REVIEWS

EDITED BY WALTER BOCK

Ecology.—Robert E. Ricklefs. 1973. Newton, Massachusetts, Chiron Press. Pp. x + 861. Drawings by Joel Ito, diagrams by John Woolsey, plus numerous photos. $15.00.—Now that a liberal arts education is incomplete without at least some input from the field of ecology, it is fortunate that an ample selection of textbooks has become available. Their variety reflects the various approaches to the subject, and I disagree with those who think that the market is oversupplied. For an emphasis on societal problems and the nature of ecosystems one would probably choose the third edition of "Fundamentals of ecology" by E. P. Odum (1971, W. B. Saunders Co.). For an advanced text covering recent research in ecology one would probably choose "Dynamic ecology" by B. D. Collier, G. W. Cox, A. W. Johnson, and P. C. Miller (1973, Prentice-Hall, Inc.). For emphasis on community ecology and statistical methods one would choose "General ecology" by S. J. McNaughton and L. L. Wolf (1973, Holt, Rinehart and Winston, Inc.). For emphasis on interactions that determine the distribution and abundance of organisms one would choose "Ecology, the experimental analysis of distribution and abundance" by C. J. Krebs (1972, Harper and Row). For mathematical ecology one would choose either R. W. Poole's "An introduction to quantitative ecology" (1974, McGraw-Hill) or J. R. Emlen's "Ecology: An evolutionary approach" (1973, Addison-Wesley).

Three of the new texts are presented in such a way that they are suitable for the nonbiology major as well as the biology major or graduate student. These are "Evolutionary ecology" by E. R. Pianka (1974, Harper and Row), "Introduction to ecology" by P. Colinveaux (1973, John Wiley and Sons, Inc.), and the book being reviewed here. The last two authors use a narrative approach, present many interesting examples, and state the problems and unresolved questions of ecological theory in a manner aimed at captivating the interest of any reader, regardless of her or his previous knowledge of the field. Ricklefs' writing, although sometimes verbose, is clearly successful in offering a familiarity with organisms and their environments as a basis for understanding ecological concepts. Pianka's text emphasizes the contributions of Robert MacArthur and his co-workers to evolutionary ecology.

Ricklefs' text is organized differently from the others, reflecting his strong conviction that an understanding of ecological relationships among animals, plants, and their environments requires an understanding of the nature of adaptation and of genetics. The book contains eight parts: Introduction; Natural Selection and Adaptation; Ecology of Organisms, Physical Environment; Ecology of Organisms, Biological Environment; Ecological Genetics and Evolution; Genetics of Populations; Ecology of Populations; and Ecology of Communities. He is certainly to be congratulated for having covered considerably more basic biology than the other authors, and for organizing it in an original and readable way. There is a good balance among the eight sections. I was pleased to see that the importance of the individual organism in relation to its environment was not lost in considerations of populations and comunities. Nearly 100 pages are devoted to physiological ecology, an area that is well treated by Collier et al., but less thoroughly treated in the other texts mentioned above. Parts V, VI, and VII, in addition to their attention to population biology and interspecific interactions, are a minicourse for ecologists on population genetics, speciation, and evolution.

Accounts of the contributions by many ornithologists to our understanding of ecology and evolution are an important element of this book. In particular works by Amadon, Keast, Lack, Lind, Mayr, MacArthur, Selander, Tinbergen, and Vaurie are summarized and illustrated. Ricklefs' own work with Hainsworth on the Cactus Wren and his work with Cox on bird populations on tropical islands are described. The book is beautifully illustrated with diagrams and drawings.

Ricklefs has given us an excellent statement of the current state of thinking about ecology and the nature of adaptation. I recommend the book highly as a text, a reference book, and a stimulus for designing new research plans. Being of a cautious nature, I am not ready to accept his premise that descriptions of ecological phenomena plus descriptions of genetic processes add up to a mechanistic understanding of evolution. The weak links are in such elusive constructs as fitness, diversity, stability, strategy, and competition. The job for the future seems to be one of either strengthening these links or replacing them.—FRANCES C. JAMES

Das Aktionssystem der Zwergohreule *Otus scops scops* (Linné 1758).—Lilli Koenig. 1973. Berlin and Hamburg, Verlag Paul Parey. Advances in Ethology (Supplement 13 to J. Comp. Ethol.). 124 pp., 54 figs., 4 tables. English summary. Paper. 54 DM.—Although badly needed, detailed descriptions of the behavioral inventory of a single avian species are quite rare. Among the few ornithologists who have specialized in this field is Lilli Koenig. After her well-known works on the behavior of bee-eaters and of several mammals, she now presents her newest work on the ethology of the Scops Owl, another real treasure chest of information for behaviorists and ornithologists. With incredible assiduity, patience, and skill, she studied 60 captive Scops Owls for 13 years; 50 of these owls were bred in captivity. She made only a few field observations, which might be regarded as the major shortcoming of this excellent study. A good description of methods for keeping and breeding owls is included.

Description of the behavior of the Scops Owl commences with courtship and reproduction. The unremittingly uttered hooting call of the male (some unpaired females also deliver this call) is a very important communication aid for pair formation. The rhythm of hooting is very constant and individual males maintain their particular rhythm for many years. The owls call mainly in spring, but also in other seasons (fall). Lilli Koenig interprets the function of the call as marking of the territory, spacing of rivals, attracting of females, and communicating of partners. Crowding of several males in one cage results in silencing all but one.

The male initiates nest site selection. He flies to a hole, inspects it and hoots, sitting in the entrance. If the female is in the neighborhood, she answers with a soft version of the male's hooting. The calls of the partners become synchronized (this does not happen between males) and a duet results. The pair may inspect several holes until the female chooses one. Her final decision is demonstrated by using the hole during the day. The female drives strange males away, but the male (in captivity) may accept a second female and raise two broods simultaneously. Duetting, feeding of the female by the male, and mutual preening strengthen the pair bond. Copulations are usually introduced by such behavior.

Eggs are laid at 2-day intervals. The Scops Owl demonstrates a special breeding strategy the author calls "fade-in brooding." Incubation starts faintly with the first egg, but is performed fully when the last egg is laid. Thus the chicks of a five egg clutch hatch within 3 days. The time between laying and hatching of an egg varies

between 20 and 29 days. Only the female incubates. At first only the male hunts for the female and the young. Between the 21st and 29th day after hatching, the young jump out of the nesting hole. After the 50th day the parents feeding activities cease.

The crowning part of this study is a 60-page section on the development of the behavior and morphological features of the Scops Owl. This chapter certainly belongs among the most exceptional pieces of recent ornithological literature. The author seems to forget nothing—embryo hatching, locomotion, measurements, structure of the sense organs, plumage, various facets of behavior, etc. Everything is well illustrated with 145 photographs, 4 figures, and 3 tables. A following chapter describes the ontogeny of the Scops Owl day by day. Last is a section describing the nine categories of vocalization Koenig recognizes. All calls are well documented with spectrograms.

The paper closes with a short discussion of the well-known and the newly discovered characters shared by bee-eaters and owls, based largely on Koenig's studies of these groups. This section is out of place with the rest of the study and would have been better published as a separate paper addressed to the question of relationships between the Strigiformes and Coraciiformes.

Considering the important contributions of this study, the understanding reader will overlook the many digressions, casual comparisons, and inconsistent interpretations that are scattered throughout the work. An extreme example of this problem is the "translation" of calls into grammatically complete German sentences, without even mentioning problems of this procedure. The male (hooting): "Here I am, where are you, do you belong to me?" The female answering: "I am here, and I belong to you!" This flirt continues and when it climaxes in copulation, he plainly ejaculates: "Finally!"

Descriptive studies of this type are a real dilemma. They are basic for other studies, comparative and analytic, but they demand unreasonably large amounts of time and patience. Most professional ornithologists do not have the time, either the amount or distribution, for such studies. Clearly this is a field where amateur ornithologists can make important contributions. All ornithologists can be grateful for papers such as Lilli Koenig's. It is a bonanza for anyone interested in comparative studies in general natural history and specialized ethology. It must be read by all students of owls. It should stimulate field studies of the Scops Owl and studies of the closely related, but not very well-known (apparently completely unknown to Koenig) American species. On the whole, this paper is a great treasure of information to be dug out, sorted, and enjoyed.—HANS WINKLER.

Food supply and the annual cycle of the Anna hummingbird.—F. Gary Stiles. 1973. Univ. California Publ. Zool. 97. 109 pp., 4 black-and-white plates, 13 figs., 11 tables. Paper. $2.50.—Hummingbirds have become one of the most popular subjects for avian ecological study during the last decade. Previous to the mid-1960s ecological knowledge of this second largest of the nonpasserine families was limited to some basic natural history, a lot of anecdotes, and some pioneering work on physiology. The recent spate of hummingbird studies has attempted to deal with ideas and generalizations concerning their evolution and ecology. Stiles' monograph of the behavioral ecology of California's only resident species, *Calypte anna*, is the first systematic, long-term study on a North American hummingbird using marked individuals. He combines the approach of the specialist, studying the basic ecology

and natural history of a single species in depth, with the approach of the generalist, attempting to make intergroup comparisons and to determine the underlying causes for the similarities and differences noted.

Stiles followed the numbers, behavior, and food availability of the Anna for four annual cycles in southern California. This yielded profuse data on the relationships of numbers and behavior to rainfall and food availability, and the author was able to infer the importance of rain as a proximate breeding stimulus. The presence and behavior of other hummingbird species were recorded and their effect on the Anna inferred. The Analysis section identifies probable proximate and ultimate factors that initiate and terminate breeding and seasonal movements, and discusses the evolution of winter breeding and of breeding territoriality in the Anna. A short concluding discussion treats seasonal movements, territoriality, and the evolution of mating systems in nectarivores in general. In this, Stiles gathers together information on sunbirds, honeyeaters, and honeycreepers from several scattered and sometimes obscure sources. One source remains obscure as the author failed to include it in the Literature Cited, which careful editing should have caught.

Documentation in this study is thorough compared to many such field studies: large numbers of individuals were watched, some males were marked individually, testis and molt information was obtained for individuals of known status and behavior, and food availability was estimated by several means, including the recording of flowering percentages, the mapping of flowering shrubs on territories, and the measuring of nectar secretion rates. Such information is difficult and tedious to obtain.

On page 3 and throughout the book, the implicit but unspecified assumption made is that hummingbird populations are food-limited. Although I intuitively agree, it is possible to dispute this important basic assumption. Early in the book the author suggests that hummingbirds have relatively higher food requirements than do other birds and are therefore tied more closely to their food sources (implying they are probably food-limited). This does not follow, because the food supply could still be superabundant regardless of the magnitude of the birds' food requirements. Also the author borders on circular logic when he subtly implies that the presence of feeding territoriality indicates food-limitation, but later in the book he considers food-limitation to be the possible force behind the evolution of feeding territoriality. Thirdly, if food were limiting the population, then human introduction of nectar-rich "bird plants" should increase overall population size. The author suggests that this has in fact happened but admits that no quantified data are available. As devil's advocate, one could suggest that nest predators keep a low ceiling on hummingbird densities. Stiles shows that nest success is low (about 40%) probably because of predation, and suggests that the reason *Archilochus alexandri* numbers are lower in garden habitats is because their nests are less camouflaged there and thus more susceptible to predation. It is exceedingly difficult to determine just what the limiting factor(s) are on animals, but if an assumption is made it should be stated explicitly.

The author's attempt to determine food availability would have been strengthened had he put estimations on a caloric basis. This would not have required much additional work, as the chief missing information is nectar concentrations for each important plant species and these are easily determined. He then could have determined the relationship between calories produced in an area and the numbers of hummingbirds censused there. This might have led to a good quantitative correlation as the number of flowers and the total number of hummingbirds of all species changed throughout the season. In fact, this could have lent support to the food limitation

assumption. Caloric productivity information also could have led to speculation about the reasons for different territory sizes and different population densities among different species of hummingbirds. For example *Calypte costae* might breed in lower numbers and have larger territories in this region because its preferred food plants (especially *Salvia*) produce less calories than do those of *C. anna* (especially *Ribes*). The author's information on nectar quantities in the two plant genera supports this idea, but data on total calories produced are required to confirm it.

One of the most important hypotheses to come out of this work concerns the proximate causes of termination of breeding. The author feels this depends on the breakdown of male breeding territoriality: maintenance of territory is made energetically impossible by pressure from increasing numbers of juvenile challengers and the concurrent decline of the richest source of food, *Ribes speciosum*. This negative feedback system could be operating in birds in general, but it seems particularly clear-cut in this hummingbird. Stiles' hypothesis could be tested experimentally in the field.

The discussion of the evolution of breeding territoriality in *Calypte anna* is not very clear. Apparently Stiles' point is that as females probably mate with the males on whose territories they feed most frequently, a male will mate with more females if he has a particularly large and rich territory. This will select for greater ability in territorial defense. Apparently the author sees the territorial system as the consequence of promiscuity. At any rate, the idea is dependent upon showing that (1) some territories are richer than others, (2) the richer territories are competed for most intensely, and (3) males with richer territories mate with more females. He documents (1) on the basis of flower and bush counts. He attempts to document (2) on the basis of observations on only two males, which is not adequate basis for his strong assertion later that "competition among *anna* males seeking breeding territories is much more intense for sites with a good *Ribes* supply." This is one of the few times I found the author stretching his data. Perhaps statistical analysis, which he avoids, would have prevented this.

Regarding (3) above, as mating is so rarely seen in hummingbirds, it is difficult to document that males with richer territories mate with more females. However, L. L. Wolf and Stiles (1970, Evolution 24: 776-790) have some pertinent data on a tropical species that could have been cited. Three *Panterpe* males had territories with different numbers of flowers: the one with the most flowers had three females associated with him, and the other two had only one each. The numbers are few but at least these data show a trend and are probably the only ones available.

In my opinion the concluding Discussion is by far the most stimulating and valuable part of the book, even though it is only 10 pages long. Stiles makes many interesting cross-family comparisons and provides much food for thought and for future research.

He suggests that the reason most nectarivores are nomadic during the nonbreeding season is because of the temporal and spatial patchiness of the food supply. He suggests that during the breeding season when the birds must be sedentary, they tend to be closely associated with certain plants whose reproductive season apparently coevolved to be concurrent. These associations have been descriptively documented for several hummingbirds, but information is lacking in other families and needs to be obtained.

The discussion of evolution of mating systems and its relation to territoriality in nectarivores in general is much clearer than in the Discussion section on the Anna.

The information the author presents provides an interesting possible test of a recent hypothesis (Orians 1969, Amer. Naturalist 103: 589-604) regarding the evolution of polygamy. Orians (and Stiles in this monograph) suggests that if food is variable in dispersion, then given a hypothetical ancestrally monogamous situation, males will differ in richness of territory. A female may gain more by mating with and nesting near an already mated male if his territory is rich than by mating with an unmated male on a poor territory even though the latter may give her more aid in rearing the young. This is the selective process for polygamy, and reinforces breeding territoriality as discussed above. Stiles suggests that hummingbirds evolved promiscuity because their food supply is patchy. However the passerine nectarivores are monogamous. He suggests that their food may be less patchy than that of hummingbirds because (1) they are more insectivorous than are hummingbirds and (2) their food plants tend to be trees, which may be more homogeneously rich. Stiles expresses the importance of food dispersion studies in these nectarivores.

Although this argument is interesting and plausible, it doesn't explain the presence of feeding (nonbreeding) territories in the hummingbirds and their general absence in passerine nectarivores. Stiles suggested earlier that competition for food selects for territoriality in hummingbirds, but this implies that passerine nectarivores must not compete for food, which seems dubious. This then is still another fruitful question for investigation.

This work is substantial in both documentation and ideas. On the technical side, it could have been improved by a better job of editing. Grammatical expressions are not always correct (e. g. "data . . . is," "none . . . were") and the text often refers to the wrong figure or table. There are many references to "see below" in which the information referred to follows half the book later. This is unhelpful; page references should have been included. The first part of the book presents data on four Anna cycles in great detail. This section is repetitive and gives the appearance of disorganization. For example, the figures and tables in the Results section are first referred to one by one in the Methods and Materials section, neither in numerical nor in chronological order. No page numbers are given for the particular figure or table and as they are not listed in the Table of Contents nor located near the page on which they are first mentioned, nor in a section of their own, the reader wastes time locating the pertinent figure or table. Sometimes a description of the content of the figure or table is made at this point, a style that is tantamount to presenting results in the Methods section. These same results are then presented again, albeit in more detail, in the Results section, and sometimes are repeated once more in the Analysis section. Some of the graphical presentation of data on different years would be more meaningful if certain figures had been juxtaposed or information included on the same figures (e.g. Figs. 5 and 7). The repetition and disorganization of data presentation make the first half of the book rather boring and difficult to read, but considering that much of the data is descriptive (e.g. chronologies of events over 4 years) and interrelated, one can understand the difficulties involved in its organization. We should probably consider these sections simply as a wealth of data for reference purposes.

In general this study is valuable as a detailed reference on the Anna hummingbird and as a germinator of ideas on both the Anna in particular and nectarivores in general. Anyone interested in any of these fields definitely should have this monograph.—F. Lynn Carpenter.

Functional anatomy and adaptive evolution of the feeding apparatus in the Hawaiian honeycreeper genus *Loxops* (Drepanididae).—Lawrence P. Richards and Walter J. Bock. 1973. Amer. Ornithol. Union, Ornithol. Monogr. No. 15. Pp. x + 173, 26 pls., 14 figs. $6.00.—The A.O.U. can well be proud of this most recent addition to its monograph series for this is an outstanding work. It is, moreover, the first detailed study of the adaptive anatomy of a major segment of a famous bird family, long a classic example of insular endemism and adaptive radiation. The study is remarkable, too, in bringing together very effectively the much earlier field and anatomical work of the senior author with the keen anatomical and evolutionary insight and knowledge of the junior author. Their combined effort has now produced an exemplary treatment of a complex and fascinating subject, and the best illustrated and described reference for passerine jaw and tongue anatomy yet published.

Briefly, the foods and feeding habits, beak rhamphothecae, cranial osteology, jaw musculature, and tongue anatomy of four of the five species and certain of their races of Hawaiian honeycreepers of the genus *Loxops* are treated in descriptive and functional detail. The important subject of cranial kinesis is thoroughly considered and well diagramed. The functional anatomy of the Akepa (*Loxops coccinea*) with its crossed bill tips is given special emphasis and its convergence with crossbills discussed. The describing and correlating of intricate asymmetrical conditions in the muscles and skeleton with the specialized use of the bill in the Akepa are a particularly fine contribution. The anatomy and evolution of the drepanidid tubular tongue are well analyzed and a plausible new theory proposed for production of the suction necessary for nectar extraction. Finally, the evolutionary history of *Loxops* and the Drepanididae are taken up and the most convincing case yet, I believe, made for the origin of the family from a cardueline finch, *Fringilla*-like, ancestor.

As is all too well-known, the family Drepanididae is sadly reduced by the man-caused extinction of many species, and many of the surviving species have critically endangered small populations and ranges. Even the amazing recent discovery of a new genus and species does not alter this nor mean that the restricted habitat of many species is not still being inexcusably destroyed by man. The authors have done a signal service in renewing recognition of the uniqueness of the Drepanididae and the need for much further study of them, and showing that a major study can be made with adequate fieldwork and a very minimum of specimens.

The monograph does not attempt to be a quantitative or statistical treatment as the number of specimens is too small and data are inadequate. Accordingly, the authors repeatedly qualify their conclusions or theories and are careful to keep them commensurate with the limitations of their information. These limitations are understandable because of the rarity of some of the birds, one even being extinct. Still, it is unfortunate that time or funds did not permit the adequate inclusion of *Loxops parva*, the Anianiau of Kauai, which is still reasonably abundant.

So well written and edited is the monograph that one can search almost in vain for errors. One small one (top of p. 81), possibly changing meaning, is where "fall *with* the capabilities" should read *within*. Again, on p. 33, the feeding of *Loxops sagittirostris*, an extinct species, is described in the present tense, perhaps reflecting a forlorn wish for the species' survival. In a different vein, the reader would have been helped by the inclusion in paragraph form under Figs. 4 and 12 of keys to skull and tongue abbreviations, thus obviating repeated reference to the appendix glossary.

The literature cited indicates the thoroughness of its perusal. Perhaps Berger's comprehensive book (1972, Hawaiian birdlife, Honolulu, Univ. of Hawaii Press),

and in it much of Eddinger's earlier work on the breeding biology of certain drepanidids that may give further insight into the ancestry of the family, was published too recently for inclusion. Perhaps, too, consideration of recent work (as Dalrymple et al. 1973, Amer. Scientist 3: 304) on the geologic age of the Hawaiian Islands would give Drs. Richards and Bock more time, probably some millions of years, as a basis for theorizing on the origin and evolution of the Drepanididae.

The policy of not providing current addresses of authors in Ornithological Monographs is unfortunate and should be reversed; sufficient space exists on the back (p. ii) of the title page to include this information. Exchange of comments or information between readers and authors of any scientific paper is essential for further development of the field. Their addresses are: L. P. Richards, Department of Biology, Eastern Michigan University, Ypsilanti, Michigan 48197, and W. J. Bock, Department of Biological Sciences, Columbia University, New York, New York 10027.

This monograph is a major landmark among studies of Hawaiian honeycreepers or among anatomical studies of any passerines. Major sections of it should be of much interest to general readers, and avian anatomists will in addition find it a valued reference. Hopefully, too, it will generate more interest in drepanidids and in the world's stake in their survival.—FRANK RICHARDSON.

Breeding birds of Britain and Ireland.—John Parslow. 1973. Berkhamsted, England, T. and A. D. Poyser Ltd. 272 pp. Illustrations by Rosemary Parslow, also 12 figs and 225 distribution maps. £3.60.—Following hard on the heels of "The status of birds in Britain and Ireland" (reviewed by me in Auk 90: 445) and written by one of its principal contributors, this book might seem to be somewhat redundant. It is in effect an enlarged treatment of the 226 breeding species, whereas its predecessor covered all of the 467 species admitted to the British list, both breeders and nonbreeders. There is thus a good deal of overlap, and one might well ask why the two could not have been combined in one volume, particularly since Parslow himself wrote the bulk of the text of the earlier work. It is much more convenient for the user to have all the information in one volume rather than having to refer back and forth from one to the other.

While one may complain about the annoyance of this dual publication, it is hard to find fault with the contents of the present work. Subtitled "A historical survey," it not only gives a detailed account of the present status of every breeding bird but also provides a well-documented historical account of the changes in populations. The present distribution of each species can be seen at a glance in the 225 maps, which constitute an appendix. The maps additionally provide information on abundance, given in symbols, summarized from the extensive treatment in the text. The gradual and continuing spread or decline of certain species of particular interest like the Little Ringed Plover, *Charadrius dubius*, and the Wryneck, *Jynx torquilla*, are additionally illustrated by maps in the text. The cutoff date for inclusion of information appears to be 31 December 1967, which seems a little strange for a book published in 1973, but we are at least given a 10-page "postscript" entitled "The years since 1967." This might seem an odd arrangement until one reads in the preface that the bulk of the book appeared as a series of papers in British Birds covering the period through 1966. Apparently it was too much trouble for the author to incorporate recent information into the original species accounts, where it would have been the most useful, so he took the easy way out and lumped it all together at the end, leaving the reader to do some more referring back and forth.

I must emphasize that there is a tremendous amount of information packed into this book. Would that such precise documentation were available in a single volume on North American breeding birds. The book is certainly a "must" for every ornithologist and every birder in Britain. On this side of the Atlantic it will have more limited appeal, particularly for those who already own "The status of birds in Britain and Ireland." But it is a fine piece of work, and everyone interested in Palearctic birds will want to add it to his library.—STUART KEITH.

Grzimek's animal life encyclopedia.—Bernhard Grzimek, editor-in-chief. English edition, George M. Narita, general editor. New York, Van Nostrand Reinhold. Vol. 7 (Birds I), 1972, 579 pp.; vol. 8 (Birds II), 1972, 620 pp.; vol. 9 (Birds III), 1973, 648 pp. Many color plates, line drawings, maps. $29.95 per volume ($325 for full 13-volume set).—These three imposing volumes (occupying 8½ inches of shelf space) form part of a 13-volume set, originally published in German in 1968. Other volumes include one each on "lower animals," insects, mollusks, and reptiles; one and a half on fishes; one half on amphibians; and four on mammals. The books owe their massive, inconvenient size in part to the thick paper used, but there is also some utterly needless redundancy. The entire list of several hundred editors and contributors for the 13-volume set is reprinted in each volume, for example. Each bird volume has an appendix called "Systematic Classification" (21, 22, and 39 pages respectively). This is simply a list in systematic sequence of the taxa mentioned in the text or figures (some figured species are not mentioned). In volumes I and III some species are listed here without page number, meaning that they are neither mentioned nor figured. The value of such a listing escapes me; only a sampling, somewhat arbitrary, is given of species not otherwise covered in the book. The only information given in the "Systematic Classification" (except for these random additional species) that is not available in the text or the index appears to be the authority and date for the scientific name, information of minimal interest to the general reader to whom the encyclopedia is addressed.

The page width is not quite 7 inches, of which 4½ are used for the type bed. The wide inner margins are used for chapter subheadings, plate captions, distribution maps (tiny but usually adequate for general indications of range), and line drawings. The latter have been adapted from a great variety of sources (fully acknowledged in appendices), their quality obviously depending on that of the original. These figures are not referred to in the text, and many are far out of place—feather types are illustrated in the migration section and discussed 6–7 pages later.

Volume I begins with a 60-page introduction to the Class Aves, all written by W. Meise except for a page-long quotation from Lorenz. Some of this is adequate, but much is perfunctory, as so much is attempted in so little space. Sources of data are not credited (either in the introduction or in the main text), although each volume has a fairly extensive supplementary reading list of books, monographs, and journal papers. These are confined to works in English in this edition, so the reader has no access to the original data published in other languages except for the occasional mention of an author's name. Not unexpectedly, most of the examples given in such sections as that on migration are taken from the European avifauna. When Meise departs from familiar Old World birds, he occasionally make dubious or confused statements. He credits the American Golden Plover with a nonstop flight across the sea from Nova Scotia to Argentina in "about forty-eight hours" (pp. 29–30). I compute that this would require a constant speed of more than 100

miles per hour for the shortest possible straight line route. An example of the utter confusion that sometimes creeps in is Meise's statement on p. 52: "The only truly hibernating bird known thus far which becomes dormant for longer periods is the whip-poor-will [sic = Poor-will] (*Phaleanoptilus* [sic = *Phalaenoptilus*] *nuttalli*), a nightjar of the southerwestern [sic] United States." Coverage of some major aspects of avian biology in this introduction is utterly inadequate; examples include molt and voice.

The arrangement of the main text is somewhat uneven. Scope of numbered chapters varies from more than one order (grebes and loons) to part of a single family ("Magpie geese, geese, and their relatives"). The division between volumes I and II falls right in the middle of the Galliformes (and is wrongly given on the dust jacket); volume III includes the Coraciiformes, Piciformes, and Passeriformes. As might be expected, the latter are given in the "crows last" sequence. Each of the numbered chapters has a general introduction and (depending on the size and complexity of the group covered by the chapter) usually several subdivisions, often by other authors. Thus in volume I, chapter 6 ("The tubenosed swimmers"), the introduction, Procellariidae, and Pelecanoididae are by B. Stonehouse, Diomedeidae by J. Warham, and Hydrobatidae by F. Goethe.

The quality of the chapters is exceedingly uneven. Some were written entirely or in part by internationally known authorities on the group involved: ostriches by F. and E. Sauer, penguins by B. Stonehouse, cathartid vultures by K. E. Stager, phalaropes by E. O. Höhn, skimmers by R. L. Zusi, honeyguides by H. Friedmann, palmchats by A. Wetmore, white-eyes by G. F. Mees, cardueline finches by I. Newton, viduines by J. Nicolai, other weavers by H. E. Wolters and K. Immelmann, etc. Not unexpectedly, these are the most satisfactory chapters or subchapters with respect to worldwide coverage of large groups, first-hand authenticity of materials, etc. I found the chapter on pigeons by R. F. Johnston particularly well done.

Other chapters were assigned to authors identified with a region of the world rather than a particular group of birds. Thus several African families were written by C. W. Benson; Asian by B. E. Smythies; Neotropical by A. Skutch, H. Sick, and E. Schäfer, etc. These, too, are usually good, but understandably uneven, often emphasizing those species with which the author is most familiar in the field. The remaining chapters were assigned to a group of European authors, few of whose names were previously known to me. This is no doubt due in part to my own ignorance and provincialism, but it is nevertheless true that in many of these chapters a few well-known European species are heavily stressed at the expense of those from elsewhere, even though these latter may have a large literature of their own. The Capercaillie has 4½ pages, the Ruffed Grouse 15 lines. There are 9 pages on the White Stork, about 4½ on all of the rest of the Ciconiidae. The chapter on sandpipers and plovers is particularly neglectful of non-European species. In general the waterfowl are well covered (the Anseriformes, including the screamers, have three chapters to themselves), but imbalance is again noted. The authors indulge in the unnecessary luxury of a six-page quotation from Lorenz on behavior of the Graylag Goose, whereas the Canada Goose, one of the three or four New World bird species with the largest literature, is dismissed in 23 lines. The abundance of information presented on European species can, of course, be considered a plus for American readers thoroughly familiar with their own birds.

The format within most chapters and subchapters involves, first, a list of the species to be used as examples of a group, usually confined to English and scientific names and length in centimeters; brief statements of range or other abridged data

sometimes appear here. Then come the species accounts, in narrative form, using only the English names. These, incidentally, are not capitalized as is the custom in American ornithological journals. I find this irritating, as the species names do not "hit one in the eye" as they do when capitalized; one must read carefully to note when the narrative description switches from one species to the next. These accounts vary tremendously in relative length and merit. They constitute the heart of this work, and fortunately the average quality is high. Far too much space is wasted on simply naming or mentioning additional species. It would be more sensible merely to state that the "typical" species described in detail is one of, say, six in its genus rather than to name (with no additional information) an arbitrary two or three of the others.

As might be expected in a translated work, awkward sentences and strange words abound. Group names for birds are especially prone to this fault. The Mesitornithidae are called "stilt rails" ("stilted rails" in the table of contents); the genus *Colinus* (bobwhites) is known collectively as "tree quails"; the name "marsh hens" is given to the genus *Porzana*; "shorebirds" is restricted entirely to the calidridine sandpipers; the literal translation "noisemakers" is applied to the members of the suborder Clamatores (= Tyranni). Although the translators have managed a huge job with reasonable success, it would have been better if a British or American ornithologist could have checked the English names used for birds or groups of birds.

There are many, many typographical errors. As is always true in books intended for nonspecialists, such errors in common English words will give no trouble, but those in scientific or proper names and in numerals will not be detected by the average reader. Even the layman, however, will doubtless know that it was not in "1938" (vol. II, p. 286) that a dodo arrived in London and was stuffed!

The kinds of errors of fact, of translation, and of illustration that plague these volumes are well typified by the chapter on parrots in volume II. The sexes are said to be, as a rule, easily distinguishable, which just isn't so. Parrots are said to "usually breed in caves," which is undoubtedly a mistranslation for cavities. Parrots are "completely sessile" birds—only the context makes it clear that "sedentary" was meant. The misleading name "green parakeet" rather than Monk or Quaker Parakeet is used for *Myiopsitta monachus*, the range shown for the species in South America is too small, and it appears on a color plate (p. 335) in which the size relationships between portrayed species are all wrong.

This brings us to the colored illustrations, an important and well-advertised feature of this work (1300 pages in color in the full 13-volume set). These consist of photographs and paintings. Most of the latter are of collections of species to accompany the pertinent chapters, but volumes I and II contain several two-page folding plates of scenes: "North Sea coast in winter," "Bird migration on Lake Constance in the late fall," "Animals of the Amazon jungle," etc. These, of course, are hopelessly, unrealistically crowded; the quality of the individual birds and mammals portrayed is variable. The photographs are generally very good. Some, while not of the highest photographic excellence, admirably portray behavior: the female Ostrich shading her chicks from the sun, the Pink-backed Pelican feeding a nearly grown young, the sandgrouse chicks drinking water from the belly feathers of their father. An especially fine sequence portrays the hatching of a European Coot. Other photographic illustrations were less happily chosen. There are poor photographs of wild birds (e.g., "Black-necked" [= Black-headed] Heron, European Goldfinch), and good photographs of cage birds in awkward positions or less than optimum physical condition (Yellow Cardinal, Purple Honeycreeper). The Black-billed

Magpie photograph (vol. III, p. 501) appears to have been staged, with a (mounted?) bird placed on the grass in front of a pile of eggs (supposed to be the nest?).

The color plates contain unfortunate misidentifications and switched captions. The following are examples from volume III alone. On p. 149 the captions for the Hooded Pitta and "Steer's" [= Steere's] Pitta are reversed. On p. 184, the bulbul labeled *Criniger flaveolus* is actually *Pycnonotus leucogenys*. Figure 8 on p. 190 is a Short-billed Marsh Wren, not a Long-billed as captioned. On p. 335, the bird labeled *Chlorospingus phoenicotis*, Glistening-green Tanager, is actually *Tangara gyrola*, the Bay-headed Tanager. On the same plate, the captions for the two species of *Cyanerpes* are reversed. On p. 353 *Saltator atriceps* is called "Black-cheeked Ant Tanager." On p. 469 the captions for the *Grallina* and *Cracticus* figures are reversed. The *Cyanocorax "cayanus"* of p. 497 is an abominably rendered *C. yncas*, whereas the *"Cissilopha melanocyanea"* is in fact *Cyanocorax cayanus*.

Color reproduction, especially of the photographs, is generally good. The printing was done in Milan, and Italian color reproduction has an excellent reputation. Among the few exceptions are the muddy reds of the woodpeckers on p. 119 and the overly greenish plate of honeyguides on p. 66, both in vol. II, for example.

I have left until last the subject of the paintings themselves. A North American or a Briton poring through these volumes will have amply confirmed what he may have already deduced from looking at other books: the tradition in the English-speaking countries for lifelike, accurate, and lively portraits of birds is, with rare exceptions, absent on the European continent. One of the exceptions is P. Barruel of France, illustrator of Haverschmidt's "Birds of Surinam," who is fortunately represented by several attractive plates in the Grzimek work. Anyone who claims that mine is a purely chauvinistic statement is invited to study objectively the plates under review. It will soon be apparent that, aside from the plates by Barruel, a few of those by H. Heinzel and F. Reimann (artists are identified in the picture credits), and a few others, the illustrators vie for the prize in grotesquery. Postures are incredibly distorted; there are outright errors in anatomy and proportions; size relationships among species combined on a plate are ignored; soft part colors are inaccurate. The perils of painting unfamiliar birds from misshapen study skins or mounts is nowhere better shown than on the unbelievable plate of icterids (III, 381), in which a stiff-legged Bobolink is half again as large as a Yellow-headed Blackbird, and a chesty, neckless Baltimore Oriole stands flatfooted on huge meadowlark feet while nearby a Western Meadowlark, two-thirds the size of a Troupial, clutches a twig with tiny toes.

Although there are many good things about the bird volumes of this encyclopedia, the uncertainty of accuracy of text and captions and the poor quality of most of the illustrations suggest that the lay ornithologist can invest $90 much more fruitfully elsewhere. He can purchase both Gilliard's and Austin's books on birds of the world, and have plenty of change left with which to buy well-illustrated field guides and manuals for parts of the world of particular interest.—KENNETH C. PARKES.

Tanagers.—E. Nørgaard-Olesen. 1973. Vol. 1, **Tersinidae. Thraupidae genera 1–16**. 255 pp., 18 col. pls., 9 monochrome photos, many maps, some anatomic diagrams. English edition $17.50. Vol. 2, **Thraupidae genera 17–57** (in Danish; English edition not received to July 1974, but to be published in late 1974). 218 pp., 14 col. pls., 11 monochrome photos, many maps, some anatomic diagrams.

Danish edition D. Kr. 145.00. Each volume 8½ × 6⅛ in. Paper. Available from Skibby-Bøgerne, v/Aage Poulsen, Skibby, Denmark; English edition available from Pickwick Aviary, 1704 Pickwick Lane, Glenview, Illinois 60025.—This work describes or characterizes all known species or subspecies of tanagers—in the traditional sense—with their ranges, and provides brief summaries of much of what is known of their basic natural history. The author is a Danish aviculturist whose specialty has been tanagers for many years. The work is mainly illustrated by color photographs taken in captivity, chiefly, but not exclusively, of members of the genera *Chlorophonia, Euphonia, Tangara, Thraupis,* and *Ramphocelus.* While the quality of the plates varies, as is so often the case with photographic reproductions, some (e.g. *Chlorophonia flavirostris*, a number of the *Tangara* species, and *Heterospingus xanthopygius*) are of special interest because they have rarely, if at all, been shown in a published color photograph. Although serviceable for identification, two plates of color drawings, depicting six species, seem rather amateurish, and the yellow shown in *Tangara argyrofenges* misrepresents the silvery hue. The taxonomy and sequence are based on Hellmayr's "Catalogue of birds of the Americas," part 9 (1936), but the subspecific sequences and most nomenclatural changes and additional forms accepted by Storer in volume 13 of "Peters' check-list of birds of the world" (1970) are accepted, or at least mentioned in the text. However those "honeycreeper" genera treated by Hellmayr as Coerebidae, which Storer (following Beecher) placed with the tanagers, are excluded.

Since Sclater's now largely out-dated volume 11 of the "Catalogue of the birds in the British Museum" (1886) no single work has purported to describe all of the tanagers. The present work thus has importance not only to aviculturists (for whom it is primarily intended) but to the many ornithologists interested in neotropical birds. The first volume begins with a short general introductory section of eight pages, part of which is devoted to the care of tanagers in captivity. Then follows the main text treating each recognized genus, species, or subspecies. Although here maintained in a monotypic family, the Swallow-Tanager, *Tersina viridis,* is included. The family Thraupidae is deemed to consist of 57 genera and 208 species. Each species treated in the book (209 in all, including *Tersina* as no. 1) is given a number, but in the case of polytypic species, except that subspecies of a species bear the same number followed by a letter, the species as a unit is ignored (not even provided with an overall English name) and the treatment is under the separate subspecies. Each genus (except for some oversights) is briefly characterized, generally with an accompanying drawing of the head, useful chiefly to show bill shape. The etymological origins of the accepted scientific names are indicated. For each form one or more English names are supplied, that in Hellmayr (op. cit.) usually being accorded first listing, although sometimes Hellmayr used the same name for two distinct species; the name selected by Meyer de Schauensee (1966, 1970) for the species as a whole, now generally adopted in the literature on South American birds, is here either assigned solely to one subspecies or sometimes omitted. Various book names in other languages are mentioned in some instances. Under the heading "Nomenclature" are listed all scientific names, back to Linnaeus, ever applied to a form, with full literature reference to the first author to use a particular binominal or trinominal combination. This section (occasionally running to 20 lines) is of dubious value, for it is drawn from the fuller synonymy, essentially complete with references (to 1933), provided by Hellmayr (1936), supplemented by the few additional synonyms mentioned by Storer (op. cit., 1970)—works that systematists (the only persons needing such synonymy) would have to consult in any case. The most useful section is that

entitled "Description," which in the case of many subspecies is a brief comparative diagnosis. Average measurements of wing and tail (sometimes also of total length and bill) are usually given. "Distribution" is briefly indicated (with a small map), apparently based on Storer. Under the English heading "In the nature," much ecological and natural history data (sometimes including food and description of nest and eggs) are summarized, but rarely is anything mentioned on displays, voice, or incubation and nestling periods, even when published data were available. The information provided is drawn from the literature, but neither the publication relied upon, nor its date, and usually not even the name of the authority, is indicated. This is regrettable, for the literature is so scattered that reference to a major paper relied on for behavioral data on a particular species would have been of great use, as students (including aviculturists) would often find there additional interesting or desired details not mentioned in this book. Restriction of the "Nomenclature" section to those synonyms used in the past half century, giving full citation only of the original authority for the current name, would have met most needs and would have saved more than enough space for citing major behavioral references (all or almost all of which were published after the Hellmayr closing date). Under "Captivity" information is often given as to year and country of "introductions" (meaning here importation for avicultural purposes), but occasionally matters appear of general ornithological interest, such as behavior or nesting in captivity. The short bibliography at the end of volume 2 is intended primarily for aviculturists, evidently to assist in identification or indicate range, for the only journals listed are avicultural, and most of the books mentioned are those with many illustrations. Aside from one avicultural book, the Hellmayr and Storer tanager volumes, and Skutch's and Bent's "life histories," they consist either of illustrated general works or of regional identification guides or handbooks. Certainly ornithologists interested in tanagers will find the bibliography disappointing, for not mentioned are such significant works as the tanager volumes of the "Catalogue of the birds in the British Museum" and Ridgway's "Birds of North and Middle America," Slud's two Costa Rican bulletins published by the American Museum of Natural History (valuable for ecology, behavior, and voice), Moynihan's ethological papers on various tanagers, and Willis' papers on the genus *Habia*—to mention a few that readily come to mind.

In view of the considerable effort expended in preparing this work and its substantial price, it seems sad that there is so little indication of prior consultation with a knowledgeable ornithologist. Mention has already been made of the failure to give bibliographic references for behavioral and ecological data, while excessive space was devoted to technical synonymy. The handling of the illustrations seems careless on the part of the publisher. The color plates are scattered through the two volumes with little regard for the text sequence, and, while the birds depicted are identified on the plates by number and scientific names, neither the text nor the index indicates which species or subspecies are illustrated. Thus, only by thumbing over the plates will one realize, for example, that the little known *Chlorophonia flavirostris* is depicted by color photographs on plates 1 and 15, or indeed learn what other birds are illustrated. In the review copies color plates 13–18 inclusive, and eight of the black-and-white photographs, appear in both volumes. Had there been a table of contents listing the plates, or had the index mentioned the illustrations this repetition probably would have been avoided. Despite the shortcomings mentioned, the work (notably the descriptions and photographs) has undoubted usefulness, especially to students situated at a distance from an adequate neotropical bird collection and ornithological library.—E. EISENMANN.

Motivation of human and animal behavior: an ethological view.—Konrad Lorenz and Paul Leyhausen. 1973. New York, Van Nostrand Reinhold Co. Pp. xix + 423, figs. $15.95. **Imprinting: early experience and the developmental psychobiology of attachment.**—Eckhard H. Hess. 1973. New York, Van Nostrand Reinhold Co. Pp. xv + 472, figs. $19.50.—Van Nostrand Reinhold is publishing a series of volumes on behavioral science under the consulting editorship of Erich Klinghammer, and two of the three initial volumes are definitely "Lorenzian" in outlook—or should one say "in retrospect"? "Motivation of human and animal behavior" is not really by Nobel Laureate Konrad Lorenz, except for the initial 31 pages translated from a 1939 paper on the comparative study of behavior. Aside from a foreword by Eckhard Hess and separate prefaces by Lorenz and Leyhausen, the book is entirely translated articles by Paul Leyhausen, one of Lorenz's oldest and most devoted disciples. Leyhausen's empirical studies center about the predatory (especially killing) behavior of the domestic cat and its relatives, and thus hold a sadistic interest for ornithologists. Many of the articles were originally written for popular and semipopular periodicals on education and educational psychology, and the exposition is as didactic and dogmatic as the concepts are dated and obtuse. Articles on drive, will, displacement activities, quasi-physiology, territory, sex, social organization, population density, fear, and communication are all based on Konrad Lorenz's original conceptualizations of behavior, liberally sprinkled with Leyhausen's fundamental confusion between operationalism and empiricism in science (e.g. pp. 218 ff) and an unswerving and naive belief in group selection (pp. 248 ff). The solid part of this book is the 1965 paper on killing behavior in 15 species of felids and their relatives (genets and civets), a section that occupies some 50 pages of the 400-page book. The volume may be of passing interest to historians of ethology or epistemology, but it seems unlikely to end up on the bookshelves of many ornithologists.

"Imprinting" of Eckhard Hess by contrast deals nearly entirely with birds. The titular word is by now so widely used that it seems barely necessary to remind ourselves that it is a translation of the German *Prägung* (meaning stamping, as in coin manufacture), a term that originally referred to the way in which young precocial birds learn very rapidly the perceptual characteristics of their species. The phenomenon was known to Spauling and James in the previous century, named by Heinroth, and popularized by Lorenz. It was Hess, working in Ramsey in this country, and Eric Fabricius working independently in Sweden who first experimentally dissected imprinting. The general testing procedures and apparatus developed by Hess still dominate research in the discipline throughout the world. Prominent reviews of imprinting have been penned by Bateson and by Saltzen and Sluckin, but the present book marks the first review by one of the pioneers in the field.

Let me say it here to avoid the formula ending. Everyone seriously interested in the behavior of birds will want to own this book, if for no other reason than to see how a brilliant but puzzling mind develops a particular viewpoint on an important concept. The book is also an important, if disjointed, review of a scattered and complicated literature.

After a foreword by his mentor, Konrad Lorenz, and his own preface, Hess traces the history of the nature-nurture dichotomy from ancient times and documents the varying uses of the word "instinct" in the last couple of centuries. Hess continues with a discussion of the history of early experience concepts, contrasting "primacy" with the viewpoint of "sensitive periods." The use of the former term seems to be uniquely that of Hess, for it is my reading of authors who use it that

"primacy" is contrasted with "recency"; if what one learns first is more important than what one just learned, the effect is one of primacy instead of recency. Hess uses the primacy concept to refer to the developmental viewpoint that what one learns first structures what he learns later. Hess then contrasts this viewpoint with that which holds that phases or periods in development exist where specific things are best learned, and his discussion is both interesting and wide-ranging, touching upon the writings of Freud and Maria Montessori among others. The emergent viewpoint is that each stage does still prepare the developing organism for the next. In an original section Hess asserts that there are three kinds of developmental sensitive periods: *critical periods* in which something must be learned or the animal will ever be behaviorally abnormal, *susceptible periods* in which how it responds to stimuli dictates how it shall forever respond to those stimuli, and *optimal periods* in which the animal can most readily learn stimulus-response associations. He ends by reasserting his belief that sensitive-period learning is fundamentally different from the associative learning of adult animals, a point with which he is likely to find himself at odds with many contemporary behaviorists.

It is when Hess begins the third chapter with his own formulations that the book begins to get difficult. On page 65 imprinting is referred to as "a type of process" and then later as an "experience." Turning the page, imprinting becomes a "mechanism" and then later an "event." The discussion is sprinkled with references to "original innate behavior patterns," "later-appearing innate social behaviors," "genetically programmed learning mechanisms," and other undefined, conceptually loaded terms. Ethology has recently begun to show signs of intellectual maturity through careful defining and consistent use of complicated concepts, and by employing operationalism in nontrivial ways; the formulations in this book will not help this laudable trend. The text proceeds to trace competently the history of imprinting from antiquity through Lorenz to the beginnings of modern laboratory studies. The author then lapses back into a confusing introduction to a review of modern studies, again reasserting that imprinting is distinct from association learning and other phenomena. The arguments are devious, but as I read (and reread) them they strengthened the suspicion that no evidence can dissuade Hess from his position—because if the evidence *seems* to be contradictory, he refers it to one of those other processes. If any one single factor has held back the blossoming of ethology more than any other, it has been the championing of unrejectable theories such as those that permeate the writings of leaders from all viewpoints (e.g. T. C. Schneirla, K. Z. Lorenz, etc.). To emphasize a strength, however, one must point out that the following 100 pages of literature review is probably the most thorough and objective such endeavor in print. It is quite clear that Hess has looked at the data, not just the conclusions and interpretations of the various authors.

In the next 100 pages Hess reviews the experiments of his own laboratory with hardly a mention of the work of others that he reviewed in the previous pages. In sections according to species the evidence concerning various concepts and variables is systematically recounted. Was this format a convenient way to compile, used for continuity of the author's own research, or pure accident? Whatever the reason it divides imprinting studies into two kinds: those done by others and those by Hess and his students, and never the twain shall meet. The naive reader cannot discern the controversy surrounding the author's results and concepts; how can he know, for instance, of the repeated challenges to Hess's so-called "Law" of effort when

the "Law" is merely recounted here in different species accounts almost as simple unassailable fact?

Hess then reviews "imprinting" to food, auditory stimuli, and habitats in a brief review that strengthens his contention that sensitive-period learning is widespread in different behavior. This chapter is followed by another useful one on imprinting in mammals, including the human mammal.

In "Theoretical interpretations of imprinting" the author identifies three types of theory: that imprinting is like other learning (type 3), that it is an early exposure-learning in a previously naive animal (type 2) and it is fundamentally different from other learning (type 1, Hess's theory). Like other puzzling aspects of this book, the types are considered in the reverse order of their numbering. This chapter shows some interaction between Hess's views and those of his critics, but it is not sufficient to resolve the previous isolated presentations of findings.

It seems appropriately puzzling that Hess, who pioneered the laboratory study of imprinting, ends the book by his return to the study of the natural history of imprinting. It is a laudatory conclusion, but in some ways leaves the reader with a sense of relief that all the issues that can be settled under controlled conditions of the laboratory have been settled. Perhaps in one person's view they have been. —JACK P. HAILMAN.

Song of the north wind/A story of the Snow Goose.—Paul A. Johnsgard. 1974. Garden City, New York, Anchor Press/Doubleday. 150 pp., 17 very fine drawings by Paul Geraghty, 27 excellent photos taken by the author, and 2 really informative maps repeated in front and back endpapers. $5.95.—This book is a joy to read, and it is an exceptional pleasure to review a book to which I can give wholehearted praise.

The book tells the life cycle of a Snow Goose, his mate, and offspring from one June to another. With the author we watch the Snow Goose courtship rites, mating, nest building, and laying of a clutch of eggs. Then after three weeks of incubation by the female and guard duty by the male, the goslings hatch. The parent birds lead them to water, molt, and prepare for migration. We go with them to each stop on the way from Southampton Island in Hudson Bay to the wintering grounds on the Gulf of Mexico, and in the spring travel northward with the survivors through a continent full of hazards. It is an adventure tale as well as beautifully written natural history.

The book is also the story of all Snow Geese and their effect on man and man's effect on them through the ages. Interwoven with Indian and Eskimo legends, the book is proof that in the heart and mind of a prosaic biologist lurks a writer of poetic prose.—ELIZABETH S. AUSTIN.

The double elephant folio: The story of Audubon's birds of America.—Waldemar H. Fries. 1974. Chicago, American Library Assoc. Pp. xxii + 501 + monochrome illus. on unnumbered pp. [= 568 pp.], 1 col. pl. (frontis.). Cloth, 7 × 10 in. $45.00.—Herein is a detailed accounting of the genesis, production, and provenance (to late 1973) of what Audubon justifiably referred to as his "Great Work." The task, by an obviously dedicated bibliophile, of assembling so scattered a collection of Auduboniana, was not done in haste; it required more than 15 years of search and study. Anyone interested in Audubon's successes and frustrations in creating the "Double elephant folio," or in knowing who subscribed to it, or the

history of a particular set, or the breaking up or loss of complete and incomplete sets, or the whereabouts of extant copperplates, or almost anything else regarding the work and its influence, will turn to this volume. Nothing seems lacking, except possibly discretion forbade recording the price that some present owners paid for their sets.

Fries' book is attractive and very well manufactured, with a strong and decorative binding. Various illustrations, as of plate legends, volumes on display, and so on, add a dimension to the work. In a rather rapid reading, this reviewer noted a single (minor) error in text.

Almost concurrent with receipt of the review copy of Fries, a dealer's catalog arrived that listed for sale a total of 116 plates from the "Great Work." Not included are some of the more famous ones—for example, the Wild Turkey. Two plates (of shorebirds) are offered at $600 each, a considerable number are priced in the range $650–$850, and others on up to $3,850 for Plate CCCI—"Canvas Backed Duck." The total asking price for the 116 plates is $135,975. Fries, in the front matter of his book, mentions a set that was sold in 1969 for $216,000 as the highest price paid "to date" for the four volumes (which would include 435 plates). Surely one would hope that, regardless of the market for individual plates, at least the remaining complete sets of so monumental a work will remain intact.—RALPH S. PALMER.

ALSO RECEIVED

Seventy years of birdwatching.—H. G. Alexander. 1974. Berkhamsted, Hertfordshire, England, T. & A. D. Poyser Ltd. 264 pp., 12 undistinguished black-and-white photos of people and 2 of places, many text figs. of birds drawn by Robert Gillmor, 6 maps (without any scale) mostly of birds' nests in local English areas. £3.80.—This pleasant memoir written with the aid of carefully kept field notes will undoubtedly be of value to an English student of avian population trends in the 20th century. It is too bad that the author did not stop writing at the end of chapter 9. His "Winter birds in the mid-Atlantic states of North America" is full of minor inaccuracies, unresearched, and a mine of misinformation about introduced species. His "Some Indian birds" is a report of a tourist under the guidance of Salim Ali with a little Dillon Ripley thrown in for good measure, and the concluding chapters are surmises and theories and speculations without recourse to banding data or much of the modern research and techniques for solving avian behavior.—ELIZABETH S. AUSTIN.

Wildlife in an urbanizing environment.—John H. Noyes and Donald R. Progulske (Eds.). 1974. Amherst, Massachusetts, Cooperative Extension Serv., Univ. Massachusetts. 182 pp., illus. with a few undistinguished black-and-white photos. Soft bound. $3.00.—This is the report of a 2-day symposium conducted by the departments that published it; the U.S. Dept. Agr., Forest Serv.; Dept. Forestry Wildl. Mgmt., Univ. Mass.; Mass. Div. Fisheries and Game; Mass. Cooperative Wildl. Res. Unit (USDI); Mass. Audubon Soc.; and Wildl. Soc. It is a fine example of the methodology of governmentizing and be-whiching the English language into a lingua franca of civil service. Only a few of the 34 slender papers are on birds—one on robins, two on Mallard ducks, one on aircraft and wildlife, one on the effect of urban development on bird populations, and a "Technique for evaluating bird

habitat." A few others touch briefly on bird life, such as "Cemetery ecology," but none adds any new or startling facts to ornithological knowledge.

What the study of dogs in cities has to do with wildlife I have yet to learn in spite of reading the article about them. It would have been more cogent to include an article on cats. Not a single bibliography referred to any of the many books on birds of our great cities, such as John Bull's "Birds of New York." The article on tree squirrels makes a flat statement that "rabies is an almost non-existent hazard (Flyger 1970)." This may be true in Maryland, but is definitely not (by personal experience) in Florida.

An exceptionally well-written paper, a great contrast to most of the others, is "Wildlife in your backyard" by James D. Davis, Director, Creative Services Division, National Wildlife Federation, Washington, D.C. In essay form and simple English he tells how wildlife can be drawn to yards, gardens, and even high-rise apartments. Mr. Davis finds English adequate and does not resort to jargon.—ELIZABETH S. AUSTIN.

Ornithology at The University of Michigan Biological Station and the birds of the region.—Olin Sewall Pettingill, Jr. 1974. Kalamazoo, Michigan, Kalamazoo Nature Center (Spec. Publ. No. 1). Pp. v + 118, 6 black-and-white photos, color photo by Bruce J. Batts on the cover, 2 endpaper maps. Soft bound, no price given.—This concise history of a biological research station established in 1909 on cutover devastated land is also a lesson on the ability of flora and fauna to reestablish themselves under the protection of conservationists. It compares abundance and/or scarcity of individual species of birds at the station over the years. In evaluating the avian population studies, Dr. Pettingill considers all contributing factors—reestablishment of the forests, lake water levels, pressures of new human settlements, introduction of highways, and modern transportation. All these facets make his paper of interest to a wide audience and not just those who work in Michigan. It is regrettable that both end maps are badly placed, and the careless binding of my copy of the booklet makes hash of Douglas Lake and the location of the research station. The details of field breakfasts, supplies, and recipes may lure some students for eating, if not for study, but the annotated bird list will bring serious students from near and far.—ELIZABETH S. AUSTIN.

Man and birds.—R. K. Murton. 1974. New York, Taplinger Publ. Co. Pp. xx + 364, 32 black-and-white photos, numerous charts and graphs. $8.95.—This is a book on the economics of ecological effects of bird conservation in Britain. It was written for the British public by a British ornithologist who uses nothing but the common names of the birds. It will cause much confusion among an uninformed laity in this country who are unaware the British Robins, Blackbirds, Goldfinches, etc. are not the same species and sometimes not even the same families as those birds with the same names in this country. The book will be of little use to laymen or ornithologists in America unless they are preparing for a life of farming, fishing, or forestry in England. Taplinger has done it again—this publisher has a knack of bringing useless or bad bird books to the U.S.A.—ELIZABETH S. AUSTIN.