Reviews

EDITED BY CARL D. MARTI

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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The Ecology of Migrant Birds. A Neotropical Perspective.—John H. Rappole. 1995. Smithsonian Institution Press, Washington, D.C. xvii + 269 pp., 18 figures, 27 tables, 5 appendices. ISBN 1-56098-514-3. Cloth, $35.00.—Originally published by the U.S. Fish and Wildlife Service in 1983 as *Nearctic Avian Migrants in the Neotropics* with coauthors Gene Morton, Tom Lovejoy, and Jim Ruos, the initial work has been considerably expanded, updated, and revised by John Rappole. Indeed, the revision warranted publication in Spanish in 1993 followed by further revision that resulted in this volume in English. This is a welcome addition to the burgeoning literature on Neotropical migratory birds, in part because the original book was out-of-print, not readily accessible in libraries, identified as gray literature, yet frequently cited for its "Neotropical perspective." Consequently, many of us hoped to see it republished so we could add it to our collection of necessary literature on Neotropical migrants. Also, it seemed like a good idea to know exactly what we were citing given that it had to be cited, but no one had a copy! One wonders, though, what happened to the original coauthors in the latest version.

The book is divided into nine chapters and five appendices. The Introduction, or first chapter, defines the scope of the book as a "summary of information and ideas on the biology and conservation of migratory birds, mainly from a Neotropical perspective." A Neotropical perspective was deemed necessary because despite conservation efforts in the United States and Canada, "most Nearctic migrants spend one-half to two-thirds of their life cycle hundreds or even thousands of kilometers away from these good intentions, in Neotropical stopover and wintering areas." The author focuses on Nearctic migrants whose populations breed north of the tropic of Cancer and winter south of that line. This definition of Neotropical migrant may be more technically accurate than some of the definitions presented by government-funded conservation programs such as Partners in Flight, but may be harder to manage across political boundaries.

The author says "I confess that there is an undeniable bias toward passerines" in the book. Well, that would be fine if all Neotropical migratory passerines were given similar coverage, but even within this taxonomic group an undeniable bias toward eastern migrants exists. Furthering this trend, the Introduction acknowledges the conservation value of symposia proceedings on Neotropical migrants published by the Smithsonian Institution, but fails to discuss other valuable sources of information such as those produced by Partners in Flight and its coalition of international, federal, state, and nongovernmental organizations. Was it an oversight that the most important conservation program for nongame birds in this century was not even mentioned?

Chapter 2 focuses on habitat use by Neotropical migrants. This chapter evaluates use of surveys for detecting habitat use in the Neotropics, determining that most survey techniques are inadequate for addressing wintering migrants. Cursory treatments of migrant use of tropical forests, second growth, shrubsteppe, open, and aquatic habitats are provided. The author notes that "little ecological work has been done on aquatic or shrub-steppe species" and that "less than one-third of all migrants use forests during the nonbreeding seasons, yet most of the debate concerning displacement of migrants by residents has centered on these forest-using species." More time is spent discussing hypotheses of habitat use, rather than describing actual use. Sexual differences in habitat use comprise the bulk of the chapter, although why the topic is more important than other aspects of habitat use is not entirely clear. In general, this chapter was heavy on speculation and light on organizing and presenting data and patterns.

The third chapter discusses food preferences and resource use in relation to survival, social behavior, flocking, and roost sites. The author documents which species are known to be intraspecifically territorial during the nonbreeding season, which is use-

ful information for developing conservation strategies in the Neotropics. A description of the behavior of nuclear and attendant species in mixed-species flocks leaves one with more questions than answers. The idea that roost sites may be critical to survival of some migrants, but that little really is known about the topic, is reason enough to conduct research to find out where and what resources are used by which species.

In Chapter 4, the author addresses the role of migrants in tropical communities and compares it with that of resident species. Six ideas that lead to the conclusion that migrants are able to survive by quick and flexible occupancy of new or ephemeral habitats are presented and thoroughly reviewed. The author points out that many Neotropical migrants do not fit this general model, and that relationships within and among species are too complex to generalize. Given that nearly half of all Nearctic migrant species have resident populations in the tropics, it is clear that there are no easy answers for explaining their roles and behaviors as a group.

Migration is the topic of Chapter 5. A strong effort is made to describe various kinds, routes, and hypotheses of migration. Although migration is poorly studied, the chapter makes it clear that behavior, movements, and habitat use during this time can vary by age, sex, and species. Timing of migration and migration pathways seem to be programmed by genetics and natural selection. Considerable research is needed to determine the importance of stopover habitats for survival and conservation of migrants.

Eight explanations for the evolution of migration are presented in Chapter 6: ancient environmental changes; availability of resources elsewhere; proximate factors such as photoperiod and temperature changes; and climatic changes; seasonal tracking of fruit or nectar; seasonality and interspecific competition; seasonal change and intraspecific dominance interactions; and Baker's migration threshold hypothesis. Rappole concludes that none of these ideas when taken separately provides a complete explanation for evolution of northward migration into the Nearctic by tropical nonfrugivores, a common group of long-distance migrants. Another hypothesis based on taxonomic evidence is proposed in which migration results from intraspecific competition for breeding sites.

Chapter 7 is a relatively short chapter that compares Old World migration systems with those in the New World. The Palearctic-African system is the best-studied avian migration system in the world. However, lack of forested environments and a lack of environmental diversity in the subtropical region of Africa relative to Asian, austral, and Nearctic-Neotropical systems may invalidate its use as a model for understanding other systems. Rappole views migration as a filtering process, with the tropical bird community being the filtering material. One filter is the material available to evolve from, a second filter is the variety of subtropical habitats available, a third is the variety of available temperate habitats, and a fourth may be the presence of isolated sites that could foster rapid speciation.

Population changes detected by the Breeding Bird Survey and other methods are described in Chapter 8. Discussion is biased toward declining populations, whereas populations showing increases are hardly addressed. Potential threats to Neotropical migrants include breeding habitat loss, habitat degradation caused by herbivores, contaminant poisoning, normal population fluctuation, procedural biases, and stopover and wintering ground habitat loss. Given the large quantity of technical papers being published on the issue of migrant population declines, this chapter's brevity, neglect of western migrants, and lack of balance was somewhat disappointing.

The ideas in Chapter 9 should be valuable in pursuing a conservation strategy for the Neotropics. Humans residing in the Neotropics, however, may not view migrant conservation as a high priority relative to other species or resources. Funding educational programs about the value of conserving habitats and species in Latin America may be the most productive approach that North Americans can take. This chapter highlights useful ideas that need to be expanded elsewhere. Fortunately, this book was published in Spanish, which represents a start in the right direction. Clearly, Rappole understood who his audience was.

In summary, I highly recommend this book because it is one of the few that address the ecology and conservation of Neotropical migrants on the migration and wintering grounds. Although some biases were identified, one's library on the topic of Neotropical migrants is incomplete without this volume.—DEBORAH M. FINCH, *USDA Forest Service, Rocky Mountain Research Station, 2205 Columbia SE, Albuquerque, New Mexico 87106, USA.*

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Partnerships in Birds: The Study of Monogamy.—Jeffrey M. Black (Ed.). 1996. Oxford University Press, New York. xi + 420 pp., numerous text figures. ISBN 0-19-854861-3. Cloth, $105.00.—Over the last decade or so, ornithologists' perceptions of the nature of monogamy have undergone radical changes, especially in light of molecular evidence of the frequency of extrapaternal (and maternal) fertilizations. This book seeks to assess our current knowledge about the partnerships involved in social monogamy

and to suggest some potentially productive avenues for further research.

I suspect it might have been more accurate to include the word "divorce" in the title of this book. For most chapters, there seems to be at least as much, if not more, emphasis on why pair bonds dissolve as on why they are maintained. The tone is established in Table 1-2 of the Introduction (written by editor Black), which gives an overview of 11 hypotheses proposed to "explain divorce and mate fidelity" in birds. As stated in this table, only two hypotheses are presented to describe conditions in which pair bonds will be maintained; the other nine are in terms of conditions under which birds will divorce.

The book opens with a three-chapter section called Initial Perspectives. This sets the stage for the next two sections, which include a total of 14 chapters based on long-term field studies of various avian species (five on continuous partnerships and nine on part-time partnerships). The last section, Concluding Perspectives, contains two chapters. Given that a total of 43 authors is involved, and 17 of the 19 chapters are written by at least two authors, I will refer to chapters simply by number.

Chapter 1, the introduction, addresses the scope of the book and gives the theoretical background and some definitions of terms. The next two chapters present views on how social monogamy has evolved and is maintained. In general, three hypotheses on the evolution of social monogamy have been proposed: (1) the polygyny threshold is not reached; (2) males are forced to be monogamous through female-female aggression; and (3) young can be reared successfully only through biparental care. Chapter 3 strongly supports the last (and perhaps oldest) view. Chapter 2 proposes a new idea, the constrained female hypothesis, which states that females will be genetically monogamous only if they have abundant opportunity to select among several potential mates, or if they are completely controlled by males. Most situations fall between these two extremes. Hence, extrapair copulations primarily are a female strategy (an idea supported by several other chapters in the book), and the theory goes on to predict which females should engage in extrapair copulations most frequently and why.

Most of the 14 case studies focus on one to three species. The choice of which studies to include clearly reflects the major interests of the editor—only the family Anatidae is represented by more than one chapter. Nevertheless, the choice of species and studies is excellent, covering a range from Barnacle Geese (*Branta leucopsis*), which spend nearly every minute of their lives together once a pair bond has been formed; to Bewick's Swans (*Cygnus columbianus*), who have a reported divorce rate of nil; to Splendid Fairy-Wrens (*Malurus splendens*), in which only about 30% of the young are fathered by the resident male; to Indigo Buntings (*Passerina cyanea*), in which even within-season divorce is a frequent occurrence.

Among the species with continuous partnerships, the case studies include year-round residents (Blue Duck [*Hymenolaimus malocorhynchos*], Mute Swan [*Cygnus olor*], Florida Scrub-Jay [*Aphelocoma coerulescens*], and Splendid Fairy-Wren), highly migratory species (Bewick's Swan, Whooper Swan [*Cygnus cygnus*], and Barnacle Goose), and highly nomadic species (Pinyon Jay [*Gymnorhinus cyanocephalus*]). The case studies on part-time partnerships include both resident populations (e.g. European Blackbird [*Turdus merula*] and Cassin's Auklet [*Ptychoramphus aleuticus*]); and migratory ones (e.g. Short-tailed Shearwater [*Puffinus tenuirostris*] and Indigo Bunting).

One of the real strengths of this book is its comparative approach. For example, Chapter 6 is about three species of swans, all closely related, yet differing in migration (one is resident, one migrates relatively short distances, and one migrates longer distances). Chapter 7 compares two jay species that inhabit very different ecological conditions. Other chapters, such as 14, 15, and 16, give a broader comparative approach to a whole group of birds (raptors, penguins, and larids). I was delighted to see the number of within-species comparisons in the book, for example, Chapter 10 on ptarmigans, Chapter 13 on Great Tits (*Parus major*), and Chapter 14 on Eurasian Sparrowhawks (*Accipiter nisus*). Such within-species comparisons are necessary, I think, in order for us to come to grips with comparisons between species.

The overall quality of writing is high; chapters range from good to excellent. However, two chapters stand out as particularly valuable and provocative: Chapter 2, by Patricia Adair Gowaty, and Chapter 19, by Bruno Ens, Sharmila Choudhury, and Jeffrey Black.

Chapter 2 gives a strong, clearly stated vision of monogamy and divorce from a female perspective. It was fascinating to see how many other authors referred to Gowaty's material, yet then proceeded to present much of their work through the lens of male bias. For example, the only table (p. 331) in Chapter 18 gives us a set of three alternative scenarios, each presented only in terms of selective pressures on males. I looked in vain for the table presenting information concerning selection pressures on females. Until we manage to pose half of our questions on how selection works on females, our understanding of any social system will be partial at best.

The last chapter in the book, Chapter 19, gives an excellent overview of the preceding chapters in light of other work (published or in press) on the subject, and points out avenues for future research. Like Chapter 3 of the opening section, this chapter argues for the importance of mathematical modeling in helping to provide new insights into the evolution and maintenance of monogamy. It is an important

chapter that provides the book with an appropriately strong ending.

One weakness I found is what I consider to be an overemphasis on reproductive success as the scale against which alternative strategies are measured. Many other measures, such as subsequent winter survival, might actually prove to be more relevant. I feel strongly that a broader approach might well bring new insights and enhance our understanding of mate fidelity and divorce in monogamous species.

The book is nicely set out, very well organized, and contains relatively few typographical errors; I found only eight. Perhaps the most confusing was in Chapter 19, where the authors refer to Table 1-1 when they actually mean Table 1-2. Despite these few criticisms, on the whole the book is an excellent contribution to our understanding of this fast-breaking area of ornithology. It belongs on the shelf of anyone interested in social behavior in general and monogamy in particular.—SUSAN M. SMITH, *Department of Biological Sciences, Mount Holyoke College, South Hadley, Massachusetts 01075, USA.*

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Made for Each Other: A Symbiosis of Birds and Pines.—Ronald M. Lanner. 1996. Oxford University Press, New York. viii + 160 pp., 15 color plates, 24 figures. ISBN 0-19-508902-2. Cloth, $35.00; Paper, $15.95.—*Made for Each Other* is a highly readable personal account of Ron Lanner's research and insights concerning the seed dispersal mutualism between Clark's Nutcracker (*Nucifraga columbiana*) and several western white pines with wingless seeds, with emphasis on whitebark pine (*Pinus albicaulis*). The author's intent is not to be scientifically exhaustive but to highlight the salient and fascinating details of these mutualisms. This he accomplishes in a simple, often poetic, carefully worded writing style that is accessible both to the professional and the lay naturalist. Additional details and issues are reserved for the 13 pages of chapter notes, which follow the text. Lanner's humor and sense of irony often are apparent. Ornithologists, and particularly avian ecologists, will find that the book summarizes an interesting and diverse literature and clearly delineates the role of seed-storing corvids in shaping many Holarctic coniferous forest communities. *Made for Each Other* is suitable as a supplemental book for an undergraduate ecology course and should be recommended to graduate students as well, with the caveat that this is not a rigorous treatment of the subject. The bird-pine relationships are conspicuous and important temperate zone mutualisms that beautifully illustrate coevolutionary processes.

Lanner is a forest biologist by training, and his research has centered on morphology, taxonomy, and seed dispersal in pines. One of his previous books, *The Piñon Pine*, has been particularly well received. Ornithologists may not be familiar with his contributions to the study of the nutcracker-pine interactions, which were published in the forestry literature in the 1980s. They were pioneering works focused on morphological adaptations and the evolutionary history of whitebark pine and limber pine (*Pinus flexilis*). Lanner's students have included Harry Hutchins and Stephen Vander Wall, who have studied nutcracker behavioral ecology. Throughout the book, Lanner graciously acknowledges the contributions of his students, colleagues, and other nutcracker or pine researchers in North America, Europe, and Asia.

Chapters 1 through 5 provide a brief description of the basic nutcracker-pine interaction, an overview of the bird-dispersed pines of the world, and a review of the western North American pine seed dispersers, featuring Clark's Nutcracker. In Chapter 6, the once puzzling question of how nutcrackers find their seed caches is explored. Next, we find discussion of the phenomenon of mass nutcracker irruptions in response to cone-crop failures. Lanner then tells us how he became interested in the nutcracker-pine interaction after writing the pinyon pine book, recounting his epiphany ". . . that *wingless* seeds indicate corvid dispersal and establishment, that the large size of those seeds is adaptive to harsh environments, and that corvids had exerted the selection pressures that lay behind the evolution of the seeds." He then describes his research on whitebark pine in western Wyoming, with emphasis on Harry Hutchins' work. In Chapter 9, again drawing on his experience with whitebark pine, Lanner shows us how nutcrackers are builders of whole communities.

The next two chapters are not directly relevant to bird-pine mutualisms but are interesting nonetheless. The red squirrel (*Tamiasciurus hudsonicus*)-grizzly bear (*Ursus arctos*) interaction is the subject of Chapter 10: red squirrels cut down whitebark pine cones and store them in middens, and grizzlies raid middens and feast on seeds prior to hibernation (". . . Red Squirrels hustle pine nuts for Grizzly Bears."). Chapter 11 recounts the traditional harvest and use of stone pine seeds by Native Americans, the Swiss, and dwellers of the Carpathian Mountains and Siberia. The theme of Chapter 12 is deviations, which unites miscellaneous information. In Chapter 13, Lanner speculates on the origin of the bird-pine interaction, providing two examples where pines show a cline in dispersal mode. He then addresses the origin of stone pines and seed dispersal by nutcrackers, and the appearance of whitebark pine in North America. According to molecular data, whitebark pine diverged from Old World stone pines between

600,000 and 1.3 million years ago, arguing for a Pleistocene appearance for the interaction in North America (via the Bering Strait land bridge). The final chapter alerts readers to current and imminent threats to whitebark pine and its major decline in the northern Rocky Mountains—all the result of human-caused factors. Principal problems are white pine blister rust (*Cronartium ribicola*), a Eurasian fungal disease inadvertently introduced to North America in 1910, and the successional effects of more than 80 years of fire exclusion. The bottom line: the most specialized bird-pine mutualism in North America has a dubious future.

The strengths of *Made for Each Other* include the clear, careful writing style and the personal narrative, which sometimes provides glimpses into the mystique of how research ideas come about and how research gets done. Here and there Lanner enriches his discussion of bird-pine interactions by drawing upon his travels and pine-related experiences. The historical and anthropological anecdotes on the harvest and use of stone pine nuts also are particularly fascinating. One of the most important contributions of the book is the last chapter, which describes the widespread losses of whitebark pine, the danger to related pines, and the imminent decline of the nutcracker-pine mutualism. All of us who study whitebark pine in the Rocky Mountains would readily concur that these losses are severe and that the species is in grave trouble.

The book is not without its inaccuracies, and it includes some questionable evolutionary interpretations. For example, on p. 13 Lanner writes, "Ponderosa and Jeffrey pine seeds are frequently taken by Clark's Nutcrackers, and by Steller's and Pinyon Jays, but apparently not on a scale large enough to have affected the biology of the trees." This suggests that all pines have equal potential for evolving bird dispersal and overlooks the importance of secondary seed dispersal in these species. The author states (p. 37) that the nutcracker is ". . . the most advanced in its evolution . . ." compared with other seed-storing corvids, but I believe that he actually means it is the most specialized species for this lifestyle. The reader gains the impression (p. 77) that whitebark pine is always both early and late successional, i.e. both a pioneer and a climax species, replacing itself through time; but, the situation actually varies geographically and with elevation. Lanner (p. 79) overstates whitebark pine's role as an ecosystem-builder following the 1988 Yellowstone National Park fires (and fires in general). Although whitebark pine seedlings began appearing in numbers by 1991, the density of lodgepole pine, spruce, and fir far exceeded the density of whitebark pine on both mesic and xeric areas.

Two longer and more problematic examples follow, if the reader will bear with me. One unique consequence of nutcracker seed dispersal in some bird-dispersed pines is the tree cluster growth form, which consists of two or more stems of different genotypes, contiguous or fused at the base, originating from the same nutcracker cache. A similar growth form occurs when the leader is damaged followed by a loss of apical dominance, resulting in multiple stems of the same genotype. Several papers based on genetic analyses have shown that only a proportion of stem clumps in bird-dispersed pines are tree clusters. Although Lanner cautions the reader that stem clumps may have an alternative origin, he uses stem clumps and tree clusters interchangeably as evidence for seed dispersal by nutcrackers (p. 100, Table 12.1).

Whitebark pine seeds have the unusual ability to lie dormant or delay germination, i.e. many seeds do not germinate for one to several years after they are cached. As Lanner recounts (p. 105), Ward McCaughey and I have suggested that delayed germination is adaptive in the whitebark pine's environment, which varies in moisture availability from year to year. Lanner dismisses this idea and suggests another explanation: nutcrackers sometimes eat germinating seeds and could dig up old caches. "The availability of germinating and dormant seeds may help nutcrackers through a lean year or two following a mast year . . . whitebark pine's seed dormancy may be an adaptation that benefits the pine in the long run by helping maintain viable populations of nutcrackers" (p. 106). Although germinating and dormant seeds may contribute to nutcracker survival (memory for seed caches begins to decline in nutcrackers about nine months after seed storage), it is difficult to see how this would select for delayed germination. First, the very seeds that delay germination are consumed and cannot pass on this trait to offspring. Second, if seeds have higher germination and survival potential by not delaying germination, this would be a powerful selective force. Finally, seed caches of Jeffrey, ponderosa, or other conifers may be more important in getting nutcrackers though lean years.

The chapter notes after the text provide additional interesting material and references. For somewhat controversial subjects, they reflect mostly Lanner's opinions rather than provide a good discussion and analysis of issues. I was also a little uneasy with the title of the book, which to me implies a comfortable relationship. I subscribe to the view that most mutualisms arise from antagonistic interactions. They are unlikely to be optimal for either participant, and each species is always pushing the envelope to maximize return at the expense of the other.

Despite these criticisms, I found the book to be enjoyable, educational, and simply a good read. I'm pleased that we now have an authoritative book on bird-pine mutualisms that will appeal to both scientists and popular audiences.—DIANA F. TOMBACK, *Department of Biology, University of Colorado at Denver, P.O. Box 173364, Denver, Colorado 80217, USA.*

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The Megapodes: Megapodiidae.—Darryl N. Jones, René W. R. J. Dekker, and Cees S. Roselaar. Illustrated by Ber van Perlo. 1995. Oxford University Press, Oxford, United Kingdom. xx + 262 pp., 8 color plates, numerous line drawings and tables. ISBN 0-19-854651-3. Cloth, $60.00.—This volume is the third in the series *Bird Families of the World* edited by C. M. Perrins, W. J. Bock, and J. Kikkawa. It is the first monograph to deal with the Megapodiidae in more than a century and is intended to be "accessible to amateurs as well as professionals." It achieves its goal admirably. The authors appear to have compiled every scrap of published and unpublished information available on megapodes, even including etymology of both English and scientific nomenclature, and have presented new insights from their own research. The writing is scholarly but will be understood easily by anyone biologically literate.

The book is organized into two parts, Part I comprising nine chapters covering all aspects of megapode biology, and Part II covering the species accounts. Eight color plates grouped in the center show all visually different species and subspecies including chicks (if known). The general chapters cover such conventional subjects as taxonomy, biogeography, ecology, and conservation with special attention to the peculiarities of the Megapodiidae, including incubation sites, ecophysiology, and evolution of incubation strategies. Chapter 1 is a well-organized overview that sets the stage for the more detailed chapters to follow.

Chapters 2 (Taxonomy and Relationships) and 3 (Distribution, Biogeography, and Speciation) are thorough and objective. Competing hypotheses, even those at variance with the authors' own, are presented dispassionately. Jones et al. have produced a major taxonomic revision that takes into account all available data, and taxonomic history is presented succinctly and clearly. They recognize seven genera rather than six as in most other modern references. *Aepypodius* and *Alectura* are split from *Talegalla* with which they often are combined, and *Eulipoa* is regarded as a monotypic genus separate from *Megapodius*. Species limits are given thorough attention. In all but one genus, the species are clearly delimited and non-controversial, but because so many of the forms in *Megapodius* are allopatric and supposed areas of sympatry have been questioned, the number of species in that genus has been the subject of wide disagreement—varying from Oustalet's 19 (Eulipoa included) to Mayr's three (*Eulipoa* excluded). Mayr's *M. freycinet* has been treated as a superspecies by most recent authors, with varying numbers of allospecies, most recently 10 (not counting *E. wallacei*): *nicobariensis, cumingii, bernsteinii, reinwardt, freycinet, eremita, layardi, laperouse,* and *pritchardii*. Jones et al. recognize three additional allopatric species, *forstenii, geelvinkianus,* and *tenimberensis,* based on a meticulous examination of supposed areas of sympatry, insular patterns of variation, ecological differences, and hybridization. English nomenclature involves some innovations. Jones et al. introduce the neologism "*talegalla*" to differentiate the New Guinea brush-turkeys in the genus *Talegalla* from the true brush-turkeys (*Alectura* and *Aepypodius*) of Australia. I doubt that this name will catch on, but time will tell. Commendably, Jones et al. use "megapode" rather than "scrubfowl" for members of the genera *Megapodius* and *Eulipoa*. I note that the recent adoption by many authors of "scrubfowl" for these species means that no species among the megapodes is actually called "megapode," a "well-known and meaningful name in the literature," as Jones et al. state. Chapter 2 also thoroughly reviews competing hypotheses about factors limiting megapode distribution (competition versus predation) and center of origin (Asia versus Gondwana).

Chapters 4 to 8 discuss megapode biology, with heavy emphasis on various aspects of these birds' peculiar nesting habits, which have been much more thoroughly investigated than things such as nonbreeding behavior, displays, and vocalizations. Chapter 5 (Megapode Incubation Sites) gives detailed comparisons of mound builders and burrow nesters, and heat sources (decaying vegetation, solar, and geothermal). Chapter 6 (Ecophysiology and Adaptations) analyzes incubation processes, energetics of mound incubation, adaptations of eggs and embryos, and the hatching and fledging of the most precocious of all avian young. Chapters 7 (Reproductive Behavior and Mating Systems) and 8 (Evolution of Megapode Incubation Strategies) complete the very thorough coverage.

The final chapter of Part I is devoted to conservation. A table reveals that 13 of the 22 species are either vulnerable or endangered. The eggs of most species are exploited by humans, but this is not necessarily the reason many are in trouble. Jones et al. show how traditional egg collecting in many areas was a sustainable activity until outside influences altered local customs. The endangered Maleo (*Macrocephalon maleo*) of Sulawesi is a case in point and is discussed in considerable detail. Other species that suffer from egg exploitation include the Moluccan Megapode (*Eulipoa wallacei*), about which this volume presents much new information from Dekker, and several remote island-inhabiting *Megapodius* about which little is known. The Malleefowl (*Leipoa ocellata*) of Australia is given separate attention because almost all of the reasons for its sharp decline in the 20th century are related to human alteration of its arid habitat. Survival of all megapodes is shown to depend on limitation of egg gathering,

preservation of habitat, and keeping introduced predators off remote islands.

The species accounts are detailed and telegraphic. Each begins with an English name, citation of the original description, other English names, and names and ranges of subspecies. Subheadings are: Description (plumages, bare parts, molts, measurements, body masses, geographic variation); Range and Status; Field Characters; Voice (with sonagrams of available recordings); Habitat and General Habits; Food; Displays and Breeding Behavior; Breeding; Local Names; and References (name and date only; a separate references section covers the entire book). In addition to their own extensive field work, the authors have drawn on recent work by others as indicated by the large number of references to personal communications.

The color plates are competently painted and accurate but not very interesting. Of course, megapodes are not a particularly colorful group, but the artist's use of the same three to four poses throughout increases the monotony and sterility. The poses are typical and correct, and the colors appear well reproduced; nevertheless, the birds seem stiff and lifeless. Each plate shows only one to three species and two to nine (usually six) individuals, so ample room was available for enhancements such as habitat elements. Only Plate 3 (Malleefowl) offers anything other than the birds themselves, and it shows what could have been done with the others. The upper figure depicts a nest mound in a natural setting, and below an adult stands in front of some rather generic vegetation that demonstrates the cryptic nature of the bird's coloration in a rendering reminiscent of those of Abbott Thayer. Shading has been kept to a minimum, and in some cases eliminated entirely, so that individual figures appear very flat. The renderings of chicks are particularly so, and appear pasted onto the background. Adults often have noticeable highlights above, but no compensating shadows on the underparts. The lack of shading may be the result of a conscious decision to emphasize local color for reference purposes, but it greatly lessens the aesthetic appeal of the plates.

A further problem with the color plates has nothing to do with the artwork itself. In my opinion, the practice of labeling color plates with tiny numbers that cross-reference the facing page rather than printing the names next to the individual figures, especially when plenty of room is available and no possibility of ambiguity exists, is one of the most annoying, useless, and unnecessary practices of the bird-book publishing industry.

Despite a few stylistic shortcomings, this volume clearly is a landmark ornithological publication, and I recommend it wholeheartedly. By molding a very scattered literature into a coherent reference, it is a model of thoroughness in coverage of a relatively obscure group and should be in every research library as well as the personal library of anyone interested in the Galliformes or in avian breeding biology. Undoubtedly, it will be the definitive reference on the megapodes for years to come.—H. DOUGLAS PRATT, *Museum of Natural Science, Louisiana State University, Baton Rouge, Louisiana 70893, USA.*

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Life of the Flycatcher.—Alexander F. Skutch. Illustrated by Dana Gardner. 1997. University of Oklahoma Press, Norman. xiv + 162 pp., 16 color plates, 32 black-and-white illustrations, 4 tables. ISBN 0-8061-2919-0. Cloth, $40.00.—Alexander Skutch needs no introduction to most ornithologists, based on his more than 25 books mostly on ornithological themes. Past books include *Parent Birds and Their Young, A Guide to the Birds of Costa Rica* (coauthored with Gary Stiles), and his "Life of" series: *The Life of the Hummingbird, Life of the Woodpecker, Life of the Tanager, Life of the Pigeon,* and *Orioles, Blackbirds, and their Kin.* His *Life of the Flycatcher,* the latest contribution to this series, is vintage Skutch: a smoothly written, nicely illustrated account of New World flycatcher (Tyrannidae) life histories and daily lives, based prominently on his original observations, and abundantly spiced with anthropomorphism and Skutch's sometimes offbeat views of nature.

Skutch begins and ends the book with his view that the New World flycatchers are peaceful neighbors and devoted parents (with strong family values?). He maintains that the "tyrant" flycatchers are unjustifiably tainted by the image of aggressiveness and belligerence, an impression originating with behaviors of some kingbirds and relatives, and reinforced by many of their common names. He then describes the history of such epithets, and renames species; e.g. Torrent Tyrannulet (*Serpophaga cinerea*) becomes Torrent Flycatcher. Besides an introductory chapter (The Flycatcher Family) and his final defense (Flycatchers as Neighbors), he details their lives in nine additional chapters: Food and Foraging; Daily Life; Dawn Songs and Flight Songs; Duets, Greetings, and Nest Songs; Courtship; Nests; Eggs and Incubation; The Young and their Care; and Enemies, Defense, Nesting Success, and Longevity. I applaud Skutch for pulling this material on a single avian family together into one volume. He also weaves into the text discoveries by many other students of flycatchers so as to give a more balanced view of the whole family than his own, largely tropical, observations would allow. All the chapters are interesting, in part because Skutch does a good job identifying unusual behaviors and adaptations of this diverse

family. I learned something new from most chapters, for example how some flycatchers roost socially at night, and how they respond vocally to a mate from inside the nest. I enjoyed his debunking of myth (p. 83): "Great Crested Flycatchers (*Myiarchus crinitus*) and related species frequently add strips of shed snakeskin to their nests, possibly, as some naturalists have surmised, as a talisman to hold nest-plundering snakes aloof, but more probably because these exuviae are soft and flexible, like shreds of cellophane or plastic that are also found in birds' nests." My favorite example of anthropomorphism occurs on p. 49: "The impression that the singing Yellow-bellied Elaenia (*Elaenia flavogaster*) is angrily self-assertive is intensified by his flattened crest, like the laid-back ears of a resentful horse."

As in other books in this series, statements are referenced only by chapter bibliographies, not individually, which will inhibit tracing sources of some statements. Overall, however, the book is reader-friendly. A six-page index references species, illustrations, authors, and subjects. The prose flows smoothly. He asks many "why" questions (e.g. why do flycatchers sometimes join mixed-species flocks?), and keeps his answers and arguments nontechnical. The 16 color plates and numerous (excellent) line illustrations add considerably to the work, but this is not quite as lavish a coffee table book as Skutch's previous "Life of" works due to the scaled-down format and to the fewer and less ambitious color plates. I think this book will appeal particularly to those who wish to watch tropical birds, to those interested in flycatchers or bird natural history in general, and to graduate students looking for research questions. The several tables and voluminous facts or anecdotes stimulated me to think about why some flycatchers build certain kinds of nests and how this is related to their phylogeny and life history, why some species have particular anatomical characteristics such as rictal bristles or long tails, how flycatchers communicate with each other (e.g. What is the role of crests in so many species?), why some species have unusually long incubation or nestling-feeding periods, why emancipated males in some species do not appear to be sexually selected, what determines the unusual array of flycatcher social systems including diverse variations on a theme of monogamy, why some species nest near wasp nests, what determines nesting success, and what determines clutch size. Skutch himself addressed some of these questions, but often I was unsatisfied that he considered alternative hypotheses as thoroughly or persuasively as he could have.

I was disappointed that *Life of the Flycatcher* did not reflect more of the recent research on New World flycatchers, although I recognize that it was not intended as a state-of-the-art review. His chapter on food and foraging was not as up-to-date and lively, for example, as the "Sallying Forth: a Flycatcher's Baedeker" chapter in Steven Hilty's book (*Birds of Tropical America: A Watcher's Introduction to Behavior, Breeding and Diversity*). I also found Skutch's accounts of duetting, twilight and flight songs, flocking and migratory behavior, and demography superficial considering the available literature. Finally, I think that Skutch's spin-doctoring of flycatchers as generally benign and family oriented works against him in this book, because it tends to obscure the grandeur of tyrannids' adaptive and social radiation, a theme that is not well developed. For example, several Caribbean kingbirds (including Loggerhead Flycatcher [*Tyrannus caudifasciatus*], Giant Flycatcher [*T. cubensis*], and Gray Flycatcher [*T. dominicensis*]) kill other birds more often than Skutch admits, and Piratic Flycatchers (*Legatus leucophaius*) certainly do not do their "hosts" any good. In summary, I recommend that both the text and artwork be savored by a wide ornithological audience as a very readable and richly detailed natural history account of a fascinating family, and as a kind of memoir by a giant among ornithologists.—THOMAS W. SHERRY, *Department of E.E.O. Biology, Tulane University, New Orleans, Louisiana 70118, USA.*

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The Raven.—Derek Ratcliffe. 1997. Academic Press, San Diego, California. xiv + 325 pp., 18 figures, 27 tables, 39 black-and-white photographs. ISBN-0-85661-090-9. Cloth, $25.00.—The Common Raven (*Corvus corax*) has had a great influence on the human imagination. Since prehistoric times it has associated closely with humans, as it does with other carnivores, to secure food. Its impressive size, varied and loud vocalizations, skillful flight, and its mischievous and seemingly clever antics seldom fail to impress and to invite speculations on its presumed intelligence. Wonder surrounds this bird of myth and mystery that, in the Tower of London, still symbolically guards the British Empire.

In recent decades the behavior of corvids has been increasingly the subject of scientific investigations. Complex and varied social systems, ecology, vocalizations, cognition, foraging behavior, tool use, learning, caching behavior, and memory all have been explored in various species. However, surprisingly little progress has been made with ravens, presumably because they behave so idiosyncratically. Derek Ratcliffe has followed ravens informally for decades in Britain during his work with the Peregrine Falcons (*Falco peregrinus*) that commonly nest on the same cliffs with ravens. Ratcliffe's book gives a good glimpse of the raven's incredible flexibility. However,

the book's main strength is that it provides a detailed summary of the population status of the bird in Britain and Ireland. It draws on an impressive data set of thousands of banding records by many interested amateur ornithologists. Only in Britain have so many taken up the challenge of climbing the cliffs to the raven eyries in the Sir Edmond Hillary tradition, "because it's there." I gained the impression that climbing to the nearly inaccessible raven nests on cliffs is a major British sporting event. And a well worthwhile one it is. As a result, we have the most complete picture of raven population biology.

Although this book is primarily about the ravens of Britain and Ireland, it includes a wealth of detailed and fascinating information about the biology of ravens in general, and it greatly illuminates our understanding of the species. As Ratcliffe points out, the raven "excites the sensibilities of successive generations of naturalists." Studies of these birds now have been done not only in Britain and Ireland, but also in Greenland, northern Europe, western and eastern North America, and elsewhere. Most of these studies deal directly or indirectly with the birds' ecology.

The ecology of ravens is closely tied up with the ecology of human affairs, and one chapter examines specifically how the bird is entangled in the cultural life of people. The raven has been a camp-follower of humans in Europe and America, is represented in cave paintings, and lived in the settlements of the Vikings, the Romans, medieval Europeans, and Native Americans. In Europe it was at first revered and protected for its valued role in garbage disposal in towns. However, in the mid-1600s ravens began to fall from grace and were persecuted all over Europe, and later also by Europeans in North America. Ratcliffe's analysis of the birds' breeding biology suggests that bounties for ravens that resulted in large-scale shooting and nest-raiding, probably did relatively little to affect the health of the breeding population. It was the use of poisoned bait that largely brought about the worldwide decline of this majestic bird, ultimately causing it to retreat far from the haunts of humans in many parts of its range.

The raven has in recent years been making a dramatic worldwide comeback. It is once again edging close to and even into towns and cities. In Britain it has recovered most of its former range, and populations are now healthier than they have been for more than 100 years. Ratcliffe believes that ravens have the potential to continue their recovery, and he examines the birds' prospects closely. An important part of his story is the indirect effects of past and present land use that is a key issue in the birds' biology. He gives detailed accounts of the ravens' status in all of the different sections of Britain and Ireland.

I felt that the strongest and perhaps most unique part of the book was the overall treatment of breeding biology integrated with population biology. Populations are held at a ceiling; the number of breeders does not change despite consistent breeding success. Ravens usually are strictly territorial, yet under some conditions (high food availability) territoriality may break down almost completely. Territory size and nest spacing vary in parallel with the available food.

The incredible flexibility of raven behavior is reflected not only in territoriality, but also in what it eats, how it secures food, its mating strategies, home life, nest construction and nest placement, nestling care, social arrangements, associations with other animals, population movements and dispersal, play behavior, breeding time, and social tolerance. This flexibility and individual variation make it difficult to come to systematic scientific generalizations. At the same time, it is this flexibility that is most interesting about this bird. In practical terms, it means that the species can exist and make its living in a wide range of habitats that include boreal forests, tundra, sea coasts, deserts, mountains, and towns and cities.

Ratcliffe's book, although focusing on the ravens of the British Isles, gives an excellent account of their biology that provides many valuable insights into one of the world's most popularly recognized yet enigmatic birds.—BERND HEINRICH, *Department of Biology, University of Vermont, Burlington, Vermont 05405, USA.*

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The Prairie Falcon.—Stanley H. Anderson and John R. Squires. 1997. University of Texas Press, Austin. viii + 162 pp., 19 color photographs, 10 figures, 5 tables. ISBN 0-292-70473-9. Cloth, $29.95; Paper, $16.95.—This book was written for a general readership and explores general facets of the biology and natural history of the species. Topics include nesting biology, seasonal distribution, population dynamics, food habits, and falconry. The latter chapter is especially well balanced and informative. Other sections, peripheral to the species profile, include bird evolution, brief accounts of other falcons, the types and uses of pesticides, "habitat mitigation," and an appendix describing risks to the birds resulting from human visits to active eyries.

In keeping with the intent to reach a lay readership, literature citations are listed at the ends of chapters, rather than near the sometimes detailed information found in the text. The result may be less distraction for the casual reader, but difficulty for the student who might want to know who said what. The book's organization needs improvement in several places; for example, nest-site fidelity by individ-

uals, dispersal by young to breeding sites in later years, and percent occupancy rate are lumped in one small section in a way that would be unclear to a novice.

More troublesome for any reader are several errors. For example, apteria are not feather tracts, the pecten does not arise from the orbit floor as shown in a drawing, pygostyles are not limited to falcons, some falcon primaries (especially no. 10) are distinctly emarginated at the tips, the juvenal plumage does not slowly come to closely resemble that of the adult by the end of the first summer, and falcons do not have 11 primaries as shown in a drawing. Other statements are dubious, including the contention that adult Prairie Falcons (*Falco mexicanus*) kill Great Horned Owl (*Bubo virginianus*) chicks in the nest, or that Prairie Falcons, which eat the whole bodies of vertebrates, might eat snails to augment calcium intake. When obtaining semen for artificial insemination in captive breeding, ejaculation into a pan is not caused by stroking; instead semen is stripped from the vas deferens and recovered from the everted genital papilla with a capillary tube.

Inconsistences include statements about the age at fledging, said to be 33 to 35 days in one place, but a much greater age is inferred if young disperse from the nest area of age 65 days, within "a week or two" after fledging. Prairie Falcons actually fledge at 40 to 44 days of age. Regarding reproduction, the reader is told that Prairie Falcons must product 1.71 to 2.00 fledged young per occupied nest for a population to persist. Elsewhere, however, the book states an average of about 3 young are required for a stable population. Either way, this focus on productivity perpetuates the widely held false notion that fledgling success is a predictor of variation in population size.

The book conveys the view that Prairie Falcons are rugged and versatile and likely to be the perpetual subjects of human observation and study. Hopefully, a thorough revision of the text can occur in a second printing. The excellent photos by Rick Kline are a major plus in the present edition.—JAMES H. ENDERSON, *Department of Biology, Colorado College, Colorado Springs, Colorado 80903, USA.*

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The Breeding Birds of Québec: Atlas of the Breeding Birds of Southern Québec.—Jean Gauthier and Yves Aubry (Eds.). 1996. Province of Québec Society for the Protection of Birds and Canadian Wildlife Service, Montreal. xviii + 1,302 pp., 381 color plates, 1,109 black-and-white photographs, 45 figures (excluding unnumbered figures that accompany descriptions of species), 21 tables. ISBN 2-9801553-2-2. Cloth, $150.00.—This volume, as stated in the subtitle, contains all of the elements one would expect to find in a conventional breeding bird atlas of southern Quebec, i.e. that part of Quebec lying south of 50°30′N. Like most such atlases, it presents the results of a systematic survey of the breeding status of all species in the area within a given time frame, in this case 1984 to 1989. For species breeding elsewhere in Quebec or outside the specified time frame, the atlas presents more limited distributional information acquired without the benefit of a systematic survey. What it does provide for the whole province is "a monumental synthesis of [each species'] breeding ecology." In that respect, it goes "well beyond the scope of traditional atlases" (p. xii) and is likely to become the definitive reference for ornithologists concerned with Quebec's avifauna. At 8.5 pounds it certainly is not going to be used in the field. Even lifting it carelessly off the bookshelf could generate a hernia!

This volume originally appeared in French in 1995 under the title *Les Oiseaux nicheurs du Québec: Atlas des oiseaux nicheurs du Québec méridional.* Only minor corrections have been made in the English translation. It is to the credit of the translation coordinator and the nine translators that the book does not read at all like a translation. The most notable exception is the reference to "Trembling Mountain" (p. 69), which is known throughout Canada by its French name, Mont Tremblant. I am unfamiliar with the English usage of the term "pochard" as applied to all freshwater diving ducks of the tribe Aythyini (pp. 35, 105, 110, 1207, and 1208), as opposed to its usage for the Old World species *Aythya ferina.* It may also be a translation error that accounts for the erroneous inclusion of Snow Bunting (*Plectrophenax nivalis*) in a list of extirpated species (p. 51), although its breeding status in Quebec is clearly spelled out on pages 1186–1188. Some attempt was made to bring the French text up to date, for example by the inclusion of a footnote documenting the 1995 sighting of a pair of Tufted Titmice (*Parus bicolor*) feeding recently fledged young, the first confirmed breeding record for the province (p. 1167).

As in many other breeding bird atlas projects, the entire area of southern Quebec was divided into squares measuring 10 × 10 km. Inevitably, in an area as large as southern Quebec and possessing such geographic variability, it proved impossible to conduct field work in every grid square in the region. Nevertheless, by enlisting 932 individuals (mostly volunteers) to spend 70,000 h in the field, it was possible to accumulate more than 200,000 records, representing 293 species. One of the difficulties of producing an atlas for a large, and especially a largely uninhabited, area is achieving complete systematic coverage. In various parts of the world where this problem has existed, strategies and compromises of

various sorts have been adopted in order to present a fairly accurate approximation of breeding distributions, and Quebec is no exception. Apart from the regrettable but necessary exclusion of northern Quebec from systematic coverage, this atlas relies on a somewhat complicated but innovative procedure for generating maps that illustrate the regional variation in relative abundance (minimal, low, high, or maximal) of each of 115 species, while compensating for the variability in coverage. Tinted choropleth maps are superimposed on maps that indicate, for each 10 × 10 km square, whether breeding for the species has been confirmed or whether it is merely possible or probable. The latter two categories are combined into one for mapping purposes. For a few open-country species (e.g. Mourning Dove [*Zenaida macroura*], Savannah Sparrow [*Passerculus sandwichensis*], Bobolink [*Dolichonyx oryzivorus*]), a tinted overlay is provided to indicate open habitat on unconsolidated deposits as an alternative to the relative abundance mapping. Readers need to be cautioned that the use of tinting can mean different things on different maps. For each of the 293 species covered, whether currently breeding in southern Quebec or not, the book provides one to three pages of text; a black-and-white line drawing of the species; black-and-white photographs of its typical habitat(s); a useful but very small-scale map of its world breeding range; a species profile covering 17 pieces of information such as clutch size, age at first flight, wing span, body mass, and longevity; and graphs of observed and extrapolated breeding chronology and seasonal occurrence in Quebec. In a few cases, the extrapolation of the breeding chronology is based on questionable assumptions. The age at first flight of the Wilson's Phalarope (*Phalaropus tricolor*), for example, is extrapolated from data on other phalaropes. The bulk of the volume, however, is based on an extremely rich mass of observed data which, one hopes, will be available to ornithologists for many years to come.

Of greater interest to amateur ornithologists is a 110-page section (a book in itself) called "The Bird Families of Québec." In it is a brief introduction to the taxonomy of the birds of Quebec (including a complete taxonomic listing of the birds described in the atlas). Then, each family and some subfamilies are described, and (generally) good color photographs are included of every species that breeds in Quebec. Treatment of different families by the authors varies more than for the individual species accounts, which also were written by a number of different authors. For example, whereas Hydrobatidae is described in four short paragraphs and Passeridae in only three, others like Anatidae occupy several pages. Readers also will wonder what unit is intended when they read, "Tytonids are particularly sensitive to high frequencies above the normal range of human hearing and can accurately pinpoint sound sources to within 2" (p. 145) or "[Strigidae] have remarkably mobile necks, enabling them to turn their heads through at least 270" (p. 146).

In addition to the two principal sections of the volume just described, there are interesting chapters on the history of ornithology in Quebec, on the biogeography of Quebec (which would suffice as a good geography text, with its surfeit of color photographs, colored maps and diagrams, and, perhaps unnecessary, color satellite images), and on the human imprint on the environment, natural disturbances, and conservation of wildlife habitat. The concluding section on avian diversity in Quebec begins with an excellent essay on biodiversity that somehow seems out of place in this atlas, and continues with chapters on species diversity in ecological regions and on the birds of particular Quebec habitats. Finally, the 37-page fine-print bibliography is an amazing reference source in itself.

This beautiful and truly impressive work is remarkably free of typographic, grammatical, and other errors. Perhaps if a future edition is contemplated, however, the discrepancy in the area of the La Grande-3 reservoir as given on pages 20 and 45 could be resolved, but quibbles like this can be forgiven given the scope of this work and the remarkable effort that has gone into it. Although it is an expensive book (and the duplication of the same map on pages 30, 1206, and 1214 does not help), it nevertheless is a book that belongs in the library of every serious ornithologist.—FREDERICK M. HELLEINER, *Department of Geography, Trent University, Peterborough, Ontario K9J 7B8, Canada.*

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The Iowa Breeding Bird Atlas.—Laura Spess Jackson, Carol A. Thompson, James J. Dinsmore, Bruce L. Ehresman, John Fleckenstein, Robert Cecil, Lisa M. Hemesath, and Stephen J. Dinsmore. 1996. University of Iowa Press, Iowa City. xviii + 484 pp., 185 black-and-white photographs, 12 figures, 11 tables, 2 appendices. ISBN 0-87745-572-4. Cloth, $47.95; Paper, $24.95.—Breeding bird atlases originated in Europe, made their first North American appearance in Vermont (Laughlin and Kibbe, *The Atlas of Breeding Birds of Vermont*, 1985), and since have spread like some exotic species invading from the Northeast. At my last count, breeding bird atlases had been published for 13 states and 8 provinces, with several more states either in progress with field work or poised to publish. The western front has now reached Iowa.

I examined about half of the published atlases be-

fore writing this review, and I judge that *The Iowa Breeding Bird Atlas* meets a high standard. It is remarkably free of typos and other errors, and the clarity of presentation is excellent throughout. Unfortunately, the proper citation for this book will be confusing for many who use it. The cover lists three authors (who are not identified as editors or compilers), whereas the title page indicates authorship by these first three "with" the last five authors (in smaller font). Evidently, the University of Iowa Press did not wish to list so many authors, so it made a distinction between those who did more compiling and writing of introductory chapters and those who wrote species accounts only. I dislike the convention used by the press—the last five are not ghostwriters! The contributions of each person are clearly described in the Preface, each species account is attributed to an individual author, and eight people consider themselves to be authors. I suggest listing all eight authors in the citation.

The book contains six chapters, two appendices, an extensive list of references containing 1,379 citations, and a species index. The six chapters are: (1) Introduction, which clearly states the project's goal of documenting the distribution of birds that bred in the state from 1985 to 1990 and details the sampling methods employed; (2) Iowa's Physical Environment, which includes descriptions of the land and climate, vegetation and land use, and the geologic setting and landforms; (3) Results, which include analyses of bird distributions by county and landform; (4) Factors Affecting Distribution, which discusses changes in habitat, agricultural practices, and biogeography; (5) Species Accounts and Background (for 185 species), which comprises the bulk (77%) of the book; and (6) Short Species Accounts for an additional 23 species that were located during the atlas project, but which have little or no history of nesting in the state.

Information known through 1995 is included in the species accounts, even though the project ended in 1990. The species accounts are well referenced, authoritative, and laid out in a standardized format for each species covering two facing pages. At the beginning of each species account is the species' common name, scientific name, a black-and-white photograph, and a table that summarizes the atlas data. The photos are attractive and enhance the book. Several are out of focus to some degree, but most are well chosen. A map illustrates the distribution of the species in the state by showing those survey blocks in which the species was reported. The text consists of four sections: (1) an introduction that describes the species and its distribution and status in a regional or continental context; (2) an "atlas data" section that presents the status of the species in the state; (3) a "life history" section; and (4) a "factors affecting distribution" section that speculates about factors that have affected or may affect a species' distribution, and sometimes offers general management recommendations.

Each state project has its unique design features. Iowa's sampling scheme took advantage of the state's rectangular shape with 99 relatively square counties, the original township-range land survey, and an extensive road system with roads normally located at one-mile intervals. A statewide grid was established by designating the southeast quarter (3 × 3 miles) of every other township as a block, yielding 522 "standard" blocks that are comparable to the 25-km^2 blocks used in other atlas projects. Iowa's unique character as perhaps the most developed of all states also came into play. With 33.5 of its 36 million acres classified as farmlands and less than 2% of its landscape in publicly owned natural areas, systematic or random sampling would not provide an adequate inventory of the limited natural areas that are important for birds in the state. Therefore, 339 "priority" blocks were selected by the atlas committee for their unique or representative natural features. Combining standard and priority areas, 861 blocks were designated for sampling. Data collection was sluggish during the first years of the project, forcing an extension to a sixth year of field work. In the end, 508 people spent 14,654 h collecting data, and 83% of the designated blocks received some coverage (with 71% completed); all priority blocks received some coverage, and 99% were completed.

The atlas documented the presence of 199 species, 158 of which were confirmed as breeding. This represents 82% of the total list of birds known to have bred in the state through 1990. The atlas helped document the expansion of the House Finch (*Carpodacus mexicanus*), which invaded Iowa from the east, first appearing in 1982 and now nesting across the state. Twenty-one species were found in 90% or more of the blocks, making them the most widely distributed species and in that sense dominating the Iowa avifauna.

An important point is that the Iowa atlas was not designed to quantify abundance, as were some other atlases. Thus the data cannot be used to conclude that a species is common or rare within its distribution. The atlas, however, did document that a large number of species had limited distributions in the state; 98 species (49%) were reported in 10% or fewer of the blocks. Although some of these species have always been rare in Iowa, many have distributions that are highly restricted by the reduction of natural habitat in the state.

The story of birds in Iowa is a story of land use. Permanent settlement by Euro-Americans began in 1833. By statehood in 1846, the human population exceeded 96,000, by 1900 it exceeded 2.3 million, and by 1980 it peaked at a little more than 2.9 million (today Iowa has about 2.85 million people). Iowa has undergone massive changes. Originally, its surface area was roughly 70% prairie, 19% forest, and 11%

wetlands. At the time of the atlas project, 94% of Iowa's land area was considered farmland, and 70% of its surface was harvested annually. It is estimated that less than 0.1% of Iowa's native prairie, 5% of its wetlands, and 27% of its forests remain, a total of less than 7% of the original natural landscape. Remaining natural areas tend to be small parcels isolated by agricultural lands. Linear habitats have been created by grassed waterways and terraces to control soil erosion and by 110,000 miles of roadways (10th highest in the United States). The authors note the potential problem of these habitat configurations being ecological traps and population sinks for nesting birds. They also raise a flag about the unknown effects on the state's bird populations of the yearly application of 49 to 61 million pounds of agricultural chemicals.

Although the presettlement picture of Iowa's avifauna is obscure, it is clear that it was rich and abundant (Dinsmore, *A Country so Full of Game: The Story of Wildlife in Iowa*, 1994). Known changes can be summarized as follows: 2 species have become extinct, 18 species have been extirpated (but 6 of these have returned naturally to nest and 6 have been reintroduced), 7 exotic species have occupied Iowa, and 18 species have become nesters in the state since 1930. Although the state list has increased (due in part to better observation), the authors note that populations of many breeding species have declined, probably dramatically if declines are at all commensurate with habitat loss. Atlas data show significantly higher species numbers in priority blocks (which were selected to feature natural areas) than in standard blocks (which were largely composed of farmland). Agricultural policy and practice can have a dramatic influence on the avifauna of any state, but especially on Iowa's. For example, during the atlas project, the Conservation Reserve Program of the Federal Food Security Act of 1985 enrolled nearly 2 million acres of Iowa farmland. More than 90% of the acres in this set-aside program were planted to grass and the rest to trees, greatly increasing the amount of semi-natural habitat in some areas and benefitting many species. The authors close with the guardedly optimistic hope that continued research on Iowa's birds will lead to better management practices.

A completed Breeding Bird Atlas is a monument to the efforts of many people. Those of us who study birds in Iowa owe the authors and surveyors a great debt for producing a first-rate state atlas that is a major advance in clarifying the history and describing the status of birds in Iowa. I recommend this book to anyone with an interest in Iowa birds. It also has a lot to offer those with a general interest in conservation biology. University libraries with collections on birds should have it, and regional public libraries should consider it as well.—TEX A. SORDAHL, *Department of Biology, Luther College, Decorah, Iowa 52101, USA.*

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A Birder's Guide to Colorado.—Harold R. Holt. 1997. American Birding Association, Colorado Springs, Colorado. vi + 392 pp., 90 maps, 26 bar graphs. ISBN 1-878788-05-1. Paper, $21.95.—This spiral-bound guide is the fourth version of one started in 1973 by James Lane and Harold Holt. That first guide covered eastern Colorado, but by the third edition it had expanded to cover the entire state. Many people contributed detailed accounts of the best-known locations, many of them new in this edition. Clearly labeled maps supplement the route instructions given in the text. Great effort was made to review location descriptions and mileages, and comparatively few errors slipped by. Two different locations are given for the town of Craig on the state map, inside front cover. The location is correct on the inside back cover. The book is thoroughly indexed by location and species. The latest AOU common names are used throughout, and a long section covers "Specialties of Colorado." Bar graphs depict relative occurrences of species by month and geographic unit. Also included are current lists of Colorado's reptiles, amphibians, and mammals (common and scientific names). Residents of Colorado and visitors alike will find the book a useful addition to their field guides when locating birds in this most interesting state.—RONALD A. RYDER, *Department of Fishery and Wildlife Biology, Colorado State University, Fort Collins, Colorado 80523, USA.*

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Stokes Field Guide To Birds.—Donald W. Stokes and Lillian Q. Stokes. 1996. Little, Brown and Company, Boston. **Eastern Region.** xxiv + 471 pp., 900+ color photographs, range maps for fully covered species. ISBN 0-316-81809-7. Paper, $16.95. **Western Region.** xxiv + 519 pp., 900+ color photographs, range maps for fully covered species. ISBN 0-316-81810-0. Paper, $16.95.—The back cover of this latest entry into the increasingly crowded field of North American field guides proclaims it "The most comprehensive and easy-to-use field guide available." The first claim is demonstrably untrue (at least five currently available field guides cover more species and a broader geographic area than the Stokes volumes), and the second is highly questionable (a one to two species-per-page format hardly is easier to use than one that presents many similar species together).

Further down in the cover blurb is the preposterous claim that the books' tiny thumbnail descriptions are "the most detailed and comprehensive . . . available anywhere." Sadly, such exaggerations are typical of today's large commercial publishers whose sole motivation apparently is profit. I doubt the authors even saw the cover text before it was published, so I will not blame them for the false advertising. Inside, the books claim to be "a bird guide for the 21st Century," that will "improve upon existing guides" and "help people become better bird watchers and gain a new appreciation and understanding of birds." The Stokeses characterize their approach as "three-dimensional birding" using identification, behavior, and conservation. This supposed innovation really is just a modernization of the approach pioneered nearly 50 years ago by R. H. Pough, but it sets the Stokes guide apart from contemporaries devoted solely to identification.

The format of the two-volume guide is simple, straightforward, and easily understood. A brief introduction explains terminology and symbols (including the usual "parts of a bird" diagram) used in the species accounts that form the body of the work. Interspersed are several pages that present groups of photographs cropped from those in the accounts and arranged in a way that mimics traditional painted plates. The first of these in each volume is a seven-page "Quick Guide to the Most Common Birds." Others are called "Learning Pages" and depict particularly difficult groups for the beginning birder: hawks in flight, shorebirds, gulls, flycatchers, warblers, and sparrows. Finally, each volume has a short glossary, a list of photo credits, and an index.

Each single-page layout covers one or two closely related species with up to four photographs above a color range map and a telegraphic text divided into sections titled "Identification," "Feeding," "Nesting," "Other Behavior," "Habitat," "Voice," and "Conservation." The latter is a single line symbolically indicating population trends based on breeding bird surveys, Christmas Bird Counts, and a few other official surveys, and an indication of whether the species is endangered. For all of the hype, the conservation information is quite minimal. Nothing is said about causes of declines or measures taken to alleviate them. Icons at the top of each page indicate whether birds frequent feeders or use birdhouses.

The back cover correctly gives the geographic coverage of the eastern volume as the eastern portions of the Great Plains and "all other states and provinces to the east." However, in the western volume, the statement "all other states and provinces to the west" is untrue. As shown on the "area covered" map (p. x), western mainland Alaska and the Aleutians are not covered, and neither is Hawaii. Despite the cover's claims of comprehensiveness, species coverage is far from complete, and the selection appears purely arbitrary. For example, the eastern volume fully covers Brown Booby (*Sula leucogaster*), Masked Booby (*Sula dactylatra*), White-tipped Dove (*Leptotila verreauxi*), Eurasian Collared-Dove (*Streptopelia decaocto*), Mangrove Cuckoo (*Coccyzus minor*), Ringed Kingfisher (*Ceryle torquata*), Black-whiskered Vireo (*Vireo altiloquus*), and Spot-breasted Oriole (*Icterus pectoralis*), but White-tailed Tropicbird (*Phaethon lepturus*), Masked Duck (*Oxyura dominica*), Brown Noddy (*Anous stolidus*), White-crowned Pigeon (*Columba leucocephala*), Tamaulipas Crow (*Corvus imparatus*), Brown Jay (*Cynocorax morio*), Red-whiskered Bulbul (*Pycnonotus jocosus*) and other local introduced species, and Shiny Cowbird (*Molothrus bonariensis*) are inexplicably not even mentioned. Ignoring Shiny Cowbird is likely to cause much confusion as numbers of this recent invader increase. The Stokeses missed the opportunity to be the first field guide to cover the newcomer. In the western volume, Aleutian Tern (*Sterna aleutica*), Parakeet Auklet (*Cyclorrhynchus psittacula*), and Northern Wheatear (*Oenanthe oenanthe*) are fully covered, but Steller's Eider (*Polysticta stelleri*), Red-legged Kittiwake (*Rissa brevirostris*), Siberian Tit (*Parus cinctus*), and Arctic Warbler (*Phylloscopus borealis*) are ignored entirely. Birders living or vacationing in Florida, Texas, or Alaska will be ill served by the Stokes guide. The authors characterize the selection as "all the birds you might want to look up," but in my view users most need to look up the rare and peripheral species not included in this guide.

The most successful bird guides traditionally used painted color plates. Recently, a host of competitors, of which the Stokes guide is the latest example, use photographs. As a field guide artist, I have an admitted bias in favor of art work, but like the late Roger Tory Peterson, I am also a photographer and I value both media. The general public seems to think that photographs are inherently superior to even the best painted illustrations. However, although photographs may be good illustrations of rocks, plants, and other sedentary nature subjects, they are problematical for active organisms like birds. The Stokes guide is clearly state-of-the-art in bird photographs—possibly the best collection of North American bird photographs by some of the world's most accomplished photographers. Does the best photography available today overcome inherent problems of photographs as field guide illustrations?

In contrast to previous photographically illustrated guides, which suffered from absence of depictions of females and immatures, the Stokes guide is surprisingly good in its coverage of intraspecies variation. It uses as many photos as necessary to depict sexual, age, and seasonal variation. A few gaps still exist, however. Only the male Rose-throated Becard (*Pachyramphus aglaiae*) is shown, and only the female Black-capped Vireo (*Vireo atricapillus*). Despite the overall high quality of the photographs, some groups of birds are still poorly served by the medi-

um. Technology has not solved the problems of photographing fast-moving, distant birds in poor light. Thus, flying storm-petrels and swifts are represented by very grainy enlargements from high-speed film. They are not pretty, but they show features essential to identification and probably are the best available. On the other hand, I cannot imagine that the Stokeses could not have found a sharper picture of a Great Crested Flycatcher (*Myiarchus crinitus*) or a full-plumage shot of an adult male Varied Bunting (*Passerina versicolor*) or Hepatic Tanager (*Piranga flava*).

The most obvious and oft-cited advantage of artwork over photography for field guide illustration is uniformity of lighting and postures. With painting, many different birds can be shown on a single page in the same pose and angle, intensity, and importantly, color of lighting. With enough pictures to choose from, the same should be possible with photographs. How well does the Stokes guide do? Some groups, especially ducks and other swimming birds easily photographed in aviaries, are wonderfully illustrated in comparable poses with more or less standardized lighting. Aside from the loss of the ability to quickly compare many species together on one page (and the resultant loss of a good "feel" for relative sizes), the photographs of these groups do as good a job as most painted plates. Among other species, however, variations in lighting occasionally produce some very misleading comparisons or color shifts. The juvenile Black-billed Cuckoo (*Coccyzus erythrophthalmus*) appears to be bright rufous above (I have no explanation for the color shift; the rest of the picture does not look unusually ruddy). The winter Spotted Sandpiper (*Actitis macularia*) misleadingly appears reddish brown in contrast with the gray-brown of the breeding bird. Beginners are certain to think that male and female Strickland's Woodpecker (*Picoides stricklandi*) differ mainly in back color (black vs. brown). The grainy Thick-billed Kingbird (*Tyrannus crassirostris*) seems to have bold white cheek-patches. The shadowed Olive-sided Flycatcher (*Contopus cooperi*) looks much darker than similarly colored species with which it must be compared. Photos of the two eastern chickadees show a striking difference in flank color (buff on Black-capped [*Parus atricapillus*], gray on Carolina [*P. carolinensis*]) that does not exist in the real world. The female Northern Wheatear is much too red below, even for the eastern subspecies, but the same photo nevertheless is used for the western volume. The Bicknell's Thrush (*Catharus bicknelli*), photographed in horizontal artificial lighting, seems colored more like a Hermit Thrush (*C. guttatus*) than the much too "warm" photo of the latter in natural light. A lot of eastern Hermit Thrushes are going to be called Bicknell's by naive users of the Stokes guide. The western volume uses the same thrush photos as the eastern, so birders west of the Great Plains using only this guide will be hopelessly misled if they attempt to identify any *Catharus*. The Brown Thrasher (*Toxostoma rufum*), photographed with artificial flash, appears to have the eye color of a Long-billed (*T. longirostre*), whereas the Long-billed, apparently photographed in cloudy natural light, loses most of its diagnostic coloration. I doubt that any beginner would correctly identify a breeding American Pipit (*Anthus rubescens*) from the far too red photo, and I do not know what produced the rusty-appearing breast and white patches of the female Olive Warbler (*Peucedramus taeniatus*). Finally, no one could properly differentiate a "bronze" from a "purple" Common Grackle (*Quiscalus quiscula*) using this guide (the two photos may be switched, or they may both be bronze grackles).

Lighting problems are particularly noticeable on the composite "Quick Guide" and "Learning Pages," the closest thing to traditional field guide illustrations in the Stokes guide. Removing a bird from its background actually exacerbates the problems because one loses the context of environmental shadows. Thus, the strong shadows produced by natural light appear to be dark coloration, as in the isolated House Wren (*Troglodytes aedon*) that appears to have a contrasting white breast and black belly, especially when juxtaposed with very flat flash photos that remove the shadows that produce the illusion of shape in natural light. Many of the sharpest photos in the Stokes guide were taken with the new equipment that can project a flash onto a telephoto image. Such shots are very striking, but because the bird's shadows are erased and differ from the surroundings, these shots often look like paste-ups.

Although the species accounts correctly describe the postural differences of Great-tailed (*Q. mexicanus*) and Boat-tailed (*Q. major*) grackles, the photos fail to illustrate them. Numerous other photos fail to properly illustrate a feature described in the text. The "dark-backed" Lesser Goldfinch (*Carduelis psaltria*) is shown in profile, but the "green-backed" form is face-on so that the back is not visible. Both adult and immature Little Blue Herons (*Egretta caerulea*) are shown in water that hides their leg color. Other problems involve perspective, as in the head-on shot of a Least Tern (*Sterna antillarum*) that makes it look as big-billed as a Royal Tern (*S. maxima*). I could go on, but these examples indicate that, despite impressive progress, the art of photography has not yet reached a state in which it can be the medium of choice for bird identification guides.

The species accounts appear to be well researched. I found relatively few errors, although many of the descriptions, especially those of problematical birds such as golden-plovers, dowitchers, flycatchers, and sparrows, are too brief and none is the "most detailed and comprehensive . . . available anywhere." In fact, they approach being the least detailed and sparse of any modern field guide. The "Feeding" subheading is likewise sparse and tends to be mod-

ular. For example, the phrase "flies out from perch to catch insects" is repeated with minor variation as the only feeding information for at least 20 species. "Other Behavior" probably is the most informative subheading, and usually it is longer than the others. It is the Stokeses' most helpful field guide innovation. I found the voice descriptions accurate as far as they go, but much too vague and brief, especially for species that are identified mainly by vocalizations. The range maps generally are well done, but I noticed a few errors for places I know well. For example, the ranges shown for Northern Saw-whet Owl (*Aegolius acadicus*), Common Raven (*Corvus corax*), and Canada Warbler (*Wilsonia canadensis*) do not include the Great Smoky Mountains where all breed, and the range of Red-cockaded Woodpecker (*Picoides borealis*) incorrectly leaves out southern Louisiana.

Because this guide is promoted for beginners who might very well learn their basic birding vocabulary here, I decided to take a close look at the glossary. I immediately noticed several discrepancies between the written definitions and the anatomical diagram. The glossary correctly defines "ear patch," but the diagram labels what most birders would call a postauricular patch. "Eyebrow" is defined correctly but vaguely as "a stripe above the eye," but on the diagram the eyebrow is a dark stripe above what most birders would call the eyebrow. The entire glossary seems to have a problem in distinguishing between "dark," "light," and "contrasting." All caps are said to be dark, all eye-rings light, and all neck-rings dark; apparently, the authors forgot about Mallards (*Anas platyrhynchos*) and Ring-necked Pheasants (*Phasianus colchicus*). The correct definition of "vent" as the "anal and reproductive opening" overlooks the other use of this term as a synonym for "undertail coverts" or "crissum" in birds such as Black-vented Shearwater (*Puffinus opisthomelas*).

Finally, I have a complaint about the way the photo credits are presented. The publishers undoubtedly just threw the section in to avoid legal complications, not thinking that users of the books actually might want to know who took a given image. They list the sources in alphabetical order, then list the page numbers on which the images appear. It is impossible, other than by searching through the entire listing for a page number, to look up the source of any particular photo. It may be a small point, but this format is a great disservice to the contributors whose works are the most valuable part of the guide.

In summary, this guide fails to live up to its advertising. It is far from being a "guide for the 21st Century," and I doubt it will remain in print for long. It offers little new and seems to be just another repackaging to enable yet another publisher to gain a piece of the field guide market. Though touted as a book for beginners, it would be disastrous as a first or only bird guide. Its shortcomings are likely to generate sufficient frustration and disillusionment to turn one off birding altogether. On the other hand, as a supplement to another field guide, the Stokes volumes may have a place. They provide a quick source of behavioral and population data not given in others, and many of the photographs, though not adequate as field guide illustrations, are wonderful examples of the wildlife photographer's art. The volumes probably are worth the rather modest price for the photos alone, but they are not destined to join the ranks of significant birding literature.—H. DOUGLAS PRATT, *Museum of Natural Science, Louisiana State University, Baton Rouge, Louisiana 70893, USA.*