

## ORNITHOLOGICAL LITERATURE

ECOLOGICAL ISOLATION IN BIRDS. By David Lack Harvard Univ. Press, Cambridge, Massachusetts, 1971:  $5\frac{1}{4} \times 8\frac{1}{2}$  in., xi + 404 pp., 34 tables, 58 text figs. by R. Gillmor. \$12.00.

In the last six years David Lack has written three new books, each involving extensive and intensive reviews of available literature on the ecological relations of birds. The first, "Population Studies of Birds" (reviewed in the *Wilson Bulletin*, 79:469-471, 1967), dealt with the regulation of population size in birds. The second, "Ecological Adaptations for Breeding in Birds" (Methuen & Co., London, 1968), focused on the evolution and adaptive characteristics of avian breeding systems. The third book, the one being reviewed here, is devoted to a synthesis of the ways in which similar species achieve ecological isolation.

The basic theme of the book is that ecologically similar, usually closely related species of birds differ from one another in (1) geographical range, (2) habitat occupied, or if they coexist within the same habitat, in (3) foods eaten. Such segregation is considered primarily an evolutionary result of competitive exclusion. Over the past three decades, Lack has contributed significantly to the development of current evolutionary and ecological theory, with particular reference to the role of competition. In this book he brings his extensive knowledge and experience to bear on a detailed review of available information on ecological isolating mechanisms in birds.

For his analysis Lack presents a comprehensive survey of those bird groups for which there is reasonably good ecological information. Specifically, he summarizes and discusses the ecological relations of the following groups: the European tits; the tits (*Parus*) of Asia, Africa, and America; the nuthatches (world-wide); the European fringillids; the European trans-Saharan migrant passerines; other European birds; North American passerines, hawks, sandpipers, and auklets; African avifaunas, turacos, brood parasites, and vultures; tropical fruit-eaters, honey-eaters, and seabirds; and the Galapagos finches and Hawaiian sicklebills; the white-eyes (*Zosteropidae*); and an analysis of the avifauna of a tropical archipelago, the West Indies. In addition to these detailed presentations which comprise the main chapters of the book, there is an 84-page appendix which contains tables and summaries of the geographical distribution, habitat preferences, morphological characteristics, food habits, and foraging methods of the above-mentioned groups of birds. This compendium, even without regard to the main theme of the book, provides a very valuable summary of widely scattered and not always easily accessible information. For this reason alone, the book belongs in the library of anyone seriously interested in the biology of birds.

The main point of this book is well made—closely related species of birds are ecologically isolated from one another. The mechanisms involved vary with the taxonomic group, the geographic area occupied, the habitats present, the characteristics and nature of the food supply and the numbers and kinds of sympatric species. Separation by geographic range is most frequent among wholly frugivorous congeners that feed on similar sized fruit and among land-birds of oceanic archipelagos where ecological diversity is assumed to be low. Isolation by habitat is commonest among congeneric passerines on large continental areas but is generally widespread in most taxonomic groups.

Closely related species occurring sympatrically are segregated primarily by differences in foods taken. In some groups, competitive exclusion has resulted in the evolution of different body or beak sizes; such differences are not usually found among congeners

separated by range or habitat. In other groups, sympatric species have evolved distinctive foraging practices, e.g. feeding at different heights or in different parts of the habitat, presumably also a result of competitive interactions. Large overlaps in the diets of sympatric congeners are considered to occur only when the food supplies are especially abundant. As these supplies become scarce, however, the overlap is reduced as each congener takes different foods. From all examples available to him, Lack concludes that no coexisting bird species take the same major prey items on a sustained basis.

Although the book provides a comprehensive survey of ecological isolation in a wide variety of birds, some aspects of this topic are only briefly considered. Lack circumvents the problem of how much overlap in habitat or in foods taken can be tolerated before competition becomes a critical factor. This is a very important practical matter that has to be considered in each case and is subject to different opinions and interpretations. A more detailed discussion of the criteria Lack used in making his judgments of each example would have been most helpful.

In the final chapter of the book Lack touches only briefly on the relevance of ecological isolation to speciation processes, adaptive radiation, species diversity, and faunal composition. Other related topics that warrant critical analysis are not included. Examples of these are the effects of ecological isolation on the structure and dynamics of avian communities, and the genetic and ecological factors that operate(d) in the evolution of such isolating mechanisms. One wishes that Lack would make these and related topics the subject of future reviews.

Nevertheless, this book provides an extremely comprehensive and useful review of current knowledge about ecological isolation in birds. It will provide the basis for continuing critical studies on the dynamics of ecological relations among birds.

I highly recommend the book to anyone interested in birds. It is very clearly written, and the drawings and sketches by Robert Gillmor are excellent.—RICHARD T. HOLMES.

GRUNDRISS DER VOGELZUGSKUNDE. 2nd Edition. By Ernst Schüz. Verlag P. Parey, Berlin—Hamburg, 1971: 7 × 9¾ in., xi + 402 pp., 142 figs. DM 88.00.

Professor Schüz, director emeritus of the State Museum of Natural History at Stuttgart and former director of the bird banding stations at Rossitten and Radolfzell, presents a completely revised edition of his comprehensive textbook on bird migration. In addition to his elaborate descriptions of the migration patterns of European species, he discusses the migrations of many species from Asia, Australia, New Zealand, Antarctica, the Americas, and Africa.

Twenty years of extensive research have passed since the first publication of this unique text. New and sophisticated information on the phenomenon and the mechanisms of bird migration has been accumulated. Schüz has delegated special topics to several young research ornithologists, H. Oelke (research methods), P. Berthold (physiology), and E. Gwinner (orientation).

In his introductory chapter, Schüz stresses the adaptive significance of bird migration, an important means for the survival of the migratory species and largely the result of their evolutionary history. Apart from a limited glossary, definitions are given throughout the book. Migration is defined as a periodic and oriented wandering. Application of this definition poses certain difficulties as there are numerous forms of transgressions from strictly resident to migratory species. The introduction lists the important institutes and stations throughout the world that devote their entire work to the investigation of bird migration. Historical sketches illuminate the origins and developments of the German

bird banding stations at Heligoland, Rossitten (now Radolfzell), and Hiddensee. The introduction of the term "Vogelwarte" (bird banding station) dates back to 1883 when H. Gätke first used it for the famous Heligoland station.

The brief descriptions of research methods pertain to the qualitative and quantitative aspects of bird-watching, recording of flight calls, banding procedures, the Louisiana "moon-watching," photography, radio and radar telemetry.

The following chapters can be considered the core and masterpiece of the Schüz text. They contain substantial descriptions of different patterns of migration exemplified by migrant species from all over the world. Included are topics on specialized migrations such as the concentrated "flyway" movements in coastal ranges, the modifying effects of off-shore islands and lighthouses on the flight pattern, migrations across mountain passes, along river systems, and the importance of oases in desert habitats. The detailed description of the migration patterns of a variety of 15 species is very informative. Among these, the White Stork has been Schüz's favorite subject through many years of pioneering research which contributed much to our understanding of bird migration. Particular aspects of migration, such as aerial, terrestrial, and aquatic locomotion, diurnal and nocturnal flights, social contacts of migrants, their flight altitude, speed, and overall efficiencies during narrow and broad front migration, are given an excellent treatment. Schüz also discusses dismigration (in contrast to site tenacity), range expansion, emigration, nomadism, and other forms of environmentally induced migratory movements.

The terminology on the categories of migration directions leaves something to be desired. It might have been better to have defined the "primary direction" not as the "obviously inborn migration direction" but rather as the species- or population-specific migratory direction in the absence of disturbing environmental factors. The "secondary direction" is characterized as the deviation resulting from the influence of landmarks; however, one should not exclude the modifying effects of various astronomical, meteorological, electrical, and magnetic forces. In Europe, most of the fall migrations are directed toward the southwest; they are eight times more common than southeast flights, and south migrations are exceptional.

Berthold's introduction to the physiology of bird migration consists of chapters on methods, registration of migratory restlessness, determination of migratory disposition (fat deposition and energetics). He describes also exogenous and endogenous release and guidance systems of migration stimulated by climate, food, light, and endocrinological processes.

Gwinner informs the reader about the study of migration orientation, compass and goal-directed flights, time-evaluation and calculation of the solar movement with the aid of an "internal clock." His description of stellar orientation is historically and factually misleading. Gustav Kramer (1949), contrary to Gwinner's statements, never claimed to have worked with Blackcaps that had shown preferred directions frequently matching the autumnal migration direction of the species. Apart from his Red-backed Shrikes, Kramer had observed a single female Blackcap in ten nightly sessions to show a NE-preference. As Kramer explained, the bird's only determinable optical response was toward the reflected harbor lights of Wilhelmshaven in the northeast. Kramer had not thought of star orientation but considered effects of shortwave radiation as a guidance system for nocturnally migrating birds. After our first studies of the nocturnal migratory flights of sylviid warblers (Sauer and Sauer, 1955), in which the shooting-star response of our birds led us to the concept of star orientation, Kramer visited us in our laboratory at Freiburg. He thought our experimental cage a horrible stovepipe device into which he would never dare to place a bird. He proposed to lend us two metallic nets with two

different, physically selected mesh sizes of mathematical accuracy that we ought to put over our stovepipe cage in order to filter out undesired radiation and to check the response of the migrants with regard to the two sharply defined wavelengths. Our answer that we first want to test the birds' response to the planetarium sky in the mariners' school at Bremen was met by Kramer with utter disbelief. Later he visited us in the planetarium during an experimental session. Kramer watched for some time in complete silence. Finally he signalled to leave, and quietly we stepped out of the planetarium leaving the active warbler behind. Under the impact of what he had seen, with both his hands in the pockets of his pants, Gustav Kramer stood speechless for quite a time until he said: "Im Geist hab ich's begriffen, im Gemüt bin ich erschüttert." This was the historical moment when Gustav Kramer, deeply moved by his emotions, realized the existence of avian stellar orientation. Never again were the metal nets mentioned in our talks. Gwinner's misquote might have been extracted from American ornithological literature in which it has appeared repeatedly, possibly as the result of faulty translation and subsequent compilation.

Gwinner further refers to directional finding without visual clues. His example of orientation (not necessarily in the primary direction!) under overcast skies must be supplemented in so far as one can not rule out a secondary orientation by landmarks both during the day and at night. The magnetic field of the earth and prevailing winds are mentioned as further orienting factors. He also discusses briefly the hypotheses on bird navigation, the mechanisms of goal-directed or bicoordinate flights. A more thorough treatment of the relevant literature would have brought more enlightenment.

Schüz concludes the discussions with some illuminating remarks on the origin and significance of bird migration. Though a translation of this remarkable text into English appears very desirable, it must be appreciated that the well-illustrated book is clearly written in generally understandable terms. Readers with some basic knowledge of German and a professional or amateur interest in ornithology should be able to dig through it. Students of bird migration should not bypass this book.—E. G. FRANZ SAUER.

NATURAL HISTORY OF THE SWAINSON'S WARBLER. By Brooke Meanley. North American Fauna, No. 69. Bureau of Sports Fisheries and Wildlife, U. S. Department of the Interior, Washington, D. C. 1971: 6 × 9¼ in., vi + 90 pp., frontispiece, 26 figs. \$0.50. Distributed by Superintendent of Documents, U. S. Government Printing Office, Washington.

Swainson's Warbler (*Limnothlypis swainsonii*) has long needed monographic treatment; Brooke Meanley has supplied an excellent one. He has assembled and digested all available literature on the species, he has studied the birds in all their major known breeding habitats, and his approach is carefully ecological. Photographs are numerous and good, and his bibliography is comprehensive.

Of the North American wood warblers, Swainson's comes closest to having a split personality. For many years after its original discovery in South Carolina the species was quite comfortably assigned, and in literature restricted, to the southeastern Atlantic Coastal Plain, and to the lowland swamps adjacent to southern rivers. By common observation and experience, its breeding habitat was placed in canebreaks and such other dense vegetation as could tolerate warm, moist situations. Those who sought the bird on its nesting grounds turned to such situations; if they knew where to look they found the birds, and Swainson's got categorized as definitely as has Kirtland's in a jack pine situation.

Then data of an unsettling nature began to appear. On 14 June 1924, Bibbee collected a male in breeding condition in Monongalia County, West Virginia, only a few miles from the Pennsylvania state line. His record was not published for some years, and when it did appear it was dismissed; the specimen was too obviously an accidental. A short while later when Jones observed the birds, and found and collected a nest in southwestern Virginia, he, quite frankly, was not believed, and no national ornithological journal would publish his data. Presently Wetmore (who had questioned Jones' record) collected a specimen in southern West Virginia, and birds were found in the North Carolina Piedmont.

It remained for Legg, working in hilly Nicholas County, West Virginia, in the Allegheny Plateau to report the species as a locally common breeder in tangles of rhododendron, hemlock, mountain laurel, and American holly, at elevations around 1,600 feet. This was a country of far call from southern coastal canebrakes, and it became imperative that the range of Swainson's be reexamined.

The remote village of Mt. Lookout, Nicholas County, W. Va., became a mecca for those in search of Swainson's, and to the area came Sutton, Lunk, Brooks, and many others. All found the birds, sometimes in numbers, and nesting data began to accumulate.

To Meanley and others it seemed logical that these birds of the Allegheny Plateau were racially distinct from those on the distant coastal plains and riverine swamps. A separate race was proposed, but this was not acceptable to the A.O.U.'s Check-list committee, so *Limnothlypis swainsonii* remains monotypic.

Thanks to the thorough work of Meanley and others, we now know a great deal more about these birds, and we can even postulate a movement route which allows the birds to pass from coastal areas to southern Appalachians with no conspicuous gaps in its nesting range. The Savannah River in its course from mountain to ocean is certainly one such possible route; there may be others.

Although this bird is frequently considered elusive and difficult to observe, Meanley correctly points out that while it chooses dark tangles it is often quite tame when found, and will often allow close observation. In deciduous tangles just outside the limits of Charleston, West Virginia, DeGarmo, Simms, and many others have studied the species in one of its habitats of greatest abundance, and Gunn chose this area to record a series of songs which he includes in one of his LP records.

After careful study of Swainson's in all its known major breeding places, Meanley concludes, and this reviewer certainly concurs: "It is possible that the Swainson's Warbler can adapt to so-called marginal Coastal Plain habitats better than is suspected. Some occur there, but these usually are bachelor males. But if the Swainson's Warbler ever has to make a last stand it may well be in the Southern Appalachians, where many of them occur in national forests and national parks or in areas unsuitable for agricultural production."—MAURICE BROOKS.

THE TRADE WIND ZONE OCEANOGRAPHY PILOT STUDY. PART VII: OBSERVATIONS OF SEA BIRDS, MARCH 1964 TO JUNE 1965. By Warren B. King. U. S. Fish and Wildlife Service, Special Scientific Report—Fisheries No. 586. June, 1970. 8 × 10¼ in., vi + 136 pp., 36 maps and figures, 11 tables, 2 appendix tables. No price given.

This is perhaps the most systematic seabird survey ever planned. Reported here are the results of a series of cruises devoted solely to seabird ornithology, or what I would call "pelagic ornithology." This science has two main directions—one, the analysis of species variety and distribution of seabirds, and the other, the contribution to comprehensive

marine biology through knowledge of the birds' niches in the pelagic community, especially in relation to food supply. The present report is a milestone in the study of species composition and distribution, owing to its multiple analyses.

As King writes, "Sea birds were observed by scientists of the Smithsonian Institution's Pacific Ocean Biological Survey Program on a systematic basis in the central Pacific Ocean for 15 months as a part of the Trade Wind Zone Oceanography Program of the Bureau of Commercial Fisheries Biological Laboratory, Honolulu, Hawaii. In 3561 hours of observation, 13,080 sightings were made of 65,707 birds along the replicate cruise track covering 34,384 nautical miles." During 17 cruises, each averaging 232.9 hours and 2258 miles of observation (averages calculated by reviewer), 51 species and subspecies were identified. These cruises covered about 50,000 square miles of the sea east of Hawaii.

Data were recorded on sea surface temperature and salinity, temperature at 10 meter depth, wind speed and direction, barometric pressure, weather, state of sea, swell direction and period, visibility, wet and dry bulb air temperatures, type of clouds and their amount of cover. A 25 minute surface plankton haul was made every evening, but the correlations with bird abundance are not discussed. Automatic Data Processing (ADP) as described by King et al. (1967) was used for storage and analysis of data.

The avifauna of the study area consisted of 12 families with 49 species and identifiable subspecies of 2 more species. The number of species per day ranged from 2 to 15 and the number of species per month ranged from 17 (July) to 32 (April). These numbers increased during the spring and fall migration periods. Seabird numbers were usually highest within 50 miles of Oahu though many were seen as far as 700 miles from land.

Some interesting records may be cited. A banded *Diomedea nigripes* followed the ship for 18 hours, 180 miles. This and the less abundant *D. immutabilis* showed similar ranges with midwinter expansion and spring contraction correlated with breeding. A southern species, *D. melanophris*, was recorded on January 23, 1965 for the first time in the north Pacific. Analysis of monthly distribution of *Pterodroma externa externa* and *P. e. cervicalis* is a valuable contribution to the knowledge of their pelagic range; I would add to this one example of the latter race found in Japan (Kuroda, Misc. Rep. Yamashina Inst. No. 18:222, 1962). Twelve species and subspecies in the difficult group of *Pterodroma* were identified (with some inevitable confusion) and their status clarified. Another important contribution is a detailed analysis of the seasonal ranges of the light and the southern dark phases of *Puffinus pacificus*, which were abundant at water temperatures of 25°C and 27°C respectively. In storm-petrels, *Oceanodroma leucorhoa*, besides winter stragglers of *O. furcata*, was the only species that occurred in abundance, although some *O. castro* may have been missed, as the author mentions. Monthly distributional maps of other species, especially the most abundant *Sterna fuscata* are also valuable.

The species accounts are followed by summaries and discussions of the following items: monthly summary, islands of origin of seabirds recorded in the study area and modes of utilization of the area, distance from land, analysis of density, direction of birds' movements, daily cycles of activity (shown by graphs), environmental influences (winds, temperature, and salinity) on each species, and flock analysis. Of 893 flocks recorded, Sooty Terns were present in 76 per cent of the flocks and the next most common, Wedge-tailed Shearwaters, were present in 39 per cent. Finally, there are given 28 pages of Appendix Tables of daily complete data adapted for ADP coding system.

The foregoing is only a bare summary of the contents of this important paper in which Dr. King has raised pelagic ornithology to a more comprehensive and analytical level than ever before. Much, however, remains to be studied, particularly in the marine biological aspect of seabirds (see Bourne, Proc. XIII Internat. Ornithol. Congr.:831, 1963)

and correlation of the birds with food supply in the marine community (Shunтов, Zool. Journ., 43:590, 1964; 44:441, 1965). In closing, I take pleasure in extending my congratulations to the author.—NACAHISA KURODA.

A NATURALIST IN COSTA RICA. By Alexander F. Skutch. Univ. of Florida Press, Gainesville, 1971: 6½ × 9½ in., x + 378 pp., 2 endpaper maps, 68 photos, 8 drawings. \$12.50.

A good deal of what is known of the lives of tropical American birds, especially during the vital reproductive period, we owe to the selfless dedication of Alexander F. Skutch. Here he tells us something of his life and times, his experiences as a struggling naturalist, his thoughts and aspirations during a residence of thirty-five years in Costa Rica, mostly at 2,200–2,500 feet above sea level in the General Valley. The book is divided into two parts: "A Naturalist's Wanderings" recounts his early years in Costa Rica, "A Naturalist's Homestead" describes the site and home selected and built. Both parts contain natural history observations and philosophical comments, including views on the state of man, but the major preoccupation is with birds. The bulk of the book consists of items that, in the case of birds and undoubtedly of other groups, too, the author has published at least once before, though only one such instance is acknowledged by him. These range from closely paraphrased condensations and excerpts to lengthy, virtually word for word, repetitions. Skutch's writing should appeal to devotees of his choice of words and humorless style.

The author's motivation in seeking out a wild place in which to live was the desire to "penetrate, as far as possible, to the secret springs of this multiplex phenomenon called life, to understand its significance in the whole vast drama of cosmic evolution. Here I hoped to have leisure to mature my thoughts on these baffling problems" (p. 140). His outlook on nature no doubt helped him decide where to settle (p. 191): "And as the physician gauges his patient's health by examining his tongue, so earth's liquid tongues reveal her condition: if only they are pure and transparent, she is in a sound and flourishing state; if they are opaque with silt and debris, she is sick and wasting away." Thus, "the Peña Blanca River that formed my eastern boundary ran clear and pure." Later (p. 203), we learn that the Peña Blanca River becomes "swollen and turbid from the afternoon downpours."

Page 173 offers two examples of the author's esthetics. "People who regard each other's taste in painting, sculpture, or music as barbarous may delight in the same flowers. This fact might make us question some of the newest theories about art." "This golden display is provided by a slender, woody vine of the dillenia family, for which I know no name more poetic than its scientific designation, *Davilla kunthii*." The latter sort of private enthusiasm colors his reaction to the vocalizations of birds.

As a lover of nature the author has strong views about snakes. A long black snake gliding to a rock almost beneath two young hummingbirds in a nest above a forest stream elicited these remarks (p. 124): "A snake intent upon ravin appears to become insensible to everything else, at times even to mortal wounds. This one was no exception; it delayed immobile while I approached and delivered the stroke that sent it writhing madly into the water, where the current bore it slowly downstream to die."

In fact, the author wishes for a world in which life has evolved free of "that most hideous blot on the fair face of nature, predation, the killing and devouring of one creature by another" (p. 231). "If predation had never arisen, predators would not

be necessary to prevent overpopulation. Predation, including its subtle form, parasitism, is a tragic miscarriage of evolution. It is responsible for some of the worst passions that afflict that long-time predator, man, and through them for a large share of the evils from which we suffer" (p. 232). When it comes to the population control of man, he sees a moral problem (pp. 340-341): "Are our only alternatives a hideously overpopulated world, afflicted with famine, crime, ugliness, and disease, and a 'contraceptive society,' in which men, women, and children wallow, like pigs in mire, in sex divorced from its natural function of reproduction, which gives it dignity and makes it sacred"?

Skutch's observations on the forested part of his property, now an isolated remnant subject to trespass, could only have resulted from a long-term stay (p. 338): "It is widely held that mature tropical forest is a stable vegetable formation that remains essentially unchanged from century to century. Yet in this forest, which appeared mature when I first saw it, the largest trees have been dying faster than they are being replaced by younger trees. . . . The explanation of this puzzling phenomenon may be that this forest has not yet reached its climax but represents an advanced successional stage on lands cleared by the Indians and abandoned by them centuries ago. Or could it be that climatic changes, resulting from the destruction of the surrounding woodland, cause the large, old trees to die prematurely? The smoke-laden atmosphere of the latter part of the dry season must have some effect. Even the destruction of so many [palmito] palms must alter the dynamics of the forest."

There are two very useful appendices. The first, an annotated list of the status of the species of birds identified by the author on the 100 hectares of his property between 1941 and 1970, to which have been added other species observed by him elsewhere in the General Valley since 1935, is especially valuable. The second is a chronological list of the author's books and articles since 1926.—P. SLUD.

**THE HUNGRY BIRD BOOK.** By Robert Arbib and Tony Soper. Taplinger Publishing Company, New York, 1971: 5¾ × 8¾ in., x + 118 pp., many drawings by Robert Gillmor. \$4.95.

Robert Arbib collaborated with Tony Soper to Americanize "The Bird Table Book," a popular British book. Many comparisons are used throughout referring to English gardens and attendant bird life, but "The Hungry Bird Book" most generally delineates the variety of birds, specific habitats and foods in the area of North America covered by Peterson's eastern field guide referring to that book by page number for each species named. Only those species likely to frequent feeders and dooryards are included, a total of 99.

Suggestions for planting to attract birds, instructions and dimensions for nest boxes, supplementary food mixes, water and feeding arrangements, even an appendix on first aid make this a "not too technical" comprehensive coverage for use by such as scout troops, garden clubs, interested homeowners, and the like. Pen and ink illustrations by Robert Gillmor, both practical diagrams and captivating birds in action, add entertainment to the attendant information. Lists of sources for supplies, book references and extensive bibliography broaden the use of the book for the would-be enthusiast.

This book would seem to be helpful in answering many of the queries that come to persons reputed to have knowledge of birds.—NANCY ELLISON.



OWLS. THEIR NATURAL AND UNNATURAL HISTORY. By John Sparks and Tony Soper. Taplinger Publishing Co., New York, 1970: 6 × 8½ in., 206 pp., col. frontispiece, 17 bl. and wh. pls., many pencil drawings. \$5.95.

This book is not a "scientific" product. It is disappointing when judged by such criteria as use of the relevant literature, evenness of coverage, accuracy, and absence of teleology and anthropomorphism. It is successful insofar as it provides some general knowledge of owls for laymen. The most pleasing features are the drawings and photographs by Robert Gillmor, which add immensely to the attractiveness of the book.

Throughout the book, the authors tend to digress from whatever is under discussion. This first is overdone to an irritating and distracting degree in Chapter 3, "Numbers of Owls", giving the impression that Sparks and Soper were becoming hard-pressed to produce a whole book on owls. This chapter is a generalized, rambling discourse on predator-prey interactions, including cyclic population fluctuations and the concept of food chains. Chapter 4, "Owls and Man", is subject to the same criticism. Six pages are devoted to rehashing the problem of DDT and other toxic substances introduced by man into the environment. Owls are hardly mentioned.

Errors and poor phraseology are not infrequent. For example, in Chapter 5 we are told that competition from bats and nightjars may have prevented owls from evolving insect-chasing techniques (p. 146), and that a bountiful food supply stimulated active speciation in rodents (p. 138).

Chapter 6, the final chapter, "Owls—Their Unnatural History", is an attempt to gather together references to owls and folklore about them from a variety of sources including the Bible, Shakespeare, Chaucer, the Greeks, "Red Indians", and others. Some of the information presented is thought-provoking, e.g. "Hooting nearby could mean loss of virginity to a Welsh girl." Three short appendices conclude the book.

In summary, "Owls" is a sometimes entertaining but superficial book. Readers should keep in mind that very little of the literature available on owls was utilized, and that as a result coverage is uneven and incomplete, and that inaccuracies are not rare.—J. DAVID LIGON.

GALAPAGOS ISLANDS. MUSEUM PICTORIAL No. 19. By Alfred M. Bailey. Denver Museum of Natural History, 1970: 6 × 9 in., paper covered, 85 pp., many photos. \$1.50.

Museums commonly dispatch expeditions but rarely report on them to the public. Here is an account of the Denver Museum's field trip to the Galapagos Islands in July and August 1960. The narrative is augmented by a comparison of the experiences of other field workers who have been there. The very nature of the place makes for interesting reading, and the report is larded with observations upon the plants and animals. Although the purpose of the expedition was to collect material for a habitat group, several scientific accomplishments were made. To quote from the Foreword, "The first eggs of the Galapagos Penguin and dusky gull to be reported were discovered, photographs were made of nesting dark-rumped petrels in the highlands of Santa Cruz, and information was secured covering the nesting cycle of the Galapagos albatrosses." The booklet is illustrated with a map and excellent monochrome photographs by Bailey, Robert R. Wright, and Jack A. Murphy. A bibliography is included.—PETER STETTENHEIM.