

## REVIEWS

EDITED BY JOHN WILLIAM HARDY

**Bird Song: Acoustics and Physiology.**—Crawford H. Greenewalt. 1968. Washington: Smithsonian Institution Press. 194 pp., 168 figs., 23 tables, 8 × 11 in. \$12.50.—Most bird sound analyses in recent years have been made using the sound spectrograph. While this method has many advantages and uses, and is a distinct improvement over aural methods, other methods permit more detailed analyses and are more applicable to studying certain problems. This volume describes and uses several of these methods. A series of chapters discuss particular acoustic phenomena and their relationship to the structure and production of bird sound; there is also one chapter on auditory discrimination.

Vocalizations of birds differ from those in man in having sounds produced with relatively few harmonics, and in having the information content usually coded into the fundamental. In a series of chapters Greenewalt demonstrates first how precisely the "whistled songs" (those with a single fundamental and no harmonics) can be characterized. Next, the mixture of two such sounds is demonstrated. Such mixtures, which produce sounds of distinctive quality, are shown to be used by more species than previously suspected. Few people, for example, might have attributed such capability to the American Bittern or the Greater Yellowlegs, though several authors have previously shown such mixtures in oscine songs. The two octave difference between the components of the Bittern's "pumping" is truly remarkable.

The phenomena of modulation are discussed in a series of chapters. The author uses four categories—phrase with beats, source-generated modulation; source-generated harmonic spectra; and source-generated pulses modulated by tracheal resonance—to describe not only true modulations, but those phenomena that are easily confused with it. The chapter on source-generated modulations, which includes a discussion of coupling of amplitude and frequency change, I feel is one of the more significant contributions to the understanding of bird sound and its production.

The chapter on tracheal modulation will come as a surprise to many readers who assume that tracheal length is an important influence on the difference in sound between such birds as the Whistling and Trumpeter Swans.

The constraint on membranes as a source of harmonics is, so far as I know, entirely new in its application to bird sound.

Of special interest, perhaps, among bird sound analyses presented in this book is the one that concerns the Mynah's ability to imitate human speech. Spectrograms show the similarity between the overtone pattern (formants) of human speech and the imitations of the same sounds as "spoken" by the Mynah. The analysis of the harmonic spectra of these sounds also shows great differences, i.e. the amplitudes of the human formants decay within the period of a single pulse, while those in comparable sounds of the Mynah do not. The former is characteristic of resonated sound; the latter is not. Here Greenewalt concludes that the Mynah's ability is a function of syringeal control and operation and is not the result of resonance, as is characteristic in human speech.

From the performance of repetitious patterns by several songbirds, Greenewalt presents data from which he concludes that the temporal discrimination of birds is not greater than 0.5 msec (i.e. it may be as much as 50 to 100 times better than the human ear), and the frequency discrimination may be comparable to that of the human ear. These data are derived by an entirely different method from that used by previous students of the avian ear.

The illustrations are clear and often show the same sound analyzed by different methods (e.g. oscillograms and spectrograms, or oscillograms and instantaneous frequencies). In a few instances in the chapter on "whistled song" the spectrograms unexplainedly have been omitted. The book is accompanied by two 7-inch, 33 $\frac{1}{3}$  rpm records that present many of the specific sounds from which the analyses and illustrations have been made. These records are useful, not only for hearing some of the different sounds, their quality and characteristics, but also as specimens from which any serious investigator can make his own analysis for comparison. The original recordings are mostly from material in the Library of Natural Sounds at Cornell University. Although perhaps of minor interest to most readers, including a tabulation of the original field data for each recording would have been valuable.

As the title states, this book is concerned primarily with the structure and production of bird sound. In presenting his data on sound structure Greenewalt utilizes sound recordings of a great variety of species, from loons to fringillids, and analyzes them in more, and in more sophisticated ways than have other authors. Here he succeeds admirably. He interprets the functional operation of the syrinx in a series of plausible hypotheses, but his case is limited by a lack of experimental data—either original or from other sources. Experiments of the sort he suggests, however, can give meaning to the present understanding of variations in syringeal anatomy. With these hypotheses he points out a way that bird sound can be explored productively. The book is well worth the consideration of students of bird sound, and should provide many new and interesting ideas to any ornithologist who is interested in a more comprehensive knowledge of his field.—ROBERT C. STEIN.

**Desert biology.**—G. W. Brown, Jr. (Ed.). 1968. New York, Academic Press. Pp. xvii + 635 (vol. 1), 25 black and white photos, 40 text figs., 53 tables, and 4 appendices, 6 × 9 in. \$29.50.—Deserts and steppes constitute about one-third of the earth's land area. The human population is now increasing by one-third every 14 years, so in that brief span the arid spaces could be populated by our reproductive excesses without improving the world's standard of living. This limited capacity of deserts to absorb population growth notwithstanding, the editor states: "Application of these [schemes for water diversion, desalination, weather modification, etc.] will contribute to the economy and comfort of those of an expanding world population who chose to live . . . within a desert or arid region biome." The biotic diversity of the deserts is threatened. Brown adds, "Man's understanding and appreciation of the arid environment are essential if he is to utilize and not abuse it."

Information on desert ecosystems, necessary for understanding the biology of desert birds as well as for the wise use of desert resources, is scattered widely in journals of agriculture, medicine, meteorology, geology, and biology. A great service has been rendered by consolidating the available knowledge into a single treatise. This begins with a holistic perspective in J. L. Cloudsley-Thompson's bio-travelogue: "The Merkhayat Jebels: a desert community." The ornithologist interested in desert habitats will find the following four chapters very informative: II: "Causes, climates, and distribution of deserts" (R. F. Logan) and III: "Geologic and geomorphic aspects of deserts" (H. T. U. Smith) provide biologists with clear, well-organized surveys. Smith also points out the difficulties in reconstructing the histories of deserts, of interest in speculations about evolutionary adaptations to hot, arid conditions (cf. pp. 55–56 and 89–94 vs. pp. 207, 282, 388, 400). In IV: "The evolution of desert vegetation in North America," A. W. Johnson concentrates on the California deserts, about which there is more information on fossil record, climate, physiography, and

present flora than from other deserts. V: "The biology of desert plants" (J. A. McCleary) is worldwide in coverage and highly informative. The longest and least digestible chapter is VI: "Biology of desert amphibians and reptiles" (W. W. Mayhew). This extensive literature survey (over 1,250 references) is a gold mine for herpetologists, but lacks explanations, definitions, and critical interpretation. This is followed by "Temperature regulation and water economy of desert birds" (see below) and "Temperature regulation in desert mammals" (Chapters VII and VIII, both by W. R. Dawson and G. A. Bartholomew). We tend to think of deserts mostly in terms of terrestrial problems, but in IX: "Desert limnology," G. A. Cole conveys an awareness of the aquatic habitats of deserts and their unique physical, chemical, and biological features. This exciting discovery is marred only by undefined jargon (e.g. *endorheic*, *arheic*, *exorheic*, *astatic*, *thinoletic*, *rheocrene*, *limnocrene*). The last chapters relate more to man. S. A. Minton, Jr. discusses natural history, biochemistry, and toxicity in X: "Venoms of desert animals." This will interest anyone from naturalist to clinician. XI: "Human adaptations to arid environments" by D. H. K. Lee includes adaptive responses; physiological failures such as heat stroke, exhaustion, and cramps; sociology; psychological adjustments; and environmental technology. What about man-made deserts? A review of man's effects on the ecology of arid lands is needed, but is absent from the list of tentative topics for Volume II.

The chapter on desert birds is of primary interest to ornithologists and so warrants more detailed comment. Essentially this is a revised and extensively updated version of Dawson and K. Schmidt-Nielsen's 1964 review (Chap. 31, *Handbook of physiology: Adaptation to the environment*, D. B. Dill, Ed.). The coverage includes twice as many references. The productivity and stimulating influence of Dawson and Bartholomew in this field are noteworthy, in that two-thirds of the 42 new publications cited were contributed by them, their students, or student's students. From their previous work and a dissection of "B. Physiological aspects of temperature regulation," it is obvious that the authors understand heat balance during hyperthermia. However, the discussion could have been much less confusing to the reader if clearer distinctions had been made between transient and steady states (heat storage and thermal balance, respectively), between cause and effect, and in different experimental conditions. E.g.: "At ambient temperatures approximating 40°C . . . most species do not achieve thermal balance by evaporative means and heat therefore *must* be stored . . . . Evaporative cooling therefore generally appears important in *limiting* the storage of heat by birds at high ambient temperatures *rather than preventing it*. . . . However under low humidities a number of species have been found to *dissipate all* of their heat production by evaporative means at 44.0–45.9°C" (emphasis mine). If they can at 44°C, why can't they at 40°C? It is because transient heat storage raised the body temperature above that of the 40° environment, preserving a small gradient for heat loss by nonevaporative means (conduction and radiation). But thermal balance *is* subsequently attained and further heat storage *is* prevented, largely by evaporation. An expansion of the brief paragraph on heat transfer (pp. 363–364) or a chapter on environmental physics, to give the underlying principles, would have clarified this. (Heat transfer is treated more extensively for man in Chap. XI, but for application to birds, see instead reviews by King and Farner, Chap. 38 *in Handbook of physiology: adaptation to the environment*, 1964; or Birkebak, *Intern. Rev. Gen. Exp. Zool.*, 2: 269, 1966). Metabolic and evaporation graphs for the Cardinal reappear here, although Lasiewski et al. (*Comp. Biochem. Physiol.*, 19: 445–457, 459–470, 1966) showed that an unnaturally high humidity for deserts was probably imposed on the regulatory abilities of the birds when exposed to high temperatures in an experimental system

with low airflow, similar to that in which the Cardinal data were obtained. Thus it is reasonable to question whether the 40–42°C Cardinal data have any relevance to a discussion of desert birds. Graphs such as that for Lasiewski et al.'s "hypothetical bird" would have been helpful and a better use of the space.

Resonant frequency, as applied hypothetically to gular fluttering of heat-stressed goatsuckers, is misunderstood (p. 362). If the Poorwill were vibrating at the resonant frequency ( $f$ ) of his gular system, the addition of weight ( $M$ ) to the system should

decrease the frequency, because  $f = \frac{1}{2\pi} \sqrt{\frac{S}{M}}$ .

The information on water economy has been significantly increased with an updated incorporation of material from the excellent review of avian water economy by Bartholomew and Cade (Auk, 80: 504, 1963) and from references as recent as 1968. The tables on water intake and the utilization of saline solutions will be particularly useful. A similar tabulation of urine, nasal secretion, and plasma concentrations would have been a valuable addition, and better use of space than Table 1, the two lines of which occupy an entire page while the essence is also in Figure 4. An alternative to its deletion would be enrichment of the table with calculations from a wider range, from small passerines to Rhea, Emu, and Ostrich.

The conclusion that desert birds are physiologically similar to nondesert species is reiterated here. Thus behavioral mechanisms must be important. There is a short section "Behavioral aspects of temperature regulation" and also a paragraph on field observations of drinking behavior. The use of suction-drinking for rapid intake by columbiforms is cited, but other references to this interesting and valuable mechanism have been overlooked: in arid-land grassfinches (Immelmann, Zool. Jahrb., 90: 1–196, 1962) and mousebirds (Cade and Greenwald, Auk, 83: 126–128, 1966). Also missing is the drinking behavior of the sandgrouse (Cade et al., Auk, 83: 124–126, 1966). However, Cade and Maclean's fascinating confirmation of water transport in the feathers of the sandgrouse is cited under "Succulent Food." If the reader must suffer eyestrain from the glare of 635 slick-finish pages, so that only 18 acceptable and 7 inferior photographs could be reproduced in the other chapters, some of Cade and Maclean's sandgrouse plates would have been a compensation in this chapter.

Lest we entertain illusions of progress in desert ornithology, the "Discussion and Summary" of the bird chapter bring us back to reality. Four years and 42 papers have left all 9 of the 1964 conclusions intact (though corroborated) and added none. There is nothing new under the desert sun, although the general picture has been confirmed by studies of other species.

In addition to the glossy paper, the method of citation makes the reading of this book very tedious. When the citations become so profuse that one wonders whether the objective is professional recognition or desert biology, and gets lost in chopped-up sentences (e.g. pp. 230, 236, 251, 289, 361), citation by number would be a great improvement.

According to the editor, the two volumes of "Desert biology" "will introduce upper division and graduate students . . . to the attributes and problems of desert life in the arid zone . . . the individual chapters will be of value to specialists and generalists alike." For introducing students and nonspecialists to desert biology, this volume cannot compete, in clarity or price, with books already available. Particularly for the environmental chapters (II–V and IX) however, this is a significant reference work, and any specialist who can afford it should acquire "Desert biology," vol. 1.—WILLIAM A. CALDER, JR.

**Hummingbirds and their flowers.**—Karen A. Grant and Verne Grant. 1968. New York, Columbia University Press. vii + 115 pp., 24 col. pls., 10 × 7¼ in. \$17.50. —The Grants have long been in the forefront of research in pollination biology, and in this attractive volume they present “the first broad, comparative treatment of a single pollination system . . . based on adequate field observations.” This field work extends back to 1949 and covers much of western United States, in particular Southern California. The subjects treated are the functional morphology, geographical and ecological distributions, and evolution of hummingbird-pollinated flowers; the ecological relationships between hummingbirds and their flowers; and the evolutionary problem of reciprocal selection, “the stepwise development of a coadapted system.”

This is not primarily an ornithological work. No significant new information on the hummingbirds themselves is presented, and most of the background information on hummers was drawn from such general works as Austin's “Birds of the World,” Bent's “Life Histories,” and Ridgway's 1891 monograph. A purely ornithological critique is thus hardly justified; I shall rather try to evaluate the author's discussions of evolution and coadaptation, and of hummingbird pollination in Southern California.

The chapters dealing with the functional morphology, ecology, and evolutionary relationships of hummingbird flowers are generally excellent, containing clear and concise discussions illustrated with pertinent examples. The authors list 129 plant species in western North America that they consider have hummingbird flowers; hummingbird pollination has been confirmed in 41 cases. I wonder whether protection of the ovules is really so important in hummingbird flowers as the authors suggest. Hummingbirds characteristically probe as shallowly as possible with the bill and use the extensible tongue to maximal effect. The observations on the relation between cross-pollination and hummingbird territoriality are valuable, as they bear directly upon the genetic aspects of reciprocal selection—an important subject still untouched.

The authors demonstrate in considerable detail a correlation between the occurrence (or absence) of hummingbirds and their flowers in various California habitats. Distressingly they state that neither occurs on the Mojave desert, where Costa's Hummingbird breeds commonly and several other species occur in migration. According to my observations *Isomeris arborea* is a staple food plant of hummingbirds on the Mojave; moreover, it is predominantly hummingbird-pollinated, at least early in its blooming season. Its claim to a place on the list of hummingbird flowers seems at least as good as that of, say, *Agave* (which was included on the list with a question mark, and without confirmation by field observations.)

The chapters on the evolution of hummingbird flowers suffer from insufficient consideration of the ecological and evolutionary pressures operating on hummingbirds. One important point not treated effectively is why, and in what ecological contexts, hummingbird pollination might have been more advantageous than the ancestral bee pollination. The authors restate their hypothesis that the diversity of hummingbird flowers in high mountains is a result of the post-breeding concentrations of hummingbirds there, but the causation need not have been all one way. Some consideration of the climatic and other factors that induce hummingbirds to head for the hills after breeding seems needed.

A chapter is devoted to K. Grant's hypothesis concerning red coloration in hummingbird flowers. The conflicting results of various investigators on hummingbird color preferences are presented, but no systematic attempt is made to resolve them. One potential consequence of a common floral coloration that deserves consideration is the possible competition for pollinators between sympatric species of hummingbird flowers, which the authors show (pp. 51-52) can exist.

The final chapter, on reciprocal selection, all too clearly demonstrates that when the treatments of the two halves of a coadapted system differ widely in quality, the synthesis is bound to suffer. In general the treatment of the hummingbirds in no way approaches the high quality of the discussions of floral biology; as a result, a number of key topics receive at best superficial treatment. For instance: why is nectar such an advantageous food? What are the behavioral correlates of a nectarivorous diet? How does the extreme development of feeding territoriality in hummingbirds fit into the picture? What ecological and evolutionary advantages do hummingbirds offer as pollinators? Valuable perspective might have been added by a consideration of the reasonably well-documented post-Pliocene history of vegetation in western North America.

Some comments on the format are in order. The authors have attempted to create a book that appeals to everyone from the specialist in pollination biology to the amateur naturalist. Their writing style is clear and readable, and reasonably nontechnical. The printing is attractive, though decidedly uneconomical of space; I found no typographical errors. The list of equivalent Latin and common names is of dubious utility and could easily have been subsumed into the index; a glossary would have been far more helpful. Some hummingbird references cited in the text were not listed in the bibliography.

The 24 plates, each consisting of four to six color photographs, depict many of the flowers, habitats, and hummingbirds discussed in the text. In subject matter and reproduction the hummingbird pictures vary from excellent to poor, and an extraordinary amount of needless duplication of subject matter is evident. Fully half the hummingbird pictures could have been eliminated without sacrificing one iota of essential information. This might also have reduced the book's price, which is exorbitant for so short a volume.

This book is an important contribution to the field of pollination biology. Had its coverage of hummingbirds been up to its treatment of their flowers, it could have been an evolutionary classic.—F. GARY STILES.

**Waterfowl: their biology and natural history.**—Paul A. Johnsgard. 1968. Lincoln, Univ. Nebraska Press. 138 pp., many halftone and col. photos. Introduction by Peter Scott. \$8.95.—Paul A. Johnsgard, at 37, is one of the most productive and knowledgeable experts in the field of waterfowl biology. His numerous technical papers on the Anatidae and his "Handbook of waterfowl behavior" are certainly notable contributions to ornithology. In "Waterfowl, their biology and natural history," he writes to an "audience of nonprofessionals who have little experience with or immediate access to the technical literature. . . ." Although his efforts at popularizing ornithology are not, in my opinion, as impressive as his technical contributions, this book will appeal to a large number of ornithologists who are interested in a less comprehensive treatment of waterfowl than Delacour's "The waterfowl of the world" (London, Country Life Limited, 1964).

The bulk of the book is simply a popularized account of waterfowl biology—ecology, sound production, breeding biology, behavior, evolution, etc. In chapter 9 Johnsgard refers to gaps in our knowledge about several extinct ducks and introduces questions regarding the taxonomic position of a few confusing species (e.g. *Corscoroba* Swan, White-backed Duck, and Freckled Duck). Chapter 10, "Waterfowl, man, and the future," convincingly portrays the plight of some endangered species. Chapter 11 contains a key to the living genera of Anatidae, but this key is of questionable value to the nonprofessional. Chapter 12 is an excellent and useful annotated list of the Anatidae of the world.

The illustrations (mostly Johnsgard's own photographs of captive birds) vary from excellent to inadequate. More than a third of the 148 photographs are in color and several, such as the Comb Duck, White-faced Whistling Duck, and Red-crested Pochard (to mention a few) are striking and quite beautiful. A few of the black and white photographs are inferior and hardly instructive (e.g. the New Zealand Brown Teal, Brazilian Teal, Pink-footed Goose, and Australian Blue-billed Duck). I was personally annoyed by the omission of scientific names and ranges beneath the photographs. Many of the better layman's books provide this information so that those who are interested will not have to search the text. To include this information would not make the book too "technical," certainly no more than including the key to anatid genera.

The task of popularizing science is, admittedly, quite sticky, as Johnsgard is aware. Since "laymen," with regard to waterfowl, comprise such diverse groups as seasoned duck hunters, wildlife technicians, and week-end birdwatchers, it is perhaps a little unfair for a reviewer to be too categorical in defining what is appropriate to include in a book of this sort. Still it seems to me inappropriate, in a nontechnical book, to burden the reader with one's own systematics, rather than follow a standard taxonomy. Is the layman, for instance, really interested in distinguishing between Johnsgard's and Delacour's subfamilies and tribes?

With regard to common names, it is perhaps regrettable that in North America we designate all dendrocygnids as "tree ducks," and Johnsgard duly explains why this term is misleading. As the name "tree duck" is almost universally used in North American publications, Johnsgard might have at least mentioned in his world list of anatids that the name "tree duck" is an important and widely used synonym for the whistling ducks. (In the text, he does allude to this and "tree swans," as synonyms for the whistling ducks.)

The chapter on vocalizations describes a few vocal mechanisms in ducks. This chapter is accompanied by an interesting diagram of the syrinxes of 27 species of anatids, but as neither the syrinx nor bulla is labeled, the reader who is uninformed on avian anatomy will probably not find the chart particularly instructive.

It is of course necessary to simplify and generalize technical data judiciously in popularized books, but it is not necessary to sacrifice accuracy or objectivity, which Johnsgard does in a few places. (The following italics are mine.) "It is strange that none of the shelducks occur in both the eastern and western hemispheres. Their complete absence from North America makes one wonder if there is not an available *ecological habitat* there that remains to be occupied some day by a shelduck colonization." (This statement suffers not only from a tautology regarding niches, but is also zoogeographically naive.) Stiff-tailed Ducks are said to exceed sea ducks in the *originality* of their vocal capabilities (p. 35); isolated populations that again come into contact before speciation has been completed may *hybridize* (p. 77); the miniature Cackling Canada Goose and the "Giant" Canada Goose are in a *practical sense* almost two distinct species (p. 72); all waterfowl (p. 53) "apparently lack the *ability* to carry nesting material in the bill." (Not only is the word "ability" used ambiguously, but Sowsls' photographs (Prairie Ducks, Stackpole Co., 1955) of Pintails and Shovelers carrying egg shells casts doubt on the validity of this statement even when "ability" is used behaviorally and not anatomically.) The pair-forming displays among stiff-tails are not as *beautiful* as they are *ludicrous* (p. 46); male ducks (p. 20) predominate in the colder parts of their wintering ranges because they are larger than females and can therefore tolerate colder temperatures. Bergmann's Rule does not necessarily deserve mention in a book of this sort; but as Johnsgard does mention it,

it seems a shame to leave unexplained why a larger species (here, a larger sex) "can tolerate slightly colder temperatures." Few laymen will sort out the volume to surface area relationships Johnsgard leaves unfilled in his passing comment.

"Waterfowl" is a worthwhile book for persons interested in waterfowl biology and waterfowl of the world. The binding is good buckrum, the print is legible, and the index passable. The price is a little high, reflecting perhaps the cost of color photoengraving. It is questionable if such a generous dose of technical detail (even though popularly presented) will captivate the nonprofessional's interest for long periods of time, but certainly anyone with more than a passing interest in waterfowl will be fascinated by the variety of anatid behavior Johnsgard describes.—MICHAEL KENT RYLANDER.

**The biology of populations.**—Robert H. MacArthur and Joseph H. Connell. 1966. New York, John Wiley & Sons. 200 pp., 91 figs., 7 tables. \$5.95.—Compared to the beginning biology textbooks of the past, whose treatment of ecology and related subjects has run from weak to nearly absent, this book is an improvement. The smallest member of a three-volume text, it is designed as a "rather tough" introduction to biology at the population level. The other volumes, by other authors, deal with the cell and organism levels. Supplementary reading, it is suggested, would allow this volume to serve for a more advanced course in ecology and evolution.

In its first role, the book will probably hold the interest of the good beginning student. Understanding patterns and processes is emphasized rather than memorizing terminology. The student's vocabulary is cluttered with neither "ece" nor "hy-perallobiosphere;" even "ecological niche" is happily missing. The style is sprightly, and outright errors are few. The beginning student might finish the book with the feeling that he has a good idea of what ecology is about. In this I believe he would be mistaken.

Coverage of the field is incomplete and crotchety. The most frequently cited authors in the bibliography are MacArthur and Connell with five entries apiece (second place goes to Charles Darwin). In a way this is good; the book is not a patchwork of other textbooks, and someone who wants a brief introduction to some of the authors' ideas already expressed in the periodical literature may find this book a fairly painless way to obtain it. But the book scarcely makes a pretense of dealing with autecology or physiological ecology, and its treatment of community and ecosystem ecology is inadequate. Possibly this is a defect in the "levels" organization of the series. Under such an arrangement the first two topics probably should be, but are not, covered in the volume on organisms, and the last two topics seem to belong to some fourth, nonexistent volume. The sections dealing with population ecology and genetics are persuasively written and, augmented with lectures or additional reading, could serve well for the population section of a beginning ecology course. Even here there is one especially unfortunate omission, that of an adequate discussion of human populations. When the most serious problems facing mankind are overpopulation and the effects of human populations on the environment, relegation of the subject to a few scattered lines in a book on population biology is like leaving Hitler out of a study of World War II.

A common flaw of textbooks is to write of a science as though it were something that exists apart from scientists. This book avoids that error, but it may leave the student with the impression that the ecological concepts it sets forth have no history prior to about 1945. This is not true of the treatment of evolution and population genetics. Lamarck is referred to but not Grisebach or Möbius, R. A. Fisher but



not Victor Shelford. Doubtless this is just an oversight or possibly merely a matter of pedagogic taste. And yet one wonders. This brand of ecology has certain obvious roots, such as the "new systematics" of the 1930's and '40's. Is it possible that the sources within ecology are as limited as they appear to be and that the seemingly Clementsian views set forth here—the primacy of climate in determining vegetation, the community as an organism—actually are independent re-inventions?

As a part of a beginning biology course, this book has its points. In an ecology course the instructor interested in balanced coverage will have to supply a great deal of supplementary material and, having done so, may find it possible to dispense with the book itself.—RICHARD BREWER.

**William Bartram/botanical and zoological drawings, 1756–1788**, reproduced from the Fothergill Album in the British Museum (Natural History).—Joseph Ewan (Ed., introduction, commentary). 1968. Mem. Amer. Phil. Soc., 74. Pp. x + 180, 60 pls. (59 plus frontispiece). \$35.00.—This handsomely printed volume of generous format ( $15\frac{1}{2} \times 11$  inches), will give much pleasure to all students of American natural history with an interest in the history of its early, formative years. How the American Philosophical Society came to undertake this publication is not stated, but it may be assumed that it was occasioned by the approximate bicentennial of the album, which involved two of the early members of the society. William Bartram was elected in 1768 to the American Society, which, a year later, merged with another Philadelphia group to become the American Philosophical Society. Dr. John Fothergill, official correspondent of the London Yearly Meeting with the Pennsylvania Quakers, and a benefactor of the Pennsylvania Hospital, was elected to foreign membership in the society in 1771. The two men were correspondents and for 10 years, 1766 to 1776, Bartram collected plants and seeds for Fothergill's botanic garden at Upton, Surrey. Accompanying these specimens the conscientious Bartram sent his English friend the drawings and color sketches of American plants and animals that form the body of the present book.

There is little need to elaborate on the importance of William Bartram in the growth of natural history studies in America. He has already been studied and published on by a good number of scholars, particularly by Francis Harper, and the present reviewer can add nothing in the way of new information.

Of the 59 numbered plates 22 contain birds. At the outset it should be said that anyone hoping for impeccable, unmistakable renditions will be disappointed, but to those who enjoy the sincere appreciation of nature by an early devotee whose interest and enthusiasm may have outstripped his artistry, these plates will have much appeal. The birds have been identified with a fair degree of certainty by such Bartram students as Harper and Mrs. Allen. In some instances, especially where the illustrations are in black and white, the identifications are suggestive rather than completely persuasive. In one case, plate 27 of the present volume, Mrs. Allen is quoted as saying the bird cannot be identified with confidence, but is a "sparrow-like bird with a heavy bill and heavy black area at corner of beak and a white throat"—which strikes me as possibly a White-throated Sparrow. Another element that may be disturbing to some is the lack of relative scale in the plants and animals on the same plate. Thus, on plate 21 the Great Blue Heron is much smaller than individual leaves of the American lotus, but we must remember that Bartram was then probably more concerned with Fothergill's botanical interests than with the heron, and the plate was not intended to be a composite picture, but rather a number of independent pictorial notes.

The birds reproduced and the number of the plate on which each occurs, are as follows: Magnolia Warbler (1); Purple Finch (3); eastern Fox Sparrow (9); Myrtle Warbler (11); Pine-woods Sparrow and Carolina Wren (16); Cardinal (17 and 54); Limpkin (18); Prairie Warbler (19); Ruby-throated Hummingbird (20 and 59); Great Blue Heron (21); sparrow, possibly the White-throated Sparrow (27); Florida Sandhill Crane (30); Green-winged Teal (31); Mallard (32); Green Heron (44); Acadian Flycatcher and Water Pipit (46); Swamp Sparrow and Blue Goose (51); Blue Jay, Florida Jay, and Eastern Bluebird (52); Bobolink (53); Black Vulture (56).

Among the topics discussed in the introduction are an estimate of Bartram as naturalist and artist, the fate of his drawings, his plant discoveries, novelties for European gardens, American birds, reptiles, fishes, mammals, insects, and shells, the American Indians, and a chronology of Bartram. Then comes the album with notes on each of the plates. Professor Ewan's commentaries are, as might be expected, primarily botanical, and it is, indeed, the botany rather than the zoology of these plates that predominates.

Two appendices complete the volume, one dealing with the drawings made for Mr. Barclay, another of Bartram's English correspondents, and one presenting Bartram's "Remarks" descriptive of specimens sent to Fothergill and to Barclay. These are followed by a long list of bibliographic references, ending with a quote from Donald Culross Peattie which is worth repeating here.

"So we leave them, these loveable Bartrams, only too conscious how dead they are, how little like our age. But this no reproach to them; they were in their day a green growing tip of science."

There is a cross index to the reproduction, an index to scientific names, and a general index.—HERBERT FRIEDMANN.

#### ALSO RECEIVED

**Edward Lear/the life of a wanderer.**—Vivien Noakes. 1969. Boston, Houghton Mifflin Co. 358 pp., 90 black and white illus. \$8.95.—This book is an entertaining and informative biography of the famous nineteenth century artist and author of the "nonsense" books. Chapter 2 is of interest to ornithologists. It tells of Lear's parrot pictures, 42 handsome lithographs bound together in a 14 × 22-inch book published in 1832 when the artist was 20 years old. The same chapter tells of the many drawings he did for zoologists, including John Gould who gave him little if any acknowledgment. Mrs. Noakes notes that Gould "would quite happily subscribe plates 'by J. & E. Gould' even when Lear's signature appeared in the drawing itself."—ELIZABETH S. AUSTIN.

**A dictionary of English and folk-names of British birds.**—H. Kirke Swann. 1913. London, Witherby & Co. 1968. Republished by Gale Research Co., Detroit. Pp. xii + 266, 8¼ × 5¾ in. Cloth. \$9.50.—An interesting little book is this if you care how the Goshawk and the Chough, for example, came to have their names, but a frustrating volume if you care *why* they came to have them. Goshawk is thus traced through Anglo-Saxon to goose-hawk but the matter is then dropped. Chough we learn goes back at least to Shakespeare. Hence the definitions are historically sound but leave the reader dangling as to the rationale of origin that is far the more interesting aspect biologically or etymologically. For Americans, at least, the unpublished "American bird names/their histories and meanings" would be a far more useful work (cf. Kalmbach, Auk, 85: 703, 1968). The work here reviewed is overpriced.—J. W. H.

**Las aves de Tikal.**—Frank B. Smithe. 1968. Printed by Litografía Byron Zadig y Cia., S.C. Sucs., Guatemala. 372 pp., 31 col. pls., 8 photos., map, diagrams.  $7\frac{1}{2} \times 4\frac{1}{2}$  in.; paperback. \$3.00. Obtainable from Asociación Tikal, Avenida de las Americas 6-19, Zona 14, Guatemala, Guatemala.—This is a Spanish edition of "The Birds of Tikal" (for review see *Auk*, 84: 440-441, 1967) translated by Graciela de la Cerda. The text and all the illustrations of the English version are included, except that footnote references to original sources and certain of the technical appendices are omitted. Added (p. xxiv) is a list of 7 species reported seen since the preparation of the English edition. The good descriptions of almost 300 species, of which over 100 are illustrated in color by H. Wayne Trimm, and the data on habitat, voice, nesting, and even weight, make this not only the first field guide in Spanish for any part of Middle America, but a work of marked usefulness far beyond the Tikal-Uaxactún region of northern Guatemala covered in detail. Appendix A lists additional species recorded from elsewhere in the department of Petén. My only regret is that this version omits English species names; Central Americans acquiring this book would find it useful to know what names English-speaking students and birdwatchers are likely to be using, especially as most published information is in English. Those concerned in stimulating local interest in birds, so essential if there is to be effective conservation of wildlife in the neotropics, must be doubly grateful to the author not only for writing, but for arranging for the translation of his excellent book. It should make a welcome gift for Latin-American friends.—E. EISENMANN.

**Lost wild America.**—Robert M. McClung. Illustrated by Bob Hines. 1969. New York. William Morrow and Co. 240 pp., 72 drawings, 1 map.—The birds, mammals, reptiles, amphibians, and fish discussed may be divided into the extinct, the endangered, and those apparently rescued from oblivion. The line drawings by Hines are good, but the Spectacled Cormorant is scarcely recognizable as there is no indication of the long, narrow feathers on the face and neck or the erectile occipital crest. The status of each animal is treated briefly. Written for the general reader, the text is void of references, but there is a bibliography and an excellent index.

The treatise covers 32 birds and 35 mammals. The eastern bison (*Bison bison pennsylvanicus*) is treated as a subspecies, though mammalogists do not recognize it as differing from the plains bison. It is disappointing to read that recent reports of the presence of the Ivory-billed Woodpecker in the Big Thicket of eastern Texas are viewed with scepticism. The book is a worthy up-to-date contribution on the status of many species over which there is concern.—A. W. SCHORGER.

**What's left: reports on a diminishing America.**—Berton Roueché. 1969. Boston, Little, Brown and Co. 210 pp. \$5.95.—The book contains eight articles: A walk on the towpath (Chesapeake and Ohio Canal); A day on the river (Current River, Missouri); The last of the Keys (Elliott Key, Florida); Ricing; South of Ajo (Arizona); Fast water (Green River, Wyoming); First boat to King Island (Bering Strait); and The witness tree (Big Thicket, Texas). All were previously published in the *New Yorker*. Birds are mentioned occasionally. As reports on a diminishing America, the book scarcely lives up to its title, but from the standpoint of nature writing, the reading is very pleasant.—A. W. SCHORGER.

**Some safety aspects of pesticides in the countryside.**—Moore, N. W. and W. P. Evans. 1968. Proc. of conference at British Mus. Nat. Hist., London, 20 November 1967. 124 pp.—Contains four chapters on development, use, and control of pesticides, and pesticides as tools.—J. W. H.