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Extinction & Biogeography of Tropical Pacific Birds

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Reviews



Edited by R. Todd Engstrom

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

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Bird Coloration.—Geoffery E. Hill and Kevin J. McGraw, Editors. 2006. Harvard University Press, Cambridge, Massachusetts. Vol. 1, Mechanisms and Measurements: ix + 589 pp., 32 color plates; ISBN 0-674-01893-1. Vol. 2, Function and Evolution: x + 477 pp., 32 color plates; ISBN 0-674-02176-2. Hardbound, $95.00 each.—In his now classic *Animal Biochromes and Structural Colours* (1953), Denis Fox surveyed the "physical, chemical, distributional & physiological features of coloured bodies in the animal world" in only 378 pages. A second edition (1976) expanded to 433 pages was considered equally comprehensive, scholarly, and complete. In 2006, just about a half century after Fox, Hill and McGraw require two volumes of 1,066 total pages, 23 authors, and 64 color plates just to survey birds! This is an important and timely contribution. Times have certainly changed, and it has all been for the good. By necessity, much of the work that Fox's volume covered was done by a group of German workers beginning with Otto Völker and lasting to the start of World War II. Fox, trained in England but working at the Scripps Oceanographic Institute, studied fish, invertebrates, and birds into the early 1960s. His work on flamingos, in particular, set the stage for young ornithologists' tentative ventures into feather pigment chemistry. The field began slowly, with the development of extraction techniques gentle enough to preserve the easily destroyed "lipochrome" pigments, separation on thin-layer chromatography, and measuring optical densities on primitive Beckman DB Spectrophotometers. It is astonishing, therefore, to follow Robert Montgomerie's (volume 1, chapter 2) masterful romp through contemporary techniques and theory for measuring and quantifying colors in birds.

By the last decades of the 20th century, there was an explosion in the understanding of avian color perception, techniques to measure and analyze reflected light, the chemistry and physiology of pigments, and new and valuable insights into the basis and nature of structural colors. There have been dramatic technical advances in electron microscopy, and sophisticated tools to separate and identify pigments of just about every type (although there are some feather pigments still to be identified) and exploration of the role of plumage in behavior. The argument that the world of color for birds is different from ours is soundly made. All this and more is covered in these two volumes, which reflect the progress and growth in the field.

With a body of knowledge of this magnitude, the reader may want to tease out information relevant to a particular question or subfield. It is all here. Topics range from the plumage-pigment biosynthetic pathways to how they are absorbed, transported, and transferred across compartments. The consequences of dietary selectivity, seasonal metabolic changes, and their connection to the molt cycle, through the genetic input into the control of plumage patterns, and environmental factors that affect their display are all represented. Higher-level issues, such as the mechanisms of color perception, the determination of feather patterns, feather-tract specificity, and pigment content, are addressed. Further, the roles of colors in signaling such features as dominance or sexual selection or a dozen

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other functions are discussed. The list continues, and the chapter authors can be credited with taking a long view of the problem addressed. Consequently, the book makes major contributions to numerous aspects of avian biology. It is well edited, with blanket coverage of the relevant literature. I noticed typos mostly in the references. Readers will delight to find authorities writing in areas and on material they know best.

Without doubt, this book is a milestone. All the contributions are relevant and all the authors conversant with their fields. I found several chapters to be extraordinarily stimulating and informative, because they either deal with a particularly knotty problem or represent major advances in the field. This is not to demean any of the other contributions. In one example, Gary Bortolotti (volume 2, chapter 1) grapples with one of the most diffuse aspects: natural selection and coloration. In a second, Alex Badyaev makes a masterful presentation of a new evolutionary synthesis of color displays (volume 2, chapter 8). Other authors explore, often at one or more levels, the plumage, its patterns, the ecological interactions, and mechanisms of its development and evolution.

I was especially impressed with Richard Prum's review of his recent work on the nature of structural colors (volume 1, chapter 7). He carefully illustrates and separates pigment and structural colors, and then introduces a clear description of coherent light scattering as the basis for structural colors. This is a problem that has gone unsettled for years. The persistence of the problem is reflected in the names for the phenomena, which include Tyndall and Rayleigh scattering (both late-19th-century optical physicists). Prum goes on to describe a new approach to the analysis of nanostructure-based colors using Fourier Transforms. Both iridescent feathers and vividly colored skin are discussed. The physical basis for his arguments resides in the β-keratin-melanin-air space known as the melanosome. The analysis has been enhanced by advances in both electron microscopy and high-speed computing. The yield is a comprehensive understanding of the structural colors of feather barbs, skin, and eyes.

Another personal favorite is the chapter by I. C. Cuthill (volume 1, chapter 1) on color perception, which establishes the interface between the environment and behavior. Starting with an operational definition of color vision ("the capacity for discriminating between objects based on differences in the relative amounts of different wavelengths of light, rather than the absolute amount of light…"; vol. 1, p. 3), its psychophysical nature is carefully explained, which takes the reader to the boundaries of neuroscience and philosophy. Cuthill goes on to review the significance and implications of the fact that avian vision is tetrachromatic, rather than trichromic as in humans. As an important aside, Cuthill included recent information from genomics that identify and sort the differences in the multiple families of opsin, the protein portion of visual pigments. This is another example of a multiple family of genes coding slightly different functional elements. The careful explanation of the function of oil droplets as ocular filters is current, critical to understanding how birds perceive color, and helpful in integrating the recently documented use of ultraviolet (UV) wavelengths by birds. Vision in the UV raises new questions. For example, in plant–animal interactions, many flowers and fruits are detected by birds aided by patterns visible in the UV. For another example, plumages that appear sexually monochromatic to humans may be discriminated by birds as dichromatic in the UV portion of the spectrum.

Understanding the production and evolution of plumage patterns has been an ongoing challenge for decades. Now Kevin Omland and Christopher Hofmann (volume 2, chapter 10) review the use of phylogenetics to reconstruct a history of plumage patterns and colors. Pattern evolution, of course, includes phenotypic plasticity, a feature covered by Alexander Badyaev (volume 2, chapter 8). One of his insights is the introduction of modularity, "the ability to form and maintain a stable and largely independent network that retains its integration in different contexts and over evolutionary times" (vol. 2, p. 353). A consequence is to consider "plumage ontogeny and evolution as a series of hierarchically arranged and recurrent developmental and functional modules, from feather-germ precursors to coordination of pigment distribution among follicles to complex courtship displays" (vol. 2, p. 353). The focus is on the generation of the plumage in its entirety (but also applies to individual feathers) and the relationships with the visual, social, and evolutionary aspects of the environment. All levels, from the molecular through behavioral ecology, are considered

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throughout; and that may be the importance of the contribution of this set.

Reading *Bird Coloration* is like having large sequences of my scientific life flash before me. Revisiting the kinds of questions asked so long ago (my first publication on the feather tips of Cedar Waxwings appeared in 1963!) is only one aspect. The other is the successful framing of larger questions now that seemed almost incomprehensible then. Advances in laboratory techniques, combined with psychophysics, behavioral ecology, and evolution and development, have made this possible. The authors of *Avian Coloration* rephrase many theoretical questions posed over the past half-century and introduce new insights into others. With the new directions applying improved techniques and theoretical insights, answers to traditional questions cannot be far behind. Work on coloration has grown and expanded to encompass behavior, comparative biochemistry and physiology, the plumage as phenotype, and the control of these processes. We now have the intellectual tools to forge connections among functional mechanisms, development, complex behavior, and evolution. There is a deep satisfaction in all of this. Hill and McGraw have facilitated a major contribution to the field in its broadest sense.

Bird Coloration should be available at colleges, universities, natural-history museums, and nature centers. Personal copies would be invaluable to anyone interested in the myriad aspects of avian plumage. There are dozens of dissertation projects here.—Alan H. Brush, *Mystic, Connecticut 06355, USA*.

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Parrots of the World: An Identification Guide.—Joseph M. Forshaw. 2006. Princeton University Press, Princeton, New Jersey, and Woodstock, United Kingdom. xii + 400 pp., 120 color plates, 399 color maps. ISBN13: 978-0-691-09251-5. Cloth, $65.00.—Psittacines (which include Cockatoos, Cockatiels, Lories, Lorikeets, Macaws, Conures, Parakeets, Parrolets, and Parrots) hold a distinguished rank among humans because of their diversity of species, colorful feathers, elaborate calls, and fabulous ability to mimic. Psittacines, unfortunately, are still among the most poorly studied species in the wild, but they have been recognized as among the most attractive pet species for many centuries. People also have contributed directly to population declines of many Psittacine species (e.g., by extermination when in competition for crops, or through the wild-caught bird trade for use as pets) or indirectly (e.g., via habitat destruction), in some cases resulting in their extinction (e.g., Carolina Parakeet [*Conuropsis carolinensis*], Cuban Macaw [*Ara tricolor*]). Without question, the order Psittaciformes include more endangered species and subspecies than any other bird group in the world (Snyder et al. 2000). Today, all extant wild or captive psittacine species are included under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in an international attempt to protect populations from going extinct because of the commercial pet trade (CITES 2007), and one species, Spix's Macaw (*Cyanopsitta spixxi*), is extirpated from the wild, though a few individuals remain in captive breeding programs or with aviculturists (Yamashita 2002).

A proper identification guide for psittacine species has been an urgent necessity. With this latest eloquent contribution by Forshaw—the world's foremost authority on Psittaciformes—and illustrator Frank Knight, *Parrots of the World: An Identification Guide* is by far the most comprehensive and illustrative handbook for distinguishing all 350 extant species of psittacines in the world. If you are looking for information or illustrations of the 19 extinct pisttacines, look into the 2006 IUCN Red List of Threatened Species (IUCN 2006) and Forshaw (1989).

This new publication is an essential tool for field ornithologists; natural-history museums, zoo curators; veterinarians; aviculturists; agency authorities implementing international conventions such as CITES; local authorities regulating permits to study, protect, and manage native or introduced psittacine species; customs authorities managing importation and exportation of live birds across world ports; and parrot enthusiasts.

This volume from the Princeton University Press is highly relevant to American Ornithologists' Union (AOU) readers because it includes detailed information about 52 extant psittacine species covered by the AOU *Check-list* area (AOU 1998, Banks et al. 2006) and

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74 introduced species that occur today in urban areas across North America (Pranty and Garrett 2003).

Forshaw, in *Parrots of the World: An Identification Guide*, has followed the taxonomy from his previous book *Parrots of the World* (Forshaw 1989) and from *Handbook of the Birds of the World*, vol. 4 (Collar 1997), including a few taxonomic amendments from recent literature reviews. One must search hard to critique this handbook, but perhaps it could benefit from peer-reviewed or regional taxonomic lists prepared by a specialist group of taxonomic experts (e.g., AOU 1998). Parrot nomenclature is among the most complicated and poorly studied, and there is a real urgency to develop the taxonomy of this order. Such study would respond to several biological and taxonomic questions (e.g., Eberhard 1998, Eberhard and Bermingham 2004), providing important solutions for some conservation problems. (See parrot nomenclature controversies in CITES 2002, 2004, 2006). In some groups (such as the *Amazona ochrocephala–oratrix–auropalliata* complex), their taxonomic situation is extremely complicated (see Eberhard and Bermingham 2004). The use of peer-reviewed regional taxonomic lists in books such as this could have a very important influence on psittacine conservation worldwide. The use of correct scientific names in the current nomenclature debate (CITES 2002, 2004, 2006) could help to reduce wild-caught parrots in the pet trade and stop commercial trade with wild-caught species listed in CITES Appendix I.

A great advantage of this identification guide is the updated information presented about each species in the descriptive text sections. Each species' section includes information about vernacular name, plate number, scientific names, other names, distribution, habitat and status, habits, calls, similar species, and suggested localities (i.e., birding hotspots for a particular species). For some species, distribution information is not necessary, because the same information is given in captions on the text page opposite to each plate. In other cases, the caption and text do not agree (e.g., distribution information about the Mexican Parrotlet [*Forpus cyanopigius*] ignores the range of the species in the state of Sonora, though the proper information is presented in the caption opposite the plate).

Parts I and II are separated by 121 color plates in the center of the book. These color plates and the drawings by Frank Knight are of outstanding quality and are quite attractive. These superb and very detailed paintings portray every extant species and almost all subspecies of psittacines in the world. Each plate is faced by a page providing color range maps and identification and distribution information. As the author writes in the preface, the purpose of this handbook is to "to address all aspects of identification, both in the field and at close quarters"; birds in these plates are in natural poses, sometimes with dorsal and ventral views with extended wings. It is very important to have one artist do all the artwork in an identification guide; this is especially useful here for aiding identification of this complex group of birds. Many of the plates include male, female, and immature plumages for proper identification. Most birds are uniformly presented without natural backgrounds (as always, with some exceptions, such as plate 24 [Pygmy Parrot, *Micropsitta keiensis*] and plate 63 [Ground Parrot, *Pezoporu wallicus*]). Most species are not illustrated engaging in natural activities; however, all portraits show typical parrot postures. If you are seeking more naturalistic illustrations of all parrots of the world, including extinct species, I strongly recommend also William T. Cooper's plates in Forshaw's (1989) *Parrots of the World*. An editorial critique is the lack of proper order of some species plates and correspondent text in the opposite page to the plate (see plates 11, 60, 66, 69). Also, the order of species and text in plates 10, 11, and 12 are confusing; readers will have to turn these plates and opposite text page to find the information and the proper image of each bird. This could have been avoided with appropriate design and review. Adding the page number of each species' descriptive text in the species caption opposite the plates also would be useful.

Other disadvantages of this handbook are its size (though this is the sacrifice made to have such detailed identification plates) and its price. These two features make it difficult to distribute, particularly to field biologists across the world and customs agents monitoring and protecting these species from illegal bird traffic, which is indicated in the preface as one of the goals of the publication.

As an ornithologist studying and conserving psittacines in the Neotropics, I have always studied and admired Forshaw's ornithological

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contributions (Forshaw 1973, 1981, 1989). There is no doubt that other professionals as well as amateurs will learn from this new comprehensive and illustrative handbook. I recommend this book to ornithologists, birders, wildlife-management authorities, and parrot enthusiasts.—Eduardo E. Iñigo-Elias, *Cornell Lab of Ornithology, 159 Sapsucker Woods Road, Ithaca, New York 14850, USA. E-mail: eei2@cornell.edu*

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Extinction & Biogeography of Tropical Pacific Birds.—David W. Steadman. 2006. University of Chicago Press, Chicago, Illinois. xiv + 594 pp., 243 text figures. ISBN 0-226-77142-3. Paper, $45.00.—As reports of new data on anthropogenic avian extinctions on Pacific islands multiplied in the ornithological, paleontological, and conservation literatures for the past 20 years, the scope of the hecatomb was gradually recognized and the widespread view that pre-European human colonists trod lightly on the landscape was overthrown. These impressive discoveries have generally received, at most, passing mention in biogeographic papers, however. This is odd, given the prominence of Pacific island birds in the development

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of biogeographic theory, particularly the dynamic-equilibrium theory of island biogeography (MacArthur and Wilson 1963, 1967) and community-assembly rules (Diamond 1975). Steadman aims to summarize both his findings and those of other avian paleontologists and to reconsider biogeographic theories in light of this growing literature.

This will be an exciting book for many audiences: ornithologists, biogeographers, ecologists, evolutionists, paleontologists, conservationists, and anyone interested in island faunas and floras. Though aiming at an academic audience, Steadman superbly captures the adventure of his 25 years of exploring remote Pacific islands and relates the bird distributions to his own observations and to the literature on anthropology, ecology, sociology, geology, and botany. This is also a big book: 22 chapters in four parts. Part I comprises extensive descriptions of the geography and history of the islands, as well as details of how an avian paleontologist actually works. Part II describes the modern and prehistoric avifaunas of each island, and Part III reviews these avifaunas from a taxonomic perspective. The book is almost wholly about land and freshwater birds, but Part III includes a chapter on seabirds. In Part IV, Steadman assesses a variety of biogeographic and ecological theories and discusses conservation and research needs. It is possible that many ornithologists will turn quickly to Parts II and III, which contain fascinating details on such depleted taxa as megapodes and rails and accounts of extinct giant pigeons and other island oddities. Ecologists, by contrast, may restrict themselves to Part IV. This would be a mistake, as the cogency of Steadman's arguments cannot be assessed without a good understanding of the underlying data.

Steadman does not pull his punches, and he telegraphs them, stating in the preface and reiterating frequently that, at least for the birds of these islands, he sees little value in the equilibrium theory of island biogeography or community-assembly rules. Subsequently, he also assails species–area relationships, taxon cycles, macroecology, and Monte Carlo simulations. He realizes that he will generate controversy, pleading for us not to write him off as a "weirdo." And he does not help his case by occasional wholesale (and often gratuitous) scatterblasts at statistics, computers, and literature on other taxa, such as West Indian anoles, plus tirades that he himself terms "ranting." However, in his primary quest, he usually restricts himself to just birds and just tropical Pacific islands, and he builds a strong case for questioning biogeographic and ecological dogma. His main contentions are two. First, the amount of prehistoric extinction on these islands is staggering in terms of fractions of the avifauna, and the fossil record for almost all of them is so poor that it is not even possible to reassess theories by simply replacing the erroneous figures with new, "complete" data. Second, virtually all of this extinction was caused not by any sort of equilibrium turnover, whether generated by interspecific competition or otherwise, but by humans through hunting, habitat destruction, and introduced species.

His data suggest that from 20% to at least 65% of land birds present on each island before human colonization are now known to be extinct, and there is good reason to believe that other species were present at human settlement that are now extinct and totally unknown because they are not yet represented by fossils. Worse, the paleontological research is so scattered that, even within single archipelagoes, it is usually impossible to construct species–area curves for pre-human-contact birds. Interestingly, there is little or no evidence of precultural bird extinction on these islands. These facts lead Steadman to propose, for birds of oceanic Pacific islands, an alternative model to both the equilibrium theory and the equilibrium-turnover interpretation of species–area relationships. In his scheme, birds begin to colonize oceanic islands about 100,000 to 500,000 years after they first rise from the sea, but at an ever-slower rate because the best dispersers get there first (not because of increasing competition). Extinction in the absence of humans is very rare, nearly nonexistent, until erosion and subsidence cause islands to sink. At some point, when they are very small (perhaps 1–10 km^2 or even less in what Steadman refers to as "Remote Oceania," and 50 km^2 in "Near Oceania"—oceanic islands near New Guinea), such decreasing islands fall below the threshold sizes required for a minimum viable population (different species have different thresholds, but almost all are small). Except in the range of the very small sizes encompassed by the thresholds, there is no relationship

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between area and species richness. Further, except for extremely rare events, the only ongoing immigration is from nearby islands within the same archipelago; thus, on isolated islands such as Easter Island, there is no short-term immigration. Steadman allows the possibility that, on average, a given species on a large, high island may be able to forestall anthropogenic extinction for longer than on a small, flat island (though such extinction is not envisioned in the original equilibrium theory). But even this case is tentative, and he points to several examples of remarkably small islands that have maintained surprisingly large avifaunas.

Steadman presents a similar null model in contrast to Diamond's (1975) assembly rules for birds of the Bismarck Archipelago. He sees most "checkerboard" distributions as artifacts of insufficient knowledge of human-caused extinctions. Fairly quickly, for each species, every island within an archipelago above that species' area threshold and not isolated by more than 100 km would usually contain that species. Subsequently, human contact leads to extinctions, and interspecific competition has little to do with the resulting distribution, whether checkerboard or not.

Steadman frequently emphasizes that his models and his rejection of equilibrium and other theories are restricted to oceanic islands and are based on the accumulated empirical ornithological information of the past 25 years. Thus, he is at pains to suggest that, for certain taxa (not birds) on continental islands over very short time scales, MacArthur and Wilson's (1963, 1967) dynamic-equilibrium theory might approximate reality. He exonerates MacArthur and Wilson on this count and indicts their successors for excessive application of dynamic equilibrium theory, neglect of conflicting data, and failure to consider alternative hypotheses. Similarly, he lauds Diamond (1975) for having developed the concept of assembly rules, given the "ecological climate of the time," and for sustained Melanesian field work, though he is far less charitable to authors who subsequently applied the rules to tropical Pacific birds, and indeed to Mayr and Diamond (2001).

His long, intensive field experience with the Pacific birds has made Steadman acutely aware of the staggering losses they have already undergone and the threats they still face. He is a fine writer, and at many points, always relevant ones, he interjects poignant notes on conservation issues. Though these are often poetic, sometimes achingly so, they are never contrived or strained, but rather flow naturally from the topic at hand. Additionally, both his copious observations and his overarching biogeographic–ecological hypotheses suggest approaches to conservation, which are summarized in the penultimate chapter. His general pleas are for far better surveys, especially in Near Oceania but also in parts of Remote Oceania, and for much greater attention to the potential value of small (sometimes very small) islands (the latter in obvious contradistinction to the current fashion in conservation biology, beginning with refuge design rules associated with the equilibrium theory). Although his overall prognosis for Pacific island bird conservation is pessimistic, Steadman warns against crying wolf about particular island species, on two main grounds—inadequate surveys and taxonomic inflation. With regard to the former problem, he points to several birds listed variously as "rare" or "threatened" that are, in fact, common and sometimes widespread. He includes an interesting section with specific suggestions for translocating populations of threatened birds to new, usually very small, islands, and abundant mention of problems caused by introduced species, including "ornitho-Euro-trash." This chapter, like the entire book, has many insights and observations about how local human populations interact with particular bird species (generally to the detriment of the latter) and some suggestions on how to ameliorate these interactions.

Steadman repeatedly fails to cite well-known ecological and biogeographic literature that would strengthen and support many of his arguments. To take just three examples, Connor and McCoy (1979) showed that species-area curves typically explain only about half the variation in species richness and that there is no empirical justification for representing the curve by a log-log rather than the semi-log plot Steadman prefers. Williams (1964) came to conclusions similar to Steadman's on the tripartite nature of the curve, and Caughley (1994) stressed the impressive achievements of autecological case studies in conserving species and lamented the lack of relevance of general theory, including the equilibrium theory. Nevertheless, with its exhaustive description

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of these birds and their biogeography, plus its many insights and about 1,800 references, this is surely now the authoritative work on land birds of tropical Pacific islands, and I highly recommend it.—Daniel Simberloff, *Department of Ecology and Evolutionary Biology, University of Tennessee, Knoxville, Tennessee 37996, USA. E- mail: dsimberloff@utk.edu*

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Roberts Birds of Southern Africa, 7th ed.—P. A. R. Hockey, W. R. J. Dean, and P. G. Ryan, Eds. 2005. Trustees of the John Voelcker Bird Book Fund, Cape Town. 1,296 pp., 81 color plates, 2 text figures, 3 tables, numerous maps. Standard Edition ISBN 0-620-34053-3. Distributed by Wild Dog Press, 3 Palm Springs, 100 Johannesburg Road, Lyndhurst 2192, Gauteng, South Africa (e-mail: wilddogp@iafrica.com). Cloth, Rand (ZAR) 795.00.—Since the publication of Roberts's *The Birds of South Africa* in 1940, "*Roberts*" has been a favorite for anyone interested in birds of southern Africa. In the 20th century, this book went through five editions (McLachlan and Liversidge 1957, 1970, 1978; Maclean 1985, 1993). These editions retained a similar format, enhanced in the later editions by some new plates, sonograms, and keys. All were about the same size, and served thousands of bird enthusiasts as both a field guide and a handbook. Because of the appearance of several field guides and the accumulation of much new information about birds of southern Africa in the 1980s and 1990s, those involved in the preparation of the seventh edition decided to make major changes to its format. This edition became a comprehensive handbook with a different taxonomic sequence, entirely new art work, enlarged species accounts, detailed reference sections and the use of common English names approved by the International Ornithological Congress (IOC). The seventh edition is large, more than twice the overall size of the sixth edition, weighs 5.25 kg, and has nearly 1,300 pages.

Roberts Birds of Southern Africa begins with two forewords, acknowledgements by the John Voelcker Bird Book Fund, a section on how to use the book, and and a table of contents with the book's new sequence of orders and families. The main body of the book is divided into the following sections: Introduction; Families and Genera; Species Accounts; Escapees, Unconfirmed Records and Incorrect Reports; References; and Indexes.

The Introduction starts with essays on the history of southern African ornithology, on the Percy FitzPatrick Institute of African Ornithology, and on Norman Lighton, the artist for the first *Roberts*, along with the reproduction of his frontispiece used in the first edition. Following these essays is a major section on evolution and classification of birds in which the editors present their rationale for adopting a sequence based largely on Sibley and Ahlquist's (1990) "tapestry of avian evolution," with some modifications. Many major changes have been made, including placing penguins, shearwaters, and petrels in the Order Ciconiiformes at the end of the nonpasserines. Some are still tentative, and one wonders whether a more conservative approach to changes in the taxonomic sequence would have been preferable, given that this handbook will be used for years to come.

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The Introduction includes biogeography of southern African birds, with maps of habitats and recent political boundaries, tables on endemism status of southern African birds, changes to common names of birds and splits of species since the sixth edition, a glossary of terms, and an illustrated glossary of the external parts of birds.

The section on Families and Genera is new and excellent. It covers common structure, biology, and behavior of families and genera found in southern Africa and recent taxonomic changes with their citations. Also, it has black-and-white sketches of a representative of each family and derivations of generic names.

The 951 species accounts, prepared by more than 50 ornithologists, make up the bulk of the book. Soon after each account was completed, it became available on the FitzPatrick Institute website (www.fitzpatrick.uct.ac.za/docs/roberts.html) so that anyone who wished could comment on an account before it was published. The accounts vary from 500 to about 2,000 words, each beginning with the *Roberts* number from the sixth edition, the page reference to the color illustration of the species, and a small black-and-white sketch of the species. Typically, only the IOC-approved English name is given; common names in other selected languages are available on the FitzPatrick Institute website. Along with the original scientific name are comments on its derivation. The maps, updated from Harrison et al. (1997), have been expanded to include Mozambique north to the Zambezi River and ranges of subspecies. The accounts are much enlarged from those in the sixth edition and include new subjects such as confusing species, movements, conservation, social behavior, and molt. The accounts are divided into Identification, Voice (no sonograms, but many details on behavior), Distribution, Population and Demography (total numbers, breeding age, ringing records, life span), Movements and Migrations, Habitat, General Habits, Foraging and Food, Breeding (courtship behavior, nest, laying dates, eggs, incubation, development and care of young, and breeding success), Conservation, Molt, Geographic Variation (with subspecies), Taxonomic Note (if there are differing views), Measurements, and References. The account ends with the name of the author. These accounts cite facts in text with superscripts, and then list them with author and date at the end of the account. Details of these citations can be found at the end of the book, in the large References section. The accounts are informative and written in a concise style, though the amount of information varies somewhat, reflecting the many authors involved.

Eighty color plates are scattered among the species accounts. All are new, and larger than the plates in the sixth edition. A team of seven bird artists from southern Africa, with widely ranging styles, prepared them. Opposite each plate are shadow images of the birds with the species' names and page references to the accounts. The use of these images is new and welcome. The plates are artistically pleasing, some more so than others. Although they add to the overall attractiveness of the book, most are not especially helpful in bird identification. Often only a breeding male or female is illustrated, and to find details on other plumages one must go to the text account.

Following the species accounts is "Escapees, Unconfirmed Records and Incorrect Reports," another new section. Each entry covers range, where and when recorded in southern Africa, comments on plumage, and reasons why the species was not accepted. All records are cited in text with superscripts, and details on the citations are included at the end of this section. Next is the large References section (pages 1145–1278). Under the entry for each species are complete details of all citations in the species account. The book ends with a list of sponsors and indexes for scientific and common English names.

In any work of this kind, especially one with many contributors, users will find errors and omissions. The editors are aware of this and have structured the FitzPatrick Institute website so that one can report errors and omissions and see those already reported.

I have a few concerns about the book. It is not easy or convenient to handle a book this size. Also, I would prefer to see all plates numbered and listed in the table of contents along with the names of the artists who painted them. It would help if the plates were included in the index as well. The only place to find reference to an illustration is at the start of the species account, and the only place to find the page of the species account is in the index. Also, short

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of checking at the end of each account, one cannot discover which accounts were written by which author.

The References section at the end of the book is impressive, but to include all the references required small print, probably smaller than most readers would wish. Because of its many pages, the References section is difficult to use. To find a reference, one first must consult the species entry in the index, where only two pages are listed: one for the account, the other for the references associated with it. Listing this second page in the abbreviated reference section at the end of a species account would have been helpful. Also, the inclusion for many species of the same major references results in much duplication and increases the number of pages in the References section. A separate general section at the beginning of the References, listing the major references, would have saved considerable space.

This is an impressive book, and it will be a key book for southern Africa and sub-Saharan Africa for years to come. Everyone associated with its production are to be congratulated. All serious birdwatchers and professional ornithologists interested in Africa should have a copy in their libraries.—Emil K. Urban, *Department of Biology, Augusta State University, Augusta, Georgia 30904, USA. E-mail: eurban@aug.edu*

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