REVIEWS

EDITED BY BRUCE M. BEEHLER

The following reviews express the opinions of the individual reviewers regarding the strengths, weaknesses, and value of the books they review. As such, they are subjective evaluations and do not necessarily reflect the opinions of the editors or any official policy of the AOU.—Eds.

An Annotated List of the Birds of Bolivia.—J. V. Remsen Jr. and Melvin A. Traylor Jr. 1989. Vermillion, South Dakota, Buteo Books. 79 pp. ISBN 0-931131-16-6. $15.00.—As more and more of South America becomes the object of modern ornithological exploration, even the most remote places have been receiving attention. Certainly Bolivia would qualify as "remote" in the minds of most Americans, and—perhaps for this reason—for the past 15 years this country and its birds have fascinated Van Remsen. Under Remsen's guidance, the Louisiana State University Museum of Natural Science has in recent years undertaken a series of expeditions to various Bolivian localities, often selected for the likelihood of their supporting bird species hitherto unrecorded from the country—and they often did! Mel Traylor was enlisted as coauthor, doubtless in part because of the large holdings of Bolivian bird specimens housed in the Field Museum of Natural History. The first major result of their investigations—one hopes only the initial result—is this slim volume, the first thorough survey of Bolivia's birds since James Bond and Rodolphe Meyer de Schauensee's annotated list, published almost 50 years ago (1942, 1943; Proc. Acad. Nat. Sci. Philadelphia 94: 307-391, 95: 167-221).

The book is essentially a list of the 1,274 species of birds recorded from Bolivia as of (apparently) 1988. Their distribution is presented by department in a clear, tabular format, with a published reference for the first formal record for each species for each department. These are handled in an exceptionally thorough way; I could find no errors, and actually doubt there are any. However, no information on abundance or (other than in an extremely general way) on habitat preferences is given, a disappointing absence. Several hundred references are cited in one way or another; the authors have researched their subject exhaustively.

The authors have in the main followed the taxonomy of Morony, Bock, and Farrand's (1975) "AMNH list" except where recent literature contra-indicates. Some of these divergencies are explained in a section consisting of 51 "taxonomic footnotes." By and large these seem reasonable, and the only outright error I spotted in a quick perusal was the use of *Phrygilus chloronotus* when (as first pointed out to me by F. Vuilleumier, and used in Ridgely and Tudor 1989) the oldest available name for that species, split from more southern *P. gayi*, is *punensis*. They are conservative on English names used, quite strictly following Meyer de Schauensee's (1966, 1970) two seminal books on South American birds, with the stated goal of not wanting "to meddle with established names" (even when these are not very well established!). Thus, for instance, the archaic group name "leafscraper" is used for the genus *Sclerurus* when almost every post-1970 book (including the 1983 AOU Check-list) has opted for the far more apt "leaftosser." An additional 28 species are discussed in a "hypothetical" section; some species included here (like *Monasa atra* and *Coelegina iris*) had Bolivian citations that were obviously in error, but others seem perfectly reasonable, and a few might better have been placed on the main list. Several species known in Bolivia only from sight records are relegated to this section, despite the fact that other species have been placed on the main list that are also known only from sightings. The criteria for placing them in one section or the other seem fuzzy (though I recognize that many times these are "judgment calls"). For instance, the sighting of *Asio stygius*, though considered "hypothetical," seems eminently reasonable given the experience of the observer, and the same can be said for *Grallaria andicola* (by the way, a few months ago I found an unpublished AMNH specimen [#229210] of *andicola* taken in La Paz at "Alaska Mine"). As for my sighting of *Premnornis*, still the only report from the country: I continue to think that's what the bird was, but in the absence of subsequent records of this obscure bird, I have to admit that the authors were probably correct in considering this one "hypothetical."

The avifauna of Bolivia is, as the authors emphasize, exceptionally rich, especially for a landlocked country. A brief discussion of the factors that have led to this richness is included, together with some comments on the few Bolivian endemics and shared endemics. Additional faunal inventory work is still needed, and the authors emphasize that much remains to be found, and that the distributions of many known species still need to be refined. The northern lowlands in particular require more attention (despite the fact that a recent paper discussing an expedition to Pando added no less than 52 species to the Bolivian bird list!), and included is a table in which are listed 80 species recorded from nearby localities in Peru and Brazil, but not yet found in Bolivia.

Published by Buteo Books, this Bolivian list invites comparison with "An Annotated Checklist of Peruvian Birds" by T. A. Parker III et al. (1982, Buteo Books; reviewed, albeit much too harshly, in 1982, *Auk* 99:

818). Superficially similar, in fact the two books are quite different. "Peru" presents nothing near the same distributional or citation detail as "Bolivia," but does present much more information on abundance and habitat. The end results are very different, with "Peru" being more useful to a broad audience (including the birding community), and "Bolivia" being of interest primarily to the more specialized scientific community with an interest in bird distribution. Its title should have been "A Distributional List of the Birds of Bolivia": there actually is not very much "annotation" per se. What I would look forward to, for both Bolivia and Peru (and for other South American countries), is a detailed verbal (*not* tabular) summary of bird species distribution, abundance, and systematics, more along the lines of the British Ornithological Union series of annotated lists published over the last several years. Nothing like this has been attempted in recent decades for any South American country, and it's high time.—ROBERT S. RIDGELY.

The Birder's Handbook.—P. R. Ehrlich, D. S. Dobkin, and D. Wheye. 1988. New York, Simon and Schuster Inc. xxx + 785 pp. $15.95.—Perhaps the most formidable obstacle that a would-be birder faces in the first months of learning to identify birds is the apparently quixotic arrangement of species in a field identification guide. It follows no principle with which the birder is familiar or which seems to make sense. It is neither alphabetic nor based on color, pattern, size, or habitat. A rudimentary understanding of taxonomy evolves slowly, and learning one's way around a single field guide (much less the variations in sequencing among several of them) requires considerable home study.

Opening "The Birder's Handbook" for the first (or tenth) time produces much the same sense of confusion, and no amount of leafing through its pages is likely to make its organization intelligible. The left-hand pages do make sense to all but novices: they contain species accounts in a largely recognizable taxonomic order (which turns out to be the sequence used by the National Geographic Society's field guide). The right-hand pages seem disconnected from those on the left. They contain essays of variable length on an extraordinary range of subjects in baffling order. A sequence of consecutive essays selected at random includes the following headings: "Conservation of Kirtland's Warbler," "Molting," "Bird Names XII" (a half-page on the derivation of some wood-warbler names), "Dominance Hierarchies," and "Determining Diets."

Because the species accounts (two to a page) are highly condensed and full of symbols and abbreviations that are not transparently meaningful, the only fruitful approach is to read every word of the long introductory section entitled "How to use this book" before exploring further. This submission to necessity makes accessible a remarkably rich encyclopedia of the biology, behavior, ecology, and evolution of 646 species regularly breeding in North America north of Mexico, as well as many basic ornithological concepts, some avian conservation issues, biographical sketches of 31 ornithologists, notes on bird names, and a miscellany of such oddities as the findings of Frank Chapman's 1886 Feathered Hat Census.

Each species account provides page references to all the major field identification guides and is uncluttered by either an illustration of the bird or any information on identification or distribution. Instead, highly compressed facts about breeding habitat, locations and type of nest, type of breeding system, eggs, incubation, chick development, diet, displays, and foraging techniques are offered. Pertinent conservation information, especially concerning threats on the wintering grounds, is mentioned. The end of each account contains cross-references to all the essays in the book of immediate relevance to the species, as well as references to publications listed in the 64-page bibliography. There are suggestions for further reading at the end of each essay. After "Dominance Hierarchies," for example, there are cross-references to "Bird Badges," "Natural Selection," "Visual Displays," "Leks," and three papers published in 1985 and 1986.

The placement of the essays is partially governed by their ties to some of the species to which they are most applicable, but recourse to the excellent index is indispensable for direct access to the subjects they treat. A 6-page guide to essay topics immediately precedes the index and is helpful in understanding the structure of the book.

The bibliography is of special interest. Citations include only recent writings with extensive references, so the reader gains indirect access to older, classic literature without citations to such publications taking up space in the present work.

Illustrations are sparse but always instructive. The precise line drawings by Shahid Naeem range from a comparison of the swimming styles of Surf Scoters and Canvasbacks, to maps of Sage Grouse lek territories, to a Loggerhead Shrike perched beside a skewered grasshopper.

I suspect that the authors would like this book to be in everyone's library as soon as the first field identification guide is acquired. Although its purchase should probably wait until a bird watcher is comfortable with binoculars and at least one field guide and can recognize most of the common birds in the neighborhood, the book satisfies the hunger for knowledge about birds' lives that is generated as soon as one begins to watch them. Moreover, it is so crammed with the results of recent research that it is likely to be of interest to any ornithologist, even if only as a quick and current source of information about species outside one's own experience.

The most admirable aspect of the book is its reflec-

tion of the authors' resolve to lure birders into becoming careful observers. Four introductory pages are devoted to an invitation to carry a field notebook and advice on what to record in it, how to become involved in co-operative field activities like the Breeding Bird Census and Cornell's bird population studies, and how to get observations published. Scattered through the species accounts are question marks to indicate gaps in present knowledge: the number of broods in Western Kingbird, for example, or whether Blue Jays are monogamous, or the nature of a Golden-winged Warbler's displays. Readers are urged to make systematic observations to fill such gaps and are assured that there is much to be known about even abundant species, a fact that amateurs rarely hear. Most recreational birders find it difficult to believe that they can make a contribution to scientific knowledge beyond reporting a rare occurrence. This book encourages birders to become bird *watchers*.

The authors refer to the work as a "small volume" and are hopeful it will be carried into the field. Despite its thin paper cover, it is, however, more than 5 cm thick and weighs more than 914 g. There seems to be no need to have it at one's fingertips, but it belongs in every birder's library—and maybe in the car, at least until taking fieldnotes becomes a habit. The book is already a hit among serious birders for the usefulness of its species accounts. Once they puzzle out the enigma of essay arrangement, they are likely to savor the breadth of the scope of the essays nearly as much and to find highly contagious the insatiable curiosity of the authors.—CLAUDIA P. WILDS.

Recent Advances in the Study of Neogene Fossil Birds.—K. Jeffrey Bickart and Robert M. Chandler. 1990. Ornithol. Monogr. No. 44. Washington, D.C., Am. Ornithol. Union. vi + 161 pp., 165 text figures. ISBN 0-943610-57-5. $19.75 ($17.75 to AOU members).—This monograph consists of two papers that describe assemblages of fossil birds from western North America. In the first paper K. Jeffrey Bickart describes the Miocene/Pliocene avifauna from Wikieup, Arizona. Robert M. Chandler examines the fossil birds from San Diego, California, in the second paper. The Foreword was written by Storrs L. Olson. The papers present assemblages represented by 1,200+ and 2,000+ specimens, respectively, and mark the achievement of years of meticulous research. Although there are other fossil avifaunas that are composed of equal or larger series of specimens (see Olson's Foreword), large sample sizes are rare in avian paleontology, and analyses of such faunas serve as unique snapshots of avian history. Through the tedious tasks of preparing, sorting, identifying, and reporting the fossil remains from these two localities, Bickart and Chandler have provided both the lay and the professional communities an essential service.

Bickart's contribution ("The birds of the late Miocene–early Pliocene Big Sandy Formation, Mohave County, Arizona"; pp. 1–72) is concise, well organized, and clearly written, with no noticeable typographical errors. The 7 text figures, which include 11 photographic plates (taken by Victor Krantz of the Smithsonian Inst.), are superb in quality and informative. Measurement dimensions are defined explicitly and figured in the Appendix. The paper is organized in the "typical" paleontological format. Short sections titled Introduction, Materials and Methods, and Geology precede the "meat" of the paper, the Systematic Paleontology section, where fossil specimens are described and referred to new or existing taxa. Bickart's approach to avian systematics is cautious and conservative. He follows the advice of Olson (1985, Avian Biol. 8: 79–256) in not recklessly describing new species. Bickart discusses 38 taxa of birds, but identifies only 9 of these taxa (24%) as species. The remaining 29 taxa are either identified at the generic (25 taxa) or higher taxonomic levels. Six of the 9 taxa identified as species are newly described. Although I commend Bickart's reluctance to describe new species based on insufficient material, in several instances the material appears adequate, and I am unsure why Bickart does not attempt a more detailed analysis.

For example, the anatids (=Anatinae) make up 31% of the entire fauna (321 specimens). Yet, Bickart uses only 3 pages (4% of the paper) to discuss this material, and does not provide a single measurement or photograph of any of the 321 specimens. Bickart describes 312 of the specimens as members of the genus *Anas*, but provides only the characters justifying their identification as dabbling ducks (Anatini, which were shown by Livezey [1986, Auk 103: 737–754] to be paraphyletic). Bickart divides the 312 specimens of *Anas* into three unnamed species of 121, 110, and 81 specimens, using an unspecified size criterion. Because Bickart does not provide morphological data for these specimens, the reader must either trust Bickart's assessment of intraspecific variation (including sexual dimorphism) or reexamine the specimens to evaluate their identification. In the Introduction, Bickart justifies his reluctance to identify the duck specimens "because of unresolved taxonomic complexities in the modern and fossil forms and because of the difficulty of determining whether a bird in the Wikieup fauna has already been named elsewhere [based] on other elements of the skeleton" (p. 6). I sympathize with Bickart's difficulty in dealing with ambiguous morphologies and taxonomic knots, but these problems are not particular to fossil ducks, and studies such as Bickart's are precisely the ones that help resolve these "taxonomic complexities." Bickart could have attempted to identify at least some of the Wikieup ducks, and should have examined the holotypic specimens of the fossil *Anas* species previously described from other Tertiary localities of North America (e.g. *A. pul-*

lulans or *A. itchtucknee;* see pp. 38–39). Bickart missed an opportunity to make a far-reaching contribution to anseriform systematics and taxonomy, and I suspect that if and when the taxonomic complexities of fossil anatids are resolved, the Wikieup material will play an important role.

Bickart's superficial treatment of the anatids contrasts sharply with his thorough handling of the anserids. Fifty percent of the entire fauna (516 specimens) consists of Anserinae remains. Bickart describes four new species of anserids (1 species of *Cygnus,* 2 species of *Anser,* and 1 species of *Branta*), and discusses in detail their anatomical and morphometric characters. Bickart provides measurements of the holotypes, and univariate statistics for the paratypic specimens. He photographed 14 of these specimens, but does not provide a figure for the holotypic specimen of *Anser arenosus,* choosing instead to photograph 6 paratypic specimens (Fig. 4). Although Bickart relies heavily on the characters discussed in Woolfenden's seminal work on the postcranial osteology of Anseriformes (1961, Florida St. Mus. Bull. 6: 1–129), he apparently does not use Livezey's (1986) cladistic analysis of the Anseriformes. Livezey summarized and polarized many of Woolfenden's characters, and his results would have aided Bickart in his higher-level diagnoses of both anatids and anserids.

The remaining taxa discussed by Bickart include two species of grebes, a stork, several falconiforms, a crane, several rails, a stilt, an avocet, a flamingo, a plover, several scolopacids, a gull, a dove, and a crow. Bickart treats these taxa in varying degrees of detail, but never as thoroughly as his analysis of the anserids. The primary character given in most cases is size, and similar to his analysis of the anatids, measurements are frequently omitted. The less-than-thorough nature by which Bickart treats these remaining taxa is exemplified by his discussion of *Grus haydeni,* originally described from the Pleistocene of Nebraska. For more than 60 years the taxonomic identity of this species has been in question. Both Wetmore (1928, Am. Mus. Novitates 302: 1–15) and Brodkorb (1967, Bull. Florida St. Mus., Biol. Sci. 11(3): 99–220) considered the species a Pleistocene representative of the extant *Grus canadensis.* Bickart disagrees, but provides no evidence for his conclusion other than stating that he "examined a cast of the type of *Grus haydeni,* and compared it with the distal ends of tibiotarsi of the Wikieup crane . . . ," and he decides that the specimens are "similar to each other, and . . . distinct from *Grus canadensis* and other extant cranes" (p. 44).

Bickart concludes his paper with a discussion of the taxonomic diversity of the Wikieup material. He stresses that the numeric and taxonomic dominance of the anseriforms is not an unbiased sample of the "real" avifauna of that area during that time, but reflects the biases of taphonomy or differential susceptibility to botulinal poisoning. Bickart cleverly shows that the Wikieup material closely resembles the abundance and diversity of birds dying from botulism in western North America today. He reasons that it is likely that at least a portion of the Wikieup birds died from an outbreak of this or similar bacterial poisoning.

Following Bickart's paper, Chandler jumps some 3 million years and 400 km from the Miocene/Pliocene of Arizona to the late Pliocene of San Diego, California. The structure of Chandler's paper ("Fossil birds of the San Diego Formation, late Pliocene, Blancan, San Diego County, California"; pp. 73–161) is identical to that of Bickart, including lengthy Tables of Contents, Figures, and Tables, and Introduction, Materials and Methods, and Geology sections. As in Bickart's paper, the bulk of Chandler's work is included in the Systematic Paleontology section. As similar as these two contributions are in structure, they differ in content. Chandler takes a more aggressive approach to the taxonomy of fossil birds. Most of the specimens (individual skeletal elements) discussed by Chandler are identified to species (with the exception of many of the mancallid specimens; see p. 150). In addition, 23 of the 40 taxa discussed by Chandler are identified as species (10 new species). With the exception of *Melanitta ceruttii,* which Chandler describes from a single specimen (a right humerus missing the proximal end), all new species are described from at least 3 specimens, and 2 of these new species (*Podiceps arndti* and *Diomedea howardea*) are described from at least 10 specimens.

In referring specimens to taxa, or in describing new species, Chandler is extremely thorough. He presents 33 tables of measurements and 158 figures, all of which are photographs of specimens (the last figure, which is not identified as such, is a map of the San Diego region, with fossil localities highlighted). Chandler is not as explicit in describing his measurement dimensions as Bickart, although none of Chandler's measurements are ambiguous enough to cause confusion. In contrast to Bickart's exceptional photographs, Chandler's figures are poor in quality; all are overexposed, and several are out of focus. I found these figures to be almost useless; unfortunately, they consume roughly 18% of the total pages (16 of 89 pages). Nevertheless, the poor quality of the photographs does not necessarily detract from the quality of the research. Chandler uses a cladistic approach to describe taxa, identifying specimens and naming new taxa on the basis of derived characters (but see below). His description sections are very detailed, and the comparison sections are comprehensive. In fact, he lists and discusses most or all of the related fossil and extant taxa.

Although Chandler's descriptions are detailed, the paper suffers from careless omissions, poor organization, and mistakes of fact. Many figures are out of order, whereby those with high numbers are referred to earlier in the text than those with low numbers. This results in excessive and annoying page turning.

In addition, the museum numbers of the figured specimens are omitted from the figure captions, making it difficult to determine if the specimen figured is the holotype, a paratype, or some referred specimen.

Chandler refers specimens to 21 genera, but provides diagnoses for only 10 of these genera. New species are described in 3 of the 11 genera with no diagnoses (*Diomedea*, *Stictocarbo*, and *Rissa*), and no new species are described in 3 of the 10 genera that include diagnoses. The diagnosis for *Morus* (no new species) is the longest and most detailed. In addition, Chandler fails to mention what skeletal element he is discussing in his diagnoses for *Puffinus* and *Melanitta* (in both cases the diagnosis pertains to the humerus).

Perhaps the most serious omission and error made by Chandler concerns his discussion of the grebes. Howard (1949, Carnegie Inst. Wash. Publ. 584: 177–199) referred the first grebe specimens from the San Diego Formation to *Podiceps parvus* (originally described by Shufeldt [1915, Trans. Connecticut Acad. Arts Sci. 19: 1–110] from the Pleistocene of Oregon). Chandler (p. 92) acknowledges this, and states that his new species, *P. arndti*, is similar in size to *Podiceps parvus*. However, Chandler does not include any additional discussion of *P. parvus*, and except for one specimen (LACM 2113; see below), he does not refer any of the specimens previously included in *P. parvus* to any other species of grebe. Chandler does not list *P. parvus* as part of the San Diego Formation fauna, making the status of this species in the fauna ambiguous. Chandler accentuates this taxonomic confusion by referring a tibiotarsus (LACM 2113), originally described by Howard as *P. parvus*, to *P. subparvus* **and** *Aechmophorus elasson*! In fact, LACM 2113 is featured in the description section of both *P. subparvus* and *Aechmophorus elasson*, and it is clear that Chandler is describing the same specimen in both discussions. I did not attempt to determine if Chandler refers any other specimen to two (or more) species, but the reader should be aware of this possibility.

Lastly, I agree with Chandler that character polarities should be considered when identifying specimens or diagnosing taxa, but I was left with the feeling that Chandler did not fully understand the methods he employed. Although Chandler states (p. 83) that he listed the appropriate outgroup taxa in each of his comparisons sections, he omits a listing in at least the *Puffinus* and Alcidae comparisons, where 4 and 9 taxa are discussed, respectively. In no case does Chandler describe the relationships among outgroups, and between the outgroup and ingroup taxa, or how he resolved polarities if the outgroup taxa differed among themselves in their character states. Chandler considers each character in isolation of all other characters, and if a character state appeared in an outgroup taxon (or taxa), he considered that state to be primitive for the ingroup taxa. This would be problematic if Chandler simply reversed the status of the ingroup and outgroup taxa in consecutive analyses (i.e. any character that differed between these two taxa would be considered derived in both taxa). I did not attempt to discover if this was true in any particular diagnosis, but Chandler prefaces his discussion of the polarity of many characters with the statements "I think . . ." and ". . . is probably derived," suggesting that rigorous outgroup analyses were not conducted. For example, in his diagnosis of the genus *Brachyramphus*, Chandler states that its "[e]ctepicondyle of humerus differs from those of other alcids extending anconodistad from internal margin" (p. 137). His diagnosis for the genus *Synthliboramphus* reads, "[h]umerus with ectepicondyle elongated distoanconally and rounded . . ." (p. 142). Chandler elaborates on page 143 and states that "*Synthliboramphus* (including *Endomychura*) is distinguishable from other genera of alcids by having a distoanconally elongated ectepicondyle . . . [t]he primitive condition is a continuous, flat, distal margin at the external condyle and ectepicondyle as seen in *Brachyramphus*, *Uria*, *Cepphus*, and *Pinguinus*." How Chandler determined the polarity of this character is not clear because he does not explicitly identify either the outgroup or ingroup taxa. In addition, it is unclear what character state is present in *Brachyramphus*, or if distoanconal differs in content from anconodistad.

There are other ambiguities from which I could have drawn examples, but this would serve no purpose. Chandler's contribution is important in that it summarizes close to 60 years of paleornithological research from a remarkable set of localities. In addition, Chandler provides detailed, and presumably accurate, descriptions for most of the material in this fauna. The quality of this work is compromised, however, by careless editing and insufficient discussion of methods. I have no doubt that most of the material covered in this contribution was examined thoroughly and thoughtfully, but some of Chandler's careless mistakes are of sufficient magnitude to bring to question many of his conclusions. Readers must evaluate for themselves the magnitude and frequency of these errors before they judge the merits of this paper.

Bickart and Chandler undertook monumental tasks in attempting to describe these faunas, and they should be credited for their contributions. This monograph is not the engrossing type of book one would read before bed, or even a good topic for a graduate seminar, but if you are interested in avian paleontology or the long-term (geologic) history of bird communities, this monograph is an important reference. [I thank C. Niemi and K. de Queiroz for comments on an earlier draft of this review. The opinions expressed herein are entirely my own.]—KENNETH I. WARHEIT.

Cooperative Breeding in Birds: Long-term Studies of Ecology and Behavior.—Peter B. Stacey and Walter

D. Koenig (Eds.). 1990. Cambridge, England, Cambridge University Press. xviii + 615 pp., 228 text figures. Cloth: ISBN 0-521-37298-4, $90.00; paper: ISBN 0-521-37890-7, $34.00.—The field of avian cooperative breeding has been blessed with several recent monographs and an excellent theoretical book (Brown 1987, "Helping and Communal Breeding in Birds"), along with a plethora of papers. Thus, I was initially puzzled as to the function of Stacey and Koenig's edited book on cooperative breeding in birds. On closer examination I found that they have taken a useful tack, in many ways unique. In this multiauthored book Stacey and Koenig have brought together some of the more extensive field studies of cooperative breeding birds with the goal of providing a basis of comparison for future research. Their goal for the most part has been well met.

The book is exceptionally well organized. Eighteen studies (each a separate chapter) are summarized and, in most cases, expanded on by their principal researcher(s). Most chapters (15) involve only one species, sometimes in several habitats. Three chapters are more comparative and include two or three closely related species. Each chapter follows approximately the same format, a facet I found refreshing and useful for comparisons. Chapters begin with the basic biology of the species, its distribution, and, briefly, its taxonomy. Details of ecology follow with descriptions of habitat, study site (including pictures), and typical weather patterns. Demography and breeding biology are then described, generally in excellent detail, with an emphasis on peculiarities of the social system. The real "meat" of most chapters is a presentation of the authors' empirical work, summarizing basically all that is known to date. These are not just overviews but are good, solid accounts, with original data and figures. The chapters finish with speculation on the evolution of cooperative breeding (in the particular species or system) and suggestions for future research.

One positive result of this similar chapter-to-chapter organization is that, without previous detailed knowledge of the field, comparisons among species can easily be made. Also, because some basic information is included in each chapter, an individual unfamiliar with the field or with the birds should have no trouble understanding each chapter alone. This makes it an excellent book for a graduate-level seminar on cooperative breeding. In fact, this book in conjunction with Brown's theoretical text could make just about anyone practically an expert in the field.

The book contains several useful features. A world map in the beginning of the text locates each study site. Each chapter is preceded by a line drawing of the study subject in a natural setting. The chapter titles reflect the different emphases in each chapter, emphases that for the most part indicate the uniqueness of each system or the importance of the research (e.g. "Splendid Fairy Wrens: demonstrating the importance of longevity"; Chap. 1). The book as a whole is organized loosely by the "complexity" of the social system, beginning with singular breeders (one breeding pair per group) and ending with the promiscuous and disorderly Noisy Miner (Chap. 18). One criticism: A more extensive index would have been of immense value for those who want to compare specific characteristics among species, for example, longevity. I recognize that this is a huge undertaking; the similar organization from chapter to chapter and the abbreviated index (3 pages) to some extent compensate for this.

The editors' introduction to the text contains a clear chronological treatment of the study of cooperative breeding in birds. Not unexpectedly, the character and quality of each chapter varies from author to author. And as in most multiauthored books, the amount of attention given to each subtopic differs, as does the amount of empirical data presented. Most chapters are excellent in depth and breadth. Although much of the information included in each chapter has been published previously, the majority of chapters contain new information or at least reanalyses of earlier studies. For example, Ligon (Chap. 2) presents unpublished data on Green Woodhoopoes associating habitat quality with group success. A few other chapters are somewhat superficial, touching primarily on natural history and demography. However, these studies tend to be more recent and therefore less extensive or, to their credit, deal with difficult field situations.

In a particularly thought-provoking chapter, Jamieson and Craig (Chap. 13) argue that helping behavior may be viewed merely as parental behavior redirected. Thus, special adaptive explanations may be unnecessary. Although this point may seem intuitively obvious, especially to anyone familiar with brood parasitism, it is timely to this field. The majority of studies until now have emphasized and devised complex benefits accruing to helping individuals to compensate for assumed costs. Jamieson and Craig suggest a subtly different way of viewing the "evolution of cooperative breeding." They imply that there is perhaps nothing necessary other than an opportunity provided by the appropriate stimulus, i.e. hungry, begging nestlings. As long as there is no cost or not enough cost to counter selection for parental behavior, helping behavior will occur. Although this view does not explain nondispersal (a common feature of cooperative breeders), it is a reasonable explanation for helping behavior itself. It is therefore appropriate to ask "how [helping behavior] might be maintained or selected against" (Brown and Brown, Chap. 9: 285) rather than selected for. In my work on cooperative-breeding Bushtits (*Psaltriparus minimus*), I have used this approach to test whether potential costs to the helper may influence their helping responses.

The final chapter ("Summary") is an assessment of the status of the field by a "nonmember." In this chapter, J. N. M. Smith summarizes, often in useful

tabular form, some of the major results of the studies as well as some of their most interesting features. He points out the chapters' common threads and reviews the evidence for the various hypotheses tested. In addition, he presents strong arguments for the need to consider phylogeny, the importance of determining actual parentage using molecular methods, and the necessity of physiological information and manipulative experiments. It is important to point out, however, that had manipulations been conducted early in these studies, much extremely valuable information would have been lost. In Florida Scrub Jays (Chap. 8) this problem has led recently to the establishment of another banded population for the purposes of manipulation.

One of the more fruitful avenues for future research suggested by Smith ("Summary"), Brown and Brown (Chap. 9), and others is the need to take into account phylogeny. More within-taxon comparisons need to be made to account for possible phylogenetic constraints. It is conceivable that helping behavior arose in an ancestor and continues to be expressed in closely related species with or without current function. Brown and Brown, at the end of their chapter on Mexican Jays, suggest that helping behavior in New World jays may be primitive rather than derived. A presumed ancestor (Unicolor Jay, *Aphelocoma unicolor*) is a cooperative breeder. This view may be in opposition to that of some of the other authors in this book. For example, Pinyon Jays (Chap. 7) are called (assumed?) "primitive" simply because they are less socially complex.

I have a small problem with the use of the phrase "long-term" in the subtitle of the text. Although several studies are more than 17 years in duration (long-term by almost any definition of the word), some are only 3–5 years long. Although this is longer than an average field study, for some questions it may not qualify as long-term. In addition, because lifetime reproductive fitness is particularly relevant to this topic and cooperative breeding birds may vary in longevity, the number of generations followed may be a more accurate means of denoting study length. For example, two entire generations of Noisy Miners (Chap. 18) would encompass about 14 years. This is not to belittle the importance of the shorter studies. Regardless of length, nearly all of the studies described here are extensive studies of natural, unmanipulated populations. They have generated a remarkable amount of information, not only on cooperative breeding but on general behavior and ecology as well.

From its beginning, the study of avian cooperative breeding has searched for a universal model, or set of universal models. This book with its clear rendition of the various systems, presented so similarly, provides perhaps the best evidence under one cover that this quest may be fruitless. As stated by Dow and Whitmore, "'cooperative breeding' is . . . a catch-all for a wide variety of unconventional breeding strategies in which the [only] common feature is provisioning of young by birds other than their parents" (Chap. 18: 590). However, I see this not as a criticism of the field, but as an indication of its strength and vitality. The research presented in this book helps define new sets of questions and points the way to new sets of explanations. Such vitality in the field is further evidenced by the number of studies continuing; I count 13 extant and only 5 extinct.

I strongly recommend this book to any biologist interested in behavioral ecology, sociality, or ornithology. It provides an excellent review of many of the primary cooperative breeding studies of the last two decades, points the way to future research, and touches on some of the more general problems in behavioral ecology. It would make a good addition to personal as well as to professional libraries. Although individuals working on avian cooperative breeding may find portions redundant, there is enough new information to hold interest and to stimulate discussion. I am pleased to see that the field of avian cooperative breeding is alive and definitely still kicking.—SARAH A. SLOANE.

World Checklist of Threatened Birds.—John Norton, Simon Stuart, and Tim Johnson. 1990. Second ed. Peterborough, United Kingdom, Nature Conservancy Council. v + 274 pp. ISBN 0-86139-601-4. £20.00 postpaid.—This volume is an annotated list of 2,241 bird names, more than one quarter of all avian species. Species are listed if they are on any of the three appendices of the Convention on International Trade in Endangered Species (CITES) or if they are listed in the "IUCN Red List of Threatened Animals" (1988, Gland, Switzerland, and Cambridge, England, IUCN Conservation Monitoring Center) or in "Birds to Watch: the ICBP World Checklist of Threatened Birds" (N. J. Collar and P. Andrew 1988, Washington, D.C., Smithsonian Inst. Press). The first edition, published in 1986, was prepared by the International Council for Bird Preservation (ICBP) as a consultation draft. With a few exceptions nomenclature follows Morony, Bock, and Farrand (1975, "Reference List of the Birds of the World," New York, Am. Mus. Nat. Hist.). Genera and species are arranged alphabetically within families.

Each entry gives Latin and common English names, CITES appendix number, Red Data Book categories (for description of these categories see N. J. Collar and S. N. Stuart 1985, "Threatened Birds of Africa and Related Islands: The ICBP/IUCN Red Data Book, Part 1, Cambridge, England, ICBP), coded major sources of exploitation, references, and breeding, nonbreeding, and vagrant distributions. A list of 469 references and a combined index of Latin and English names complete the volume.

Integration of the CITES list and the ICBP Red Data Book list in one volume invites a comparison of the two to see the extent to which they overlap. Ideally, all species on CITES Appendix 1 (endangered) should be Red Data Book species; that is, they should be biologically endangered. Most species on CITES Appendix 2 (threatened) should be Red Data Book species, with some allowance for inclusion in CITES of species that are look-alikes. Conversely, because the potential exists for trade in almost any bird species, and because the Red Data Book has been claimed to provide a convenient shopping list for unscrupulous animal dealers, suppliers, pet fanciers, and private collectors, all species that are biologically endangered or threatened should appear on CITES Appendix 1 or 2.

Of 2,241 listings, 38 (1.7%) are on CITES Appendix 1 but not in the Red Data Book. Of these 38, 24 were in earlier editions of the Red Data Book but are presently excluded either because subspecies are no longer treated or because current information or interpretation suggests these species are no longer at risk.

A total of 1,038 listings (46.3%) are on CITES Appendix 1 or 2 and in the most recent Red Data Book. Many of these (including all members of the Accipitridae, Falconidae, Psittacidae, Tytonidae, Strigidae, and Trochilidae, other than those on Appendix 1) are listed, presumably as look-alikes.

Only 280 listings (12.5%) are both on CITES Appendix 1 or 2 and in the most recent Red Data Book. A further 750 (33.5%) are listed in the Red Data Book but not on CITES. Finally, 135 (6.0%) are on CITES Appendix 3, listed not because they are at risk but because a party to the convention wanted them listed for that country. Included here are some widespread common birds, e.g. *Anas acuta*, as well as highly endangered and potentially traded species, e.g. *Nesoenas mayeri* of Mauritius.

These figures indicate that most of the CITES listings are not endangered or threatened species. Presumably, CITES is more concerned about political and economic reality than biological reality. One could say that it is better to err on the conservative side, to protect (if that is what CITES listing actually does) unendangered species than not to protect endangered species. One might hope that those 750 species listed in the latest Red Data Book and not covered on CITES would ultimately receive CITES protection. When look-alikes are added as well, the CITES Appendix lists will rapidly be approaching Morony, Bock, and Farrand's list. How much simpler it would have been to "reverse-list," that is, to make a short list of species the world agrees may be traded. This book would then never have been needed.

Aside from its application in generating comparisons of the sort attempted in this review and its use by scientific authorities of CITES party states to document the supposed origin of CITES species in trade, this book has a limited audience. For ornithologists it provides a slightly more detailed reference than "Birds to Watch" for the distribution of threatened species. That may not be incentive enough to buy this book.—WARREN B. KING.

Molecular Systematics.—David M. Hillis and Craig Moritz (Eds.). 1990. Sunderland, Massachusetts, Sinauer Assoc. Inc. xvi + 588 pp., 101 illustrations. ISBN 0-87893-280-8. Cloth, $65.00; paper, $37.95.—Traditionally, systematists searched for phenotypic characters to classify organisms. Within the last 25 years, beginning in earnest with Lewontin and Hubby's (1966, Genetics 54: 595) exposé of protein electrophoresis, the search for systematic characters has shifted to biochemical studies of molecular variation.

Widely heralded, molecular methods have contributed significantly to studies of population structure and geographic variation, species limits, and phylogenetic relationships. Besides offering new insights about organismal evolution, molecular methods have revealed much about the evolution of molecules themselves. Oft-cited advantages of molecular methods include their direct exposure of genetic variation, explicit genetic models of evolution of molecular characters, and the apparent selective neutrality of many characters. Further, the tendency for molecular characters to evolve in a clocklike fashion, the genetic independence of characters (if unlinked), and the potential to study homologous molecular regions extends across often broad taxonomic arrays. It is now generally appreciated that these advantages must each be qualified with caveats, some rather weighty. Nonetheless, the euphoria generated by molecular methods is far-reaching, in both the popular press (e.g. Gould 1985, Nat. Hist. 94: 12) and technical journals, where, for example, Sarich et al. (1989, Cladistics 5: 3) state: "Comparative studies of proteins and nucleic acids provide the best data for objective discovery of . . . phylogenies." However, most molecular studies begin with limits of study taxa defined by morphological criteria, and when molecular data corroborate traditional phylogenies, molecular techniques are considered to be accurate. But when molecules and morphology disagree, morphology is considered to be wrong. Whether molecular characters are inherently better suited for phylogeny inference is undecided, except in groups that lack much morphological variation. For several reasons, studies of molecules do not always provide robust cladograms, and thus molecular methods are not a panacea. In many instances, trees derived from molecular techniques are given too much credence by their creators.

A variety of molecular methods now exists to address systematic questions at various tiers in the taxonomic hierarchy. These methods are brought together in one volume edited by David Hillis and Craig Moritz. Although not an exhaustive treatise, the book contains chapters introducing molecular methods

(Hillis and Moritz), sampling design (Baverstock and Moritz), collecting and preserving tissues (Dessauer, Cole, Hafner), protein electrophoresis (Murphy, Sites, Buth, Haufler), immunological comparisons (Maxson and Maxson), cytogenetics (Sessions), DNA-DNA hybridization (Werman, Springer, Britten), restriction enzyme analysis (Dowling, Moritz, Palmer), DNA and RNA sequencing (Hillis, Larson, Davis, Zimmer), analysis of population data (Weir), and reconstruction of phylogeny (Swofford and Olsen). Lastly, Hillis and Moritz provide a thoughtful summary that includes a comparison of resolution and cost/benefits of each technique, and a glossary.

The rather broad aim of the book is to guide beginners through a molecular systematics study and to provide established investigators with new ideas, techniques, and approaches (p. xiii). Each chapter on molecular methods provides a detailed set of instructions for setting up a laboratory and performing particular techniques. However, we recommend that researchers unfamiliar with a technique visit a laboratory where the technique of interest is routine, learn it by "hands-on" experience, and then transfer the technology to the laboratory back home. Far too much valuable time and resources would be wasted by trying to use this book as a "how-to" guide. To that end, we question the use of 211 of 325 pages in biochemical methods chapters (4–9) for protocols. These recipes are available elsewhere where the reagents' properties and functions are explained in detail (see General References, p. 10).

In Part I, the chapters on sampling methods are straightforward, but the intended audience is not readily apparent. Surprisingly, Baverstock and Moritz omit the importance of preserving voucher specimens. Recent demonstrations that degraded DNA can be amplified via the polymerase chain reaction (PCR) does not justify the abandonment of frozen tissue collections. Fortunately, Dessauer et al. emphasize forcefully the value of frozen tissue collections and the importance of voucher specimens for frozen tissue samples.

Part II is devoted to the presentation of molecular techniques. The parallel format of the chapters (Principles and Comparison of Methods, Applications and Limitations, Laboratory Setup and Protocols) facilitates comparisons between these diverse approaches. It is surprising to see a long chapter on protein electrophoresis on the heels of an entire book (Richardson et al. 1986, "Allozyme Electrophoresis," Florida, Academic Press). In the cytogenetics chapter, Sessions provides fascinating glimpses of how genome macrostructure evolves, and how cytogenetic data can be used to derive a phylogeny. In an attempt to be complete, some methods are included that currently do not enjoy widespread use. It is our impression that techniques such as DNA-DNA hybridization and immunology are not primary techniques for phylogenetic inference, although each has merit. The immunology chapter lacks sufficient discussion of the many criticisms of this approach. Werman et al. include a lengthy discussion of the correction factors needed for DNA-DNA hybridization to be a reliable tool in phylogenetic inference; indeed, if searching for a technique to make phylogenetic inferences, the problems cited in this chapter seem to outweigh the advantages. Not surprisingly, these out-of-favor methods are distance-based techniques. Although such methods undoubtedly uncover phylogenetic information, unless one has an independent check on the results (e.g. sequence or morphological data), these methods are ill suited as primary techniques. That is, they could corroborate results of a phylogenetic study, but they are not well suited as tools to discover phylogenetic patterns. It would be of interest to map changes in the genome measured by DNA hybridization onto a phylogeny determined by some other means to examine rates of evolution.

Dowling et al. provide an extremely good summary and critical appraisal of the restriction fragment length polymorphism (RFLP) method. Importantly, they stress that the mtDNA genome is inherited as a single linkage group (and behaves as a single gene). Single-gene trees and species trees can be discordant, especially if gene flow has ceased recently. Simply sequencing different regions of mtDNA is not an independent test of tree structure derived from other regions (or genes), as the entire mtDNA molecule has a single history. Different cladograms from different mtDNA regions signal homoplasy in one or both regions. One needs to study nuclear gene loci to complement (and test) the mtDNA estimate.

The chapter by Hillis et al. on sequencing is excellent and could be consulted profitably by both beginners and old pros. They appropriately note that there is not a "molecule for all seasons." Specifically, if closely spaced nodes are embedded early in an ancient lineage, no molecule will recover evidence of monophyly. Lineages of short duration will be marked as a clade by rapidly evolving molecules, but as time progresses, this evidence of monophyly will be erased by the time-dependent nature of molecular change (see also Lanyon 1988, Auk 105: 565). Hillis et al. nicely describe the polymerase chain reaction (PCR). PCR followed by direct sequencing is a methodological breakthrough of major proportions. Hillis et al. note that sequencing is not always the appropriate technique. Although DNA sequence information is always of interest, it is often too costly (at present). Sometimes DNA sequences will be inappropriate because of closely spaced ancient nodes, large gaps, because the chosen sequence lacks sufficient variation, or saturation (multiple hits) has occurred. MtDNA RFLPs or allozyme variation will often be equally suited (and cheaper) to answer the question of interest. Given the well-reasoned and clearly written prose, we encourage Hillis to consider writing a book himself on molecular systematics.

Part III, devoted to data analysis, is disappointing. The chapter by Weir on intraspecific differentiation is a basic, rather narrow review that neglects to mention how most of the data derived from molecular techniques discussed in the book could be related to population-level phenomena. An important addition to analysis of populations is a series of papers by Slatkin (e.g. Slatkin and Maddison 1990, Genetics 126: 249), noting that mtDNA data contain more information than just gene frequencies. Phylogenetic analysis of mtDNA restriction site or sequence data produces a cladogram of haplotypes (or clones), which can reflect rates of gene flow. Weir's omission of Slatkin's other works on gene flow apparently indicates his disapproval. Finally, hundreds of papers on genetic population structure have been published using analyses included in Swofford's computer program "BIOSYS." It would have been interesting to learn Weir's views on the analyses included in this package.

The longest chapter is by Swofford and Olsen on phylogeny reconstruction, and unfortunately, its length results from poor organization. Swofford and Olsen do mention most analytical approaches relevant to all types of molecular data. The material should have been divided into two or more chapters, with some sections included as companion chapters to, or as sections within, the appropriate molecular techniques chapter. It is not clear to whom the chapter is addressed, and Swofford and Olsen missed an opportunity to address a long-standing need in molecular systematics—that of conscientious and thoughtful data analysis. A novice to systematic analysis will be discouraged within the first few pages. Experienced systematists will consult the original papers.

A serious drawback of their chapter is the interminable number of equations and associated verbiage. These disrupt the discussion of the approaches themselves and are often superfluous. Ironically, Swofford and Olsen complain, "early descriptions of parsimony methods (e.g. Farris, 1970) tended to be presented in a way that obscured the boundaries between criteria and algorithms" (p. 452). On the contrary, lucid descriptions of parsimony and other approaches may be found in various articles and textbooks. Swofford and Olsen themselves devoted space equivalent to 18 pages or 20% of the chapter to equations, matrices, and definitions of variables. Frequently, the reader is referred to the original paper if interested in the *assumptions* underlying a certain procedure. A revision or second edition of this chapter should place most of the equations in an appendix (if included at all).

Swofford and Olsen are concerned that average biologists are becoming "mired in algorithmic details" and are neglecting "underlying biological principles and assumptions." When discussing bootstrapping, however, they omit a critical assumption: independence of characters. Further, they neglect to stress that bootstrapping gives confidence estimates on the ability of the data to produce an a priori tree topology. Bootstrapping cannot indicate whether a particular topology is "correct" or closer to "truth" than another tree generated by an independent data set. Two independent data sets can yield different topologies that are equally significant when bootstrapped. Bootstrapping significance levels are often misused because many researchers are unaware of this subtlety (and others noted by Swofford and Olsen).

There are other deficiencies in the chapter. A rich theoretical literature exists that the molecular systematist should be aware of and consult. Molecular and morphological analyses encounter common problems such as tree topology being influenced by choice of outgroups, choice of exemplar taxa (disguised as a discussion of long and short branches, p. 497), and central to any phylogenetic analysis, homology assignment. Swofford and Olsen fail to provide the conceptual framework necessary to evaluate phenetic and phylogenetic approaches, and whether phylogenetic inference is inherently statistical (e.g. Felsenstein 1988, Ann. Rev. Genet. 22: 521), a controversial issue. After briefly listing serious objections to converting sequence data to distance data, they present several ways to do so. There is serious debate concerning the analysis of distance data (e.g. Farris 1986, Cladistics 2: 144; Felsenstein 1986, Cladistics 2: 130); we suggest that discrete data be analyzed as such and not converted into distances for phylogenetic inference. We find their treatment of gaps in sequences unsatisfying—why should a gap be weighted by one half? Swofford and Olsen's discussion of character weighting is at best naive and at worst incorrect. Consensus trees are mentioned only obliquely, which is unfortunate because they are often mistakenly presented as phylogenetic trees.

Other topics either omitted or in need of expansion include the value of trees slightly longer than the most parsimonious tree(s), and how congruence of different data sets is a test of robustness. Recent interest in levels of homoplasy in data sets (e.g. Archie 1990, Syst. Zool. 39: 169; Farris 1990, Syst. Zool. 39: 406) should also be considered in a revision.

The last 25 years have witnessed an era of technique-driven research programs. Of course, doing a "modern" technique is often a reality in the search for jobs, tenure, and grants. For a period of probably 10–15 years, protein electrophoresis was considered the "cutting edge" of population genetics and phylogeny reconstruction at the level of genera. Type II restriction endonucleases rather quickly signaled an end to the era of protein electrophoresis. Even more rapidly, direct sequencing is replacing restriction endonuclease analysis as the primary tool of molecular systematists. These techniques each contribute important information for intraspecific studies, and fit reasonably well into the quantitative framework of population genetics (but see Felsenstein 1982, J. Theor. Biol. 96: 9). However, a common theme of these mini-

revolutions in techniques was inattention to methods of phylogenetic reconstruction. Apparently, if one had "genetic data," the analysis was of secondary importance. Data analysis needs to be of a stature equal to molecular data collection.

What is the future of molecular systematics? Clearly, molecular methods have established a niche in analysis of populations and species limits. The use of molecular methods in speciation analysis is unclear, and will depend on current discussions of species concepts. For phylogeny inference, we predict that both molecular and morphological methods will be of value. Comparisons of DNA sequences of homologous genes represent a major accomplishment. The sequence is not, however, the end-all. Instead, understanding how sequence variation contributes to phenotypic variation that has fitness consequences will be the next major goal of the synthesis between the fields of molecular and organismal evolution (e.g. DeSalle et al. 1986, Genetics 112: 861).

Overall, this book will be a standard reference for some time to come. Because of the broad audience it was aimed at, the book is sometimes an unwieldy mix of introductory and advanced material. Nonetheless, we cannot imagine an institutional or systematist's library without it.—ROBERT M. ZINK AND SUSAN J. WELLER.

New Jersey at the Crossroads of Migration.—Peter Dunne (Ed.). 1989. Franklin Lakes, New Jersey, New Jersey Audubon Society. xiii + 74 pp., 200+ black-and-white photographs and figures. ISBN 0-9624065-0-3. $8.00.—The aim of this conservation book is to inform and guide land-use planners, from governmental agencies to developers and private landowners, about the habitat requirements of migratory birds and ways to include these habitat needs in land-use acquisitions. This noble goal is straightforward but difficult. Three New Jersey Audubon Society authors present the message of migrants in a well-illustrated glossy format, clearly designed to attract attention and be easily understood (even, for example, by politicians). Essentially, this short book describes the remarkable migrations of birds through New Jersey, the habitat losses and declines of migrants, and practical approaches to reduce further losses. (While written from one state's perspective, the problems and suggested solutions are fairly universal).

An introduction provides an overview of the significance of recent habitat losses with the modern declines of migrant birds. Included are such alarming declines as an 80% reduction in Sanderlings (*Calidris alba*) in just 10 years. The ideas of global protection for migrants and the importance of species diversity are explained clearly, with poignant text and illustrations. The 6 chapters that follow are each distinct, by theme.

Peter Dunne starts with a portrait of the magnitude of bird migrations in New Jersey, especially using data from Cape May (e.g. an estimated 200,000 hawks pass each autumn). His second chapter takes a different course: an emotional short story of a migrating Golden Plover (*Pluvialis dominica*), describing some of the terrible challenges and tremendous efforts of the long journey. The chapter is set in an artistic format, with italicized text and evocative drawings. In this story the migration does not end happily but with a final sad interaction of man and bird.

In juxtaposition, Paul Kerlinger has a chapter on the remarkable energetic demands on avian migrations. Kerlinger himself has made major contributions in this area. Although this chapter reviews technical information, it is easily understood and emphasizes the importance of "refueling" habitat for the migrants, where they can quickly deposit body fat.

Richard Kane wrote the fourth chapter, an intimate discussion of key migrant bird habitats and localities in New Jersey. Again, diversity is an important theme, from estuaries and freshwater wetlands to forests and farmlands. An illustrative migration calendar for the state shows that the spring and autumnal migratory movements of various species involve all months of the year.

In Chapter 5 Dunne reviews some of the well-documented declines of migrants from long-term studies in New Jersey, West Virginia, and other states. He concludes with a chapter of specific land-use recommendations, with argument that migrant birds should be given the same level of conservation and management interest as nesting birds, for both game and nongame species. The recommendations touch on many subjects, from landscape ecology to gypsy moth aerial spraying programs and even environmental education. Many of the major management suggestions have been aired recently by other advocates as well, but this book does so at the conclusion of a well-laid background from the earlier chapters. Many of the management ideas are specific and immediately applicable to land-use decisions. Hopefully, the book will contribute to the adoption of many conservation attitudes and practices for migrant birds that, as a group, are threatened. Some readers may criticize the optimism or enthusiasm of general management proposals, but, as emphasized throughout the book, we appear to be in a "now or never" situation (certainly that is the case in New Jersey).

There are two useful appendices. Appendix A is a listing of New Jersey bird species with indications of status for breeding, migration, and wintering in the state, and preferred habitat(s). The information is accurate but abbreviated, being limited by the spacing constraints of the checklist format. Appendix B, by Pat Sutton, provides lists of plant species that are

especially beneficial to birds and other wildlife. The listings include trees, shrubs, and vines, and evaluations of their importance to New Jersey birds.

It is noteworthy that numerous corporate foundations and private sponsors made possible the book's publication and its distribution to many who may influence land-use policy in the Garden State. The book may well serve as a model for those wishing to make applied uses of a variety of ornithological knowledge in the conservation of avian resources, especially preservation of migrant species and their habitats. The book incorporates the strengths of the three authors, who have a breadth of knowledge on bird migrations and migrant research as well as an intimate familiarity with conservation and environmental needs in New Jersey. It is readable, albeit sobering, and its popular appeal is enhanced by the abundance of fine photographs and illustrations.—CHARLES LECK.

North American/World Birdbase. Version 2.—Santa Barbara Software Products. 1990. Santa Barbara, California (phone 805-963-4886). Two IBM DOS-compatible 5.25-inch diskettes (or one 3.5-inch diskette), and a 70-page user's manual. $59.96 (plus $3.00 shipping) for program and North American list; $99.95 (plus $5.00 shipping) for both North American and world lists.—This sounds like a great tool for a hard-core "lister," and it certainly is that. In working through the tutorials, however, I was surprised to find that this software package offers much more than a quick and accurate way to produce life lists or day lists of birds.

Birdbase2 is a sophisticated database management program that is specifically tailored for anyone who works with lists of birds. The program's lists include both English and scientific names. Birdbase2 thus could be used not only for bird-watching lists, but also for creating, for instance, a regional checklist for the island of Guam; for short-cutting the process of typing a long list of birds collected on a field trip to Bolivia; or even for organizing brief species field notes in preparation for writing a regional ornithological monograph.

The "base" for Birdbase2 comprises two computerized lists: the AOU-ABA list of birds of North America and Hawaii, and James Clements' list of birds of the world (an updated version of his 3rd ed. list). These are made accessible by "paging" through the double-column lists using various keystrokes, or by using a simple searching function that can quickly find a desired species either by its scientific binomen or English name. The search function is remarkably fast. While my cursor rested in the section for Casuariidae, I decided to search for the Torresian Crow (*Corvus orru*) near the end of the world list, and my cursor flew to the correct destination in less than a second (using a 386/16 machine with a math coprocessor). XTs or ATs will probably be a bit slower, but still fast enough to satisfy any user.

Another function of the program is that brief notes can be appended to species records. Thus, observations on particular bird species can be added, filed away, dated, and then retrieved a month or a year later. Searches can be made by species name or by date. This makes it a valuable tool for a field-worker wishing to refer back to observations on a particular day, or for collating data on a particular species being studied. These can be selected and printed alone with very little effort.

Complaints? In some ways the program is too heavily hard-wired for listers. The available space for notes in each record is limited to a total of 95 characters (in two small fixed fields). It thus is not possible to record complex foraging or behavioral observations. Still, with some coding, the two small comments sections could be used to advantage. I would have preferred a more open-ended format, which would have allowed biologists to tap in on this resource and adapt it to their varied needs.

The nomenclature and sequence of both lists provided with the program are well-known and widely used (conservative) treatments that I consider the best choice for the intended audience. Better yet, it is fairly straightforward to alter and customize the lists, making corrections, taxonomic and nomenclatural revisions, etc. This means the list never has to go out-of-date.

Operation of the program requires the use of a "key disk" inserted in the A: drive. This guards against software piracy. While this is not inconvenient for most users, one might worry about the integrity of that floppy disk, which may have to suffer years of wear and tear.

This is a great program for people who want to keep lists of birds, and it may find a number of additional uses by resourceful ornithologists interested in organizing field records, brief notes, and distributional data on birds.—BRUCE M. BEEHLER.

OTHER ITEMS OF INTEREST

Rainforests: A Guide to Research and Tourist Facilities at Selected Tropical Forest Sites in Central and South America.—James L. Castner. 1990. Gainesville, Florida, Feline Press. xxxvi + 380 pp., 35 black-and-white photographs, 32 figures, 9 maps. ISBN 0-9625150-2-7. Paper, $21.95 (+$1.50 shipping from Feline Press, P.O. Box 7219, Gainesville, FL 32605 USA).—This is a reference book for those interested in visiting Neotropical rain forests. The book is divided into sections on sites and facilities, information sources, "hands-on" organizations, sources of funding and four appendices.

"Rainforests" is aimed at hardy tourists and beginning graduate students looking for a tropical research project. The section on sites and facilities makes up the bulk of the book, but unfortunately the "selected" in the title means that the book covers facilities in only *seven* countries (Costa Rica, Ecuador, French Guiana, Panama, Peru, Trinidad, and Tobago, Venezuela). Thus, there is no information on sites in such important countries as Brazil, Suriname, Bolivia, or Mexico. Twenty-seven facilities are described in detail (e.g. whether and when electricity is available), and some information is given on the local climate and habitats. Addresses are given for other lodges and research stations. The section on information sources is about 100 pages long and is primarily an annotated bibliography, although it also contains addresses and details on a number of professional and conservation organizations. The "hands-on" organizations of the next section primarily include organizations such as Earthwatch, which provide experience for volunteers and assistance for researchers. The sources-of-funding listing in the final chapter gives addresses and data for 22 organizations, from the National Science Foundation to World Wildlife Fund and private foundations.

"Rainforests" is only moderately useful to the experienced Neotropical ornithologist, but may prove worthwhile in encouraging new researchers to begin tropical projects.—DAVID A. WIEDENFELD.

Natural History and Management of the San Clemente Loggerhead Shrike.—Thomas A. Scott and Michael L. Morrison. 1990. Los Angeles, California, Proc. Western Found. Vertebrate Zool. 4(2): 23–57. ISSN 0511-7550. $5.00.—The authors report on a 5-yr study, conducted between 1984 and 1988, of an endangered subspecies of Loggerhead Shrike (*Lanius ludovicianus mearnsi*) endemic to San Clemente Island, located off the California coast. They document the decline of this already endangered population from 11 pairs in 1985 to 5 pairs in 1988.

Various factors associated with human disturbance, particularly the past introduction of exotic species, have influenced the distribution and abundance of shrikes. The authors identify predation as a major factor that contributed to the decline of shrikes on San Clemente Island. Nearly half (49%) of all nests were affected. Eggs and young were taken by Common Ravens (*Corvus corax*), while nestlings and incubating adults were captured by island foxes (*Urocyon littoralis*) and feral domestic cats (*Felis catus*). Loss of suitable nesting habitat also was identified as a critical factor that affected the shrike population. Grazing by feral domestic goats (*Capra hircus*) has been substantial and has greatly affected the current availability and future potential for nesting sites on the island. The management recommendations focus on maintaining the existing nesting areas through goat removal, restoring large shrubs to the denuded northern canyons of the island, and protecting breeding shrikes and their young from predators.

Many shrike populations have experienced substantial declines, and there is considerable interest among ornithologists and conservation biologists in shrike biology and management. Consequently, this monograph should be well received. The study design is straightforward, the methodology clearly documented, and the results and conclusions clearly presented. I highly recommend this monograph to those interested in conservation-oriented studies of endangered species.—MICHAEL W. COLLOPY.

Social, Sexual, and Pseudosexual Behavior of the Blue-bellied Roller, *Coracias cyanogaster*: The Consequences of Crowding or Concentration.—Martin Moynihan. 1990. Smithsonian Contributions to Zoology, No. 491. Washington, D.C., Smithsonian Inst. Press. iii + 23 pp., 15 figures, 3 tables.—In this short monograph, Martin Moynihan summarizes approximately 150 hours of field observations of more than 200 Blue-bellied Rollers in the Basse Casamance, Sénégal, West Africa. The data section contains a wealth of roller natural history information, although Moynihan did no mist-netting and his populations were not color-banded.

The data section begins with a thorough description of the roller and its behaviors (e.g. habitat use, feeding, and interactions with other species). Descriptions of intraspecific interactions of the Blue-bellied Roller follow, and include displays, various postures used in aggression and mating, and details of song. Sonograms of nine different vocalizations are included.

As a preface to his ideas on pseudosexual behavior, Moynihan discusses attributes of group size, group composition, sexual behavior, and population densities in Sénégalese Blue-bellied Rollers and compares them with similar species. According to Moynihan, "pseudosexual behavior" or "pseudocopulation" is sexual behavior that occurs during the nonreproductive period or is altered such that fertilization is doubtful. The author tries to explain the adaptive significance of these behaviors, suggesting that pseudocopulations may serve to canalize aggression between close relatives or potential aggressors to "control aggression and the dangerous consequences of overt fighting."

The idea that sexual behavior might be used to control aggression is interesting. However, it should be remembered that nonreproductive sexual behaviors may serve many other functions as well, such as establishing and maintaining pair bonds. This monograph presents mostly anecdotal or equivocal observations that are not used to discriminate between hypotheses or quantify the effects of pseudocopulation on aggressive behavior. Moynihan's observations are

the basis for an interesting hypothesis; the testing of his notion hopefully will follow.—JOHN DUMBACHER.

African Birds of Prey.—P. Pickford, B. Pickford, and W. Tarboton. 1990. Ithaca, New York, Cornell Univ. Press. 227 pp., color plates. ISBN 0-8014-2515-8. $45.00.—This volume is a showcase for the Pickfords' photographs. There are 82 species of raptors pictured, all in natural settings. The images differ in size for no apparent reason, and there are frustrating cases where plumage variants (color forms) are mentioned but not illustrated. The book is attractively produced.

The text by W. Tarboton is vague in its focus. The theme is natural history, but the accounts range widely and Tarboton often is distracted by details of taxonomy, size comparisons, or banding data. The juxtaposition of information in the narrative is sometimes distractive and borders on the trivial (". . . is the largest known bird of prey that hovers regularly"). He does attempt to provide details of distribution, social behavior, and nesting biology.

An appendix includes distribution maps, flight silhouettes, and statements on habitat, status, food, voice, etc. These are absolutely minimal in content.

The book is intended for travelers, casual birders, and "raptor enthusiasts." The authors attempt to avoid treating their "subject on a documentary level" because it would be "an act devoid of sensitivity." The photographs are adequate, and serve well as portraits. There is no literature cited or suggested reading for further exploration of either the birds or the "strong plea for preservation" included in the text.—A.H.B.

A Monograph of the Pheasants.—William Beebe. 1990 (reprint of 1918–1922 originals). New York, Dover Press. Four volumes bound as I & II. xlix + 1,232 pp., 90 color plates, 184 black-and-white photographs, 20 maps. ISBN 0-486-26579-X and 0-486-26580-3. $50.00 each.—Beebe's volumes represent a milestone in the line of monographs on pheasants that began with D. G. Elliot (1872), includes Delacour's (1951) works, and tracks directly to Johnsgard (1986, and below). There has always been widespread interest in this group because of their desirability as game birds, their occurrence in some of the world's more exotic localities, and their commercial value. These authors cover much of the material intellectually, but aesthetically they are worlds apart. Beebe led a large expedition, sponsored in part by private benefactors and in part by the New York Zoological Society. He spent 17 months in Asia and the East Indies and eventually visited more than 20 countries. His team included an artist who painted only the landscapes used as background. Close to 100 "species" are included, with illustrations by six artists.

Beebe writes in the grand style of the late 19th century. A typical account begins, "It is two o'clock in the morning in the wilderness of South Ceylon, and darkness and silence claim the whole world. From the porch rafters of a native house my hammock sways gently, and I twist around and peer out between the meshes. For a very long time there is absolute silence. Then far off there come a series of falsetto shrikes and wild, inarticulate cries . . . ." Well, this isn't mtDNA or multivariate statistics. You know you are in for an interesting species account. We don't get writers like Beebe in the technical literature, at least not frequently. By contrast, the species accounts are descriptive, and presumably accurate, although one might argue that sample sizes are small. The general text includes a history of the name, anecdotal accounts of behavior, reports of earlier workers and hunters, and even comments on the history of particular taxa as captive birds. There is a melange of information, including descriptions of known and alleged hybrids. With the original large typeface, the volumes, despite their mass, are difficult to put down.

Beebe struggled with Darwinian evolution. He seems to find the relationships between evolution and systematics elusive. He dismisses the importance of variation by frequently using the subspecies designation. I have the impression that splitting taxa, to give each "new" bird a unique identity, was, in part, due to their value to collectors and aviculturists. He admits that "From osteological to plumage characters all show such variation that any gradual transition from genera to genera seems hopeless." In spite of the vast overlap in characters observed, he frequently chose, rather arbitrarily, to separate taxa. While Beebe appreciated the variation of characters, and different degrees of variation in some characters as compared with others, he did not consistently use this information. He admits early that establishing a geneology (in the sense of a phylogeny) is hopeless for these birds.

Dover has found a market reprinting books in many areas, and their list now includes 4,000 titles. They are probably best known in ornithology for the Bent life history series, and recently produced J. C. Phillips' "A Natural History of the Ducks." The color plates in both works are magnificent and represent some of the best 20th-century bird artists. Dover does well (Forbes, Sept. 1990: 179), and the public benefits by having classics available at reasonable costs. Their titles are mostly in the public domain and sales may be only modest, but the Beebe volumes are important historically and their availability is welcome.—A.H.B.

The Quails, Partridges, and Francolins of the World.—Paul A. Johnsgard. 1988. New York, Oxford Univ. Press. 264 pp., 127 color plates (mostly by H. Jones, from the collection of the Zoological Society of London), 22 figures, 42 distribution maps. ISBN

0-19-857193-3. $89.00.—Like Beebe's monograph on the pheasants, Johnsgard treats three important groups of game birds. The accounts are thorough and include comments on identification, general biology, social behavior, reproduction, status and conservation, and evolutionary relationships. Johnsgard is a keen field observer and understands the nature of the evidence used in taxonomy. Further, he has contributed to the primary literature and has an extensive knowledge of the literature, which gives him high credibility.

This volumes covers slightly more than 130 species in 32 genera. Johnsgard deals well with the systematic problems in the two subfamilies. In addition, he claims this to be the only attempt in this century to illustrate all species in color and map their distribution. It is also an extraordinarily useful survey of the biology of this group. This volume maintains the quality of Johnsgard's previous work.—A.H.B.

Current Ornithology, Vol. 7.—D. M. Power (Ed.). 1990. New York, Plenum Press. 388 pp. ISBN 0-306-43307-9. $75.00.—Dennis Power and his four-person board of editors have managed to find 14 authors who, together, have produced another excellent volume in this series. Of the eight chapters, my favorite is "Food storing in birds: an evolutionary perspective" by A. Kallander and H. G. Smith (University of Lund, Sweden). It is an exceptionally scholarly treatment of a topic that is fragmented in the literature, difficult to study, and often subject to anthropocentric interpretation. The most timely contribution is on "Population declines in migratory birds in eastern North America." The authors, R. A. Atkins, J. F. Lynch, and R. Greenburg, present an even-handed treatment of a potentially emotion-laden topic. They are careful to dissociate cause and effect and not to point fingers. The problem is not simple, especially when applied to species with diverse life histories, and there is still controversy on how best to recognize and measure declines. Their analysis was limited to forest-dwelling birds for a variety of reasons, one being the availability of long-term data. Their recommendations are sound, the problems with census and statistical techniques notwithstanding. The patterns that emerge are a matter for concern.

There is a scarcity of state-of-the-art reviews or theoretical papers in many subdisciplines of organismal biology. Ornithology is fortunate for this series and others such as "Avian Biology" (Academic Press). Both have a record of presenting valuable, timely papers. The origin of good papers is a constant concern for editors. Journal contributions usually appear "over-the-transom," and editors cannot influence either the topic or the author. This is not the case with invited reviews. Review series also offer an opportunity to publish manuscripts that are longer than the average journal article and for authors to be bolder in their speculation. There are, of course, a different set of problems in setting and meeting deadlines. There are different headaches for the different authors. So Plenum, and Dennis Power, have found a niche. The community of editors, authors, and readers wish them well. The series should be in every library, although at $75.00 for 388 pages the volumes are pricey. Unfortunately, this is not a new trend in science publishing and is a topic better dealt with elsewhere.—A.H.B.

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