

REVIEWS

EDITED BY BRUCE M. BEEHLER

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

Population Trends in British Breeding Birds.—J. H. Marchant, R. Hudson, S. P. Carter, and P. Whittington. 1990. Beech Grove, Tring, Hertfordshire, U.K., British Trust for Ornithology. xii + 300 pp., 14 figures, 103 population index graphs, 105 black-and-white species illustrations. ISBN 0-903793-03-2. Paper. £12.00.—Americans who are involved in large-scale cooperative research projects have long admired the ability of the British to organize and to carry through to publication a wide variety of such projects, most of them under the auspices of the British Trust for Ornithology. "Population Trends in British Breeding Birds" summarizes the results of one of the longest-running and most important of the large-scale cooperative projects, the Common Birds Census (CBC), plus a linear version of the CBC, the Waterways Bird Survey (WBS).

The British Trust for Ornithology (BTO) was founded in 1933 with the specific purpose of organizing large-scale cooperative bird research projects in the British Isles. (The organization's story is told in "Enjoying Ornithology," R. Hickling [Ed.], 1983, Calton, Waterhouses, Staffordshire, England, T. & A. D. Poyser). In 1937 BTO took over the National Ringing (banding) Scheme; in 1939 it initiated the Nest Record Scheme; and in 1953 it launched the journal *Bird Study*. Most importantly, 1953 marked the year that a British government agency (then the Nature Conservancy, now the Nature Conservancy Council) assumed the major financial burden for many of the long-term projects organized by BTO.

A major step for BTO occurred in 1960 when it launched the Common Birds Census (CBC), a standardized technique for quantifying habitat-specific bird densities during the breeding season. In 1964 the CBC adopted the spot-mapping method, which had been pioneered by A. B. Williams (1936, *Ecol. Monogr.* 6: 316). The spot-mapping method has a variety of pluses and minuses, which are fully discussed in the book. The major advantage of the CBC is also its major disadvantage: it is a more intensive technique than most of the alternatives. As a result, the results are more consistent than those obtained by other census techniques. The cost is the greater time required of those doing the fieldwork and of those who determine the territory boundaries for each species (in Britain the territories are determined by paid BTO staffers).

At first the CBC concentrated on farmland, accepting censuses from other habitats on an ad hoc basis.

The number of plots in a wide variety of habitats grew steadily. Woodland plots became as numerous as farmland plots in 1976, and in 1983 the decision was made to concentrate censusing in just woodland and farmland plots. Other habitats were eliminated to reduce staff analysis time and because sample sizes were too low for habitat-specific indices. The Waterways Bird Survey was begun in 1974 to census riparian habitats; about 100 plots are censused per year. The number of farmland CBC plots per year has exceeded 100 since 1964, and the annual number of woodland CBC plots has exceeded 80 since 1970. Most of the plots are revisited year after year, although the data on the number of years per plot was not discussed in the book (except to identify 41 CBC plots that have been censused for 20–29 years [1961–1989] and 35 WBS plots that have been censused for 10–16 years [1974–1989]).

The long-term, consistent censusing represented by the CBC and WBS has produced quantitative data on the population status and trends of 103 species of birds. The status of those 103 species of birds from 1961 to 1988 is the focus of this book, although some information is provided on all 228 species that have bred in Britain since 1970.

The long-term population trends are determined by the chain or base-year method in which annual changes in population level for each species are calculated for all plots censused in consecutive years and then are summed by species over all plots. One year (for this book, 1980) is chosen as a base year and given the arbitrary value of 100. In years of low populations, the index number (on a logarithmic scale) falls below 100; when the population increases above that of the base year, the index number rises above 100. This method has been criticized because random deviations can occur in the index when sample sizes are low (P. H. Geissler and B. R. Noon 1981, *Stud. Avian Biol.* 6: 42). Despite this criticism, the method may be valid for common birds. More information on sample size limits for this technique would be valuable, because it is much easier to compute than alternative methods, such as multiyear comparisons (M. D. Mountford, pp. 121–132 in B. J. T. Morgan and P. M. North [Eds.] 1985, "Statistics in Ornithology," Berlin, Springer-Verlag) or route-regression methods (P. H. Geissler and J. R. Sauer 1990, *Biol. Rep.* 90(1): 54). Technical issues of data analysis occupy a full chapter of the book.

The book is full of just the kind of population in-

formation one would like to have: year-by-year population indices; specific information for farmland, woodland, and riparian habitats; an estimate of the overall size of the breeding population; a regional summary of population changes; a mention of trends elsewhere in Europe; and discussion of factors most likely to affect the population status of the species. One chapter summarizes the major factors that affect British bird populations, especially winter weather in Britain and the Sahel of Africa and habitat changes in the major bird habitats in Britain. Many British species were severely affected by an especially harsh winter in 1962-1963. The Whitethroat and other migrants have been severely affected by the Sahel drought. Tree Sparrows and other seed-eating birds have declined on farmlands, perhaps because of the loss of weeds on farm fields due to more efficient farming practices, including herbicides. The planting of conifers over the past 40 years correlates with increases in siskins and crossbills.

One of the major surprises of this book is the inability of these two programs to provide uniform geographic coverage over Great Britain. Most censuses are done in southern and eastern England. Northern England, western England, and Wales are poorly covered, while Scotland and Northern Ireland are hardly represented at all. As a result, CBCs may need to be supplemented by point counts to achieve a complete monitoring program for Britain. Point counts have the advantage of requiring much less time from fieldworkers and from analysts.

In technique, the CBC is comparable to the North American Breeding Bird Census, which was initiated by the National Audubon Society in 1937 and is currently managed by the Cornell Laboratory of Ornithology; in its goals, the CBC is more comparable to the Breeding Bird Survey of the U.S. Fish and Wildlife Service, begun in 1965. In fact, the book under review is very similar to "The Breeding Bird Survey: Its First Fifteen Years, 1965-1979" by C. S. Robbins, D. Bystrak, and P. H. Geissler (1986, USFWS Resource Publ. 157). The major differences are that the British book covers 103 species on a large island, while the American book covers 233 species on a large continent. Second, the British book is based on repeated visits to uniform plots; the American book is based on single trips through mixed roadside habitats. Finally, the British book can discuss habitat-specific differences in population dynamics; the American book cannot. The American book has 22 species maps and 4 summary maps of relative abundance, which are absent in the British book.

The British experience provides at least two important lessons about the role of various monitoring methods available to us in North America. (1) Habitat-specific results are very useful in determining habitat preferences and the effects of habitat changes on bird populations. (2) It is difficult to recruit a large number of observers for such an intense effort as the spot-

mapping method. Britain has had a maximum of 400 plots done in the two schemes (CBC and WBS) in a single year. In North America just over 200 spot-mapping censuses have been done in a single year. In both areas, participation is lower now than at the peak.

Both the British and the North American experiences suggest that habitat-specific point counts may be the wave of the future for large-scale monitoring programs. In the United States such counts may be included in the Environmental Monitoring and Assessment Program currently being undertaken by the Environmental Protection Agency. Obtaining habitat information for Breeding Bird Survey routes should prove valuable.

The major advantage of spot-mapping is its ability to link particular habitat types (and portions of habitats) to specific locations and densities of breeding pairs. Thus, spot-mapping allows tight correlations between changes in breeding habitat and changes in breeding-bird abundance (or the detection of declines that *cannot* be linked to habitat changes). The importance of breeding habitat to breeding birds cannot be overemphasized. The importance of spot-mapping censuses remains high. In Britain, BTO has suggested ways to alter land use in farmland and woodland to improve conditions for birds. Many of those recommendations are mentioned in this book. Both Britain and North America have large quantities of spot-mapping data that have yet to be fully exploited. These data on bird/habitat relationships should support high-quality research into the future.

The book should be purchased by anyone interested in the population biology and habitat requirements of European birds and anyone interested in the methodology and results of spot-mapping censuses. It should be purchased by libraries at all institutions with population biology research programs.—GREGORY S. BUTCHER.

The Birds of Papua New Guinea. Vol. II, Passerines.—Brian J. Coates. 1990. Alderley, Australia, Dove Publications. 576 pp., 558 photographs, 39 sketches or line drawings, 556 distribution maps, 1 table, 3 endpaper maps. Order From Dove Publ. Pty. Ltd., P.O. Box 59, Alderley, Queensland 4051, Australia. ISBN 0-9590257-1-5. Cloth. \$110.00.—With the publication of this book, just three years after the appearance of Vol. I (nonpasserines), Brian Coates has completed his stated goal of providing, in two volumes, a complete reference for all bird species known to occur in Papua New Guinea (PNG). Coates has succeeded by no small measure, and his books will, I believe, become the standard references for PNG birds for the next two to three decades, as Rand and Gilliard (1967, *Handbook of New Guinea Birds*, Lon-

don, Weidenfeld and Nicholson) has been for the previous quarter-century.

This is an amazing book. Volume I was good, but the magnitude of Coates' contribution to ornithology is even more apparent in this volume. This book is not just a summary of existing knowledge, but in many cases presents original scientific observations and descriptions, including documentary photographs of previously undescribed nests and display behavior. For many species this book will be cited as primary literature. As I attempted to convey in a review of Volume I (Pruett-Jones 1987, *Condor* 89: 946), the contribution Coates' books have made to the study of New Guinea ornithology is so great that any criticism is made insignificant by considering what Coates has provided. In this case there is no important criticism to be offered. The book is beautiful in appearance and complete in its coverage of the biology of PNG birds.

Papua New Guinea encompasses the eastern half of the island of New Guinea, the Bismarck Archipelago (most importantly New Britain and New Ireland), the Admiralty Islands, and the island of Bougainville in the Solomon Islands. Lest a potential reader think that the coverage of the avifauna of PNG specifically, rather than that for the entire island of New Guinea, is too restrictive, an appendix lists the bird species known to occur to Irian Jaya (the state of Indonesia that comprises the western half of New Guinea) but not recorded in PNG. This list includes just 65 species. The species accounts in Volumes I and II combined (741 total) thus cover more than 90% of the species one could see on the island of New Guinea, the Bismarck and Admiralty Islands, or Bougainville. A second appendix provides a species list of birds recorded from the Solomon Islands, from Nissan to San Cristobal and Rennell Islands. This list is tangential to the primary focus of the book—the birds of PNG—but as there is not yet a field guide to the birds of the Solomon Islands (Hadden [1981, *Birds of the North Solomons*, Handbook No. 8, Wau Ecol. Inst., Wau, PNG] covers the birds of the north Solomons), it is nevertheless a welcome and important contribution. Mayr (1945, *Birds of the Southwest Pacific*, New York, Macmillan) remains the source of identification for species and subspecies endemic to the Solomons but not found in PNG.

This book is organized as was Volume I, with the exception that it does not duplicate information contained in the introduction to Volume I: avifaunal origins; endemism; ecological relations; breeding phenology; the area's physical features, climate, and vegetation types; and an analysis of the major habitats with respect to bird distribution. Species accounts are provided for 364 species and 4 observed or probable vagrants. The species accounts include data on size (total length only), field description, comparison with similar species, distribution and extralimital range, habitats, altitudinal range, relative abundance, gen-

eral habits, displays, nesting, and subspecies. The species accounts are well written, but Coates repeatedly alternates between normal prose and what might be termed a field-guide style of abbreviated and incomplete sentences. The abbreviated style saves space, but in a book of this format I find it more frustrating than helpful. I found few typographical errors, most of them trivial. One that should be mentioned is that if the melampittas (*Melampitta* spp.) are considered birds of paradise (Paradisaeidae) as suggested by Sibley and Alquist (1985, *Emu* 85: 1), and adopted by Coates, then there are a total of 44 species in the family, not 42, and there are 36 species in PNG, not 32 as listed.

The ordering of families conforms to that of Beehler and Finch (1985, *Species-checklist of the Birds of New Guinea*, Australasian Ornithol. Monogr. No. 1, Melbourne, Royal Australasian Ornithol. Union) with minor changes taken from Sibley and Alquist. Unless justified by recent studies, the scientific names used also conform to those found in the checklist. Coates uses a combination of new and old common names based primarily, it appears, on his personal preferences. The absence of clarification by Coates regarding his decisions on common names is the only shortcoming of the book. This is a minor point, but unless changes are justified by taxonomic revision, the checklist or the field guide (Beehler et al. 1986, *Birds of New Guinea*, Princeton, New Jersey, Princeton Univ. Press) should, in my opinion, remain the source of common names for the birds of New Guinea.

The photographs in this book are as important as the species accounts. Most are of extremely high quality, and many illustrate species, nests, bowers, or displays never before photographed. The bower of the Fire-maned Bowerbird was discovered in 1986, and the two photographs included are the first ever to be published. Many of the photographs are absolutely stunning, and those of the displays of the Magnificent, Emperor, and Blue birds of paradise are no less than incredible. This is not an exaggeration. If you are among the few who are not already enthralled by birds of paradise, wait until you see the photographs in this book; you will be amazed.

Anyone who is interested in the birds of PNG, or in high-quality bird photography, will find this book of interest. It is the only up-to-date source of detailed information on birds from an interesting and biologically important part of the world, and its photographs complement and add to the illustrations in the field guide of Beehler et al. The price (\$110.00) is significantly higher than that of Volume I (\$65.00), but the increase is justified. No expense was spared in the preparation or illustration of this book. Fewer photographs would have cut the cost (e.g. 16 photographs illustrate the King Bird of Paradise, and 13 illustrate the Magnificent Bird of Paradise), but the extent of the photographic coverage was necessary for a thorough summary. The 157 pages and 180 photographs devoted to the bowerbirds and birds of par-

adise are by themselves worth the purchase price. Every ornithologist should make an attempt to at least look at this book; if you are interested in the birds of New Guinea, you will want it for your library.—S. G. PRUETT-JONES.

The Manx Shearwater.—Michael Brooke. 1990. London, T. and A. D. Poyser. viii + 246 pp. ISBN-0-85661-057-7. \$32.00.—A nocturnal, burrow-nesting seabird, breeding on storm-girt islands and foraging up to 360 km from its colony, would hardly seem the best of species for productive research, yet the Manx Shearwater (*Puffinus puffinus*) is one of our best-studied seabirds and the stimulus for many advances in ornithology. Ronald Lockley, trained only "in the university of the fields and woods of Monmouthshire," began studies of the Manx while a farmer on Skokholm. His two books "The Shearwater" (1942) and "The Island" (1969) are classics of natural history writing. Using the Manx, Lockley was the first to demonstrate navigation in a wild bird species, using releases of Skokholm shearwaters from Italy, Switzerland, and the eastern United States. The results were confirmed more rigorously by G. V. T. Matthews, who also investigated the mechanisms allowing such navigation.

V. C. Wynne-Edwards and David Lack were influenced by studies of the Manx Shearwater in developing their own theories of population regulation. Wynne-Edwards suggested that the "rafts" of shearwaters resting on the sea surface around the breeding colony allow birds to assess their total population and to adjust individual reproductive effort accordingly. In contrast, Lack suggested that seabirds attempt to maximize their individual reproductive success. Wynne-Edwards' theory has remained untested, at least for seabirds, while twinning studies by Harris and Perrins show that the Manx can raise more than one young, which suggests that Lack's theory is insufficient to explain the species' behavior.

Another topic of importance has been the demonstration by Perrins, Brooke, and others that the earlier a young Manx hatches, the heavier it is at fledging and the more likely it is to survive to return as an adult. This work stimulated increased attention to determining what controls breeding seasons and success. Finally, the studies of Dane, Harris, Diamond, Nuttall, and Brooke on puffinosis, a mysterious disease of unknown etiology that attacks fledgling Manx Shearwaters, are fascinating reading for anyone interested in the role of disease in population regulation.

All these topics are woven into the central theme of "The Manx Shearwater," exploring how the species functions as a nocturnal, burrowing, colonial seabird. Brooke adds his own 17 years of experience with the

species, providing updates and additional data on many of the earlier studies as well as detailed new work on vocalizations and olfaction. This is a book very much in the tradition of the British natural history monograph and a worthy addition to the genre. It is also an example of how good natural history is excellent science, despite the tendency on this side of the Atlantic to separate the two. In the same British tradition, the book is peppered with the occasional wry author's aside, which leavens the text's impressive presentation of data. The book's main weakness, reflecting the lack of research effort, is the paucity of material on the shearwater's diet and behavior at sea. Given local sea and weather conditions around the British Isles, such a weakness is understandable, but a fuller understanding of this species must await such studies.

The Manx Shearwater has been central to our understanding of seabird biology. Brooke has done a good, readable job of summarizing and synthesizing the vast literature on this species and placing it in the wider context of seabird biology and general ornithology. "The Manx Shearwater" should be read by or find a place on the shelf of every seabird and population biologist, and would be a useful addition to academic and professional libraries.—DAVID CAMERON DUFFY.

The Black Eagle.—Valerie Gargett. 1990. Johannesburg and United Kingdom, Acorn Books and Russell Friedman Books. (Mill House, Ewell Road, Surbiton, Surrey KT6 6JB, England.) 300+ pp., 40 color plates, including 7 paintings by Graeme Arnott, 70 color photographs, more than 70 sketches by Robert Davies, graphs, figures, 60 tables. Standard ed. (cloth), ISBN 0-620-11915-2, \$55.00; collector's ed. (200 copies), ISBN 0-620-11916-0, \$320.00.—This remarkable book is the culmination of more than 20 years of intense field investigation of a population of Africa's Black Eagle (*Aquila verreauxii*). It is an epic, an odyssey, pursued under difficulties, both political and physical, in the Matobo Hills of Zimbabwe. The editors and publisher have produced what may be the foremost contribution to eagle biology. The book is so lavishly illustrated that the viewer is transported to the rugged granite koppies and dwallas of Zimbabwe and the superb aerial gymnastics of the world's most spectacular eagle.

The pair bond of the Black Eagle is remarkably strong—members of the pair are almost always seen together, except during the first months of early nesting when the female alone is at the nest. Some 60 pairs of eagles live among the great granite "whale backs" (dwallas) centered in the Matobo National Park, just south of Bulawayo, Zimbabwe. They feed almost

exclusively on "dassies" (*Procavia Procaviidae*), rodentlike mammals more closely related to elephants and dugongs, which live in dense colonies on the vegetated sides of the steep boulders and koppies. Dassies weigh 3 kg and are easily caught by at least 4 species of eagles.

In the early 1960s, Carl Vernon reported on 38 pairs (43 nests) in an area of 414 km² that included much of the Maboto National Park. He suggested to Valerie Gargett, a mathematics teacher from Livingston who had moved to Bulawayo with her husband a few years earlier, that she continue the survey. Provided a stimulus where little was needed, Gargett in 1964 began, organized, and directed the subsequent study.

Teaching school in Bulawayo during the week, Gargett led field trips each weekend into the rugged rocks of the Matobo Hills to collect data. This provided an open-air school for a group of volunteer eagle-watchers who over the years gained in skills and maturity. Gargett observed and noted in meticulous detail what became a voluminous record. Twenty years later, some 12,000 records formed the data base of "The Black Eagle."

If the text deserves superlatives, so too do the illustrations. In Graeme Arnett's paintings the flying eagles seem to sweep over the granite Matobo hills. The photographs, all in color, provide an excellent close-up of the eagles and their nests, eggs, and eaglets, and action views of adults and young. Most striking is a series on fatal sibling aggression. The views of Gargett at nest 57, measuring an egg and an eaglet removed from and replaced beneath the adult, are astonishing. Robert Davies' sketches are the work of a gifted student of the Black Eagle. They yield a deep view into the behavior and appearance of this bird, from eaglets to flying adults. Most interesting are the sketches of flight behavior, which show display flights interposed with the regular circling and sailing.

Students of raptor biology are familiar with Gargett's work from her many publications, mostly in *Ostrich* and *Bokmakierie*. Here the various studies come together in one volume. She writes well and with painstaking attention to detail. It is a pleasure to read.

In 1969 Mrs. Gargett resigned her teaching position to devote full time to the eagle project. And full time it was! For 19 pairs of eagles in which the sexes could be distinguished, she logged nearly 864 h, spread over 155 periods of 2 or more hours, with 21 periods of 10 or more hours of continuous observation (p. 49). One can only guess at the total hours spent in the field for her summary of one nesting pair over the years: "Pair 1 successfully raised 17 youngsters in 22 years, the best breeding record to date." She credits her fellow workers, and particularly her husband, Dr. Eric Gargett, for their expert handling of the difficult access to many nests, with spectacular rappelling down bare rock faces.

While her work is best known for her resourceful

design of experiments to shed light on the "Cain and Abel" conflict, her comments on individual differences in behavior of two female eagles at her two most studied sites (80 and 57) are most interesting. Gargett notes that observation is a two-way process, and that the eagle is both observed and an observer. Because of this, the human observer must take all feasible precautions to minimize the effect on the eagle. Gargett advocates talking quietly to the eagle as the nest is approached, "to let the bird know that an approach is being made." Gargett used "a manner of approach that respects the natural ways of a creature in the wild." Otherwise the observer not only abuses a privilege, but ends up studying not just an eagle, but an eagle being studied by an observer. No matter how careful one is, "the one-way process will become a two-way relationship, and the form that the relationship takes will now depend not on the observer alone but on the individual characteristics of the bird or birds that are being studied. And because birds are individuals, not all cast in the same mold, the relationship is unpredictable."

The females at the two sites came to recognize the observer. At site 80, the male recognized both Gargett and her motorcar. He flew near the nest when her car appeared on the road. Then the female circled near the nest, and moved closer as Gargett became more familiar. Later the eagle became bolder and, perhaps not liking what she saw, began to swoop directly at the observer. Finally, the attacks became so determined that Gargett had to have a helper stand above her and wave a club! Photographic plate 38 of the female eagle coming in eye-to-eye, with talons at the ready, is frightening.

At nest 57 the female over the years gradually let Gargett get close before leaving the nest. Gargett's approach was from above, a drop of about 6 m using a rope ladder and then climbing down a narrow crack in the rock, all in view of the eagle. Eventually, the eagle stood and watched but did not leave the nest as Gargett descended. Then the bird settled back on her egg as the crouching Gargett inched her way closer, extended her hand, reached under the eagle, removed the egg, measured and weighed it, and replaced it under the still sitting eagle. "Perhaps after so many years of my trying to respond to her behavior, she was responding to mine." I stroked her back, packed my equipment, climbed away and pulled up the ladder. "She watched me go, unmoving."

When both eggs of nest 57 had hatched, Gargett would remove each eaglet from beneath the sitting parent, weigh and measure it, and return it under the adult. She could feel the brood patch, "bare and very warm." But when Gargett reached out and picked up a dead dassie in the nest, the eagle was alert at once and pecked at the carcass. When Gargett picked up another dassie carcass, the eagle "swung around, picked up the prey in her beak and plunged off the nest."

The contrasting behavior of these two females, which reacted differently to Gargett when she did not react differently to them, "illustrates that large eagles are as individual as we are."

This authoritative book is a pleasure to read and with the illustrations is an important addition to the literature of Africa. It is the best book on a raptor we have ever seen, and is a fitting tribute both to its author and this fine raptor. It should be in the library of every raptorophile and belongs in every university library as an example of how field studies should be conducted.—WALTER R. SPOFFORD AND SALLY H. SPOFFORD.

Hawks, Eagles, and Falcons of North America.—

Paul A. Johnsgard. 1990. Washington, D.C., Smithsonian Institution Press. 403 pp., 39 color plates, 71 text figures. ISBN 0-87474-682-5. \$45.00.—Johnsgard presents a thorough and current summary of the diurnal raptors (exclusive of the Cathartidae) that breed in North America. The book begins with five chapters dedicated to evolution, classification, and zoogeography; foraging ecology and foods; comparative behavior; reproductive biology; and population biology. The remaining section details the natural histories of 31 diurnal raptor species. Species accounts include a description of the North American distribution with map, other vernacular names, North American subspecies, description, measurements, weights, identification, habitats and ecology, foods and foraging, social behavior, breeding biology, evolutionary relationships, and current status. Four appendices include a key to the North American diurnal raptors, origins of vernacular and scientific names, a glossary, and line drawings of field identification views and anatomy.

Most photographs are of captives and are generally of excellent quality. The black-and-white anatomical drawings in Appendix 4 seem of limited value when compared with a copy of "A Field Guide to Hawks of North America (W. S. Clark and B. K. Wheeler 1987, Boston, Houghton Mifflin), where various morphs are presented in color.

Chapter 1 provides a valuable comparison of five prominent classification systems and a thorough discussion of raptor origins. This chapter also provides thought-provoking estimates of the winter population size of 26 diurnal raptor species (350,000 Red-tailed Hawks) based on CBC data. Chapter 2 presents a good overview of foraging ecology, and the obligatory discussion of the significance of reverse size dimorphism in raptors. Chapter 3 summarizes various behavioral actions and migration. In Chapter 4 I found several excellent tables and figures (some modified after I. Newton [1979, *Population Ecology of Raptors*, Vermillion, South Dakota, Buteo Books]) that sum-

marize what is known of the breeding phenology, reproductive parameters, and breeding success of North American raptors. Likewise, Chapter 5 provides helpful summary tables of mortality rates and population estimates with their sources. Because most or all of the data presented in this book are from other sources, their appearance in one table or figure will save a lot of future literature search.

The species accounts are accurate and current. The only mistake I found was the statement that when hunting, the Red-shouldered Hawk "mainly uses direct searching while in flight as a primary [hunting] method" (attributed to N. K. Johnson and H. J. Peeters 1963, *Auk* 80: 417). This species hunts almost exclusively from perches; thus, my objection is with the original statement, not Johnsgard's use of it. There are few typos.

The major weakness of the book lies in the range maps; a good recipe for a headache is to attempt to understand them. A key to the different stippling patterns (up to four) on each map (as in R. S. Palmer [Ed.] 1988, *Handbook of North American Birds*, Vol. 1, New Haven, Connecticut, Yale Univ. Press) or grouped in the front of the book (as in C. S. Robbins et al. 1983, *A Guide to Field Identification: Birds of North America*, New York, Golden Press) would have been helpful. The shading pattern is not uniform for each species, as exemplified by differences in the Bald Eagle and Sharp-shinned Hawk maps. The Golden Eagle range map refers to a resident population that is supposed to be depicted in cross-hatching, but is detailed in stippling. Shading to indicate large wintering regions for the American Kestrel (e.g. most of Mexico), Merlin (e.g. southern United States, Mexico, and Central America), Golden Eagle, and Ferruginous Hawk was omitted. For California, the region with which I am most familiar, minor breeding-range errors on maps of the Red-shouldered Hawk, Northern Harrier, and Prairie Falcon could have been screened and corrected (at least for the former two species) by examining regional references such as K. Garrett and J. Dunn (1981, *Birds of California: Status and Distribution*, Los Angeles, Artisan Press). Winter-range errors for the Osprey and Rough-legged Hawk were even more pronounced and again could have been identified by consulting Garrett and Dunn (1981), or relevant issues of *American Birds*. Ospreys commonly winter in coastal southern California. Rough-legged Hawks commonly occur in winter throughout most of California, including the Central Valley, Owens Valley, and the Mojave Desert; the species is not limited to the northeast corner, as depicted.

Johnsgard provides a concise, well-written summary of the current state of knowledge of diurnal North American raptors. Perhaps the range map problems, the only real flaw of the book, can be corrected in a forthcoming edition. This is a desirable addition to any personal, college, or university library.—PETER H. BLOOM.

Phylogenetic Systematics as the Basis of Comparative Biology.—V. A. Funk and D. R. Brooks. 1990. Washington, D.C., Smithsonian Inst. Press. i + 45 pp., 102 text figures. ISBN 0-87474-375-3. \$7.95.—Just a few years ago virtually all discussions about the evolution of ecology and behavior took as their theme adaptive change within populations. Little attention was directed toward patterns of historical change among species. This has all changed substantially. In recent years we have witnessed a proliferation of papers using phylogenetic hypotheses as the basis for inferring ecological or behavioral character-state transformations within clades of closely related species or across higher taxa.

This small monograph attempts a broad review of many of the phylogenetic methods that can be applied to the analysis of a wide panoply of questions in comparative biology. Although these methods will be fairly well known to contemporary systematists, evolutionary biologists, especially those concerned with behavior and ecology, may be unfamiliar with most of them and therefore should find this a useful introduction.

This volume is not a guide to the mechanics of phylogenetic systematics, or cladistics, but rather an argument and demonstration of its use in comparative biology. This is all well and good because there are now numerous books and papers that describe cladistic methods. Instead, Funk and Brooks focus on two aspects of comparing historical pattern, assuming that the relevant phylogenetic relationships have already been determined: (1) assessing the congruence of one cladistic hypothesis with another, and (2) mapping traits of interest on a given cladogram. They briefly discuss consensus analysis, which the investigator uses to compare cladistic patterns shown by two or more phylogenetic hypotheses. The major kinds of consensus trees are described and illustrated. Unfortunately, they equate strict consensus trees—which recognize only those cladistic elements that are shared by all trees in the sample—with “Nelson” trees. This is a common error in the systematic literature, as Page (1989, *Cladistics* 5: 177) has noted. More significantly, Funk and Brooks spend only the briefest of time with component analysis (G. Nelson and N. Platnick 1981, *Systematics and Biogeography: Cladistics and Vicariance*, New York, Columbia Univ. Press), which is a powerful method for examining shared patterns among cladograms, particularly those with numerous ambiguous elements. This is especially the case in biogeography, where taxa may be distributed in more than one area, or in host-parasite patterns where parasites may be distributed over different hosts. R. D. M. Page (1989, privately distributed) has released an excellent computer program, *Component*, that implements component analysis as well as computes various types of consensus trees (for a description, see Page 1988, *Syst. Zool.* 37: 254).

Most of the authors' attention is paid to the “map-

ping technique, and they devote the lion's share of space in the methods section to this. Mapping could take one of two forms. The simplest, which is discussed little in this paper, would code character-states for, say, ecological or behavioral characters and then optimize them on a tree that was generated using other data. Once this is done, historical patterns of ecological or behavioral change could then be inferred. A second way of mapping can be applied to comparisons of historical patterns of areas of endemism (area-cladograms) for different clades, or to relationships of hosts relative to those of their parasites. The relationships specified by two or more cladograms can be converted to data matrices using some form of binary or linear coding, pooled, and then analyzed cladistically. Alternatively, the matrix for one cladogram could be optimized on the branching pattern of a second cladogram.

Following this methodological introduction, the reader is taken through discussions of the analysis of historical constraints, hybridization, biogeography, speciation, and historical ecology, the latter including coevolution and ecological and behavioral diversification. The above-mentioned methods are applied using both theoretical and real-world examples. Many of the latter are fairly well known, having been discussed in other publications, but they exemplify the points the authors are trying to make and should therefore be informative for nonsystematists.

Of these topics, biogeography, speciation, and historical ecology receive most of the attention. In searching for commonality in biogeographic patterns across clades, Funk and Brooks first apply Adams and strict consensus trees to the area-relationships implied by two sets of cladistic studies, one for fishes and the other for birds. They also take the cladistic relationships, code them, and then apply parsimony procedures. This exercise is purely descriptive rather than analytical, for the results of the consensus and parsimony analysis are not compared; this is unfortunate because they do not yield the same answer in the case of the complex fish data. It is also too bad that the solutions for the fish data provided by component analysis, which have been discussed extensively in the literature, are not mentioned.

The section on speciation is disappointing. It starts with pure confusion over species. They suggest there are two “common” ways of looking at species, one evolutionary and the other taxonomic. To them, the evolutionary view is equivalent to Wiley's evolutionary species concept in which species are defined as lineages having their own evolutionary tendencies and historical fate. A taxonomic species (p. 25) is a “group of phenetically [*sic*] distinct individuals but, actually, it can be anything a taxonomist says it is.” This caricature of species concepts will surely be perplexing to practicing systematists, especially cladists. Funk and Brooks adopt the evolutionary view of species, but address not at all the obvious problem of its

being nonoperational. The fact is, one must use character analysis to individuate species, and it is not a matter of whim as their statement implies. Systematists have been debating species concepts more and more recently, but none of this ferment is recognized here.

Different modes of speciation (sympatric, allopatric, parapatric) are illustrated with some interesting examples from Andean plants. Their conclusions would have been strengthened, however, if they could have shown that these patterns for individual plant groups do or do not exhibit biogeographic congruence with other groups having endemics in the same areas. Consequently, one cannot make strong inferences about the occurrence of peripatric (peripheral) isolation vs. vicariance of those peripheral isolates without information on congruence.

The study of historical ecology owes much to Brooks' work on host/parasite associations (see especially D. R. Brooks and D. A. McLennan 1991, *Phylogeny, Ecology, and Behavior*, Chicago, Univ. Chicago Press). So it is not surprising that the section on historical ecology relies heavily on examples from parasite systematics in which host and parasite cladograms are compared by some of the methods already discussed. Perhaps the most conceptually interesting aspect of this section is how cladistic analyses can be used to compare patterns of taxonomic diversification with those of ecological and behavioral diversification. Traditional neo-Darwinism is imbued with a healthy dose of ecological determinism in which ecological change is seen as "driving" evolutionary change. But when one maps ecological change onto cladograms, it is often discovered that speciation events are not always accompanied by ecological innovation. There are a number of methodological issues here, namely whether the investigator is actually recording all possible ecological change. But if this observation is general, then it suggests substantial phylogenetic constraint on ecological evolution and calls the importance of ecological determinism into question.

In summary, this publication is not a critical analysis but an exposition of how cladistic hypotheses can be applied to various problems in comparative (historical) biology. Ecologists and behaviorists will profit from reading it, and it should stimulate their thinking, but before applying these methods to their own work, they should also take a critical and extended look at the relevant primary literature.—JOEL CRAFT.

Annotated Check-list of the Birds of East Africa.—Lester L. Short, Jennifer F. M. Horne, and Cecilia Muringo-Gichuki. 1990. Los Angeles, California, Proc. Western Found. Vertebrate Zool. Vol. 4(3): 61–246. 26

half-tone habitat photographs, 3 maps. ISSN 0511-7550. \$20.00.—This annotated list of the 1,320 species of birds recorded from Kenya, Tanzania, and Uganda offers an up-to-date taxonomic, nomenclatural, and biogeographic perspective on the East African avifauna. The authors consider this checklist to be a tool for the comparative geographic study of continental avifaunas, and I have little doubt that this will be an important reference work for just this kind of research. I have used it already for biogeographic comparisons between African and southern Asian avifaunas, and their checklist served this purpose well.

A brief introduction outlines the authors' taxonomic perspective, delineates protocol for choice of English names (in some cases, new ones are coined), and discusses habitat alteration and conservation priorities. Make no mistake—this is a checklist and not a regional ornithogeography. All but 5 of its 185 pages are devoted to the annotated taxonomic list. The more than 1,300 species accounts that follow are enlivened by photographs of the varied Kenyan habitats that give the reader a fair introduction to the range of environments in East Africa. A detailed line map is presented for each of the three nations included, with provinces and protected areas delineated.

Perhaps its most important contribution is the collation of new viewpoints on the systematics and taxonomy of African and Old World birds. This checklist incorporates the insights provided by the first three volumes of "The Birds of Africa" (C. H. Fry, S. Keith, E. K. Urban, and L. H. Brown 1982–1988, New York, Academic Press), new sequences provided in the as-yet-unpublished revision of the American Museum of Natural History's "Reference List of Birds of the World" (formerly Morony, Bock, and Farrand; revision being authored by Bock and Gulledge), and information contained in the most recently published volumes of Peters' checklist. The authors also consulted and synthesized many papers on African birds that were published in the 1980s. This is not to say the list is a mere compilation, for the authors have made their own choices and decisions, and have deviated from the published view when their own experience supported such action. It should be noted that there is little mention of the work of Sibley and Ahlquist, and the reader is given the impression that the new arrangements and designations suggested by that body of work have not been employed here. In addition, it is apparent that the present work was conducted without consultation with the East African Natural History Society, whose checklist committee is currently preparing a revision of its annotated list of East African birds. It will be interesting to see how the two compare.

This is a reference work that must be on the shelf of any ornithologist interested in the distribution and taxonomy of Afrotropical birds. The more than five pages of citations are a useful source of recent work in these fields, and the commentary provided in the

species accounts gives a first look at currently unresolved problems in regional speciation and systematics. One could find a range of minor points to quibble about, from the hyphenation of some English names (why Bat-hawk and not the universally employed Bat Hawk?), to generic limits that might offend some splitters. The list would have benefited from an index to families, a table of contents of families, or simple running heads with familial designations. I found it difficult to locate quickly some of the smaller passerine families in the text. Suffice it to say, these problems are minor, and the main purpose of the work is admirably accomplished. Here is a useful reference for the study of East African birds.—BRUCE M. BEEHLER.

Homeward Bound: Problems Waders Face When Migrating from the Banc D'Arguin, Mauritania, to their Northern Breeding Grounds in Spring.—B. J. Ens, T. Piersma, W. J. Wolff, and L. Zwarts (Eds.). 1990. Special ed. of *Ardea* 78 (1/2). Den Burg, Texel, Uitgeverij Het Open Boek. Separately published as an issue of *Ardea*. xii + 364 pp., 2 color photographs, numerous text figures and black-and-white photographs. Order by sending a money order to Stitching WIWO, U. v. Stuivenbergweg 4, 6644 AB Ewijk, Netherlands. ISBN 90-70202-131. DFL 55.00 (about U.S. \$33.00).—This book is a collection of papers that report on expeditions to the Banc D'Arguin (Mauritania) between 1985 and 1988. The title appears to reflect the narrow set of circumstances under which the data for the book were collected. At the same time, the title is extremely misleading because this book is far from narrow. Because the data are always analyzed and discussed within an ecological and evolutionary perspective much broader than just the local circumstances at the Banc D'Arguin, "Homeward Bound" is the most important contribution to shorebird biology since "Shorebirds in Marine Environments" (F. A. Pitelka 1979, *Stud. Avian Biol.* 2) and one of the most significant reviews of several aspects of bird migration, especially physiology, ecology, and energetics.

"Homeward Bound" includes 23 papers by a total of 28 authors (26 from the Netherlands, 1 from Mauritania, 1 from Ghana), although some authors made numerous contributions (for example, Zwarts coauthored 9 papers and Piersma 7). The papers address complex issues: (1) the importance of the Banc D'Arguin to migrating shorebirds, (2) a description of their migratory patterns in space and time, (3) migratory behaviors, (4) the acquisition of the nutrients necessary for migration, and (5) the construction of energy budgets for migration.

The Banc D'Arguin represents only 5% of all intertidal land along the east side of the Atlantic, but

more than 25% of the 7.5 million coastal waders winter there. Surprisingly, it has the highest recorded feeding density of shorebirds in the world, but one of the lowest prey densities. In the first section of the book some of the early work and ideas generated by this seeming paradox are discussed. Wolff and Smit (pp. 17-38) demonstrate that food consumption by shorebirds almost equals food production, implying that the system is probably tightly regulated. There is, however, an important error in their calculation of food consumption; the estimate does not include the extra energy necessary to build up fat and protein reserves before migration (both the fat and protein themselves and the energy lost in building up these reserves). This component adds to an already tightly regulated system because of the implied higher energy consumption. The other papers in this section deal with more specific foraging and nutritional aspects.

The section on migratory patterns includes, among other topics, migratory routes. There is a report on an unsuccessful attempt to detect the breeding locations for some of the species. Evidence is given that the site is also used as a refueling site or "stopover," and that the area is also important during the summer for nonbreeders (possibly first-year birds). In one paper in this section Piersma et al. (pp. 123-134) show that departure schedules of different species are correlated with the breeding range and not with wind speed. They conclude that the timing of departure from the Banc D'Arguin is largely under internal, instead of environmental, control.

The section on migratory behavior contains some of the most provocative contributions. Piersma et al. (pp. 157-184), for example, carefully analyze and disentangle several lines of evidence to provide a "migrants checklist," a list of the circumstances necessary to initiate departure. This checklist calls for a sequential combination of appropriate conditions for take-off that include, among others, the correct seasonal timing, a "full fuel tank," wind conditions, availability of flock mates, cloud conditions, visibility, magnetic cues, visibility of stars, etc. I speculate that this scheme will become a textbook example for years to come.

The fourth section deals with the acquisition of the necessary energy for migration. This is the most important part of the book because of the new data presented. Although some of the experiments and observations are based on circumstantial evidence (some results are based on a sample size of 1!), this is the heart of the book. There are experiments on maintenance metabolism, feeding and intake rates, and the fashionable idea that feeding rates are constrained physiologically. There are also several new lines of evidence that demonstrate conclusively that, at least in shorebirds, the mass gain before departure is composed of both fat and protein, not just fat alone.

The final section, the construction of the energy

budgets for migration, is the most enjoyable and speculative part of the book. Careful reviews of new data and of previous studies strongly suggest that most current estimates of flight ranges tend to underestimate flight range capabilities. Unless tail winds contribute significantly to enhanced flight ranges, shorebirds probably fly very close to their physiological limits. In conclusion, the authors believe that the available data for the cost of flight in birds has been pushed too far, and the field is in desperate need of actual metabolic data from shorebirds in flight during migration. This would be a worthwhile project, but probably is unfeasible because of technological limitations.

The language of "Homeward Bound" tends to be conversational, giving the book more powerful and clear descriptions. For example, one paper (p. 157) begins with "migration can be in 'the air' even before waders fly up and leave an area." Few editors would allow a phrase like this to be published in a scientific journal. On the other hand, anybody who has witnessed shorebird migration knows that, in fact, "migration is in the air" before flocks of shorebirds depart. In general, however, the book is well presented, and the line illustrations are excellent, although some of the photographs are not of very good quality.

One of the most rewarding and stimulating aspects of "Homeward Bound" is the careful weaving of data and cooperation among many researchers toward one goal: to understand the Banc D'Arguin system. This approach has been described by E. H. Bucher (1990, Applied ornithology: putting theory and practice together, 20th Plenary Conference, IOC, Christchurch, New Zealand) as a "goal-oriented research approach" instead of the prevalent "discipline-oriented research approach." Under the former, all research is subordinated to the management (or other) goal in a systematic, interdisciplinary (and cooperative) way. Given the serious environmental predicaments faced today, we cannot be satisfied with understanding natural systems without working toward their conservation (Bucher 1990). This conservation component (and implicit goal) is found throughout the book, even though a few years ago it would have been considered sacrilegious. In fact, the preface of "Homeward Bound" starts with a message from the Dutch Minister of Agriculture, Nature Management and Fisheries: "Many wetlands of international importance can be found in the Netherlands. It is our policy to protect these areas . . . so that very large numbers of migratory birds can find food and shelter during their migratory movements over many thousands of kilometers." It is hard to visualize James Watt or Manuel Lujan saying something like this.

"Homeward Bound" is a fundamental contribution to shorebird biology and should be purchased by every college, museum, and university library. Every shorebird biologist must have a copy, as well as every ornithologist interested in bird migration. I strongly

recommend it to ornithologists interested in various aspects of ecology and evolution, and it is suitable for use in seminars with advanced undergraduate and graduate students.—GONZALO CASTRO.

Behavioral Ecology of the Galah.—Ian Rowley. 1990. Surrey, Beatty & Sons Pty. Ltd. 188 pp., 54 figures and color photographs, 33 tables. ISBN 0949324-272. No price given.—This volume is a must for ornithologists and conservationists interested in the Rose-breasted Cockatoo or Galah (*Eolophus roseicapillus*). This is the most comprehensive behavioral ecology work published recently on any species of Australian cockatoo.

The author briefly, but carefully, describes the study areas and methods before proceeding to a longer description of the environment, the food resources, and the "pest" status of the species. Numerous behavioral elements are then categorized and described. A separate chapter on vocalizations precedes two chapters on social behavior and daily activity patterns. The rest of the book concentrates on the breeding biology of the species, including behavior of the pairs, nest building, incubation, and chick rearing. Greater detail in some of these areas would have been useful from the purely biological point of view. A final summary chapter on productivity and survival includes forecasts about the future of the species.

Rowley provides fascinating details of the breeding biology and behavior of Galahs as well as insights into their "pest" status and what the future holds for them. The book makes it clear that the Galah is a classic example of a species that has adapted quickly to the presence of humans and their agricultural practices. Once very restricted in range, the species has exploded since humans began planting crops that can provide an unlimited seasonal food supply. It is of little surprise that the Galah has become a local pest; however, Rowley clearly points out that other ecological factors, namely nest sites and roost sites, may in the near future result in a rapid reversal of the species' status.

A major question left unanswered is whether the species will be able to adapt to areas without the usual nest sites and roosts by using other locations or, as some do now, flying great distances each day. The author also points out the highly social nature of this species, which could easily work against it if control measures are initiated that are as serious as the farmers would like. (One needs to think only of the fate of other flock species like the Passenger Pigeon and the Carolina Parakeet.)

While Rowley does not offer a direct solution to the "pest" problem that this species poses, he does provide a lot of data and ideas that should greatly

assist the Australian management authorities as they grapple with some of these issues. In the final paragraph of the book, the author provides a clear warning that the future survival of the species may well be dependent on man's assistance in replanting trees. This seems like a real paradox for the continued existence of what many farmers consider a terrible pest.

It is unfortunate that the author was not able to compare his work with similar works, if they exist, in other parts of the species' range. Even minimal efforts in other areas might provide good comparisons to determine if the results of this study are applicable to the entire species throughout its range. It would have been helpful to include more comparisons of its behavior and breeding biology with those of other cockatoo species.

The list of references is broad and comprehensive. This book should become a useful reference and hopefully a model for similar works on some of Australia's other fascinating cockatoos.

This book should find its way into the libraries of colleges, universities, museums, and game management and conservation agencies. It should also be found in the private libraries of aviculturalists interested in cockatoos, of game managers, and of conservation biologists.—DONALD BRUNING.

Current Topics in Avian Biology. Proceedings of the International Centennial Meeting of the Deutsche Ornithologen-Gesellschaft 1988. Supplement to the *Journal für Ornithologie*.—R. van den Elzen, K.-L. Schuchmann, and K. Schmidt-Koenig (Eds.). 1989. 403 pp. ISSN 0021-8375.—Even though the national organization of the German ornithologists (DO-G) was founded in 1853, temporary interruptions and reorganizations caused by war and political constraints are the reason the 100th annual meeting was not held until 1988. To celebrate the occasion appropriately, a symposium was organized with international participation. Of the 53 papers in this volume, 20 are by non-German-speaking authors. The symposium had two major themes: biogeography and systematics, and behavioral ecology. The systematics theme seemed particularly appropriate, because the meeting was held under the sponsorship of the Museum Alexander Koenig in Bonn.

To give an adequate abstract of all 53 included papers is impossible; the best I can do is to indicate the themes and summarize some particularly noteworthy findings. I myself discuss the impact of the theory of plate tectonics on our interpretation of the history of bird faunas. Unexpectedly, this impact has been quite minor, leading only to a correction of the early history of the Euro-American bird fauna (owing to the acceptance of an early Tertiary North Atlantic connection). W. Bock and P. Bühler studied the comparative anatomy of the tongue of the ratites and used the

fossil history of the (flying) paleognaths to arrive at a classification and reconstruction of the history of the ratites that differs considerably from that proposed by Sibley and Ahlquist. Other papers deal with functional anatomy, the history of species concepts, the exchange of faunal components, and questions of avian relationships. Scherzinger shows that the Burrowing Owl's vocal repertoire is very similar to *Athene noctua* (Little Owl), confirming the recent conclusion of other authors that the genus *Speotyto* cannot be maintained.

The main body of the volume (40 papers) is devoted to behavioral ecology. Twelve subdivisions deal with physiology of nutrition, bioacoustics, the ecology of marine birds, telemetry, the physiology of bird migration, population biology, mating systems, homing and orientation, foraging strategies, morphology and habitat selection, niche establishment, and circannual periodicities.

Rost and Bauer show how local the song dialects are in two different species. Berthold compares the onset of migratory restlessness with the actual average departure date in 19 migratory species. A number of studies deal with the control of population size by genetic and environmental factors. The problem of long-distance orientation never loses its fascination. Schmidt-Koenig discusses the role of airborne information for the initial orientation of homing pigeons. Several authors deal with the factors controlling foraging strategies. Particularly welcome are several papers that show the important role of morphology (locomotory adaptations) for habitat selection. Rutschke presents massive evidence that Heinroth's theory that widowed Graylag Geese do not remate is erroneous. In a large population of free-living geese, widowed birds invariably found a new partner in the next breeding season. The Innsbruck ethologist Ellen Thaler raised and bred two American kinglets in the aviary (never done in the United States as far as I know) and makes major new contributions to the knowledge of the life history of these species.

I have picked only a few plums from this rich pudding, but there is a wealth of interesting new information in many other papers. The volume should be in every ornithological library. It was published by the DO-G, and I presume that it can be ordered through the editor of the *Journal für Ornithologie* (Dr. Einhard Bezzel, Gsteigstrasse 43, D-8100 Garmisch-Partenkirchen, Germany).—ERNST MAYR.

OTHER ITEMS OF INTEREST

***Quelea quelea*: Africa's Bird Pest.**—Richard L. Bruggers and Clive C. H. Elliott. 1989. New York, Oxford University Press. xxii + 402 pp., 32 color plates, 91 text figures. ISBN 0-19-857607-2. \$90.00.—This volume is a compilation of the effort of many ornithol-

ogists working since the 1950's on one of the most destructive agricultural pests in Africa. Possibly the most abundant bird in the world, there may be upward of 1,500 million Red-billed Quelea. They destroy tons of crops, particularly cereals and sorghum, at an estimated cost of at least \$22,000,000 per annum.

Quoting from Jean Roy in the foreword, "Dispersed subsistence agriculture is the most seriously affected by the quelea, especially when it is near plentiful water supplies which are available as drinking places for the birds. Sometimes bird pressure on crops can force out the local farming populations. Often fertile land has to be abandoned in favor of less fertile areas with less bird pressure." Compared with North America, which has its pest bird problems but still produces surplus crops, parts of Africa often face famine because of food shortages. Widespread crop damage by quelea occurs even though native grass seeds are the quelea's principal food.

That there have been more than 400 published and unpublished papers on the biology and management of the species attests to the seriousness of the problem. There are 25 authors contributing to the 25 chapters in the book.

Quelea roosts and nesting colonies often contain millions of birds. They breed during the wet season when seeds of native grasses and insects are available. Nesting seasons are brief, and the 9-10-day incubation period probably is the shortest of any bird. After the initial hatching, adults may move to other areas to breed.

Breeding colonies and roosts are vulnerable to some sort of management, usually reductional control. "Lethal control by aerial spraying of avicides (mainly the organophosphate fenthion) is the established control technique for quelea" (Chap. 22). Spraying usually is localized, or done where birds are concentrated within feeding distance of crop fields. A theme of several chapters is that reductional control on a continental or regional basis is impractical if not impossible because of the monetary cost and the difficulty of locating the sometimes nomadic populations. Aerial spraying of toxic chemicals also has an environmental cost. Thus, spraying should be targeted only at specific populations causing or about to cause significant loss.

Age-old methods by the natives of scaring or frightening birds from crop fields are still used, and probably always will be, because quelea populations may move into an area suddenly, before reductional control at roosts or nesting colonies can be implemented. Other nonlethal methods include use of bird-resistant crop varieties, which usually produce lower yields, and a change to alternative crops that may not always be suitable to the environment. Another method, chemical repellents applied to grainheads, would not be cost-effective, except possibly in very small plots. Nonlethal control methods often only move birds from one farmer's crop to another farmer's crop.

The floodlight trap, a giant funnel trap made of netting, with a catching tent at the rear and floodlights to attract birds toward the funnel, has captured as many as 120,000 blackbirds and starlings in one night's operation at a roost in the United States. Curiously, according to the text, this technique has not been used at quelea roosts. Quelea are used as food by African natives; thus, this giant trap could serve a dual purpose.

Considerable attention is given to the subjects of distribution and migration of quelea, population dynamics, ecology of breeding populations, mass marking at roosts and nesting colonies with fluorescent pigment particles, methods of assessing damage, natural predation on quelea, and, as discussed above, control methods.

"*Quelea quelea*: Africa's Bird Pest" is a valuable reference for ornithologists and agriculturalists concerned with the ecology and management of large concentrations of problem birds. Because of its up-to-date information on population biology, it would be of interest to any professional ornithologist.—BROOKE MEANLEY.

Rapaci in Volo [Birds of Prey in Flight].—Luisella Caretta. 1988. Genoa, Francesco Pirella Editore. 73 pp., drawings, text in Italian alternating with English translation. ISBN 88-85514-24-3. Paper. No price given.—A most peculiar book of detailed drawings depicting the three-dimensional flight tracks of five species of Italian raptors engaged in various behaviors: soaring, carrying food, "courting," "teaching young to fly," etc. The illustrations of the birds are quite crude, and I find the work unattractive artistically and of limited scientific use. The depictions of "courtship" are of some interest but add little to what is available in the literature.—HELMUT C. MUELLER.

Parrots: A Natural History.—John Sparks with Tony Soper. 1990. New York, Facts on File, Inc. 240 pp., 20 color photographs, numerous line drawings by Robert Gillmor. ISBN 0-8160-2427-8. \$24.95 (U.S.), \$31.95 (Canada).—The authors, both filmmakers with the BBC Natural History Unit, have produced a wide-ranging, popular-level introduction to the biology of parrots and their varied interactions with humans, but the telling of interesting information is too often marred by mistakes of names, geography, fact, or emphasis. What confidence should you have in a book that says the Hudsonian Godwit is extinct, that Linnaean classification moves from genera direct to orders, that Audubon produced lithographs, and that ICBP's first list of rare birds was published in 1978?

On parrots the authors stick closer to good sources, but miss opportunities to discuss some of the most interesting material available. They describe briefly the use of "drumsticks" by Palm Cockatoos, noting that this is an exceptional case of tool use (the sticks are specially prepared and stored for future use), but the authors do not consider this in their discussion of parrot intelligence. Parrot edibility and suits brought against the owners of noisy captive birds each receive more space.

The most comprehensive sections are on species distribution and on endangered and extinct species. The variety of threats parrots face is well documented with numerous examples. The authors make a strong case for buying only captive-bred parrots. Unfortunately, these chapters, like the others, are written in a breezy colloquial style that conveys misinformation or noninformation. For instance, in treating the breakup of Gondwanaland, they write, "the continents have waltzed around the globe," and a problem for the Mauritius Parakeet, they say, is being "gazumped" by Hill Mynahs. Libraries and individual buyers should wait for a book that has been better edited and examines more thoroughly the aspects of parrot biology that make this a particularly fascinating family.—ROGER F. PASQUIER.

A Parrot Without a Name: The Search for the Last Unknown Birds on Earth.—Don Stap. 1990. New York, Alfred A. Knopf. x + 239 pp. ISBN 0-394-55596-1. \$19.95.—If you've ever wanted a book for your nonornithologist and nonbirding friends that explains why ours is an exciting science, this is it! Don Stap, a professor at the University of Central Florida, focuses on the work by Louisiana State University in Amazonian Peru and the many new species it has revealed. Stap participated in recent faunal surveys with John O'Neill and Ted Parker; during one, the first specimen of *Nannopsittaca dachilleae*, previously known only from sightings and photographs taken in Manu National Park, was collected. Interwoven with vivid depictions of the pleasures and frustrations of tropical fieldwork are a history of Neotropical ornithology and discussions of avian systematics that are scientifically accurate and stimulating to the lay reader.

Ornithologists and anyone interested in the natural world will find it a pleasure to read a book so evocative of the rain forest and so enthusiastic about scientific pursuits usually treated more dryly than they deserve. This is a valuable addition to community libraries and to academic institutions where students are considering a career in biology, as well as for anyone who enjoys a tale of wild places, colorful personalities, and the spirit of inquiry.—ROGER F. PASQUIER.

Animal Cytogenetics. Vol. 4, Chordata 3 B. Aves.—Les Christidis. 1990. Stuttgart, Germany, Gebruder Borntraeger Berlin. x + 116 pp., 40 figures, 30 tables. ISBN 3-443-26014-4. DM 108.00, U.S. \$68.00.—Christidis uses published information concerning the chromosomes of birds to thoroughly document the status of avian cytogenetics. He is to be commended for his efforts in assembling this information, however obscure or incomplete the original published articles may have been. More than 400 references are cited, and I am unaware of any in this field that have been omitted. Christidis summarizes our knowledge of each bird group with information on diploid numbers, karyotypic forms, occasional photographs of either chromosome spreads or karyotypes, ideograms, and in some cases diagrammatic schemes for his interpretation of the chromosome relationships within the various groups. He does not merely summarize the data of others but offers critical evaluations and alternative interpretations of the published work. This approach may well stimulate additional research by others in these controversial areas.

The volume is not intended for the casual reader because descriptions of karyotypes, which constitute much of the text, soon become iterative. Some errors are probably unavoidable when so much information is analyzed. Christidis confuses the meiotic situation in the White-throated Sparrow (Throneycroft 1975, *Evolution*) with that in *Junco* (Shields 1976, *Can. J. Genet. Cytol.*). Juncos have interstitial chiasmata, while the White-throat does not. Such markedly different meioses in such closely related taxa deserve further investigation. There are more than the usual number of editorial errors in this volume; the most distracting is the phrase "data is."

This relatively small volume (116 pages) carries a hefty price, but, nonetheless, it should prove to be an extremely helpful source of information for students of avian evolution who want to apply more informative molecular and biochemical methodology to some of the more basic and fascinating cytogenetic descriptions provided. As I've said before, "I hope that this synthesis of available data will encourage greater activity in this long-neglected field of avian biology."—GERALD F. SHIELDS.

Penguin Biology.—L. S. Davis and J. T. Darby (Eds.). 1990. San Diego, Academic Press. xx + 467 pp. ISBN 0-12-206335-X. \$79.95.—The papers included in this review volume represent a valuable expansion of presentations from the First International Conference on Penguins (Dunedin, New Zealand, 1988). The organizers had the wisdom not to publish this as a proceedings but to allow the authors to develop their contributions and expose them to peer review before the volume was produced. The overview by B. Stone-

house gives a bit of the history of penguinology. The discussion, based on Stonehouse's fantasy of what a similar conference might have been like 50 years ago, is inventive and instructive. Most modern studies of the Sphenisciformes go back only about 50 years. They began in New Zealand and included major contributions by amateurs. The reports presented here are comprehensive and balance data, interpretation, and speculation. Some of the subjects studied hardly existed 50 years ago. The text is divided into five major sections, each of which has its individual character.

(I) *Breeding biology*.—In this section nine authors cover six species. The work is basically descriptive. By the very best of fortune, most of the work includes long-term studies. The study sites are widespread, so in addition to detailed investigations of species at single locations, the authors consider the same species in other localities and different species in the same environment. There is enough variety in the species selected, the measurements, and the derived parameters (e.g. lifetime reproductive output) to make for interesting reading.

(II) *Foraging*.—Penguins breed on land, which makes long-term studies possible. They forage at sea, mostly out of sight of land, a basic fact that has produced a great hiatus in our understanding of their biology. But no more! Techniques and technology developed since Stonehouse's monumental "Penguin Biology" (1975, London, Macmillan) have allowed workers to accumulate and exploit information garnered at sea. We can now track the distances birds travel to feed, and we can measure the depth and frequencies of dives. We have nondestructive methods to sample gut and crop contents. We have an intellectual paradigm that includes activity and energy budgets. The result is that there is now more information than ever on what birds do, when they do it, and the energetics and physiology involved.

(III) *Energetics*.—Studying the energetics of penguins in the field has come a long way since the early work on body-temperature regulation. We now have doubly labeled isotopes and an enriched understanding of the biochemical mechanisms of metabolic regulation. An outstanding example is the use of all sorts of interesting approaches by Groscolas to decipher the mechanisms of the extended fast in winter-breeding *Aptenodytes*.

What bothers me about many current studies of foraging, breeding, and energetics is the extensive use of metaphors to human activities. Analogies to the military and economics are pervasive and not entirely compatible with concise scientific writing. I fear that sometimes unwarranted assumptions are involved. Consequently, authors and readers get caught in a web that can lead to misunderstandings. For example, the idea of a "breeding strategy" implies behavior according to a predetermined plan. We may have followed a strategy in the Gulf war, but can penguins (or any bird) follow a "breeding strategy"? Even more

impossible, in my view, is the possibility of an "evolutionary strategy." Birds may, in the view of some, act as if they understood natural selection and could determine its course and consequences *and* act accordingly. Further, does anyone really think that birds get divorced? That particular reference to mate loss is not used here (thanks perhaps to some alert editor), but how often do you see it?

The idea of cost and benefits comes from our concepts of economics. Because we can measure the amounts of energy used to perform various functions and can determine the amounts of energy the animal consumes, we can indeed prepare a flow sheet or a budget. The idea is probably not a bad one, as animals conform to the same physical laws as do nonliving systems. But the idea that the animal can somehow, perhaps by the development of a strategy and the use of tactics, optimize the process can involve untoward assumptions. Its use heuristically is valuable, but because we have a good verbal model does not mean that we understand the process. Granted, selection should work to optimize, but neither author nor reader should assume that the animals comprehend that.

(IV) *Behavior*.—This section contains an admixture of chapters, two of which are concerned with breeding. The other two discuss topics of enormous difficulty. J. F. Cockrem treats the general problem of the role of circadian rhythms in birds at high latitudes. Understanding the problems of timing when external cues are unlike those in other environments is important. Cockrem summarizes carefully what we know, looks for sources of things we might not know, and is creative in setting it all in an understandable light.

The other chapter (by J. K. Waas), on communication in aggressive interactions, is equally stimulating. He walks a narrow, tortuous line among behavior, cognition, and speculation, and does it masterfully. One point to emerge is that the investigator was able to predict how individuals would signal their intentions under various circumstances and what level of risk this involved. A knowledge of subsequent responses provided information on the potential intensity of the interaction.

(V) *Taxonomy*.—The lone chapter in this section provided the authors an opportunity to review generally the fossil history of the penguins, and compare them with some marine mammals. They introduce a series of as-yet-undescribed fossils from work either "in press" or represented by material of marginal value. Much of the material represented in recent studies is from New Zealand, but they consider the whole array of specimens available.

The book is relatively free of detectable typos. Most involve spacing, and none interferes with comprehension. This is an important book. It is of value to those interested in penguins, but more generally to readers interested in the processes involved. Each chapter is loaded with information, much of it gleaned under difficult field conditions.—A.H.B.