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A Red Bird in a Brown Bag: The Function and Evolution of Colorful Plumage in the House Finch

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BOOK REVIEWS

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A Red Bird in a Brown Bag: The Function and Evolution of Colorful Plumage in the House Finch.—Geoffrey E. Hill. 2002. Oxford University Press, New York. xii + 318 pp., 119 figures. ISBN 0-19-514849-5. $40.00 (paper). ISBN 0-19-514848-7 $65.00 (cloth).

A journal editor recently declined to send out for review a manuscript I had submitted because I was providing the first test of an idea published 15 years previously. The editor interpreted the delay in testing the idea as evidence that the idea must not be important. Had similar reasoning been applied to Darwin's hypothesis that bright plumage evolves because female birds find colorful males attractive, Geoffrey Hill would never have produced the impressive body of research described in this book. Darwin's proposal that female choice is responsible for the evolution of ornaments in males was poorly received by his contemporaries and the source of a long-running disagreement between Darwin and Wallace. Wallace's view, that plumage was naturally, not sexually, selected, prevailed. It took more than 100 years before female mate choice began to receive serious attention from evolutionary biologists, and 131 years until Hill's work on House Finches (*Carpodacus mexicanus*) provided definitive experimental evidence that female birds prefer brightly colored males.

Hill's work on House Finches is impressive for reasons beyond originality—the work is both broad and deep. Methodologically, Hill has used the full arsenal of approaches available to modern evolutionary biologists, combining observation and experiment with comparative analysis, while taking advantage of technological developments for assigning paternity and quantifying color. Subjects explored range from the proximate factors underlying plumage coloration (e.g., diet, parasites) to the role that color variation plays in mate preferences expressed by females and males, to the consequences of those preferences. Depth has been achieved by Hill's unwillingness to address a particular question with one experiment and then move on. Rather, Hill typically has conducted a series of experiments, the results of which have allowed him to refine the question and to recognize the complexity that might initially have been overlooked. For example, instead of sticking with his initial approach of treating color as a one-dimensional trait (i.e., which bird is redder?), Hill systematically determined that red coloration actually consists of multiple traits: color hue and intensity, hue consistency, patch size, and patch symmetry. That approach led Hill to recognize that the proximate factors affecting expression of each of these color traits differ, as do the fitness consequences of variation in expression of each trait.

This book is first and foremost a review of work by Hill, his students, and his colleagues on plumage color variation in House Finches. Although the book provides an avenue into the broader literature on avian plumage coloration, Hill's goal was not to provide an exhaustive review of this topic. The organization of the book is effective, despite being different from what one might expect. Rather than starting with a detailed treatment of the theoretical framework for his research, Hill focuses instead on the historical interest in plumage color, the debate between Darwin and Wallace, and the simple question of whether female birds prefer brightly colored males. After a valuable review of the biochemistry and physiological ecology of carotenoids (the pigments that make birds red) Hill details his efforts to answer that simple question. Once he has vindicated Darwin, he then broadens the focus to address topics that include male preferences for color in females, the evolutionary origin of coloration in House Finches, and geographic variation in plumage color. Only later in the book does Hill delve more into sexual selection theory to illustrate how his results collectively support the hypothesis that plumage color in House Finches is an honest signal of individual quality.

Books such as Hill's, in which an author reviews his or her own body of work, are guaranteed an audience of at least those other researchers who share an interest in the subject, and Hill's book will surely interest students of avian plumage coloration. There is a feature of Hill's book, however, that makes me comfortable recommending it to a wider audience. As the whimsical title suggests, the style of the book is not that of a dry academic treatise. Hill prefaces each chapter with several quotations and a personal anecdote. The quotations are eclectic, and they both inform and amuse. The anecdotes are entertaining tales that include, among other things, an explanation of how Hill came to this study (he was unsatisfied with the maternal nostrum of "God did it") and a description of a macabre incident involving a dentist with an unhealthy dislike for House Sparrows (*Passer domesticus*). (Visions of Laurence Olivier as the dentist and Geoff Hill as Dustin Hoffman were unavoidable.) These anecdotes are also informative, providing the reader with insight into why the study took the course it did, including the inevitable setbacks that are seldom evident in published papers.

Hill has greatly increased our understanding of the evolution of bright plumage in birds, but he is quick to point out how much remains to be learned. This engaging book will guide those who want to continue

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the study of House Finch plumage, while providing a template well worth following for research on plumage in other species, sexual selection in broader contexts, and behavioral ecology in general.—PATRICK J. WEATHERHEAD, Program in Ecology and Evolutionary Biology, University of Illinois, 606 E. Healey Street, Champaign, IL 61801. E-mail: pweather@uiuc.edu

Conserving Bird Biodiversity: General Principles and their Application.—Ken Norris and Deborah J. Pain [editors]. 2002. Cambridge University Press, Cambridge, UK. xiii + 337 pp., 26 figures, 7 tables, 2 appendices. ISBN 0-521-78949-4. $38.00 (paper). ISBN 0-521-78340-2. $100.00 (cloth).

Conserving Bird Biodiversity provides succinct and well-written summaries of most of the major topics of interest in avian conservation. Authors of the 12 chapters provide numerous specific examples from the world literature to nicely illustrate most of the points made.

In the first chapter Michael W. Bruford provides a very brief and selective overview of the levels and patterns of biodiversity, including subspecies concepts and evolution. Unfortunately, this chapter is among the weaker, failing to devote enough space to this huge topic to be very useful.

Collin Bibby discusses the social values of birds; for example, the economic value of ecosystem services and birdwatching. These practical arguments will be of great value to those who must justify bird conservation actions to those outside the conservation arena.

Les Underhill and David Gibbons touch on many of the familiar methods for mapping and monitoring bird populations, although I was surprised to see no reference to the Christmas Bird Count (Bock and Root 1981, Studies in Avian Biology 6:17–23) or Breeding Biology Research and Monitoring Database (Martin et al. 1997, *BBIRD Field Protocols,* University of Montana, Missoula, Montana). The section on indicators could have been much more thorough, given the importance and controversy of this concept in conservation biology.

A chapter by Georgina M. Mace and Nigel J. Collar and another by Andrew Balmford nicely cover many approaches to species and spatial prioritization, both of which are central to efficient strategic conservation action. The experience and leadership of European ornithologists in this arena deserves study and attention.

Ben D. Bell and Don V. Merton provide a number of examples and more detail than many chapters regarding critically endangered bird populations and their management. Rhys E. Green also provides some detailed thought processes and examples for diagnosing causes of population declines and selecting remedial actions.

Larger scale issues such as climate change and disease are addressed by Deborah J. Pain and Paul F. Donald in their review of pandemic threats to bird biodiversity. Unfortunately, only the briefest overviews of these huge topics are provided.

Population viability analysis and behavior-based models for predicting the impact of environmental change are briefly addressed by Ken Norris and Richard Stillman. The usefulness and limitations of these approaches are illustrated with a few examples.

Paul Opdam and John A. Wiens provide an excellent overview of fragmentation, habitat loss, and landscape management, including particularly lucid descriptions of various concepts. Their predictive tools for planning purposes is a most useful summary, and I would like to have seen analogous sections from the other authors.

I found the chapter on the interface between research, education, and training by Leon Bennun to be of least value to me, although the author pointed out that this chapter largely is a case study of personal experiences in Kenya rather than a global overview. Readers in developing countries may find much more of value here than I did.

The final chapter by Gerard C. Boere and Clayton D. A. Rubec on conservation policies and programs affecting birds provides an excellent summary of international conventions and treaties, with many examples from throughout the world. If we are to conserve bird biodiversity globally, many more conservation biologists need to understand and become involved in this arena.

I see two minor shortcomings. Several of the chapters begin with similar introductory paragraphs on avian biodiversity and conservation concern. The editors should have consolidated this material into a single location in the preface or introductory chapter. Also, the level of detail varies among chapters, with some authors providing numerous examples from the literature, tables or figures, while other authors only skim the surface. Certainly more complete treatments of every topic in this book can be found in other books or major papers.

But these imperfections do not detract from the great value of this book in providing a single source reference for the stated topic. With over 900 references, 17% of which are from 2000 or later, *Conserving Bird Biodiversity* is a valuable comprehensive reference for everyone interested in bird conservation. But further, because birds are arguably the best-understood group of terrestrial vertebrates, the numerous processes that have been developed for their conservation should be of considerable value to those working for the conservation of other terrestrial vertebrate taxa. For those of us in the New World, the great number of examples and references from the Old World will provide an immediate enrichment to our background and understanding.—TERRELL D. RICH, Partners In Flight, U. S. Fish and Wildlife Service, 1387 S. Vinnell Way, Boise, ID 83709. E-mail: terry_rich@fws.gov

Birds of Nebraska: Their Distribution and Temporal Occurrence.—Roger S. Sharpe, W. Ross Silcock, and Joel G. Jorgensen. 2001. University of Nebraska Press, Lincoln, Nebraska. xiv + 520 pp., 25 figures and plates. ISBN 0-8032-4289-1. $69.95 (cloth).

Many ornithologists think of Nebraska as miles and miles of treeless agricultural fields, populated by an occasional meadowlark or other supposedly boring grassland bird. This misconception may have been generated in part by the experience most out-of-staters have with Nebraska as they cruise the heavily traveled

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Interstate 80 through the middle of the state. In actual fact, the land types and resulting avian habitat in Nebraska are amazingly diverse. Over 400 bird species regularly occur in the state, and over 200 of those are breeders. In the immediate vicinity of my own study site at the Cedar Point Biological Station in southwestern Nebraska, over 360 species have been recorded. With eastern deciduous forest along the Missouri River in the east, grasslands of several distinct types in the central and western portions of the state, fingers of Rocky Mountain woodlands extending into western Nebraska, numerous small lakes and marshes in the grass-covered sand dune region (the Sandhills) of northwestern and north-central Nebraska, and riparian forest along the prairie rivers essentially connecting all of these habitats, one has a structurally complex, dynamic, and biogeographically fascinating mosaic that is anything but a flat, boring plain.

Although various annotated lists of Nebraska's birds have been published and the state featured prominently in Johnsgard's book on the birds of the Great Plains (1979, Birds of the Great Plains, University of Nebraska Press, Lincoln), until now there has been no widely available reference on Nebraska birds. Sharpe et al. have remedied that situation in grand style, producing a wonderfully thorough summary of the temporal status and spatial distribution of all regularly occurring, irregular, accidental, hypothetical, extirpated, and extinct species found in the state. It is current through 1999, in welcome contrast to many state bird books and atlases which often have long publication delays and are of primarily historical value as soon as they are published. For each species, Sharpe et al. provide status information, the details of its first documentation in the state via a specimen, photograph, or other means, a brief discussion of its general distribution and ecology (although mostly distribution and not much ecology), seasonal occurrence data divided into the four major seasons with dates and often numbers for many counties, and a site or two within the state where the species can most reliably be found. For some species, comments on taxonomy, breeding phenology, and historical changes in range are also provided.

One of this book's most interesting sections is a detailed historical account of ornithology and birding within the state. Sharpe et al. trace the first reports of birds in Nebraska back to Lewis and Clark, with interesting accounts of other early expeditions, such as those of Thomas Say and the Long Expedition, Prince Maximilian von Wied, Zebulon Pike, John C. Fremont, and F. V. Hayden. The early development of the Nebraska Ornithologists' Union (NOU, the state bird society) is chronicled, including the interesting tidbit that from 1916–1924, the NOU actually joined forces with the Wilson Ornithological Society to coproduce the Wilson Bulletin. Sharpe et al. seem to implicitly equate the development of the NOU with the rise of ornithological study in the state. This may be true, but throughout the book one gets a vague, uncomfortable feeling that active involvement with the NOU is, in the authors' minds, a prerequisite for serious study of Nebraska birds. Their treatment of more recent history is less interesting or objective; for example, I was surprised that Paul Johnsgard, who is clearly Nebraska's most acclaimed ornithologist—he has written over 50 ornithological books and is often designated (along with the obligatory Nebraska football coaches!) as one of the state's 100 most important people of the twentieth century—rates barely three sentences in the history. Individuals who have contributed much less are given as much or more attention. The book also contains a chapter describing the major habitat types in the state, and its beautiful photographs of landscapes evoked pleasant summer memories for me while reading this book during my forced annual winter absence from the state.

For anyone interested in where and when a given species occurs in Nebraska, this book will be the definitive reference. It is attractively produced, and I didn't see a single typo. Interesting facts can be gleaned from many of the species accounts. For example, I was unaware that Common Ravens (*Corvus corax*) were once common in Nebraska, but the extirpation of the vast bison herds in the nineteenth century led to their disappearance on the plains, with the last documented record apparently in 1936. The Say's Phoebe (*Sayornis saya*), which reaches the easterly limit of its breeding range in Nebraska, is apparently sensitive in this area to 20-year wet and dry cycles. Numerous nestings were observed in the relatively dry 1960s and 1980s and few in the relatively wet 1970s and 1990s, a pattern indeed consistent with phoebe sightings in my own study area. I learned that Gyrfalcons (*Falco rusticolus*) occur almost every winter in the northern Sandhills and that they should be looked for on windswept, frigid grasslands wherever there are concentrations of waterfowl or grouse.

Like virtually any book, this one does have some weaknesses. Most state bird books are long on summary and description and short on synthesis. This one is no exception. For example, I had hoped to see a general discussion of the effect that the development of floodplain forest along the east-west prairie rivers (especially the Platte) has had on Great Plains avian biogeography in the twentieth century. Prior to about 1920, the western half of the Platte in particular was apparently virtually treeless all the way to its banks; photos in our study area from the very early twentieth century show a river bisecting a treeless prairie that in the same spots today contains thick riparian woodland. This forest, a consequence of modern fire suppression, has provided corridors for the movement of arboreal and brush-associated species throughout large portions of formerly unbroken grassland. Sharpe et al. describe the consequent range changes for certain species in detail, such as Northern Cardinals (*Cardinalis cardinalis*), that have expanded their range westward along the river valleys. However, the book lacks a more general evaluation of how this rather drastic environmental change has impacted birds in Nebraska, nor is there any discussion of its historical influence on the dynamics of hybridization seen in various east-west species pairs (e.g., flickers, grosbeaks, buntings, and orioles). The book is very thorough in its documentation of distribution and occurrence, but it is less so for nesting biology. For some species, nesting data based on rather dated Cornell nest record cards are given, but it would

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be difficult to glean from this book the typical nesting period for most species in the state or where nests should be searched for. Related to this is the strong emphasis on sight records by birders (especially those connected with the NOU) but relatively little mention of scientific studies of behavior, ecology, physiology, or population biology of birds in the state. For example, work done on bird biology by professional ornithologists and their students at the Cedar Point Biological Station and the Crescent Lake National Wildlife Refuge is largely ignored unless it involves bird sightings in some way. I have always thought that one role of state bird books should be to highlight scientific advances that have come from that state on particular species.

These quibbles aside, this is an outstanding book, and clearly the best state bird book available for any of the states in the Great Plains. All birders in Nebraska and indeed throughout that entire part of the country will find it useful for its documentation of bird occurrence, and it contains an abundance of raw material for anyone interested in analyses of Great Plains biogeography.—CHARLES R. BROWN, Department of Biological Sciences, University of Tulsa, Tulsa, OK 74104. E-mail: charles-brown@utulsa.edu

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