REVIEWS

EDITED BY WILLIAM E. SOUTHERN

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

Tropical seabird biology.—Ralph W. Schreiber (Ed.). 1984. Cooper Ornithol. Soc., Studies in Avian Biology 8. 114 pp. $12.00.—This collection of papers, part of a symposium sponsored by the Pacific Seabird Group in 1982, apparently was intended to review active areas of research on tropical seabirds. It succeeds but at the same time has some equally interesting things to say about the ways we do research on seabirds.

To someone who believes in the theory of Thomas Kuhn (1962, "The structure of scientific revolutions," Chicago, Chicago Univ. Press) that science advances in a series of bursts of new theories or paradigms followed by periods of "normal science" when work is done within the framework of these theories, tropical seabird biology is an excellent example. Ashmole's theory of population regulation and Lack's discussions of life-history adaptations in tropical seabirds have been the backbone of recent tropical seabird research. In the 6 papers of this volume, papers by Ashmole are cited 13 times and those by Lack, 9 times. However, while several of the papers are developments of the themes of Lack and Ashmole, there are rumblings of new things to come from several others.

Ainley and Boekelheide, using data from 5 trans-Pacific cruises, found that the classic marine zoogeographic zones have little relevance to seabirds. Overlap in species composition between zones is high; changes in surface temperature and salinity prove better predictors of avifaunal change than zones. Ainley and Boekelheide also used their data to test an interesting theory that water turbidity and productivity determine foraging methods in a seabird community: tropical birds tend to feed by plunging, while temperate species dive from the surface. The authors show an interesting relation between wind speed and foraging methods in different areas. While comparisons of the marine biologies of seabird communities such as presented here have been rare in recent years, the present paper suggests that the subject is far from exhausted.

Diamond's comparison of diets of seabirds at Aldabra and Cousin Island, Seychelles is rather disappointing. The author makes extensive use of overlap indices but at the same time denigrates their significance. He also ignores more than a decade of literature, much of it in *American Naturalist*, on niche overlap, overlap indices, and competition theory. Despite this, his analysis of diets is a thorough one. I would question, however, his finding that "overlap between members of the pelagic or squid-eating guild is much higher, commonly exceeding 90% between guild members, and poses a more serious challenge to competition theory" (p. 41). Having previously (p. 28) stated that "the value of the overlap need bear no relation whatsoever to the competition coefficient," his interpretation might have been more cautious. Finally, I would suggest that a study of Seychelles birds at sea might show that intense interspecific interactions occur at feeding situations, particularly over schools of tuna: the Seychellois seabird community may partition by access to prey rather than by diet.

Whittow presents an elegant summary of the incubation physiology of seabirds, showing that the prolonged incubation periods of tropical compared to temperate species have led to differences in gas exchange between the egg and its environment. One hopes that such studies of physiology, with their precision and sophistication, can be successfully linked to other, less exact aspects of seabird ecology.

In the next chapter, Langham compares the growth of temperate terns at Coquet Island, England with tropical terns at One Tree Island, Australia. The study is very much in the school of David Lack, showing, as Lack predicted, smaller clutches and slower growth of tropical species compared to their temperate congeners.

Ricklefs develops a model of reproductive energetics for tropical seabirds based on the costs of delivering food to young and of storing food by the adult when not at sea. Brooding of young appears to be the part of the nesting cycle when food is most difficult to supply relative to demand: half of the parents' time is spent brooding, reducing time for foraging, at the same time that young represent an additional demand for food. Additionally, Ricklefs suggests that the parents' ability to transport sufficient food, rather than the food supply itself, may represent the key factor limiting nesting success. The comparison of energy demands of breeding with methods of supplying this energy (frequent vs. infrequent trips; intact or regurgitated fish; stomach oil or fat) appears to offer an exciting new interpretation of breeding biology. The model allows predictions that can be tested in the field, in contrast to the *post hoc* interpretations that usually result from comparative studies.

Nelson concludes the volume with a comparison

of the breeding biologies of tropical and temperate marine Pelecaniformes. More than anyone else, Nelson has followed the comparative approach of David Lack. However, where Lack used a broad brush, Nelson has filled in details, demonstrating the strength of the comparative method. While much of his work has appeared before, the tropical-temperate review will be a useful source for future workers. Among his most interesting findings is the apparent absence of cooperative breeding in seabirds. He suggests that young seabirds need to disperse from their birthplaces to find food, thus preventing potential participation in this system of breeding. One might expect then that those few seabird species that have minimal dispersal, such as the Galapagos Flightless Cormorant (*Nannopterum harrisi*), might exhibit cooperative breeding. After M. Harris's extensive studies on this species, this possibility is remote, but I wonder whether helpers at the nest have been overlooked among seabirds merely because no one has really searched for them. Nelson concludes with a "shopping list" of research topics and stresses the importance of long-term studies of marked birds.

The volume is generally well edited. A few typos appear, such as "Quanay" instead of Guanay Cormorant (p. 112). Of more concern is the confusion over the publication date. The papers say 1983, but the publication date is February 1984. Several other recent symposia have also had "flexible" publication dates. These may, in time, lead to bibliographic chaos. In any event, the editor is to be congratulated for producing the volume only 14 months after the symposium was held.

For any student of seabirds, this is a volume well worth owning. It is a fair picture of where tropical seabird studies were in 1982. Several of the papers demonstrate the strength of the comparative approach that has dominated work for the last 10 years or more, but there are also the beginnings of the use of testable models of breeding systems and a rekindling of the study of seabirds at sea, as parts of marine communities. Two other factors, barely mentioned in the proceedings, also promise rapid changes in how we study seabirds. The massive effects of the 1983 El Nino/Southern Oscillation, a change in oceanographic conditions on virtually a worldwide basis, are forcing a reassessment of the "blue-water" tropics concept where environmental change is never extreme. The time scales at which El Nino and other interannual variations in climate occur may be profound influences on the life-history strategies of seabirds. The development and successful field use of devices for measuring bird activity at sea have also progressed much more rapidly than one would have expected at the time of this symposium. Future studies of seabirds at their breeding colonies will have to include the use of devices to monitor such important parameters of foraging as distance traveled, time spent on water, and depth and duration of plunge or dive.

This volume is a milestone in the study of seabirds, but it is likely to be rapidly left behind, at least in part because its contributions are apt to quicken the tempo of what is already an active branch of ornithology.—DAVID CAMERON DUFFY.

The bee-eaters.—C. H. Fry. 1984. Vermillion, South Dakota, Buteo Press. 304 pp., 8 color plates, several line drawings, 9 appendices. ISBN 0-931130-11-5. $47.50.—The bee-eaters are a remarkably homogeneous coraciiform family (Meropidae) restricted to the Old World. The 24 species in 3 genera (21 of which are in the genus *Merops*) exhibit considerable uniformity in body shape, feeding mode, diet (mostly alate hymenopterans), nidification, and breeding biology. C. Hilary Fry has combined a considerable amount of literature and his own extensive field experience into the first synthesis of information about this family since H. E. Dresser's monograph from the 1880's. More than 60% of Fry's text consists of species accounts in which field characters, habitat, distributions (very detailed accounts), behavioral attributes, foraging mode, and diet (insects often noted to genus) are described, together with subspecies descriptions and an additional set of very detailed plumage descriptions and measurements (skull, wings, eggs, etc.). Eight color plates painted by Fry depict all the species and several of the subspecies. Adequate range maps face each plate. Some 76 line drawings by John Busby are scattered throughout, often depicting behaviors mentioned nearby in the text. A brief introduction precedes the species accounts, and in the remaining 66 pages of text Fry attempts to summarize and synthesize aspects of bee-eater speciation, relationships with apiculture, foraging specialization, and behavioral ecology. The nine appendices include a brief glossary of terms, systematic names, breeding locales for two species, detailed diet analysis of four species, and a listing of aberrant plumages.

The major strength of the book comes from information accrued from the 621 references cited (nearly one-quarter of which are from non-English papers and books). Most of this information is put into the species accounts. A considerable amount of recent information is presented, including published and unpublished accounts by S. Emlen and R. Hegner on the cooperative behavior of *M. bullockoides*, recent studies by J. Krebs and coworkers on *M. apiaster* foraging, and recent dissertations and associated work by Fry's own students (M. Dyer and H. Crick) on *M. bullocki* and other species. Novel methods of studying these hole-nesting birds (inexplicably in a section labeled "Nidification"), including how to monitor nestling and adult weights continuously, are detailed in two pages (241–242). The line drawings are most often usefully applied to show specific behaviors peculiar to bee-eaters. The color paintings are well done.

Many regional field guides tend to exaggerate the bold colors of the bee-eaters, but in this volume Fry has come closer to their actual appearance, although some of the tones appear slightly off (especially the greens). Additionally, Fry offers interesting information on topics such as the vicissitudes of the European Bee-eater (*M. apiaster*) range contraction and expansion during historical times, parallels between bee-eaters and New World jacamars, the Carmine Bee-eater's (*M. nubicus*) use of several large birds (imagine them perching on a Secretary Bird) and mammals as "beaters" to stir up prey, the bee-eater's handling and devenomization of hymenopterans, Crick's discovery of intraspecific kleptoparasitism in *M. bullocki* at nesting colonies, aerial hawking by *M. albicollis* of oil palm nut epicarps when the scraps are discarded by arboreal squirrels, and descriptions of the kingfisher-like fishing in several bee-eater species.

The major weakness of this book is that there is insufficient integration and synthesis of the information given in the species accounts. The bee-eaters show dramatic differences in social behavior (from solitary pairs to dense coloniality and variation in the degree of cooperative behavior) and occur in a diversity of habitats ranging from barren deserts to dense tropical jungle. Perhaps it is unfair to expect both detail and an evolutionary and ecological synthesis in a book of this kind, but when reading the species accounts, I couldn't readily integrate the patterns of habitat and social system for each species and had hoped the final chapters would provide some insight. Tabular summaries would have been helpful. The chapter on bee-eater evolution and speciation seemed to be riddled with arbitrary conclusions. Curiously entitled "The origin of species" (this section does not address origins), this chapter begins with a seemingly disjunct and out-of-place discourse on evolutionary theory, Lamarckism, and creationism. A long discussion on polytypic bee-eater species and patterns of speciation in allopatry and sympatry follows. Many of the assertions in this section would probably bother many systematists, but I found it to be one of the better summarizations of pattern found in the book.

Other problems include the song descriptions. No sonograms were included and so I had a hard time telling the "diripps" from the "dreee-dreees." The prey descriptions often seemed redundant and there were few disclaimers about potential seasonal or geographical biases of the sampling. Additionally, his infrequent estimates of total population sizes of species and use of competition to explain foraging patterns are based on weak inference. The prediction that some bee-eaters will acquire conspicuously shaped tails, as are found in motmots and drongos, can only await the test of time. But Fry's presentation of the various patterns of sympatry, coloniality, and the need for modern taxonomic revision makes it clear that the bee-eaters are a group worthy of strong consideration for comparative studies.

Fry is to be commended for his rigorous review of bee-eater biology and his assimilation of recent information. The book is largely free of typographical or citational errors. This book will certainly be a useful reference for all universities and major museums. It should not be considered a "coffee table" book, as the species descriptions are not for the casual reader. All African ornithologists should look this book over, as should ornithologists with interests in avian biogeography and the mechanics of foraging behavior.—STEVE ZACK.

The Cattle Egret: a Texas focus and world view.—Raymond Clark Telfair II. 1983. College Station, Texas, The Texas Agricultural Experiment Station. 144 pp. No price given.—This commendably produced booklet was published by the Caesar Kleberg Foundation for Wildlife Conservation. Attractive makeup, color covers, a color plate, and scattered black-and-white photos add interest. The text consists of 9 chapters on distribution, migration, nesting habits, reproduction, population changes, pesticides, and management. Appendices list scientifc names and 6 pages of detailed data on food habits. The literature cited includes nearly 500 references.

The title promises a Texas emphasis and a worldwide perspective, while an introductory paragraph expresses the more modest hope that the monograph will lead to a more thorough understanding of the Cattle Egret (*Bubulcus ibis*). The latter hope probably will be realized, as this work contributes to the vast data base on this species. Disappointingly, the promised world view fails to materialize. Rather, the monograph is a descriptive study (part of a 1979 doctoral thesis) on the range, nesting, and food of the Cattle Egret in Texas, similar to other studies in other places.

As a descriptive regional study it has its strengths, not the least of which is that much of the summary data are extensively tabulated and so available to others. These include food habits, laying and hatching intervals, egg loss, and growth. A detailed analysis of egg size and shape seems rather unique. Also of use is the gathering of references, mostly pre-1980, on Cattle Egret range expansion. A map of the first sight and breeding records of Cattle Egrets in North American states and provinces is interesting, as are data compiled on long-term censuses in Texas. Unanticipated is a chapter on economic and health aspects of the species, in which consumption of injurious insects, suspected contraction of ornithosis by colony workers, and the Cattle Egret's potential as a game bird are discussed.

As a scientific study, certain weaknesses are evi-

dent. Unfortunately, no fundamental ecological or evolutionary questions are asked, and no statistics are brought to bear upon the various comparisons made. Extensive quantitative data apparently were collected on such topics as nesting habitat and nutrient movement, but they seem barely evaluated. The lack of work on the most fundamental of the Cattle Egret's adaptations, its foraging behavior, is puzzling. Most disappointing is a failure to evaluate critical literature, such as Payne and Risley's (1976, Univ. Michigan Mus. Zool., Misc. Publ. 150) exciting suggestion that the Cattle Egret is an *Egretta*, Siegfried's (1978, Natl. Audubon Soc. Res. Rept. 7: 315) crucial contribution on the relation of the Cattle Egret's original habitat to its range expansion, and Byrd's (1978, Natl. Audubon Soc. Res. Rept. 7: 161) definitive review of Cattle Egret migration and dispersal—including to and from Texas.

The text is not an easy read, as it seems much overexpanded and replete with paragraph-long strings of references. One must make extensive use of the encouragingly straightforward chapter summaries, which, however, differ in emphasis from the text.

Overall it is clear that this monograph is the result of a tremendous field and library effort, from which future students of the Cattle Egret will benefit. It is certainly essential for such researchers, and the data presented could be useful to those interested in reproduction and growth. It would be of limited use to others, however. Publication of the booklet makes the information available in a better, and less expensive, format than does the thesis on which it is based. Thus, the Kleberg Foundation should be commended for making this and similar texts available, but I suggest that in the future the titles not promise more than is to be delivered.—JAMES A. KUSHLAN.

Behavioral ecology: an evolutionary approach.—J. R. Krebs and N. B. Davies (Eds.). 1984. Second ed. Sunderland, Massachusetts, Sinauer Associates, Inc. 493 pp. ISBN 0-87893-132-5. $42.00 cloth. ISBN 0-87893-133-3. $25.00 paperback.—Behavioral ecology, as practiced by the authors of this book, is fundamentally a hypothetico-deductive discipline. From a few basic principles about how natural selection operates, it seeks to predict what an animal should do in a given environmental context. Field or laboratory tests of the prediction are then used to judge the efficacy of the prediction.

In the 6 yr since the first edition of the book appeared, there has been steady progress in the discipline. The basic theme has not changed, but there have been refinements in theory, widespread use of new analytical techniques, and many predictions tested. The editors state in the preface that the romantic period for behavioral ecology is over. The discipline now faces the hard task of sifting ideas and gathering evidence. The new edition reflects this change with the addition of several chapters that address some theory and techniques that have been misunderstood and misused in the past. The addition of a chapter on learning does much to address a major criticism of the discipline, and some of the chapters on familiar topics contain critical assessments.

The book is organized into 4 sections of 15 chapters by 22 authors. Many of the authors and topics are the same as in the first edition. Section I consists of 3 chapters on concepts and methods that according to the editors have created problems in the past.

Chapter 1, by T. Clutton-Brock and P. Harvey, concerns the comparative approach to studying adaptations. The authors suggest that 6 questions be addressed in using interspecific comparisons, including (1) how broad a taxonomic array should be included, (2) how biologically relevant are the variables chosen, and (3) how appropriate is the statistical treatment. No mention is made of researcher bias, a problem that I think is of major importance in this field.

Chapter 2 is on evolutionary stable strategies (ESS) by G. Parker. The author reviews what is meant by an ESS and concludes that the development of this concept by J. Maynard Smith is the most important contribution to the discipline since W. Hamilton's explanation of altruism. Those interested in understanding the basics of ESS and the application of game theory need look no further than this excellent chapter.

In Chapter 3, A. Grafen discusses inclusive fitness and kin and group selection. He states that inclusive fitness is often misused in the literature and argues that the concept should include only the added young of relatives resulting from an animal's efforts and only the animal's young that are not the result of others' help. After reviewing the new group of group-selection models, he concludes that they are not much different from kin-selection models.

Section II of the book contains Chapters 4–7, which concern predators and prey. Chapter 4 is entitled "Optimization in behavioral ecology" and is written by J. Krebs and R. McCleary. This paper actually is a review of optimal foraging theory. At the end of the chapter, the authors ask an important question about a concept in decision theory termed "satisfaction." Might an animal settle for a satisfactory solution rather than an optimal solution? The concept seems inconsistent with the principle of optimality in natural selection. I believe it might be important, however, where natural selection has favored the flexibility of learned behaviors. This flexibility might "permit" an animal to be satisfied with something less than optimal in certain environmental contexts.

Chapter 5 is a review of group living by R. Pulliam and T. Caraco. Their game theory analysis of whether

or not an animal should join a group and their discussion of habitat selection based on S. Fretwell's concept of "ideal free distribution" are especially interesting. The authors (and some other authors in this book) treat dominance and subordination as discrete variables. In my opinion, this is only true in groups of two individuals. It would be interesting to see what the effect would be on their models of treating social rank as a continuous and relative variable.

Chapter 6 is on territorial economics by N. Davies and A. Houston. As the topic implies, they review territorial behavior driven by an assessment of the value and defensibility of resources (e.g. Sanderlings), rather than the more obligate territories that animals establish before environmental conditions can be assessed (e.g. male Song Sparrows in spring).

Learning and behavioral ecology is the topic of Chapter 7, written by S. Shettleworth. The most important message here is that learning can be viewed as adaptive and should be included into the mainstream of behavioral ecological thought. My hope now is that the concepts in this very important chapter will be applied to relevant topics throughout behavioral ecology. There is some risk, however, in biologists dealing with the intricacies of experimental psychology. For example, foraging theorists may not know that whether a laboratory animal matches or maximizes in a probability learning problem is somewhat dependent on the type of reinforcement schedule used.

Section III of the book consists of 4 chapters on various aspects of reproduction. In Chapter 8 on the ecology of sex, J. Maynard Smith discusses sexual vs. asexual reproduction, sex ratios, hermaphroditism, and parental care. He argues that group selection cannot be ruled out as an explanation for sexual reproduction.

Chapter 9, by L. Partridge and T. Halliday, concerns mating patterns and mate choice. Their review includes (1) variation in individual mating success, (2) inbreeding and outbreeding, (3) assortative and disassortative mating, and (4) frequency-dependent mating.

In Chapter 10, S. Vehrencamp and J. Bradbury describe 3 generations of models for the study of mating systems. They then design the "ideal" third-generation approach and see how well current research on polygyny, polyandry, and lek behavior measure up.

Chapter 11 concerns behavioral adaptations and life histories and is written by H. Horn and D. Rubenstein. Both *r* and *K* selection concepts are much in evidence as they review how reproduction and survival are allocated for fitness in different environments.

The last section contains Chapters 12–15, all dealing with topics related to cooperation and conflict. Chapter 12, a review of cooperative breeding in birds and mammals by S. Emlen, addresses questions about the evolution and maintenance of breeders and helpers. Emlen believes that most cooperating animals do so because they are forced to by constraints. He concludes by saying that helping does not present the paradox that once was thought.

In Chapter 13, J. Brockman reviews the evolution of social behavior in insects, primarily the Hymenoptera. The two issues she discusses are the evolutionary steps that lead to eusociality and the maintenance of what appears to be the unfit behavior of sterile castes.

E. Charnov begins Chapter 14 on the behavioral ecology of plants by saying that although plants may not behave in the usual sense, they too are governed by some of the concepts developed in behavioral ecology. He proceeds to illustrate his point by applying theory to sex choice, breeding systems, and male-female conflict in plants.

The last chapter is entitled "Animal signals: mind-reading and manipulation" by J. Krebs and R. Dawkins. This work is a clarification and extension of their thinking in the first edition of this book. They conclude that ritualized signals are the product of a coevolutionary race between manipulator (actor) and mind-reader (reactor) roles. In my view their model misses the mark, but those that thought well of their chapter in the first edition will probably think well of this chapter.

The book's utility is primarily as an information and discussion source for researchers, instructors, and graduate students in behavioral ecology and allied disciplines. Over one half of the chapters should be of direct interest to professional ornithologists. The book is less suited for undergraduates and those with only a passing interest in the area because, as with most edited books, the coverage is uneven in content and detail. The editors' book entitled "Introduction to Behavioral Ecology" would be more appropriate for them.

I believe the book's primary importance is in illustrating the breadth of evolutionary behavioral ecology. Its authors have capably applied the concepts and techniques of their science to a variety of problems that cross kingdom and discipline lines. Although many of its models may still be more heuristic exercises than profound truths, the discipline has the potential of developing into a truly integrative and predictive science. Perhaps the next book on this topic should be entitled "The natural selection of organisms and their attributes."—DAVID F. BALPH.

Identification guide to European passerines.—L. Svensson. 1984. Third ed. Stockholm, published by the author. (Published and sold in the Nordic countries by the author, Sturegatan 60, S-114 Stockholm, Sweden. Distributed outside the Nordic countries by the British Trust for Ornithology, Beech Grove, Tring,

Herts., HP23 5NR, U.K.) 312 pp. ISBN 91-7260-957-5. £12.00.—There can be few accolades for a book greater than becoming known simply by the name of its author. On this criterion "Svensson" has become a classic among European birdbanders. Since its first appearance in 1970 (followed by a second, enlarged edition in 1975) Svensson has become an indispensable part of the bander's tool kit, providing instant guidance to the criteria to be used in aging or sexing the bird in the hand. The appearance of this third, revised and enlarged, edition is therefore a welcome event for most European banders.

This latest edition follows the formula of the earlier editions: an initial foreword, a section providing directions for use of the guide, and an account of the general techniques available for aging and sexing passerine birds. Then follows the core of the book, some 245 pages of species accounts, 12 pages of references, and the indices. At first sight the 312 pages of this new edition look to be a considerable enlargement over the 184 pages of the 1975 edition (and the 152 pages of 1970), but this is mainly an artifact of the larger typeface used in the present volume. In reality the increase in content is much smaller, by my calculations about 7%. This reflects an increase in the species coverage from 180 to 207 species [though curiously enough Svensson specifies an increase of 29 species in this third edition (p. 6)] and an increase in the number of subspecies covered from 30 to about 50. Svensson notes the introduction of some 150 new diagrams in this edition, although some of this seems to be the result of numbering diagrams that previously were unnumbered. However, it is in the quality and quantity of the factual information presented in the text that this new edition scores.

Despite its title, the Guide is not intended for *de novo* identification of European passerines. It is a pocket reference work directed toward banders who will have the bird they seek to identify in captivity and thus be able to use the minutiae of plumage for age and sex classification. Museum workers are a secondary market for the book. Although the majority of this audience will be able to recognize a Black-billed Magpie (*Pica pica*) or a Winter Wren (*Troglodytes troglodytes*) without consulting a species key or description, Svensson has expressly included brief species entries on identification as a check against confusion of less familiar species with similar ones from elsewhere in the world. Within each species account this species identification entry is followed by a note on the molt pattern and accounts (by subspecies where appropriate) of the sex and age differences in plumage, presented separately for spring (approximately January–June) and autumn (usually July–December). In addition, special features of use in sexing breeding birds during the summer or breeding period are commented on, predominantly in relation to the usefulness of the presence of an incubation patch as an indicator of sex. Any references considered particularly useful by Svensson then follow.

The "Directions for use" section is generally clear and helpful. It begins with a brief explanation of the organization of each species account and a note on the terminology of aging birds adopted by EURING (the European Committee for Bird Ringing, which is responsible for coordinating banding activities conducted by the European Bird Ringing Schemes). Then follows a note on the numbering of the remiges and a note on how to examine wing formulae. Here, Svensson recognizes that there are two schools of thought about how to hold a living bird for such examinations. He favors the upside-down position, with the thighs of the bird held between the first and second fingers, tail pointing upwards, and any necessary control of the bird's head movements provided by the little finger. The British Trust for Ornithology recommends the alternative hold, with the head held upward between the first two fingers and the tail down toward the wrist. This hold was not described in the previous two editions of Svensson, who notes here that he finds this method less convenient for studying the finer details of wing formulae, although he acknowledges the possibility that practice may help. Another welcome addition in this section is the citation of recent work showing that wing formulae may alter in museum specimens as a result of postmortem changes, particularly in relation to the position of the inner primaries. The next section on measurements is largely a repeat of that in the second edition, although a few minor differences have obviously come as a result of queries from its users.

Thus, the discussion of bill-length measurement now includes an explicit "Avoid dividers," a point made only in relation to other measurements in the second edition. As in the second edition, all three methods of measuring wing length—the American "minimum chord" method, the "flattened wing" method, and the "maximum length" method of European banders—are described, but Svensson strongly favors the latter on account of its reproducibility. A useful addition to the short section on the recording of plumage colors is a paragraph on what ornithologists should understand by terms such as "buff," "rufous," "flesh-coloured," etc. It is perhaps a sad indictment of the level of general knowledge among modern ornithologists that such terms need definition in this way, but Svensson's paragraph, and his reference to F. B. Smithe's (1975, 1981) "Naturalist's Color Guide," should alert users to this gap in their knowledge, if appropriate.

The section on general techniques for aging and sexing birds closely follows the version in the second edition, with minor updating in the light of more extensive knowledge of, for example, molt patterns. Thus, several of the lists of species constituting exceptions to normal patterns have been enlarged from

the second edition. Another useful addition for the inexperienced is the inclusion of a diagram showing a typical passerine wing in molt: as they say, one picture is worth a thousand words. Svensson also seems to concede somewhat greater value to the use of tail abrasion patterns for aging than he did in the second edition, although substantial and probably justifiable caution is still apparent in his text. Similar caution is apparent in his treatment of growth bars on the tail. The list of species in which adults molt the whole tail more or less simultaneously has also been enlarged over that in the second edition. Svensson endorses quite strongly the use of skull ossification, and the dates of applicability of the technique have been revised since the second edition. The sections on the use of the shape of the cloacal region for sexing, on the presence or absence of an incubation patch during the breeding season, and on sexual dimorphism in body size as techniques for sexing closely follow the earlier versions. Throughout this general section, various new figures have been introduced, in general providing greater help to the readers in understanding the descriptions presented in the text.

It is not practical to review in detail the various species accounts, but a few general points may be made. First, sexing techniques are now available, though at times on a probability basis, for a number of species described as being sexually monomorphic in the second edition. This is partially the result of greater information, so that the Crested Tit (*Parus cristatus*) and the Scandinavian Willow Warbler (*Phylloscopus trochilus*) can now be sexed with greater or lesser certainty on the basis of size, and for other species such as the Blue Tit (*Parus caeruleus*) sex characteristics (covert colors, crown and head pattern) now allow sex identification for 75% or more of the individuals caught after their juvenile molt. For many species the new text also shows the extent to which the presence of a brood patch can be used unequivocally to indicate the sex of the bird concerned, and in many cases additional aging criteria have been established. It is these changes that will increase the value of this work for its principal users.

Svensson has become the standard guide to the identification of European passerines in the hand and is so useful that it remains the best available book for western European banders. The first-time buyer need have no doubts about the value of his investment. For the thousands of banders already equipped with the second edition, this latest version is not quite as good a value, although most will probably want to possess a copy nonetheless. Despite the apparent 70% increase in size associated with the additional pages, the additional information is in fact much smaller. However, the larger typeface will be a boon for banders working in poor ambient light at roosts and the like. The new Svensson also endorses some widely used techniques that were mentioned only with caution in the earlier editions, e.g. the use of tail abrasion patterns in distinguishing adults and juveniles, the use of molt patterns, the emphasis on the use of the color of the greater coverts, etc. The references have been updated thoroughly, and information from these and from a wealth of private correspondents have been incorporated systematically into the species accounts. Perhaps people oriented towards particular species or narrow groups of species can get by without this new edition, but the majority of "generalist" banders will need this reference on hand in the field. Indeed, many may need this third edition as a physical replacement for the second edition, now tattered with use (on which point it is good to see the sturdier binding and cover of the latest offering). The additional species described may well be useful for those working at observatories and other places prone to the rarer vagrant species. But, as Svensson points out in his foreword, there are many American species not treated in this work that may turn up on western European shores, and similar information is not available to aid in determining their age and sex. Svensson asks on their behalf, perhaps rather cheekily, "When do we get an American guide?"—RAYMOND J. O'CONNOR.

Aves del Parque Nacional Natural Los Katios, Choco, Colombia.—J. V. Rodríguez. 1982. Bogotá, INDERENA. xxvi + 328 pp., numerous text illustrations, 36 color plates depicting 339 species. Paper. No price given.—INDERENA, an acronym for the National Institute of Renewable Resources, under which the National Parks of Colombia belong, should be congratulated for launching this laudably illustrated book. Los Katios is one of the country's 31 nature reserves, and it is situated along the border with Panama. Its 72,000-ha territory extends from the Tacarcuna hills at the Panamanian border east to the Atrato River valley, and thus includes lowland, seasonal, humid forests and swamp areas as well as altitudinal zones. Both because it is located at the neck of the Central American isthmus where it joins the South American continent, and because it is situated only ca. 300 km from Barro Colorado Island (the well-studied biological station in Panamá), it is of utmost importance to study and preserve its nature and avifauna. The park was founded in 1974, and this book, describing 412 species and subspecies of birds, is one of the results of inventorying its natural resources.

The book is intended as a field guide. Each of the 6 families of birds occurring in the park is given a short and concise one-page description with 3–4 pencil drawings of characteristic members in characteristic poises, i.e. flying, running, etc. The species accounts give the scientific and common name; local vernaculars, if any; and the English name. Size, a brief description of the sexes, and if warranted, the

different plumages by season and age are also included. Social habits, habitat, and each species' foods are outlined, but we learn nothing about breeding habits. This is followed by the species' Colombian and worldwide distribution. There is no mention, however, of local occurrences within the park, although the introduction informs us that these birds occur within it. There is an extensive glossary.

Each color plate is accompanied by a legend that, in the telegraphic style, repeats the most important information of each species account: size, sex (when different in plumage, both sexes are illustrated), and habitat. These plates are neither great pieces of art, nor do they show the fine differentiating marks of, for example, *Myiarchus* flycatchers. On the whole, however, they make the book usable to the beginner for the less difficult bird groups.

As far as I can ascertain, this is the first Colombian bird guide that is written for the Colombian or other Spanish-speaking park visitor. As such, we welcome it as another sign that bird watching, nature lore, and ornithology are becoming well-established activities in South American countries, not the least as a result of the unceasing efforts by international agencies (World Wildlife Fund, International Union for the Conservation of Nature, UNEP, UNESCO, FAO) that have succeeded in convincing governments that nature conservation—and with it a greater local consciousness of the significance of natural resource preservation—is in the interest of future generations of their citizens. Professor Rodríguez deserves recognition for this book, and his park is to be warmly recommended for itinerant North American birders.—M. D. F. Udvardy.

Aves del Ecuador: sus nombres vulgares, vol. 1.—S. Valerezo. 1981. Quito, Museo Ecuatoriano de Ciencias Naturales, Monografia No. 1. 222 pp., with 114 line drawings by J. C. Matheus.—The late author of this volume initiated the collecting of vernaculars and explanations of Latin and Greek scientific names of birds as a complement to the 1975 "Check-list of the Birds of Ecuador," which lists only the scientific names. In the course of this work, he found that many Ecuadorian birds have no known vernacular name, or conversely, that the same vernacular is applied to species belonging to different families. From the copious literature he studied, Valerezo also was able to include the names applied elsewhere in the world to Ecuadorian birds. For every species from penguins to cuckoos, this nomenclator lists the vernaculars in every language the author could find, together with explanations of the scientific name and of one or several of the Spanish or Indian vernaculars. However, these explanations are sometimes incomplete, e.g. only the generic or the specific name of a bird is discussed.

The list of names is quite impressive. As an example, the Black-crowned Night-Heron (*Nycticorax nycticorax*) has a list of 64 names. Among these we find 12 names in different European languages and 52 vernaculars from various parts of Hispanoamerican countries; one of the latter is designated as the vernacular recommended for use in the Ecuadorian Check-list. We learn that a number of these names refer to the species' nocturnal nature, others are onomatopoieic (i.e. reminiscent of its eery call), and still others conjure up the utterance of a troll or the voices of the spirits of the deceased!

In countries where ornithological knowledge and interest is slight or relatively recent, it is extremely important to complete the first step of all human inquiry, viz. naming the object—even if people are just beginning to develop an interest in birds, they need to start by becoming acquainted with their names. The collecting of vernaculars is therefore a primary and important step in awakening an interest in birds and in their conservation. This is the real importance of publishing this book. We look forward to the appearance of its second volume, which will include the rest of the system through to the Passeriformes. The book is also handy to the North American field birder visiting a Spanish-speaking country, because Colombian, Chilean, Guayanan, Venezuelan, Argentinian, and many other vernaculars are all found here.—M. D. F. Udvardy.

Catálogo de las aves Uruguayas. 3ª parte, Galliformes y Gruiformes.—Rodolfo Escalante. 1983. Montevideo, Museo Damaso Larrañaga (Montevideo). 120 pp., 8 color and 1 black-and-white plate. No price given.—This is the third in a series of Spanish-language volumes that should eventually cover all of the 378 species of birds recorded in Uruguay. The author does state, however, that the groups covered in a volume are those for which information and material are available and those for which there is a need to properly stress their status for conservation purposes.

I was unable to locate the first two volumes, but I assume that the format of all three is similar. There is a general discussion of each order, each suborder when applicable, and each family, and these sections are followed by a key to the species covered. The key is then followed by a generic discussion, after which is a description of the species in that genus. After covering all of the included species, the author then has a separate section on synonymy, relevant literature, geographic distribution, and miscellaneous notes on abundance and other bits of information not presented elsewhere.

At first I was very excited to see that there seemed to be a plan to cover the avifauna of Uruguay, but as I worked through Volume 3 I became disappointed.

I was looking for information about the birds of Uruguay that I could not find in existing literature, but, in reality, there is little. On the other hand, this volume and its predecessors are called "catalogs," and thus the author's intention may be only to pull together the existing information for Uruguayan and other biologists. If this compilation of data is what was desired, then the author seems to have done a good job. I was, however, hoping that he would have included personal observations, notes on vocalizations, and other valuable natural-history data, but most comments about such information come only from the existing literature.

The nine plates by Victor Garcia Espiell will be useful to Uruguayans who may not have access to many books, but the illustrations are only "adequate." In most cases the space on the plates was poorly used—either the birds should have been larger or more birds should have been put on a plate. Three of the plates show only a single bird and the most birds on a plate is four, except for plate 1, which has 13 pen-and-ink figures of beaks and feet. The color reproduction does seem to be well done, and the heavy paper binding seems to be glued in place fairly well. The cover is graced with a striking photo of a Red-legged Seriema (*Cariama cristata*)!

My overall assessment of this volume is that it is well done as a catalogue, and any ornithologist interested in neotropical birds will want to own it and the companion volumes. On the other hand, I would hope future volumes would contain more first-hand and new information and that any color plates be more carefully planned, especially with the cost of color reproduction today. I would also advocate putting all material together rather than having separate sections for additional information on synonymies, literature, and other data.—JOHN P. O'NEILL.

Handbook of the birds of Europe, the Middle East and North Africa, vol. 3.—S. Cramp and K. E. L. Simmons (Eds.). 1983. Oxford, Oxford University Press. 913 pp., 103 plates, many maps and text figures. ISBN 0-19-857506-8. $89.00.—Volume 3 is part of a projected series of seven. It treats 112 species, in 10 families and 10 subfamilies, of shorebirds, jaegers, and gulls from the Painted Snipe (*Rostratula benghalensis*) to the Ivory Gull (*Pagophila eburnea*). The scope, contents, and regional extent of the entire series were stated in Nisbet's review of Volume 1 (1979, Ibis 121: 375).

> "This volume deals with most of the Charadriiformes, the largest order among the non-passerine birds of the west Palearctic. Besides being the largest, it includes groups (waders, skuas, gulls, terns, and auks) which have been extensively studied, especially in recent years, by both amateur and professional ornithologists . . . . in order to achieve a book of manageable size, we have been forced to reduce the scope of the summaries for order, families, and subfamilies in this volume." (from the Introduction).

The pressures of the wealth of information have had other consequences. The excellence of the contents is marred by some technical details, which I will discuss first to get them out of the way. The printing is so crowded, especially in the sections on Social Pattern and Behavior, that it may be hard for a reader to find the next line of print. Though written in plain English, the laconic, encyclopedic style lacks synthesis or emphasis, and fails to project the "personality" of the species. As an illustration of what I mean, the plate in Palmer's "Handbook of North American Birds" showing the intense colors in the soft parts of herons during courtship provides a useful synthesis. Similarly, Palmer's treatments of courtship behavior in sea ducks, including ink drawings, make satisfying reading, and are suitable for assigning to students.

The interests of the book's main constituency are evident in the headings in the species accounts: Field Characters, Habitat, Distribution, Numbers, Movements, Food, Social Pattern and Behavior, Voice, Breeding Season, Plumages, Bare Parts, Molts, Measurements, Weight, Structure, Geographical Variation. While the editors include detailed accounts of reproductive behavior, they do not go deeply into ecology. An explanation of the contents under each of these headings is given in Henri Ouellet's review of Volumes 1 and 2 of the series (1982, Auk 99: 807).

While this compendium is edited by professionals, it depends for its completeness and high quality on the contributions of amateurs. The excellence of this book reflects the degree to which the scientific study of natural history has maintained high standards in Britain and in central Europe. It is apropos to consider again Ernst Mayr's question, raised in his review (1978, Auk 95: 615) of Glutz von Blotzheim et al.'s "Handbuch der Vogel Mitteleuropas, Vol. 7": With the explosion of information, what can be most profitably included? What might be usefully left out? The descriptive details of plumages and other characteristics useful in field identification are available in previous handbooks and field guides, as are color plates, which add to the cost but make the volumes more salable. The duplication of the accounts of central European species in this British "Handbook" seems to reflect the resistance of most English-speaking peopies to use sister languages.

Some improvements in the treatment of social patterns and behaviors have been introduced in this volume, perhaps in response to Nisbet's (loc. cit.) suggestions. For example, the editors treat "Bonds"

as a wider category than previously, including in parental care both the type of heterosexual association and the relative share of the birds. The detailed treatment of antipredator stratagems reflects the special attention that field students have paid to distraction displays among the Charadrii.

Changes have been made in the accounts, which make comparisons among species easier. Within *Charadrius,* displays are described in some detail under the first species, *C. dubius,* and differences are pointed out in the subsequent species. Such details enrich the account for someone who wants to compare a familiar species to a closely related one found "abroad." Yet, in the descriptions of postures and actions, it is hard to tell what are "typical intensities" of actions/postures and what are expressions of different levels of "conflicts," unless one already knows the species. As is the case with technical descriptions of plant associations, details mean little unless one is familiar with the plants that are being described. With some familiarity, the descriptions become lucid.

I read with interest the accounts of species I know well and was not disappointed. The description of the flight of Golden Plovers as "rapid and confident" is apt and uninhibited. It was good to see the editors willing to quote those who know their species well enough to judge behavior: Golden Plover "Pair bond life long, birds probably maintaining contact outside of breeding season, though no direct evidence" (R. Parr), and the "darker male Golden Plovers seem to be more assertive" (P. J. Edwards). I expected some comment on the "paranoia" of Golden Plovers, who may spend hours crying "peeee" from an exposed perch, while the object of their attention is watching Kittiwakes.

As in previous volumes, an outstanding feature is the quality and wealth of color plates. The artists are acknowledged in the Introduction but they deserve better recognition than that. For artists of analytical bent, "good science" requires illustrations to be compared feather by feather with specimens from a museum drawer. Some artists are skilled at representing exact shades of colors and meticulous plumage detail, but the birds appear to be wooden. Other artists have the knack, as L. A. Fuertes did, of representing the intensity and energy of the species. Some artists today can provide such elegant vignettes. In that endeavor, good art and good science come together. The differences, as D. A. Ratcliffe put it (1976, Biol. Conserv. 9: 45), are not between science and natural history, but in personal preferences. For some visually oriented field biologists, these points are among the most interesting; they should get more emphasis in future manuals.

Another area that may be ready for innovative treatment in the future is the replacement of written language in describing voice and song. Recognition of species often depends on familiarity with the kind of quality differences that separate a clarinet from an oboe. For example, one can readily recognize the song of a previously unheard species of *Zonotrichia.* But the quality remains obscure until the listener has heard it.

The editors may well have decided that synthetic treatment and interpretation belong in other books. These, too, are personal preferences. After all, the editors and authors made the effort to write this magnificent piece, and it is their choice as to what they include and with what emphasis. If others of us have different ideas we should write our own, not snipe at them, but that seems to be the assignment of the reviewer.

We should congratulate and admire those who have done all this work. Our equivalent, "Handbook of North American Birds" by Palmer, appears to "be fetched up." There are many possible explanations; among them, perhaps, is a lack of a critical mass of biologically enlightened natural historians between the "list chasers" and the academics. This population is well represented in Europe and in the contributors to this book. Let's hope that we, in North America, can soon match their achievements.—WILLIAM DRURY.

Extinctions.—Matthew H. Nitecki (Ed.). 1984. Chicago, University of Chicago Press. x + 354 pp. ISBN 0-226-58690-1. $16.00 (paper).—Extinction is a hot topic. Recent symposia of the Society for the Study of Evolution and the American Malacological Union, as well as conferences at Northern Arizona University and the Field Museum, have treated the disappearance of species. The two immediate causes for such heightened interest are the controversy surrounding the Alvarez group's suggestion that meteorite impacts could have caused mass extinctions in the geological past, and the contention of alarmed conservationists and environmentalists that we are on the threshold of a new mass extinction, particularly in tropical forests. Nitecki's volume, consisting of eight contributions to the Sixth Annual Spring Systematics Symposium of the Field Museum, addresses both problems, plus other aspects of extinction.

David Raup points out in his introductory chapter that extinction has drawn attention from workers in widely disparate disciplines looking at extinction on temporal scales from the short term to the very distant geological past, at spatial scales ranging from small islands to the entire earth, and with data bases that are often incomplete. Noting the absence of a common framework and well-developed theory to deal with extinction, he argues that the controversies that have recently arisen about extinction (the meteorite impact hypothesis for the late Cretaceous extinction and the hunting hypothesis for the Pleistocene extinction of large mammals) reflect a confusion

unusual for science. He believes they may presage a Kuhnian paradigm shift, from a generally gradualistic interpretation of natural phenomena, including extinctions, to one emphasizing sudden events.

Two papers are of particular ornithological interest. Jared Diamond asks what characteristics of species make it particularly likely that isolated populations will go extinct, and marshals his evidence primarily from birds. He is asking about the causes and rates of background extinction, rather than the catastrophic extinctions that geologists have usually argued about. His main conclusion is that smaller populations are more prone to extinction, and that there should be other traits (such as generation length) that help to predict likelihood of extinction, but that the effect of population size is so overwhelming that it is difficult to test other effects. Some of Diamond's data come from short-term studies in the California Channel Islands, where compositional change has been observed. Similarly, he cites data by Hope on Tasmanian mammals where fossils demonstrate that populations have disappeared.

However, some of Diamond's examples infer extinction, and the inferences are often not unexceptionable. For example, he repeats Wilcox's scenario (1978, Science 199: 996) depicting lizard species loss from islands in the Gulf of California increasing with time since land bridges were severed, without noting that the same data of numbers of species on different islands can be just as cogently explained without invoking either time or extinction (Faeth and Connor 1979, J. Biogeography 6: 311). Again, one might think that birds on land-bridge islands could not easily be used to infer extinction because they could easily recolonize owing to their powers of flight. Diamond contends that, because many of them are afflicted by "fear-of-flying," they do not cross water gaps and so are just as suitable for analysis as are mammals. However, the criterion for identifying such fear-of-flying birds, which Diamond cites as in MacArthur et al. (1972, Ecology 53: 330) and Diamond and Gilpin (1983, Oikos 41: 307), seems to be that the species never be found on non-land-bridge islands. So the reason we know these birds do not cross water gaps is that we have not seen them do so! I would argue that we have no more evidence that they crossed the land bridges when these existed, so that we cannot assume they were ever present on these islands to go extinct.

Thomas Lovejoy and his coworkers on the Amazon forest remnants project report on extinctions to date in the 1-ha and 10-ha remnants that had been set up by May 1983. For birds, 5 ant-following species quickly disappeared, although 3 species recolonized the 10-ha fragment with an increase in ants. Seven understory species declined or disappeared, although canopy species do not yet appear to be greatly affected. The authors suggest great caution in interpreting observations, especially until replicate fragments and larger fragments are in place. However, they construct plausible explanations, involving such habitat variables as ants and vegetation, for some specific changes already observed. Most interesting will be results from the very large fragments that are planned; perhaps these will allow tests of Diamond's predictions about which sorts of species will go extinct most quickly. A general problem in extrapolating this experiment to the island literature is that it is not yet known to what extent birds in the fragments are resident, rather than either transients or individuals that include several fragments in their ambits.

Bruce Patterson discusses mammals of the southern Rocky Mountains. His thesis is that montane vegetation advanced into lowland areas during glacial advances, allowing mammals to colonize many peaks. Retreat of the vegetation up the mountains rendered the peaks habitat islands, and extinctions then occurred to produce the present biotas. As with Diamond's land bridge-island birds and lizards, little fossil or other direct evidence documents that extinctions actually occurred. Instead, Patterson infers extinctions by assuming that colonization occurred, then by noting that various aspects of the species-area relationship that obtain for present islands would, in fact, have been produced by extinction. For example, large islands tend to have more species than small islands do, and the islands that each species occupies tend to be larger than those that it does not occupy. Patterson is usually not clear about what exactly are the alternative hypotheses he is testing against his own; this, combined with the lack of direct evidence for extinction, makes it difficult to evaluate his proposal.

Paul Martin summarizes evidence for and against his contention that the late Pleistocene extinctions were caused by human hunting, and not by weather. He continues to focus primarily on mammals, and his approach is to show that the extinctions were both very quick and contemporaneous with the arrival of humans. He likens this "blitzkrieg" form of extinction to avian losses on islands caused by the arrival of prehistoric humans.

Finally, Andrew Knoll examines the geological record of plants and finds no evidence of the mass extinctions that characterize animals. He attributes this fact to adaptations of plants (such as dormancy) that allow them to survive short periods of great environmental upheaval. Instead, one sees broad patterns of gradual displacement of one large plant group by another, as when progymnosperms replaced trimerophytes during the Devonian. Knoll feels such replacements are competitive, with new groups characterized by certain design features that give them the edge over superseded species, particularly in the face of changing climate. In particular, he finds no major effect wrought by the meteor that is claimed to have caused animal mass extinctions at the end of the Cretaceous.

Any reader will find this a fascinating book. New information abounds, and who is not interested in extinction? However, this volume does not yield the synthesis and ordering that Raup calls for. Though certain authors (e.g. Martin) have confronted alternative hypotheses directly, and seem not to have relied on too many ad hoc assumptions, most authors attempt to confirm pet hypotheses and are much more lenient with these than with rivals. An interesting exercise is to see how many big, unsupported statements one can find about the way nature is, mentioned in passing as the pet hypothesis or a subsidiary is erected. Aside from the fact that most authors seek confirmatory evidence, much of this lack of rigor is probably caused by how difficult it is to observe extinction directly. The dearth of hard data will render an understanding of extinction difficult, but a synthetic understanding of the sort Raup desires, incorporating both paleontological and neontological patterns, is probably possible. Apparently the extinction industry is still in the sorting-out and jockeying-for-position stage, and one hopes with Raup that this will quickly lead to a firmer underpinning.—DANIEL SIMBERLOFF.

The birds of China.—Rodolphe Meyer de Schauensee. 1984. Washington, D.C., Smithsonian Institution Press. 602 pp., 38 color plates, 39 text figures, 2 endpaper maps. ISBN 0-87474-362-1. $45.00 (cloth), $30.00 (paper).—This is the book that China-bound birders have been waiting for. Although primarily intended as a descriptive catalogue of all the birds of China, the text and color plates of this trim volume have been conveniently organized for identifying birds in the field.

The Introduction first explains the nature of the information included in the species accounts. Then, a section on "The geography of China" locates the important mountain ranges and river systems and discusses briefly the major life zones, habitat types, and associated bird species. In combination with the endpaper map of China, the material in this section provides a helpful first impression of the biogeography of Chinese birds. Besides providing a historical perspective, the colorful narration of "The history of ornithology in China" conveys the excitement and adventure, as well as the hardships, experienced by the early explorers. It also reveals that the specimens (many of them type specimens) collected in these past expeditions reside in museums outside of China—a sensitive if not sore point alluded to frequently in the Chinese literature.

The utility of this work as a field guide is certainly enhanced by the placement of all color plates in one section at the beginning of the volume. Three artists, John Henry Dick, John A. Gwynne, Jr., and H. Wayne Trimm, contributed to the illustration of 511 species; I particularly admire the lifelike portraits by Mr. Gwynne. The plates are well composed and generally will aid in field identification since the birds on all but 5 plates have been drawn to scale. There are some confusing features, however. The Dollarbird (*Eurystomus orientalis*) is shown with a gratuitous red eye ring. Plate captions have been transposed between the Orange-breasted Trogon (*Harpactes oreskios*) and the Red-headed Trogon (*H. erythrocephalus*) on Plate 12 and between the Ruddy Kingfisher (*Halcyon coromanda*) and the Stork-billed Kingfisher (*Pelargopsis capensis*) on Plate 13. The plumage color represented for some of the species should not be taken literally. Severtzov's Tit-Warbler (*Leptopoecile sophiae*) and the Crested Tit-Warbler (*L. elegans*) appear more violet than is believable. Other species, such as those on Plates 11, 12, 29, 30, and 33, appear paler than normal. It will not be a simple matter to identify the confusing *Phylloscopus* warblers because only 6 of 19 species present in China have been illustrated, and these 6 are located on 2 separate plates. Whether any particular species was illustrated or not probably depended entirely on the availability of specimens rather than on its abundance in China. The plumages of dimorphic species are sexed when both male and female forms are illustrated but not when only the male plumage is shown. Each illustration was based on a single specimen, but no mention is made of the subspecific form used to represent a polytypic species.

The black-and-white drawings by Michael Kleinbaum depict an additional 51 species. Besides providing aesthetic relief from continuous pages of text, the drawings succeed in showing birds with natural poses in their respective habitats.

The species accounts of each of 88 families are preceded by a thumbnail sketch of family characteristics. A nice addition to this material would have been the total number of species in the family and the number present in China. The species accounts consist of succinct paragraphs that describe the morphology, distribution, habitat, and habits of the 1,195 bird species in China (including Taiwan). Only English (large bold type) and Latin (italics) names are given. The symbol "HK" follows the English name of species that also occur in Hong Kong, the usual starting point for travelers to China. Body length is given in both millimeters and inches. A full description is given for the most common adult male plumage encountered in China. Female and immature plumages are described where different. Distinctive subspecific forms are described and assigned a number within parentheses, and the name and ranges of these forms are correspondingly identified in the paragraph dealing with distribution. Characteristics thought to be helpful in field identification are set in italics, but probably need to be field tested because they were likely surmised from study skins rather than derived from field experience.

Each species' range within China is first described

in general by region (e.g. Tibet, S. China, Far w China), and then is delineated further by a list of provinces or geographical localities such as mountain ranges, river systems, or lakes. The wintering range is given for species that do not reside yearround within their breeding range. The use of Wade-Giles rather than Pinyin transliterations for Chinese place names was attributed to the author's desire of publishing the book without delay. But because only province names are used in the text, it would have taken relatively little extra effort to make the conversions. However, the addition of Pinyin place names in the endpaper map of China is a small step in the right direction. The extralimital distribution of species that range outside of China is detailed within square brackets. One point of confusion here was the use of "Malaya," "Malayan Peninsula," and "Malay States" in three successive species accounts, with no explanation of how these geographical designations might differ, if at all. The endpaper map of Asia inside the back cover is useful for locating the distribution of species in the region.

Spot checks of the habitat and habits section revealed that there was no attempt to incorporate new information from the recently published "Fauna Sinica" volumes. For example, the Ruddy Shelduck (*Tadorna ferruginea*) is cited in this volume as "breeding on lakes, rivers and small streams up to 4,575 m." Volume 2 (Anseriformes) of "Fauna Sinica" (1979, Beijing, Science Press, Academia Sinica) reports a nesting record at 5,700 m for this species in Tibet. An obvious gap in the species accounts is the absence of information on the status (commonness or rareness) of Chinese birds. The availability of this book will no doubt help to fill the void, but information will come slowly because this book was not designed for use by the Chinese (the author specifically apologizes for this in the preface), and the relatively few Western birders who can get to China will be restricted in their movements.

The Bibliography lists well over 100 works on Chinese birds, but conspicuously absent from the entries are the three recent "Fauna Sinica" volumes (1978, 1979, and 1980, Beijing, Science Press, Academia Sinica), Cheng's "Avifauna of the Qin Lin Range" (1973, Beijing, Science Press, Academia Sinica) and "The Avifauna of Xizang [Tibet]" (1983, Beijing, Science Press, Academia Sinica), and "[A report of the survey of vertebrates in the Gaoligong Mountain region]" (1980, Beijing, Science Press, Academia Sinica) that was compiled by the Bird Team of the Kunming Institute of Zoology. The "Variant names list" juxtaposes the names (English and Latin) used in this volume with the versions used in Cheng's "Distributional Checklist" and should help to reduce the nomenclatural confusion in the literature of this avifauna. Because several hundred entries were included, family headings would have helped to organize this list for rapid information retrieval. The "Checklist of the birds of China" that follows includes English and Latin names and will help zealous birders record their sightings. Both the English- and Latin-name indices should prove extremely useful in locating species accounts and illustrations. Family names are not included in these indices, but the detailed table of contents in the beginning of the book will quickly guide the reader to the desired section.

Of all the books currently available on Chinese birds, "The Birds of China" is the volume that I would choose to take with me for travelling in China. Although it includes less information per species and fewer illustrations than more bulky works, its very compactness and excellent organization will promote its frequent use in the field. By itself, "The Birds of China" cannot stand as a definitive reference work on the Chinese avifauna, but it will certainly make using Cheng's "Distributional Checklist" much easier for workers who do not read Chinese. This book is reasonably priced and would be a worthwhile purchase for anyone interested in the birds of China.—MARINA WONG.

The care and breeding of seed-eating birds.—Jeffrey Trollope. 1983. Dorset, U.K., Blanford Press. 336 pp., 50 color plates. No price given. Hardback.—This book was written with the objective of "providing information which will help aviculturists to achieve greater success in breeding seed-eating birds" (p. 9). The author has drawn from his own 30 years of personal experience keeping and breeding seed-eating birds.

The first chapter, entitled "Accommodation," presents useful details on aviary designs and construction, including types of plants that could be used to provide cover and breeding sites for captives. Chapter 2 is concerned with nutrition and foods. The author cautions that birds designated "seed-eaters" usually require some live foods to be maintained in good health. He discusses the importance of proteins, carbohydrates, fats, minerals, and various vitamins to the health of captive birds. Especially useful is his treatise on vitamins (pp. 32–34) and the maladies occurring when specific vitamins are missing from the captive bird's diet. Noteworthy also is the detail (pp. 40–46) given to methods of raising various live foods (insects and worms) that are a necessity in the captive breeding of most species. Chapter 3 deals with management of captives and discusses treatment of some of the more commonly encountered ailments. The discussion of parasitic diseases is excellent, covering vector, symptoms, and treatment. Chapter 4 deals with breeding and hand-rearing. The section on hand-rearing is a little weak. For example, it would be useful for readers to know that begging behavior in emberizids, estrildids, and columbids is very different and that each group re-

quires special techniques in hand-feeding. Foods used to hand-raise birds in these three groups are also quite different.

The next 7 chapters, covering 242 pages, deal with specific groups of seed-eating birds. These are treated by family: Emberizidae, Fringillidae, Estrildidae, Ploceidae, Phasianidae, Turnicidae, and Columbidae. Each species account begins with a general discussion of that taxon in captivity, including captive-breeding records and husbandry, followed by general descriptions, breeding details, voice, and behavior.

The author's taxonomy is not always current; for example, he refers to the mannikins as Amadinae (p. 68) rather than Lonchurinae. The genus *Amadina* (p. 245) is placed with the mannikins (Lonchurinae), whereas more recent studies utilizing palate markings, downy patterns, vocalizations, and nest structure suggest that its affinities are with *Pytelia* in the Estrildinae (Güttinger 1976, Bonn. Zool. Beitr. 27: 218). The 50 color plates illustrating 51 species are quite good in quality. I note only one error in a caption: Plate 33 illustrates two Silverbills, *Lonchura malabarica* and *L. cantans*, whereas the caption indicates that the illustration is of only one taxon, *L. malabarica cantans*. These two Silverbills have different vocalizations and breed assortatively in captivity, and Harrison (1964, Ibis 106: 462) has suggested treating them as two species, to which I concur.

The descriptions of bird songs are not always useful. For example, in treating *Zonotrichia capensis*, the author cites an old study by Thorpe and Lade (p. 100) that stated that songs of *Zonotrichia* species are generally of poorer quality than is usual in buntings. This is surely a "subjective" statement. The author notes differences in songs of subspecies but makes no mention of "dialects," which are a well-known feature in this species (e.g. Nottebohm 1969, Condor 71: 299). Songs of some species are also highly variable among individuals.

The descriptions of behavior are interesting reading, although often sketchy. The emberizids and fringillids are well treated, but in the latter section of the book, e.g. the section covering whydahs and weavers, descriptions of behavior may be absent altogether, despite the detailed studies by Friedmann, Nicolai, Payne, and others on these groups. Some interesting behavior patterns were overlooked. For example, the fact that *Sorella* (= *Passer*) *eminibey* (p. 260) is a nest parasite in the wild (Payne 1969, Ibis 111: 300) may be useful to know in terms of husbandry. Payne reported that these sparrows built no nests of their own but actively supplanted weavers and usurped weaver nests for their own use. This behavior is quite distinct from that exhibited by some mannikins and waxbills that often appropriate old, abandoned nests of ploceids.

The author notes that young of *Lonchura griseicapilla* are pink-skinned (p. 256). In my experience, they are pink on hatching but turn black-skinned within a day (as in a few other estrildids). The author notes that nestlings of *Tiaris canora* have grayish-white down (p. 124). Those hatched in my aviaries were always naked. It could be that some *Tiaris* nestlings are naked and others downy, as in some *Estrilda* species.

The author has not claimed to be an ornithologist, although he is clearly an excellent observer much in love with his subjects. He states from the outset that he wished to reach aviculturists as his audience, to share his experiences in the hope that others would achieve good breeding success. He has done well. Ornithologists who wish to keep colonies of seed-eating birds for captive studies would learn much from this book.—LUIS F. BAPTISTA.

Voices of the New World jays, crows, and their allies. Family Corvidae.—Compiled and edited by John William Hardy. 1983. Gainesville, Florida, ARA Records. 33-⅓ record album and 8-page insert booklet.—Hardy has gathered here the best and most representative sounds from all but 1 of the 49 New World corvid species. Missing are sounds of the Azure-naped Jay (*Cyanocorax heilprini*), which apparently have not been tape-recorded. Coverage ranges from 20 s of the only known recording for the Beautiful Jay (*Cyanolyca pulchra*) to 4 min, 41 s for the White-collared Jay (*C. viridicyana*); average is 1 min, 11 s/species. Recording quality is mostly superb, even though many species have not been studied and recorded intensively. The booklet provides data on "localities, dates, names of recordists, and, where . . . [Hardy] . . . felt like it, remarks on the sounds and/or the birds." The selections provide not only food for thought to evolutionary biologists interested in the relationship between vocal behavior and social organization but also "entertainment for everyone who likes birds."

Hardy clearly enjoyed producing this album. The corvids, and especially the jays, have been a "career-long interest" to him, and he confesses that he has "yet to meet a dumb corvid, unclever and unthinking, as . . . most passeriform birds are." These corvids have "astonishingly large," perhaps "open-ended repertoires . . . that we might as well call language" (though linguists would argue for a more restricted use of that term). The taxonomy follows not the 6th edition of the A.O.U. Check-list, but rather Hardy's personal convictions [splitting the Sinaloa Crow (*Corvus sinaloae*) and the Mexican Crow (*C. impartus*); and lumping *Cyanolyca* in *Aphelocoma* and *Psilorhinus*, *Calocitta*, and *Cissilopha* in *Cyanocorax*].

This production, from the excellent sound selections to the self-styled taxonomy to the unabashed corvid-chauvinism, is vintage Hardy. I like it!—DONALD E. KROODSMA.

Size, function and life history.—William A. Calder III. 1984. Cambridge, Massachusetts, Harvard University Press. xii + 431 pp., 47 text figures. ISBN 0-674-81070-8. $32.50.—When Lemuel Gulliver awoke in the land of the Lilliputians he found himself conversing with men $\frac{1}{12}$th his own height, or so Johnathan Swift [1726 (reprinted 1946), Travels to Several Remote Nations of the World by Lemuel Gulliver, New York, Ronald Press] would have it. If the Lilliputian vocal cords were also $\frac{1}{12}$th as long, their natural frequency would have been 37 kHz, 7 octaves above Gulliver's and out of his hearing range! In the real world, mice make high-pitched tones that attenuate rapidly with distance, whereas the elephant's low voice carries. The elephant can be heard over a longer absolute distance, but because home range is related to body size, the two species can both be heard over similar portions of their own territories! Such an example of allometric relationships seems to have an air of whimsy about it, but it nonetheless illustrates the sometimes unexpected relationships of body size to biological phenomena. In this book William Calder takes advantage of such examples, and many more sober ones, to convince the reader that "any biological study must first consider size as the most significant characteristic of an animal" (p. ix).

Calder starts this volume with an introductory chapter on the biology of body size, followed by a chapter surveying the literature on the allometry of organ mass vs. body mass. One would think that unequivocal data on these relationships would be abundant after nearly two centuries of comparative anatomy, but the findings of different workers may not be comparable. Was skeletal mass reported from fresh or dry bone? Do muscle weights also include coagulated blood and adipose tissue? In the face of such uncertainties a plea for uniform methodology is made.

Chapter 3 is devoted to an exploration of the allometric equation, $Y = aM^b$ (where Y is the measurement of a biological character, M is body mass or some equivalent measure of overall size, b is the allometric exponent, and a is a constant), and some of its algebraic properties. The most useful numeric technique described is dubbed "allometric cancellation," which allows one to derive the relationship to body size of a composite character (e.g. the proportion of the home range over which an animal's voice will carry) by manipulating the allometric equations describing the component characters (voice pitch and home range size). This technique is used throughout the book to discover new and fascinating relationships. I feel that in this chapter it would have been appropriate to include a fuller discussion of alternate allometric models based on major-axis and reduced-major-axis regression. Unavoidable error is introduced into the analysis when species mean body mass is used as the independent variable. The impact of violating this assumption of linear regression is perhaps small when comparing animals over several orders of magnitude in size, but when species are of similar size the impact can be substantial.

A series of chapters concerned with form and structural support, physiological rates and times, locomotion, energetics, growth, and reproduction constitute the body of the book. Size has been shown to have an important impact on all of these biological features. One of the findings Calder highlights is that of Prange et al. (1979, Amer. Natur. 113: 103), which disproved the long-held notion that the pneumatization of avian bones, and their reduction in number through fusion, leads to a lighter skeleton for a given body size and hence more efficient flight. The allometric equations describing skeletal mass to body mass in birds and mammals are statistically indistinguishable, hence bird bones comprise the same proportion of body weight at any given size. One of the more curious points discussed is that of physiological time, the concept that organisms of different sizes live within different time scales. Metabolic rate is widely known to scale to body mass raised to the ¾ power. Geese use fewer Joules·gram^{-1}·day^{-1} than hummingbirds. What is the total energy use over the entire lifetime? Life span scales to body mass raised to the ¼ power, so that after allometric cancellation we find the total energy use·gram body weight^{-1}·lifetime^{-1} is the same for geese and hummingbirds. In other words, each may be passing through its own life span at the same pace, even though they live at different rates when measured by the astronomical clock.

Chapter 11 deals with the influence of body size on life history and ecological attributes, and Chapter 12 is on the interpretation of deviations of characters for single species away from their allometrically predicted value. Ecological attributes of species such as population doubling time, turnover time for standing crop, periodicity of population cycles, and even the size of social groups are strongly related to body size. However, even if body size explains a large percentage of the variance in such attributes, residual variance need not be viewed as so much noise. Indeed, Calder argues with others that the deviation of a character in a species away from the value predicted by body size can indicate that an adaptive strategy involving that character has evolved to cope with particular environmental conditions.

Chief among the author's aims in this book was to show biologists how size must be addressed in comparative studies—statistically speaking, body mass should be the universal covariate. With the mass of evidence sieved from the book's more than 600 citations, he has succeeded. It seems, however, that the book never really "takes off." Although Calder states in the preface that much of the book is speculative, while reading I frequently wished he had been bolder in following up on particular points with his own

ideas and suggestions for further research. Regardless, this is a book I would recommend for every institutional library and for the personal library of any biologist whose research involves species comparisons.—ARTHUR E. WEIS.

Bird conservation. 1.—Stanley A. Temple (Ed.). 1983. Annual publication for the International Council for Bird Preservation, United States Section, published by and available from the University of Wisconsin Press, 114 North Murray Street, Madison, Wisconsin 53715. viii + 148 pp. ISBN 0-299-08980-0 (cloth), 0-299-08984-3 (paper). $12.95 plus $1 postage and handling. Standing orders $10.36 plus $1 postage and handling. Succeeding volumes sent as published.—The world is in a terrible state. The rich keep getting richer but the poor only get more numerous. Between them they are exerting an ever-increasing pressure on limited natural resources, and in an increasingly materialist epoch conservation measures are failing to contain it. Possibly because many of these resources are being devoted to the production of armaments we should be worrying about the fate of mankind, but if we find it more inspiring to watch birds instead, it is becoming necessary to take steps to preserve them as well. It is strange that the general public of the more civilized countries appears more aware of this than the ornithologists, with the result that the lead has not always been taken by the best-informed people. It seems time that wise men also take an interest in the subject before their case is lost by default.

The most important general rallying point is the first international conservation organization, founded in 1922, the International Council for Bird Preservation, which has been left in charge of the subject by subsequent, more broadly based bodies with Cinderella's share of the resources (which may help explain the lack of interest in some circles). It is organized as a vast array of National Sections, run independently and with varying efficiency by local naturalists who often make it the center of their activities in undeveloped countries, by committees nominated by competing national voluntary bodies in the western developed nations, and by the official wildlife services in their eastern counterparts.

Citizens of the United States have always played an important role in the affairs of the international organization, but the National Section has not always been so conspicuous for its activity. This may be because other organizations with wider interests and more resources, such as the Audubon Society, National Wildlife Federation, and A.O.U., have tended to steal its thunder, and the scientists have failed to participate. Thus, for example, while the Royal Society has long supported the British Section, the National Academy of Sciences is not included among those supporting the U.S. one. It is therefore interesting to find what appears to be a small group of officers now taking steps to provide it with a clearer image through the production of a substantial annual publication covering those ornithological matters that fall between the provinces of the established ornithological and wildlife management journals. The first volume is devoted to the group with which the nation has recently made the most spectacular advances, the birds of prey.

Two-thirds of the publication is devoted to massive reports documenting different aspects of the plight of three of the more important representatives of all American wildlife, and attempts to help them: the Peregrine, wiped out over much of the continent by agricultural pesticides and now responding to an energetic rehabilitation program; a variation on the same theme with the Bald Eagle; and the California Condor, for which the development of similar measures has been frustrated by controversy. The rest of the North American avifauna is covered in just 30 pages of short notes followed by a list of 162 occasionally annotated references.

The splendid story of the "Restoration of the Peregrine Falcon in the eastern United States" by J. H. Barclay and T. J. Cade (pp. 9–40) is already fairly well known, but might have merited slightly more explanation before we were swamped with details of the parentage of no less than 269 birds returned to the wild by the end of 1981, the manner of their release (when Great Horned Owls proved the worst identified problem), and the 74% success rate, culminating with 6 nests by the end of the period under consideration (although it should have been possible to include 1982 in a publication appearing in 1983). Unfortunately, one must plow through a lot of statistics before arriving at the interesting tale of Scarlett, descended in captivity from a Californian father and Chilean mother. After release in the country, Scarlett took up residence on a tower in Baltimore, where she ran through three husbands before realizing that they were unnecessary for the production of foster-chicks that she could rear by herself (these birds seem quite human). It seems superfluous to comment on an unnecessary diatribe against people who express doubts about the wisdom of complicating the lives of less-threatened stocks with such reinforcements.

The subsequent extract from plans for "The propagation of the Bald Eagle in the northern United States" by J. W. Grierson et al. (pp. 41–86) has the merit of greater novelty to an outsider whose view has been obstructed by clouds of White-tailed Eagles (which unfortunately seem to take longer to mature). It was interesting to learn that, despite two centuries of persecution of their National Bird that has resulted in the elimination of most of the southern breeding stock, Americans can still find over 13,000 from

such places as Canada in the winter, and have now become so enthusiastic about them that they consider "land use that would result in destruction of trees in [a] roost . . . alteration of physical features . . . construction of highways, roads, railroads, gravel pits, mines, buildings, airports or other structures . . . use of the area by livestock should be controlled or prohibited." In such circumstances it is hardly surprising that Tom Cade later is able to report that "the rate at which hacked eagles have become established as breeders is well-nigh unbelievable . . ."

We return to reality with the most desperate case of all. According to a survey of "California Condor reproduction, past and present" by N. F. R. Snyder (pp. 67–86), covering 74 nests over 40 yr, the species has continued to decline steadily despite a fair reproductive success and now may be down to about 30 individuals with 15 yr to go for no very obvious reason (although it seems suspicious that the feeding grounds apparently lie far away from the nest sites on inaccessible private ranches, and one recollects that a supplementary feeding program had a dramatic and highly photogenic effect on Spanish vultures). Unfortunately, J. C. Ogden (pp. 87–102) then goes on to describe in "The California Condor Recovery Program: an overview" how, instead of considering this (which may have been tried in the past, for all I know), it was decided to adopt a more active policy of telemetry and captive breeding, which appears to have been put forward in such a heavy-handed manner that most of the people who might have been expected to support such measures ended up in opposition, made worse when one of the investigators killed a chick (something that I do not remember encountering otherwise with birds of prey). Posterity seems likely to take a very grim view of this display of Californian attitudes if it costs us the Condor.

The short notes include a series of progress reports on such matters as the Convention on International Trade in Endangered Species, the Ramsar Convention on Wetlands of International Importance, the Fish and Wildlife Conservation Act, the Federal Endangered Species Program, and the preservation of the birds of prey found along the Snake River, Idaho; further propagation of Bald Eagles and Peregrines, as well as Harris' Hawks, Whooping Cranes, and Antillean *Amazona* parrots; and threats to woodpeckers and tropical winter quarters. Several notes reveal a recent interruption of progress, and in the first it is remarked "the fact that final U.S. positions on several issues reversed positions originally arrived at through lengthy, and highly commendable, series of public hearings, gave conservationists cause for worry about the receptivity of the Reagan administration to input from the conservation community in the U.S. To have taken the reservation [over control of the trade in parrots] would have eroded still further waning world confidence in the U.S. government's present commitment to wise and careful stewardship of the world's natural resources." It is a pity that the publication is so out of date; what worries the rest of us is that much of the rest of the world does not question U.S. policy, but follows it.

In general, this seems a sound and useful document, although it does not break much new ground yet. It seems rather a pity that the I.C.B.P.'s U.S. elite fails to provide a proper address and advice on how ordinary people can join them, since there still appears to be a vacancy for a serious ornithological conservation organization in North America. My main reservation is that in an increasingly hostile environment the contributors still retain a rather euphoric attitude developed in the 1970's, instead of adopting the change of approach needed to retain public support. I doubt whether even in America it is still wise to propose holding up all sorts of development for the convenience of even the National Bird when it could doubtless often roost elsewhere. The result of such attitudes is illustrated by the last note reporting the initial refusal of the Fish and Wildlife Service to authorize an attempt to perpetuate the Dusky Seaside-Sparrow (*Ammodramus maritimus nigrescens*) by hybridization at the point where it was reduced to five aging males and conservation of its habitat became unduly expensive. As in the case of the California Condor, neither side can really afford such confrontations, and with a more flexible approach they should be avoidable.—W. R. P. Bourne.

Birds of southern California's Deep Canyon.—Wesley W. Weathers. 1983. Berkeley, University of California Press. x + 266 pp., 93 text figures, 28 color plates. ISBN 0-520-04754-0. $35.00.—Few environments on earth span such a remarkable range of conditions within so short a distance as Deep Canyon, in southern California. Within 11 miles (18 km) one travels from low-lying Colorado desert at sea level to montane coniferous forest at an elevation of 8,700 ft (2,650 m). From 1977 to 1980, Wesley Weathers surveyed the distributional patterns of birds over this range of conditions, and the results he reports in this volume are of substantial interest to the professional ecologist and the interested layman alike. Combining his survey results with other observations from the area yields a listing of 217 species that have been recorded, 112 of which have bred in the area.

Weathers's study evolved from his interests in the physiology of desert birds, and this physiological perspective is much in evidence throughout the volume. The detailed, quantitative results are based on systematic transect surveys in the nine major habitat types along this elevational gradient. Throughout, densities of species are reported in terms of individ-

uals per 40 ha—a fairly standard expression, and in this instance one based on careful work. Still, the habitats differed in total area sampled. The survey results (and the measures derived from them, such as number of species or bird species diversities) are thus not directly comparable between habitats without some adjustment by rarefaction procedures. Weathers recognizes this bias but does not resolve it in his analyses. Even with this limitation, however, the surveys provide a fascinating and detailed picture of how bird abundances and distributions vary in relation to environmental conditions. For example, communities vary from only 35% resident species in the coniferous forest to 75% in the lower plateau habitat. Diversity is greatest in the chaparral, although this habitat contains the lowest average densities of birds (despite the relatively great plant coverage). The valley floor habitat, lying near Palm Desert, is extensively disturbed by man, and this is evidenced by the fact that the starling is the second most abundant bird, even in relatively pristine areas. Weathers also uses a simple, straightforward energetics model to calculate daily energy expenditures and uses this as a measure of the potential role of species in a given system. It adds an additional perspective that is generally lacking in such studies.

Weathers begins with a useful background chapter that develops the general characteristics of the study area and describes his methods. Chapter 2 gives a detailed accounting of the climate of the area, including a brief review of climatic trends in the region over the past 60 million years. These chapters provide a valuable and necessary foundation for Chapter 3, which reviews the general structural and functional features of bird communities across the gradient. There follow 9 chapters describing in greater detail the distributional and seasonal patterns of occurrences of bird species in each of the habitat types: valley floor, human habitats, alluvial plain, rocky slopes, lower plateau, piñon-juniper woodland, chaparral, coniferous forest, and streamside. The remaining half of the book is occupied by species accounts, which provide information on the body weight, general distribution, detailed distribution over the study transects, and comments on aspects of breeding biology, behavior, diets, ecology, and physiology. Some of the species are illustrated with adequate line drawings or excellent black-and-white photographs; 28 species are shown in sharp, well-composed color photographs. An appendix summarizes the patterns of habitat distributions and seasonal occurrences for each of the 217 species recorded in the canyon area.

Weathers has done a superb job. He has carefully documented the patterns of occurrence of birds in an area in which fieldwork is not at all easy, and he has provided us with a wealth of information, carefully analyzed and condensed. Beyond this, however, he has presented his findings in clear, readable prose—the entire book is refreshingly well written, and the clean production complements Weathers's fluid writing. The book is a joy to read!—JOHN A. WIENS.

Geographical ecology.—Robert H. MacArthur. 1984 (1972). Princeton, New Jersey, Princeton University Press. xviii + 269 pp. ISBN 0-691-02382-4. $15.00 (paper).—Whether or not you accept his views, there is little doubt that Robert MacArthur was one of the most influential figures in ecology during the decade of the 1960's. These were the formative years of "modern" ecology, and much of what we have been asking about, thinking about, and (increasingly) arguing about was shaped in one way or another by MacArthur's gentle intellect. He encapsulated his views in "Geographical Ecology" shortly before his death. It is a mark of MacArthur's impact that now, more than a decade later, Princeton has reprinted this work in an accessible paperback volume. Certainly one would think that the questions MacArthur posed would long since have been answered, and that we would now be off following entirely different tangents. To some degree this is true, and some of MacArthur's writings now seem commonsensical and almost trivial. Many of those questions are still with us, however, and rereading MacArthur provides a valuable perspective. It clearly indicates MacAurthur's thinking at that time, and as such constitutes an important historical statement: to see where we are going we must see where we have been, and MacArthurian ecology is a large feature in that past. It demonstrates a way of thinking about nature that was bold and imaginative in its time, and is still fresh and original. It indicates clearly the logical approach to science that characterized MacArthur's work and that of his followers, and this lies at the foundation of some of the controversies that have erupted in ecology over the past decade.

The book represents an important statement. Those ecologists who have not read it should; those who have should reread it, and ponder carefully what it contains.—JOHN A. WIENS.

ALSO RECEIVED

Bird sounds and their meaning.—Rosemary Jellis. 1984. Ithaca, New York, Cornell University Press. 256 pp., 90 text figures. ISBN 0-8014-9276-9. Paper. No price given.—A reprinting of the 1977 hardcover first produced by the British Broadcasting Corporation. I largely concur with the favorable review given the original edition by J. L. Gulledge (1979, Auk 96: 632): Jellis's book remains "the best general introduction

. . . to the subject of bird sounds." The bird sounds on the disc that had accompanied the original edition are now available on cassette tape from the Crow's Nest Bookshop, Laboratory of Ornithology, 159 Sapsucker Woods, Ithaca, New York 14850.—DONALD E. KROODSMA.

Birding with a purpose—Of raptors, Gabboons and other creatures.—Frances Hamerstrom. 1984. Ames, Iowa State University Press. viii + 130 pp., 16 black-and-white photographs, 40 line drawings. ISBN 0-8138-0228-8. $13.95.—The author is well known for her many technical papers on raptors based on extensive field work. This book presents the lighter side of research activities and introduces the reader to Gabboons. This group of teenagers assisted her with research and provide ample humor with their unique manners. Much in the way of field technique is presented throughout the book. The contribution that the serious amateur can make to scientific research is the thread that ties the anecdotes together.

Researchers who work in the field extensively will recall happenings similar to those recounted by the author. This book has a place in the personal libraries of these scientists. Amateurs who have worked on research projects and have made their contribution to ornithology also will want this book.—PETER C. PETERSEN.

World inventory of avian anatomical specimens: geographical analysis.—D. Scott Wood and Marion Anne Jenkinson (Eds.). 1984. Norman, Oklahoma, American Ornithologists' Union and Oklahoma Biological Survey. 290 pp.—Database derived from previous surveys of skeletal and anatomical specimens. The goal was to identify avian species from each geographic area currently underrepresented in collections. Presentation includes a useful definition of 60 global areas with attendant maps.—A.H.B.

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