even rarer example of excellence in primary scholarship at the book scale of publishing; it is a model of wise use (and in some cases deliberate nonuse) of existing data; it tells an important tale of the complexity of unraveling environmental change; and it is a case-history harbinger of what likely is to come to other parts of the globe, because it is in the Sahel that the effects of climate change are not modeled predictions but real and compelling facts on the ground.

This book aims to reveal the ecology of the Sahel and the Palearctic birds that use it, particularly waterbirds. Why waterbirds in the seasonally desiccated landscape of the sub-Sahara? Because it is also a landscape containing dry-country rivers, wetlands, and lakes, including the Niger River and Inner Niger Delta, the Senegal River and Senegal Delta, Habesja-Nguru floodplain, Lake Chad and its basin, and the Sudd, habitats used by a half billion European birds (more or less). The Sahel first came to my attention years ago when it was unexpectedly discovered that survivorship of southern European Purple Herons was correlated not with what was happening in Europe but with rainfall in the Sahel, inversely so. It turns out that about a quarter of European birds migrate seasonally to the Sahel during the northern subtropical drying season, and these species are, for the most part (75 of 127), in a state of population decline. Conditions in the Sahel are a prime candidate by way of explanation. The climate in the Sahel has been changing complexly for thousands of years, and over the last decades mostly getting drier, although somewhat wetter more recently. The authors show that of all the proposed explanations, this drying is most closely correlated with ocean warming—global climate change in action. They explore why most climate-change models do not detect the Great African Drought of 1972–1992 and find that the most acceptable of current models show a continuation of current conditions with further drying in subsequent decades, thus setting the stage for critical bird-conservation issues of the future. For today, the current problems are people-caused.

The first chapters are analyses of the abiotic and biological characteristics of the Sahel, including climate, vegetation, rivers, and land use. These are clearly written, full of original analyses, superior interpretation of the literature, excellent illustrations, and mind-bending use of original modeling and satellite data—a tour de force of geography. They show, for example, that, contrary to the previously accepted paradigm, which once underpinned the Desertification Convention, desertification is more the result of climate change than of human activity, which can, however, prolong drought recovery. Massive human population increases and urbanization, increases in farmed land and the elimination of land rotation, dams and water use, destruction of native forests for charcoal, planting of insect-free trees, hunting, and elimination of the once huge herds of grazing wildlife—much of this in the past 50 years—all contribute to a continuation of the pattern of habitat loss for birds, which began in drought.

The second part of the book devotes chapters to the great wetlands and to rice farming. The Inner Niger and Senegal deltas are treated in most detail because they are the better known. Dams, irrigation, land-use changes, climate change, and population pressures have changed the way these Sahel wetlands function. The seasonal flood pulse and seasonal dry-down have been altered to the extent that 15–20% of the floodplains of the Inner Niger Delta have been lost and the Senegal Delta was converted