REVIEWS

EDITED BY M. ROSS LIEN AND 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.

Handbook of North American Birds.—Ralph S. Palmer (Ed.). 1988. New Haven and London, Yale University Press. Vol. 4, Diurnal Birds of Prey (Part 1): vii + 433 pp., numerous maps and drawings, one color plate by R. M. Mengel. ISBN 0-300-04059-8. $40.00. Vol. 5, Diurnal Birds of Prey (Part 2): v + 465 pp., numerous maps and drawings, one color plate by R. M. Mengel. ISBN 0-300-04060-1. $40.00 (Volumes 4 and 5. ISBN 0-300-04062-8. $80.00).—About once a decade ornithologists are treated to the appearance of one or two new volumes of the "Handbook of North American Birds," edited by Ralph S. Palmer. The project began in 1950 under the sponsorship, but not the direct supervision, of the American Ornithologists' Union. The stated goal was to produce a series similar to the "British Handbook" by Witherby et al., which would cover "... with reasonable completeness, but in telegraphic style, our knowledge of each of the more than 600 species occurring in the A.O.U. Check-list area (omitting Baja California)," to be done in five volumes of not more than 550 pages each (Auk 68: 384–385, 1951). Volume 1 on loons through flamingos appeared in 1962; volumes 2 and 3 on waterfowl, in 1976; and now, in 1988, we have volumes 4 and 5 on the diurnal birds of prey. One hundred and eighty-seven species have now been treated. At that rate, it will be well toward the end of the 21st century before the series is finished!

The completion of this handbook will require a great deal more coordinated effort from many more American ornithologists than has so far been the case. Palmer himself has had to author half or more of all the accounts in these five volumes in addition to serving as editor. No editor of such a handbook should have to assume that much responsibility.

The character and coverage of the Handbook have changed somewhat over the years. Volume 1 came closest to meeting the original expectations of the AOU. It treats 81 species in 568 pages (approximately 7 pages per species). Volumes 2 and 3 treat 64 species of waterfowl in 1,081 pages (ca. 17 pages per species), and volumes 4 & 5 consider 42 species of diurnal raptors in 898 pages (21 pages per species). Obviously the Handbook has grown from being something like Witherby et al. in size to the more extended coverages found in such works as "Birds of the Soviet Union" edited by Dementiev and Gladkov (1951 *et seq.*), "Handbuch der Vogel Mitteleuropas" by Glutz von Blotzheim et al. (1971 *et seq.*), and "The Birds of the Western Palearctic" by Cramp and Simmons (1977 *et seq.*). Palmer's Handbook compares favorably with the Russian work, is less exhaustive and meticulous than the German, and less scientifically generalized and succinct than the Cramp and Simmons volumes (which to my mind constitute the best handbook on birds produced to date and the one which shows the best mastery and use of the "telegraphic style"). Bent's series of "Life Histories" is, of course, the direct progenitor of Palmer's Handbook, which is basically a contemporary, updated replacement of that great work begun in 1916.

Compared with the first volume, volumes 4 and 5 justifiably no longer provide any treatment of higher taxa (order, families, genera). There is no list of contributing authors at the beginning, but their names appear at the ends of the various sections they wrote. Otherwise the format and sequence of topics are much the same.

These two volumes cover the Order Falconiformes as traditionally constituted, e.g. in the sixth edition of the AOU Check-list (1983). They include the families Cathartidae, Accipitridae, and Falconidae, although the editor recognizes that modern studies align the Cathartidae more closely with the storks (Ciconiidae) than with any other group. The only departures from the long familiar taxonomic arrangement for this order are the inclusion of the Osprey in the Accipitridae instead of its own monotypic family (Pandionidae) and resurrection of the genus *Asturina* for the Gray Hawk (*Asturina plagiata* for *Buteo nitidus*), and alignment of the Roadside Hawk (*magnirostris*) and the Red-shouldered Hawk (*lineatus*) in the same genus with the Gray Hawk, following D. Amadon and B. Millsap. Both actions are premature in view of the undetermined relationships of species placed in the so-called "subbuteonine genera" to species in the genus *Buteo*. Admittedly the genus *Buteo* comprises a large collection of species, but our current understanding of relationships might be served better by including *Asturina* as a subgenus under *Buteo*.

As to the systematics of species, "The editor tends to merge or combine on a selective basis where some authors would maintain separation." An example is "Harlan's Hawk," which he considers to be a melanistic morph of the Red-tailed Hawk (*Buteo jamaicensis*) with no taxonomic status, a conclusion based more on opinion than on careful analysis of data. The fact that there are mixed pairs in parts of the range does

not invalidate the possible subspecific or even specific status of the *harlani* population. I believe that "Harlan's Hawks" represent a breeding population that became isolated in a Pleistocene refugium, where these hawks achieved distinctive morphological differentiation from other Red-tailed Hawk populations but failed to achieve reproductive isolation, so that on recontact of formerly separated populations, there has been exchange of genes (see Mendel 1983, Auk 100: 161–169). The more numerous Red-tailed Hawks have probably been "swamping out" the distinctive traits of the *harlani* genotype for many years.

Volume 4 treats condors through the genus *Asturina*; volume 5 includes the remainder of the Accipitridae (Broad-winged Hawk through Golden Eagle) and the Falconidae. Species accounts range from one page for the extralimital Northern Hobby to 50 or more pages for popular or well-studied species such as the Bald Eagle, Northern Harrier, Golden Eagle, and Peregrine Falcon. Over 2,500 references have been consulted. The number of references cited per species ranges from more than 200 for Bald Eagle, Northern Harrier, Golden Eagle, American Kestrel, and Peregrine Falcon, to over 100 for Swallow-tailed Kite, Cooper's Hawk, Goshawk, Red-tailed Hawk, Rough-legged Hawk, and Merlin, and fewer for the other species.

We are told that the authors range in age from their mid-20s to 94 years. I cannot identify the youngsters, but the senior member is J. A. Hagar, who has authored detailed accounts of migration for the Broad-winged and Swainson's hawks. He is the only author whose writings bridge Bent's "Life Histories" with Palmer's Handbook. His account of "Duck Hawk" habits in Bent has never been surpassed.

Most of the other 24 authors are well-known raptor experts: S. R. Beissinger, K. L. Bildstein, D. M. Bird, J. M. Gerrard, D. P. Hector, C. J. Henny, J. A. Jackson, M. Kopeny, W. J. Mader, H. K. Meng, B. A. Millsap, D. P. Mindell, J. A. Mosher, J. C. Ogden, J. W. Parker, W. B. Robertson Jr., R. N. Rosenfield, J. H. Schnell, D. C. Smith, T. B. Smith, H. Snyder, N. F. R. Snyder, M. V. Stalmaster, and C. M. White.

In addition to the usual handbook topics—description, subspecies, field identification, voice, habitat, distribution, migration, banding status, reproduction, survival, habits, and food—more than usual attention has been devoted in these volumes to human-related subjects. This attention is to be expected because birds of prey have become such popular subjects of public interest and concern in recent years. The number of "raptorphiles" in the world is truly astounding compared with 30 years ago (annual meetings of the Raptor Research Foundation Inc. sometimes exceed the size of AOU meetings). These topics range from "ceremonial use" by aboriginal Americans (see accounts under California Condor, Bald Eagle, Golden Eagle), "some interrelations with man" (see Bald Eagle, Vol. 4: 228–232), to considerations about falconry and captive breeding (see accounts under Bay-winged Hawk, Goshawk, Golden Eagle, Peregrine Falcon, Gyrfalcon), artificially produced hybrids in captivity, and various restocking and reintroduction projects (see especially Bald Eagle and Peregrine Falcon).

Many of the criticisms expressed about earlier volumes of the Handbook continue to apply to volumes 4 and 5. There is little synthesis or generalization. There is often a preoccupation with detail, but detail also varies greatly from topic to topic and species to species, often independently of available information. Often a specific topic is merely cited in a published source with no treatment in the Handbook; or one encounters uninformative statements such as, "At least 3 authors have speculated on possible function of the dark ocelli on the side of the nape [of *Falco sparverius*]; see Balgooyen (1975)"—(Vol. 5: 256). The same number of words could have been used to state the possible functions.

Even after three decades of insistence on the use of the Humphrey and Parkes system of naming plumages and molts, Palmer still finds it necessary to include two pages (Vol. 4: 6–7) of explanatory diagram and notes about this nomenclature and still feels obliged to put terms like "adult plumage" or "subadult" in quotation marks, which he uses frequently and with some distraction throughout the text. It might have been better to have heeded Stresemann's (Auk, 1963) early advocacy of retaining the "widely accepted terminology of Dwight," as other recent handbooks have done.

There is little on internal anatomy—nothing on the rather specialized digestive apparatus of raptorial birds, for example, or on the anatomy and function of the nasal glands. Even some external characters are only mentioned infrequently, for example, brood patches (described once under *Falco sparverius*), which show interesting morphological variation among different groups of raptors in relation to pectoral and abdominal pterylosis.

The many abbreviations do not aid rapid comprehension of the text, and the frequent mixing of metric and English systems of measure is a further confusion.

Following the tradition of Bent's "Life Histories," anecdotal accounts, which may or may not reflect something significant about the species, occupy considerable space. While often interesting or amusing, they are not the best use of an expensive printed page. For example, five lines are devoted to a seemingly "fanciful" account of a Turkey Vulture seizing and picking up a dog (Vol. 4: 39). Other stories are incidental to the purpose of a handbook, although of social or historical interest, such as the paragraph (Vol. 4: 232) about A. C. Bent's birthday in 1946 and his attribution of good health to imbibing "at least one eagle eggnog each year," followed by the editorial observation: "Current self-proclaimed environmentalists take umbrage at this, showing little comprehension of the former abundance of [Bald] eagles

or the triviality of the taking of several eggs by this responsible collector." Note lapse from telegraphic style.

Such gratuitous or rhetorical comments abound. Sometimes they are intrusive, other times merely curious. For example, the habits section (Vol. 4: 219) for *Haliaeetus leucocephalus* begins: "Is the Bald Eagle majestic, noble, awesome? Or lazy, an 'arrant coward' (Bent 1937), a thief? Are such attributes in the eye of the beholder?" Surely consideration of such anthropomorphisms has no place in a scientific handbook which aims to give a general biological description of the bird. Again, one reads (Vol. 5: 411) that "there is current hearsay evidence that this falcon [*Falco mexicanus*] breeds well down into Mexico, this from persons seeking Peregrines—that is, have little interest in other species." Is the side remark intended to encourage the reader to accept the hearsay or to cast doubt on its source? Why is hearsay included in a handbook? Unnecessary comments are frequent, e.g. "Anyone with much field experience could add to the following observations . . . " (Habits of the Golden Eagle, vol. 5: 216).

In any work of this size there are bound to be some omissions and erroneous, misleading, or enigmatic statements; but, on the whole, the editor and his authors have produced an authoritative, factually sound text. Mechanical errors—typographical mistakes, incorrect punctuation, misplaced decimal points, etc.—are not numerous, perhaps one or two per species account. None that I found are grossly misleading.

Some of the more flawed bits of information and serious omissions of detail that I noted are as follows, by volume and page number. (Vol. 4: 137)—The lines in the legend of the map of the Black-shouldered Kite for "Numerous recent occurrences . . . " do not correspond with the lines drawn on the map. (Vol. 4: 214)—Two enigmatic statements: "The energy required in hunting equals the energy supplied by mammalian food (Koplin et al. 1980)" and "Kites often descend [sic] high so as to swoop down on buteo hawks." (Vol. 4: 214)—For the Bald Eagle, it is stated that "In suitable quarters, captive females evidently produce eggs annually as long as they live." There is no reference, and it is extremely doubtful as other female raptors become reproductively inactive several years before achieving maximum longevity. (Vol. 5: 99)—No hybrids are reported for the Red-tailed Hawk; yet in the same source used to report several hybrids produced by artificial insemination, there is the interesting case of *Parabuteo unicinctus* × *Buteo jamaicensis*. (Also, *Parabuteo unicinctus* has been crossed artificially with *Buteo regalis* in Canada in 1988, casting further doubt on the phylogenetic utility of the monotypic genus *Parabuteo*.) (Vol. 5: 153)—Cade (Condor, 1955) did note the possibility of incorrectly sexed specimens of the Rough-legged Hawk in his study of sexual dimorphism but chose not to bias his samples by excluding specimens he suspected were incorrectly sexed. (Vol. 5: 254)—The size range of American Kestrels "in our area" does *not* include "approximately the total size range of all birds elsewhere." The kestrels which T. R. Howell described as *F. s. nicaraguensis* from the lowland pine savanna of northeastern Nicaragua are very small (males weigh ca. 73–74 g and females, ca. 81 g). Kestrels from Puerto Rico and the Lesser Antilles also average smaller than the smallest birds in North America. (Vol. 5: 255)—Primary no. 3 is missing from the molting sequence. (Vol. 5: 256)—Hybrids between *Falco sparverius* and *Falco peregrinus* have been produced by artificial insemination. (Vol. 5: 278)—The statement about "renesting interval" is out of place under the topic "Two broods/season;" it should be under "Replacement clutch" on p. 275. (Vol. 5: 280)—"Basically, the Kestrel kills only when hungry (Mueller 1973b) [Behaviour 49: 313], yet it may store a considerable surplus of food (see below)." This is an incongruous statement, and the first assertion is not really correct; males which hunt and kill frequently to feed their mates and young in the breeding season are not constantly hungry. (Vol. 5: 349)—Under copulation-related behavior there is no mention of the male Peregrine's "hitched-wing" or "slow-landing" displays. (Vol. 5: 354)—The boldface topic, "Egg-laying territory," was probably meant to be "Egg-laying lethargy." (Vol. 5: 355)—The interval between first and replacement clutches of the Peregrine depends on how long incubation has progressed before the first set is taken. After 7–10 days of incubation, the interval *is* "invariably" 14 days, unless some injury or sickness befalls the female. (Vol. 5: 375)—It is stated that "some 8 or 9 of every 10 wild-produced birds [Peregrines] do not survive to flight age." Mortality of nestlings varies greatly from year to year and from region to region, but nowhere has it been reported to be as high as 80–90% on a population-wide basis! (Vol. 5: 375)—It is a common misconception that all Peregrines now nesting in cities were "hacked" or released in cities. In the list of cities cited here, neither Baltimore nor Salt Lake City had falcons released in them, but both have highly successfully nesting pairs of released Peregrines which came from elsewhere. (Of 22 cities in North America where pairs of Peregrines occurred in 1988, 9 have never been used for releases; none of the four pairs now nesting in New York City include birds hacked there in earlier years.) (Vol. 5: 377)—The Peregrine bibliography of Porter et al. (1987) does not contain "over 3,500 citations," although it easily could have; it actually contains 1,401 citations to the more technical (scientific) literature. (Vol. 5: 385)—Reference to a hybrid "Gyr × ¾ Prairie + ¼ Red-footed Falcon" is incorrect; it should be ¼ Red-naped Shaheen. (Vol. 5: 415)—The statement that Prairie Falcon "captives often lay daily for several days" is incorrect; the usual interval between eggs is more than 48 hours.

Criticisms aside, the production of these two volumes has been a herculean effort—a true labor of

love—by an editor largely abandoned by the American ornithological community to his own devices. A bibliophile grudgingly turned "raptorphile," he did the best with the materials and help available to him.

It is much to the credit of the Smithsonian Institution and to Yale University Press that these valuable, standard reference works on the diurnal raptors have become available at a time when public hunger for knowledge about these emotive birds has never been greater. There is no doubt that they will quickly become a part of the personal libraries of all true devotees, and they should be equally sought after by professional ornithologists and resource managers who need an authoritative, standard work summarizing much recent—and older—information on this group of birds.—TOM J. CADE.

The Parrots of Luquillo: Natural History and Conservation of the Puerto Rican Parrot.—Noel F. R. Snyder, James W. Wiley, and Cameron B. Kepler. 1987. Los Angeles, California, Western Foundation of Vertebrate Zoology. xiii + 384 pp., 8 color plates, 135 figures, 103 tables. ISBN 0-935868-27-5. $29.50.—More than 300 species of parrots and allies are recognized and an astounding number of them are rare, endangered, or worse—already extinct. Thus, a monograph on the natural history of a parrot based on two decades of comprehensive research deserves considerable attention, especially when that monograph deals with an endangered species.

This study of the Puerto Rican Parrot, called iguaca in Puerto Rico, began shortly after passage of the Endangered Species Act in 1968. Kepler was project leader from 1968 to late 1971. Snyder was project leader from 1972 until 1976, when Wiley assumed responsibility for the project.

The Puerto Rican Parrot and the problems of island species are introduced briefly in Chapter 1. Chapter 2, "The historical decline," gives details of the discovery of Puerto Rico and its physical and vegetational characteristics. The original distribution of iguaca encompassed the entire island of Puerto Rico as well as several satellite islands and may have exceeded one million individuals. Iguaca populations declined as human populations increased after 1650 but especially from 1850 to 1900, a period of massive deforestation. Five populations remained early in this century, but only the Luquillo Mountain population persisted after 1940. In addition to deforestation, hunting for food and pets, and persecution as a pest, were the principal factors responsible for the decline. As was the case with the Heath Hen in New England, severe weather (hurricanes) may have devastated small and especially susceptible populations early in the 20th century. In the face of all these stresses, "the wonder is . . . that a small population managed to survive to the present" (p. 36).

The origins and relatives of the Puerto Rican Parrot are the subject of Chapter 3. Macaws, parrots, and parakeets were apparently common throughout the West Indies upon the arrival of Columbus, but most are now extinct. This includes at least 7 species of macaws, 5 of 8 parakeets, and 3 of 12 parrot species. Most remaining parrots are threatened with extinction.

The last introductory chapter (4) describes the physical and biological attributes of the Luquillo Forest. The Luquillo Mountains rise to just over 1,000 m and receive an annual rainfall that sometimes exceeds 5,000 mm. Four forest types are recognized in the range and only one, palo colorado (*Cyrilla racemiflora*) forest, provides acceptable nesting cavities today. Analyses of populations of other species of the forest of Luquillo suggest that nest-cavity availability may be especially critical to the iguaca. The Scaly-naped Pigeon (*Columba squamosa*), an open nester with the same diet as the parrot, has not declined despite heavy hunting pressure, perhaps because it is not dependent on tree cavities for nesting sites.

The first four chapters set the stage for a presentation of the results of an impressive series of field studies spanning the period from 1968 to 1979. Chapter 5 ("Movements and food") documents the daily life of parrots from waking at dawn, through dispersal for feeding, a midday rest period, and finally a short feeding period before the return to the roost in late afternoon. A dominant theme is the social nature of the species with pairs being the primary social unit. The authors suggest that much of the behavior of iguaca may be tied to the detection and avoidance of predators. The diet is mostly fruits, and records exist for feeding on at least 60 species of plants in Luquillo. Sierra palm (*Prestoea montana*), the most frequently recorded food, matures just before parrot breeding, but in at least one year successful breeding was recorded following a local fruit failure. After the breeding season, the parrots diversify their diet and alter their distribution to take advantage of spatially and temporally variable food supplies.

Because nest sites seemed to be a critical limiting factor to iguaca, considerable effort was devoted to the study of nest sites (Chapter 6). Early efforts demonstrated that parrot nesting attempts are concentrated in a relatively small area of the apparently suitable habitat, a habit that has facilitated study of the species. Of 11,330 ha in the entire forest, nesting regions active in the current study occupy no more than approximately 125 ha. Small traditional nesting areas probably contributed to their exploitation by nest robbers and certainly enhance their susceptibility to the ravages of hurricanes. Although only palo colorado are used as nest sites now, older records confirm use of other tree species, and some populations made extensive use of cavities in limestone cliffs. Limited availability of nest sites today is the result of a series of events including cutting for lumber and charcoal, successional changes in forest, hurricane

damage, and destruction of trees in searches for honey and parrot nestlings. Finally, moisture makes many cavities unsuitable for parrot nesting.

The chapter (7) on reproductive biology is especially intriguing for what it says about the future of iguaca. Sources of mortality during the nesting period have been identified, and their impacts reduced through careful management (reduced predation by Pearly-eyed Thrasher, parasitism by warble flies, and cavity competition by honeybees). But problems with the birds themselves may prove to be the most difficult. The failure of the population to form new breeding pairs remains an ominous sign, especially as older breeding pairs die. Inbreeding depression, dietary deficiencies, and a possible reluctance for birds without breeding experience to breed with other naive birds are suggested reasons for the lack of reproduction.

The final chapter of this section (Chapter 8) documents the influences of natural enemies. The relative influence of these enemies has changed over time. Recent impacts of honeybees, warble flies, and the thrasher have been especially large but may now be under control. Red-tailed Hawks seem to be the major predators on adult parrots, and injuries from territorial fights seem to be common. Diseases have not been a problem to date, but concern about diseases grows with numerous introductions of exotics on the island. The background knowledge provided in chapters 5–8 is critical to understanding both the species decline and the efforts needed to protect the remaining population.

The final series of chapters begins with a quantitative analysis of the recent decline. The population stood at approximately 200 birds in 1954 and declined by approximately 8% per year until 1966 when the decline rate increased to 42% per year. The population stood at only 24 in 1968 and declined to a minimum of 13 in 1975. Improvements in the 1980s are due to protection of wild birds, control of enemies, and an intensive captive breeding program. First-year mortality is high at 32%, but the rate declines as birds age to ca. 9% annually for adults. As a result of breeding since 1973, the population has increased, but few of the birds produced have started to breed and the old breeders are slowly disappearing. Using knowledge of the changes in the population of the past 30 years and demographic information from the current study, the authors develop a model to illustrate theoretical age distributions and productivity patterns under optimistic, best-guess, and pessimistic assumptions. Although the news from this exercise does not give cause for rejoicing, the result is useful and provides insight about the depth and complexity of the problem.

Next, the authors outline their conservation efforts. Captures of wild birds for reintroductions elsewhere predate the present study and probably speeded the decline. Even the current study made errors, but it has benefited from those errors and provided valuable insights that will be critical to the preservation of the species. Nest-box construction and management has reduced competition for cavities from honeybees, predation by the thrasher, and parasitism by the warble fly.

In addition to field studies and management programs the authors initiated a captive-population breeding program. Despite early setbacks, both wild and captive populations have increased in recent years. Many birds (most of the recent population growth) have been saved by informed movement of eggs and chicks between captive and wild populations.

Although 1979 data are the most recent in this monograph, a final chapter summarizes the trends through 1986 when both wild and captive populations stood just below 30. Ominously, few new pairs have become reproductive and an early 1980s decline in egg fertility was particularly alarming.

Even though much has been learned in the last 20 years and the iguaca population has increased, many questions remain unanswered. Major success in nest-predation reduction and the provision of acceptable nest-site alternatives may in fact be for naught if, as the authors suggest, immature birds must pair with mature birds to become reproductively successful in the wild. Finally, the role of chance events in the dynamics of small populations must be kept in mind. The captive population represents a hedge against such a disaster.

To their credit, the authors carefully discuss the strengths and weaknesses of their field research, their conservation efforts, and their speculation about the iguaca and its situation. Project staff and their funding agencies deserve credit for their contribution to conservation of the iguaca and for the value of their results to other conservation efforts.

Biologists charged with the management of endangered species face what seem to be insurmountable obstacles. Conservationists demand immediate solutions that will insure species recovery, whereas theoreticians wait for more refined data and sophisticated theory before committing to a recovery plan. While this volume will not keep either group entirely happy, the information should make the future of iguaca more secure. The value of the volume is enhanced by excellent summaries at the end of each chapter, an impressive set of appendices that provide raw data and detailed presentations of methodologies. Numerous well-selected photographs are interspersed throughout the text. Finally, the authors recognize the weaknesses of their methodologies and the tentative nature of many of their conclusions. They clearly describe their current understanding of the situation, but they present alternative perspectives to be considered. This volume is an important contribution to knowledge of parrot biology and to conservation of endangered birds. It should be read by all concerned about either of these subjects.—JAMES R. KARR.

Atlas of Wintering North American Birds.—Terry Root. 1989. Chicago, Illinois, University of Chicago Press. xxiv + 312 pp., 614 text figures. ISBN 0-226-72539-1. Cloth, $60.00. ISBN 0-226-72540-5. Paper, $35.00.—Birds are especially useful subjects for research because so much is known about them. Much of this information rests, directly or indirectly, on the contributions of amateurs. Potentially, one of the most valuable contributions of North American birdwatchers is the Christmas Bird Count (CBC). First run in 1900, these standardized annual censuses have been conducted at Christmastime at more than 1,000 sites since the early 1960s under the auspices of the National Audubon Society. Although data of comparable quality on abundance and distribution are available for few other kinds of organisms, research scientists have made surprisingly little use of the CBC. Terry Root, while a graduate student at Princeton, conducted a massive analysis of CBC data and developed important contributions to our understanding of the ecology and biogeography of wintering birds. This atlas presents the results of some of that work (see also Root 1988, J. Biogeogr. 15: 489, Ecology 69: 330).

This atlas goes a giant step beyond the winter range maps in field guides, because it depicts quantitatively both the abundance and distribution of winter birds. Root has taken data from 1,300 Christmas Bird Count sites censused during the winters of 1962/1963 through 1971/1972 and produced maps that indicate both geographic winter range and relative abundance. There are both contour and 3-dimensional maps for each of 250 species that have widespread wintering populations in North America north of the Mexican border. An additional 96 contour maps are provided in an appendix for species that present difficulties of interpretation. These species are either very rare or extremely gregarious. Maps are not included for another 162 species with very restricted distributions. For all 508 species, there are brief species accounts that describe the winter range, variation in density within the range, and other aspects of ecology. The atlas also contains nifty transparent overlays to aid in visualizing how each species is distributed in relation to latitude and longitude, location of counts and of National Wildlife Refuges, and six environmental variables that include elevation, vegetation, temperature, precipitation, and humidity.

This atlas will be an invaluable source of information and interpretation for biogeographers, ecologists, and other individuals interested in factors that affect the abundance and distribution of birds. A blurb on the back cover suggests that "unlike a conventional field guide ... the *Atlas* tells where to find (birds) in the winter months." This is misleading, for it implies that this book will be useful for most birdwatchers. The scale of the maps used, however, is necessarily so coarse that readers will have difficulty identifying specific localities where particular species may be found. This is especially true for birds that have extremely localized distributions (i.e. waterfowl). Root acknowledges this problem and often provides additional information on habitats and localities in the species accounts. But the species accounts are uneven and do not provide much in the way of hard, standardized data. By far the greatest value of this atlas is the quantitative analysis of the CBC censuses that is presented in the maps.

The precision of these maps should be regarded with caution because of problems inherent in the CBC. The censuses are conducted relatively early in the winter, when some species may not have completed their migratory movements and established their definitive winter ranges. This is particularly a problem for seabirds and waterfowl. In addition, the involvement of amateurs, and the census procedures used, undoubtedly cause errors and biases. Root's introduction and Chandler Robbins' foreword discuss these issues. Root has chosen analytical methods that minimize some of the most serious biases. Nevertheless, it is probably true that rare species are overrepresented on her maps because birdwatchers make a special effort to find them, and that abundances of common species are not estimated very accurately because the censusers are not very interested in counting them.

These are minor shortcomings, and most of them reflect the limitations of the CBC rather than deficiencies in the author's presentation. Root is to be praised for having produced a unique publication. This atlas is an invaluable reference book. This work is of greatest use to those interested in broad-scale ecological and biogeographic patterns and processes. Ornithologists interested in species winter ecology will also find this a valuable reference. All university and museum libraries will require this volume, and many individual ornithologists, ecologists, and biogeographers will want to purchase it, especially considering its modest price in paperback. Most amateur ornithologists, however, will find the "Atlas" to be of limited use in their birdwatching activities.—JAMES H. BROWN AND RAYMOND PIEROTTI.

The Birds of Nevada.—J. R. Alcorn. 1988. Fallon, Nevada, Fairview West Publishing. xxiv + 418 pp., 1 color plate, 41 black-and-white photographs. ISBN 0-9620221-0-1. $57.00.—Knowledge of the geographic and ecologic distribution of birds is fundamental to an understanding of their biology and underpins any effective conservation strategy. For this reason, compilers of avian distributional data for large and diverse regions face serious responsibilities and challenges. The main responsibility is to assemble and evaluate the disparate evidence available. The principal challenge is to analyze and interpret the valid records in a search for patterns of geographic, seasonal, and ecologic occurrence.

At 110,540 square miles (approximately equivalent to the combined areas of New Hampshire, Connecticut, Vermont, Massachusetts, New York, New Jersey, Rhode Island, Delaware, and one-half of Maine), Nevada covers an enormous region of the intermountain West. The major part of the Great Basin and portions of the Snake River and Colorado River drainages are included. Even today avifaunal distribution in this region is understood only in broad and imprecise terms.

Alcorn's privately published book on Nevada birds is the first volume devoted specifically to the state's avifauna since Jean M. Linsdale's compilation (1936, Pac. Coast Avif. 23: 1–145). Alcorn has lived in Nevada for many years and, until his retirement in 1973, worked mainly for the U.S. Fish and Wildlife Service. From 1947 to 1959, he collected mammals for the Museum of Natural History, University of Kansas.

For the present book, Alcorn reviewed the published records in Linsdale and scattered other literature, his personal field notes (mainly from the Fallon area), and those of the late Charles S. Lawson (Las Vegas area) and Art Biale (Eureka area). Field records of personnel associated with wildlife refuges and of other cooperating birders were included. Kathy Napier examined records from Nevada at the National Museum of Natural History. The significant collections of Nevada birds in other institutions apparently were not studied. Alcorn himself collected relatively few birds in Nevada (the Museum of Vertebrate Zoology, University of California, Berkeley, and the Museum of Natural History, University of Kansas [*fide* Marion A. Jenkinson and Tristan J. Davis, *in litt.*, 9 May 1989], each have 212 Alcorn specimens). The "over 30,000 specimens" mentioned on the dust jacket as having been collected by Alcorn are mostly of mammals.

Accounts of 456 species make up the heart of the book. After introductory statements on worldwide distribution and on status in Nevada, each account consists of long lists of rather undigested records for each species. These are presented in a rough north to south and west to east format. For some species remarks on nesting, food habits and other information is appended. The chief contributions of the book are Alcorn's careful records, painstakingly gathered over 60 years; documentation of major changes in breeding distributions for several species (e.g. Franklin's Gull [*Larus pipixcan*], American Pipit [*Anthus spinoletta*], Great-tailed Grackle [*Quiscalus mexicanus*], and Common Grackle [*Q. quiscula*] now nest in the state); and demonstration of the importance of aquatic habitats (e.g. at Stillwater, where 210,000 Northern Shovelers [*Anas clypeata*] were present during autumn migration in 1986) to birds in the generally dry interior of the western United States.

In the Introduction, Alcorn states, "Some species in this book would not meet the requirements of a bird records committee for inclusion in a state list. However, I have chosen to add these species because they provide important information on Nevada birds." By this unfortunate decision the author abandoned his obligation to judge the validity of each record in the mass of reports he faced during compilation. Thus, a discouraging number of questionable reports infest the species accounts. Alcorn seems to have accepted every record from *American Birds* and from various agency files, no matter how improbable. Thus we find reports of the Whip-poor-will (*Caprimulgus vociferus*) in Reno, Ladder-backed Woodpecker (*Picoides scalaris*) in white fir and limber pine in Elko County, Black-tailed Gnatcatcher (*Polioptila melanura*) at Ruby Lake, Elko County, Curve-billed Thrasher (*Toxostoma curvirostre*) in extreme northwestern Nevada, and Rufous-crowned Sparrow (*Aimophila ruficeps*) at Lehman Caves National Monument, among others, all presented without proper documentation or sufficient detail. Even some purported specimen records are suspect (e.g. the female Crissal Thrasher [*Toxostoma crissale*] "collected by Burleigh for the USNM from North Lake Tahoe" [!] cannot be located in that collection [*fide* R. C. Banks, *in litt.*, 5 May 1989]). Obvious misinformation from the literature (e.g. reports of Rufous Hummingbirds [*Selasphorus rufus*] and Cedar Waxwings [*Bombycilla cedrorum*] nesting in the Great Basin and Horned Larks [*Eremophila alpestris*] and Brewer's Sparrows [*Spizella breweri*] as "summer resident in woodlands") is also cited.

A disturbingly large number (70) of the 456 species the author ascribes to Nevada are based on sight records. Voucher photographs, some of which have been published, were taken for 10 of these species. The location of the unpublished photographs is not identified. Three species (Black-bellied Whistling Duck [*Dendrocygna autumnalis*], Emperor Goose [*Chen canagica*], and Eurasian Wigeon [*Anas penelope*]) were included on the basis of secondhand reports of birds shot by hunters. Presumably, evidence supporting these records was never saved. Overall, the lack of sufficient detail and proper documentation for many records in this book will make corroboration difficult or impossible.

Although the statements on "status in Nevada" are often helpful, for at least 20 species they are either misleading or erroneous. As examples, the status of the White-winged Scoter (*Melanitta fusca*) is given as "accidental straggler" despite the fact that Alcorn lists 24 records. Of the 20 records for which dates are provided, 16 fall between 13 October and 30 November, justifying a status of "scarce but regular fall migrant." The few remaining records indicate that the species is also a rare winter visitant and rare spring migrant. The Hermit Warbler (*Dendroica occidentalis*) is stated to breed in extreme southern Nevada. Actually, this species breeds in extreme western Nevada (N. K. Johnson, 1956, Condor 58: 451).

Alcorn's treatment of the literature on Nevada ornithology represents another serious deficiency. Some

of the most significant papers on Nevada birds, although cited in the list of "resources" at the end of the book, are essentially ignored in the species accounts (e.g. G. W. Gullion, and G. C. Christensen, 1957, Condor 59: 128; C. L. Hayward, M. L. Killpack, and G. L. Richards, 1963, Brigham Young Univ. Sci. Bull., Biol. Ser., 3: 1; N. K. Johnson, 1965, Condor 67: 93). Of the two major published syntheses on avian distribution in Nevada, one was cited erroneously at the end of the book but never referred to in the text (N. K. Johnson, 1975, Evolution 29: 545) and the other was ignored completely (N. K. Johnson, 1978, Great Basin Nat. Mem. 2: 137). The book contains no gazetteer, maps, or treatment of subspecies. The book lacks an analysis of records to establish the main dates of migration or to separate probable breeding localities from those occupied by migrants or visitants. Information on ecologic distribution is often omitted.

In conclusion, this book can be recommended to recreational birders for the information it provides on common, easily identified species in Nevada. Wildlife managers and water bird enthusiasts also will welcome the data it offers on population trends of species at the several major refuges. Professionals and serious amateurs, however, will find that the inclusion of numerous improperly documented records and the incomplete coverage of existing collections and literature severely limits the usefulness of this compilation. All readers will need to exercise unusual care when evaluating statements on status in the state and, especially, the specific records on which these statements are based.—NED K. JOHNSON.

A Field Guide to Hawks—North America.—William S. Clark, illustrations by Brian K. Wheller. 1987. Boston, Massachusetts, Houghton Mifflin Company. xii + 198 pp., 24 color plates, 2 black-and-white plates, 32 maps, 41 pages of black-and-white photographs. ISBN 0-395-36001-3. Cloth, $19.95. ISBN 0-395-44112-9. Paper, $13.95.—Few are better qualified than Bill Clark to offer an identification guide on diurnal raptors. I watched Bill in action a few years ago when we jointly gave a raptor field identification course for the National Wildlife Federation in Oregon; I learned several fine points about identification. In addition to many years that Bill spent identifying raptors at Cape May, New Jersey, he has had considerable experience overseas, particularly with the spectacular raptor flights in Israel. At a time when many other guides to specialized groups are appearing (gulls, waders, etc.), this book is welcomed as an important contribution. Unfortunately, its impact is somewhat diluted as several other "guides to hawks" have also recently appeared. The illustrations are a credit to Brian Wheller, and I suspect we will see more of his work in the future.

It was hard to give an exact title on this volume, and I hope I got it right. On my hardcover version, the dust jacket simply entitles the book "Hawks" (the same cover as on the paperback version); on the hardcover, the title is "A Field Guide to Hawks," while the title page gives "A Field Guide to Hawks North America." This seems to be an editorial problem and unfortunately there are more (e.g. the table of contents is not consistent with the book's contents). This book is number 35 of the "Peterson Field Guide" series and makes a nice addition to that series. Naturally, the book goes into the sort of detail needed for some species that a typical field guide cannot. At the same time, although I like the idea and found it useful, I questioned the necessity of such detail as etymology of the scientific names. Possibly, users would become a better informed lot if this were done on all field guides.

The content format of each species gives a description, similar species, flight, behavior, status and distribution, fine points, unusual plumage, subspecies, etymology, measurements, weight, and sometimes a note about the species. The description includes both adult and immature plumages and, for geographically variable species such as the Red-tailed Hawk (*Buteo jamaicensis*), it includes all the geographic forms and color morphs, which for that species requires nearly three pages of text. Such detail is an attractive feature of the book. At the end of the book there are 23 pages of literature references, followed by 9 pages of references by species and topic (for example, for the Red-tailed Hawk, there are 38 references in total for the topics of natural history, behavior, distribution, plumage, identification, taxonomy, migration, and albinism). The front endpaper has a well illustrated anatomy of a raptor (duplicated again in a section on hawk topography), whereas the back endpaper gives general flight silhouettes of major groups of hawks (i.e. buteo, falcon, kite, etc.). Many of the silhouettes are really quite poor and detract from the quality of the book. These same silhouettes are used in an introductory section with the topic, "How to Identify Hawks." Equally detracting is the poor quality of many of the photographs—over- or underexposed, out of focus, too small, etc. The number of photographs per species seems unbalanced relative to what they show or what is needed to adequately cover the species. The maps stop with the United States-Mexico border and do not include Greenland. I hope that, in future editions, Clark will include ranges in Greenland and down to the end of the Mexican Plateau (North America from a biogeographical viewpoint), as other guides do. It is probably acceptable to lump eagles together for the purposes of a field guide, but there should be some statement that this is not a correct evolutionary sequence and that the relationships are different.

Statements on similar species are critical to help sort out what a bird might or might not be. Clark has done a respectable job overall. In addition to what he points out for similar species, a couple of others quick-

ly come to mind. I have seen falcon trappers mistake a Northern Harrier (*Circus cyaneus*) for an immature Peregrine Falcon (*Falco peregrinus*) because of similar head-on appearance as the falcons flew low along a barrier island in variable head winds. The Ferruginous Hawk (*Buteo regalis*), like the Black-shouldered Kite (*Elanus caerulus*), may drop from the air onto prey, with wings stretched upward, frequently checking its descent. I also suggest that it might have been appropriate to indicate that a Northern Raven (*Corvus corax*) can be briefly mistaken for a raptor, especially when the raven is soaring or flying into a wind.

There are several other unusual plumages of hawks, not mentioned by Clark that may be seen in the field and may affect identification. For example, in the Golden Eagle (*Aquila chrysaetos*), some individuals have white epaulettes of varying sizes much after the fashion of the Imperial Eagle (*A. heliaca*) of Europe. The suggestion that there are two records of partial albinism in the Prairie Falcon (*Falco mexicanus*) is misleading because varying degrees of leucism in this species are seen occasionally (I am aware of two in one year at different nests in Utah).

There are many useful features on the plates. Most show a head-on schematic view of the wing position for each species in a glide. Such views are particularly useful, for example, when comparing eagles. The idea of having dark morphs of most species together on one plate is useful also. At the same time, perhaps a miniature drawing of the dark morph could have been placed on the same plate with other color morphs of the species figured (e.g. Red-tailed Hawk). The plates were apparently designed to emphasize critical traits for field identification and, for the most part, they do an excellent job. The crop and upper breast on the Red-tailed Hawk (*B. j. calurus*; plate 11) from the west, however, should be whitish to represent the average. The bird shown is what I would label a "reddish" departure from the norm—a variation of the "rufous morph" illustrated on plate 14. The wing structure on the Swainson's Hawk (*Buteo swainsoni*), shown in the black-and-white dark raptor summary plate (plate 26), has the shape of a generic *buteo* wing, not the attenuated *swainsoni* wing useful in field identification. Lastly, the bodies of the flying adult *Accipiter* (plate 6) are too tubular.

In a second edition, it would be a simple matter to label the plates in a clearer fashion. For example, the Red-shouldered Hawk (*Buteo lineatus*; plate 9) is shown as a flying adult and immature from below, and then an additional underwing is shown for both ages. In both cases, the wing is shown darker than on the flying bird. The labeling simply indicates that it is an underwing of the respective ages. Are we to assume that the extra underwing indicates the range of variation among *B. l. lineatus* or represents the dark *B. l. elegans* of the west coast?

Overall the book is a credit to Bill, and I recommend this book for those interested in knowing what hawks really look like. It is suitable for an array of ages and backgrounds of knowledge of birds, as are other books in the Peterson series.—CLAYTON M. WHITE.

Studies of the Wild Turkey in Florida.—Lovett E. Williams Jr. and David H. Austin. 1988. Gainesville, Florida, University of Florida Press. xxiii + 232 pp., 87 text figures. ISBN 0-8130-0874-3. No price given.—This book reviews data on the capture, morphology, reproduction, life history, and management of the Osceola subspecies of the wild turkey (*Maleagris gallapavo osceola*) in southern Florida. The fieldwork was conducted from 1967 to 1980 when Williams and Austin were employed by the Florida Game and Freshwater Fish Commission.

A wealth of hard-earned information is presented. The study was begun to determine the causes of a marked decline in wild turkey populations, with initial emphasis on nesting behavior and reproductive performance. The authors pioneered the capture of wild turkeys with orally administered drugs, developed an automated data recording system to monitor nesting behavior, helped to develop radiotelemetry techniques to monitor movements, and gathered valuable information on the response of hunters to regulation changes.

The investigators logged >30,000 man-hours in the field during the nesting season and trapped >6,000 turkeys. George Schaller observed that the quality of the findings from field studies markedly improves when >2,000 h of observations are made. By this rule of thumb, the study by Williams and Austin ought to be of landmark proportion, and I believe it is.

The data on morphology and life history are presented in easily understood form. Information on growth, feather molting, egg laying, nest abandonment, nest predation, and age-dependent mortality is complete enough to firmly establish an invaluable baseline data for the subspecies. The inventiveness, persistence, and effectiveness of the researchers were impressive. Williams and Austin found that it was not production of turkeys on their 4,047-ha study area that limited the population but overharvesting by hunters. Based on their data, the authors recommended closure of the area to turkey hunting in the autumn, but they suggested opening it to a limited number of hunters in the spring to hunt gobblers only. When surveyed subsequently, the hunters indicated high levels of satisfaction with the new regulation. At the close of the study, the turkey population was expanding without need for expensive trapping and relocation of wild birds into the area.

Resolution of wildlife management problems through implementation of recommendations derived directly from research are rare and highly instructive. The researchers conclude their volume with a list of worthy research objectives.

The book is free of typographical errors. The sub-

heading and index make access to the information easy. Observations by the authors are considered in light of other published works. Behavioral and reproductive characteristics are interpreted in evolutionary terms.

The reasoning that links observations to management recommendations and future research is sound with one curious exception. The data clearly indicate that hunters could not be trusted in the autumn to take only gobblers, yet the authors recommended that autumn, gobbler-only seasons be tested again. The list of recommended future research did not include a study of nutritional ecology. Such research might explain, for example, why insects comprised only 25% of the diet of turkey poults up to 14 days of age in Florida whereas, in more northern areas, insects make up at least 75% of the diet.

This volume will be an essential addition to university and museum libraries as well as to the personal libraries of researchers on wild turkeys and other gamebirds.—PETER T. BROMLEY.

Hindlimb Myology and Evolution of the Old World Suboscine Passerine Birds (Acanthisittidae, Pittidae, Philepittidae, Eurylaimidae).—Robert J. Raikow. 1987. Am. Ornithol. Union, Ornithol. Monogr. 41. viii + 81 pp. ISBN 0-943610-51-6. $12.50 ($9.50 to AOU members).—What are the phylogenetic relationships of the avian higher taxa? Can those relationships be read accurately—perhaps even without error—from any one kind of data? What methods are most appropriate for generating phylogenetic relationships? How are we to interpret and evaluate phylogenetic hypotheses that conflict with one another?

These questions are among the most important that face systematic ornithology, and answers to them have obvious, far-reaching implications for all of ornithology. With the increasing prominence of molecular data of various kinds, more workers are addressing questions of avian phylogeny. This activity is welcome for it can only increase our understanding of avian relationships. There is however, a downside that is perhaps more sociological than scientific. Some molecular systematists, and even a few nonsystematists strongly enamored with reductionist methods, have hailed molecular data as something akin to the Holy Grail, able to resolve relationships where other kinds of data have failed. The claim is frequently made, moreover, that molecular data *are* the answer, that they *do* provide us with an accurate description of phylogeny—after all, it is sometimes argued, we are talking real genetic divergence here.

Other systematists point out, in contrast, that this view is naive. *All* molecular data have formidable problems of interpretation and are, in this regard, no different from traditional sources of systematic data such as morphology. It has not been demonstrated that molecular data—in contrast to morphology, say—are truth-giving; any claim to the contrary is little more than propaganda.

How do we judge the "truthfulness" of systematic hypotheses? The answer would seem to be rather simple: in science, we judge the correctness of our understanding by the degree of convergence, or congruence, of different kinds of data toward a common answer. This is precisely one reason why molecular data are so important: they provide a rich source of systematic information. Because our understanding of relationships is so dependent upon congruence among different data, we will always need a diversity of approaches to systematic problems. The notion of congruence is not always easy to grasp, however. One of the more conspicuous logical errors making the rounds within systematic ornithology is that because certain molecular data are often congruent with morphological results, this implies that the molecular data can be trusted to provide the truth even in those cases when they are not congruent with morphology. The irony of this reasoning, of course, is that the inference is symmetrical and speaks for the truthfulness of morphology as much as molecular data. All data are capable of producing spurious results, and it is only through comparative analysis of independent data sets that we can distinguish between spurious results and putative truth. Which brings us to Robert Raikow and his analysis of suboscine relationships.

The focus of this study is the systematics and anatomy of the Old World suboscines, including the Acanthisittidae, Pittidae, Philepittidae, and Eurylaimidae. As Raikow notes, the relationships of these taxa to each other, the other suboscines, as well as to the oscines, have been an enigma. The primary reason for this has been the absence of phylogenetically informative characters and a method of comparative analysis that does something more than base relationships on overall resemblance. Over the past decade, Raikow and his students have provided the majority of the character-state data that can be used to evaluate phylogenetic hypotheses for the passeriform higher taxa. Without this work, we would have few, if any, characters uniting many of these families. Through extensive and detailed dissections of hindlimb and forelimb musculature, he has documented patterns of variation and identified numerous characters of systematic value. This monograph continues this work and provides the most substantial evidence yet available bearing on the relationships of the basal lineages within the Passeriformes.

In an extensive Introduction, Raikow reviews the systematic history of the above-mentioned suboscine families and discusses the controversies surrounding their affinities to suboscine and oscine taxa. He follows this with a short synopsis of his systematic methods, namely numerical parsimony analysis using outgroup comparison (in this case, nonpasserines) to polarize character variation. This is followed by the

longest section of the monograph, 19 pages examining variation in the hindlimb musculature. Each muscle is described in detail for *Eurylaimus* and then compared with the other taxa.

These data enabled Raikow to extract 23 phylogenetically informative characters, to which he added four other characters from the literature, including bill shape, the presence of eye wattles, stapes shape, and the possession of an oscine syrinx. A parsimony analysis, using PAUP (Phylogenetic Analysis Using Parsimony), produced four equally parsimonious trees having a consistency index of 0.771. Differences among these trees involve the relationships of genera within the Pittidae and Eurylaimidae, thus the higher-level relationships were stable across each of the trees. The significant findings include the following: (1) one character corroborates a sister-group relationship between the Acanthisittidae and the oscines, with this clade being the sister-group of the suboscines; (2) only one character, an expanded stapes, supports the monophyly of the suboscines; (3) within this latter clade, there is a trichotomy consisting of the Tyranni, Furnarii, and a clade of Old World suboscines including the Philepittidae and Eurylaimidae and their sister-group, the Pittidae; and (4) the relationship between the philepittids and eurylaimids is strongly supported (by three characters), whereas two characters corroborate their relationship to the pittids.

Raikow compares his results with those of DNA hybridization which places the acanthisittids with the suboscines rather than oscines. He dismisses this conflict as minor—because the acanthisittids are outside the other suboscines in both studies—yet a distinction between such fundamentally different hypotheses for the basal dichotomy of the passeriforms is hardly minor. It would have been more appropriate to have had a discussion of the relative merits of the conflicting data and how these differences might have arisen. Thus, with respect to the myological data, only one character supports the acanthisittid/oscine clade, yet that character—the loss of the distal belly of the M. flexor perforatus digiti IV—is unique to acanthisittids and oscines. With respect to the DNA hybridization result, data necessary for evaluating this hypothesis have not yet been published (i.e. the matrices are incomplete and the original melting curves are not available for analysis). Although the DNA hybridization results are suggestive of a suboscine/acanthisittid relationship, they are ambiguous in that all the distances among the relevant taxa are close to or exceed the values at which heterologous strands hybridize sufficiently to be measured directly and accurately. More data would be welcome. Other morphological data such as the syrinx and stapes do not appear to be very informative, but osteology has not been examined in sufficient detail as yet. What is clearly needed are more molecular data, especially from DNA sequences.

In summary, this small monograph makes a solid contribution to our knowledge of suboscine anatomy and the phylogenetic relationships of the early lineages of the Passeriformes. All avian biologists interested in the suboscines and in passeriform systematics will want to refer to it.—JOEL CRACRAFT.

Reproductive Success: Studies of Individual Variation in Contrasting Breeding Systems.—T. H. Clutton-Brock (Ed.). 1988. Chicago, Illinois, University of Chicago Press. ix + 538 pp., 25 halftones, 115 text figures. ISBN 0-226-11059-1. Paper, $29.95. ISBN 0-226-11058-3. Cloth, $75.00.—Studies of behavioral ecology, population demography, and selection are almost invariably predicated on comparisons of the fitness of individuals. Although defining fitness is not always easy, under most circumstances the best measure we can hope to obtain is lifetime reproductive success (LRS). Unfortunately, measuring LRS in the field is difficult at best. Consequently, with a few notable exceptions, workers have obtained such data from natural populations only within the past several years, and the total number of studies published before 1988 reporting LRS data in birds can be counted on the fingers of one hand. This sorry state of affairs was changed forever with the publication of "Reproductive Success." T. H . Clutton-Brock, one of the first workers to realize the desirability and feasibility of obtaining LRS data, has brought together a remarkable collection of papers on a wide range of animals, almost all of which focus on measuring and analyzing the LRS of individuals of both sexes.

A total of 25 studies are included, of which 13 are on birds. All but one involve following the same individuals throughout most or all of their lives, and all are long-term studies. I estimate the total number of field-years represented by the 13 bird studies to be ca. 240 yr, or a staggering 18.5 field-years, on average, per study! In several cases, these studies cover not only the lifespans of the birds but virtually the entire professional lives of the researchers as well. This is succinctly illustrated by the frontispiece showing George Dunnet banding Fulmars (*Fulmarus glacialis*) both today and at the start of his study 34 years ago. What else can one expect when the goal is to understand the factors that influence reproductive success in a bird that may not breed until age 19! The only alternatives to devoting decades of effort to such a study are cross-sectional sampling or simulations of various sorts; few such shortcuts are to be found here. Indeed, this book contains some of the most thorough and comprehensive data on the variables that influence reproductive success available anywhere.

In the introduction, Clutton-Brock points out several major advantages of longitudinal data. Longitudinal data enables researchers to compare more accurately the fitness of different categories of individuals, to reduce biases attributable to short-term environmental variation and changes in successive

cross-sectional samples, and to provide clearer insights into the relationship between particular phenotypic traits and reproductive success. These advantages are well illustrated in the papers presented here. Thomas and Coulson, for example, show that in Kittiwakes (*Rissa tridactyla*) there appear to be significant differences in individual quality such that long-lived individuals are reproductively more successful when young than individuals that die young. Without long-term data, such a relationship could easily be misinterpreted as an increase in reproductive success among older individuals. Studies by J. N. M. Smith of Song Sparrows (*Melospiza melodia*) and by Bryant of House Martins (*Delichon urbica*) document the importance of short-term environmental variation by showing the potentially overriding effects of a bad year on the success of entire cohorts in these short-lived species. Again, only long-term studies can avoid the pitfalls of drawing erroneous conclusions based on conditions which may occur only rarely or, conversely, based on average conditions, exclusive of the potentially major selective and demographic effects of a population crash or a year of extremely high food supply.

From the extraordinary data sets at their disposal, contributors attempt to determine which life-history stages contribute most to total variance in LRS, the degree to which reproductive success varies between males and females, the effects of age on breeding success, and the environmental and phenotypic causes of variation in LRS. Of course, not all four areas are covered by all authors and analyses often differ from chapter to chapter, even when addressing the same question. This sometimes makes the studies difficult to compare. One benefit, however, is that the book provides a useful compendium of ways to analyze reproductive success data. Techniques vary from Newton's relatively conventional analysis of factors that influence reproduction in female Sparrowhawks (*Accipiter nisus*) to Cooke and Rockwell's complex model of the components of fitness in Lesser Snow Geese (*Chen caerulescens caerulescens*).

Worthy of particular mention is the partitioning of the opportunity of selection (I) performed by a majority of authors. This analysis is designed to estimate the relative contributions of different components of breeding success to LRS and has been rarely applied previously, in part because the analytical techniques for performing the analysis are relatively new. In fact, the method used by most of the authors here is one described for the first time by D. Brown in the last section of the book. These analyses are illuminating. Among other things, partitioning of the opportunity of selection suggests that differences in survival of offspring are probably the most important source of variation in fitness among breeders in the Great Tit (*Parus major*) populations studied by both van Noordwijk and van Balen, and by McCleery and Perrins. Lifespan, however, appears to be the most important component to overall variance in fitness for House Martins (Bryant) and Song Sparrows (Smith). It is sometimes difficult to interpret the massive sets of numbers produced by these analyses, particularly because workers use different definitions for nonbreeders, but they offer by far the largest collection of such data available anywhere.

It is tempting to compare I values between the sexes and across species, particularly among species with differing social systems. The studies presented here are sufficiently diverse to allow such comparisons. Besides the monogamous species already mentioned, studies include one lek-breeding species (Black Grouse [*Tetrao tetrix*] by Kruijt and de Vos) and two cooperative breeders (Groove-billed Ani [*Crotophaga sulcirostris*] by Vehrencamp et al. and Scrub Jay [*Aphelocoma coerulescens*] by Fitzpatrick and Woolfenden). Such interspecific comparisons are no doubt one of the original goals of the editor, as suggested in his overview chapter in the last section of the book. Unfortunately, recent work shows that interspecific and intersexual comparisons can be difficult to interpret because I values are sensitive to differences in sampling, dispersal patterns (which can be confounded with mortality), and the contribution of the environmental component to reproductive success. Other cautionary points are made in several of the avian chapters. For example, McCleery and Perrins point out some of the dangers of overanalyzing I values derived from Brown's analytical technique. Bryant shows how frequency dependence can confound interpretation of I values. To these I might add the problem of extrapair copulations by males and egg-dumping by females, phenomena whose frequency may be high enough to compromise LRS patterns derived from behavioral data.

To the editor's credit, he does not shirk from these difficulties but rather confronts them head-on in both his own overview chapter and in one by Grafen critically discussing such issues. Grafen's discussions of adaptation versus selection in progress, difficulties in interpreting opportunity for selection and selection gradients, and problems in measuring fitness serve to clarify both the meaning and the limitations of data presented in the book. Both Grafen's and Clutton-Brock's summaries should be read by anyone about to collect or analyze their own longitudinal data.

In addition to birds, the book also includes an outstanding collection of chapters on five species of insects, two anurans, and six species of mammals. The overall standard is high. Contributions to multiauthored books are rarely as thematically matched as this one, and certainly few contain a comparable wealth of data. I recommend it highly to all those interested in ecology, evolution, and behavior. It is a must for anyone interested in what can be done with data from long-term studies or wondering why anyone would be crazy enough to undertake one.—WALTER D. KOENIG.

Seabirds and Other Marine Vertebrates: Competition, Predation, and Other Interactions.—Joanna Burger (Ed.). 1989. New York, Columbia University Press. x + 342 pp. ISBN 0-231-06362-8. $45.00.—A multiauthored volume at its best brings together a variety of disparate viewpoints and speculations to generate a new research field or to summarize the achievements of an established one. The present book falls between these goals. It offers a variety of interesting papers but no clear idea of why they came to be published together or of what milestone they mark. Many of the chapters are interesting and important, but they might more profitably have been published in the refereed literature. The book also suffers from *laissez-faire* editing. The page numbers of the chapters as they appear in the table of contents do not agree with the actual page numbers. There is a random scattering of typos, repetition of data among text, tables, and figures, and some of the most horrendous sentence structures since my dissertation.

The book opens with what should have been a theme-setting essay by the editor on "Interactions of marine birds with other marine vertebrates in marine ecosystems." Much of this is a review of reviews by Connell, Schoener, and Sih et al. of studies of competition. There is a brief discussion of mutualism and commensalism, then a section concluding that "the lack of studies dealing with vertebrates either as competitors or predators is noteworthy" in marine and intertidal ecosystems. Unless one excludes fish from the vertebrates or limits vertebrates to air-breathers, this seems a strange claim. Fisheries science is alive and well, or at least well-funded, and competition and predation are among its major subjects.

I suspect the chapter faced an early deadline, as it makes a number of similar statements that might have fermented further. That "Interactions that are positive for one or both members of a species pair are largely ignored in ecological studies, particularly in experimental studies" is simply not true. The definition is so broad as to include predation and competition, reviewed earlier in the same section. Excluding them, parasitism, commensalism, and mutualism are thriving themes in ecology, indeed sometimes they threaten to become competitive dominants. Similarly, we are told: "For marine birds, the indirect effects of competition and predation are critical." Many would question how much evidence there is of direct effects on marine birds, never mind of indirect ones. Marine birds are then cited as different from other marine organisms in "being adapted for flight," thus omitting the Galápagos Flightless Cormorant, Great Auk, 18 penguin species, and the extinct, flightless species discussed in a later chapter by Warheit and Lindberg. Again, "Until recently, the species interactions and coexistence mechanisms of marine birds in marine habitats have largely been ignored." Early studies by Formosov (cited by Gause *in* "Struggle For Existence"), Murphy, Fisher, Pearson, Belopol'skii, and Lack are not mentioned. The review does make the useful point that seabirds operate in three very different media (air, land, and sea) that have very different demands and cause interactions with other vertebrates to be complex.

R. Pierrotti reviews associations of birds and mammals in the northwest Atlantic and interactions between gulls and otariid pinnipeds in two chapters. Both papers present interesting syntheses and exciting new information, especially on whale-seabird interactions, but they suffer from a nearly fatal flaw; they lack methods sections. We don't know where observations were made or how, or whether they might be representative. In the next chapter, K. Hulsman links the structure of seabird communities from the Great Barrier Reef of Australia to a model of food abundance, derived from earlier work by Perrins. He ties together foraging, morphology, and breeding in a model that deserves testing in other tropical systems.

C. Safina and J. Burger present a 98-page chapter (29% of the book) on the trophic relationships of baitfish, Bluefish (*Pomatomus saltatrix*), and Common Terns (*Sterna hirundo*). Judicious editing could have reduced the 26 figures and 19 tables. The data set is unique for its direct measurement of surface-prey schools, but the paper almost drowns the data in discussion. The writing also obscures the data's elegance; for example, "An exception to this was that in the post-fledging period (subsequent to July 15), when prey numbers were low, the presence of bluefish corresponded with increased differences in prey abundance under versus adjacent to tern flocks."

D. W. Au and R. L. Pitman use another large data set to examine foraging of dolphins, tuna, and seabirds, and to develop a novel theory, based on marine productivity, to explain patterns of association among the three groups of predators. R. W. Furness et al. suggest that 90% of offal and 75% of fish discarded from fishing boats around the British Isles are consumed by seabirds. Their use of experimental feeding of offal and fish allowed them to examine the handling efficiencies and times for different sized prey by different seabirds. They suggest that plans to increase net mesh-size will lead to reductions in offal and discards, and place the smaller scavenging species at a competitive disadvantage.

L. L. Jones and A. R. DeGange review the published literature on interactions between seabirds and fisheries in the North Pacific Ocean. The lengthy introduction would have benefited from a definition of "competition" and of its effects. The authors infer that seabirds compete with fisheries because birds eat lots of fish; however, birds may eat fish not available for commercial exploitation or take fish that would be consumed by other natural predators. Jones and DeGange conclude that over a million birds die in gill nets each year in the North Pacific. This sounds terrible, but it represents less than a one-percent mor-

tality in a seabird population which they estimate to be in the "low hundreds of millions of individuals." This hardly sounds serious, but probably it is. Even minor net mortality, such as a few hundred Marbled Murrelets (*Brachyramphus marmoratus*) in the British Columbian salmon fishery, may represent serious threats to local seabird populations. Percentage mortality estimates would have been more useful than absolute numbers which lack reference to the initial populations and their turnover.

The book concludes with a paper by K. I. Warheit and D. R. Lindberg on interactions over time between pinnipeds and seabirds at breeding sites. Warheit and Lindberg suggest that competition between the two groups, combined with changes in marine productivity and sea level, may have shaped seabird communities and helped determine the body size, number, and distribution of flightless seabird species. Warheit and Lindberg argue that present-day seabird populations have been substantially reduced by human activity; that competition for space is rare at present, but was probably important previously; and that community organization cannot be understood without considering conditions that prevailed over evolutionary time.

The book needs a closing section to tie the papers together. A number of interspecific interactions are demonstrated with varying degrees of rigor, but there is no attempt to integrate them into the wider context of seabird or marine vertebrate ecology. There is also a need to address the great variety of scales at which events occur and the difficulty of linking such scales. For example, how can we link interactions that last only a few seconds and take place in less than a meter or so (such as competition for offal behind a fishing boat or for bait fish between terns hovering over bluefish) to the standing stocks and dynamics of seabird populations at scales of hundreds of miles and decades, in a statistically rigorous manner? What sorts of rules or generalities regarding interspecific interactions should we look for in seabirds? I wonder if the field is likely to end up a disconnected aggregation of studies, much like the present volume?

Despite its problems, this is a useful and stimulating book for seabird biologists, but others outside the field will perhaps wish to await a more cohesive, definitive volume.—DAVID CAMERON DUFFY.

The Skuas.—Robert W. Furness. 1987. Calton, England, T & A D Poyser Ltd. 363 pp., 100 text figures, 65 tables, 30 text photographs, 35 illustrations (by John Busby). ISBN 0-85661-046-1. No price given.—Furness completed his doctoral research on the Great Skua (or Bonxie) (*Catharacta skua skua*) in Scotland during the mid-1970s and then continued intensive work on that species as well as observing other skuas elsewhere. The result is another fine book on seabird natural history—mainly breeding biology—in the tradition of other British authors. The book should be of use to ornithologists and ecologists interested in the breeding ecology of nonpasserine birds, but the chapters entitled "Reversed sexual dimorphism," "Plumage polymorphism," and "Pollutants" will be of great interest to a much wider readership. Though the book contains a wealth of technical information, well displayed in the large number of tables and figures, it is quite readable and can be enjoyed by anyone with an interest in seabirds.

The book is directed mostly at a British audience. Besides the Great Skua, the other stercorarid treated in great detail is the Parasitic Jaeger (or Arctic Skua, *Stercorarius parasiticus*). The populations of these two species in the British Isles are emphasized. This treatment disappointed me. I am from North America, where three species of jaegers are important parts of the arctic fauna, and I have spent a great deal of time in the Antarctic where the South Polar Skua (*C. maccormicki*) and the Brown Skua (*C. s. lonnbergi*) reside. It is really too much to ask a European to summarize all the "gray literature" on jaegers in the Canadian and Alaskan Arctic that has resulted from environmental assessments and biological surveys related to minerals development. Such a summary, though, would be welcomed. The Antarctic skuas are another matter, because their biology has been the subject of a great deal of directed and published research. Omission of reference to several important papers (mainly but not necessarily in the non-European literature) is detrimental. The inclusion of these papers likely would have headed off the perpetuation or generation of some unsupported hypotheses, such as, that the movement of South Polar Skuas around the Pacific is a response to the migrations of one fish species, and that the northward expansion (has there been a significant one?) of South Polar Skuas in the Antarctic Peninsula region is a response to the supposed increased abundance of another fish species. The literature on southern skuas is certainly ripe for review, and I expected it in this book. Compared with the otherwise fine piece of work that the book represents, however, this is a relatively small point of limited interest.

I found Chapter 2 ("Early history and classification of skuas") to be particularly enlightening. Furness assembled a wealth of information on classification, nomenclature, populations, and status from many obscure sources. Included is evidence on the occurrence of Bonxies for the past few hundred years, in some cases based on the taxes that were paid by the presentation of skua bills as evidence of "vermin" control. Because of their aggressive nature and large size, Bonxies are well known to Scottish sheep farmers. Skuas long ago earned an unjustified reputation as predators and harassers of sheep, a reputation that to some extent continues to this day. The fact that Furness has more or less lived with the Bonxies for ex-

tended periods, and in the process came to know well a number of sheep farmers and herders who have strong opinions about these birds, has added an interesting dimension to several portions of the book. Skuas vs. sheep and other ecological interactions between Bonxies and man, chronicled over several centuries, are treated in special detail in Chapter 15, "Skuas and agriculture," and Chapter 16, "Skuas and conservation." These chapters illustrate the complexity of "managing" wildlife populations, and especially those of apex predators (or keystone species) in the modern world. Changes in Bonxie populations, wrought both directly and indirectly by humans, have had (and will continue to have) ramifications for the populations of avian species with which the skuas interact.

The chapter on reversed sexual dimorphism will be useful to students of raptor biology and to those interested in the evolution of sexual dimorphism. Furness explores several hypotheses that attempt to explain reversed sexual dimorphism in other animals. The range in degree of sexual dimorphism exhibited among the skuas, correlated with the range in feeding habits, lends support to an idea that the phenomenon has to do with the degree to which reversed-dimorphic species are predatory on other birds.

Anyone needing to known about pollutants in marine food webs should read Chapter 14, which contains much detail on pollutant loads in Bonxies and other skua species. Apparently work on pollutants was an important source of funding which allowed work on skuas to continue for a number of years. Apex predators often receive the brunt of food web contamination, and for that reason I suppose inclusion of this material in the book is justified (a definite part of modern-day skua ecology), but future reference to this information by toxicologists will depend on successful exercise of the bibliographers' "art." To be sure, much of this information in the book is summarized from the author's other publications.

Another strong contribution is the chapter on plumage polymorphism. Some skua species exhibit differences in coloration between the sexes, among populations, or both. The phenomenon is fairly well documented, but finding a cause or causes, in the author's words (p. 196), "is a complex and confusing issue" and he does not really offer a favored hypothesis. Nevertheless, his detailed summary of available information and his discussion of the evidence in light of current hypotheses provide the platform, and perhaps the stimulus, for further work on the subject as it pertains to skuas.—DAVID G. AINLEY.

Birds and Berries: A Study of an Ecological Interaction.—Barbara and David Snow. 1988. Vermillion, South Dakota, Buteo Books. 268 pp., 40 illustrations, 11 text figures, 83 tables, 5 appendices. ISBN 0-85661-049-6. $37.50.—Although Barbara and David Snow first became interested in the interaction of birds and fruits in the New World Tropics, more recently they have focused their attention on this phenomenon in their native England. "Birds and Berries" reports the results of extensive field observations made by the authors in southern England between 1980 and 1985.

The dedication of this book to Alexander Skutch, "the only ornithologist we know whose research technique has been to sit and watch," underscores the book's greatest strengths as well as its greatest weaknesses. Written with the intention of providing a general natural history publication on the interaction of birds and fruits, "Birds and Berries" will prove rewarding reading for a variety of ornithologists, from interested amateurs to research professionals. Nonetheless, readers who anticipate critical testing of hypotheses concerning the interaction of birds and fruits, as well as a thorough review of pertinent literature (perhaps not an unrealistic expectation from two of the founders of the field), may be disappointed.

The book is written in three main parts. The first two parts, called "The fruits" and "The fruit-eaters," are factual accounts of timed watches of bird species taking a large variety of native and introduced plant species. The last part, called "Interpretation," attempts to place the factual material presented in the first two parts in a larger ecological context. The scope of the study and the methods used are discussed in a brief introductory chapter, and the table of contents will direct readers to each of the fruit and bird species studied, as well as various aspects of their interaction (e.g. adaptations for a fruit diet, coevolution of birds and plants). Following the text are five appendices providing details of the fleshy fruit-bearing plants native to England, "design components" of these and introduced fruits, nutritive properties of selected fruits, as well as monthly totals of timed watches at fruiting plants. The index includes the plants and animals discussed in the book but does not include concepts (e.g. I could find dispersers but not dispersal), or authors whose work is discussed in the text.

The book's greatest strength results from the large amount of information concerning fruiting seasons, fruit traits, and foraging observations for virtually all fruiting plant species and fruit-eating bird species of a particular geographic region amassed into a single volume. From this perspective, "Birds and Berries" provides a useful and unique reference, despite its restriction to primarily English flora and fauna. Amateurs and professionals alike, for instance, can use this sort of information when designing habitat management plans from backyards to larger nature preserves. Perhaps of more interest to most readers of *The Auk*, this book should be required reading for researchers looking for interesting hypotheses to pursue concerning bird-fruit interactions. New graduate students contemplating beginning research careers, in particular, can benefit from a close reading of this

book, not only regarding research questions but also the realities of conducting research (e.g. 16.4 h observing *Daphne laureola* yielded only 16 feeding visits!).

The wealth of data, as one would expect, raises more questions than are answered. For instance, are "unsuccessful" attempts to take fruit really unsuccessful, or are they possibly rejections of inferior fruit? Do all, most, or few members of a given bird species exhibit the same fruit preferences or the same handling characteristics? Does the answer to the previous question hold for most fruit-eating bird species? What role does relative fruit abundance play in bird foraging decisions? Do fruit crop sizes vary from year to year for the same plants? Readers with interests different from mine will find much stimulus in this book for numerous other questions.

I found the section on "Interpretation" to be the most disappointing aspect of the book. Here the authors discuss their observational data in relation to the rather large body of theory that has accumulated regarding bird-fruit interactions. As a North American reader, I was struck by the lack of citations of bird-fruit studies in temperate North America, as well as citations of North American researchers who have worked primarily in the tropics. Even though some of this literature may have been excluded because of the geographical location of the study, naive readers could be given any of several false impressions because of the omission (e.g. bird-fruit interactions are not important or prominent in North America, or not much work has been done in North America, or the phenomenon is so different in North America that parallels are few, etc.). My major point regarding this criticism is that inclusion of a greater array of literature would vastly increase the usefulness of this book as a reference. To be fair, the authors do cite three different major reviews (however, only readers with access to research libraries would probably be able to find them).

Parallels to as well as contrasts with different plant and animal systems also are unmentioned. For instance, in attempting to understand the adaptive function of flocking in fruit-eaters (antipredator vs. overwhelming individual birds defending rich fruit crops), consideration of the large amount of work on heterospecific schools of coral reef fish and damsel fish (e.g. *Eupomacentrus planifrons*) defending algal lawns might prove useful.

One final (and rather minor) criticism is that I found the writing in this section to be slightly rambling, and I sometimes found it difficult to determine precisely what hypothesis was under scrutiny, and what evidence was necessary to reject it. On the other hand, this writing style may be appropriate for a book intended for a lay as well as a scientific audience.

Overall, "Birds and Berries" is a stimulating and enjoyable read. I noticed virtually no typographical errors, and the illustrations by John Busby contribute a nice flourish. This volume belongs in both university and community libraries, and despite its inadequacy as a source of literature citations, I would recommend this book to research professionals interested in bird-fruit interactions.—CHRISTOPHER J. WHELAN.

Life of the Tanager.—Alexander F. Skutch. 1989. Illustrated by Dana Gardner. Ithaca, New York, Cornell University Press. xii + 114 pp., 24 color plates, 19 text drawings. ISBN 0-8014-2226-4. $36.50.—More than 40 years ago Alexander Skutch moved to what was then a relatively unpopulated region in Costa Rica and, among other ventures, began to observe the daily activities of the avifauna. What followed was a ground-breaking series of "life histories" that have enriched the world's knowledge enormously and placed Skutch among the most prolific and articulate observers of ornithological natural history. Moreover, as a trained botanist with a Ph.D. from Johns Hopkins, Skutch has the tools to interrelate bird and plant ecology, a skill that he has called upon many times over the years as he observed tanagers.

The current volume consolidates Skutch's tanager observations, previously published in more than a dozen books and papers, in the following chapters: (1) The tanager family; (2) Food and foraging; (3) Voice; (4) Daily life; (5) Displays and disputes; (6) Temperament; (7) Courtship and nests; (8) Eggs and incubation; (9) Nestlings and their care; (10) Helpers; (11) Enemies, nesting success, and longevity; and (12) Tanagers and man. Appropriately, some of the longest and richest chapters are directed at nesting behavior, for that subject (along with plant-bird interrelationships) is the greatest strength of Skutch's work. Those familiar with Skutch's oeuvre, however, will find little new herein. Almost all of the data have been published previously although details are added occasionally. Given the abundance of observations that Skutch has given us over the years, the lack of new data is hardly a criticism; the book remains a fertile repository of information, written in a flowing style that continually expresses Skutch's admiration for tanagers.

The style of Skutch's writing, especially when it takes an anthropomorphic turn, will trouble some readers, but the much more distressing aspect of the book (which begins with the book's title) is the extrapolation of Skutch's observations to the entire tanager assemblage. Putting aside the still unanswered question of "What is a tanager?" articulated so well by Storer (1969, Living Bird 8: 127), Skutch makes a number of generalizations about the behaviors of tanagers even though substantial information is provided for only ca. 30 species that are principally Central American in distribution. The data do not provide a sound basis for generalizing to all or most of the 230–

240 tanager species, and as a consequence unsupportable statements follow.

For example, in previously published writings such as his overview of the tanagers in the "Dictionary of Birds" (Campbell and Lack [Eds.], 1985, Buteo Books), Skutch embraced the traditional belief that tanagers are largely frugivorous. In the "Food and foraging" chapter of "Life of the Tanager," he seems to modify this view with the statement that "Tanagers prefer a mixed diet of fruits and insects, supplemented by nectar in a number of species" (p. 9), but the closing paragraph in the book (p. 107) starts with "Tanagers, like a number of largely or wholly frugivorous birds," which illustrates the persistence of such unsupported generalizations in his writings.

An even more troublesome generalization in the chapter on feeding behavior is the concluding sentence: "Versatile tanagers are generalists rather than specialists in foraging." This statement ignores published data, especially the work of Steven Hilty (*in* Isler and Isler, 1987, The Tanagers, Smithsonian Inst. Press; cited by Skutch). Hilty's and other published data show that sympatric tanager species are often extremely specialized in their insect-foraging behavior, even though they feed at the same fruiting trees. Skutch's statement not only indicates the common bias towards observing tanagers at fruiting trees on the forest edge rather then tracking their insect-foraging behaviors within the forest where they are more difficult to observe, but the statement also reflects the author's dismissal (p. xi) of several hundred uncited and apparently unused publications that contain relevant information regarding foraging and other behaviors of tanagers (*see* Isler and Isler). As a final example of the limitations of the book's data base, the chapter on "Voice" considers 29 tanager species and implies that vocalizations for remaining species remain to be discovered, thereby ignoring the recordings of over 175 species that have been placed into public archives, such as Cornell's Library of Natural Sounds (*ibid.*).

The 24 watercolor paintings by Dana Gardner are inserted in a folio in the middle of the book. Befitting a large (ca. 9″ × 12″) "coffee table" book, each painting usually contains a single species set in an expansive environment. The colors are good, the habitats appropriate to the species portrayed, and the plates altogether pleasant to view.

"Life of the Tanager" will have research value primarily to libraries and to ornithologists who do not have access to Skutch's previous publications or to those who may wish to have his data organized by subject matter in a single book rather than on a species by species basis. Additionally, the book should appeal to individuals who enjoy richly detailed natural history accounts and bird portraits. But seekers of knowledge of tanagers should be warned to restrict their intake to Skutch's direct observations and to beware his generalizations.—MORTON AND PHYLLIS ISLER.

Form and Function in Birds, Vol. 4.—A. S. King and J. McLelland (Eds.). 1989. San Diego, California, Academic Press. xiv + 591 pp., 226 figures, 22 tables. ISBN 0-12-407504-5. $89.00.—Volume 4 completes one of the more highly regarded review series in recent ornithological literature. This latest addition is equal to, or perhaps surpasses, the high standards of the previous volumes (reviewed for *The Auk* by W. Bock [1981, 98: 856] and A. Moiseff [1986, 103: 648]). It is also the most internally coherent of the volumes; all chapters but one treat some aspect of avian respiratory systems. The singular chapter, "Central nervous system" by J. E. Breazile and H.-G. Hartwig, might have fit better in Volume 3.

All but one of the chapter bibliographies are extensive and, in and of themselves, will be a resource worth the price of the book. Oddly, it is the references and one nonrespiration chapter that highlight the only pervasive weakness (a hazard common to all ventures of this type): the loss of timeliness because of delays between receipt of manuscripts and final publication.

The editors comment in their preface (dated March 1988) on the problems of assembling a satisfactory grouping of articles in a timely fashion. The dates of cited references indicate that most chapters were prepared in 1985–1986. Several authors have clearly added references to the proofs, but there is a limit to what can be done this way, and not all contributors will be equally responsive. One omission that I consider disturbing is the absence of reference to any of Nowicki's work on the use of resonance for modulation of avian phonation in the three chapters in which it might have been appropriate. The references cited in M. A. Abdalla's "The blood supply to the lung" do not extend beyond 1979, suggesting either that the chapter was prepared for an earlier volume and has not been revised, or that the author (whose address is the University of Khartoum) does not have ready access to recent literature.

Three chapters deserve special commentary, each for a different reason. S. F. Perry's leadoff chapter, "Mainstreams in the evolution of vertebrate respiratory systems," is unusual in several ways. Unlike most other chapters (in both this volume and of the set), which emphasize a descriptive approach, Perry's is almost entirely interpretive. I suspect that the editors wished to begin by setting an evolutionary context into which to fit the admittedly peculiar avian respiratory system. Whether Perry's chapter succeeds may be a matter of taste, but I suspect that most ornithologists will find it too pedantic, too complicated, and too involved with Perry's own theories on the subject. Comparative anatomists and comparative embryologists, who might appreciate the arguments, may find them too condensed—if such investigators consult this source at all. The chapter certainly left me with the wish that Perry would expand this material to a book, where he would have the expanse to de-

velop his complex arguments with the leisure and scope they deserve.

"Functional Anatomy of the Syrinx" by A. S. King is a document that I have long awaited. Despite the importance of syringeal structure to studies of avian taxonomy and phonation, the best previous set of illustrations of the diversity of syringeal types was Beddard's 1898 classic "The Structure and Classification of Birds" (New York, Longman, Green & Co.), in which the illustrations are distributed according to the taxonomy of the day. Here at last we have a well-illustrated assemblage of a wide variety of syringes. King has culled the literature for representative illustrations, some of which have been redrawn and relabeled with modern terminology, and many new figures from his personal observations are included. The series showing the structure of, and flow patterns through, the syringeal bulla of a male *Anas platyrhynchos* is notably well done. Because the chapter is organized to emphasize the relationship between form and function, it avoids becoming a catalog.

While introducing "The morphometry of the avian lung," J. N. Maina comments on the need for detailed structural information if function is to be elucidated. His chapter is indeed rich in details, well-presented in both tabular and graphic forms, and set in a comparative context. I found the comparisons of birds and bats especially intriguing. The consistent differences, at even the cellular and tissue levels, between the two (three?) groups of flying vertebrates once again reveal that, apart from an energy-expensive life style, birds and mammals have remarkably little in common.

Other chapters include two by J. McLelland, "Larynx and trachea" and "Anatomy of the lungs and air sacs." The first of these deserves much the same kind of commentary as King's chapter. J. H. Brackenbury discusses "Function of the syrinx and the control of sound production." There is the expected chapter by P. Scheid and J. Piiper on "Respiratory mechanics and air flow in birds." "Physiology of gas exchange in the avian respiratory system" by F. L. Powell and P. Scheid contains a welcome explanation of the experimental logic in such studies. M. Gleeson and V. Molony discuss "Control of breathing."

The composition of the fourth volume of "Form and Function in Birds" invites comparison with the two-volume "Bird Respiration," edited by T. J. Sellers (1986; reviewed by T. L. Taigen 1989, Auk 106: 345). The overlap is surprisingly small. Seller's volumes contain nothing to compare with J. McLelland's two chapters, whereas "Form and Function in Birds" contains nothing on temperature control or diving. Even when subjects are directly comparable, the authors (except for Scheid and Piiper) are different and emphasize their individual interests. Thus, Brackenbury explores the neural control of vocalization at some length in the volume at hand, a topic essentially absent from Gaunt's contribution to "Bird Respiration." In general, the chapters in "Form and Function in Birds" are devoted to descriptions of structural systems, those in "Bird Respiration" are more concerned with ecophysiological problems. The alphabetized references in "Form and Function" will provide much easier access to the literature than the numerical order of citation organization in "Bird Respiration."

In summary, Volume 4 of "Form and Function in Birds" is a worthy completion to the series. It will be a necessary volume for academic and veterinary libraries, and a welcome resource for all interested in avian anatomy or physiology. Happily, the price is less than for some previous volumes in the set!—A. S. GAUNT.

The American Crow and the Common Raven.—Lawrence Kilham. 1989. College Station, Texas, Texas A&M University Press. xiv + 255 pp., 13 black-and-white illustrations by Joan Waltermire, 17 sonograms, 1 text figure, 8 tables. ISBN 0-89096-327-0. $29.50.—This book is a deeply personal account of the author's six-year immersion in crow social life. Kilham and his wife were able to observe many nuances of territorial behavior and communal breeding by regularly feeding two territorial groups of crows in Florida. Interspersed with discussions of possible cooperation are anecdotes on caching behavior, vocalizations, predator deterrence, and cognitive abilities of wild and hand-reared crows in Florida and New Hampshire. Kilham aims to "make a study of all aspects of crow behavior" and to that end dwells on crows, devoting only 45 pages to his studies of captive and hand-reared ravens.

Kilham's work is a testament to the importance of amateurs to ornithology (Professionally he is a virologist). The research summarized in this book is an important documentation of group territoriality and foraging and communal nesting by American Crows. Unfortunately, possible influences of supplemental feeding on territoriality are not discussed. The results from Florida, Cape Cod, and Los Angeles (which are briefly summarized) suggest that American Crows are much more social than previously appreciated. Crow groups may include up to seven auxiliaries that help a dominant pair breed. Kilham's claim that their communal breeding is "more highly developed . . . than in any bird north of Mexico," however, is certainly an overestimate of their sociality.

Kilham supplements our knowledge of crow and raven natural history. In particular, he observed a great variety in foraging behavior including group attacks on deer fawns and a swan nest. Cooperative foraging may be common in Florida, where members of crow groups often flushed insects out of cabbage palms to other group members. His documentation of extensive caching and the possible use of caches by incubating females is also important. He is quick

to point out the extreme shyness that ravens (even a hand-reared one) exhibit at food, which was also detailed by Heinrich (1988, Condor 90: 950). In contrast to other accounts, Kilham did not observe crows acting as sentinels for ravens. Instead he reports that ravens dominate crows and may rob them of food. Quantification of time budgets, reproductive success, and relative composition of diet are notably lacking.

The vocal repertoire of crows and ravens is legendary. Kilham presents several sonograms of interesting vocalizations and suggests their function. Function is difficult to ascribe because he did no playback experiments, nor did he quantify the use of calls in a variety of contexts. Mysteriously, the extensive work on crow calls by Brown (1985, Z. Tierpsychol. 67: 17) is not discussed (her work on crow song is only briefly mentioned).

Kilham's novel interpretations of behavior should fuel further research on crows. His insight is rarely influenced by preexisting literature, which leads to original, although sometimes anthropomorphic, speculations about rare observations. For example, he feels that crows bombard predators and competitors with vocalizations in an effort to repel them or force them to abandon their catches. They may also try to deceive hawks by luring them with imitations of prey, perhaps attempting to frustrate potential competitors. These ideas are pretty farfetched, but they are testable and if confirmed would go far in supporting claims of the superior cognitive abilities of crows and ravens.

Kilham's book succeeds as a collection of interesting observations, but it falls short as a scientific study. Discussions are primarily lists of studies supporting or in conflict with his observations. Rarely are there in-depth discussions of current theories and how various observations support or refute them. Kilham openly deplores statistics in his introduction and reports no statistics more complex than a mean (without a measure of variation). Without quantification, his statements must be confined to the few individuals he studied. Moreover, the text often presents disjointed anecdotes instead of quantified ideas and tests of hypotheses. At times Kilham seems to have gone out of his way to avoid experimentation. For example, his hand-reared crow appeared to mob a black bathing suit hanging on a nearby clothesline (supporting Lorenz's famous claim), yet Kilham never systematically presented objects to his pets to test this (or any) idea. I was often frustrated by exciting observations like this that lacked rigorous investigation.

My most serious criticism is that many of Kilham's claims are suspect because he refused to mark his study animals. He justifies this approach by suggesting that color marking hinders observations because one is more concerned with reading bands rather than watching behavior. He also feared that his subjects would remember the trauma of banding and forever label him as their enemy. A last concern is that color bands may influence mate choice. These are real, but by no means insurmountable, concerns. The information gained in recent long-term studies of marked populations suggests that the benefits far outweigh the detriments. Although Kilham alludes to the benefits of marking, he relied on natural markers rather than artificial bands. He suggests that individuals were recognized by noting individualistic deformities, vocalizations, and the presence of broken or bent feathers. These may be reliable cues to identity, but I doubt they are as permanent as the author claims (he identified the "same" bird by a broken feather for two years). Paradoxically, Kilham later suggests that crows themselves may have difficulty identifying individuals at a distance because of their uniformly black plumage. Yet we are expected to believe that he could. Without reliably marked individuals, it is difficult to evaluate many claims about crow group composition and territoriality. We really do not know that the "groups" of crows included the same individuals from day to day.

The chapter on the evolution of crow communal breeding is especially weak. Kilham suggests (without supporting data) that habitats are saturated, that parents with helpers raise more young and have more time to devote to other activities than parents without helpers, and that helpers gain experience useful in the future. These are likely, but data on time budgets and reproductive success of many pairs are needed. The importance (or lack thereof) of indirect genetic benefits are not discussed, and Hamilton's (1964, J. Theor. Biol. 7: 1) seminal work is not mentioned. Occasionally, Kilham waxes "group-selectionist" as he does when explaining that helping and delaying reproduction are not costly in long-lived species like crows because populations will not suffer.

This book is supposed to "appeal to professional and amateur ornithologists," but it is likely to appeal to amateurs more than professionals. Amateurs will certainly enjoy his stories of interesting behaviors and exploits with pet corvids. The illustrations are wonderful and Kilham's insights into crow and raven sociality are important. However, most ornithologists are likely to tire of wading through disjointed, often repetitive, tales. Those interested in corvids, caching, foraging, and communal breeding, however, should look at this book. I recommend this book for community and university libraries, but few researchers will find it essential for their personal libraries.

Perhaps the greatest contribution that this book makes to ornithology is to point out how important it is to mark birds. My immediate feeling upon reading the text was a desire to rush out and color-band crows! So much more could have been learned if Kilham's crows wore color bands. Nonetheless, Kilham has added much to our knowledge of these common but understudied birds. His take-home message is important to professionals as well as amateurs: crows are "intelligent, resourceful, and cooperative," not simple-minded robots.—JOHN MARZLUFF.

OTHER ITEMS OF INTEREST

Songs of Mexican Birds.—Ben B. Coffey Jr. and Lula C. Coffey. 1989. Gainesville, Florida, ARA Records. 2 cassettes: ARA 13-1 (137 species), ARA 13-2 (109 species of birds plus a frog and howler monkeys). $21.00.—Ben and Lula Coffey have assembled representative vocalizations of 246 species of Mexican birds in what might be termed "Ben's Greatest Mexican Hits." Included are both previously released and unreleased cuts. The tapes are minimally annotated with Ben usually announcing only proper common names. Occasionally he gives a bit of sage advice on species identification, perhaps some behaviorial information, or the identity of other natural sounds on a cut. He also mentions (59 times) the general recording locality (otherwise assumed to be Mexico "sensu lato"), either a state (e.g. Tamaulipas for the Mottled Owl [*Ciccaba virgata*]), or a familiar landmark (e.g. Palenque Ruins [Chiapas] for the Scaly-breasted Wren [*Microcerculus marginatus*]). Infrequently the authors use a recording from a nearby country; for example, Honduras for the Lesser Ground-Cuckoo (*Morococcyx erythropygus*). Ben also cautions the user about problems with aural identification alone; for example, the similarities of songs of Blue (*Melanotis caerulescens*) and Blue-and-white (*M. hypoleucus*) mockingbirds, and hybridizing Collared (*Pipilo ocai*) and Rufous-sided (*P. erythrophthalmus*) towhees. In both cases, the observer must see as well as hear the singer. Elsewhere, noting a systematic problem with crows, Ben provides good vocal evidence in support of full species status for both the Tamaulipan and Sonoran populations of the Mexican Crow (*Corvus imparatus*). The eastern birds have a low-pitched nasal call; the western have a distinctly higher pitched one.

In another instance, Ben adventurously uses his own phonetically based, proper common names for five species of nightjars from tropical Mexico. My favorites are "Will" instead of Yucatan Poorwill (*Nyctiphrynus yucatanicus*) and "Cookachea" rather than Buff-collared Nightjar (*Caprimulgus ridgwayi*). Such phonetic appellations make good sense when you consider the fact that birders may hear but seldom, if ever, see one of these night birds well enough to spot a buff collar. To facilitate matching of scientific name with check-list common name, the Coffeys have taped a printed note to the box of cassette 1 with the author's common name and the scientific name of each of these caprimulgids.

In general, these tapes contain excellent-quality (but not audiophile-class) recordings typical of the Coffeys' work. This package, however, is not accompanied by the highly informative text of some of Ben's recent collaborations with J. W. Hardy on mimids (Hardy, J. W., J. C. Barlow, and B. B. Coffey Jr. ARA-12, 1987) and wrens (Hardy, J. W. and B. B. Coffey Jr. ARA-2 [2nd ed.], 1988). Rather, the present cassettes comprise a utilitarian compendium of songs and calls of Mexican birds meant to provide a handy aural field guide to some common and not-so-common Mexican species. Used with an illustrated Mexican field guide, these tapes should be most effective for that purpose. In another vein, many of the cuts are long enough (up to 60 seconds) for playback (coaxing of reluctant songsters into view), which adds another dimension to their usefulness.

I doubt that the Coffeys would mind if one played these recordings in quiet contemplative moments away from the field. Then the minimal intrusions of the author's voice and the purity of many cuts (e.g. wrens) or the mix of other natural sounds with those of the principals (e.g. cuckoos) should be at once soothing and bracing. Both the completest and the casual buyer of bird recordings will appreciate the Coffeys' latest release.—JON C. BARLOW.

Shrikes of Southern Africa.—Tony Harris. 1989. Capetown, South Africa, Struik Publishers. 224 pp., 63 color figures and sketchs and numerous black-and-white figures by Graeme Arnott. ISBN 0-947430-08-3. No price given.—Harris and Arnott present a lavish treatment of the 32 species of shrikes that occur in southern Africa. Most of the book is devoted to species descriptions. Each is accompanied by a full-page illustration. The figures are clear and balanced, and they illustrate an interesting posture or behavior. Arnott has gone to great effort to present the birds in as lively a fashion as possible and has used both filed sketches and museum skins to produce his pictures. The colors and textures are outstanding.

The emphasis in the text is on behavior, especially communication. Extensive portions are given to systematics, and Harris goes to some length to discuss taxonomic problems. He proposes a new classification of the Laniidae that is based on "more than 90 characters" and is not cladistic but "is supported by DNA-DNA hybridization studies." The strongest points are in the way Harris relates communication to environmental and social factors. He is open about where information is inadequate but compensates for much of this through his "holistic" (comparative) approach.

Each species account includes a summary of identification, status, and standard data on breed and general behavior. The Introduction features a discussion of the species concept, especially the problems of maintaining species bonds and defining species integrity. Harris believes communication is paramount to these processes. His perceptions and presentation of this material are refreshing.

The book is attractive, well made (including jacket), and useful. Years of fieldwork are supplemented by a thorough analysis of the literature. The bibliography is organized by species, which is unusual. The volume continues the tradition of Goodwin, Johnsgard, and others whose enthusiasm and expertise cen-

ter on a specific group. There are some editing flaws, but they are only minor. Arnott's drawings match the text well; for example, in the genus *Batis*, where "The male (of the Pririt Batis) is easily confused with both the Chin-spot and the Mozambique males . . . ." This is not simply species accounts added to nice pictures.—A.H.B.

Owls of the Northern Hemisphere.—Karel H. Voous. 1989. Cambridge, Massachusetts, MIT Press. 320 pp., 50 color plates by Ad Cameron, 24 maps. ISBN 0-262-22035-0. $55.00.—Voous calls this a labor of love. He treats 47 species, all the species of owls that occur north of the tropics. The organization is as species descriptions, followed by a set of distribution maps. The data are culled from the literature (there is an extensive bibliography) and, after a general summary, the information is presented in an accessible format. There are no tables or graphs; the text is intended to accompany the paintings. There is meticulous documentation of distribution, structure (especially hearing), behavior, breeding, food, etc. Two unique topics include the position of the species in an "ecological hierarchy" (e.g. relationships with other species) and "life in man's world." The accounts are descriptive, chatty, and easy to read.

The real attraction of the volume is the paintings by Ad Cameron. In addition to full-color renditions of every species, there is a page of pen-and-ink sketches. The paintings are extraordinary; some are stunning. The textures, colors, backgrounds, and postures are elegant and accurate. Cameron shows superb talent and is a forceful illustrator.

The paintings are seductive. If you can extract yourself from them and ask if this effort improves our overall understanding of the group, the answer is mixed. The book probably breaks no new ground, but it masterfully brings together extensive information from scattered sources. I tried to compare it with Paul Johnsgard's recent "North American Owls" (reviewed Auk 106: 350, 1989). The two books are organized differently but cover similar material. Johnsgard deals with fewer species. Both texts emphasize natural history and use a comparative approach. Voous provides distribution maps as an appendix rather than with each account. The dominant difference is Cameron's artwork. The reader's attention is inextricably drawn to the paintings, which put the book in a special category.

There is abundant information in Voous' text; don't underestimate it. But the real attraction is the painting. Both author and artist are to be congratulated.—A.H.B.

Birds in Ireland.—Clive D. Hutchinson. 1989. Staffordshire, England. T & A D Poyser, Ltd, for the Irish Wildlife Conservancy (distributed by Buteo Books, Box 481, Vermillion, SD 57069 USA). 215 pp. ISBN 0-85661-052-6. $55.—The core of this book is dedicated to species accounts of Ireland's birds. Reports are current through 1986 and follow Voous' (1977) sequence. The accounts cover all seasons and emphasize localities, dates, and number of individuals. The data are extensive and meticulous. The text is enhanced by John Brody's sketches.

The introductory material includes chapters on "Factors affecting the distribution of birds," "Ornithology and bird conversation" and "Recent changes in status." Definitely not a field guide, the information is of interest to biogeographers, conservationists, and others interested in records and populations trends.—A.H.B.

The Editorial Office continually receives material for review. A portion of the material is inappropriate for detailed comment for a variety of reasons. However, because it may be of general biological, but not ornithological, interest or potentially of only limited readership, it is not reviewed. As a service to our readers, these items are occasionally listed.—A.H.B.

Evolution of Life Histories of Mammals.—M. S. Boyd (Ed.). 1988. New Haven, Yale Univ. Press. 373 pp. ISBN 0-300-04084-9. $45.00.

Birdwatching in Britain: A Site by Site Guide.—N. Redman and S. Harrap. 1987. London, Christopher Helm (order from ISBS, 5602 N.E. Hassala St., Portland, OR 97213 USA). 360 pp. 340 maps. ISBN 0-7470-2800-1. $24.95.

A Handbook of Biological Illustration, 2nd ed.—F. W. Zweifel. 1988. Chicago, Univ. Chicago Press. 137 pp. ISBN 0-226-99701-4. Paper, $9.95.

A Synopsis of the Birds of India and Pakistan (together with those of Nepal, Bhutan, Bangladesh and Sri Lanka).—S. D. Ripley II. 1988. New York, Oxford Univ. Press. 652 pp. ISBN 0-19-562164-6. $35.00.

Compact Handbook of the Birds of India and Pa-

kistan, 2nd ed.—S. Ali and S. D. Ripley. 1988. New York, Oxford Univ. Press. 737 pp. 104 color plates. ISBN 0-19-562063-1. $98.00.

Birds to Watch: The ICBP World Check-list of Threatened Birds.—N. J. Collar and P. Andrews. 1988. Cambridge, ICBP Tech. Publ. 8. 303 pp. ISBN 0-946888-124. No price given.

Bustard Sanctuaries of India.—A. R. Rahmari and R. Mankadan. 1988. Bombay, Bombay Nat. Hist. Soc. Tech. Publ. 13. 40 pp. $5.00.

Animal Behavior: An Evolutionary Approach, 2nd ed.—J. Alcock. 1988. Sunderland, Massachusetts, Sinauer Assoc. ISBN 0-87893-202-5. $34.95.

Voices of the New World Nightbirds.—J. W. Hardy, B. B. Coffey Jr., and G. B. Reynard. 1988. Gainesville, Florida, ARA Records. Rev. ed. on audiocassette. No price given.

The Ecology of Sumatra, 2nd ed.—A. J. Whitten, S. J. Damanik, J. Anwar, and N. Hisyam. 1987. Yogyakarta, Indonesia (order from Sinauer Assoc., Sunderland, MA 01315 USA) Gadjah Mada Univ. Press. 587 pp. 268 drawings, 59 black-and-white photographs, 32 color plates. ISBN 979-420-035-1. $45.00.

Ecology of Sulawesi (The Celebes).—A. J. Witten, M. Mustafe, and G. S. Henderson. 1987. Yogyakarta, Indonesia, Gadjah Univ. Press. 802 pp. 326 drawings, 20 black-and-white photographs, 44 color plates. ISBN 979-420-048-4. $50.00.

[Birds of Prey of the Middle East].—B. Bruun and Aserhal. 1988. Holy Land Conservation Fund (order from Society Protection of Nature in Lebanon, P.O. Box 11-5665, Beirut, Lebanon). $10.00. (In Arabic).

The Whooping Crane: A Comeback Story.—D. H. Patent. 1988. Boston, Houghton Mifflin (Clarion Books). 85 pp. ISBN 0-89919-455-9. $14.95.

America's Neighborhood Bats.—M. D. Tuttle. 1988. Austin, Univ. Texas Press. 128 pp. 33 color photographs. ISBN 0-292-70403-8. $19.95.

The Mockingbird.—R. W. Doughty. 1989. Austin, Univ. Texas Press. 80 pp. 16 color illustrations. ISBN 0-292-75099-4. $12.95.

Summer Bird Feeding.—J. V. Dennis. 1988. Northbrook, The Audubon Workshop. 136 pp. ISBN 0-9620001-0-8. $9.95.

What is an Animal?—T. Ingold (Ed.). 1988. Winchester, New Hampshire, Allen and Unwin, Inc. xv + 189 pp. ISBN 0-04-445012-5. No price given.

Les Oiseaux de Massif de Fontainebleau et des Environs.—J.-P. Siblet. 1988. Paris, Lechevalier-P. Chaubaud. 286 pp. ISBN 2-7205-0325-0. No price given.

Connie Hagar: The Life of a Texas Birdwatcher.—K. H. McCracken. 1989. College Station, Texas A&M Univ. Press. 206 pp. ISBN 0-89096-406-8. Paper, revision of 1986 volume, $13.50.

Handbuch der Vögel Mitteleuropas, vol. 11.—U. N. Glutz von Boltzheim and K. M. Bauer. 1988. Wiesbaden, AULA-Verlag, **Part 1:** 1-728 pp. ISBN 3-89104-020-2. DM 218. **Part 2:** 729-1228 pp. ISBN 3-89104-486-0. DM 148.

Alaska: Reflections on Land and Spirit.—R. Hedin and G. Holthaus (Eds.). 1988. Tucson, Univ. Arizona Press. xv + 322 pp. ISBN 0-8165-1093-8. $24.95.

Did Darwin Get it Right? Essays on Games, Sex and Evolution.—J. Maynard Smith. 1989. New York, Chapman Books. vi + 264 pp. ISBN 0-412-01911-6. $22.95.

The Bengal Florican: Status and Ecology (*Houbaropsis bengalensis*).—A. R. Rahamani. 1988. Bombay, Bombay Nat. Hist. Soc. Annu. Rep. 2. 148 pp. No price given.

The Birdwatchers Handbook: A Field Guide to the Natural History of North American Birds.—P. R. Ehrlich, D. S. Dobkin, and D. Wheye. 1988. New York, Simon and Schuster (Fireside Books). 336 pp. ISBN 0-671-65989-8. $14.95.

Caring for your Bird.—R. D. Axelson. 1989. New York, Sterling Publ., 160 pp. ISBN 0-8069-6968-5. $12.95.

Field Guide to Wildlife Habitats of the Eastern U.S.—J. M. Benyus. 1989. New York, Simon and Schuster (Fireside Books). 336 pp. ISBN 0-671-65908-1. $14.95.

Field Guide to Wildlife Habitats of the Western U.S.—J. M. Benyus. 1989. New York, Simon and Schuster (Fireside Books). 336 pp. ISBN 0-671-65909-X. $14.95.

Learning to Fly: A Season with the Peregrine Falcon.—P. H. Liotta. 1989. Chapel Hill, North Carolina, Algonquin Books. xii + 201 pp. ISBN 0-945575-15-7. $16.95.

The Rural Living Book.—Editors of Mother Earth. 1989. New York, Simon and Schuster (Fireside Books). 192 pp. ISBN 0-78911-95. $11.95.

The Backcountry Handbook.—Editors of Mother Earth. 1989. New York, Simon and Schuster (Fireside Books). 192 pp. ISBN 0-68911-95. $11.95.

Odd Perceptions.—R. L. Gregory. 1989. New York, Routledge. 230 pp. ISBN 41-5006-6432. $14.95.

Birds of North America.—D. A. Hancock. 1989. Blaine, Washington, Hancock House Publ. 52 pp. ISBN 0-88839-220-6. $4.95.

Adventures with Eagles.—D. A. Hancock. 1989. Blaine, Washington, Hancock House Publ. 80 pp. ISBN 0-88839-217-6. $5.95.

Birds on Coll and Tiree: Status, Habitats and Conservation.—D. A. Stroud (Ed.). 1989. Edinburgh, Scottish Ornithol. Club. 191 pp. £6.50.

Introducing Birds to Young Naturalists.—I. Hiller. 1989. College Station, Texas A&M Univ. Press. 64 pp. ISBN 0-89096-410-6. No price given.

Recent Vertebrate Carcasses and their Paleobiological Implications.—J. Weigelt (translated by J. Schaefer). 1989. Chicago, Univ. Chicago Press, 185 pp. (translation of 1927 issue). ISBN 0-226-88167-9. $19.95.

Humans and Other Animals.—B. Noske. 1989.

Winchester, Massachusetts, Unwin Hyman, Inc. 224 pp. ISBN 1-85305-054-7. $39.95.

Birds of North America (Western Region).—J. Bull and E. Bull. 1989. New York, Collier Books (Div. Macmillan Publ.). 144 pp., 54 color plates. ISBN 0-02-062580-4. $12.95.

Keeping and Breeding Snakes.—C. Mattison. 1988. London, Blanford Press (in USA, Sterling Publ., New York). 184 pp., 40 color photos. ISBN 0-7137-1865-X. $24.95.

Henri Jacob Victor Sody (1892-1959): His Life and Work.—J. H. Becking. 1989. Leiden, E. J. Brill, 272 pp. ISBN 90-04-086870. $50.00.

The Lyrebird: A Natural History.—P. Reilly. 1988. Kensington, New South Wales (Available from ISBS, 5602 N.E. Hassala St., Portland, OR 97213 USA). 93 pp. ISBN 0-86840-187-0. $14.95.

The Biology of Hair and Wool.—G. E. Rogers, P. J. Reis, K. A. Ward, and R. C. Marshall (Eds.). 1989. New York, Chapman and Hall. 506 pp. ISBN 0-412-32120-3. $105.00.

On the Wing: The Life of Birds From Feather to Flight.—B. Brooks. 1989. New York, Charles Scribner's Sons. 192 pp. 150 color photographs (companion to PBS series on "Nature"). ISBN 0-68419119-9. $40.00.

The Naturalist in La Plata.—W. H. Hudson. 1988 (reprint of 1892 ed.). New York, Dover Publ. vi + 394 pp. 0-486-25740-1. $8.95.

Whales, Dolphins, and Porpoises of the Eastern North Pacific and Adjacent Arctic Waters.—S. Leatherwood, R. R. Reeves, W. F. Perris, and W. E. Evans. 1988 (reprint of 1982 book based on earlier technical reports of U.S. Navy Natl. Marine Fish. Serv.). New York, Dover Publ. 256 pp. ISBN 0-486-25651-0. $11.95.

The Improbable Machine.—J. Campbell. 1989. New York, Simon and Schuster. 334 pp. ISBN 0-671-65711-9. $19.95.

Ecology and Our Endangered Life-Support Systems.—E. P. Odum. 1989. Sunderland, Massachusetts, Sinauer Assoc. 283 pp. ISBN 0-87893-635-1. $14.95.

The Carolina Parakeet in Florida.—D. McKinley. 1985. Gainesville, Florida Ornithol. Soc. Spec. Publ. 3. 64 pp. $6.00.

Status and Distribution of the Florida Scrub Jay.—J. A. Cox. 1987. Gainesville, Florida Ornithol. Soc. Spec. Publ. 4. 109 pp. $8.00.

The Birds of Nebraska: A Critically Evaluated List.—T. E. Bray, B. K. Padelford, and W. R. Silcock. 1986. Bellvue, Nebraska, publ. by the authors (available from B. K. Padelford, 1405 Little John Rd., Bellevue, NE 68005 USA). 111 pp. $4.00 plus $0.75 postage.

Annotated Checklist of Georgia Birds.—Georgia Ornithol. Soc. Checklist Committee. 1986. Atlanta, Georgia Ornithol. Soc. Occas. Pap. 10 (available from C. H. Lane, Georgia Ornithol. Soc., 869 Clifton Road N.E., Atlanta, GA 30307-1223 USA). 53 pp. $5.00.

The Birds of Java and Bali.—D. Holms and S. Nash. 1989. New York, Oxford Univ. Press. xii + 109 pp. 24 color plates. ISBN 0-19-588927-4. $19.95.