

BOOK REVIEWS

Avian Energetics and Nutritional Ecology—Edited by Cynthia Carey. 1996. Chapman and Hall, New York. xi + 543 pp., numerous tables and black and white figures. ISBN 0-412-03701-7. \$90.00 (cloth).

The book *Avian Energetics* (Paynter 1974, Nuttall Ornithological Club) represented the first attempt to synthesize existing knowledge on avian energy use. Twenty-odd years after *Avian Energetics* was published, the field of avian physiological ecology has matured and flourished, and a new book attempts once again to summarize current information. Cynthia Carey's recently edited volume (*Avian Energetics and Nutritional Ecology*, henceforth referred to as AENE) consciously strives to be the heir of *Avian Energetics*. Because *Avian Energetics* had a deep influence on me (and I suspect on a whole generation of avian physiological ecologists), I approached this new book with high expectations. I was not disappointed. AENE will become a valued reference for professional ornithologists and an essential component of the library of all avian physiological ecologists.

In *Avian Energetics*, both Bartholomew and Ken-deigh recognized that energy and nutrient use are inseparable and encouraged more work on avian nutrition and digestion. Their pleas seem to have produced results: 3 of the 14 chapters in AENE deal directly with nutritional ecology and several other chapters discuss the interplay between energy and nutrient use. Mary Murphy provides a comprehensive overview of nutrient requirements and metabolism (chapter 2) and of energetics and nutrition during molt (chapter 6), and William H. Karasov (chapter 3) focuses on plasticity in structure and function of the gastrointestinal tract and how it influences supply of energy and nutrients for maintenance and production. A detailed list of prospects for future research in avian digestive ecology distinguishes Karasov's paper from most other chapters. I am certain that graduate students in search of research projects in avian physiological ecology will find that AENE is a fertile source of ideas. Their job, however, would have been facilitated if authors had made a more concerted effort to identify significant knowledge gaps and new research questions and methods that promise to be productive.

Two chapters in AENE review thermoregulation. Randi Reinertsen (chapter 5) examines hypothermia and torpor, and William H. Dawson and Timothy O'Connor (chapter 4) survey mechanisms of regulatory thermogenesis in birds and explore energetic costs of thermoregulation. The latter describe methodological advances that have allowed studying energy budgets of free-living birds, including the use of doubly-labeled water to determine field metabolic rates and the ability to measure and model effects of microclimatic variables. Dawson and O'Connor conclude, not surprisingly, that for birds in temperate habitats and at high latitudes, thermoregulatory costs are higher in winter. The "big" physiological, ecological, and evolutionary questions that justify the effort and expense that go into determining in painstaking detail

the effect of temperature on avian energetics are inexplicably absent from this chapter.

Herbert Biebach (chapter 9) discusses the role that fat accumulation plays in both overwintering and migrating birds. Biebach outlines observed patterns of fat accumulation and summarizes how these patterns conform or deviate from model predictions. Biebach's chapter illustrates the usefulness of the interplay between theory, laboratory experiments, and field observations in physiological ecology. His discussion of the limited success of aeronautical models in predicting flight ranges in migrating birds emphasizes the need for a continued dialogue between modelers and physiological ecologists who apply their constructs.

Energetics of flight are reviewed by Ulla Norberg (chapter 7). Although her chapter contains little information that has not been summarized elsewhere, it provides a nice outline of the computations needed to estimate power requirements of flight in birds and a brief comparison of theory with new empirical results. However, I found this comparison a bit unsatisfying. Recent testing of aeronautical models in birds seems to have involved either making and testing simple qualitative predictions correlating ecology and morphology, or comparing predicted rates of energy use with measurements of flight metabolism which are not direct measurements of mechanical work. After reading Norberg's chapter, I was left wondering about the directions that studies of avian flight biomechanics will take in the next 20 years. Will we be satisfied with the broad correlations between ecology and morphology that have characterized recent studies, or will new techniques and methods, such as particle image velocimetry and computational fluid dynamics, allow more exacting measurements and analysis, and hence improvement, of our models?

Two chapters in AENE analyze and advocate use of optimization perspectives in the study of avian energetics and nutritional ecology. Robert E. Ricklefs (chapter 1) examines the relationship between energy use and avian evolutionary ecology, and Brian Maurer (chapter 8) discusses foraging behavior. Ricklefs' chapter is an affirmation of the central role of energetics for avian biology and a compelling call for integrating energetics studies into the broad framework of bird life-histories and evolutionary optimization. Because it helps to provide an ecological and evolutionary context for future studies on avian energetics and nutrition, Ricklefs' chapter is timely and likely to be very influential. I believe that the three considerations that conclude Ricklefs' chapter should be mandatory reading for budding avian physiological ecologists.

Maurer's chapter outlines a few of the optimal foraging models that have been used on birds, describes their performance, and examines their assumptions. He does the commendable job of presenting a quantitative genetics framework that allows examination of one of the crucial premises of foraging theory: the heritability of traits determining foraging behavior. With few ex-

ceptions, foraging studies ignore metabolic and nutritional physiology and Maurer's chapter is no exception. This is unfortunate because a handful of studies have demonstrated the usefulness of even a minimal infusion of mechanistic physiology into both theoretical and empirical foraging studies. The integration of physiological mechanistic detail into a coherent theory of avian foraging will require a more open conversation between individuals engaged in energetic and nutritional research with their ecologist and behaviorist colleagues.

The energetics of reproduction and growth occupy four chapters of AENE. Cynthia Carey (chapter 10) discusses energetics and nutrition of egg production, Joseph B. Williams (chapter 11) deals with energetic costs of incubation, Carol and David Vleck (chapter 12) describe the energetics of embryonic development, and Wesley W. Weathers (chapter 13) provides a broad perspective on energetics of postnatal growth. These four chapters provide evidence of the enormous progress achieved in avian energetics in the last twenty years. Carey synthesizes the abundant data currently available on both inter- and intraspecific variation in egg size, composition, and energy density, and outlines several preliminary patterns. The validity of even some of the most widely accepted of those patterns, such as the difference in relative amount of yolk in eggs of precocial and altricial species, remains to be established. The reason is that all those allometric patterns have been established without taking phylogeny into account, which can lead to faulty conclusions.

The absence of use of contemporary evolutionary biology methods in the synthesis of comparative physiological data and in evaluation of ecological and evolutionary hypotheses is a feature of AENE that I found extremely surprising. Although all chapters describe comparative data, and most chapters suggest ecological and evolutionary patterns and hypotheses, only David and Carol Vleck's chapter shows a phylogeny and uses phylogenetic information. Throughout the book, chapter authors voice the need of including phylogenetic information in comparative analyses but fail to do so. Hence, their vows to the comparative method ring hollow.

Although most chapters of AENE attempt to link energetics and nutrition with ecological processes, the last chapter by John A. Wiens and Adrian H. Farmer is explicitly concerned with the role of energy in the ecology of birds. Although Wiens and Farmer's chapter is entitled "Population and community energetics," the community ecology component is conspicuously absent. The chapter presents two almost disconnected sections: the first section provides a short introduction to population energetics modeling in birds and a digest of its rise and decline during the last two decades. They argue that, in spite of potentially important applications of the method, population energetics waned for lack of new questions. The second section focuses at a different organizational level and delineates an unpublished dynamic optimization model for shorebird migration in North America. The model weaves physiological and geographical data to attempt to answer how changes in large scale ecological factors such as the spatial distribution and quality of wetlands might

affect migration, reproduction, and survival of migrating shorebirds. The approach is attractive because it launches classical foraging optimization theory into the applied realm and at a spatial and temporal scale at which it has been rarely used.

Bird physiologists often complain about a lack of understanding of basic physiology on the part of ecologists and behaviorists. In turn, ecologists and behaviorists gripe about the lack of a broad ecological and evolutionary context in the work of physiologists. Ecologically-minded ornithologists will find in AENE a compendium of mechanisms that should serve as anchors to the ecological processes and patterns that occupy them. Physiologists will find in AENE an abundance of ecological and evolutionary questions that should give their mechanistic pursuits a more expansive meaning. Bartholomew proclaimed that *Avian Energetics* would "represent the base-line from which all studies involving the energetics must start." AENE presents a new set of standards and a fresh collection of challenges. Meeting these standards and challenges will make the next 20 years of avian energetics and nutritional ecology a very exciting time indeed.—CARLOS MARTINEZ DEL RIO, Department of Zoology and Physiology, University of Wyoming, Laramie, WY 82071-3166, e-mail: cdelrio@uwyo.edu

Newman's Birds of Southern Africa.—Kenneth Newman. Illustrated by the author. 1996. University Press of Florida. Gainesville, FL. xv + 512 pp., numerous color plates and text figures, 825 range maps. ISBN 0-8130-1427-1. \$39.95 (paper).

Birds of Southern Africa.—Ian Sinclair, Phil Hockey and Warwick Tarboton. Illustrated by Peter Hayman and Norman Arlott. 1993. Princeton University Press, Princeton, NJ. 426 pp., numerous plates, text figures and range maps. ISBN 0-691-04469-4. \$45.00 (cloth).

With the fall of apartheid, South Africa and its associated states, freed from guerrilla war and urban unrest, have opened up to the world. The range of habitats and species in southern Africa is remarkable. In a lengthy, but not overly strenuous, afternoon around Cape Town, one can reasonably expect to see African Penguins (*Spheniscus demersus*), Helmeted Guinea-fowl (*Numida meleagris*), White Storks (*Ciconia ciconia*), Blue Cranes (*Anthropoides paradisea*), and a host of "dicky birds." Farther inland, the great barrens of the Karoo, the deserts of Namibia, the bushveld and thornveld of the Interior, the Okavango Swamp, and the Kalahari present habitats and birds as intriguing as their names.

In contrast to their treatment of people, the past governments of South Africa were better stewards of their wildlife than were other African nations, so there are more birds and intact habitat. South African wildlife management continues to lead the world in several fields. Finally, owing in part to the influence of the British birding and naturalist traditions, Southern Africa has a long history of excellent amateur and professional ornithologists, so that the avifauna is very well studied. Both books reviewed here are worthy products of that tradition.

These are two excellent field guides and the differ-

ences in style are relatively subtle. Both books feature brief species accounts and range maps facing color plates; both feature excellent illustrations, and the texts are generally pithy. Both have useful introductions and descriptions of Southern Africa's habitats.

Beyond this the differences begin. Sinclair et al. begin with family introductions that will be useful for those facing rollers, drongoes, batises, and penduline tits for the first time. Newman's pages are color coded which helps narrow the choices down to the level of "larks to robins" and "warblers to starlings." Newman concludes with a nifty checklist. Newman's maps are in color; Sinclair et al.'s are in black-and-white.

The Sinclair et al. book plates take a more artistic approach. Many species have elegant halos of vegetation or substrate. Birds in flight or in different plumages are often greatly reduced in size and some plates are just too "busy." In contrast, Newman takes a non-sense approach, more like an early Peterson, with all birds on a plate oriented in the same direction and the same size. Space is better used so one can find the birds. He also has several black-and-white plates ("nightjar wings and tails" and "common weaver nests") that add depth.

Each book has an italicized section that gives key field marks and important interspecific differences. Sinclair and his coauthors are some of Africa's best birders ("twitchers" in British English) and this shows up in the species' accounts with more detail. Sinclair et al. also give descriptions of vocalizations; Newman does not.

Both books have annoying features. Newman's multiple indices make it difficult to use in a hurry. The English index and checklist are combined, so the birds beginning with "p" cover four pages. Sinclair et al.'s book has no hierarchical organization. This is fine if one knows what to look for, otherwise be prepared to wade through plate by plate. The binding on the Newman (a paperback) snapped the first time I opened it, which does not bode well for its use in the field. On the other hand, Sinclair et al.'s hardbound didn't fare much better, cracking in two places. This may have been the result of the dry Alaskan winter, but I suspect both books would require coddling or duct tape for field use.

For a newcomer to African birds, I would recommend the Newman as being more user friendly; for someone with a working knowledge of the African bird families, the Sinclair et al. book offers more detail and nuance. In either case, one won't go far wrong.—DAVID CAMERON DUFFY, Alaska Natural Heritage Program and Department of Biology, University of Alaska, 707 A Street, Anchorage, AK 99501, e-mail: afdcd1@uaa.alaska.edu

Pittas, Broadbills and Asities.—Frank Lambert and Martin Woodcock. 1996. Pica Press, Sussex, England. 271 pp., 24 color plates, 21 text figures, 51 maps. ISBN 1-873403-24-0. \$40.00 (cloth).

This volume is the first general treatise ever produced on two of the groups covered (Broadbills, Eurylaimidae and Asities, Philepittinae, as the latter is here treated), and the first this century on the Pittidae. Despite the fact that many species involved are noto-

riously elusive and some are restricted to areas difficult of access, this book brings together an immense amount of information on diverse aspects of their biology. Much of the data are previously unpublished and were contributed by numerous field and museum experts. In addition, the first author's extensive field experience with many aspects of the biology of most species covered makes this book far better than some earlier works in this series. The straightforward and explicit presentation of distributional data is especially commendable, in that records based purely on sight observations or vocalizations are stated as such and are treated cautiously, and the reliability of certain specimen records is examined.

The range maps for this book were prepared in various ways, which are indicated in the caption of each map. In some cases, maps show apparently suitable habitat at the approximate elevations from which the species is known, but without indicating specifically known sites. In other cases, remaining suitable habitat and known localities are both shown but are differentiated, and in still others (e.g., Gurney's *Pitta pitta gurneyi*), historically known range and present distribution are both shown. Whereas these approaches are superior to those used for production of many range maps, in which distant localities are connected on speculation, it would have been useful to have a better indication of the historic range of each species.

The book is well-produced, although the review copy contained some irregularities in printing quality, especially affecting tone shading on a few maps. Only a few insignificant typographical errors were detected by this reviewer. The paper stock seems unnecessarily heavy, and had a lighter weight been used, perhaps the type could have been slightly larger and more easily read.

The Introduction (p. 13, para. 4, line 4) should state that there are four genera of broadbills and asities in Africa (including Madagascar), not two. Under "Measurements" (p. 10, para. 7), it is implied that tail measurements were not taken from birds in primary molt. For maximum bill depth, the description of the measurement states "usually at the culmen base" (p. 11, para. 1, line 9), but with no indication of the landmarks from which the measurement would have alternatively been taken. Weights "of the live bird" (p. 11, para. 1, line 11) are said to derive from specimen labels, but not mentioned is the obvious fact that in nearly all cases, the bird would have been dead when weighed, sometimes full of shot, or dehydrated due to delays. The description of a large centipede as "fierce" (p. 20, para. 3, line 9) is certainly evocative, but the word does not appear in the dictionaries consulted by this reviewer.

Some text drawings are well-rendered and quite attractive (*Pitta caerulea* at nest on p. 99, *P. steerei* on p. 130, *P. moluccensis* on p. 169). However, the color plates do not do justice to the spectacular species, particularly in terms of plumage brilliance and texture. Many pittas are shown in awkward stances, with poorly drawn and painted legs and feet. Figure 32b (Plate 15) appears to have no bill commissure; on Plate 7, Figure 12g has no primary coverts. In numerous cases, it is difficult to reconcile certain features mentioned in

the descriptions in the facing page notes with the paintings. None of the figures on Plate 4 (*P. cyanea*) really match the facing page descriptions. The flight figure for *P. moluccensis* (Plate 13, Fig. 27c) shows a decidedly lilac instead of blue rump. Figure 41e shows an improbable tail pattern. Despite these criticisms, the plates will certainly prove very useful as the first depiction of many plumages and the only readily accessible illustrations of several species. The plates provide fairly complete coverage of strongly marked taxa, females for sexually dichromatic species, plumage variants, and immature plumages.

Descriptions of vocalizations are thorough, treating possibly confusing species and providing appropriate cautions, and in a few cases sonagrams are included. The relatively small number of species treated (51) allows for as full a treatment of each species' biology as present knowledge permits. Much more so than for some previous volumes in this series, this book will be equally valuable to scientists, students, environmental policymakers, birders, and many others. It will be an essential part of every ornithological library, whether institutional or personal. Not only does it provide interesting and educational reading on some of the world's most fascinating and poorly known birds, but this book should help promote their conservation and contribute toward directed research on the many as yet unknown facets of their biology.—PAMELA C. RASMUSSEN, Rm. 336 NHB MRC 114, Division of Birds, Smithsonian Institution, Washington, DC 20560, e-mail: rasmussen.pamela@nmnh.si.edu

Orioles, Blackbirds, and Their Kin: A Natural History.—Alexander F. Skutch. 1996. University of Arizona Press. Tucson, AZ. xiii + 291 pp., 32 illustrations. ISBN # 0-8165-1584-0. \$21.95 (paper), \$50.00 (cloth).

The American blackbirds have been more intensively studied than any other passerine family of the Western Hemisphere, mostly because of two species, the Brown-headed Cowbird (*Molothrus ater*) and the Red-winged Blackbird (*Agelaius phoeniceus*). Yet, this is an extremely diverse family (ca. 90 species) with enormous variation in ecology, mating systems, social behavior, and life history traits. The majority of species are very poorly known and some are even highly endangered. These traits make the Icteridae a fertile group for continued study.

Skutch's book should be an excellent resource for graduate students to read when pondering studying American blackbirds. This book is filled with fascinating details of natural history, some culled from the literature, others from Skutch's own vast field experience. A few species accounts are reprinted from previous publications, but most of the material is new. The emphasis throughout is on the fine details of behavior, including vocal behavior, courtship, nest building, incubation schedules, foraging tactics, parental care, and interactions with predators. There are no tables or figures and few numbers of any kind. In addition, there are few references in the text, except when a particular study is explained in detail. Therefore, this book is very different from the standard literature review of a bird family.

The book is at its best when Skutch uses his considerable writing skills to describe his own observations. Skutch is justly legendary for his powers of observation and for the breadth of his field experience. His accounts are vivid and rich in detail, which makes the book informative and a pleasure to read. Many of his observations provide new insights into the natural history of blackbirds, even well-known species. I was struck by his observation that female oropendolas actually help other females' fledglings leave the colony and even help chase away predators. This is very different from my observations of Yellow-rumped Caciques (*Cacicus cela*), which seem determined to make life miserable for fledglings of their own species. Skutch also vividly describes Great-tailed Grackles (*Quiscalus mexicanus*) plundering the nest of an euphonia. Skutch's studies of thornbirds provide material for his excellent descriptions of two blackbirds, the Troupial (*Icterus icterus*) and Bay-winged Cowbird (*M. badius*) that pirate thornbird nests. He also speculates that Giant Cowbird (*Scaphidura oryzivorus*) nestling bill color may mimic that of their oropendola hosts. An account of a group of Giant Cowbirds raiding an oropendola colony strongly implies that males may attempt to distract their hosts while sneaky females enter the temporarily undefended nests. Skutch also describes an unambiguous case of a Montezuma Oropendola (*Psarocolius montezuma*) rejecting a cowbird egg. Such natural history anecdotes suggest fertile areas for future study.

Skutch also has a knack for extracting interesting details from other studies. He is very well versed in the writings of early naturalists and frequently cites them. Skutch borrows heavily from Hudson's accounts of Bay-winged and Screaming Cowbirds (*M. aeneus*) and Lesser Red-breasted Meadowlarks (*Sturnella militaris*). Skutch repeats Hudson's observations of the latter species apparently migrating by foot in large flocks across the pampas.

Skutch offers his own theory of the evolution of brood parasitism, which is based on the penchant of cowbirds for nesting in more elaborate structures than they can make. Although his arguments are weakened somewhat by the discovery that Bay-winged and Screaming Cowbirds are not closely related, this hypothesis is stimulating. The nest piracy of Troupials also appears designed to give them access to well-protected nests of thornbirds and caciques. Nest piracy may be an intermediate step in the evolution of brood parasitism.

In a few places, Skutch's accounts are somewhat weakened by failing to cite pertinent studies. He fully describes many aspects of the behavior of caciques and oropendolas, including those from other writers. But, he does not cite studies showing clear dominance hierarchies and intense, if infrequent, fighting among males, presumably because they do not support his statement that "males scarcely ever fight and do not establish evident social hierarchies" (p. 225). He rejects the possibility that Screaming Cowbirds mimic nestling and fledgling plumage of Bay-winged Cowbirds, attributing it instead to shared ancestry. Given the likelihood that Bay-winged Cowbirds are not closely related to Screaming Cowbirds, this specula-

tion seems unlikely. In some cases, the author may have been unaware of additional references.

The "missing" references, however, do not detract greatly from the value of the book. Many recent references are cited, often in great detail. His accounts of several of my papers were notably complete and accurate. I was especially delighted to discover that Skutch had picked up on many subtler details buried in those papers and placed them in the larger context of Icterid natural history. This is Skutch's special talent—extracting observations and making seemingly obscure features of natural history interesting and relevant. Skutch may not cite all relevant papers, but he provides a great deal of information about those that he does cite.

The book is organized by genera rather than by more general themes. The last chapter provides some syntheses of common and divergent themes within the family. Each chapter provides a general review of the natural history of each genus and more detailed information about well-known species, often including his own observations. Skutch even provides his own observations of familiar, well-studied North American birds. Each chapter also contains fascinating details such as the nest of a Rufous Hornero (*Furnarius rufus*) that contained 37 cowbird eggs and was visited by 13 different female Shiny Cowbirds (*M. bonariensis*). He even found an account of Brown-headed Cowbirds perching on horse-mounted humans. Skutch's writing freely uses adverbs and words such as "stilted," "self-important," and "riotous" to describe behavior. After a very extensive discussion of interspecific preening displays by cowbirds, he marvels at how this behavior demonstrates how "opaque to humans the minds of nonhuman animals are" (p. 160). His description of the Jamaican Blackbird, a species that forages in bromeliad epiphytes in tropical forests, is full of speculation about how this species' behavior reflects its marsh-nesting ancestry. He further speculates that this species' conspicuous behavior near the nest may result from the historical lack of predators on the island, and may help explain its current endangered status.

I found this to be an entertaining and highly readable account of an amazingly diverse bird family. All of Skutch's books (he has written more than 20 in his 90+ years) are beautifully written and accessible to a broad audience. This book would be of use to students, ornithologists, and birdwatchers with an interest in natural history. Every library should have a copy of this volume and of the rest of Skutch's books.—SCOTT K. ROBINSON, Illinois Natural History Survey Center For Wildlife Ecology 607 E. Peabody Drive, Champaign, IL 61820, e-mail: scottr@mail.inhs.uiuc.edu

Cranes: Their Biology, Husbandry, and Conservation.—Edited by David H. Ellis, George F. Gee, and Clair M. Mirande. 1997. National Biological Survey, Washington D.C. and International Crane Foundation, Baraboo, WI. 308 pp. ISBN 0-88839-385-7. \$49.95 (cloth) (available from Hancock Wildlife Research Center, 1431 Harrism Avenue, Blaine, WA 98230).

This volume presents a concise and well organized summary of information essential to those involved in the propagation of cranes. The strength and weakness of the volume lies in its "outline-like" syntheses of

formidable topics. For readers interested in concise answers to applied questions concerning care of cranes in captivity, the book represents an excellent, well organized reference. For those interested in broad ecological, behavioral, or biological questions related to crane management, this volume provides only a small spring-board into the primary literature.

On a few occasions, the brevity and simplification of complex biological issues addressed in this volume may lead to misinterpretation by uninformed readers. For example: (1) "Although there is remarkable variation between species, crane eggs from hot climates usually have less pigment than those in cold climates" (p. 23). Broad statements such as this need a cited authority. Heat transfer to the environment or heat gain from the sun may be just one of many factors (e.g., predator pressure, protection from UV light) that influence the extent of egg pigmentation. The brevity and lack of authority after such broad statements may hinder the reader's ability to obtain more in-depth information. (2) "Territory size is extremely variable, . . . , with territory size roughly proportional to the openness of the landscape (Johnsgard 1983)" (p. 23). Although most would agree that habitat openness influences territory size, other factors like food abundance and crane population density also have been shown to influence crane territory size. The omission of those considerations represents an over simplification of the subject. (3) "If proper husbandry and genetic management practices are followed, captive breeding can perhaps indefinitely maintain viable populations of each crane species and provide birds for reintroduction efforts" (p. 27). The implication is that captive propagation is a primary (first line) tool for species recovery instead of a secondary or tertiary tool of last resort to be implemented only when habitat management efforts are unsuccessful. Certainly captive propagation plays an important role in conservation of some critically endangered species. However, maintenance of suitable natural habitat should be the primary long-term goal of any species recovery effort. The maintenance of species for which there is no suitable habitat (and no hope of establishing suitable habitat) is of questionable value. Aldo Leopold suggested that the success of any wildlife management effort may be measured by the degree to which "wildness" is maintained in the population. The idea of using a large portion of our limited conservation energy to maintain a living library of semi-wild birds, while our remaining natural habitats are lost, is disturbing.

Despite these minor short-comings, the primary audience of avian caretakers is well served by this concise summary of practical information. The high quality of the color photographs, figures, tables, and maps greatly enhance the presentation. Of particular value are the sections on medicine and surgery, genetic management, artificial insemination, and reintroduction techniques. The presentation of this information is of great value to those caring for cranes as well as a wide variety of other species. Because of the broad range of topics covered, this book should appear in college, museum, large city libraries, and most certainly in libraries of those serving as avian caretakers.—HOWARD E. HUNT, Louisiana Tech University, Department of Biological Sciences, P.O. Box 3179, Ruston, LA 71272.