REVIEWS

EDITED BY WALTER BOCK

The evolutionary ecology of animal migration.—R. Robin Baker. 1978. New York, Holmes and Meier. xxii + 1,012 pp. $85.00.—Before discussing the merits and shortcomings of this book, a few words about the author seem appropriate. Prior to this work, Baker was best known to students of animal migration from a series of papers on butterfly migration and orientation he published in the late 1960's. He completed his Ph.D. thesis on the evolution of migratory habits in British butterflies at Bristol University in 1968, and 4 yr later began work on this volume. Baker suggests in the last paragraph of his acknowledgements that the timely, but far from favorable, comments and publications by some of his colleagues related to his insect migration work helped to maintain the motivation and drive necessary to complete a work of this size. This huge volume was apparently completed early in 1976.

Baker divides the book into three parts. In Part I (Chapters 1–6: pp. 3–34) he addresses the various definitions of the term migration, discusses the variation in some components of migration (e.g. seasonal change in geographical range, return movement, direction, periodicity, and distance), and ends by presenting a detailed treatment of the individual and group characteristics of migrants. The overriding impression one gets from reading Part I is that migration has meant and still means very different things to different investigators. To most ornithologists migration is characterized by the movements from and return movements to breeding areas that show seasonal fluctuations in favorability. To many entomologists the return movements are not necessary and in fact are not possible because of the short life span of most insects. Clearly the definition problem is the result of varying degrees of scientific myopia, and there is a great need to put the phenomenon of animal migration in its proper behavioral, ecological, and evolutionary perspective. Although Baker attempts this task, in the end he offers no satisfactory solution. He defines migration as the act of moving from one spatial unit to another—a hopelessly general definition that begs for additional qualifications. Baker unfortunately places too much emphasis on terms and not nearly enough time or emphasis on the concepts to which the terms apply. A treatment of migration in terms of population genetics and ecology would have greatly strengthened this section and eliminated the rather poor treatment of the interrelationships of dispersal, migration, and convergence (Baker's term for immigration). One would do better to read the pertinent sections of T. R. Southwood's paper (1977, J. Anim. Ecol. 46: 337–365) and that of L. R. Taylor and R. A. Taylor (1977, Nature 265: 415–421). These papers offer a different emphasis to the study of animal migration than Baker's Part I, despite some bothersome but tolerable entomological biases.

In Part II of the book (Chapters 7–13: pp. 35–88) Baker develops a migration model that attempts to put the incredibly diverse observations of animal migration into a total evolutionary context. I suspect this is the reason for the ever-so-popular terms "evolutionary ecology" in the book's title. Baker's model is a rather straightforward optimality model, and it relies heavily on the marginal value theorem of microeconomics, as have a number of models emphasizing cost-benefit analysis in behavioral ecology. The model predicts that an animal will migrate (reach the migratory threshold) when the expected gain in fitness for moving is higher than that for staying. The way that the selection associated with the advantage of migration can act on an animal to produce migration thresholds to habitat, migration costs, and indirect variables is next considered. This is followed by a discussion of the interrelationships of thresholds for migrations that fulfill different functions, and the way that these thresholds differ among species and among different age and sex classes within a species. The last two chapters in Part II cover the ways that the behavior of an animal during migration could be shaped by selection to produce a strategy that is optimal for a given situation. Although Part II is largely theoretical it is also basically qualitative, and some quantitative derivations would have greatly strengthened the theory.

Part III (Chapters 14–33: pp. 91–922) is the largest in the book, and contains nearly all of the extensive natural history observation related to animal migration. According to Baker most of this information is included to substantiate and expand the theoretical considerations and models presented in Part II. Part III is divided into two subsections. The first (267 pages) deals with removal migrations—movements away from one spatial unit not followed by a return. These movements may be calculated (to a specific destination that is known to the animal at the initiation of the migration) or non-calculated (without information about destination at the beginning of the migration). Exploratory migrations beyond the limits of an animal's familiar area during which the ability to return to the familiar area is retained are also included. Baker states that the eventual aim of any study of migration is an understanding of the factors involved in the initiation of removal migration, because the lifetime track of an animal can be thought of as a succession of removal migrations.

Attempts to analyze the various forms of lifetime track manifested by different members of the animal kingdom make up the bulk of the second section of Part III (563 pages). The selective pressures that act to produce the two major forms of the lifetime track, the linear range and the limited-area range, are discussed first. The different mechanisms involved in the execution of a linear range by a variety of animals including the phenomenon of re-migration are explored, and the best known form of lifetime track, that in which the animals perform a regular, seasonally or ontogenetically synchronized, return migration, is examined in great detail. The final chapter in this section deals with the orientation and navigation mechanisms of seasonal and ontogenetic return migrations.

The format of the book is in keeping with its size. The table of contents runs for 13 pages. Each page of the text contains two columns, and numerous tables summarize migration data for the species in particular taxonomic groups. Every portion of the book is copiously illustrated with maps, graphs, diagrams, photographs, and ink drawings of animals referred to in the text. Frequently the figure legends, set in very small type, are over a page in length, and generally contain an incredible amount of textual material. Each of the 45 pages of references is arranged in double columns, and each reference gives the pages in the text where the work is cited. A triple column format is used in the geographical index (6 pages) and the subject index (14 pages). A taxonomic index of 24 pages is arranged in double columns with small ink drawings of animals that appeared previously as larger text figures.

Information on birds occupies approximately 170 pages of text, including Chapter 27, which is a detailed treatment of the seasonal and ontogenetic return migrations of birds. The coverage is badly out-of-date. Most of the references are dated 1972 and earlier, and although a 1976 paper by Wiltschko and Wiltschko is cited, it is done so only parenthetically and with no elaboration. No reference is made to the excellent review papers by Berthold, Emlen, and Gwinner in volume 5 of *Avian biology* (1975) or Griffin's 1969 paper on the physiology and geophysics of navigation. Even though olfaction is discussed, no reference to the recent work on the use of olfaction by homing pigeons appears in the bibliography. Keeton's 1974 review of the orientation and navigational basis of homing in birds in *Recent advances in the study of behavior* is also missing from the references. The brief treatment of the physiology of bird migration is very incomplete (e.g. the only reference to the work of King and Farner is a paper published jointly in 1965). If a reader wishes more current information on bird migration and orientation I strongly recommend *Animal migration, navigation, and homing* (1978, K. Schmidt-Koenig and W. Keeton, Eds., Springer-Verlag) and *Current bird migration research* (1978, T. Alerstam, P. Enckell, and S. Ulfstrand, Eds., Oikos vol. 30, no. 2).

The book is valuable because it attempts a compilation of the vast literature on animal migration and orientation. The sections on bat, pinniped, and cetacean migrations are some of Baker's best, but the coverage of the literature is in general incomplete and in most instances not very current. Inclusion of Jander's fine paper on the ecological aspects of spatial orientation in animals (1975, Ann. Rev. Ecol. Syst. 6: 171–188) would have been a valuable addition to the treatment of animal orientation and navigation. Despite the amount of published literature on animal migration and orientation, the length of the book is excessive. A number of factors are responsible. Baker's writing is wordy and very repetitious. In discussing a particular topic he often goes astray and devotes considerable space to relatively trivial matters or repeats a lengthy discussion that was given in an earlier chapter. The book includes far too many useless illustrations (e.g. at least three nearly full page photographs of gorillas in a forest, a large photograph of the lunar rover on the moon, and a sizable photograph of a moving van). Consequently, there is too much illustrative material for the serious professional and too much tedious jargon for the educated layman. Baker should have directed his book to only one of these audiences; instead he misses both.

From its size alone Baker's book has the potential of having a major influence on future studies of animal migration, but I sincerely hope that this will not happen. Although the book may be viewed as a valuable reference to the literature, it does little to advance our udnerstanding of the subject. In Baker's honest attempts to do so, he may have actually done a disservice to naive students interested in asking "why" and "how" questions about migration. My reason for saying this is based primarily on Baker's failure to integrate thoroughly the fields of population genetics and population ecology into his subject. A treatment of the evolutionary ecology of animal migration cannot possibly succeed without doing so.—SIDNEY A. GAUTHREAUX, JR.

Behavioural ecology. An evolutionary approach.—J. R. Krebs and N. B. Davies (Eds.). 1978. Sunderland, Massachusetts, Sinauer Assoc. xi + 494 pp. $27.50.—I recommend this book to everyone interested in bird behavior. Although it is about the behavior of animals in general, birds receive more

attention than any other group. Half of the contributors to the volume are ornithologists, and one quarter of approximately one thousand references are ornithological.

Fourteen chapters are organized under three headings: Predators and Prey; Sex, Mating and Signals; and Strategies in Space and Time. Each chapter is a thoroughly modern, readable, review of a topic, written to capture and hold the attention of upper level undergraduates but serving also, in the words of the editors, to "contain enough by way of new ideas and reviews to be of interest to research workers in behaviour and ecology." The book is primarily about behavior and secondarily about ecology. It really should be called something like "Animal Behavior, an Evolutionary Approach," but that title was preempted by John Alcock in 1975. The sources of inspiration have been the writings of evolutionary theorists such as W. D. Hamilton, J. Maynard Smith, R. L. Trivers, G. C. Williams, and E. O. Wilson, rather than classical ethologists (N. Tinbergen being an outstanding exception). Most authors ask questions of why animals behave in the way they do. It is fitting that the chapter dealing with populations most explicitly, written entertainingly by Henry Horn on life history tactics, is the last one. It is the only one that is primarily ecological. Being slightly out of place, it points to the need for a synthesis of behavior and ecology in an evolutionary context.

I found Stephen Emlen's chapter on cooperative breeding in birds to be especially well organized and clear. This complex subject is summarized and illustrated with several case histories. Some original analyses are given, including a demonstration that the incidence of helping at the nest by Australian Superb Wrens decreases as the proportion of reproductive females increases. Behavior is given a good ecological perspective; demography is even mentioned! The chapter concludes with the development of six hypotheses to explain the evolution of cooperative breeding. These should serve as an extremely useful framework for organizing future studies of cooperative breeders.

Likewise J. R. Krebs provides a clear and informative summary of another complex subject, the application of optimal foraging theory to animals, mainly birds. He discusses the laboratory and field evidence for optimal choice of food types, the effects of patchiness and resource renewal on search paths and diets, and such ecological consequences of optimal foraging as resource partitioning by competitors. There are serious difficulties with the theory, some of which are pointed out without equivocation; nevertheless the author ends on an enthusiastic note that characterizes the spirit of the book as a whole: "I take the optimistic view that in spite of all these difficulties, optimal foraging theory is by no means a failure in predicting how predators make decisions."

In a chapter on habitat selection, Linda Partridge summarizes experimental evidence, including her own, demonstrating how birds choose a habitat or part of a habitat to exploit, how preferences develop, their adaptive significance, and implications for speciation theory. This area of research has certainly evolved since the pioneering descriptive studies were made by D. Lack, A. H. Miller, and G. Svärdson, yet even now it seems to attract less attention from experimental biologists than other subjects treated in this volume, and not for want of theory.

Territorial behavior is given detailed treatment by N. B. Davies. His chapter is structured to answer four questions: how do we recognize a territory; what are its functions and consequences; what determines territory size; and how are territories defended? Davies recognizes a territory when individuals or groups are spaced out more than would be expected from a random occupation of suitable habitats. This bypasses some difficulties encountered when trying to measure 'defended' or 'exclusive' areas, but runs into others, such as providing an operational definition of suitable habitat. There follows a review of attempts to study costs and benefits of holding territories. The best are from studies of nectar-feeding birds. The factors giving rise to unequal mating success of males are considered next, and the conclusion is reached that the problem of what the females choose—a male, a territory, or both—is unresolved. In fact W. K. Pleszcznska (1978, Science 201: 935–937) has shown that female Lark Buntings (*Calamospiza melanocorys*) respond to habitat features in deciding where to breed, so in this species choice of a male is apparently secondary to choice of a particular place. Interspecific territoriality is dealt with succinctly. Davies comes down on the side of it being adaptive to both of the participating species. But like J. Verner's super-territory concept, which is also discussed, the issues are complex and deserve more discussion. Finally, after a consideration of density-limiting effects of territorial behavior, the chapter ends with a discussion of why one animal should obey the "keep-out" signals (e.g. song) of a territorial neighbor.

J. Maynard Smith invented Evolutionary Stable Strategy analysis several years ago to deal with the more general form of this question, the question of why an animal capitulates in a ritualized (as opposed to physical) contest. A clear exposition is to be found in the chapter by R. Dawkins and J. R. Krebs on animal signals. It is the most provocative chapter in the book. If you embraced the concept of the selfish gene with enthusiasm, you will be delighted to learn that genes are cynical too. They encode behavior

which misinforms an audience, thereby allowing the bearer to manipulate its colleagues for its own selfish purposes. According to the argument, birds keep out of other territories because they are misinformed about the numbers of their neighbors by the large vocal repertoire each possesses. This in turn gives them an incorrect assessment of the probability of being attacked if they stray from the stockade. The chapter is explicitly anthropomorphic. The ideas may be wildly wrong but they are cogently argued. They had a strange effect on me, however. The authors establish a link between animal signals and human advertising where the goal of the advertiser is to persuade. Because the entire chapter is a piece of advertising for a particular point of view, I was left at the end with the curious feeling that the authors might be mere unwitting vehicles of their own cynical genes, reciprocating altruistically, of course, but not with us. Forgive them their genes, for they know not what they do.

In a chapter on sexual selection and mate choice, T. R. Halliday surveys the ideas and evidence that mating systems and the distribution of parental investment between the sexes are dependent on two classes of factors; ecological factors, such as food availability, and intrinsic factors, most important being the difference between the sexes in the size and number of their gametes. The intrinsic factors are elaborated by J. Maynard Smith in a chapter on sex. Other chapters, with varying degrees of relevance to the study of birds, deal with group living (B. C. R. Bertram), defences against predators (P. H. Harvey and P. J. Greenwood), searching for mates (G. A. Parker), decision making (R. H. McCleery), and insect sociality (B. Heinrich).

I have two general comments to make about the content of the book. First, I was struck by the large number of statements of the form "If variation in the observed behavior has a genetic basis, we can make the following adaptive argument." It seems that behavioral genetics has made little contribution to the topics discussed in this book, although more than is evident here. Second, there is a profound division of attitudes or philosophies among evolutionary biologists at present that is not reflected in this book. The debate concerns whether the optimization approach to understanding evolution is useful, in a scientific sense, or not. The controversy is not apparent in the book because most authors either do not question the usefulness of the approach or ignore it. Yet there are serious problems that have been raised mildly and sporadically in the past, but pointedly and acerbically more recently by R. C. Lewontin (e.g. 1979, Behavioral Science 24: 5–14). These objections certainly apply to this volume, where several adaptive explanations are dangerously close to being empty by leaving virtually no room for alternatives. J. Maynard Smith (1978, Ann. Rev. Ecol. Syst. 8: 31–56) has written an eloquent if not entirely successful rejoinder to Lewontin's objections. Both papers provide valuable/essential supplemental reading to this volume.

The illustrations are excellent, and the writing is generally very clear and surprisingly uniform in standard and style. I suspect the editors took their job seriously. They have succeeded in making this more a book than a collection of articles by extensive cross-referencing and by introducing each of the three major sections with a helpful scene-setting prelude. I noticed only one typographical error, one figure without a legend (following 11.7), one confusion concerning functional and evolutionary questions (p. 317), one piece of obscene jargon, and one piece of cumbersome jargon (explosive female access polyandry; EFAP!). The goal of stimulating an interest in the subject at all levels from undergraduate to senior research worker is likely to be fully met by this welcome book.—P. R. GRANT.

Check-list of birds of the world. Volume I, second edition.—Ernst Mayr and G. William Cottrell, Eds. 1979. Cambridge, Massachusetts, Museum of Comparative Zoology. xvii + 547 pp. $30.00.—With the first volume of Peters' Check-list (1931) being long out-of-date and long out-of-print, Ernst Mayr decided some years ago to organize a second edition. The results of his efforts, together with the contributions of a dozen other ornithologists who authored the individual sections and that of G. William Cottrell, who co-edited the work, are shown in this thick volume.

A comparison of revised volume I with the other volumes of "Peters' Check-list" will show that it is the best edited volume of the set, with accurate summaries of geographical ranges, extensive citation to recent literature of individual taxa, etc. Most of the credit for this accuracy and detail must go to Mr. Cottrell, who did a magnificent job as copy editor, spending long months in the MCZ library. No detail was too small to escape his attention. This editorial care, which is shunned by too many of us, makes the difference between a good and an outstanding work, and is what will make this volume of Peters' more useful and valuable to all ornithologists. Because he is an editor of this work, proper recognition of Mr. Cottrell's contribution could not appear in the introduction of Volume I; I take this opportunity to do so and to express special appreciation to Mr. Cottrell for a difficult job well done.

No cut-off date has been given for the manuscripts as had been the custom in all previous volumes of

"Peters' Check-list." It may not have been possible to provide a single cut-off date for this volume because the individual manuscripts were completed over a number of years. The best solution might be to give the date of completion of the manuscript for each taxon along with the author's name, thereby providing the needed information on which taxonomic and nomenclatural changes were available to the author. John Farrand informed me that he found only one name known to him, an Oberholser name from "The birds of Texas," that was not included in the synonymies.

The difference that is seen immediately between the two editions is the much larger size of the second, which has 200 more text pages. This increase is in spite of a reduction of 63 genera and 54 species in the second edition. Part of this change is due to a larger type face used in the second edition, but most of the increase results from the greater amount of information provided. Range descriptions are more detailed, synonymies are more complete, many more footnotes are included, and far more references are provided. These changes represent important improvements and make this new edition of greater value to many more ornithologists.

Each author was responsible for the taxonomy of the group he was assigned; no changes were made by the editors. This policy follows that adopted for the later volumes of Peters' Check-list under Mayr's editorship; it results in greater variation than seen in the first edition. Some major modifications from recent classifications are obvious. The large ratites are placed in a single order, Struthioniformes, and the tinamous in a separate order, Tinamiformes; these orders are not placed in a separate superorder. The Sphenisciformes are not separated in a monotypic superorder and are placed following the Procellariiformes. *Pandion* is placed in a subfamily, the Pandioninae, of the Accipitridae. And the Anseriformes follow the Falconiformes to position them next to the Galliformes, which are the first group in Volume II. Individual workers may object to aspects of the arrangement of orders and families or to details of the classification of particular families, but a discussion of these details is out of place in this review. My only comment is a technical one relating to the division of a family into tribes (e.g. the Ciconiidae). It is not clear whether the category "tribe" can be used as well as the category subfamily for a group of genera; my preference is to restrict the use of tribes as a subdivision of subfamilies.

A most important addition in this volume is the notation (with footnotes) of those species that comprise a superspecies. These should be noted carefully. The introduction to the Falconiformes should be read carefully as the use of parentheses enclosing species names to designate "megasubspecies" is explained (p. 273) as well as the history of this section.

I am sure that I speak for all ornithologists in expressing strong appreciation and thanks to Ernst Mayr and his collaborators for their work in preparing this fine volume. Hopefully, a program will be established to prepare and publish second editions of the later volumes of Peters' Check-list at regular intervals.—WALTER J. BOCK.

Check-list of birds of the world. Volume VIII.—Melvin A. Traylor, Jr., ed. 1979. Cambridge, Massachusetts, Museum of Comparative Zoology. xv + 365 pp. $25.00.—With the publication of volume 8, the penultimate volume of Peters' "Check-list," the final work of John T. Zimmer is available to ornithologists. At the time of his death in 1957, Zimmer had almost completed the manuscripts of the New World families of the Tyrannoidea—these fill 310 of the 336 text pages of this volume. In addition to the New World Tyrannoidea, this part of Peters' "Check-list" includes the Pittidae, the Philepittidae, the Acanthisittidae, and the Menurae (the Menuridae and Atrichornithidae); these Old World groups are authored by Dean Amadon and Ernst Mayr.

Because Zimmer dealt only with the species and subspecies in his revisions for the family treatments the "Check-list," and had accepted the long outdated generic and familial classifications of Hellmayr's "Catalogue of Birds of the Americas" (1927–9), the editors of Peters' "Check-list" felt that his manuscripts should be revised before publication. Fortunately, Melvin Traylor agreed in 1971 to undertake the task of preparing a revision of the Tyrannidae and to edit the entire volume. He was able to obtain the assistance of David Snow, who agreed to revise the Cotingidae and Pipridae. Revisions of these families were completed and published separately. These revisions dealt mainly with questions of familial assignment of problem genera and with generic revisions. Zimmer's treatment of subspecies of New World families were accepted uncritically unless questioned in a recent publication or by a colleague (in litt). The matter of species revision was left somewhat vague, with no definite statement given in the introduction. Traylor did not treat species in his "A classification of the Tyrant Flycatchers (Tyrannidae)." Snow followed the policy in his revisions of the Pipridae and of the Cotingidae of recognizing distinct but allopatric forms as separate species, and indicating the members of superspecies (designated as zoogeographical species, e.g. p. 245). Thus the species and subspecies of the Tyrannidae, the Pipridae, and the Cotingidae represent the treatment of Zimmer done prior to 1957. Mayr (p. 310) mentions that

no adequate revision exists for the Pittidae and that many of the subspecies listed in this volume may have to be synonymized eventually. I must hasten to add that the treatment of species and subspecies in this volume is not as old as my statements above imply. As stated by Traylor in the introduction, Zimmer's knowledge of South American birds was superb nnd equalled only by his scholarship. Moreover the authors endeavored to obtain the most recent information and assistance from their colleagues; thus, the treatment of *Myiarchus* follows Lanyon's recent detailed analysis, that of *Tyrannus* is based on W. J. Smith, that of *Todirostrum* and allies is based on Fitzpatrick, etc. Yet it is clear that much work remains to be done on these and other New World nonoscine passeriforms before the species and subspecies limits are well known. One needs only to note on p. 47 where an unnamed subspecies of *Anairetes flavirostris* is listed, or that *Tyrannus couchii* (p. 223) was shown to be distinct from *T. melancholicus* by Traylor in a poster paper at the 17th International Ornithological Congress in June 1978 (see Auk, 96: 221–233, 1979).

The short discussion of the higher classification of these groups shows clearly the nature of the problem and the difficulties in reaching a satisfactory solution. Quite wisely the editors of Peters' "Check-list" decided to follow the Wetmore classification, which maintains consistency with volume 7. I should note one minor slip (p. viii) in that the articulation discussed by Olson in his study of the Eurylaimidae is the quadrato-jugal, not the quadrato-mandibular (jaw), articulation.

The cut-off date for the manuscripts is given as 31 December 1977, indicating that taxonomic and nomenclatural changes published prior to this date have been included. John Farrand informed me that he found only one name known to him, an Oberholser name from "The birds of Texas," that was not included in the synonymies.

Although most ornithologists will have little opportunity to use this volume directly, all of us will benefit from it. A real thanks of appreciation must go to Mel Traylor for the huge amount of careful work he devoted to this work, as well as to David Snow for his treatment of the Pipridae, the Cotingidae, and several flycatcher genera, and to all others who assisted in preparation of this volume. I would like to mention specially the great effort of Ernst Mayr toward completing this important ornithological reference work. But most of all, ornithologists must acknowledge their debt to John T. Zimmer, who completed the basic work for this volume. It is entirely fitting that volume VIII of Peters' "Check-list" is dedicated to him.—WALTER J. BOCK.

A field guide to the nests, eggs and nestlings of North American birds.—Colin Harrison. 1978. Glasgow, Collins. 416 pp., 64 color plates, many line drawings. $11.95.—Despite the reprinting of Chester Reed's archaic and generally useless 1904 book, "North American Bird Eggs," by Dover in 1965, this continent has never really had an adequate, inexpensive guide to its bird eggs. Colin Harrison's book is an attempt to fill this gap, and it is also intended to serve as an identification guide to North American bird nests and nestlings. It is identical in format to the author's previous work on the nests, eggs, and nestlings of European birds.

Following a strong (and appropriate) plea to the reader to avoid the deliberate or unintentional disturbance of nesting birds, the book begins with an introductory chapter on the main ingredients of avian reproduction, including discussions of nest sites and nest building, breeding seasons, eggs, incubation, nestlings, and nestling periods. This material, which is geared for the amateur user, was lifted virtually entire from the earlier European book, but with the substitution of well chosen North American examples.

Identification keys to nests, eggs, and nestlings follow, but they are of doubtful utility. I question the usefulness of a key so coarse-grained that the nests of such dissimilar species as pelicans, ospreys, chachalacas, Great Gray Owls, and Piñon Jays end up in the same final category. Although a prominent footnote states that the Marbled Murrelet is not included in the keys, that species is found in two of them, whereas most common birds are either omitted or appear only under the blanket of a substantive name (e.g. "some sparrows," "most titmice," or "gamebirds").

The bulk of the book is devoted to over 600 systematic species accounts that include information on nests, breeding seasons, eggs (including clutch size, shape, texture, color, and average dimensions), and on incubation, nestling, and post-fledging periods. This material is presented concisely and in a consistent manner from one account to the next.

The great debt (which is acknowledged by the author) owed to the now fashionably maligned A. C. Bent's "life histories" series in the compilation of the species accounts can scarcely be overemphasized. The majority of the accounts appear to be simply distillations of the meat contained in the respective Bent treatments. Indeed, providing a synopsis of this information in a single volume may be the most important contribution of Harrison's book.

Where the author could not locate information on some aspect of a species' breeding biology (e.g. the

length of the incubation period), this is indicated in the species account. In those instances where this reveals real gaps in our knowledge, it will hopefully stimulate observers to take to the field to obtain the missing information. In some cases, however, the gap may merely reflect an unfamiliarity with the North American literature, since a number of excellent post-Bent single species studies (e.g. those on the Black-capped Vireo, Swainson's Warbler, Olive Warbler, and Golden-cheeked Warbler) were apparently overlooked.

Much to the despair of those who write their texts, field guides generally live or die according to the quality of their plates. In this volume, the 48 color plates of eggs, portraying 622 eggs representing over 500 species, are highly variable in their usefulness, ranging from good (hawks, eagles, tyrant flycatchers) to hopeless (wood warblers). In general, the plates for the eggs of most of the non-passerine species are probably adequate to permit their identification from this book. The egg plates for the passerine families are more uneven in quality, and I suspect that most users will find it impossible to separate the eggs of the more difficult groups like sparrows, wood warblers, or vireos.

Some plates (e.g. loons, corvids) are badly underexposed in my copy and present a dismal contrast to the equivalent ones in the European guide. Other illustrations are either misidentified or are so atypical that they are useless for identification purposes, including at least those called Black Hawk, Lesser Nighthawk (9b), Black Swift, Yellow-bellied Flycatcher, Varied Thrush, Golden-winged Warbler, Tennessee Warbler, Olive Warbler, Gray-crowned Yellowthroat, Hooded Oriole, Western Tanager, and Henslow's Sparrow.

A further weakness of the egg plates is an irritating inconsistency in the size of the scale used. This is particularly confusing when comparing eggs of similar species that appear on different plates (e.g. the scaups on plates 24 and 25), or even on the same plate (e.g. plate 59 of the wood warblers). Size relationships are reversed for certain pairs of species (e.g. Long-tailed and Parasitic Jaegers, plate 40), and are somewhat misleading for many others. Some of the problems are caused by the inevitable difficulty of selecting a single "typical" example from a series of highly variable objects. In certain cases, several examples are shown of the eggs of a single species, and these are generally well chosen, both in regard to the species so illustrated and in the choice of eggs to show the range of variation.

There are a number of black-and-white line drawings of nests sprinkled through the text. These are totally non-diagnostic but innocuous, except in the case of the bushtit nest (p. 221). It is erroneously shown as an oriole-like purse with a large opening at the top, instead of having a small entrance hole "on one side of the top," as is correctly described in the text. The nest descriptions are concise and accurate, but they can hardly stand alone as a field guide in the conventional sense. Persons wishing to identify nests of North American birds would be better advised to obtain *Hal* Harrison's "A field guide to birds' nests in the United States east of the Mississippi River" (a companion guide for the West is expected imminently).

Certainly one of the strongest points of *Colin* Harrison's book is the excellent 16 color plates of nestlings by Philip Burton. One wishes for more of them, as only 147 species, mostly precocial forms, are shown; however, examples of all major groups are included. The color plates of nestlings are supplemented by line drawings of the dorsal patterns of confusing downy young in the text. In at least one instance (Pied-billed Grebe), there is a considerable difference in the appearance of the downy young in the color plate and the two shown in black-and-white.

The comments included in the captions to the plates of nestlings are particularly useful, since they deal mostly with the distinguishing characteristics of the nestlings of similar species. The same technique could have been used profitably throughout the discussions on nests and eggs. For example, I would think that a user of the book in eastern North America might wish to know how to tell the eggs of Yellow-billed and Black-billed cuckoos apart, or that a westerner might like to know how to separate the humingbird nests in his area, but such tasks cannot be easily accomplished with this book. Lamentably, many such opportunities to improve on past summaries are consistently overlooked.

The selection of species included in the book is remarkably complete for the area of coverage (North America from the Arctic to the southern boundary of the United States). In fact, I question the necessity of providing species accounts for the Barnacle Goose and White-tailed Sea Eagle, both apparently on the basis of their Greenland populations, or for the White-eared Hummingbird (including a drawing of the nest), a species that has not yet been recorded nesting within the United States. It would probably have been more useful to most North American users of the book to have expanded the accounts for widespread, polytypic species (e.g. Scrub Jay, Brown Towhee, Song Sparrow) whose nesting habits and/or eggs differ markedly in various parts of their ranges. The parsimonious procedure of lumping the elements of the nesting habits of several diverse populations within a single write-up sometimes results in a species account that, as a whole, is typical of none of the races.

The Black-capped Gnatcatcher (*Polioptila "nigrescens"*) [sic] account contains only the terse comments: "A single pair nested in Arizona in 1971. There appears [sic] to be no useful data on the nesting of this species." Contrary to Harrison's statement, useful data on the nest and eggs of this species have been published. Neither the Five-striped Sparrow nor the Thick-billed Kingbird, both of which nest regularly in the same portion of southeastern Arizona as the 1971 Black-capped Gnatcatchers, are mentioned in the book.

Although typos occur fairly infrequently, most are repeated persistently in the text, in the plate captions, and in the index, including at least three family names (Meleagrididae, Haematopodidae, and Rynchopidae) and at least seven generic names. The only lapse of this sort of any real consequence is the reversal of the scientific names for the Willow and Alder flycatchers in the species accounts, coming unfortunately at a time when many of us had just succeeded in finally getting them straightened out!

The book is of unusually sturdy construction and should stand lots of wear and tear. However, like many "field guides," this one is not likely to be carried into the field unless one is on a very specific mission. On the other hand, it should prove to be quite useful as a shelf reference to such persons as teachers, camp counselors, and curators of regional museums. Despite its limitations, this book is the best single source available for information on the eggs and nestlings of North American birds.—LLOYD KIFF.

Geographic variation in social behavior and in adaptations to competition among Andean birds.—M. Moynihan. 1979. Cambridge, Massachusetts, Publ. Nuttall Ornithol. Club No. 18. 162 pp., frontispiece, 42 tables, 16 figs., 1 map. $17.50.—"A principal objective of this paper will be to demonstrate that some kinds of social behavior may differ considerably among different populations of the same species, and that they tend to do so according to regular rules. There is geographic variation in behavior as in other characters. It will be suggested that comparisons among populations can provide information that is as useful as are comparisons among individuals or species. An attempt will be made to determine why the observed differences among populations occur. The search for causes will lead to a consideration of selection pressures; more precisely, to a consideration of the particular aspects of ecology and competition that might explain the pressures. Social behavior patterns can be advantageous in several ways. Some are adaptations to obtain necessary resources directly. Some are mechanisms to mediate, enforce, or evade competition for resources. Some are both." This long quotation, from p. 1 of this book, explains Moynihan's goals and summarizes his thesis far better than a paraphrase. This piece of work is a comparative study of social behavior among two "clusters" of species living in the cool tropical Andes, the diglossa cluster, and the mixed flocks of species belonging to such families as Thraupidae, Parulidae, Emberizidae, Tyrannidae, Furnariidae, Cotingidae, and others. Moynihan defines "cluster" behaviorally: "any series or group of species that are connected among themselves, in one way or another, by the performance of real social responses of some appreciable strength or degree of specialization" (p. 3).

The diglossa cluster includes not only species of the genus *Diglossa,* but also species of the genus *Conirostrum* and of some other genera as well (e.g. *Myioborus, Coeligena, Colibri, Atlapetes,* and others). Nowhere, however, is a complete list given of all the species included in the cluster. The socially important species of the cluster (especially the diglossas) are nectarivores. Generally speaking, the social interactions among species that are members of the diglossa cluster are of a hostile rather than friendly nature. By contrast, the social behavior among species that are members of the "mixed flocks" cluster are of a "friendly" nature. In Moynihan's own words (p. 91): "These birds are heterogenous. What they have in common, i.e., why they can be assigned to the same social cluster, is the habit of associating with one another, at least in some places at some times. In most cases, where and when associations do occur, they are obviously "friendly."

Moynihan compares the inter- and intraspecific social behavior of a variety of species in about 12 regions of the Andes. Before stating that the behavior of birds of a given species in these two clusters is different, say in regions A and B, one must show the range of variability in several kinds of behavior (both inter- and intraspecific) for several species at each of the sites, and then demonstrate that there is only partial overlap in behavioral repertoires. Hence the sampling efforts at each site must be large and roughly equal, to minimize sampling bias and insure strict comparability. In other words, one must beware of conclusions about similarities vs. differences in behavior that are based on insufficient data, for they could be misleading. If the sampling effort at site A is twice that at site B, and one observes differences in social behavior between species of either cluster at these two sites, is one justified in concluding that these differences are real, and not an artifact of insufficient sampling? This is a hard thing to do in work of the sort Moynihan reports upon in this monograph. In order to obtain sufficient

samples one ought to spend a lot of time in the field. Indeed, between 1959 and 1974 Martin Moynihan traveled extensively in the Andes, visiting sites in different regions of Venezuela, Colombia, Ecuador, Peru, and Bolivia. According to his itinerary (p. 5), Moynihan spent a total of about 325 days in the field; according to Tables 1–42, he devoted at least 950 h to observations of mixed flocks alone. During his fieldwork, Moynihan observed birds with binoculars but did not collect any voucher specimens. Thus all identifications rest only upon visual observation, verified against illustrations in field guides and museum skins. As Moynihan himself is aware, this is a drawback, for many species in mixed flocks are cited by genus name only, or by group name (e.g. p. 122: "Furnariids: a considerable variety; none securely identified as to species"). Although Moynihan's study is temporally and geographically extensive, it is not intensive, in spite of the large numbers of days or of hours spent in the Andes. The average number of days at any one of the 12 regions visited is about 27, but the number per region varies between 5 and 68. Similarly, the average number of hours spent observing mixed flocks at each site (obtained by averaging the numbers in Tables 1–42) is about 23 h, with a range of 7 to 111. This great variability in sampling effort is another drawback of this study, although here again Moynihan is aware of it. On p. 137, for instance, referring to the numerical figures and statistics in Tables 1–42, he states that "it should be remembered that the counts [numbers of birds] were made for purposes of illustration rather than statistical analysis."

Moynihan's book is an ambitious undertaking based on many days in the field. I know all too well from personal experience in the same areas of the Andes how much travel, time, effort, and frustration this sort of field research implies. But I wish that Moynihan had explained to those of us who don't know of some of these difficulties (weather, road conditions, rough terrain, for example) why it is not always possible to avoid sampling bias or to spend more hours gathering data in such extensive field studies. If Moynihan had clearly stated potential sources of difficulty and/or bias in his interpretations of geographical variation in social behavior, his specific conclusions would have been more credible.

To give but one concrete example of sampling difficulties, I should like to compare Moynihan's observations with my own (1970, Revue suisse de Zoologie, 77: 209–235) on mixed flocks in the Carpish area of central Peru. Moynihan spent 24 h observing mixed flocks at Carpish Pass in May 1966 (his Table 8); I spent 20 h there in May 1965. In spite of the roughly equal sample size and the similarity in timing of our respective visits, it is clear that Moynihan's observations (pp. 103–105) and mine (loc. cit.) are quite different. For instance, Moynihan describes *Hemispingus xanthophthalmus* and *Anisognathus lacrymosus* (two tanagers) as "core species." I did not see the first species at all and *A. lacrymosus* only once (two individuals), and thus could not concur about the important social role of these two species in mixed flocks at Carpish. However, as "core species" I would include species such as *Basileuterus luteoviridis* (which Moynihan saw "possibly"), and *Tangara nigroviridis* and *T. vassorii* (not cited by Moynihan). According to my observations, *Myioborus melanocephalus* was a "core species," and this might have been a conclusion reached by Moynihan also, but it is not evident from his text. Thus, I can only conclude that on the basis of equally small samples (20–25 h in montane tropical forest is an infinitesimal "sample"), two independent observers obtained different species lists of mixed flock attendants, and reached different conclusions about core or other species in two different years. In view of this difficulty, one is entitled to ask: To what extent are geographic differences in social behavior reported upon in this book not an artifact of sampling procedure? This is not a purely rhetorical question about methodology.

If Moynihan's method of comparative study is sound (in other words, if he has minimized the effects of sampling bias), then his conclusions about similarities or differences in social behavior in the diglossa cluster or in the mixed flock cluster at different sites along the Andes are also sound. My *impression,* based upon independent visits to some of Moynihan's study sites and to other sites situated near his, is that Moynihan's main—and very general—contention is correct. Namely, there is indeed geographical variation in intra- and interspecific social behavior within each cluster along the Andes. However, in view of the severe limitations of sampling presented by this study, I cannot agree with Moynihan's contentions about either the specific trends in geographical variation in social behavior or about their possible adaptive values, either in terms of ecology, of competitive relationships, or of historical factors. Moynihan's book simply does not provide the reader with the sort of data necessary to make one confident that he is describing what *is,* not merely what *could be.*

This problem is undoubtedly compounded by the complexities of the subject. The clusters of species are complex, their biogeography is complex, and the habitat ecology of the Andes where the clusters occur is complex. These difficulties are not so much of an obstacle for someone who, like myself, has spent much time in the Andes, has observed the very same species, and has a reasonable grasp of Andean topography, vegetation, and climate. But for readers interested in the problem of geographical variation in social behvior who are unfamiliar with the birds or the geography or both, Moynihan's book must be

very hard to evaluate. Hence the more casual reader might be tempted to accept uncritically Moynihan's specific conclusions. Because of the geographical variation in color and pattern, it would have been useful to have illustrations showing this aspect of the species involved in the diglossa cluster. Similarly, figures showing the color patterns of some of the major species in the mixed flock cluster would help the reader. It would have been helpful to have detailed maps showing where the study sites were, to be able to visualize better, say, why some birds may be present at one site but not another very close by. Appendixes giving some of the raw data (e.g. total number of species in each flock, total number of flocks, number of individuals of main core species) would have been invaluable. A series of tables summarizing, for each of the 12 major regions, its habitat ecology, its rainfall seasonality, the breeding season of birds, *and* the major behavioral characteristics of each cluster would have been nice to have. Some, but not all, of this information is available in the text, but is not easy to extract. All too often general statements are made but no data are presented to back them up. This is true, for instance, of flowers as sources of nectar for members of the diglossa cluster. "The flowers and probably the arthropods on which members of this group feed are numerous, diverse, and (as a whole) common over large expanses of the Andes" we are told on p. 75. But apart from a few plant names (the families of which are rarely cited), Moynihan does not give lists of plants used as sources of food at any of the regions he studied, nor does he cite arthropod taxa, even less their numbers, diversity, and relative abundances.

Moynihan's published report does not do justice to the extent of his fieldwork. He wants us to believe his field impressions, yet makes no attempt to convince us that *his* impressions, rather than yours or mine, make up the correct description of highly complex and fascinating types of social behavior in Andean birds. Because Moynihan is a very keen naturalist, he is probably right in his most general conclusions, yet we have no alternative than to take his word. He must have a lot of data, but they are either not presented or not given in a way that allows one to support his ideas.—FRANÇOIS VUILLEUMIER.

The herons of the world.—James Hancock and Hugh Elliot (paintings by Robert Gillmor and Peter Hayman). 1978. New York, Harper and Row. 304 pp. $65.00.—At first glance this handsome volume looks like just another coffee-table ornament, but it is much more than that. Like the family it describes, the book is fascinating and worthy of serious study. It is the first full summary of a scattered literature on all 61 heron, egret, and bittern species.

The book's primary value is that it brings a great amount of useful information together for the first time. That material was collected from the primary literature, extensive correspondence with specialists in the field, and the authors' personal experiences around the world over a period of many years. The 61 large (22 × 34 cm) color plates constitute the first complete set for the family and illustrate many species for the first time anywhere. The information is generally up-to-date and complete, given certain format restrictions (see below). A critical reading enables one to identify many of the major gaps in our knowledge of herons; the book will be a key resource for students.

Although neither author has conducted intensive research on any single heron species, their combined experience with the group is remarkable. Hancock, the "serious amateur," is a businessman whose work keeps him skipping from continent to continent. He has observed more heron species in the wild than anyone else. Sir Hugh Elliot, a noted ornithologist and scholar, has had extended periods of tropical residence that provided opportunities for intimate familiarity. With the exponentially growing heron literature under their belts, they are a formidable team, successfully giving the reader some of their feel for the group.

The book's layout is straightforward. After the obligatory cameo foreword from a well known ornithologist (Roger Tory Peterson in this case), comes a series of introductory segments. These discussions cover the adopted classification, plumages and molts, breeding behavior, feeding behavior, migration and dispersal (with special attention paid to the extraordinary saga of the Cattle Egret), and conservation. These are sadly the only syntheses in the book, but they should provide the uninformed reader with a good start on a family overview. The authors wisely chose to soft-pedal the scanty fossil record of the Ardeidae.

The next 251 pages are devoted to individual species accounts. Each species is presented with a suitable English name (usually the most commonly used) and is identified by its scientific name, synonyms, and a conservative list of subspecies. I rejoiced to see that the races were not exhaustively described; indeed most were not described at all! Then three or four sections per species summarize the wheres, whos, and hows. The first (*Distribution, Migration, and Habitat*) and second (*General Appearance and Identification*) are overly detailed. There seems to be little justification, for instance, for telling how to distinguish each heron from sympatric relatives in the field. Anyone foolish enough to try carrying this enormous

book around as a field guide would not be able to use binoculars! The third section, *Behaviour,* deals with feeding and breeding. It is generally too skimpy but usually contains the most interesting material. A fourth section, called *Taxonomic Note* and included for 13 species, was surprisingly engaging. There the authors reviewed the often shifting conclusions of systematists: this has another (perhaps intended?) effect of showing that the history of heron study has been dominated by splitters until very recently.

The original paintings, made especially for his book by Robert Gillmor and Peter Hayman, are generally excellent. The night-herons and *Tigriornis* are exceptionally fine. Of course, with two artists and 61 plates, there are also some poorer illustrations and some minor errors of color. I disliked the *Egretta thula* cover painting because its aigrette plumes look a bit like artificial flowers. *Cochlearius* looks hastily done. *Ardeola ralloides* and *Ardea goliath* are unrealistically orange. Finally, the "breeding colors" of *Bubulcus ibis* must have come from an unpretentious population: the U.S. Cattle Egrets acquire much more intense coloration, especially on the base of the bill. Without knowing where their model came from, one cannot be sure whether this is a geographic peculiarity or an artistic error.

The taxonomic arrangement, a pragmatic mixture of current opinions, is well laid-out at the beginning of the book and is unlikely to make enemies. Their arrangement generally follows Bock's massive lumping with some modifications as suggested by Payne and Risley. Where they depart from orthodoxy, they clearly state their reasons so the reader can accept or reject.

As with any such book, *Herons of the world* is a compromise between science and marketability. Its attractive large format leaves great empty spaces at the end of many species accounts that could have been filled with additional information. For reasons not altogether clear, most species accounts are uniform in length, 2 or 3 pages. This is obviously too much space for some species (e.g. the virtually unknown *Zebrilus*) and far too little space for other well-studied herons. A half-dozen or so of the better-known species (e.g. *Butorides striatus*) were given a fourth page for elaboration, but I found this concession insufficient. It seems to me that the reader's understanding of herons would have been better served with a few highly detailed profiles, even if that meant crimping space for some of the unknown species. Actually, because patchiness is perhaps the foremost characteristic of our knowledge of herons, a less egalitarian format would be more authentic.

At the end of the book there is a series of range maps for only 25 of the 61 species. At first the 36 omissions annoyed me, until I realized that the distributional information on most species is so scanty that a "map" would be misleading. I commend the authors' restraint.

The culminating feature—and perhaps the most valuable to the specialist—is a large, up-to-date bibliography of a thousand heron references, including many in languages other than English. These are usually cited properly in the text, so a reading of a given species account serves as an introduction to most of the relevant literature from everywhere.

Although the descriptions of distributions and plumages are necessarily rather dry, the authors have had some playful moments, too. Bonaparte's night-heron genus, *Gorsachius,* is credited with having ". . . given birth to an astonishing number of misspellings." Cattle Egret commensals, including elephants and rhinos, are depicted as ". . . the large creatures which man still treats with respect." Generally, the reader is entertained with a supply of intriguing facts from the primary literature. For example, Cattle Egrets have learned to forage along the beaches of the Dry Tortugas during spring migration, where they eat small birds exhausted from the Gulf crossing. I also enjoyed learning that one tribe of Amerindians has a name for Whistling Herons that translates as "Flute of the Sun."

Occasionally, I found their word-choice confusing. The Malay Night Heron is described as "shy and self-effacing." Self-effacing??

A more serious complaint has to do with the authors' apparent lack of understanding about natural selection. For example, they suggest that Reddish Egrets have evolved displays that are so complicated as to make mating difficult. Ostensibly, this is why there are so few Reddish Egrets. No explanation is offered to show how maladaptive communication could evolve. Similarly, the authors pay kneejerk homage to competition dogma in ecology. Thus night-herons are nocturnal to avoid competition with day-herons. The possibility that nocturnal foraging might actually have some special advantages is simply not entertained. Another example: they suggest that the Malagasy Pond Heron populations are declining because the congeneric Squacco Heron is increasing on Madagascar. Though they do not pretend to know how this works, they imply that the circumstances *must* be related somehow. Of course, neither of these sins is unique to this book!

As an acknowledged compromise, *Herons of the world* achieves considerable success in both science and bird art. But even a beautiful and informative book can be worth only so much money. This one costs $65.00 U.S. and it would be well worth the price to me . . . but then I got the review copy.—DOUGLAS MOCK.

Parrots of the world.—Joseph M. Forshaw. 1978. Second (revised) edition. Melbourne, Lansdowne Editions. 616 pp., 158 color plates by William T. Cooper. A$39.50.—The long-awaited second edition of the "Parrots of the World" is now available. As this new edition differs in many respects from the first one, dating from 1973 (reviewed by L. L. Short, 1974, Auk 91: 850–852), it seems appropriate to review this well-known work that had been unavailable for the last few years.

The text has been revised and updated, the latest references dating from 1977. The updating of the literature is not quite complete for the years 1976–77 because the revision had already been finished in 1977. As in the first edition, Forshaw makes use of a great amount of unpublished information given to him in the form of letters or personal communications, which he supplements by personal observations not only from his native Australia but also from his travels abroad. This rich background makes this book an unexcelled, fascinating, and reliable source of information on the general biology of the parrots as a group and of particular species. Much information has been added, or even given for the first time, for the *Vini* species (pp. 82–88), *Strigops habroptilus* (p. 278), *Ara rubrogenys* (p. 382), *Rhynchopsitta pachyrhyncha* (p. 424), and for the amazons of the Antilles (*Amazona vittata, A. versicolor, A. arausiaca, A. guildingii,* and *A. imperialis*). Many notes on breeding biology have been added, such as observations from captivity for many lories and for *Psittrichas fulgidus,* and field observations, for example, for *Poicephalus gulielmi, P. rueppelli,* and *Agapornis cana.* Some taxonomic revisions, such as the splitting of the "White-tailed Cockatoo" into the two subspecies *Calyptorhynchus funereus baudinii* and *C. f. latirostris* (Saunders 1974) have also been incorporated. Some references mentioned in the first edition have been replaced by more recent accounts on the subject, but the old references have not always been removed from the bibliography.

The systematic arrangement of the major subgroupings has not been changed in the second edition. It is "modified from that of Peters" (1937). As Forshaw states "I am not a taxonomist . . . so . . . there are no discussions on the major subgroupings," he has not considered any of the major revisions of the classification of the parrots since Peters' work (there are at least four). Forshaw does, however, give his opinion on the relationship of particular species, and several of these opinions have been revised for the present edition. In such instances especially, it becomes apparent that the geographical divisions of the Psittacinae do not define monophyletic (in the broad sense) subgroups. To overcome these difficulties when discussing relationships, Forshaw introduces subgroups taken from different classifications, such as the "Platycercine parrots," but for which he actually never gives a clear definition. Whereas some of his taxonomic statements have still to be tested (e.g. the relationship between *Psittrichas* and *Calyptorhynchus,* p. 207), I am very pleased to see that my own suggestions concerning the taxonomic position of *Prosopeia, Aprosmictus, Alisterus, Polytelis,* and *Psittacula* (Homberger, 1979, Bonn. Zool. Monogr. No. 13) have been accepted and acknowledged as "recent research findings" and "new evidence from behavioural and anatomical studies."

Although the number (158, not 147 as cited in the first review) of the famous plates has not been changed for the present edition, two plates have been replaced by new paintings—those of *Psephotus varius* and *P. haematonotus* (p. 245) and of *Graydidascalus brachyurus* (p. 516). Whereas I prefer the new plate of *Graydidascalus,* I do not see any reason for the substitution of the plate of the *Psephotus* group. It would have been very desirable to have an additional plate depicting more of the numerous subspecies of *Trichoglossus haematodus.*

The above-mentioned changes of the text do not represent a major revision of the first edition. Such a revision is to be expected for future editions of this work, which has become a standard reference source for scientists and aviculturists interested in this complex group of birds.

A major disappointment, however, is the presentation of the new edition. At first sight, its reduced size (31 × 22 cm instead of 39 × 27.5 cm of the first edition) seems to have the advantage of having less weight and being easier to handle. But the plates were literally squeezed into the new size, and this was done by either reducing the picture or, more often, by cutting off the white margin and the background vegetation from the painting. Throughout the book, the plates lack the brilliance and clarity of those of the first edition. Most of the plates are more yellowish than in the original printing, which does not always represent an improvement toward the natural coloration of the birds. The black-and-white vignettes along the margin of the text are especially badly reproduced and very fuzzy. The highly original cover of the first edition has been replaced by a reprint of one of the more conventional and uninspired plates of the book, namely two macaws. Since the general arrangement of the text has been maintained as in the first edition, smaller type had to be used. The paper is of lower quality than in the first edition and so is the quality of the binding; all four corners of my copy showed extensive cracks when I received it.

[A brief mention should be made of the TFH reprint of the first edition, which was not properly

authorized by the author or the original publisher. In this reprint, the color plates were produced by photographing the printed plates in a copy of the first edition, which resulted in poor definition and bad color reproduction. Moreover, the color plates were grouped together so that the illustrations of particular species were generally positioned well away from the text discussions. The paper used for both the text and plates was of poorer quality than that used in the 1st or 2nd editions. I do not know whether the TFH reprint of the first edition is still available and if so, its price. But my strong recommendation to anyone desiring a copy of this work is to purchase the 2nd edition, or to search for a copy of the original first edition if quality of the color illustrations is of prime consideration.—Walter J. Bock]

Whereas the first edition was a true DeLuxe-edition, which—of course—reflected on the price of the book, the present edition costs only about two-thirds of the original price—but it also looks cheap. The printing quality of the present edition will be a disappointment for anybody who could not find a copy of the first edition and had therefore to wait patiently for the second edition, but especially for those who were looking forward to enjoying some of the finest bird illustrations of our days.

At present, no arrangements have been made to publish the second edition in the United States. Unless this work is made available by one of the book dealers specializing in bird books, the best way to obtain it would be to write directly to Lansdowne Editions in Australia or to David and Charles in England.—DOMINIQUE G. HOMBERGER.

Waterfowl: Ducks, geese and swans of the world.—Frank S. Todd. 1979. San Diego, California, Sea World Press. 399 pp., 790 illus. $45.00.—This is a large-format book featuring outstanding color photographs of waterfowl supported by a modest but up-to-date text. It represents an almost single-handed effort to photograph all the waterfowl of the world, a task nearly achieved, as Todd took 750 of the 787 photographs. Of several recent books dealing with waterfowl, it is certainly the most attractive. It is designed for a popular audience and especially aviculturists, but it should appeal to the gift buyer as well as to more specialized students of waterfowl.

The first chapter introduces the reader to waterfowl through a series of pictures of and comments on general activites such as flight, feeding, bathing, courtship, preening, nesting, and brood rearing. Illustrations of plumages, habitat, general morphology, and various predators complete this section of 51 pages. After a brief (1 page) chapter on classification, each of 11 chapters considers a tribe of waterfowl except that two are devoted to Anserini (swans and geese). The fourteenth chapter briefly reviews screamers (Anhimidae) as possible ancestors of waterfowl (of which Todd seems doubtful) so the book really covers the entire order Anseriiformes. The penultimate chapter discusses propagation, and the final chapter considers the future of waterfowl. Paintings of waterfowl topography and bill types are placed at the end of the text and photographs, as is a two-page map of climatic regions of the world. Both might have been more useful up front.

There are two appendices. One is a handy summary of all the species and races of waterfowl with notes on distribution, average weights (where available), nests and eggs, status in the wild (quite current on the threatened and endangered forms), and status in captivity. Another appendix briefly discusses the techniques used in photographing waterfowl and other wildlife in the field. The glossary will be most helpful to the amateur, but the bibliography of 115 titles will be a disappointment to the more advanced student of the group. This list includes only major books and bulletins that consider waterfowl, but the text is not referenced to these works.

Photographs are clearly the selling point of the book. The layout is attractive, often dramatic. Many of the photographs are from zoos and other collections, but few birds show pinioned wings or other clues to their status. Numerous pictures were taken in the field, however, and some have majestic backgrounds. Most of the photos are very good to excellent, but some were printed rather darkly and leave some pages and sections rather drab. Most photos are sharp; a few are not, but softness does not always detract from spectacular shots.

There is a tendency toward many small photos to facilitate placement of the text and to utilize what would have been wasted space, but there are many full-page photos and even a few two-page spreads. Duplicate photos of the same species are common, often on the same page, seemingly to show different features or behaviors—but this is not always the case. Some readers also will question the need to have 12 photos of bathing waterfowl and 13 of preening birds, even if they are excellent pictures. In an effort to include all species, several photographs of skins were included, but the one of the extinct Coues' Gadwall (*Anas strepera couesi*) of Washington Island isn't very helpful. There is only one painting of a duck for which no photograph was available, the Chinese or Scaly-sided Merganser (*Mergus squamatus*).

The placement of photos often seems size-related and taxonomic order is attempted but is not followed

rigorously. For example, photos of the Coscoroba Swan (*Coscoroba coscoroba*) are found in the middle of the swan series rather than at the beginning or end. The figure titles are generally excellent and enhance the text considerably except for a number of photos of ducks underwater taken by another photographer. A few photos of nonanatids scattered here and there somewhat surprise the viewer, but there is usually some reasonable tie-in to the text.

Although the text seems abbreviated in relation to the photographs, the print is small and the book long (348 pages), so coverage of groups and species is fairly complete. The text is terse and effective, and the information is up-to-date. Within each chapter, there are no subtitles to separate topics or species so paragraphs may represent major shifts in ideas. Species names are given the first time in boldface type followed by the latin name, but this may not be in the first sentence of the paragraph. Species or group treatments briefly consider dominant morphological features, distribution, habitat, handling in captivity, and status. These statements vary considerably in length, influenced in part by their potential interest to readers but also by the amount of information available. There is little original information in the text, but there are some personal interpretations. Although the book has strong leanings toward aviculture, Todd knows breeding biology of wild birds and has had experiences in many habitats.

The taxonomic treatment is that of Delacour rather than Johnsgard, but it is not updated by recent changes that Delacour has recognized in print. Todd obviously knows of these changes as he presents taxonomic interpretations other than those he has chosen to follow. For example, he discusses the extinct Pink-headed Duck (*Rhodonetta caryophyllacea*) with the dabblers but notes that many consider it a pochard. He points out that Frith and Johnsgard have shifted the Freckled Duck (*Stictonetta naevosa*) to tribal status under the Anserinae, and that Johnsgard has moved the White-backed Ducks (*Thalassornis leuconotus*) to the Dendrocygnini—both of which Delacour (1975, Waterfowl of the World, Vol. 4—Supplemental corrections) seems to accept. But by following Delacour's early classification, Todd retains a more serious problem of retaining the eiders as a tribe Somateriini separate from the sea ducks (Mergini)—a much challenged arrangement that Delacour (1964, Waterfowl of the World, Vol. 4—Corrections and additions) early recognized as unlikely. At least in the list of taxa in the appendix, Todd also retains a race of the Canada Goose (*Branta canadensis asiatica*) that Delacour (1975) and Palmer (1976, Handbook of North American Birds, Vol. 2) fused with the Aleutian race (*B. c. leucopareia*). However, one must have sympathy with any author's quandary and his desire to pick some system and follow it; the recent dynamics of waterfowl classification challenge anyone to keep up or to find an acceptable system.

Todd's decision not to cite the many hundreds of papers on which the text is based is understandable for a book tailored to a general audience, yet it certainly makes the work less useful to those who wish a source for some of the statements. A number system might have been the answer, but any detailed citation system complicates the assembly of a smooth and effective text. Otherwise, this attractive book will be a great learning aid for all students of waterfowl, and an up-to-date reference on status of the rarer waterfowl in the wild and in captivity.—MILTON W. WELLER.

My life among the Eskimos: the Baffinland journals of Bernhard Adolph Hantzsch, 1909–1911.—Bernhard Hantzsch, translated and edited by Leslie H. Neatby. 1977. Saskatoon, Institute for Northern Studies, Universtiy of Saskatchewan. xxii + 395 pp. 8 color plates, 19 figures, and 1 map. Can $20 (hardback), $18 (soft cover).—Barnhard Hantzsch (1875–1911), a native of Dresden, Germany, was a schoolteacher whose principal avocation was ornithology. His field studies of European wildfowl and birds of prey were of such excellent quality that he won the support of some of the leading ornithologists of Germany for more ambitious projects. While funding could not be found for research in German East Africa, which he preferred, he did fine work in Iceland and Labrador.

By 1909, his reputation as "an ornithologist of proved and exceptional competence" was such that he found it relatively easy to secure backing from wealthy German patrons and learned societies for an ambitious zoological and geographic exploration of Baffin Island. Most of the territory to be traversed had not previously been visited by white men, though it was known to the Eskimos of the region. Hantzsch proposed to travel alone, hiring such Eskimo assistance as he needed on the spot. He left Dresden in July 1909 with several tons of supplies, the majority of which were lost when the Dutch vessel on which he was travelling foundered in Cumberland Sound 2 months later. A portion of his remaining stores had to be surrendered upon demand to a group of European traders whose food and trade goods had been lost on the Dutch schooner. This was necessary lest these people starve before another supply ship could reach them.

Though now compelled to sharply curtail the scope of his itinerary, Hantzsch persisted, fearing that abandonment of his plans might anger his supporters and force postponement of a second effort for years. Hantzsch therefore set out at the end of April 1910 with a party of 13 Eskimos, a number of whom were infants and young children. Early in July, four of the Eskimos left the party by previous arrangement while Hantzsch remained in summer camp for about 5 weeks doing some collecting and other research.

Hantzsch clearly did not anticipate the severity of the arctic winter. During the winter of 1910–1911, he was often hungry and frequently ill, and his lack of experience ultimately proved fatal. So too, was the decision to kill a polar bear for meat when his party was desperately short of food. From the bear meat Hantzsch contracted trichinosis, and this, coupled with his already weakened condition, led to his death at the end of May 1911. Several of his faithful Eskimo companions brought his journal, notes, specimens and personal belongings back to an Anglican missionary, Edgar W. T. Greenshield, with whom Hantzsch had become friendly when he first arrived in the region.

The journal makes up the bulk of the present volume. Hantzsch took his own journal entries and began writing a narrative of his expedition, which covers the period from July 1909 until July 1910. He was unable to complete this process because he ran out of paper. The remaining five chapters (out of 17) consist of his rough notes, which make up about one-third of the entire text. His account is most notable for its description of Eskimo life, which had not then been much affected by modern civilization.

He also discusses the mammal and bird life he had observed, the essence of which is summarized by C. Stuart Houston in an appendix (pp. 378–379). This commentary by Houston also draws upon separate bird and mammal notes kept by Hantzsch that have been published elsewhere. Excerpts only are quoted by Houston in this section, which treats 37 species of birds. Houston lists locations and dates when specimens and eggs were collected and dates when Hantzsch simply observed the various species in the wild. In some cases, Hantzsch's remarks about nesting, breeding, food habits and the like are quoted in extenso.

Errors in the text and appendix are largely due to the fact that Houston had no opportunity to review it in the page proof or galley stages, but many are noted in a boxed Addenda and Errata section (p. 395). Houston also provided an index and a natural history index, the latter a most useful feature.

Houston observes that Hantzock "obviously was a well-trained and knowledgeable ornithologist—with true German thoroughness." The book is illustrated with Hantzsch's own sketches, some of them quite good, and with watercolors and photographs by J. Dewey Soper, himself a leading Canadian naturalist who covered some of the same ground as Hantzsch had in the 1920's.

The book should be of interest to those concerned with the ornithology of the Canadian arctic from an historical standpoint. Much of Hantzsch's nomenclature used in the text is no longer current, but the correct names are listed in the appendix. Houston's contributions to the volume provide an excellent starting point for those who want the meat of Hantzsch's field observations without working their way through the entire text. Both text and appendix should be used in conjunction with the map, which is a great help.—KEIR B. STERLING.

Eleonora's Falcon: adaptations to prey and habitat in a social raptor.—Hartmut Walter. 1979. Chicago, University of Chicago Press. Pp. xiii + 410, 36 photos, 38 tables, 59 text figures, includes maps. $30.—*Falco eleonorae* nests in colonies on islands in the Mediterranean and off northwest Africa and winters, so far as known, only in Madagascar. It breeds late in the season, the chicks hatching only in mid-August, this timed to coincide with the fall migration of small birds from Europe to Africa. The small rocky nesting islets are difficult to approach (one boatman was drowned during the study), hot, and arid. Professor Walter, now of the Geography Department of UCLA, labored long in both field and library to produce this monograph.

In colonies athwart the migratory stream, the hunting male falcons form a "standing wall," facing into the wind and beating the wings just enough to remain stationary. They do not hunt cooperatively, but a hapless migrant may find itself pursued by up to a dozen falcons before it is caught, sometimes after being forced down to the waves. Excess prey is cached among the rocks; the supply is somewhat intermittent. At colonies where the food supply is poor, productivity is low. In winter and early in the nesting cycle, large flying insects form a major part of the diet.

All aspects of the life cycle and biology of Eleonora's Falcon are considered, occasionally more than adequately. Thus one scarcely needed an analysis of trans-Caribbean migration that concludes that a similar falcon could not exist there. And I would have thought that every possible explanation of reversed sexual dimorphism in birds of prey has been advanced, but Walter has thought of another. These

hypothetical discussions, however, do introduce the reader to literature that might otherwise be overlooked, and do not seriously detract from the factual body of the text. Perhaps because rather than in spite of the fact that it is so specialized, *Falco eleonorae* (and its sister species, *F. concolor*) provides clues to certain complex aspects of predation. This book will be valuable to general students of ecology and predation and essential to raptor specialists.—D. AMADON.

Analysis of ecological systems.—David J. Horn, Roger D. Mitchell, and Gordon R. Stairs (Eds.). Columbus, Ohio, Ohio State Univ. Press. Pp. ix + 312. $27.50.—Ecology is a complex discipline, pursued at many levels of biological inclusiveness, and any book that bears a title such as this one promises a great deal. In fact, the title is perhaps the most unfortunate feature of this book, for the contents have almost nothing to do with analysis as it is commonly understood, and the "ecological systems" that are considered range from single-species populations in laboratory vials through communities to ecosystems. The nine chapters represent contributions to a symposium held at Ohio State in 1977. If there is any common thread binding them to one another it eludes me, unless perhaps it is the notion that ecology is in fact a diverse science.

Despite his lack of integration and cohesion, many of the contributions are solid and have some interesting points to make. The dissection of desert lizard community niche patterns by Pianka, Huey, and Lawlor, for example, includes some innovative attempts to demonstrate that the observed community structurings really mean something by comparing them to randomly generated community patterns; while the interpretations are perhaps too constrained by current dogma to be entirely convincing, the approach has considerable potential. Embree documents several scenarios of the colonization dynamics of sets of species in Canadian forests, and the details of natural history he describes reveal how easy it might be to draw erroneous conclusions by applying current theories to incompletely known situations. Ecosystem modeling is considered by Wiegert, who advocates approaching ecosystem analysis through consolidating population models. Certainly one of the major deficiencies in much ecosystem ecology has been its lack of attention to the details of the dynamics of the constituent populations, and Wiegert's ideas suggest some worthwhile directions for future ecosystem analysis.

Few of the chapters emphasize or even mention birds, but Orians and Pearson discuss the development of a central place foraging model specifically designed to consider avian systems. The basic problem addressed in this model is to determine how an individual occupying some central place to which it returns with prey after foraging (a nest site or breeding colony, for example) should select prey or foraging patches, and what load size it should carry back. The modeling requires several assumptions to be made, and while some of the assumptions can be questioned (e.g. a forager increases its fitness by maximizing the rate of delivery of energy to the central place), most of them are at least explicitly stated. The model produces several predictions. Some, such as the suggestion that as distance (and thus traveling time) from feeding areas to the central place is increased the forager will require greater prey energy, seem commonsensical, but others are less apparent. If individuals forage optimally, for example, they should travel initially to the farthest site to be exploited during a trip and then forage while moving in the general direction of the central place. If risks influence the location of a central place, the extent of those risks can be gauged by the nature of the deviation of the central place from the location predicted on purely energetic criteria. And, as optimal prey selection can change as a function of distance from the central place, the patterns of depression of prey populations by potential competitors may also change as a function of distance from their respective central places; this implies that there may be a spatial element to the interactions among potential competitors that has not previously been considered.

This model thus yields some interesting predictions, and these will no doubt inspire someone to gather field data to "test" the model. But the model rests on some critical assumptions, not the least of which is that optimization of foraging behavior is likely to be a consequence of selection. Such optimality arguments lie at the foundation of much of the current theory of ecology, behavior, and evolution, but in his introductory chapter Lewontin challenges such widespread reliance on optimization principles. Noting that there is nothing in the process of natural selection that necessarily implies optimization, Lewontin suggests that we must look to empirical findings rather than theory to convince us that optimality arguments are in fact valid and useful, and not just fanciful stories. But the performance of real-world individuals and populations is so subject to so many sources of variation that deriving empirical generalizations on which to build optimality arguments may be nearly futile. Practitioners and testers of theory would do well to consider Lewontin's warnings carefully.—JOHN A. WIENS.

ALSO RECEIVED

The birder's field notebook.—Susan Roney Drennan (ed.). 1979. Garden City, New York, Doubleday. 150 pp. Paper. $4.95. **The North American birder's library lifelist.**—Susan Roney Drennan (Ed.). 1979. Garden City, New York, Doubleday. 630 pp. Cloth. $24.95.—These two volumes are directed toward birdwatchers, especially those whose goal is primarily to list species and records. Both are promoted as means to assist such individuals in keeping records. The "field notebook" is simply a series of double-page sets of charts for recording observational details of species. One page lists various categories in which one may fill in "distinguishing field characteristics" for a species that has been observed; this simply enables one to write out what is contained in the species descriptions of any good field guide. The other page contains categories for entering observations on the circumstances of an observation, but so little space is given to record *substantive* observations of behavior, habitat, and the like that it makes this volume seem rather unnecessary, if not downright restrictive to good field observations.

The "library lifelist" provides avid listers with a permanent, standardized volume in which to record the specifics of their listings. For each of some 800 North American species, spaces are provided in which one may fill in the date and circumstances of the first sightings, as well as checking off state or province records, Christmas count listings, etc. While those who are interested only in record-keeping may find this helpful, any serious student of avian biology will find little of value in either of these books.—J.A.W.

Lories and Lorikeets.—Rosemary Low. 1977. Neptune, New Jersey, T. F. H. Publications. 180 pp., 55 photographs in color. $12.95.—The text of this soft-cover edition is identical to that of the hard-cover edition of Van Nostrand Reinhold, which was reviewed previously (1979 Auk, 96: 641–642). The 21 color photographs of the hard-cover edition have been incorporated in this edition, but the printing quality is sometimes only slightly, but some other times considerably, inferior to that of the hard-cover edition. The 34 new photographs are generally good and add much to the value of the book. Of special interest are the photographs of juvenile birds. Some duplications in about nine of the depicted species and subspecies seem to be unnecessary, especially as one of the photographs is often of considerable less value than the other. Regrettably, the black-and-white photograph showing a lorikeet holding food in its foot has been deleted from the present edition. The captions to the photographs have been changed for the soft-cover edition, and, unlike those of the hard-cover edition, they include many printing errors, mix-ups of scientific names, and obviously wrong words [e.g. "*T. h. mitchelli* is fairly frequently improved" (= imported?)]. Often the wording is trivial, as in "The Red Lory is a beautiful bird."—DOMINIQUE G. HOMBERGER.

Birds of northern California.—Guy McCaskie, Paul De Benedictis, Richard Erickson, and Joseph Morlan. 1979. Second edition. Berkeley, California, Golden Gate Audubon Society. 84 pp. Paper. $5.80.—This handy field list provides distributional data for the birds of the northern half of California. Graphs depict the seasonal patterns of abundance of the species, and this information is supplemented by text comments on distribution and (for troublesome species) identification aids. Appendices list recent records, introduced species, and recent changes in the names of some species perpetrated by the A.O.U. This volume should serve as a model for the preparation of local or regional distributional check-lists.—J.A.W.

Birds of southwestern Oklahoma.—Jack D. Tyler. 1979. Contrib. Stovall Museum No. 2. Norman, Oklahoma, University of Oklahoma. 65 pp. Paper. $2.25.—In this volume, Tyler has compiled records of bird distributions in the southwestern quarter of Oklahoma. The accounts cover nearly 300 species for which verified rcords exist, as well as several species of less certain occurrence. The accounts are strictly distributional, giving a status statement and pertinent distributional records for each species, with little information on the patterns of seasonal abundance, behavior, identification, or habitat affinities.—J.A.W.