REVIEWS

EDITED BY WILLIAM E. SOUTHERN

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

Patterns of evolution in Galápagos organisms.—Robert I. Bowman, Margaret Berson, and Alan E. Leviton (Eds.). 1983. Pacific Division of the American Association for the Advancement of Science (% California Academy of Sciences, Golden Gate Park, San Francisco, California 94118). 568 pp. ISBN 0-934394-05-9. $32.50.—This volume brings together scientifiec papers presented at a 1-day symposium convened by the Pacific Division of AAAS. The meeting took place in June 1977, more than 6 yr before publication of the book. The long time lag is unfortunate. By now some of the papers are not up-to-date, even though writers have had the possibility of including a short addendum dealing with recent advances in their studies. The 13 research reports cover a wide field of topics from the origins and antiquity of the islands, to the nature of submarine rift hydrothermal systems, to the evolutionary significance of structural and behavioral diversity in terrestrial plants and animals. I will confine my review to the four papers on birds, all of them dealing with the fascinating subfamily of Darwin's finches (Geospizinae).

Two papers report studies on genetic relatedness of Darwin's finches. It is valuable that traditional taxonomic analyses can be compared with modern genetic analyses. Jo has determined karyotypes for 12 species of Darwin's finches. There was a striking similarity among the species in gross morphology of the chromosomes. Karyotypes of Geospizinae were more similar to the subfamily Fringillinae than to Emberizinae.

Polans has analyzed enzyme polymorphisms of 257 Darwin's finches, representing 12 species from 12 islands of the Galápagos archipelago. Genetic distances between species are derived, and on basis of them Polans estimates the divergence time between species of finches. Even if such estimates are admittedly rough, it seems that most of the speciation among the finches has occurred within the order of one million years or so. The species of *Geospiza* (ground finches) are most closely related to each other, with speciation estimated to have occured within 100,000 yr. The genetic analysis is quite concordant with previous taxonomic classifications of the species. Yang and Patton (1981, Auk 98: 230) have made a further analysis on the same tissue samples, reaching largely similar conclusions. Their paper was available much earlier, however, than the report of Polans, since this volume has taken so long to be printed.

During the last few years, the role of interspecific competition on adaptive radiation of Darwin's finches has been hotly debated. In this volume Grant presents an important original analysis, earlier publication of which would have made parts of the debate unnecessary. Furthermore, by now Grant and his coworkers have come much farther in understanding the roles of present-day and past competition in the evolution of *Geospiza* finches than was the case in 1977. Some of these advances are presented in the addendum to the paper in this volume, but for those interested in the question, Grant's later review (1981, Amer. Sci. 69: 653) gives an updated presentation.

Grant shows convincingly that particular combinations of *Geospiza* species found to coexist on islands are nonrandom. Missing species comprise species that are size-neighbors on a bill-size spectrum. Grant also presents a strict test of the hypothesis that interspecific competition has been affecting the evolution of *Geospiza* finches. This is an important, original analysis in view of the results of Strong et al. (1979, Evolution 33: 897), who found no evidence for character displacement in an analysis based upon Lack's old measurements of finches. The major point in the reply of Grant and Abbott (1980, Evolution 34: 332) to Strong et al. is based upon the test presented in this volume. Bill sizes of each island population of *Geospiza* are presented with multivariate methods in the same way as Strong et al. did. The average distance for sympatric populations of a given pair of species is compared with the average distance for all of the populations of those species, both sympatric and allopatric. The result is that there is a significant tendency for sympatric populations to be more different than would be expected on the basis of randomly combining populations. The implication is that character displacement has occurred in some of the situations.

The fourth bird paper is an extremely long report on the evolution of song in Darwin's finches by Bowman. The paper includes no less than 182 figures and 38 tables, comprising more than half of the pages of the whole volume. An extensive comparative analysis of the song of all the species of Darwin's finches is presented. High-frequency "whistle" song is given during courtship and is presumably structured so as to impede binaural localization of its source by predators. "Basic" and "derived" songs are used in mate attraction and territorial defense, and they appear in a variety of patterns. Bowman has analyzed transmission of sound frequencies in different plant communities, and he hypothesizes that signal structure of the songs has been shaped so as to minimize trans-

mission loss of acoustical energy. Song dialects reflect regional differences in sound transmission, and song convergences are thought to be the result of occupation of similar acoustical environments.

Bowman's song-learning experiments suggest that specific adult mating preferences are conditioned early in life (age 10–40 days) through imprinting on the song of the attending parental male. It is suggested that heterospecific matings that are observed now and then are a result of vocal misimprinting. The paper by Bowman is tediously long, and I found it difficult to grasp the essential results and tests of hypotheses. However, the paper will surely be of great value for those interested in the dependence of bird song on the structure of habitat and in differences and similarities between songs of related bird species in sympatry and allopatry.

Among the other papers, Porter points out that birds have probably played the most important role in the dispersal of Galápagos vascular plants. Cox estimates the age of islands as 3 to 5 million years. When the first island emerged above sea level the archipelago lay about 200 km farther from the mainland than it does now. The rest of the papers consider the thermal springs of the Galápagos rift (Corliss), genetic variation in tomatoes (Rick), morphometrics of tortoises (Fritts), evolutionary genetics of lizards (Wright), marine iguanas (Boersma), age of iguanas (Wyles and Sarich), and native rodents (Patton and Hafner).

The book will be essential to anyone studying the Galápagos and it is desirable for any college, university, or museum library. It will be less important to those interested in birds in general, however, as other papers published on Darwin's finches are easily available. The original and thorough study by Bowman on bird song will of course be valuable for those studying the evolution of bird song. Even in this field, Darwin's finches appear as a most suitable study object.—RAUNO V. ALATALO.

Darwin's finches.—David Lack, with Introduction and Notes by Laurene M. Ratcliffe and Peter T. Boag. 1983. Cambridge University Press. liii + 208 pp. 8 plates, 27 figures. ISBN 0-521-27242-1. $13.95 (paper), $39.95 (cloth).—This reprint of "Darwin's finches" fills two needs. It will introduce a new generation of biologists to a classic and delightful work in evolutionary ecology, and it will aid those of us who already know this work to update ourselves on the considerable body of literature that has arisen on the finches since the original publication in 1947 and even since the verbatim reprint in 1961. This last function is served by an extended and referenced preface, introduction, and chapter notes by Laurene M. Ratcliffe and Peter T. Boag.

It is remarkable how engaging Lack's work seems even to someone who read all of it 20 yr ago and parts of it over and over since then. Partly this is because Lack addresses many of today's burning issues in ecology and evolution: resource competition, the significance of intra- and interspecific size variation, the extent to which traits are adaptive or nonadaptive. Partly it is because there is adventure, vividly but not flamboyantly described, in Lack's enterprise—in-depth fieldwork on a remote tropical archipelago redolent with history and presenting physical dangers and discomfort. (After all, Melville "doubted whether any spot of earth can, in desolateness, furnish a parallel to this group" of islands.) Consequently "Darwin's finches" is reminiscent of the travelogs of the great naturalist explorers—Darwin's own "Voyage of the Beagle," Arseniev's "Dersu the trapper," etc. But the main reason that "Darwin's finches" continues to excite one's interest is that it shows an astute naturalist thinking. It is a bonus that it is beautifully written.

His *modus operandi* is to seek confirmatory evidence for explanations that Ball (1975) calls "narratives": coherent stories that encompass all the observations, but for which there is no objective way to choose one over another. Nevertheless, by virtue of the breadth of observations that Lack adduces, both his own and those of earlier workers, and the logic of his individual arguments, Lack's theses always demand attention even if they are not completely convincing. One must also be impressed by Lack's ability to marshall germane examples from other birds and even other taxa to buttress his views. The examples are selective. For instance, in the section "Size differences in other birds," he cites examples from several continents in which he perceives surprising differences in size and beak size between congeners, but no examples among many that must have been known to him where sympatric congeners are very similar in size. Yet the very breadth of his knowledge and his recognition that such data could be deployed to support his point are impressive; seals, flatworms, crayfish, rodents, even malarial plasmodia are all discussed. His use of literature is particularly striking when one realizes (as Ratcliffe and Boag note in the Introduction) Lack's major thesis: interspecific competition between the bird species for food serve that Lack's earlier work, "The Galapagos finches—a study in variation" (1945), espoused a very different explanation for the phenomena. In general, most of the interspecific morphological differences were seen as nonadaptive; many were attributed to genetic drift. One srongly senses in "Darwin's finches" the zeal the recent convert, as if Lack would atone for errors in the earlier work by the cogency of the latter one I am continually struck by the short shrift that Lack gave to alternative adaptive hypotheses, particularly the possibility of climatic and habitat differences between islands might have selected for their morphological

differences. This was a rather heretic notion in 1947. Most workers were not looking in this direction.

This is a work of advocacy. Ratcliffe and Boag observe that Lack's earlier work, "The Galapagos finches—a study in variation" (1945), espoused a very different explanation for the same phenomena. In general, most of the interspecific morphological differences were seen as nonadaptive; many were attributed to genetic drift. One strongly senses in "Darwin's finches" the zeal of the recent convert, as if Lack would atone for errors in the earlier work by the cogency of the latter one. I am continually struck by the short shrift that Lack gave to alternative adaptive hypotheses, particularly the possibility that climatic and habitat differences between islands might have selected for morphological differences. Bowman argued for this interpretation in 1961, but I see no reason why it should not have been an attractive potential hypothesis 16 yr earlier, given the widely known contributions of Bergmann, Allen, Rensch, and others along these lines.

The first part of "Darwin's finches," "Description," presents data on all aspects of the birds' biology. The heart of this section is three chapters on beak and body size differences, but plumage is thoroughly treated, and Lack also describes the basic natural history not only of the finches but of other members of the island biotae. There is more than description in this section, however. The primary arguments on the adaptive significance of size variation are established here: body-size differences between species are obscure, beak-size differences between species are largely the result of competition for food (but now serve as specific recognition cues), body- and beak-size differences between island races of the same species are primarily without adaptive significance, and so are inter- and intraspecific plumage differences.

Ratcliffe and Boag provide, in the "Notes," a running commentary or scorecard on subsequent observation and interpretation for all of these hypotheses, and one gets the feeling that Lack did quite well. Certainly the emphasis on the competitive significance of interspecific beak size differences is maintained by the avalanche of recent papers from Peter Grant and his colleagues (including Ratcliffe and Boag). Revisionists of this ilk would mainly act to take this emphasis still further by assigning a large fraction of the intraspecific beak variation in *Geospiza* to the same competition for food; since most islands have different sets of species, most island races of any one species are subject to unique sets of competitive pressures selecting for unique beak characteristics. Ratcliffe and Boag give key references both in support of and opposition to this proposition, and take a rather ecumenical stance toward this and other current controversies. The "Notes" are obligatory as well as interesting reading for initiates to the Galápagos finch literature.

Part Two is entitled "Interpretation," though Part One is just as interpretive. The real difference is that Part Two is much more evolutionary than ecological. Lack's chief concern here is the origin of both species and island races, and he concludes that prevention of gene flow by allopatry is the key mechanism. Although Lack achieves a high score in the "Notes" on this topic, these chapters seem not quite so timely as the ecological ones, perhaps because the allopatric model has now been widely accepted for quite some time, while ecological narratives still seem problematic.

Thus, the most intriguing chapters in this section are those that grade into ecology, such as the discussions of adaptive and non-adaptive variation and of ecological isolation in the finches and other animals. Lack saw much of the island-to-island intraspecific variation in the finches and in other Galápagos organisms as non-adaptive, because he felt that the islands themselves were not sufficiently different ecologically to have selected for these differences. As noted above, subsequent workers, including Bowman and the Grant team, have documented large differences in the physical environment and vegetation among the islands and, to varying degrees, attribute the racial variation to these differences. Turning to ecological isolation, Lack cites several interesting examples in a diversity of birds and other animals in which sympatric congeneric species differ in their use of the habitat in one way or another. He adduces these examples to support his argument that interspecific competition has selected for these differences, but the critical examples—sympatric congeners that do not seem to differ much ecologically—are not mentioned. Nor is it surprising, in a frank search for confirmatory evidence, that Lack did not ask what observed degree of ecological isolation he would take as falsifying his argument. Other contemporary ecologists, such as Charles Elton, followed the same procedure in attempting to demonstrate the role of interspecific competition, while very few skeptics (e.g. C. B. Williams) asked for clear criteria of refutation.

Ratcliffe and Boag, in an interesting discussion of the historical context of Lack's book, observe that he was not concerned with generating testable hypotheses. They add that Lack's methods differed from those of many ecologists today in a second way: his almost complete reliance on uncontrolled observational data rather than experiment. They point out that experimental techniques did not become widespread in animal ecology until much later, while Abbott's monograph on landbirds on islands (1980) warns of the difficulty of drawing strong inference from the "natural experiments" that island communities seem to present. Most avian ecologists nowadays at least genuflect in the direction of experiment and falsifiable hypotheses, although the natural experiment is still a major part of the literature. The caution that Abbott

advises seems especially appropriate for the Galápagos finches, where, after all, there are a small number of species occupying a small number of islands that differ considerably from one another. Unfortunately, the alternative of experimentation is both illegal and immoral for these animals. Consequently, they are perhaps not the best study organisms from a community ecological standpoint. Nevertheless, they are there, they are interesting, and their historical significance insures that they will continue to receive attention. This edition of "Darwin's finches" is an excellent introduction for anyone who would be a serious student of these birds or of the ecological and evolutionary arguments that have surrounded them. In addition, it is a joy to read.—DANIEL SIMBERLOFF.

LITERATURE CITED

ABBOTT, I. 1980. Theories dealing with the ecology of landbirds on islands. Adv. Ecol. Res. 11: 329–371.

BALL, I. 1975. Nature and formulation of biogeographic hypotheses. Syst. Zool. 24: 407–430.

Nature through tropical windows.—Alexander F. Skutch. 1983. Berkeley, California, University of California Press. xiii + 374 pp., 41 black-and-white illustrations. ISBN 0-520-04745-1. $19.95; ISBN 0-520-04759-1, $19.95 (paper).—Alexander Skutch, the pioneer of the study of live rather than skinned neotropical birds, presents us with another in his series of books oriented toward a semipopular, semiprofessional audience. As the title suggests, Skutch discusses the lives of the many birds that he has observed through the open windows of his home in the forests of Costa Rica. This book, however, is more than bird stories, as the author uses windows as a point of departure for wider ranging discussions of scientific and philosophical questions.

Of the 18 chapters, 12 are devoted to the details of the natural history of birds, mammals, and plants near his home, while in the remaining 6 the author presents his views on such topics as the relative virtues of large and small animals (he prefers small), what he thinks is an unhealthy and unjustified preoccupation with selfishness and violence in modern biological thought, the question of altruism between organisms, and the philosophical development of a naturalist.

To turn to the ornithological aspects of the book, Skutch gives charming and very detailed accounts of the roosting, nesting, and feeding behaviors of the small birds that live near his house, always concentrating on the social interactions between individual birds. The author has already published life histories of all seven species that he discusses in detail here, namely Little Hermit Hummingbird (*Phaethornis longuemareus*), White-crested Coquette (*Lophornis adorabilis*), Southern House Wren (*Troglodytes musculus*), Blue-and-White Swallow (*Pygochelidon cyanoleuca*), Bananaquit (*Coereba flaveola*), Boat-billed Flycatcher (*Megarynchus pitangua*), and Black-striped Sparrow (*Arremonops conirostris*), but many of the details presented are new.

The four chapters on plants include many valuable accounts of bird species that eat the fruits of different Costa Rican trees. In fact, there is an entire chapter on the arils of different fruits and on the birds that eat them, and in a chapter on trees, the author includes fascinating new details of plant-ant interactions. The two other plant chapters are devoted to the biology of tropical weeds and to the oil palm and the animals and plants that rely on it.

In the impressive diversity of topics that Skutch deals with in this book, his most ambitious effort is his attempt to chip away at some of the widely accepted tenets of sociobiology. Specifically, in chapters entitled "The Gentler Side of Nature," and "Selfishness, Altruism, and Cooperation," he discusses "the factors that promote gentleness and concord among animals." Unfortunately, Skutch does not do full justice to the current thinking on selfishness. For instance, his assumptions that a bird giving an alarm call is benefitting all of the surrounding birds is no more proven that is the converse possibility. Likewise, in discussing alarm calls and many forms of cooperative behavior, he neglects to discuss Trivers' ideas about reciprocal altruism, which might apply to many of the examples cited. At one point, he attacks Dawkins' view of organisms as "gene machines," and he suggests that "r," Hamilton's well-known coefficient of relatedness, is not a realistic way to approach altruism between conspecifics. He points out that "r" refers only to rare genes identical by descent, while two conspecifics likely already share the vast majority of their genes. Looking at it this way, all conspecifics are extremely closely related to one another, and altruism should be common and dispensed indiscriminately among all members of each species. Dawkins (1979, Z. Tierpsychol 51: 184) refuted this common misunderstanding of kin selection by pointing out that a strategy of universal altruism is not evolutionarily stable because it can be invaded by a strategy of dispensing altruism only to close kin.

In the final chapters, Skutch traces the development of morality in a hypothetical naturalist. He claims that, initially, most naturalists treat animals as mere specimens to be collected, whereas eventually, after passing through several stages of increasing sensitivity, a few naturalists develop moral systems that include profound respect for other organisms. The author is certainly one of the latter.

This book is very desirable for college or university libraries, for community libraries, and for the

personal libraries of all serious field biologists and naturalists. The beautiful and useful black-and-white illustrations by Dana Gardner also add considerably to what is already a fine volume. Let's hope that the author will produce yet more volumes of this quality in the near future.—CHARLES A. MUNN

The ecology of a tropical forest. Seasonal rhythms and long-term changes.—Egbert G. Leigh, Jr., A. Standley Rand, and Donald M. Windsor (Eds.). 1982. Washington, D.C., Smithsonian Institution Press. 468 pp., illus. $25.00 (paper).—This large volume is a compilation of articles by staff, recent graduate students, and postdoctoral fellows working at the Smithsonian Tropical Research Institute (STRI) in Panama. The subject is the semideciduous tropical forest on Barro Colorado Island. This 1,500-ha island was isolated from neighboring forest in 1914 by the formation of Gatun Lake during the construction of the Panama Canal. Since 1946 the island has been under the jurisdiction of the Smithsonian Institution, and since 1971 a standardized environmental monitoring program has been conducted. The objective of the monitoring program is to obtain data on seasonal changes in the physical environment, leaf flush, flowering and fruiting of plants, insect and mammal populations, and decomposition of litter in the soil. The book contains a tremendous amount of interesting information about tropical ecology.

The main value of the book to scientists will probably be its documentation of diverse projects conducted in a single environment in the tropics. Its title suggests that it also presents a coherent view of seasonal rhythms and long-term changes in the biota. A reader can attempt such a synthesis, but the editors have not insisted on promoting this stated objective. The particularly good chapters on vegetation history (Foster and Brokaw), treefalls (Brokaw), leaf flush and litterfall (Leigh and Windsor), flowering (Augspurger), fruitfall (Foster), mammals (Smythe, Glanz and Leigh; Russell), insects (Smythe and Wolda; Smith), litter arthropods (Levings and Windsor), and herps (Toft, Rand and Clark; Andrews and Rand) all left me with the feeling that this tropical system is more tightly driven by the physical environment than I was led to believe by Egbert Leigh's introduction. This conclusion is of course counter to the conventional MacArthurian notion that biotic diversity itself begets stability. In spite of the high species richness of the biota and the lack of top mammalian predators (no pumas or jaguars occur on the island), the normal annual population fluctuations of vertebrates and insects are as large on Barro Colorado Island as on equal-sized areas of temperate forest.

The vegetation of BCI is not a genuine rain forest. The plants are adapted in various ways to a moderate but very important dry season, which lasts from January to March. A major pulse of leaf flush and insect abundance accompanies the early part of the rainy season (May and June). The most stressful season for the fauna is apparently the later months of the rainy season (August to December). Foster gives an interesting analysis of the importance of the alternation of the seasons in his description of the dramatic effects of the unusually wet "dry season" in 1970. There was widespread starvation among many species of frugivores because so many species of plants require the normal dry season in order to flower and set fruit.

Taken together, the chapters on vertebrates are a good reminder of how little is really known about population regulation in the tropics. The chapters on birds are about frugivory (Howe), manakins (Worthington), and antwrens (Gradwohl and Greenberg). Froehlich and Thorington describe how dermatoglyphics (the analysis of fingerprints) can be used to study the socioecology of howler monkeys. They show that the individual monkeys in troops that occupy areas of higher food abundance are larger than those in other troops. In many, but not all, species of vertebrates, the regular late rainy season is accompanied by a shortage of food. A disruption of the normal seasonality, such as the unusually wet dry season of 1970, accentuates the stress of this phenomenon.—FRANCES C. JAMES.

Bird-habitat relationships on southeastern forest lands.—Paul B. Hamel, Harry E. LeGrand, Jr., Michael R. Lennartz, and Sidney A. Gauthreaux, Jr. 1982. U.S.D.A. Forest Service, Southeastern Forest Experiment Station, General Technical Report SE-22. 417 pp. No price given.—This large, paper-bound volume is intended to be a "comprehensive summary of the life histories and habitat associations of all bird species that breed, winter, or both in forest habitats of the Southeast. It is limited in scope to . . . Virginia, North Carolina, South Carolina, Georgia, and Florida." The intended uses of the volume are (1) for forest managers as an aid to planning forest management activities, and (2) for ornithologists as a "working hypothesis" to stimulate research on avian habitat requirements.

The content of the small print, camera-ready copy is primarily a series of tables listing bird species by habitat type and indicating seasonality, geographic distribution, substrate used within the habitat, and specific requirements (e.g. large trees, closed canopy). These tables are presented for 23 vegetation types (e.g. everglades, tropical hardwoods, pine savanna). Following these are brief species accounts giving legal status, relative abundance, primary habitats, key habitat requirements, sample breeding densities, general reproduction information, food habits, and a few references. A glossary is provided, defining some

forestry jargon as well as a lot of terms that most of us wouldn't give a second thought to. For example, a "carnivore" is "an animal that feeds on meat, especially on animals larger than 5 cm in length" and a "tree" is "a woody plant over 5m in height."

The authors indicate that the data matrices are compilations from their own experience and "all relevant literature." While I know that the authors' experience is extensive, I question that the 152 cited references represent "all relevant literature." Examination of those citations in fact indicates a preponderance of government publications, including 32 Forest Service publications. Considering the details sought for the narrow geographic region under consideration, one would think that the respective state journals—among the best in the nation—would have been prime sources. However, only two references are given from state journals: one from the *Chat* and one from the *Florida Field Naturalist*. Most of the data seem to have come from breeding bird and winter bird surveys published in *Audubon Field Notes* and *American Birds*. The "Bent" series was also heavily relied upon, sometimes resulting in statements that are questionable or certainly outdated. For example, the Black Vulture (p. 276) is said to frequently feed in "cities and towns." And, in spite of Lennartz' very extensive research with Red-cockaded Woodpeckers, that species is listed (p. 310) as nesting from "early April to late May" when in fact it frequently has young in the nest into June and sometimes even into early July. As this is a federally endangered species and forest management activities are supposed to be scheduled to avoid the nesting season, this error could have an adverse effect on the species. Some species seem oddly out of place in a volume on bird-habitat relationships on forest lands: how could anyone consider the Pied-billed Grebe a forest bird?

As a tool for forest wildlife biologists, this volume is of value, especially because it puts habitat preferences into forestry jargon (e.g. "poletimber," "sawtimber"). In spite of the above criticisms of the data base, the associations described are generally reasonable. For the ornithologist, however, the "working hypothesis" presented could use substantial shoring up with the abundance of data available in state journals, state bird books, and monographic publications on the avifauna of particular areas. Certainly the volume is one worth including in college libraries.

The weakest aspect of the volume is its binding. I received two copies of the volume—one as a review copy and one as a personal copy. Both had loose pages when received and the review copy now has over a hundred loose pages. If the Forest Service really intended this to be a manual that will be used, why did they make it so it would self-destruct?—JEROME A. JACKSON.

Australia: A natural history.—H. E. Evans and M. A. Evans. 1983. Washington, D.C., Smithsonian Institution Press. 208 pp., 24 color plates, 70 text figures. ISBN 0-87474-418-0. $29.95 (cloth), $19.95 (paper).—It is nice sometimes to be proved wrong! When the editor asked me to review this book my first reaction was "Why the hell are these Yanks writing about Australia?" and I must confess my second reaction was "Who are they anyway?" Not a very auspicious start, especially in a land surfeited by fleeting visitors eager to show the "ignorant colonials" all the things that we have missed or are doing wrong! But then the book itself arrived and now my reaction, 200 pages later, is that I wish some well-travelled, literate, Australian would write just such a potted natural history of the U.S.A., for it would be an enormous help in preparation for a visit to America.

This book is written by two professional biologists, a husband-and-wife team, who have visited Australia in three spells over 10 yr spanning some 24 months. Their sojourns were no fleeting holiday or journalistic whirlwinds, but periods of professional work during which they entered into and obviously enjoyed the way we live "down under." They also took every opportunity of travel to distant places and, when there, were not afraid to leave the bitumen. They have read widely of our history, our literature, and our problems, and quote from these with sympathy and understanding.

The book consists of 163 pages of text in 11 chapters with a 30-page swathe of color plates in the middle and a useful 2-page bibliography of further readind at the end. The first chapter is introductory, and I can do no better than quote from page 10:

> "There is no way of putting a continent within the pages of a book. What we have tried to do is to capture, in separate chapters, the essence of the wildflowers, its mammals, birds, reptiles, insects and marine life .... It is very much the personal view of two people who admit to being incurable biophiles and australophiles."

Read as a whole, I enjoyed the book, and I am sure that Americans about to visit Australia will find it a great help in planning where to go and in preparing them for some of the larger surprises—perhaps that most of us are white and speak the same language! But chapter-by-chapter I must be honestly critical. Howard Evans is a professional entomologist and the chapter on insects "rings true" with all the enthusiasm of a dedicated research worker, and I have no fault to find. The bird chapter (which I suppose is the basic reason for this review) and the mammal one appear not only superficial, as they must be in an overall review, but read as third-hand material, as if collations such as my own "Bird life" or Frith and Calaby's "Kangaroos" have been read but not the original contributions upon which those books were based. Nevertheless, as a part of the whole, these chapters form adequate introductions to their fields and do illustrate the variety of the Australian fauna.

To detail: the caption to Plate 24 is misnamed—they are Straw-necked, *not* White, Ibis. And the caption to the photograph of shearwaters on page 81 is misleading, largely through the use of the term "mating season": mutton birds lay one egg and mating *sensu stricta* occupies but a small part of the *breeding* season. They do not "spend the days at sea and the nights with their mates in underground nests," anthropomorphically comfortable as that may sound! Each member of the pair forages in turn far at sea whilst the other incubates the egg; they do meet when they change-over incubation shifts (which is infrequent) but take it in turns to feed the nestling.

Both those criticisms refer to captions and not the text, so perhaps it is the editor/publisher who is to blame. Certainly I have one major moan to lay at their door: these days there is no shortage of excellent wildlife photographs, and I find it sad to see the same old pictures rehashed from the Australian Information Service, although I must admit some were new. But above all why, oh why, repeat photographs? Nine of the 11 chapters start with half-page, black-and-white relevant photographs (pp. 9, 16, 33, 84, 126, 142, 158, 173, and 189) and in each case the same picture or a part thereof is repeated in the text (pp. 22, 25, 42, 90, 133, 145, 168, 185, and 193). Admittedly, only the ones in the text carry captions, but what a wasted opportunity to have shown the reader nine additional pictures. One can't help wondering if the owners of those photographs received two fees! Whilst in a carping frame of mind, the captions for plates 21 and 22 have been interchanged (unless the helicopter flew very low), the picture on page 89 is Gould's sand monitor (a goanna), and the upper picture on page 90 is the bearded dragon, not as writ.

Having got the "nit-picking" off my shoulders (which reviewers are *expected* to do to show that they really have read the book), I would return to praise both the concept and the execution. I congratulate the authors on compiling such a broad overview of Australian natural history. Anyone who ventures beyond our city broadwalks will find it an invaluable introduction and from it will get directions to further reading and field guides in their particular fields. It is written in such a way as not to offend Australians when the authors deal with "touchy" subjects, such as shooting kangaroos or aborigines.

A visitor who wants to take more than a superficial look at Australia will find this book an excellent, well-rounded introduction to our natural history—including our own species. Specialists, including ornithologists, may be disappointed with their specific chapter, but further reading is listed and any such shortcomings should be forgiven for the value of the whole.—IAN ROWLEY.

The North American Black Duck (*Anas rubripes*): A case history of 28 years of failure in American wildlife management.—John W. Grandy. 1983. International Jour. for the Study of Animal Problems, Suppl. to Vol. 4, No. 4, Pp. 1-35. Price not given.—John Grandy is Vice President, Wildlife and Environment, of The Humane Society of the United States. In 1982, his institution and other litigants sued the U.S. Fish and Wildlife Service to have that year's hunt of the American Black Duck closed. If the present paper is any indication of the litigants' approach to the court case, I can see why they were unsuccessful in their bid for a closure.

Contrary to Dr. Grandy's claim, I find this work to be anything but "a scientific and technological analysis." Were it not for the fact that an ornithological issue lurks here, Grandy's paper would not merit review in these pages. However, this issue is real and deserving of our attention; hence, we can tolerate what is at best poor science to get to it.

At the outset, Dr. Grandy throws down the gauntlet with an inflammatory title—spiked with "28 years of failure." Then, instead of steamrollering us with facts, he instead opts mainly for quotes (about seven pages worth), repetition, and rambling discourse on who did what to whom and when. There are some facts, to be sure—including two tables and one figure (about two pages total). These are presented with little explanation or discussion, however, and the reader must digest them largely on his own. I never did fully understand Table 1, even though I have some passing experience with waterfowl regulations.

Quotes are a notorious medium of communication, given the lack of context and other problems attendant with their use. Even so, a number of authorities on the American Black Duck seem to be saying that the species *is* declining, and several point the finger primarily at overharvest by hunters. The winter inventory also points to a decline, with over 700,000 ducks counted in 1955 in the United States versus fewer than 300,000 in 1983 (Grandy's Figure 1). In spite of this decline, Atlantic Flyway hunting regulations for recent years are not designed to decrease the harvest of these ducks. For example, under the first option (Grandy's Table 1), the lowest allowable harvest for a season per hunter was 50 American Black Ducks in 1972, but this rose to 90 for 1973-1977 and 100 for 1978-1982—even as mid-winter duck numbers were falling from about 420,000 (1972) to about 300,000 (1982). The result was that harvest totals as a percentage of the mid-winter count increased from 83% in 1972 to 143% in 1980—the latter being the last year for which Grandy shows harvest data (his Table 2). For the period 1955-1972, the annual harvest as a percentage of the mid-winter count averaged about 77%, while in 1973-1980 it was 99%! No wonder Grandy and others were concerned.

In my view, Dr. Grandy's paper fails as either a scientific or technical analysis of the decline of the American Black Duck and the implication in this of hunting. The reason for this failure is largely its in-

adequacies in scientific method and the reliance instead on a nonscientific approach. Nonetheless, the paper does raise legitimate concerns about the American Black Duck and its management, and these questions deserve serious attention—soon and in depth.—JOHN P. HUBBARD.

Report of the 1979 Greenland White-fronted Goose study expedition to Eqalungmiut Nunât, West Greenland.—A. D. Fox and D. A. Stroud (Eds.). 1981. Aberystwyth, U.K., School of Biological Sciences, University College of Wales. 319 pp.—In the best of British traditions for such endeavors, this expedition grew from one person's dream to a serious study of the breeding biology of the Greenland White-fronted Goose (*Anser albifrons flavirostris*), one of the rarest subspecies of geese. Twelve intrepid amateur naturalists investigated these birds (and almost everything else) from May to August 1979 in the Eqalungmiut Nunât, 900 km^2 of upland tundra at the western edge of the Greenland Ice Sheet. This report, written and edited by expedition members, is an unorthodox but fascinating account of their results and their adventures and anecdotes. As such, in addition to the scientific aspects, it conveys an appreciation of personal experiences and ". . . the magic of Eqalungmiut Nunât, a beautiful but often unusual and alien environment."

Approximately one-third of the report is devoted to Greenland Whitefronts, based on studies of the population of about 400 birds in the study area. The expedition arrived there just ahead of the geese and stayed until the geese had molted and regained flight. Thus, the 1979 season is covered: arrival, nesting, predation, food and feeding, post-breeding, and molt. This section is rounded out with a discussion of banding and banding recoveries and a general review of the life history of the Greenland White-fronted Goose.

Systematic ornithological reports on an additional 31 species observed and a breeding bird survey are also given. Mammal observations include a curiously detailed analysis of salvaged caribou atlas vertebrae. The scientific reports are completed with sections on botany, invertebrates, meteorology, and on fauna on other sites visited by expedition members.

The scientific activities and results of the expedition and the relevant literature are thoroughly covered. The presentation of detail, however, makes for a lengthy report. The discussion of results is stimulating, although one must sometimes question the generalization of conclusions based on small sample sizes. For example, the recovery patterns (based on visual sightings of "Darvic" leg bands and hunting kills) of the 96 geese banded by the expedition in Eqalungmiut Nunât may not be representative of the subspecies, which totals about 15,000 birds and whose breeding range extends for over 800 km, south to north, on West Greenland.

Narrative and technical accounts occupy about a fifth of the report. They provide an excellent description of daily activities and logistics, and a backdrop of the landscape and environment. Having taken that approach, however, they should have provided more background on individual expedition members. The reader is left to piece the characters together from intriguing but incomplete details in the reflections and anecdotes given. Logistical and technical aspects are covered in detail and should prove useful in planning for any similar expedition. Here the authors are completely candid, dealing with their mistakes and troubles just as clearly as with their successes.

The expedition succeeded in its basic objectives to obtain current breeding information on the Greenland Whitefronts, a subspecies still in jeopardy but still hunted on its wintering grounds in Britain. Key expedition members are working and planning for another expedition to Greenland soon. I wish them success.

This volume is written and illustrated well, including many attractive and decorative sketches. Minor nuisances in readability are caused by small, noncolumnar print and a lack of scale bars on many key maps. It would be a desirable addition to university or museum libraries, and to personal libraries of those interested in geese, particularly the Greenland Whitefront.—RICHARD H. KERBES.

Birds of the Netherlands Antilles.—K. H. Voous. 1983. Utrecht, Netherlands, De Walburg Pers. 327 pp., 28 plates. £11.75.—Is there a need for yet another Caribbean field guide? With Brudenell-Bruce's "The birds of the Bahamas," ffrench's "A guide to the birds of Trinidad and Tobago," Raffaele's recent "A guide to the birds of Puerto Rico and the Virgin Islands," and Bond's classic "Birds of the West Indies," there would seem to be little need for an additional guide. Voous' "Birds of the Netherlands Antilles," however, is a revised English edition of his 1955 edition of "De Vogels van de Nederlandse Antillen," which fills an important niche.

Voous' book is intended to serve as both a field guide and a miniature handbook to the 252 bird species recorded from Aruba, Curaçao, and Bonaire (the Leeward Group, along the Venezuela coast) and St. Martin, Saba, and St. Eustatius (the Windward Group, to the east of Puerto Rico). The Windward Group has a West Indian avifauna while the Leeward Group, 900 km to the southwest, falls just outside the zoogeographic limits of the West Indies and hence has an avifauna predominantly of South American origin and is usually omitted from West Indian field guides. Because of these avifauna differences, the author has divided the book into two sections and treats

the species of the two respective island groups separately.

The species accounts provide English, Dutch, and Papiamento common names. For each species the author provides a short description, a detailed account of the species' occurrence on the islands (including a valuable survey of the literature), and a section on habits and food, breeding, voice, and distribution outside the Dutch islands. The amount of information provided on the general biology of each species is quite variable (e.g. 4 pages on Greater Flamingo, *Phoenicopterus ruber*, as compared with one small paragraph on a sight record of Bulwer's Petrel, *Bulweria bulwerii*), reflecting both the species' abundance and previous literature. The species accounts contain some valuable basic biology plus numerous references to the Dutch Caribbean literature, certainly useful for anyone interested in Caribbean birds.

The information on species occurrences is of particular interest to those concerned with avian dispersal and island colonization. Although there is no way to control adequately for observer bias (e.g. European "search images" may account for eight Leeward records of Lesser Black-backed Gulls, *Larus fuscus*, and two Northern Wheatears, *Oenanthe oenanthe*), the records of South American vagrants on the Dutch Leewards may still be used to illustrate an important point. Only 20 vagrant species of land birds from South America (Columbiformes through Passeriformes) in 12 families have been recorded from the Dutch Leewards (a total of 44 South American vagrant species in all). This is a rather low number of South American vagrants when compared with potential colonists (990 species and 42 families, Columbiformes through Passeriformes) from nearby Venezuela (ca. 30 km from Aruba). With the exception of Steatornithidae and Alcedinidae, the remaining 10 vagrant families are common throughout the West Indies. Such low dispersal rates are contrary to Lack's hypothesis (1976. Island biology illustrated by the land birds of Jamaica. Oxford, Blackwell Scientific Publications) that birds behave like spores and hence dispersal is not a limiting factor for a species' presence on an island. These valuable observations of South American vagrants recorded by Voous and his colleagues are consistent with the hypothesis that species differ substantially in their dispersal abilities and, hence, island bird communities may partially reflect these dispersal differences.

This book will be indispensable to any bird watcher visiting the Netherlands Antilles. A guide to good birding locations and frequently encountered species is included along with a description of the climate and vegetation for each island. In addition, there are 21 color and 6 black-and-white plates depicting 145 of the 252 described species. Unfortunately, the plates are not always in phylogenetic order, nor are page numbers for the species accounts included with the pictures, making it necessary for the reader to refer to the index for each species description. The paintings by H. J. Slijper are variable in quality, ranging from poor bill/head or head/body proportions in tremblers, thrashers, and doves (plate 18) to some very fine plates of egrets and herons (plates 4, 5, 6). Despite the variable quality of the plates, one should have no problems identifying most of the resident island birds by referring to the illustrations, although a visitor might wish to bring a North American field guide for identification of difficult migrant species such as peep sandpipers and terns.

I think Voous has done a commendable job, and would recommend his book to anyone planning to visit the Dutch islands or as a valuable reference to Caribbean birds. The overall quality of the book is high, with very few typographical errors. It has a truly hard cover and a sewn binding and should survive rigorous field use. The author has promised a Papiamento edition in the near future, which may assist avian conservation efforts on these rapidly developing islands.—JOSEPH M. WUNDERLE, JR.

A field guide to the birds of Puerto Rico and the Virgin Islands.—Herbert A. Raffaele. 1983. Fondo Educativo Interamericano, San Juan, 253 pp. Obtainable from Addison-Wesley Publishing Co., Inc., Jacob Way, Reading, Ma. 01867, paperback. ISBN 0-201-06191-0 $13.95.—This is a comprehensive and up-to-date guide written by an author whose field experience in the region is unsurpassed. Of particular usefulness is the thorough accounting of feral exotic species, especially finches and parrots, that have become established on Puerto Rico in recent years. Raffaele gives accounts of 37 such species (at least 32 of them known breeders). Populations of some now number in the thousands, and in disturbed areas the casual visitor is now almost as likely to see exotics as he is native species, much as in Hawaii. Attempting to track these species down with guides available up to now is a hopeless task.

From my own limited experience with Puerto Rican birds I find no glaring errors in this guide and am particularly pleased with its well-conceived organization, which should make it an essential item for anyone interested in birds of the region. An introductory section defines terms, reviews the composition of the avifauna, indicates field hazards such as schistosomiasis, summarizes the biogeography of the islands, and thoroughly discusses conservation of the more threatened species. Following the introductory materials are well-executed plates of the species found in the region by Cindy J. House and John Wiessinger. Twenty-four of the plates are in color and 16 are in black-and-white. Endemic species are given special attention, and all of these, except the Puerto Rican Whip-poor-will (*Caprimulgus noctitherus*), are illustrated in color. Of special interest are full-page color plates of the Puerto Rican Lizard

Cuckoo (*Saurothera vieilloti*), Puerto Rican Woodpecker (*Melanerpes portoricensis*), Puerto Rican Tody (*Todus mexicanus*), and Puerto Rican Parrot (*Amazona vittata*), which are particularly well done.

The species-account section that follows the plates is not organized taxonomically, but conveniently groups birds into flying seabirds; large, long-legged birds (mostly waders); medium and small, long-legged birds (mostly waders); swimming birds; birds of prey; and land birds. This division seems to work well and to be especially suited to the nonprofessional. The depth of detail on individual species found in this section, especially as regards seasonal and precise geographic occurrence, is exemplary.

After the species-account section are lists of vagrants and unestablished exotics, a description of seven outstanding places to find birds in the region, a locality check list indicating where the species considered in the text can be found, and an index.

My only criticism of this guide, and it is a minor one, is that it would have been useful if page numbers of species accounts could have been listed beside species names in the plates section, as it sometimes takes a bit of hunting, or alternatively a trip to the index, to find the species accounts of birds that one has zeroed in on in the plates (page numbers of plates are given with the species accounts). Altogether this is a first-rate field guide.—NOEL F. R. SNYDER.

Breeding birds of Ontario: nidiology and distribution. Volume 1: Nonpasserines.—G. K. Peck and R. D. James. 1983. Toronto, Royal Ontario Museum. 321 pp., 170 fig. (142 maps), 37 illustrations. $25 Cdn.—Ontario covers a huge area of over one million square kilometers, being 1,624 km from east to west and 1,736 km north to south. From fresh-water marshes and deciduous (Carolinean) forests along the north shores of Lakes Erie and Ontario to the salt marshes and tundra of the Hudson and James Bay coasts, Ontario contains a wide variety of habitats home to over 280 breeding species. This book is an ambitious documentation of the distribution and aspects of the nidiology of the province's 143 breeding nonpasserines up to 1980. Information presented is a summary of the data contributed to the 24-yr-old Ontario Nest Record Scheme; where necessary to fill in gaps in the ONRS data base, other published and unpublished sources have been used. The remainder of the scheme's 80,000 records will be summarized in a future complementary volume on passerines.

Thoughtful formatting has created a visually appealing package, making the book more than a documentation of data. The layout is airy and attractive, thanks in part to Ross James' occasional sketches, which add a certain charm to what is basically a reference text. Two pages are devoted to each species, one page of text and a full-page map. Aspects of nidiology covered include the number of record cards for the species in the ONRS, breeding habitats, nest locations, nest positions, nest heights, nest constructions, nest materials, nest sizes, clutch sizes, average clutch ranges, incubation periods, and egg dates. An impressive volume of valuable data is summarized in the book. Because of the nature of nest record cards, upon which incomplete information is often unavoidable, the authors assist us in interpreting the results by presenting averaged nest heights, nest sizes, clutch sizes, incubation periods, and egg dates. Habitats, nest positions, tree and plant types, and nest materials are listed in order of frequency of usage, adding considerably to the value of this information. The presentation of data for colonial birds is somewhat confusing, because the number of records at the ONRS is presented instead of the actual number of colonies. Therefore, the White Pelican appears to breed in 33 locations when the scheme actually has multiple records of the province's one or, more recently, two pelican colonies. The maps and text help to reduce this minor confusion.

As the authors admit, using nest-record-scheme data to plot breeding distribution often indicates the distribution of the observers rather than the species, and to some extent this can be a valid criticism of the maps in the book. On the maps, symbols indicate whether or not a record was substantiated with a specimen or photograph, and whether or not the nesting or breeding evidence at that location was only historical. In the southern, relatively heavily populated portion of the province, distribution is shown by symbols placed in each of the political "regions" in which the species has bred. For northern Ontario each record is plotted individually using the same symbols. A paragraph of text accompanies each map and expands briefly upon the range and history of the species, providing an essential supplement to the maps. In northern Ontario, much of which is without road or rail access, information is sometimes unavoidably scant, and the explanatory text must be relied upon to flesh out details of each species' range in this area. The maps produce a general picture of each species' range, particularly in southern Ontario, which will be interesting to compare to the more detailed maps soon to be available through the breeding bird atlas project.

An additional feature that will be of value to field workers and visitors is the section containing 42 photographs of birds and habitats representative of the different forest and physiographic regions of the province.

As a reference work this book deserves a place in university, museum, and many personal libraries. Its main strength is the enormous data base of nidiological information, which will be useful to researchers in a variety of ornithological fields. Habitat and nest-location data will be of particular and immediate value to those in northeastern North America who are presently participating in other nest record

schemes or in breeding bird atlas projects. The large size of the book (18 × 25 cm) makes it a somewhat bulky field reference, but personal experience has shown it to be worth the effort. The price, which seems a little high, may reduce its appeal to nonprofessional ornithologists.—MICHAEL D. CADMAN.

Breeding biology of the Adelie Penguin.—D. G. Ainley, R. E. LeResche, and W. J. L. Sladen. 1983. Berkeley, California, University of California Press. xii + 244 pp, 15 halftones. $27.50.—Book titles should be brief, but not so brief that they become misleading. An honest title to this book would have been "The effect of age and experience on the breeding biology of a bird: the Adelie Penguin at Cape Crozier."

Penguins are physically ideal subjects for studies of the effect of age and experience upon avian biology. They are flightless and so easily caught, and are large and so can take a band that is easily monitored. Most breed colonially in the open so that large numbers can be monitored with ease, and in all species initial breeding attempts are deferred for a year or more. There have been two previous long-term studies concerning the effect of age on penguin biology. Richdale has presented data based on a 19-yr study of the Yellow-eyed Penguin (*Megadyptes antipodes*) in New Zealand. The results of an Australian study by Carrick on the so called "Royal" form of the Macaroni Penguin (*Eudyptes chrysolophus*) at Macquarie Island have been presented in only a brief summarized form. Other studies are underway in Australia, South Africa, and South America.

In this research monograph, Ainley, LeResche, and Sladen present the results of a 21-yr study involving repeated recoveries of almost 5,000 individually marked birds. This book is admirable in that it combines a huge body of data, detailed in no less than 103 tables, with a simply written and very concise text.

The first two short chapters introduce the topic of age and experience and give details of the study area (but nothing on the climatic regime) and methods, and provide definitions of 35 terms used in the text. The following seven chapters, most of which have a summary/synthesis, present the "results." Chapters 3 to 6 consider processes preliminary to breeding: the age at which birds first return to the colony, the date of return in each season, the activities of prebreeding birds, breeding behavior, and the age of first breeding. Chapters 7 and 8 consider the activities of breeding and the factors other than age that affect breeding success. The demography of the Cape Crozier population is the subject of Chapter 9. The tenth chapter discusses the results.

In this study, the most detailed long-term study of marked birds yet summarized, the authors succeed in their aim to provide good evidence that age and, to a lesser extent, experience have a significant effect on Adelie Penguin breeding biology. They demonstrate 27 factors that vary with age in the Adelie Penguin: individual arrival dates at the colony; ability to overcome difficulties of travel to the colony, individual body weight and fat level at arrival, the time spent in the colony during the breeding season, the number of visits to the colony, activities at the colony, the frequency of displaying, facility of social interactions, breeding incidence, the time between arrival and laying, the date of laying, nest quality, nest location within the colony, clutch size, incubation routine, duration of feeding trips, egg loss, the proportion of eggs that are addled, the number of eggs hatched, nestling survival, the age at which chicks are left unguarded, fledging success, the weight at fledging, site and mate fidelity, feeding proficiency, and survivorship. Neither the duration of incubation nor the interval between the laying and loss of eggs was related to age. The principal factor other than age that affected Adelie Penguin breeding biology was wind: strong winds are required to break up the pack-ice and make travel between the colonies and the feeding grounds easier, and not until its speed was above 140 mph did wind begin to cause casualties. The authors report no effects due to low temperatures. Peripheral sites were not markedly less productive than central sites. Researcher activity had no significant effect on productivity but did seem to affect recruitment, so there was a decline in the studied populations.

Ainley et al. estimate that Adelie Penguins spend 90% of their lives at sea. The skills required to find and capture food in and around the pack-ice and to avoid marine predators take time to acquire, and the authors show that at-sea survival increases with age and experience. After "fledging," young penguins do not land at breeding colonies until they have developed sufficient skills at sea to acquire adequate food reserves to withstand a period of fasting ashore. The youngest birds return 2 yr after hatching, but some birds do not return until they are 8 yr old. Once ashore at a colony the young bird has to learn the topography of the colony and has to develop the social skills that enable it to settle among many other individuals and to acquire a mate.

At Cape Crozier (latitude 77°20'S) Adelie Penguins are faced with a short breeding season during which food at sea is generally ample. Weather-influenced movements of pack-ice, however, can irregularly delay movement between the breeding and feeding areas. Successful breeding is markedly affected by the individual's at-sea skills in obtaining sufficient food for fasting ashore and its skills in negotiating its way through or over pack-ice, its social skills in being able to acquire a mate soon after the initial seasonal return to the colony, and by the pairs' ability to coordinate their actions through the breeding cycle.

Adelie Penguins readily change partners. The authors suggest that this is because, with such a short breeding season, it is more effective to mate with a bird whose arrival was synchronous than to await the arrival of the previous partner. The authors demonstrate effectively that first breeding is not delayed by a bird's inability to breed but rather by the time required for it to develop feeding and travel proficiency, and by its need for at least one season ashore in order to become proficient in social skills. They also suggest that females breed when younger than males because females have a lower survival rate and thus face reduced competition for a superabundant resource (availability of males). Their least convincing argument is that Adelie Penguins must lay two eggs to compensate for predation pressures. Two-egg clutches are standard in all penguins except *Aptenodytes*, irrespective of varied predation pressures.

The authors conclude that, now that the breeding biology of Adelie Penguins has been made less speculative, "an exciting opportunity exists to learn further . . . all that is needed is some additional long-term research." At this point it is tempting to consider the cost-effectiveness of their efforts with those of Richdale, whose 19-yr study of the Yellow-eyed Penguin was carried out during his spare time. Money for long-term research might be better applied to the study of less well-known species of penguins in order to increase our comparative data. Nevertheless, the results of this study have at least been adequately published, unlike the unfortunate case of the Australian study at Macquarie Island.

It is not clear to me to whom this book is addressed. It is unusual to find so many results tables presented in a book, and one suspects that this work could have been more cheaply available to its most obvious audience, postgraduate researchers, if produced as a research monograph in one of the established series, but that it was produced in book form to impress past and potential funders of Adelie Penguin research. This book can, and probably should, be read at two quite separate levels. Most potential readers will be satisfied by reading the two introductory chapters, the introductions and summaries/syntheses of each results chapter, and the final discussion chapter. These can be read rapidly and provide a succinct account of the authors' findings and opinions. This excercise can be recommended to all interested in the effects of age and experience upon avian breeding biology. Those with deeper interests or problems can then delve into the results chapters in full.

I found no glaring ommisions or typographical errors. The most serious fault I found with this book was its misleading title. With a book of this title, the prospective reader could reasonably expect at least a more comprehensive summary of the species' ecology and have some anticipation of comparison of the breeding biology of this high-latitude species with that of more typical, lower-latitude penguins. Anyone with such expectations will be disappointed by this book. There is not even a map of the world distribution of this species, although Figure 1 could easily present such information, and the index lists only five other species of penguins, three of which are mentioned only once.—ANTHONY J. WILLIAMS.

The amateur naturalist.—Gerald Durrell. 1982. New York. Alfred A. Knopf. 320 pp., 67 color plates and hundreds of black-and-white and color illustrations. ISBN 0-394-53390-9. $22.50.—From early boyhood in India, Greece, and England, Durrell was fascinated by the natural world around him. From land and water he collected plants and animals of all sizes down to the microscopic. Help from books was scanty, and now, with help from his American wife Lee, he has set out to write the kind of guide he wishes he had had as a beginner.

In suggesting subjects within the reach of the amateur, he devotes separate chapters to environments accessible to different people, starting with human habitations and continuing through 17 categories. In addition, one important section of 45 pages deals with equipment and methods used in studying and keeping live and preserved specimens.

The book is exceptionally well made. The paper and binding are excellent, and the typography is outstanding. Many of the color plates are spectacular. Some of the paintings and photographs are close-up portraits of individual animals, and some are montages of the elements of selected environments. Also, every page of text is adorned with marginal illustrations, often in color. In view of these features, the book is inexpensive.

With its attractive illustrations, it might be a coffee-table exhibit, but it is much more than that. Although his style is popular, Durrell consistently looks beneath the appearances of things to find their significance. His accounts are embellished with tidbits of information from an amazing range of topics gleaned from personal experience on six continents. It is not all light narrative, however. In a section on taxonomy, he presents a brief illustrated discussion of each kingdom, and among the higher animals, each class. Although a life-long collector himself, his message carries a strong conservation theme throughout. A glossary and index are provided.

Generally, his point of view and information are good. He intended to present a broad panorama of nature in a volume of handbook size, and he has done it. Of course, in giving us a little about everything, he has not told as much as some of us would like about our specialties. For example, he dismisses the preparation of birdskins in two sentences (p. 269). He tells how to clean and store fragments of egg-

shells (pp. 269–270), but not how to clean and store complete eggshells.

I was intrigued with his chapter on the wildlife environment in and around the home. Others will enjoy his picture of more exotic environments, like the tropical forest. I was least satisfied with his description of the tundra, a part of the world he may not have visited. He misses the clean "mountaintop" feel of the arctic, the brilliant flowering of the landscape in summer, and the vast differences from the wet lowlands to the dry uplands. He may have revealed that the Far North was not his familiar turf when he stated that the land bridge across the Bering Strait was laid bare by the shrinking of the continental glacier (p. 131), whereas, in truth, it was laid bare by the lowering of ocean levels as a result of the piling up of water in ice on land.

I noted few outright errors, and some appeared to be mere slips of the pen, as when he placed "redwoods" instead of redbuds in the southern Appalachians (p. 106). Sober scientists may wince when he defines gallinaceous birds as "game birds" (p. 82), or when he seems to attribute true ventriloquism to a cicada (p. 150). People within the range of the bird in question may have to go to their dictionaries to find that the "scissorbill" (p. 178) is the Black Skimmer.

This book might be a stimulating gift to a young naturalist and also a useful item for community libraries.—HAROLD F. MAYFIELD.

Die Seeadler (The sea-eagles).—Wolfgang Fischer. 1982. Wittenberg Lutherstadt, A. Ziemsen Verlag. 192 pp., numerous photographs and figures. About $5.00, paper.—The primary value of this book is that it places between two covers a good summary of much of the available information on all eight species of sea-eagles. About 15% of the text is devoted to a general introduction to the genus *Haliaeetus*, brief chapters on population declines and conservation, sea-eagles in zoos, and even a page on heraldry. The remaining text is devoted to species accounts, of which just over half is devoted to the White-tailed Eagle (*H. albicilla*). For those who find English easier to read than German, it is instructive to compare Fischer's account with that of Cramp and Simmons (1980) in their "Handbook of the Birds of Europe, the Middle East, and North Africa."

Fischer's account is considerably longer than that of Cramp and Simmons: 35 vs. 9 figures and about three times as much verbiage. Cramp and Simmons exceed only in colored illustrations of paintings of the species (6, to 1 for Fischer) and also exceed the latter in artistic quality. However, 28 of Fischer's illustrations are photographs and all of these are poorly reproduced (as is generically typical of books produced in East Germany). Few, if any, of the photographs are worth the proverbial "thousand words." In contrast, three of the four line drawings in Cramp and Simmons are quite instructive, as are the two sonagrams. The two distributional maps in Cramp and Simmons are easier to comprehend than the three in Fischer, and the former present greater detail on breeding distribution in Europe than the latter.

Although one can glean bits of interesting information from Fischer that cannot be found in Cramp and Simmons, the primary difference is that the former tends to present information, often in considerable detail, while the latter summarize, often tersely. Even though I read German almost as easily as English, I prefer Cramp and Simmons. In a few cases there is actually more useful information in Cramp and Simmons than in Fischer. This is true of sections on courtship behavior, vocalizations, and measurements and weights. In the latter, Cramp and Simmons present standard deviations and statistically significant differences; Fischer provides only means and extremes.

Fischer, however, does provide useful bits of information not in Cramp and Simmons and not readily available elsewhere. I found it interesting that not only is nest building virtually a year-round activity in North Germany, but that greenery was observed being delivered to a nest in September, even though egg laying does not start until late February or March. Other samples: During their first few days of life young are fed hourly, and over a period of 8–12 min they are fed 4–8 pieces of meat. At 6 days the interval between feedings is 2 h, the young actively reach for the food, and conflicts between young occur frequently. Details on use of the same or alternate nests are presented for several pairs; one pair used 6 different nests, 2 of them only once, and another used the same nest for 5 consecutive years. Scavengers (e.g. kites and crows) often nest near the eagles and pick up uneaten prey remains.

The best source of information on the African Fish Eagle (*H. vocifer*) should be Leslie Brown's (1980) "The African Fish Eagle." I was unable to obtain a copy of this book, and thus will compare Fischer with Brown, Urban, and Newman (1982), "The Birds of Africa." Again, the illustrations in Fischer are inferior and the distributional map less detailed than in Brown et al. In the verbal accounts, I prefer Fischer to Brown, who is responsible for the account in Brown et al. Brown is too sweeping and qualitative in his account. I also note some discrepancies between the two and generally I favor Fischer (which is surprising, as many of the data have been gathered by Brown). For example, Brown states that the clutch size is ". . . 1–3, usually 2 . . . Sibling aggression less violent than in some other eagles, but older usually eliminates younger by c. day 10 . . . single eaglets may fledge before broods of two or more; 3 occasionally reared (2 cases in 140 Kenya records)." Fischer gives the average

clutch size as 1.93, and an average of 1.29 young fledged per successful pair can be calculated from data in his Fig. 84. If we assume that all eggs are fertile, and all losses are due to sibling aggression, we can obtain an estimate of 0.33 young per nest killed by their siblings. This estimate is certainly high, and any other ways of looking at the data hardly suggest that fratricide "usually" occurs. I believe that Fischer is correct in noting that fratricide has been seldom recorded in this species.

The 21 pages devoted to the Bald Eagle (*H. leucocephalus*) treat the species rather superficially and rely a bit too heavily on secondary sources. Much has been published on the Bald Eagle in recent years and Fischer provides a reasonably representative but far from exhaustive review. The representation is spotty, giving relatively minute details of, e.g. distribution and abundance for some areas with extremely superficial mention of others. I would not recommend the chapter on this species as a prime source of information. Other reviews of the biology of the species, however, are quite old, and Fischer is as good or better than anything else available.

The accounts of the remaining five species are, on the average, slightly more detailed and informative than the accounts in Brown and Amadon (1968) "Eagles, hawks and falcons of the World." Overall, Fischer's book is a good place to start looking for information about sea-eagles, and deserves a place on the bookshelf of any raptor enthusiast who can read German.—HELMUT C. MUELLER.

The grouse of the World.—Paul A. Johnsgard. 1983. Lincoln, Nebraska, University of Nebraska Press. xvi + 413 pp., 72 black-and-white and 50 color photos, 1 color plate, 31 black-and-white figures, 15 distribution maps, and 24 tables. ISBN-0-8032-2558-X. $42.50.—Paul Johnsgard is a prolific writer with broad interests. His titles include such diversity as "Cranes of the World" and "Hummingbirds of the World." "The grouse of the World" is his seventeenth book. Writers who can walk the line between scientists and laymen without being patronizing to one or the other are rare. Johnsgard has this ability, and he writes well.

Johnsgard's main research has been in the area of waterfowl behavior; two of his first three books dealt with this group. His fourth book, "Grouse and quails of North America," was published in 1973. I find it impossible to consider his new book on grouse without reference to the latter work, which I henceforth will refer to as "Grouse and quails."

"Grouse and quails" was a welcome addition to the literature and was eagerly awaited by biologists studying these birds. Although this book considered two groups outside Johnsgard's research specialities, it has been well received and widely quoted. It received thoughtful and generally favorable reviews from Bendell (1975, J. Wildl. Mgmt. 32: 231) and Lumsden (1974, Wilson Bull. 86: 190) and won Johnsgard the annual Terrestrial Publication Award of The Wildlife Society in 1974.

"Grouse of the World" follows the same format as the earlier work. Part I (so designated in "Grouse and quails" but not in "Grouse of the World") is a comparative biology of the grouse and consists of 10 chapters (106 pp.). Part II consists of 16 chapters (252 pp.), each of which is an account of an individual species. Three appendices consider 1) name derivations of grouse and ptarmigans, 2) a key to identification of grouse and ptarmigan species, and 3) hunter harvest and population status estimates of grouse and ptarmigan.

Those who have "Grouse and quails" likely will be disappointed with most of Part I. Although "Nearly all of these sections from the earlier book were extensively reworked . . ." (xv), the main revisions in the text of the new book are deletions of references to quail. Most of the text is nearly verbatim from the earlier book, with occasional changes in syntax, or additions of new references, sentences, or short paragraphs. Nine of the 10 chapters have the same titles as in Part I of "Grouse and quails." Only minimal references to Eurasian species are included and most of them were in the earlier work. The one "new chapter," Physiological Traits, is composed mainly of sections taken from other chapters in "Grouse and quails." Perhaps the most important new contribution in Part I is the compilation of tabular data that now compare all grouse with respect to such things as adult weights, clutch sizes, and mortality rates. More interpretation of these data would have made them more meaningful. Tabular data are updated more fully than is the text, but the majority of references are still pre-1971.

Most new pen-and-ink drawings in Part I are well executed and add to its usefulness, but one (Fig. 6) seems a step backward. This figure compares the downy young of all grouse. Because of individual variation within species, it would be very difficult to use this monochromatic figure for identification of chicks. A color plate of North American downies, as in "Grouse and quails," and as for Eurasian downies in the present work (Plate 51), would have been much more valuable.

Johnsgard continues to espouse Short's (1967, Amer. Mus. Novitates, 2289: 1) suggestion that the "superspecies" sharp-winged/spruce grouse is most like the ancestral form of grouse. In the text he proposes forest or forest/grassland edge as the original habitat of grouse. Yet, he presents a new phylogenetic tree (Fig. 1) that suggests two major points that conflict with this interpretation: 1) a North American, grassland origin of the grouse, and 2) a subsequent radiation into forest, thence tundra, habitats. I feel much more comfortable with the latter scenario than with that

proposed in the text. But the truth may never be known without adequate fossil evidence.

There are few new ideas or proposals in Part I, especially when one considers the large amount of new literature since publication of "Grouse and quails." Most of the earlier generalizations persist and some continue to be tenuous (see the earlier reviews by Bendell and Lumsden).

Part II consists of 7 accounts of North American species, 7 of Eurasian species, and 2 that consider the circumpolar Willow and Rock ptarmigans. Treatments of North American grouse and the Rock Ptarmigan, especially, have received only minor revisions from those in "Grouse and quails"; much of the text is virtually word for word from the earlier work, as in Part I. A rather large number of recent Fenno-Scandian publications on Willow Grouse seem to have been missed.

New accounts of Eurasian species consider the Sharp-winged Grouse, Capercaillie, Black-billed Capercaillie, Black Grouse, Caucasian Black Grouse, Hazel Grouse, and Black-breasted Hazel Grouse. Sections on the Hazel Grouse were prepared in large part by E. O. Höhn.

Chapters treating Eurasian species follow the same format as for North American species in this and the earlier work. Except for the Capercaillie and Black Grouse, the accounts tend to be shorter than those for North American forms, in large part a reflection of a paucity of information for some species (e.g. the Sharp-winged Grouse, Black-billed Capercaillie, and Black-breasted Hazel Grouse). As in "Grouse and quails," the most thoroughly documented aspects of life history are those on reproductive biology and behavior, areas of special interest to Johnsgard. For most species, other major topics include taxonomy to the subspecific level, measurements and identification, distribution and habitat, population density, habitat requirements, food and foraging behavior, mobility and movements, and evolutionary relationships. The greatest synthesis among species is in the sections on evolutionary relationships. Sections entitled *habitat requirements* might better be labelled *habitat use*, for use does not necessarily equal need. Only with careful comparisons or experiments can one hope to determine habitat requirements, and we know there is considerable plasticity in the kinds of habitats used by a number of species.

Overall, species accounts are clearly written and provide useful summations of the natural history of the various grouse. Perhaps the most frustrating aspect of these chapters is that Johnsgard does not use consistent units of measurements. One may find population densities expressed as acres/bird, birds/acre, birds/100 acres, birds/square mile, square miles/bird, birds/square kilometer (100 ha), or birds/1,000 ha. Measurements may be expressed in either mm or inches in the same paragraph.

"Grouse of the World" has only a few typographical errors. Numerous black-and-white and color photographs vary in quality from a few that are very good, to most that are average or good, to some that are poor. Some of this variation may be a result of reproduction, but in some cases better photos are available. This book has many more pen-and-ink drawings than the earlier work. Most illustrate behaviors, are nicely drawn, and enhance both the aesthetic and scientific values of the book.

I noted few obvious errors. Considering Johnsgard's background, the enormous tasks he has taken upon himself (13 books in the last 10 yr), and his wide range of interests and abilities, the product is good. However, it likely would have benefited from having the different chapters submitted to specialists for review. A better update, especially of North American literature, also would have increased its value. As noted by Bendell and Lumsden in their reviews of "Grouse and quails," a detailed index would have made this book a more easily used reference work. The production of such an index should be a relatively simple task with today's computer technology.

Despite its shortcomings, the publication of this book is a valuable service to general ornithologists, naturalists, and tetraonophiles. Its main value to theoreticians will be as a source of reference material. My copy of "Grouse and quails" is well worn and I am sure that "Grouse of the World" will receive the same intensity of use. This book should find a home in many private, and in most reference, libraries. For those who do not have "Grouse and quails" and whose main interests are with grouse, "Grouse of the World" will suffice.—FRED C. ZWICKEL.

Life history studies of woodpeckers of eastern North America.—Lawrence Kilham. 1983. Publications Nuttall Ornithol. Club No. 20. vii + 240 pp., color frontispiece, 58 text figures and photographs. (order from the club, % Museum Compar. Zool., Harvard Univ., Cambridge, MA 02138). $19.00.—The author, a retired microbiologist, is well known for his many publications over 25 yr, mainly treating woodpeckers of eastern North America. This volume summarizes and to some degree extends his previously published studies of woodpeckers. It is basically a personal record of the author's observations in the field and in aviaries. The observations are of particular value, as the volume shows no evidence of a thorough search of the literature nor bases for what have to be considered subjective interpretations resulting from observations often of a few birds or pairs in but one or several localities. Studies over a broader geographical area, and particularly of different subspecies, are needed, as well as a more rigorous interpretive analysis of the results, to put the observational data into perspective.

An all-too-brief 2 pages of Introduction provide no insight into the behavioral frame of reference of the author. The main text treats the Downy Woodpecker in 34 pages, Hairy Woodpecker in 40 pages, Black-backed Woodpecker in only 6 pages, Pileated Woodpecker in 32 pages, Red-headed Woodpecker in 16 pages, Red-bellied Woodpecker in 22 pages, Yellow-bellied Sapsucker in 26 pages, Northern Flicker in 18 pages, Crimson-crested and Pale-billed woodpeckers in 10 pages (in place of their North American relative, the probably extinct Ivory-billed Woodpecker!), aspects of behavior and morphology in 16 pages, and summary and conclusions in 12 pages. Appendices give brief but informative data on raising and care of captive woodpeckers (a hint, not mentioned, is use of dog meal, which I have found a very effective food for captive picids), and the scientific names of animals and plants mentioned in the book. The frontispiece is a rather amateurish rendering of a female Pileated Woodpecker. The photographs generally are good and useful, as are the many line drawings (by the author's wife, Jane), although it is unfortunate that the latter must be regarded only as suggestive. Drawings traced from movies or still photographs (see e.g. Short, 1971, Bull. Amer. Mus. Nat. Hist. 145: 73) illustrate displays with more accuracy and less subjectivity.

The accounts vary in the amount of coverage, as suggested by the varied space alloted to them, depending upon the author's experiences. Longer accounts, such as that of the Hairy Woodpecker, are full of diverse material on everything from stress to foraging behavior. A plus is the list of contents for each species' account. Unfortunately, many reflections and even whole sections are clouded by the lack of a conceptual framework. "Conflict" is used in many ways, and the author seems unwilling or unable to accept simultaneous occurrence of conflicting tendencies (e.g. reproductive and agonistic). One account category is "contentment," "play" is used often, as is "dance" for certain displays, all with strong anthropomorphic overtones that leave a scientist a bit queasy. Facts are sometimes stretched, as when the sexual difference between male and female Downy Woodpeckers in bill length, a difference of up to 10% with some overlap, is stated (p. 38) to "almost puts them ... in a class with the extinct Huias of New Zealand"! Some agonistic conflicts are "colorful affairs" (p. 123). In Northern Flickers, the females are noted as "leaders," based upon observations on greater female "interest" in feeding young at four nests and upon one late-nesting pair in which the female performed most of the excavating and incubating (but males arrive ahead of females in the spring, usually begin excavation and conduct most of it, and invariably incubate all night, every night!). In the summary and conclusions is a section "which of a pair is stronger?" that discusses this ambiguous question purely in physical, rather than behavioral-physiological, terms.

In view of the amount of detail presented for Downy and Hairy woodpeckers, one is struck by the lack of comparisons of the congeners and the failure to bring in relevant comparative information from the works of Blume and other European students of *Picoides*, and to put vocal communication in anything like the context provided for that genus by Winkler and Short (1978, Bull. Amer. Mus. Nat. Hist. 160: 1). In contrast, without substantiating background, we find that the early breeding behavior of congeneric Red-headed and Red-bellied woodpeckers "is practically identical" (p. 121).

Without conceptual behavioral bases the odd array of items in the summary and conclusions ("relation of territorial to courtship behavior," "limits to fighting," "scaling of behavior," "flexible role of females," and "quiet agreement") is difficult to "digest" except straightforwardly, as results of the author's extensive observations.

There is plenty of "meat" in this book, much of which, the reader should be aware, is (directly or paraphrased) from the author's other publications, some material even being reprinted herein. Many of the figures also are "repeats," some in larger scale than originally. There is also new material obtained more recently for most species, and even new figures that have no woodpeckers in them (e.g. Collared Aracaris at an appropriated nest of Crimson-crested Woodpeckers, p. 198). There is a section on black-crowned morphs in female Yellow-bellied Sapsuckers, a subject treated in only four lines in the author's previous publication (1977, Wilson Bull. 89: 321); strangely, in 2 pages he omits an important detail. On page 215 he notes that 12 black-crowned morphs were found among New Hampshire female sapsuckers, and that, of seven nests found in 1967, females at three were "black morphs." One might infer up to 42% occurrence of the morph, but in the 1977 paper one finds the important fact that $n = 69$, so 17% is the more likely inference! It is disconcerting that, although his earlier publications are listed at the end of each chapter, there is no citation of earlier publication of material actually reprinted in the text—one has to cull his publications to check on this. I estimate that roughly 80–90% of the material in the book is repeated, paraphrased, or boiled down from previous articles.

All in all, this volume is a fitting climax to Kilham's arduous endeavors, and it renders results of his many scattered publications over the years readily available to everyone at a price better than the cost of copying all of them, and with up-to-date information on some species and topics. Of eastern woodpeckers, omitted or but mentioned briefly in relation to other species are the Red-cockaded and Three-toed woodpeckers, and of course, the Ivory-bill. The book

represents a bargain and is desirable for all institutional libraries and larger community libraries. All picophiles will require it. Amateurs and general readers will find in this volume examples of the contribution that can be made by diligent, patient observers. Would that we could clone such observers and place them strategically, in regard to the disappearing habitats in the world!—LESTER L. SHORT.

Animal behavior: an evolutionary approach. (Third edition).—John Alcock. 1984. Sunderland, Massachusetts. Sinauer Associates, Incorporated. 596 pp. ISBN 0-87893-021-3. $25.00.—The study of behavior from an evolutionary perspective has progressed rapidly over the last 20 yr. Much of this progress has been due to the development and tentative acceptance of a few working principles regarding the natural selection of behavioral traits. Some of these principles (loosely stated) are: (1) the unit of selection is the individual organism, (2) individuals behave so as to increase the number and survival of their offspring, and (3) there is a match between an animal's behavior and its environment. Such principles provide a theoretical framework within which predictions can be made about behavioral patterns. Because one can proceed logically from theory to prediction and because many of the predictions are testable, numerous scientists find the discipline intellectually stimulating and worthwhile. The relative ease with which new hypotheses and predictions can be generated from the basic principles sometimes results in more ideas than facts; this causes instability but also produces the vigor and excitement of a new and expanding field of study.

John Alcock's book is a widely used undergraduate text in this field. The fact that three editions have appeared in the last 9 yr attests to rapid progress in the discipline, the popularity of the book, and perhaps a need to remain competitive with a number of other recent books on the same general topic. Alcock's third edition differs considerably from earlier editions; most notably, a new chapter has been added on the development of behavior, reproductive behavior is treated more fully, and greater emphasis is placed on methodology. In addition, most other areas of the book appear to have been rewritten and updated, and many topics have been expanded.

As stated in the Preface, the book is divided broadly into two parts, the first dealing with "how" questions (proximate cause) and the second with "why" questions (ultimate function). This division, however, does not strongly compartmentalize the book, as the theme of evolution is present throughout. Chapter 1 introduces the reader to the principles of evolutionary behavior, to some of the methods used in the discipline, and to the contents and organization of the book.

Chapters 2 and 3 cover the genetics and development of behavior, respectively. The new chapter on development gives the reader an appreciation of the complexity and importance of behavioral ontogeny. This perspective increases the third edition's balance as compared to earlier editions. The material in both chapters is presented very clearly and simply; we believe that students with no college training in biology will be able to understand the concepts presented.

Chapter 4 deals with the modifiability of behavior. The author views behavior as a continuum ranging from "restricted" through "semi-restricted" to "flexible," depending upon the degree to which a given behavioral pattern is modified by developmental processes. The author attempts thereby to avoid a nature/nurture dichotomy. We believe that his approach has merit, but that it may not prevent some from merely substituting the terms "restricted" and "flexible" for "innate" and "learned," in which case little would be gained.

Chapters 5 and 6 outline the nervous and endocrine control of behavior. These chapters conclude the portion of the book dealing with behavioral causation.

Chapter 7 presents a preview of the chapters on behavioral ecology that follow. The author discusses at length how one can determine the adaptive significance (function) of behavior. To illustrate points, the author uses familiar examples, primarily from the mammalian and avian literature.

Chapter 8 is on the ecology of finding a place to live. Topics covered include habitat selection, homing, migration, and territoriality. Oddly, the author treats territoriality and home range as alternative modes of spatial organization, which would make it appear that an animal with a territory has no home range. More troublesome for instructors, perhaps, is the placement of the topic of territoriality in a chapter on habitat selection. From a conceptual standpoint, we would prefer to see territoriality, social rank, and agonistic behavior discussed together as social phenomena associated with resource allocation.

Chapters 9 and 10 discuss feeding and anti-predator behavior, respectively. The chapters are rich in examples from a variety of taxonomic groups, but there is little theoretical treatment aside from some basic coverage of optimal foraging strategies. Little or no information is given on such topics as patch and package size exploitation, prey switching, probability learning, and hedophagy.

Chapters 11 and 12, which deal with reproductive behavior, explore the sociobiological concepts of sexual selection, male and female mate choice, intrasexual competition, and mating systems. The cover-

age of these topics is perhaps the most thorough of any in the book.

Chapter 13 discusses the evolutionary history of behavioral patterns. The chapter begins by outlining how one might investigate evolutionary history and uses communication in various species to illustrate major points. Later in the chapter it becomes evident that the author is attempting to cover the topic of communication simply with these illustrations and supplementary material at the end of the chapter. Although communication is not treated in detail, coverage does range from an ethologist's view of conflict in displays to J. Krebs' Beau Geste hypothesis of deceit.

Chapter 14 deals with the evolution of societies and the costs and benefits of group living. Current sociobiological thinking is much in evidence in the author's discussion of such topics as helpers at the nest and eusociality in insects. The author relies strongly on kin selection to explain what appears to be cooperative or altruistic behavior. For example, the author chooses to emphasize the role of kin selection in the reproductive behavior of male lions and turkeys despite recent challenges (which the author does cite). Yet from his account, a reader still would not realize that the genetic relatedness of Rio Grande Turkey "brothers" was never known. We support Maynard Smith (1982, Current problems in sociobiology, King's College Sociobiology Group, p. 2) in thinking that the idea of kin selection has been overemphasized by sociobiologists at the expense of mutualism.

Chapter 15, the final chapter, places human behavior in an evolutionary perspective. The chapter is thought-provoking, although far from a model of science pursued with an eye toward falsification or strong inference. This is not a criticism of the book; it simply reflects the current status of the discipline on this topic.

As an undergraduate text, this book has important strengths. The author is an excellent writer, and his presentation is clear, lively, and in places colorful. (On page 179, for example, the author refers to cows as ". . . disgraceful animals that have consumed most of the vegetation in the western United States . . . ." Instructors should have an amusing time explaining this comment to students from the agricultural sciences!)

Alcock's book is replete with interesting examples of behavior drawn from a wide variety of organisms ranging from simple invertebrates to humans. This phylogenetic balance is especially evident in the first six chapters. Some students and instructors might prefer a greater number of vertebrate examples in subsequent sections of the book dealing with behavioral ecology. The emphasis on invertebrates here is understandable, however, in that these taxa appear to fit the adaptionist's paradigm better than vertebrates, the author is primarily an insect behaviorist, and invertebrates are more numerous and diverse than vertebrates.

Instructors may have some difficulty with the book's organization. The primary problem is that topics that should be grouped together are presented at scattered points throughout the book. For example, taste aversion and song dialects are discussed in Chapter 4 as examples of behaviors under various degrees of developmental control but do not appear in later sections on feeding or communication. This pattern is sufficiently common to necessitate that instructors carefully read the entire text and plan on what material to present when, before beginning the class. Ornithologists specifically may wish to add material on communication, social rank, individual distance, and agonistic behavior, as these topics are dealt with sparingly in the book.

In summary, we consider Alcock's third edition to be one of the better undergraduate texts on animal behavior from an evolutionary perspective. The clarity of the prose, level of presentation, and use of a wide variety of examples should keep students and informed nonstudents alike eager to learn even more about this fascinating topic.—DAVID F. BALPH AND MARTHA H. BALPH.

Behavior of fledgling Peregrines.—Steve K. Sherrod. 1983. Pioneer Impressions, Ft. Collins, Colorado (available from The Peregrine Fund, Inc., Ithaca, New York). xi + 202 pp., 23 tables, 59 figures. $10.00 (paper).—Parental care and the development of foraging skills by fledgling raptors is recognized as a critical period during the nesting cycle, but one that has been largely ignored until recently due to difficulties in monitoring both parents and young. In this book on fledgling Peregrines, Sherrod presents the results of 4 yr of research on the relationship between parents and offspring and on the ontogeny of hunting skills by both wild and hacked fledglings. It should be noted that monitoring fledgling Peregrines is difficult at best, particularly once their flying abilities are well developed, and that the time frame each year in which observations can be made is limited. The 2,390 field hours of observation that Sherrod made on wild and hacked Peregrines in Greenland (2 broods), Australia (2 broods), and the United States (3 broods), reflect the efforts made to monitor the behavior of these birds intensively.

In Chapter III, Sherrod presents data suggesting that the age at which young Peregrines fledge varies considerably and that many figures reported in the literature may significantly underestimate the length of the chick-rearing period. These discrepancies may have resulted from premature fledging caused by ob-

server disturbance or simply the sighting of young birds on cliffs at some distance from the nesting ledge. Sherrod's observations show that Peregrine nestlings can and do wander on foot along the nest cliff just prior to fledging. The most important point of this discussion, however, is that fledgling does not occur on any specific day, but is the result of a variety of factors such as developmental stage, brood size, sibling behavior, food supply, and adult behavior, and may vary considerably.

In his discussion of the period in which fledging occurs, Sherrod also considers the "luring behavior" exhibited by parents toward offspring about to fly for the first time. He contends that at least some of this behavior is related to the avoidance behavior shown by parents to their aggressive offspring late in chick-rearing. Every time adult Peregrines exhibited "luring behavior," the offspring showed great interest in the prey, and a food-transfer took place on the cliff or ledge immediately afterward. Sherrod concludes that food did not appear to be withheld from young about to fledge and that the apparent "luring behavior" may only be a reflection of the difficulty parents have in avoiding excessive aggression by the young during mealtime.

In Chapter IV and Appendix I, considerable detail is presented on the various perched and flight behaviors exhibited by fledgling Peregrines. What appear to be dressed-up field notes also are regularly interjected as supportive and illustrative material in this and other chapters. In most cases, these passages are useful and supportive of interpretations presented in the main text, although at times they are too lengthy and disrupt the discussion in the text.

A thorough and interesting review of play and its role in the development of hunting skills by fledgling Peregrines is presented at the end of Chapter IV. An analysis of the relative number of animate and inanimate objects pursued or "tagged" by fledglings is presented and discussed in relation to the structural diversity of the habitat in the natal area. Apparently Peregrine fledglings chase "anything that moves," but when insufficient numbers of avian prey are present, bushes, shrubs, and trees also stimulate the "pursuit and capture" behavior.

In Chapter VII, Sherrod discusses the behavior of parents and young in light of current evolutionary thought, particularly the concept of parent-offspring conflict. While the behavior exhibited by the falcons appears to conform to the predictions of Trivers (1974, Amer. Zool. 14: 249), the author at times tries overly hard to convince the reader that the data fit perfectly in this context. It seems clear to me that, to make such assertions, much more quantitative information is needed on parent-offspring interactions and the actual costs to the fitness of parents extending parental care into the fledging and migratory periods.

Line drawings are used throughout the book to illustrate and support the descriptions of Peregrine behavior. While these drawings are simple, they effectively highlight the behavioral acts of interest and are very useful. Those figures that are not line drawings, however, range from being overly simple with information that could have been presented as easily in the text (e.g. Figs. 25, 36) to overly detailed presentations of descriptive material (e.g. Figs. 27A, 27B, 39). In general, most figures illustrate interesting trends in the behavioral patterns of the falcons, but the typewritten legends and axis labels and the distracting patterns of shading used in the histograms detract from their appearance.

In each chapter there are references to further discussion in other parts of the book. This certainly reflects the inter-related nature of the various behaviors considered each chapter, but the use of cross-referencing seems excessive, particularly in Chapter VI, when the reader is directed to "see Chapter VI."

As I mentioned earlier, this book is the result of a large-scale research effort and describes in detail the post-fledging behavior of both wild and hacked falcons. The behavior of the hacked birds is well integrated with data from the wild falcons and provides many insightful observations of otherwise unobservable behaviors. Potential problems in the behavioral development among parentless Peregrines are discussed, although more consideration of the political and ecological issues surrounding hacking as well as cross-fostering endangered species would have been welcome.

Those particularly interested in Peregrine Falcons and falconry will find this book full of valuable descriptions of post-fledging behavior, and at a very reasonable price. Ornithologists interested in raptor behavior also will enjoy this work, although the frequent use of falconry terminology may at times be distracting. All things considered, Sherrod has produced a book addressing an aspect of avian breeding behavior and ecology that has not been given the attention it deserves, and he should be congratulated for his efforts.—MICHAEL W. COLLOPY.

Vertebrate circadian systems: structure and physiology.—Jurgen Aschoff, Serge Daan, and Gerard A. Groos (Eds.). 1982. New York, Springer Verlag. xiii + 363 pp., ISBN 0-387-11664-8. $56.00.—This book combines papers presented at a 1980 symposium in Schloss Ringberg with several recent invited contributions. The editors' aim was to provide an update on research in the circadian organization of higher vertebrates that supplemented two similar publications [Suda et al. (Eds.). 1979. Biological rhythms and their central mechanisms. Elsevier North Holland

Biomedical Press, and Aschoff, J. (Ed.). 1981. Biological rhythms. Handbook of behavioral neurobiology, vol. 4, New York, Plenum].

The term circadian was introduced in 1959 and, since then, endogenous rhythms have been found in avian locomotor activity, body temperature, food intake, and even *in vitro*, in isolated pineal cells. The persistence of these rhythms in the absence of environmental signals identifies them as circadian. The appropriate phase relationship between endogenous rhythms and ambient conditions is mediated through environmental entraining agents or "zeitgebers."

"Vertebrate circadian systems" comprises 37 short papers, divided into eight sections. The papers address aspects of the three following questions:

1) How are zeitgebers perceived by the organism and the sensory input transmitted to a central timer?
2) Where is (are) the central timer(s)?
3) How are differently phased rhythms coordinated by the timer(s)?

These are not questions posed by field ornithologists, and those who read only the major North American ornithological journals will not be familiar with the background literature. In the last 5 yr, only one paper in the *Auk*, *Condor*, or *Wilson Bulletin* was based on research of circadian rhythms. Four or five others looked at temporal phenomena on an annual basis. The literature on circadian systems is found in physiology journals or in recently published symposia proceedings [note the two cited earlier, as well as Tanabe et al. (Eds.). 1980. Biological rhythms in birds: neural and endocrine aspects. Tokyo, Japan Scientific Press, and Follett, B. K. and D. E. Follett (Eds.). 1981. Biological clocks in seasonal reproductive cycles. Bristol, England, Wright]. A nonphysiologist might find these symposia proceedings heavy going because the short contributions are highly specialized and rarely given a context through a summary chapter. "Vertebrate circadian systems" helps bridge this gap with 10 general contributions summarizing current research. Even so, before tackling the book I would recommend that general readers look at Eberhard Gwinner's review [Chapter 4 in Farner, D. S. & J. R. King (Eds.). 1975. Avian Biology, vol. 5, New York, Academic Press].

The contributions in sections one through four proceed from an examination of retinal and extraretinal photoreceptors to neurophysiological studies of the putative central timers—the Suprachiasmatic Nucleus (SCN) and the pineal gland. Sections five through seven deal with endocrine influences on neural oscillators, sleep wake rhythms, and photoperiodic control over circadian oscillators. Section eight provides general discussions of the adaptive value of circadian rhythms and some empirical demonstrations of their contribution to fitness. Most of the experimental work presented in the book is on mammalian systems. Of the 27 nonreview papers, only five deal exclusively with birds. There are few references to research on nonhomeothermic vertebrates.

There is considerable overlap between the ornithological material presented in this book and that found in Tanabe et al. (1980). New observations are given on the dual SCN—pineal pacemaker system in birds. Contributions by Kawamura and Takahashi show that both the SCN and the pineal are critical for the maintenance of normal circadian rhythmicity in several bird species. B. K. Follett updates Colin Pittendrigh's work (pp. 1–37 in Follett and Follett 1981) on the relationship between circadian rhythms and photoperiodic time measurement. The paper by E. Gwinner and J. Dittami summarizes recent work on the link between circannual cycles and circadian rhythmicity. An important contribution is by Serge Daan and Jurgen Aschoff on circadian contributions to survival. Drawing on recently published ornithological examples, they show that behaviors such as hunting and territorial advertisement have circadian or ultradian components critical to the success of the behavior. The lack of empirical confirmation of increased fitness from rhythmical versus arrhythmical behavior could involve more field ornithologists in studies of circadian phenomena.

From an editorial viewpoint, the book is adequate, the contributions short and generally readable. There are a series of disconcerting typos in the first 175 pages involving double quotes (e.g. instead of "zeitgebers," it appears as, „zeitgebers"). I found the book to be stimulating reading, initially because of the unexplained neurological variability shown in the class Aves but generally because of the need for empirical confirmation of laboratory observation.

While this book is probably on the bookshelves of most avian physiologists involved in research of circadian rhythms, it should also be consulted by others for a look at the review sections. I particularly recommend the sections focusing on functional aspects of circadian systems.—W. BRUCE MCGILLIVRAY.

Species limits in the Indigobirds (Ploceidae, Vidua) of West Africa: mouth mimicry and description of new species.—Robert B. Payne. 1982. Miscellaneous Publications of the Museum of Zoology, University of Michigan No. 162. 96 pp. No price given.—Earlier work of the author and others has shown that this group of small African ploceids consists of several species with little if any differences in the external morphology of adults (even in the male breeding plumage), each of which is brood parasite of a different species of firefinch (*Lagonosticta*). They are adapted to this parasitism by many characters, the most striking among the morphological ones being the replica of the complex, highly species-specific

mouth markings of the host's nestling in the young Indigobird. Another of these adaptations is behavioral: the learned imitation of the host's song repertoire by the displaying male Indigobird, which attracts female conspecifics. The student of these birds often has no other information but these imitations to determine to which species a male Indigobird belongs, but the character is not a reliable one: among some 400 South African males, Payne found two imitating the song of *Lagonosticta* species other than their normal host.

Nevertheless both categories of characters are used here, together with the more classical approach via measurements and plumage coloration, to revise West African Indigofinches. The fieldwork was done during five expeditions to various places in West Africa between 1968 and 1980. The songs of both Indigobirds and the host firefinches were recorded. The vocalizations of one of the latter, the Black-bellied Firefinch (*L. rara*), are given in audiospectrograms for the first time. Young Indigobirds were found in nests of five *Lagonosticta* species, but none of them could be reared, as had been done earlier in southern Africa, so the evidence that these nestlings were conspecific with the adult males imitating the song repertoire of their foster parents remains circumstantial.

Both the song imitations and the mouth markings of nestlings are thus not entirely satisfying elements of a species diagnosis. They form an essential part of Payne's descriptions of five West African Indigobirds, however, by sheer necessity, as only two of the latter (both widespread on the continent outside of West Africa) can be identified with certainty by characters of the male breeding plumage. The Village Indigobird (*V. chalybeata*), brood parasite of *L. senegala*, may be identified by its black flight feathers, and Wilson's Indigobird (*V. wilsoni*), which parasitizes *L. rufopicta*, is told by its purplish gloss. The other three species parasitizing *L. rara*, *L. larvata*, and *L. rubricata* are very similar: the male breeding plumages possess pale flight feathers and a gloss that varies geographically between blue and green (local populations have consistent gloss hues that differ from one species to the other).

Observations in Cameroon showed that males of different species defend territories against each other, but when taken away for collection purposes individuals are replaced significantly more often by a conspecific than by a male of another species. They thus behave as "good" species; this indicates that identification by the song imitations is correct.

The formerly described species (*V.*) *nigeriae* Alexander, *camerunensis* Grote, and *sharii* Bannerman, on the other hand, turn out to be agglomerations of at least three of these newly observed species. Not even the holotypes can (where still available) be attributed to one of these forms, and Payne therefore declares the three old names as *nomina dubiosa*. Instead, he furnishes descriptions of two new subspecies of *V. funerea*, parasitizing various forms of *L. rubricata*, and of two new species, *V. raricola* and *V. larvaticola*, named after their hosts, *L. rara* and *L. larvata*. Unfortunately, the form treated as *L. larvata* by Payne has been split into two species by Goodwin in his recent standard book on Estrildine finches; the name *L. larvata* is retained only for the eastern population in the Nile area while the populations studied by Payne would be *L. vinacea*. To name parasites after their hosts is obviously a rational procedure, but suffers when the systematics of the hosts are still under discussion.

The paper keeps within the boundaries already set by Payne's previous publications. The social organization of indigofinches and its mechanisms, established earlier in other parts of the continent, are confirmed for the West African members of the group. Payne's work on these birds, taken as a whole, should be of much interest not only to students of this special group and their hosts but to ornithologists and ethologists in general because of the particular interaction of morphological, genetically inherited, and "cultural" learned elements that maintains the highly specific brood parasitism and, in close connection with it, the limits between the species.—PETER KUNKEL.

Pigeons and doves of the World (Third edition).—Derek Goodwin. 1983. London, England, and Ithaca, New York, British Museum (Natural History) and Cornell University Press. 363 pp., 6 color plates, 21 numbered and many un-numbered text figures. ISBN 0-8014-1434-2. $48.50.—Persons familiar with the earlier editions of this standard reference work to the columbids of the world will expect this edition to be as well-done as its predescessors. They will not be disappointed, for Derek Goodwin is easily the most informed and experienced student of pigeons and doves active today. He is especially well-known for his work in pigeon behavior and has seen a great number of columbid species alive, a major fraction of them afield. He received good marks for the first edition of this work, and I suspect he will record more of the same for this one. New information has been added where appropriate, three new color plates complement the earlier three, and the entire text has been reset into a two-column page format that realizes a considerable economy of space and greater legibility over the earlier editions. The book does what it used to do, but it does it better.

Readers not familiar with the earlier versions should know that Goodwin has a general introductory section that deals with systematics, plumages, reproductive biology, and general behavior. This is followed by species accounts that provide a view of relationships among and within genera, descriptions of plumages, distribution (accompanied by sketch maps), habitat, general ecology, voice, display, and

pertinent references. Many accounts have an ink drawing of the species by Robert Gilmor, either from life or museum specimens. A number of aspects of this edition are much as they were formerly. The text is largely the same, as are the ink drawings and maps. The three old color plates have held up reasonably well.

The book of course has a few problems. The distribution map of the Mourning Dove omits a part of its range in Canada. Migration, homing, orientation, and navigation are omitted from discussion, the latter surprisingly so, given the significance of *Columba livia* in the years following Gustav Kramer's work. Many readers will be pleased to find an account of the feral pigeon, but Wendell Levi's 1974 book on *C. livia* is not mentioned, as also is true of Daniel Lehrman's work on *Streptopelia "risoria"* (cf. Collias 1969). Goodwin persists in citing a manuscript by Alexander Wetmore in accounts of species occurring in Panama, when the proper update would be "Wetmore (1968)." In his discussion of mate choice in *C. livia*, Goodwin emphasizes that the birds show positive assortative mating by plumage color and pattern, but does not cite Obukhova and Kreslovskii (1982), who have evidence to support the claim, Mainardi (1964), who examines the idea as a function of classical imprinting, or Murton, Westwood, and Thearle (1973), who contradict the assertion and have quantitative evidence that the birds in central England show negative assortative mate choice.

Persons with a systematic bent will be discomfited to find that Goodwin's diagrams of relationships among and within genera are the same as those appearing in 1967 (although the legend to that for *Columba* has been modified). There is no precise indication of characters or character-states used, nor of the bases on which the tree diagrams were developed. Goodwin may well believe that such detail would be tedious in a book dealing mainly with the biology of pigeons, but I think he missed an opportunity to tell us something of value.

These contrary matters are not important, but because this book is by way of becoming a classic (any book about birds that reaches its third edition is clearly something special), I had been hoping for something a little different. What Goodwin has actually done, however, is something special, and anyone or any library in need of solid information on pigeons and doves of the world, with a special emphasis on display and behavior, simply has to have this book.—RICHARD F. JOHNSTON.

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ALSO RECEIVED

Endangered & threatened wildlife of the Chesapeake Bay Region.—Christopher P. White. 1982. Tidewater Publishers, Centreville, Maryland. xii + 148 pp., 46 color photos, 35 maps, 4½ × 7 in., index. $5.50.—A brief introduction laments the continuing decline in diversity of wildlife, describes briefly the endangered species program, and outlines the watersheds of the Chesapeake Bay and the Ohio River. Most of the booklet is devoted to single-page accounts of individual species, generally with a color photo on the facing page: 6 whales, 3 bats, 2 other mammals, 7 birds, 5 turtles, 5 fishes, 2 arthropods, 9 mollusks, and 2 plants. Data for each species appear under the headings: Description, Distribution, Habitat and Behavior, Reproduction, and Remarks. Of the seven birds included, all Federally listed as endangered, only the Bald Eagle, American Peregrine Falcon, and Red-cockaded Woodpecker have been known to nest anywhere in the tri-state area.

The two Appendix tables, summarizing status by State, are potentially the most useful part of the book. They contain data on many animals and plants not covered in the species accounts. Included in these tables are 50 species of endangered or threatened plants and 17 species of breeding birds in danger of extirpation. The author's poor choice of some of the species (e.g. Grasshopper Sparrow) detracts from the usefulness of these tables.

Most of the information presented is factual, but there are some careless statements such as: ". . . all of the predatory birds . . . continue to hold a status of special concern." For more details on the current status of declining species in Virginia and Maryland I refer the reader to two of the Selected References (Linzey 1979 and Norden and Forester 1984). The U.S. Fish and Wildlife Service has subsequently (27 July 1983) republished their Endangered and Threatened Wildlife and Plants (50 CFR 17.11 and 17.12), which incorporates minor changes, principally in names of the species.—CHANDLER S. ROBBINS.

The birds of the Department of Lima, Peru.—Maria Koepcke; translated by Erma J. Fisk. 1983. Newtown Square, Pennsylvania, Harrowood Books. 144 pp. ISBN 0-915180-11-1. $9.95.—Koepcke's "Las Aves del Departamento de Lima" was translated into English in 1970, but that second edition of the work has been out of print for several years. Now, Harrowood Books has reprinted the book in a third edition that is unchanged from the second. Descriptions for the 331 species covered include size, plumage, song, posture, habits, distribution, range, and habitat; each species is illustrated by a small line drawing. The treatments are now somewhat out of date, but will still be tremendously useful for those undertaking field work or simply watching birds in a good deal of Peru. It is good to have this important work available once again, especially at an accessible price.—J.A.W.

Working bibliography of the Golden Eagle and the genus Aquila.—Maurice N. LeFranc, Jr. and William S. Clark. 1983. Washington, D.C., National Wildlife Federation. National Wildlife Federation Scientific & Technical Series No. 7. xxx + 222 + 12 appendix pp. ISBN 0-912186-49-6. $21.50 (+1.55 postage) (paper).—This, the third in the National Wildlife Federation's bibliographic series (the others covered owls and Bald Eagles; see Auk 96: 643, 1979), contains over 3,400 reference citations relating to the Golden Eagle and the nine other members of the genus *Aquila*. The foreword, by Leslie Brown, briefly describes the features of these 10 species and comments on the usefulness of the bibliography. These themes are developed in somewhat greater detail in the first two chapters of the book (13 pages). The body of the work, however, is the listing of references. One chapter lists the references in a standard alphabetical-chronological sequence. This is followed by a lengthy permuted list of keywords, which is probably the most valuable section of the bibliography. Each reference is assigned several primary and secondary keywords, so that there are several opportunities to encounter a reference while scanning this list for topics of interest. The following chapter lists the reference citations by number according to species, while the next chapter does the same by geographic location. Chapter 7 contains citations of references dealing primarily with occurrence records, and is also arranged geographically. A concluding appendix provides definitions of all terms used as primary keywords.

This is an impressive and tremendously useful and well-designed bibliography, which will be absolutely indispensible to anyone working with *Aquila* eagles or, for that matter, with raptors in general.—J.A.W.

Managing wetlands and their birds: A manual of wetland and waterfowl management.—D. A. Scott (ed.). 1982. (Proceedings of the Third Technical Meeting on Western Palearctic Migratory Bird Management, held at the Biologische Station Reiselfelder Münster, Federal Republic of Germany, 12–15 October 1982.) Slimbridge, Glascow., England, International Waterfowl Research Bureau. 368 pp. No price given.—This volume consists of 43 chapters (papers) arranged by eight subject areas. Nineteen chapters are included under "Management of wetlands." A diversity of subjects is discussed, including water-level manipulation, vegetation control, waterfowl management, prey-fauna management, fertilization, habitat restoration, and impoundment construction. The other seven subject areas are creation of artificial nesting sites (5 chapters); farming for waterfowl and prevention of crop damage (3 chapters); predation and other wildlife interrelationships (3 chapters); environmental contamination and disease (7 chapters); endangered species, introductions, and restocking (4 chapters); regulation of waterfowl shooting pressure (3 chapters); and sanctuaries and disturbance (3 chapters). Twelve of the 16 chapters from the "Manual of Wetland Management" published in loose-leaf form by the International Waterfowl Research Bureau between 1972 and 1980 are partly or entirely incorporated into this proceedings.

Persons involved in or concerned about wetland management, enhancement, and protection will find this book useful. Descriptive information about techniques for management are in short supply, and this volume contributes somewhat to easing this problem. It is unfortunate, however, that the management chapters, in particular, are not more detailed. Inclusion of more "how to" information would make the book (which is supposed to be a manual) more useful to managers and researchers alike. The chapters provide an overview of most subjects but the involved reader will have to contact the authors of chapters or seek other sources for the complete story.

A bibliography slightly longer than 11 pages is provided at the end of the book instead of a literature cited section accompanying each chapter. Besides being brief, some chapters are without literature citations, and this further limits their usefulness to workers in the field.

Hopefully, the International Waterfowl Research Bureau will continue its effort in this area and offer an expanded update to this volume in the not-too-distant future. Such a contribution is needed as more nations realize that action must be taken to enhance the quality of many of the remaining wetlands or to create wetlands to compensate for some of those previously destroyed. I would suggest that IWRB broaden its horizons and consider wetland wildlife other than waterfowl when developing management strategies.—W.E.S.

The Smithsonian Institution. Second edition.—Paul H. Oehser; Louise Heskett, Research Associate. 1983. Boulder, Colorado, Westview Press. xvi + 223 pp. ISBN 0-86531-300-8. $25.00.—The Smithsonian Institution is a magnificent, diverse museum, a tremendous national resource and a scientific Mecca of sorts. In this volume, Paul Oehser reviews the history of the Smithsonian in considerable detail, describes the current programs of the many branches, and discusses how museums such as this can contribute to science and, indeed, humanity. It is interesting reading, especially for those who like to have some historical perspective on contemporary activities.—J.A.W.

Birds of the St. Croix River Valley: Minnesota and Wisconsin.—Craig A. Faanes. 1981. Washington D.C., U.S. Fish and Wildlife Service, North American Fauna Series No. 73. 196 pp. No price given.—The St. Croix River Valley encompasses about 11,550 km^2 in east-central Minnesota (3 counties) and northwestern Wisconsin (2 counties and part of another). This area is described by Faanes as a biological "crossroads" for many species. Because of its location and mixed affinities of plant communities, the valley includes the northern and southern range limits of a number of species as well as the meeting point for typically eastern and western forms.

The first 24 pages are devoted to climate, physiography, habitats, terminology, and related subjects. The bulk of the book (156 pages) provides species accounts (312 by my count), including information on status, migration, nesting-season distribution, and habitat. Distributional data presented are from fieldwork conducted by the author during 1966–1980, published accounts in state journals and other sources (e.g. *American Birds*), unpublished data from resource agencies and other investigators, and data from survey routes established by the Fish and Wildlife Service and National Audubon Society. Five pages of references follow the species accounts.

The book is well prepared and appears free of typographical errors. It has a limited audience because of the relatively small area covered.—W.E.S.

Welt der Storche.—M. Philip Kahl. 1981. Hamburg and Berlin, Parey. 96 pp., 68 photographs. No price given.—With this German edition of his "Wonders of Storks" (1978, New York, Dodd, Mead & Co.), Phil Kahl makes available to another audience his insightful knowledge and fascination with storks. Ernst Schuz, the godfather of stork research, adds an introduction and a chapter on the White Stork. Kahl's short chapters cover the essence of storkhood, paragraphic species accounts, feeding, breeding, migration, and their human relationships. A book with 64 of Kahl's photographs can be recommended to anyone with an interest in birds. These are in black-and-white, but as such, they encourage a closer look at the biology they illustrate than is likely when one is distracted by the brilliant artistry of their color renditions. The text seems aimed at the educated layman, but this is also the book for graduate students preparing for a German qualifying examination and others ridden by private guilt over a dwindling facility with their hard-won foreign language. I am always pleased to see another piece of Phil Kahl's work, whether technical or popular. Through photographs, he allows his reader the ultimate in ornithological intimacy—an invitation to share his blind. Hopefully, additional translations will share his work with more of the naturalists of the world.—JAMES A. KUSHLAN.

South Texas fauna—A symposium honoring Dr. Allan H. Chaney.—Brian R. Chapman and John W. Tunnell, Jr. (Eds.). 1983. Kingsville, Texas, Texas A&I University Caesar Kleberg Wildlife Research Institute. No price given. v + 97 pp.—This volume, honoring a gentleman well known to biologists in Texas, presents two abstracts and 13 papers delivered at the symposium in December 1977. Of these, three papers have an immediate interest to ornithologists: "Current status of Roseate Spoonbills on the Texas Coast," by Brian R. Chapman; "Anatomical and vegetational features of dredged material islands and their utilization by birds: upper Laguna Madre of Texas," by Carlos H. Mendoza and Rene Ortiz; and "Growth energetics of Black-bellied Whistling-Ducks," by Brian W. Cain.

Chapman notes a current population of 2,200 pairs of spoonbills in 27 colonies. He also reports a shift of the population from the upper to the central coastal areas, with over half the colonies located on dredged material islands. Mendoza and Ortiz studied 11 islands for 20 months in an attempt to determine relationships of physical and floristic properties of the islands to diversity and density of nesting birds. They report the distribution of nesting-bird colonies as related to: 1) the presence of the preferred plant species but at less than 90% vegetative cover; 2) presence of barren dredged material areas; and 3) nonbarren areas with less than 30% vegetative cover. These factors reflect the needs of different colonial species that use the island; this paper should prove instructive to those who create or maintain spoil islands and to those who have concerns about these colonial birds. Cain's paper on the Whistling-Duck presents information on growth cost and efficiency that may well explain the limits of distribution for this species in Texas, but the recent, sudden expansion into central parts of the state indicates otherwise.—KEITH A. ARNOLD.