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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Taking Wing: *Archaeopteryx* and the Evolution of Bird Flight.—Pat Shipman. 1998. Simon and Schuster, New York. 336 pp., 77 black-and-white figures. ISBN 0-68481131-6. Cloth, $25.00.—The origin of birds and the evolution of flight have been debated for almost 150 years, and the discovery of *Archaeopteryx* in 1860 provided the stimulus and first major piece of evidence. New fossils and techniques have provided evidence that has afforded exciting approaches and sophisticated analyses. This intellectual ferment is driven by advances in phylogenetic theory and practice, new understanding of dinosaur physiology and functional morphology, and the discovery of new fossils whose features have been hotly debated, interpreted, and reinterpreted. The existence of these Mesozoic forms has provided clues to everything from the evolution of feathers to the implications of nesting and social behavior in avian ancestors. The polemics reflect the innate interest of the topic and its relevance to our understanding not only of the origin of birds but also the evolution of flight. Shipman, an anthropologist with credentials as a fine science writer, considers the history of *Archaeopteryx* in light of the hypotheses that surround possible avian ancestors and the events that led to full flapping flight. Shipman approaches the various issues with a narrative style, thorough documentation, and an appreciation of the nature of scientific debate. Several minor errors and omissions crept in but none relevant to the overall message.

Archaeopteryx, with a classical mixture of morphological features, strongly implies that from the first appearance in the fossil record, birds possessed basic but unrefined flight and perching capacities. Vertebrate paleontologists generally believe that the debate—whether birds are theropod descendants or closer to the crocodylomorphs or some more remote diaspid reptile—has been resolved over the last decade. Adherents of the theropod hypothesis employ cladistic evidence that favors birds as specialized coelurosaurs. Opponents, several of whom are also respected ornithologists, have yet to present their opinions as a phylogenetic hypothesis. They have identified no specific outgroups nor itemized character evidence. Both camps generally accept *Archaeopteryx* as the oldest, most basal bird. True, cladistics does not explain how a particular system works, or how a morphological element is structured, or how organs function. But cladistics does organize animals in a rational manner. In their elemental form, the arguments involve identifying the ancestry of birds and whether bird flight had an arboreal (trees-down) or cursorial (ground-up) origin. Shipman discusses the issues and includes profiles of many of the principal advocates involved. She also includes critical accounts of many of the advances in related fields such as cladistics, functional morphology, and the many fossils that have recently become so abundant (especially from the late Jurassic and early Cretaceous of Argentina, Spain, and China) or are so controversial (e.g. the Triassic *Protoavis*).

The two theories of flight—cursorial and arboreal—are based on different methods and different assumptions. Hence, they are traditionally difficult to reconcile. The situation is largely rectified through a thorough discussion of both the data and methods, which contributes the bulk of the text. Shipman elegantly and convincingly points out that the theories are not symmetrical. The cursorial theory posits that the avian ancestor was a theropod dinosaur. The premise includes elements such as bipedal locomotion, the strong possibility that the evolution of essentially modern feathers preceded flight, that the wing developed exclusively from the forelimb, and that takeoff came from the ground up. By contrast, the core of the arboreal hypothesis is that gliding from an elevated position was a key step in the evolution of flapping flight. Gliders, by definition, must be arboreal, and feathers evolved as a mechanism to support the gliding apparatus, which in turn evolved from a still unknown ancestor with quadruped locomotion. Further, the avian ancestor could not be from among the theropods, because there is no obvious way to get a biped up a tree. "Thus,"

Shipman infers, "whereas the 'ground-up' hypothesis is based on a belief about phylogenetic relationships, the 'trees-down' hypothesis is built upon an idea about locomotor mechanisms." And, as I write this, evidence has been found of feathers on theropod fossils morphologically more primitive than *Archaeopteryx*.

Shipman reviews all of the corollaries to the premise that avian flight evolved from a terrestrial ancestor. Bipedal locomotion preceded forelimb-powered flight (all four limbs are involved in quadruped flight). The origin of feathers complimented flight because bipeds required proto-wings capable of generating lift or complimenting the power provided by the hind limbs. If these early feathers provided even some insulation, then a crude heterothermy and elevated metabolism were probably involved. However, it seems likely that *Archaeopteryx* could fly with a reptilian-grade metabolism. Ground takeoff would reduce potential injury and allow time for early birds to master the motor behavior patterns supporting aerial maneuverability that leads to full-flapping flight. These and related points are discussed in detail.

A fascinating chapter on the other flying vertebrates is highly instructive. The evolutionary pathways of this complex system in bats, and particularly in pterosaurs that were contemporaneous with the earliest birds, are compared with that proposed for birds. The nature of the fossils, the anatomical evidence, the functional implications, and the role of reconstruction and models, illustrate how the evidence has been historically interpreted and reinterpreted. It is repeatedly reinforced that knowing what an animal was capable of is different than knowing what extinct animals did. As with birds, understanding the evolution of pterosaur flight involved ancestral locomotor patterns, skeletal adaptations, physiological inferences, and being able to confirm or reject multiple hypotheses. A nice discussion of the ecological aspects of the origin of bird flight in a world dominated by the highly volant pterosaurs is included.

The fundamental question "did *Archaeopteryx* fly?" is answered in the affirmative. The broader, more difficult "how well?" and "under what environmental conditions?" are discussed in greater detail. These issues provide the meat of the book. Shipman brings together essentially all the available evidence, ranging from the environmental factors in the Stolenhofen area, through the best description I have read on how the avian wing skeleton works, recent interpretations of early avian metabolism, and the potential roles of the functions of very early feather structures. The support for the premise that the bird ancestors were obligatory bipeds, which led to the two separate locomotor systems that typify birds is strong. The smallish, partly feathered dinosaur ancestors had legs capable of complete mobility on the ground and were strong enough to lift the body by extension. The forelimbs, no longer involved in locomotion, were used in feeding, as reflected in the presence of claws, or for balance, as reflected in the proportions of the hands. Shipman's presentation of these larger biological features, marshaled in the first nine chapters, analyzes their functional aspects, details of the shape of hand claws and their potential use in climbing or grasping, and the shape of the carpal bones and their relevance of flight movements. Each adds weight to the argument for a cursorial origin of flight. The strength of the book is that Shipman argues persuasively that "The key to understanding *Archaeopteryx* is recognizing that it was not a bird as birds are today, but an evolutionary fledgling." I agree. Ultimately, there is ". . . a satisfying sensibleness about concluding that *Archaeopteryx* could and did fly in a vegetated habitat, and that it could take off from the ground."

It has become commonplace for scientists and lay persons alike to consider the fact that birds have feathers as part of a deductive process. If all birds have feathers, and only birds have feathers, then feathers define birds. But Shipman points out the danger in accepting such an equivalence. The tacit implication is that anatomical characters held in common will define a group. A bird without feathers is still a bird. But would a feathered dinosaur be a bird simply because of its feathers? And, by the way, such beasts are now known to exist. Although characters certainly aid in the recognition of ancestry, they do not define it. The problem is that characters that demarcate a node will typify all taxa more advanced or derived. The temptation is to see the nodal characters as defining characters rather than ancestry. If the traits of all modern members of a group define the group, the problem as Gauther has pointed out, is that no evolution could have occurred—all members of the group always had those characters. The issue is at the diagnosis of the clade, not its ancestry. The possible presence of feathers or feather precursors on the recently discovered theropod dinosaurs (e.g. *Sinosauropteryx* and *Protarchaeopteryx*) raises more questions. Shipman remarks that "the story of the evolution of *Archaeopteryx* and the evolution of the interpretation of *Archaeopteryx* are parallel tales."

Our understanding of avian origin and flight is still incomplete. The nature and significance of *Archaeopteryx*, perhaps the world's best-known fossil, are still debated. The intensity of the debate has been fueled in the last decade by a host of new fossil finds. Shipman has done a masterful job of discussing both the evidence and the analysis. So, what to think? Did *Archaeopteryx* fly? Certainly, but perhaps not like modern birds. Are birds derived from theropod dinosaurs? Almost certainly; most likely from a small theropod. The most parsimonious and best-supported hypothesis is that flight evolved from a cursorial

platform rather than through an arboreal-gliding series. And, although no one knows what the earliest feather looked like, it almost certainly provided insulation, mechanical protection, or tactile transduction; flight feathers followed quickly. *Taking Wing* provides a scholarly analysis of the evidence for our understanding of many important issues. Regardless of your current biases in any or all of this, the book should be read and savored.—ALAN H. BRUSH, *92 High Street, Mystic, Connecticut 06355, USA.*

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The Rise of Birds. 225 Million Years of Evolution.—Sankar Chatterjee. 1997. Johns Hopkins University Press, Baltimore. xvi + 312 pp., numerous text figures. ISBN 0-8018-5615-9. Cloth, $39.95.—The last few years have witnessed the publication of several books on the origin of birds written largely for the lay public and supporting the position that birds evolved from a group within the dinosaurs. These books follow the cladistic approach and conclude that birds should be considered living dinosaurs and make statements to the effect that one can observe dinosaurs simply by looking out the window at the backyard feeder. *The Rise of Birds* fits into this genre and is perhaps the only one written by a professional paleontologist who has been responsible for discovering the earliest known bird representative—the Triassic fossil *Protoavis*.

Protoavis was discovered by Chatterjee and his students in 1983 while excavating vertebrate fossils from the Post Quarry of the Upper Triassic Dockum Group of sediments in West Texas. While working about a meter over the known fossil layer, Chatterjee noticed that a small block of mudstone contained a series of small, delicate bones. Initially, he believed that these represented a juvenile skeleton of the dinosaur *Coelophysis*, and they were set aside and all but forgotten. Two years later Chatterjee compared the specimen with the material of a small theropod, *Alwalkeria*, from the Triassic of India. Upon close study, this fossil revealed a number of characteristics not present in any known theropods, resembling more typical avian features. Additional material was collected from the Post Quarry and from the nearby Kirlpatrick Quarry, resulting in nearly every skeletal element of *Protoavis texensis*. The cranial skeleton of *Protoavis* was described in 1991, and the detailed paper on the postcranial skeleton will appear later this year.

Unfortunately, much of the material attributed to *Protoavis* is scrappy and requires considerable work and interpretation to reconstruct the individual skeletal elements. Because of this, identification of *Protoavis* as an early representative of birds has been very controversial. Some workers, mainly dinosaurian paleontologists, have maintained that this fossil is not avian, a conclusion that appears to be based on inherent biases or hidden agendas. Other workers, mainly avian paleontologists, have agreed with Chatterjee that *Protoavis* is indeed avian. In the late 1980s, I was able to examine this material carefully; Sankar Chatterjee was always most generous in permitting everyone who wished to study these fossils to do so. I should note that the material that I examined was from the first known specimen of *Protoavis* and did not include material discovered later, which was much better. Many of the features of the skull and postcranial skeleton are in agreement with the conclusion that this fossil is an early representative of avian radiation. However, if one was being severely critical, few features are conclusively avian. One feature is avian, however, and it is a most important one: several vertebrae were unmistakably cervical with clear heterocoelous articulating surfaces on the centra. Vertebrate morphologists have been in complete agreement that only birds possess cervical vertebrae with heterocoelous articulating surfaces. Hence, *Protoavis* has to be considered a bird. Otherwise, one has to assume that cervical vertebrae with heterocoelous articulating surfaces evolved at least twice in the history of the tetrapods. Such an assumption clearly would be ad hoc and not acceptable, unless one could demonstrate it independently of the occurrence of these articulations in *Protoavis* and its possible placement within the class Aves.

Chatterjee published his description of the cranium of *Protoavis* in 1991 (*Philosophical Transactions of the Royal Society of London Series B* 33:277–343); his detailed description of the postcranial skeleton should appear later this year. Unfortunately, detailed discussions of the possible consequences of *Protoavis* to our understanding of the origin and evolutionary history of birds are lacking. Although not entirely his fault, one of the serious omissions in Alan Feduccia's *The Origin and Evolution of Birds* (1996) is an inadequate discussion of *Protoavis*. The important contribution in *The Rise of Birds* is Chatterjee's presentation of the skeletal features of *Protoavis* and a discussion of his interpretation of its position in the evolution of birds. The text discussion is accompanied with excellent drawings showing the skeletal elements of *Protoavis*, but readers should remember that many of these skeletal elements had to be extensively reconstructed from fragmentary material. This extensive discussion of *Protoavis* provides an excellent first introduction of this important fossil to most ornithologists, and it is for this reason that I strongly recommend this volume to all ornithologists and others interested in the origin and evolution of birds.

Unfortunately, some serious problems accompany

this presentation. Chatterjee accepted the theory of the dinosaur origin of birds and indeed of the dromaeosaurian origin of birds, and presented all of his discussions and comparisons as cladistic analyses based on this assumption. Dromaeosaurs are an advanced group of saurischian dinosaurs that appeared late in the Cretaceous; hence, there is a gap of more than 125 million years between the age of *Protoavis* and that of the first known dromaeosaur. This resulted in Chatterjee (Fig. 10.16) placing the splits between dromaeosaurs and birds early in the Triassic, and the splits between major groups of birds in the Triassic or early in the Jurassic at the latest. These timings appear to be unrealistic. In discussing the skeleton of birds to show their design as an airframe (Chapter 2), comparisons are made between avian and dromaeosaurian skeletons. This is perfectly valid, but the same comparison could have been made between the skeleton of any archosaurian reptile and that of birds. Nothing is said about whether any special homologies exist between the skeletal features of the dromaeosaurs and of birds that are not found between other archosaurian reptiles and birds. Based on the conclusion of the dinosaur origin of birds, Chatterjee accepts (Fig. 10.9 and elsewhere) that the hand digits of birds are 1, 2, 3 and not 2, 3, 4, as is supported by the major embryological studies of the avian hand. A better discussion could have been presented if the comparisons between features of birds and their possible reptilian ancestors and if the origin of typical avian features, including those seen in *Protoavis* and in *Archaeopteryx*, were presented without basing these discussions on presumed cladograms of the phylogeny of archosaurian reptiles and birds.

Chatterjee differs from most paleontologists who advocate the dinosaur theory for the origin of birds in that he accepts strongly the arboreal theory for the origin of avian flight (Chapter 9). Chatterjee is a reptilian paleontologist, and as such is out of his field in dealing with the characteristics, relationships, and evolution of later avian radiation, especially that of the Cenozoic. Hence, in the latter part of his book dealing with the Cretaceous and Cenozoic radiations of birds, he is dependent on information in the literature. These sections contain numerous errors, both of omission and commission. Chatterjee presents (pp. 221–230) the results of a cladistic analysis he undertook, but without providing any of the details of the analysis. He shows the late Jurassic *Archaeopteryx* and early Cretaceous *Confuciusornis* as branching off the avian lineage earlier than the Triassic *Protoavis*. More importantly, although he cites the significant paper by E. Kurochkin (*Archaeopteryx* 13:47–66, 1995) on the early evolution of birds, he does not discuss it at all. Kurochkin places *Protoavis* in a separate subclass Praeornithurae, which diverges from the major line of avian evolution just before the base of the subclass Ornithurae and the entire radiation of birds leading to the modern radiation of the Paleontognathae and the Neognathae, and *Archaeopteryx* and the Enantiornithes (the "opposite birds") in the subclass Sauriurae that he considers to be a side branch to the main line of avian evolution. The subclass Sauriurae and the subclasses Praeornithurae and Ornithurae form a dichotomy at the base of the class Aves. Use of the names *Polarornis* for a late Cretaceous Antarctic loon-like bird and *Gobipipus reshetovi* for a Cretaceous enantironithine (not neornithine) embryo from Mongolia (pp. 125–126) are nomina nudia in this publication; these names should not be used until properly published.

I would like to make one strong complaint against the publisher. A large-format size has many advantages for a book, especially in permitting larger and more informative illustrations. But this advantage is rarely used in this book. Moreover, as a conservationist, I object strongly to the use of the large format coupled with a very broad outer margin. My estimate is that this style wastes about 20% of the available space in this volume, resulting in an excessive waste of paper (recycled paper is not used in book publishing), and it adds to the cost of the book. Although this style may gladden the hearts of book designers, I feel that a firm message of protest should be sent to all publishers of this environmentally unsound procedure.

In spite of its shortcomings, I recommend this book to anyone who wishes to learn more about the important late Triassic fossil *Protoavis texensis* and its significance in understanding the origin and early evolution of birds.—WALTER J. BOCK, *Department of Biological Sciences, Columbia University, 1200 Amsterdam Avenue, Mail Box 5521, New York, New York 10027, USA.*

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The Birds of Africa, Volume V.—Emil K. Urban, C. Hillary Fry, and Stuart Keith (Eds.). 1997. Academic Press, London. xix + 669 pp., 32 color plates by Martin Woodcock, numerous line drawings by Ian Willis, many distribution maps. ISBN 0-12-137305-3. Cloth, $145.00.—Nearly 60 pages longer than any of the previous volumes in this folio-sized series, Volume V maintains the high standard exhibited by its recent predecessors. Its style and appearance are much the same, except that species' breeding ranges are now shown in red, a welcome innovation. Much of the eight-page Introduction is devoted to useful regional maps depicting 359 often obscure or hard-to-find localities mentioned in various recent publications. Also included is an updated political map of Africa. In the text, however, the old names of South African provinces are retained to conform with use

in standard southern African bird books. The 32 pages of literature references are grouped into "general and regional" and family categories. Three pages of acoustic references by Claude Chappuis list published discs and cassettes, institutions with sound libraries, and more than 70 individual recorders. A page of errata to previous volumes precedes the extensive indexes (to scientific, English, and French names) in which bold type conveniently marks the main account of each entry.

As in the earlier volumes, all birds known from Africa are covered, including those Palearctic forms breeding south to North Africa, migrants, winter visitants and strays to the continent, together with Afrotropical species. Volume V includes the thrush genera *Monticola, Zoothera, Psophocichla,* and *Turdus* not dealt with in Volume IV, plus the families Sylviidae, Muscicapidae, Monarchidae, and Platysteiridae. The latter two groups are elevated to family level, diverging from the classification of Campbell and Lack (*A Dictionary of Birds,* 1985), which generally is followed for the higher categories. For genera, species, and subspecies, no single classification is followed, and the "authors have made their own [taxonomic] decisions after discussions . . . with the editors." The species accounts were authored by C. Erard, L. G. Grimes, M. P. S. Irwin, P. C. Lack, R. deNaurois, D. J. Pearson, A. Prigogine, A. Tye, and each of the editors.

Accounts of sylviid warblers occupy more than half of the book (374 pages) and include several notable departures from conventional treatment. The prinias are considered to be "probably polyphyletic," with *Heliolais* (Red-winged Warbler), *Urolais* (Green Longtail), *Phragmacia* (Namaqua Warbler), *Oreophilais* (Roberts's Prinia), *Malcorus* (Rufous-eared Warbler), *Schistolais* (White-chinned and Sierra Leone prinias), and *Urorhipis* separated from the genus *Prinia* sensu lato "on behavioural and morphological grounds." Some workers may not be impressed with the evidence for certain of these splits. *Spiloptila* is considered monotypic, and maintained for the Cricket Warbler of the Sahel, whereas the Red-fronted Warbler (placed in that genus by most recent workers) is treated as the monotypic *Urorhipis.*

Although the text mentions that many Red-fronted Warblers in southeast Kenya show a dark breast band, this distinctive but little-known plumage is not illustrated. *Calamonastes* is kept distinct from *Camaroptera,* and *Calamonastes undosus* (with *fasciolatus*) is separated from *C. simplex.* "Miombo Wren-Warbler" is not the most suitable name for that bird, because nominate *undosus* in Rwanda and Kenya does not inhabit miombo woodland (unlike *stierlingi,* which is also vocally distinct). Segregating *Hyliota usambarae* as a species distinct from *H. australis* "on morphological evidence that is admittedly slender" may be premature. The White-tailed Warbler is now known to build an unstitched nest, and for that reason is here separated from *Camaroptera* as the monotypic genus *Poliolais. Stenostira,* variously thought to be a sylviid, a monarch, or a muscicapid flycatcher, is placed with the latter, despite its unspotted juvenal plumage. This bird is regarded as close to ("probably" even congeneric with) *Myioparis plumbeus,* whose juvenile has only ephemeral dorsal spots.

The often strikingly different forms of Bar-throated Apalis, many of them montane isolates, are all considered races of *Apalis thoracica,* 20 such here recognized. Most of these, disappointingly, lack biological information, although it is correctly pointed out that the dark-throated *fuscigularis* of Kenya's Taita Hills does not react to taped calls (or songs) of neighboring races. The species known to many as Long-billed Apalis, *A. moreaui,* is placed in the genus *Artisornis,* along with *A. metopias,* and both called "tailorbirds." The only nest reported for *moreaui* was not positively identified as that of this species. This, plus the bird's decidedly apalis-like song, prompted Zimmerman et al. (*Birds of Kenya and Northern Tanzania,* 1996) to retain *moreaui* in *Apalis* following Hall and Moreau (*An Atlas of Speciation in African Passerine Birds,* 1970). Other authors have placed it in *Orthotomus,* which in *The Birds of Africa* is considered generically distinct based on its 12 rectrices (as opposed to 10 in *Artisornis*). The Rockrunner, *Achaetops,* traditionally considered a warbler, is illustrated on Plate 6, but the species account will appear incertae sedis among the babblers (Timaliidae) in Volume VI.

Most groups appear to have been adequately researched by the authors, but in a work of this magnitude some oversights are bound to occur, and the pitfall of faulty previous literature is ever present. Confusion between *Batis minor* and *B. orientalis* in eastern Africa unfortunately is perpetuated here. The latter species is mapped across northern Kenya to well south of Lake Turkana, a large region from which it appears to be absent. Collecting since early in the century, from West Pokot and Samburu districts north through the Turkana region, has yielded no *orientalis.* Only two Kenyan specimens of this bird are known, both from Moyale on the Ethiopian border. The species may indeed range westward south of the border, but existing Kenyan sight records are entirely undocumented and unconvincing, including those reflected in the map by Lewis and Pomeroy (*A Bird Atlas of Kenya,* 1989). *Batis minor,* common on the Kongelai Escarpment in western Kenya, has been miscalled *orientalis* by a succession of birding tour leaders and others over the last two decades, but only *B. m. erlangeri* has ever been collected there. In the 1990s, investigations by myself and D. A. Turner disclosed only *B. m. erlangeri* and *B. molitor* in that region, and only *B. molitor* and *B. perkeo* in Samburu Game Reserve where *orientalis* also had been reported. The mapping of *orientalis* in southern Somalia probably stems from statements in *Birds of Somalia* by Ash and Miskell (1983), who erroneously extended its range "below 3°N." Those authors, however, were "unable to examine any museum

material," basing their species accounts almost entirely on sight records or literature statements—risky with birds as similar and poorly known as most *Batis* species. No tangible evidence exists to put *B. orientalis* south of about 10°N in Somalia, whereas *B. m. minor* is at least locally common in the southeastern part of that country. An extensive search of American, European, and African collections by Turner and me has turned up no specimens of *orientalis* from that region.

A few other minor imperfections appear in various *Batis* accounts. *Batis soror* is said to be "exactly parapatric" with *B. perkeo* in southeastern Kenya, but this is not clear from the map of the latter on page 597. *Batis perkeo* does not reach the southeastern coast as shown, and its range also is more extensive throughout arid eastern Kenya. *Batis orientalis* is indicated as not tape-recorded, but recordings have been made in Ethiopia by D. A. Turner and others. Unlisted recordings of the other East African *Batis* species also exist. The description of the voice of *B. mixta* appears to have been based on a single recording, and is not really representative. (A more extensive account appears in Zimmerman et al. 1996.)

The map for Kretschmer's Longbill (*Macrosphenus kretschmeri*) incorrectly shows a contiguous block of habitat in northeastern Tanzania. Actually, the species inhabits a series of small, isolated forest patches. The Kilimanjaro record is correct, and two individuals were ringed near Moshi in July 1996 (D. A. Turner pers. comm.), but the statement that there was only a single record ("possibly a wanderer") from Kitovu is misleading. Records existed up to the 1920s, but when the forest link with Kilimanjaro disappeared, so did the bird.

Martin Woodcock's color plates continue to improve, both in accuracy and visual appeal. Some of his thrushes, *Sylvia* warblers, certain *batises*, and *Ficedula* flycatchers are especially nice, although the Red-breasted Flycatcher (*F. parva*) on Plate 27 seems too short-tailed (compare with the text drawing from a photograph on p. 507). A few other proportion problems also exist, but the vast majority of the illustrations are excellent for identification purposes. Among the exceptions, *Turdus* (*olivaceus*) *helleri* on Plate 3 is barely recognizable, with a bill too small and too dull, no indication of the bare postorbital skin, and plumage that is too brown and pale; the strong-billed *helleri* is blackish above and on the breast. It is quite possible that the artist has not seen this rare bird in life. Least successful, in my opinion, are Woodcock's *cisticolas*. Many give the impression of being too large-eyed and slightly too long- and thin-legged. The postures chosen often are not ideal. The figure of *C. bodessa* is too pale and may have been painted from a faded skin. On Plate 30, the underparts of the Yellow-bellied Wattle-eyes (*Dyaphorophyia concreta*) are too pallid as they are in all old specimens. In life they are bright yellow. The dorsum of the male *D. c. graueri* pictured is much too gray. Fresh birds appear decidedly olive above, and the eye-wattles of both sexes should be bright applegreen, not dull bluish green.

Reflecting Ian Willis's considerable skill are numerous line drawings, most apparently done from photographs. These adequately illustrate various points in the text but show curious inconsistencies in the degree of completion of those drawings showing birds at nests. In some, the attending bird is depicted in full detail, whereas others show little more than a bird's outline at an intricately drawn nest. Treatment varies even within a genus, or on a single page. The drawing of *Cisticola cantans* (p. 144) is a mere outline with an eye; that of *C. galactotes* (p. 175) shows fully inked dorsal stripes but no other plumage details; the figures of *C. robustus* (p. 184), and even the tiny ones of *C. juncidis* at the top of p. 202, are executed in full detail, yet the larger *juncidis*, lower on p. 202, has the appearance of a paint-by-number sketch. The inconsonance among the figures is at variance with an otherwise polished, harmonious book where attention to detail is evident.

This is a well-produced, nicely bound volume that stays open on one's lap even with the frequent shifts in position required in response to the book's weight of nearly eight pounds. The type is dark, clear, and easily read. Despite the telegraphic style, the text is quite readable. Annoyingly, sex symbols and numerals begin sentences (which might have saved five lines of type in the entire volume), even in the generally well-written (and less telegraphic) generic summaries. In considerable reading I have found no obvious typographical errors.

The few shortcomings of this book detract only slightly from its overall excellence. The magnitude of the editors' undertaking in preparing this monumental series is perhaps fully appreciated only by those who have themselves labored on works covering large segments of a diverse tropical fauna. The effort expended on the present volume, and its predecessors, has been enormous and remarkably successful considering the immensity of the project. *The Birds of Africa* belongs in all natural history museum and university libraries. It is, of course, indispensable for anyone with a serious interest in African birds.—DALE A. ZIMMERMAN, *1011 West Florence Street, Silver City, New Mexico 88061, USA.*

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A Guide to the Birds of Wallacea: Sulawesi, The Moluccas and Lesser Sunda Islands, Indonesia.—Brian J. Coates and K. David Bishop. 1997. Dove Publications Limited, Alderley, Queensland, Australia.

536 pp., 64 color plates by Dana Gardner, 5 black-and-white figures, 1 color map. ISBN 0-9590457-3 1. Cloth, $55.00.—This is a particularly refreshing book, in part because so many of the "New Age" ecologists have placed such emphasis on cladistics and vicariance as important issues in biogeography that the contributions of dispersal seem to have been discredited. The composition and distribution of the avifauna of Wallacea reflect the important contribution of a dispersal legacy in addition to vicariance; Wallacea is also rife with endemism at the generic and species (249 species) levels. Although Wallacea may be one of the most ornithologically unappreciated and unfamiliar regions, it is also one of the most exciting. The name Wallacea is used solely as a geographic term; its name was derived from the renowned naturalist Alfred Russel Wallace who worked throughout the region for many years in the mid- to late 1800s.

Both authors currently live in Australia. Both have done extensive field work in New Guinea, particularly Papua New Guinea, and Bishop lived for several years in Indonesia. So, their first-hand experience in the region is extensive. Other than the very expensive check-list by C. M. N. White and M. D. Bruce (*The Birds of Wallacea,* BOU Check-list No. 7, 1987), this is the first really comprehensive attempt, with color plates, to cover the birds of this region under one cover.

Wallacea is a myriad of about 13,500 islands stretching more than 5,000 km, located between the subcontinent of India and adjacent parts of Asia to the east (Borneo to the Philippines) and the Australia/New Guinea region to the west. As indicated in the book's title, all of Wallacea lies within the current political boundaries of Indonesia. Wallacea comprises three major constellations of islands, called subregions; Sulawesi (the former Celebes) and its satellite islands, including the Sula Islands; the Moluccas group; and the Lesser Sunda Islands. The Moluccas consist of six major islands or island groups, and the Lesser Sundas comprise seven major island groups. Perhaps most notorious of the Lesser Sundas islands is the politically strife-torn Timor. Lombok is also part of the Lesser Sundas and forms the western margin of Wallacea, being separated from Bali (not part of Wallacea) by only 32 km across a deep oceanic trench; the two small islands are thus on either side of the famous Wallace's Line. The largest Wallacean island, Sulawesi, is only separated by a 105-km water gap from Borneo. The eastern margins of Wallacea are separated from New Guinea and the Aru Islands by what is called Lydekker's Line. Part of the interesting biogeographic and systematic composition of Wallacea owes itself to vicariance as related to the complex and progressive breakup and migrations of parts of Laurasia and Gondwanaland, with remnants of both land masses represented in Wallacea. The larger continental islands on the Sunda Shelf to the west of Bali (Java and Sumatra) were part of Laurasia and largely contain birds from the Oriental region. A rapid assessment of birds species shows 46 species in Bali (mostly of Oriental region origins) that are not in Lombok just 32 km away. The transitional nature of the Wallacean avifauna is reflected in the compositional decrease of Oriental region species as one moves eastward across Wallacea through the Lesser Sundas; 87% Oriental species in Bali, 73% in Lombok, 68% in Sumbawa, 63% in Flores, and 57% in Alor. On the eastern margins of Wallacea, more or less along Lydekker's Line, the land masses of New Guinea and Australia lie on the Sahul Shelf and are Gondwanic, as are Sumba and Timor in the Lesser Sundas. Perhaps the best way to interpret the current Wallacean bird distribution and composition is to incorporate plate tectonic paleogeography, paleo-climatic shifts (causing local extinctions or invasions), oscillating land bridges (as occurred during the Pleistocene), and the ability of certain bird groups to cross oceanic water gaps.

This book is not a carry-in-the-pocket-type field guide; it measures 228 mm × 150 mm and comes in a hard cover. The first 50 or so pages have sections on topography, geology, and vegetation; climate; bird habitats in Wallacea (the authors recognize 17 major habitat types from the ocean and inshore waters to alpine grasslands); characteristics of the Wallacean avifauna, including biogeography (with an analysis of endemism by subregions), migration, feeding flocks, community richness, elevational zonation, and breeding; conservation; a key to the bird-watching sites in the region; a general plan of the book's lay out; and an identification section. A short but informative discussion is included of the so-called "supertramps" that occur in Wallacea, which are mainly pigeons, monarch flycatchers, whistlers, and honeyeaters. Sixty-four plates illustrate 697 species (although the book actually describes more than 700 species), often showing both sexes and sometimes breeding and nonbreeding plumages or geographic variation, and a brief description of each species by sex and age. The cutoff point for the inclusion of species was July 1996. The remainder of the book presents "mini" species accounts giving range (with an analysis of subspecies), status and habitat (the latter is important because many species exhibit elevational zonation), habits (important because behaviors can be distinctive for species identification), voice, and frequently notes of interest about the species that are often taxonomic in scope. The systematic arrangement, with a brief introduction to each family, follows the more-or-less traditional system starting, in this case, with cassowaries and ending with the buntings and allies.

Although some of what can be said about the Wallacean avifauna can be said about other regions of the world, some interesting patterns play out in Wallacea, depicted in plates and text, which increases the

book's interest and value. The region is a hotbed for the radiation of some widespread groups of birds and at the same time has a depauperate representation for other such groups. For example, Wallacea has about 25% of the 49 species of accipiters, six of which are endemic (four endemic on Sulawesi and its satellite islands alone). Sulawesi may represent the extreme in number of sympatric accipiters for such a small geographic and insular area, perhaps closely rivaled only by New Britain. By contrast, both North America and Australia have but three species each (6% of total species). Wallacea contains about 19% of the world's 310 species of columbids (25 endemic species and 2 endemic genera) and also has an incredibly rich representation of kingfishers, with 26 species. Six of the world's 15 species of tytonid owls occur in Wallacea, with four being endemic. The Old World orioles, which range from Europe and Africa to Australia, are represented by 10 species (37% of the world total). Within the Megapodiidae, nearly 37% of the species occur in Wallacea, with one of the most unique of the family, the Maleo (*Macrocephalon maleo*) being endemic to Sulawesi. This is a sharp contrast to another galliform family, the Phasianidae, which is widespread in the Old World and consists of some 177 species, yet only four are in Wallacea. Only 14 anseriforms of the 156 or so species are represented; three are nonbreeding migrants from the Palearctic, and two essentially are Australasian endemics that occasionally wander to Wallacea.

Wallacea represents a location where otherwise widespread distributions end or slowly fade out. Woodpeckers, represented by only three species (two endemic), essentially reach their distributional limits as they spread from mainland Asia about half of the way through Wallacea toward Australasia (where none occur). The same can be said for the extremely successful babblers, where, out of more than 290 species that occur westward, only four make it into Wallacea (three endemic to the Sulawasi subregion) as their distribution also fades out. The widespread tits and chickadees, which are especially speciose in the Holarctic, barely spread into the western part of the Lesser Sundas, where the Great Tit (*Parus major*) occurs, but do not spread eastward from there. Of the 45 or so species of birds-of-paradise that one associates with Australasia, only two (both endemic to Wallacea) have extended westward off the Sahula Shelf islands and occur in the Moluccas: the Paradise Crow (*Lycocorax pyrrhopterus*) and the Wallace's Standardwing (*Semioptera wallacei*).

Wallacea seems to show an accumulation of species with extensive melanins and deep color pigmentation (blues, purples, and blacks) relative to other members of the taxon, particularly accentuated in Sulawesi. A representative sample follows. Most bee-eaters tend to be characterized by combinations of iridescent greens, yellows, and reds; the fore half of the monotypic and endemic Purple-bearded Bee-eater (*Meropogon forsteni*) from Sulawesi is deep purple. Likewise with the rollers, that generally are combinations of greens, blues, browns, and pink or rufous. Of the three species in Wallacea, the two endemic forms are largely deep blue to purple; the Purple Dollarbird (*Eurystomus azureus*) and Purple-winged Dollarbird (*Coracias temminckii*). As suggested by the name sunbird, the Nectariniidae are characteristically strikingly plumaged, brightly colored, iridescent species that have names typifying their colors, as in the Flame-breasted Sunbird (*Nectarinia solaris*) that occurs in Wallacea. In sharp contrast is the apply named Black Sunbird (*Nectarinia aspasia*), a Sulawesi subregion endemic. Using the Old World orioles again, their colors generally range from dull brown (very few) to olive or green and bright yellow with splotches of black. Perhaps the most uniformly dark species is the Dusky-brown Oriole (*Oriolus phaeochromus*) endemic to Wallacea. Even below the species level, such melanic colors are accentuated. The most richly colored Peregrine Falcon (*Falco peregrinus*) occurs in the Solomon Islands, New Guinea, the Philippines, and Indonesia (all currently united under subspecies *F. p. ernesti*), and the darkest individuals among this subspecies occur in Sulawesi; indeed, they are noticeably enough darker that at one time they were given their own trinomial name, *F. p. heinrichi*.

This book is a must for those interested in biogeography and conservation biology, and also for the general ornithologist, for it supplies information for a part of the world that is lightly touched by literature sources. Because of the comprehensive nature of the well-formatted and nicely illustrated plates, and the information given throughout the text, this book is appropriate for general libraries and especially those at the secondary school and college level.—CLAYTON M. WHITE, *Department of Zoology, Brigham Young University, Provo, Utah 84602, USA.*

The Auk 115(3):813–815, 1998

Social Influences on Vocal Development.—Charles T. Snowdon and Martine Hausberger (Eds.). 1997. Cambridge University Press, Cambridge, United Kingdom. ix + 352 pp., 82 figures, 20 tables. ISBN 0-521-49526-1. Cloth, $74.95.—Based in part on a Jacques Monod Conference at Aussois, France, in 1992, this edited volume is a fine effort at integrating our understanding of vocal development across taxonomic groups. Eight chapters (primarily) on birds, two on cetaceans, two on nonhuman primates, and four (primarily) on humans nicely accomplish the three goals of the editors. Those goals were to em-

phasize the parallels in vocal development among diverse taxonomic groups, to emphasize not only how these animals (including humans) acquire but also how they use and comprehend their vocalizations, and to illustrate the variety of ways in which social influences affect vocal development.

The editors identify five main themes that emerge from the 16 chapters; I agreed with the first four, but was not as enthusiastic about the fifth. (1) Vocal learning involves learning to produce, to use, and to comprehend vocalizations, and all three aspects must be fully studied before we will understand the essence of vocal learning. (2) Social influences affect vocal development, and can, for example, enable vocal learning later in life, well past the early sensitive phase. (3) Social influences can include a number of factors and do not necessarily involve social interaction; mere proximity to a stimulus, for example, could also influence learning, without any interaction. We must learn more about why and how social influences affect learning. (4) Vocal learning can occur in aggressive contexts (e.g. between territorial male songbirds), but it often occurs in affiliative contexts, such as when birds imitate social partners or other members of a social group. We poorly understand the context and function of vocal learning in most groups. (5) Although the editors thought that great mobility (as by migratory birds and mammals) or life in unpredictable environments (e.g. Zebra Finch [*Taeniopygia guttata*]) has enhanced the "capacity for new learning" later in life, I was not as convinced. My fifth theme would be as follows: "The evolutionary correlates of the effects of social influences on vocal development are poorly known." The why, how, and when of signal learning should be better understood with additional well-focused comparative surveys.

The most engaging section, I felt, was the critical review of "social interaction and sensitive phases for song learning" in birds by Douglas Nelson and the response by Luis Baptista and Sandra Gaunt; the margins of my book are littered with notes of both disagreement and agreement. Nelson first contrasts instructive and selective models of learning. With instructive learning, a young bird first memorizes a song during an early sensitive phase and then later learns to produce that sound via auditory feedback. With selective learning, the young bird also memorizes during an early sensitive phase, but the young bird memorizes more songs than it needs, and then later selects for use a particular subset of songs (a subset, for example, that most closely matches songs of adult, countersinging neighbors). Nelson finds examples of this learning by selective attrition in Field Sparrows (*Spizella pusilla*), White-crowned Sparrows (*Zonotrichia leucophrys*), and other species. I am uneasy, however, about the confidence of his conclusions. Although he marshals evidence against the occurrence of instructive learning (of novel sounds) in his field-recorded, yearling Field Sparrows, our laboratory studies contradict his conclusions: some yearling Field Sparrows are clearly capable of learning new songs by instruction (W.-C. Liu and D. E. Kroodsma unpubl. data). I am equally uneasy with the declaration that any song learning by yearling or older White-crowned Sparrows "is based on learning by selection from an over-produced repertoire, and not on learning by memorizing novel sound stimuli" (p. 8).

I am uneasy about these conclusions because I believe that songbirds have repeatedly taught us that they are remarkably resourceful in how they go about acquiring their songs, which I see as a recurring theme in this volume. Changing seemingly minor conditions in a laboratory environment, for example, can alter whether or how or when songs are learned, but too often the (known) conditions of experiments are not even reported (see chapter by West, King, and Freeberg). Individuals respond differently, too, to seemingly the same sound environment. For example, in the same room, some of our Field Sparrows produced a song heard during the hatching year, some produced a song heard only as a yearling, but others seemed not to imitate any songs at all. Given how little we know about the environmental conditions to which the birds are responding, both in the laboratory and in the field, I think we best proceed cautiously and deliberately, with few declarations, and be ready to capitalize on what the birds reveal to us.

I found much of value in many chapters in this volume. Baptista and Gaunt, besides responding to Nelson, provide a good review of how social factors affect vocal learning in birds. West et al., with a review of their Brown-headed Cowbird (*Molothrus ater*) story, urge that we study not only what birds learn to produce, but also how they learn to use and comprehend those signals; to do so, they argue convincingly that we must study birds under far more naturalistic, if not natural, settings than we have. Payne and Payne contrast age-dependent and social-dependent learning and conclude that song learning occurs between socially interacting adults in their study species, Indigo Bunting (*Passerina cyanea*) and Village Indigobird (*Vidua chalybeata*). Zann reviews the literature on song learning by laboratory-reared Zebra Finches and by his free-living finches in Australia, a much-needed contribution to understanding how males of this species learn under natural conditions. By studying vocal learning in three highly social species, Brown and Farabaugh can distinguish between learning from social rivals in aggressive interactions and learning from social collaborators in affiliative interactions. Hausberger reviews the complex vocal behavior of the European Starling (*Sturnus vulgaris*). The quality of social interaction is dissected in the last "bird chapter" by Pepperberg: learning is enhanced when an animal has social interaction with

another animal and when the interaction includes information on what the signal is about and what its function is.

I found the remaining eight chapters equally fascinating. Dolphins, for example, imitate signals that relate to objects and then use those imitations when playing with the objects (McCowan and Reiss), and they learn whistles in affiliative contexts throughout life (Tyack and Sayigh). The absence of obvious vocal learning in primates provides a stark contrast to songbirds, but recent studies show more parallels with birds and also that some subtle changes within vocalizations of groups may be due to vocal learning (Snowdon et al., Seyfarth and Cheney). The final four chapters focus on human language: how social influences affect learning (Locke and Snow); the resilience of language, as revealed in communication by deaf children (Goldin-Meadow); the intricacies of communication between dizygotic twins and their parents (Jouanjean-L'Antoëne); and how boys and girls communicate within play groups (Goodwin). Throughout these chapters (especially those by Pepperberg and by Locke and Snow) are important references to cross-taxonomic themes in how social behavior influences vocal development.

The quality of the chapters varies, as expected in a volume of this sort. Some chapters were exquisitely written, I thought, and a joy to read; each of us is alternately an author and a reader, and we owe it to each other to strive for such good form. With some other chapters, however, I yearned for a few good paragraphs, or for figure legends that told how I should look at a complex figure. A few of the (longer) chapters could have used some rigorous editing, I felt, thereby avoiding some of those sections that were such a chore to read.

Overall, I believe this book accomplishes its goals admirably. It provides a stimulating discussion of how social influences affect vocal development among representative birds and mammals, and provides multiple ideas for debate and future research. Anyone interested in how we humans acquire our speech and how we compare with other primates and with birds will find much of interest here.—DONALD E. KROODSMA, *Department of Biology, University of Massachusetts, Amherst, Massachusetts 01003, USA.*

The Auk 115(3):815–816, 1998

The Great Blue Heron: A Natural History and Ecology of a Seashore Sentinel.—Robert W. Butler. 1997. University of British Columbia Press, Vancouver. ISBN 0-7748-0635-4. Cloth, $29.95.—The Strait of Georgia, like neighboring Puget Sound, is home to a rapidly expanding human population. At last count, one in 15 Canadians was found around its shores, and urban sprawl claims more of the landscape every year. The Fraser River delta and surrounding environs are still home to a rich panoply of wildlife, but for how much longer is anyone's guess. The conservation problems here are a microcosm of those wherever the interests of humans and wildlife collide. The focus of Robert Butler's *The Great Blue Heron* shows similarly broad ecological, geographic, and behavioral dimensions. The heron ranges across most of North America and exhibits catholic tastes in where it lives and what it eats. As top-level predators, Great Blue Herons (*Ardea herodias*) cut a high profile within an ecosystem, and Butler argues persuasively that they are useful indicators of environmental health. They usually require undisturbed forests for nesting and feed in both aquatic and terrestrial habitats over the year. They neatly fit the profile of an umbrella species, because when herons do well many other species also do well. Thus, the Great Blue Heron is well suited for telling the story of wildlife conservation in an urban landscape.

The book is an elegant volume—from the foreword by the artist Robert Bateman to the superb photography of Tim Fitzharris—and the text is written in a breezy style that is obviously intended for a general readership. The use of scientific citations throughout distracts from this goal and would better have been included as chapter endnotes. That quibble aside, the book should appeal to a wide audience—beyond just those interested in heron biology. Described here is a complex and intriguing problem of the ever-present conflicts between populations of humans and wildlife.

The volume begins and ends with a discussion of conservation biology and the ecological landscape, and in between is a description of the natural history of the Great Blue Herons of coastal British Columbia, drawing together the findings of a study that now spans more than a decade. The efforts of Butler and a veritable army of colleagues, students, and volunteers show how the study of descriptive natural history can rise above aimless fact-collecting to lay a solid foundation for conservation biology. Herons in the Strait of Georgia are year-round residents, and the birds are followed throughout their annual cycle. The link between feeding and breeding is tight; colony size tracks the quantity of estuarine breeding habitat, and the timing of nesting, which varies across colonies in the region, reflects local foraging conditions.

The final chapter concerns the conservation of herons and the Strait of Georgia ecosystem, and here Butler paints a portrait of an uncertain future. Since the late 1970s, a growing awareness of the importance of estuarine marshes to multitudes of migratory fish and birds has resulted in greater protection

of this critical and threatened habitat. But Great Blue Herons face threats on many fronts, nearly all of which are related to the rapid growth of human populations in the region. That herons are permanent residents elevates the conservation challenge because their habitat requirements change seasonally. Fortunately, that is simplified because coastal British Columbia knows only two seasons: rain and less rain. During breeding, herons need quiet forests and bountiful wetlands for raising nestlings with insatiable appetites. During the rainy season, herons rely more upon uplands, where they feed upon small mammals. Woodlots, fields, and farmlands are lost to urban sprawl, industrial and urban pollutants contaminate aquatic ecosystems, and disturbance to breeding colonies is on the rise.

Curiously, the threat to these herons is heightened by the success of that well-known urban denizen, the Bald Eagle (*Haliaeetus leucocephalus*). Local populations of eagles have soared in recent years as their winter mortality has abated thanks to increased stocks of gulls and garbage as forage. Eagles can now be seen hunting pigeons amidst the office towers in downtown Vancouver, or raising families overtop softball fields in the suburbs. Ironically, this tale of success is bad news for herons, because eagle depredations on heronries are sometimes so severe as to cause total reproductive failure and colony abandonment. Eagles find heron nestlings tasty morsels, and when adult herons have the good sense to get out of harm's way, they leave eggs and small nestlings vulnerable to the "lesser" predators, crows (*Corvus* spp.) and Common Ravens (*Corvus corax*).

The inimical effects of disturbance from eagles and humans during breeding, particularly in the large colonies that hold the majority of the population, erode reproductive success. The results of a simple population model incorporating such effects forecast a grim future, but the numbers upon which the model is based are soft. Although reproductive success can be monitored fairly accurately, estimates of adult and juvenile mortality are guesswork, and better demographic information will be needed to lay a quantitative foundation for management. The absence of marked birds to assess intercolony movements (are small colonies population sinks?), and interannual variability in mortality, including possible density-dependent effects, are a major data gap. Unfortunately, gathering this information is no easy task, because herons seem to be an avian example of Heisenberg's uncertainty principle. Past attempts to band nestlings have often coincided with the abandonment of established breeding sites, leading one to believe that such disturbance is intolerable to these birds. Thus, the simple act of attempting to measure demography may change it and for the worse. Catching herons once they have left the nest is no small challenge, as those who have tried are sure to know.

Although the conservation of this unique coastal race of Great Blue Herons is itself a worthy goal, even more important is what the continued presence of these birds signifies: intact, functioning ecosystems. While these herons still haunt the forests and beaches of Georgia Strait and Puget Sound, it means that there are still beds of eelgrass in summer, home to countless small fish, crabs, shrimp, plankton, and algae. It means that there are still stands of mature alder and cottonwood, spruce, hemlock and cedar, and communities of forest birds and insects. It means that there are still farmlands and fields, and wintering waterfowl, raptors, and small mammals. Ultimately, it means that there is still room for wildlife in this increasingly crowded urban landscape.—SCOTT FORBES, *Department of Biology, University of Winnipeg, 515 Portage Avenue, Winnipeg, Manitoba R3B 2E9, Canada.*

The Auk 115(3):816–818, 1998

Peterson Field Guide to Warblers of North America.—Jon Dunn and Kimball Garrett. 1997. Houghton Mifflin, Boston. x + 656 pp., 32 color plates, 141 color photographs, 60 maps. ISBN 0-395-78321-6. Cloth, $28.00; Paper, $18.00.—The Peterson Field Guide series needs no introduction, nor do Jon Dunn or Kimball Garrett, two of the best-known field birders in North America. This book covers the 60 species of New World wood-warblers (Family Parulidae), and the Olive Warbler (*Peucedramus taeniatus*), that occur in Canada and the United States. It is the first guide to sport a new Peterson design, described on the dust jacket as giving it a "cleaner, brighter look," but which actually exudes a "coffee-table" feel.

This long-awaited addition to the Peterson series differs from the more familiar "text facing plates" field guide format in having a monograph style. An excellent introductory section discusses aspects of the natural history and identification of wood-warblers. This is followed by 32 color plates that have brief, facing identification texts, and then by the species accounts, which form the bulk of the book. Each species account is divided into a brief introduction, description, similar species, voice, behavior, habitat, distribution, status and conservation, subspecies, taxonomic relationships, plumages and molts, and references. Many of these sections are further subdivided by use of bold text (e.g. voice into song, call note, flight note; plumages by all age/sex combinations, plus bare parts).

The species accounts are a real tour-de-force, and I have nothing but praise for them. The sheer quality and quantity of information are outstanding, and

throughout the authors succeed in imparting a great deal of detailed knowledge in a readable, accessible style. This is especially true for distribution data, given that the authors are dealing with an entire continent. The distribution section contains at least one large map for each species depicting its range within North America. The winter, summer, and resident distributions, and details of both spring and fall migration, are also described in the text. Where relevant, the maps denote subspecific ranges, or a second map is given when the number of subspecies is too great (e.g. Common Yellowthroat [*Geothlypis trichas*], Yellow-rumped Warbler [*Dendroica coronata*]). The detail to state and province level in the maps is superb, and for restricted-range species, even county boundaries are marked. It is even tempting to suggest that this guide is worth buying only for the distribution information (although this is no criticism of the remainder of the book).

References in the species accounts are left to a short list at the end of the account, rather than by direct citation in the text. This may allow the text to flow, but it also may prove a little frustrating to those trying to track down a specific source. Citations in the introductory sections and species accounts are curiously (and somewhat annoyingly) listed separately under bibliography and references, respectively. Trying to track down "Sibley and Monroe" mentioned on p. 2 is not helped by an incorrect date (1992, rather than 1990). A brief check through the bibliography revealed a number of similar referencing errors, but this quibble aside, the literature review is laudably comprehensive.

Now that color production is no longer as financially constrained as it once was, color plates and color photographs in the same guide have become increasingly frequent. Given that each medium has certain advantages, this is a very welcome trend. The color photographs in this guide are scattered liberally throughout the species accounts, and all are excellent images taken by many well-known North American bird photographers. Unfortunately, the reproduction of at least some photographs was rather dark—I hope that this can be corrected in subsequent impressions. It is moot whether the photographs would have been more valuable lumped together in one section, with the advantage of putting photographs of similar species side-by-side. Although this clearly would have been the preferred option from an identification viewpoint, the photographs nevertheless work well to enhance the text.

All this wonderful information (on high-quality, glossy paper) results in a book of brick-like proportions! The review copy was in paperback, but the binding showed signs of weakness after a few days of use. The book is so thick, and the binding necessarily so tight, that when I handled a cloth version I found it awkward to use. Although I appreciate the desire to keep the Peterson series consistent in size and shape, if those restrictions result in a book so thick as to be impracticable for field use, then surely the purpose has been defeated. Given this guide's bulk and weight (similar to a pair of roof-prism binoculars!), how many birders will really take it into the field? Assuming the answer is "not many," then there would have been clear advantages to breaking the mold and using a slightly larger format. In addition to thinning the book down a bit (which might make the binding more durable), larger plates would have allowed three-species identification problems to have been usefully illustrated on one plate rather than spread across two (e.g. Blackpoll [*Dendroica striata*], Bay-breasted [*D. castanea*], and Pine [*D. pinus*] warblers; MacGillivray's [*Oporornis tolmiei*], Mourning [*O. philadelphia*], and Connecticut [*O. agilis*] warblers). No matter how good the text is, for many users the primary value of a field guide is derived from its plates. The styles of the two artists, Thomas Schultz and Cindy House, are strikingly different. Schultz's images are consistently bold and bright and fill each page effectively; I particularly enjoyed his *Oporornis* warblers. The plates by House are fine, but more variable in quality. Arguably, House had some tougher genera to work with than Schultz (e.g. *Vermivora* and *Seiurus* versus *Dendroica*). Nevertheless, the images are often small, leaving extensive blank space on some plates, and rather "grainy," which at times compromises the detail expected in a topnotch field guide. Some of these problems may have been a consequence of the printing process (apparently, the second imprint has greatly improved reproduction of some plates), but that merely invites the question, why was the reproduction poor in the first place? Besides, printing problems are surely not responsible for the ill-conceived use of space of Plate 6. The work by both House and Schultz is less "three-dimensional" than that of some field guide artists, and it does not always capture the unique shape and structure of each species. In particular, both artists have a tendency to paint all images rather slimmer than they often appear in life (compare the two photographs of Prairie Warbler [*Dendroica discolor*] on pages 364–365 with Schultz's Plate 19). More so than for text, critique of artwork is a peculiarly personal thing; for me, the plates in this book would probably make the playoffs but would not be championship contenders.

This guide inevitably invites comparison with Curson, Quinn, and Beadle (reviewed in *Auk* 112: 813–814, 1995), also published by Houghton Mifflin in North America. Curson et al.'s text gives a generally accurate, basic overview, but it is no match for the depth of knowledge that Dunn and Garrett impart, and the information for some topics (especially distribution and voice) simply does not bear comparison. The older guide has a larger format, and hence few, if any, pretenses to be a field guide. Consequently, the artwork has more space, with bigger,

livelier images, and up to four species per plate. The Peterson guide has more illustrations per species—sometimes two to three times more, than does Curson et al. (12 plumages of Orange-crowned Warbler [*Vermivora celata*] illustrated in Dunn and Garrett compared with four in Curson et al.). However, the obvious advantage of having more plumages illustrated is marginally outweighed by the superior technical quality of the artwork of Quinn and Beadle. Compare, for example, the parulas by Quinn (Plate 4 in Curson et al. 1994) with those by House (Plate 7 in Dunn and Garrett). Put simply, the text in the Peterson guide is clearly superior to that in Curson et al., whereas the artwork averages better in the latter.

I enjoy seeing rarities, and as a premium-quality bird book at a refreshingly low price, this newest Peterson guide is indeed a rarity. All warbler enthusiasts will want a copy of this book, even if they already own Curson et al.—JON R. KING, *Point Reyes Bird Observatory, 4990 Shoreline Highway, Stinson Beach, California 94970, USA.*

The Auk 115(3):818, 1998

A Guide to the Nests, Eggs, and Nestlings of North American Birds.—Paul J. Baicich and Colin J. O. Harrison. 1997. Academic Press, San Diego, California. 347 pp., 64 color plates, 103 text figures. ISBN 0-12072831-1. Paper, $24.95.—In 1978, during a visit to England, I purchased a copy of the first edition of this book, then called a field guide. It was written by Colin Harrison, published by Collins, and produced in standard field guide size. It never was effectively distributed in North America, which was unfortunate, because it was far better than the guide to bird nests by Hal Harrison in the well-known Peterson field guide series. Not only did it illustrate the eggs of about 550 species, in color and life size, but it also offered nestling paintings of nearly 150 species, plus numerous line drawings of nests and young. Just as importantly, it offered concise information on breeding seasons, incubation periods, nestling appearances, and nestling periods; altogether it provided a sort of condensed and updated version of Bent's life histories. I have used this book a great deal and found it invaluable as an introductory reference, as opposed to searching for primary data sources.

Now we are offered a new version of this guide, in a larger format (6 × 9 inches), with the same number of color plates (but eggs of 597 species illustrated) and an additional 43 splendid line sketches by Terry O'Nele. The taxonomy has been brought nearly up to date (exclusive of 1997 AOU changes), and much new information on nesting biology is provided. It is therefore even more useful than the original version. Although no in-text citations are provided, a list of 100 book or monograph references judged by the authors to be the most important sources of nesting information is provided.

In addition to the information summarized on the nesting biology of North American birds, the book provides an easy way of judging what remains to be learned. Besides about a dozen species for which little information is yet available on the nestling phase of breeding, some two dozen species are still essentially unstudied as to nesting biology. These include the Black Storm-Petrel (*Oceanodroma melania*), Hook-billed Kite (*Chondrohierax uncinatus*), Eskimo Curlew (*Numenius borealis*), Buff-collared Nightjar (*Caprimulgus ridgwayi*), Berylline Hummingbird (*Amazilia beryllina*), Violet-crowned Hummingbird (*A. violiceps*), Eared Trogon (*Euptilotis neoxenus*), Northern Beardless Tyrannulet (*Camptostoma imberbe*), Greater Pewee (*Contopus pertinax*), Couch's Kingbird (*Tyrannus couchii*), Thick-billed Kingbird (*T. crassirostris*), Black-capped Gnatcatcher (*Polioptila nigriceps*), Black-whiskered Vireo (*Vireo altiloquns*), Bachman's Warbler (*Vermivora bachmani*), Lucy's Warbler (*V. luciae*), Tropical Parula (*Parula pitiayami*), Black-throated Gray Warbler (*Dendroica nigrescens*), Grace's Warbler (*D. graciae*), Hepatic Tanager (*Piranga flava*), Olive Sparrow (*Arremonops rufivirgatus*), and McKay's Bunting (*Plectrophenax hyperboreus*). Clearly, the American Southwest remains a fertile area for graduate students who may casting about for field projects.

All told, this book will be of great usefulness to field ornithologists, and, if larger than most field guides, it nonetheless is well worth hauling along in a knapsack or glove compartment. It also belongs in personal and institutional libraries, especially those lacking the earlier edition.—PAUL A. JOHNSGARD, *School of Biological Sciences, University of Nebraska, Lincoln, Nebraska 68588, USA.*

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Ecología de los vertebrados de Chile.—Fabián Jaksić. 1997. Textos Universitarios, Ediciones Universidad Católica de Chile, Santiago, Chile. xix + 262 pp., 17 figures. ISBN 956-14-0440-0. Paper, $20.00.—This work seems to be the first entirely Latin American book on ecology and is written in Spanish. By entirely, I mean that all of the material covered and discussed in the text originated in the Neotropical realm. I could also describe the work as entirely Chilean, because almost all of the examples in the book were researched in Chilean territory. Is this narrow

approach justified? Probably, because Chile is the most active Latin American country in ecological research, and its flora and fauna are quite peculiar. Nevertheless, many vertebrates are shared with other countries, particularly Argentina, and some research on them has been conducted outside of Chile, a fact that is rarely mentioned in the book.

The first chapter of the book discusses concepts and methods in ecology. The remaining 10 chapters review examples of ecological studies on the different vertebrate groups. Birds are covered in three chapters: a brief introduction, non-raptorial birds, and raptorial birds (i.e. Falconiformes and Strigiformes). The preference given to raptors obviously reflects the author's important research on predators. The text is clearly written, but the reviews of ecological studies are sketchy and cannot replace the original sources. Within the geographical restriction mentioned above, the coverage of the literature on Chilean birds is impressive. Tables and figures are quite helpful, but a map of Chile would have been useful for non-Chilean readers. The author states that the book is addressed mostly to Chilean readers: undergraduate students and their professors, postdoctoral students, and researchers interested in vertebrate ecology. Most ecology textbooks available to Chileans originate in the Northern Hemisphere, and their coverage of Neotropical material is inadequate. A work correcting this bias is obviously needed. Although filling that niche, this excellent book will complement rather than replace the standard ecology textbooks.—ROSENDO M. FRAGA, *AOP, 25 de Mayo 749 2° 6, (1002) Buenos Aires, Argentina.*

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Bird Sounds of Bolivia.—Sjoerd Mayer. 1996. CD-ROM for Windows 3.1/95/NT, Bird Songs International B.V., Wierengastraat 42, NL-9969 PD Westernieland, The Netherlands. $99.00.—Bird song has always been a difficult subject to reference, especially for Neotropical birds found far from established sound-recording infrastructures. As a consequence, the new CD-ROM *Bird Sounds of Bolivia* by Sjoerd Mayer represents a dramatic advancement in bird sound information for the Neotropics.

I have been using this CD-ROM for the last year to review, study, and double-check my Bolivian bird song recordings. The CD-ROM format offers several advantages over cassette tapes and compact disks. One is quantity of information. *Bird Sounds of Bolivia* contains more than seven hours of bird sounds and hundreds of pages of stored text. The search function is another. I depend upon it greatly. To check a slight rattle, I enter woodpecker, click a few species' songs to get the rattle idea, then I can type woodcreeper to click through their rattle sounds. If I am still unsure, I can quickly type and click the common antbird species. Within 10 seconds, I can listen to any species that is available. The CD-ROM has little field practicality, but then again, my Ridgely and Tudor *Birds of South America* books do not get into the field much either. The CD-ROM cannot be used in the field as a playback tool, something that the compact disk format excels at.

I installed the CD-ROM using Windows 95 with little more effort than it takes to label a blank cassette; the software is not compatible with Macintosh computers. During the installation process you may choose whether the presentation is in English or Spanish—the material is completely bilingual. Once installed, the screens are designed with buttons to reveal and hide text. Clicking on a family unfolds a list of the species recorded in that family. Another click and you have a list of the sounds of that species, labeled as to their characteristics (e.g. call, song, alarm, etc.). Another click and you are listening to this sound. Another click and you can read the thorough recording information. Click again and one can see on a map of Bolivia where the recording was made; the map also has a scroll-down function for more in-depth habitat and location information, including geographic coordinates. And all of this is accessible within seconds.

Mayer's *Bird Sounds of Bolivia* is a masterpiece of diligent, exacting work covering 538 of Bolivia's presently known 1,365 species (the complete species list can be found on the web at http://ourworld.compuserve.com/homepages/bird_songs_international). All recordings were made in Bolivia, with the majority made by Mayer himself. Each track is labeled precisely, containing all of the information one needs to make quality scientific comparisons (e.g. location, elevation, time, date, and sound duration). Most of the recordings are for a very decent period of time (20 to 40 seconds), have good volume, and a refreshing lack of shoe noise and chickens. Unlike many other Neotropical bird-sound products, Mayer almost always manages to give the listener at least two types of sound variations. Species accounts are thoughtfully made; species that have more regional or individual variation are displayed with more examples of sites and sound recordings. The song data base is well distributed, with an example of almost all of the genera found in Bolivia. All of the bird sounds are accompanied by an identification reliability percentage. Mayer is not afraid to admit when he does not know a sound or is not sure of its identification, and this attitude has created a very accurate product.

Although Mayer tried to cover many areas in Bolivia, he was biased toward a few selected sites. Consequently, some habitats, like Andean dry valleys,

are very well covered, whereas other habitats, like Bolivian Amazonian forests, are covered rudimentarily. Some recordings are too distant and really should be improved, but they are in the minority. I could also comment that many sound variations and vocalizations are missed, but the reality is that the same holds true for all of the recordings for South America. The quality and depth of the recordings must be viewed in view of the fact that this is a CD-ROM of Bolivian birds, a country rich in avifauna but poor in researchers.

One feature that I believe deserves special acknowledgment is the thorough identification of the background sounds on all of Mayer's tracks. This is a feature that 98% of available recordings completely overlook. It demands a complete knowledge of bird sounds and is difficult, time-consuming work. The advantages this has for the researcher are unquantifiable. I cannot explain the frustration of hearing that sought-after species in the background of another recording, only to realize it is not listed and the mystery will remain. Every cut of *Bird Sounds of Bolivia* is accompanied by a list of the background species with an alphabetical rating of their volume. I cannot praise this enough, and I can only wish that future bird-sound products will start to realize the benefits of this extra effort.

I would also like to congratulate Mayer on creating a bilingual product. I hope this will be an example for future Neotropical CD-ROMs and other products. It is ignorant and egotistical that products about Latin America wildlife are made only for people outside these countries. The extra effort Mayer placed in writing both the English and the Spanish text should be standard practice for all works of this type.

My biggest criticism is that I want more. I want everything that is on *Bird Sounds of Bolivia* and then more calls and songs showing more and more variation. But this is a typical complaint in South America, where many species with quite a large vocal repertoire are demonstrated by just a single type of sound.

As a research tool, *Bird Sounds of Bolivia* will be a very important asset for anyone studying Neotropical bird sounds. The CD-ROM, like Bolivia the country, includes bird sounds of the Andes, Amazonia, Pampas, and Chaco, making it valuable throughout Central and South America. Its ease of use is incredibly advantageous for studying bird songs, especially if your research work is done on a computer. And for bird watchers, I believe *Bird Sounds of Bolivia* is a very entertaining way to learn your bird song; I have often found myself just playing with the software for hours.

I hope that *Bird Sounds of Bolivia* represents a technological and ideological revolution that will set a precedent for all future bird-sound (especially Neotropical) products. If one were to own only a single reference work of bird sounds for the Neotropics, I would recommend *Bird Sounds of Bolivia* above anything else available.—A. BENNETT HENNESSEY, *Asociación Armonía/BirdLife International, Casilla 3081, Santa Cruz, Bolivia.*