REVIEWS

TWO PAPERS ON THE EVOLUTION OF COMMUNAL DISPLAYS

On the breeding behavior of the Cock-of-the-rock (Aves, *Rupicola rupicola*).—E. Thomas Gilliard. *Bull. Amer. Mus. Nat. Hist.*, 124: 35–68, 1962. 10 pls., 6 text-figs. Reviewed with:

A field study of the Black and White Manakin, *Manacus manacus*, in Trinidad.—D. W. Snow. *Zoologica*, 47: 65–104, 1962. 21 text-figs., 13 tables.—Many species of the large family or superfamily of Neotropical "sub-oscines" that includes the tyrant flycatchers, cotingas, and manakins are known to exhibit a distinctive type of reproductive behavior. Males display in a very conspicuous manner, for comparatively long periods of time, and pair-bonds seem to be absent. In extreme cases, the males display in more or less segregated social groups, on traditional "communal" display grounds (separated from the nesting areas). The almost simultaneous publication of monographic papers on two of the more specialized members of this family or superfamily, the Cock-of-the-rock and the Black and White Manakin, provides an excellent opportunity to compare the behavior of the two species, and throws considerable light on the evolution of communal display behavior in general.

GILLIARD'S account of the Cock-of-the-rock is based upon observations made during a six week field trip to British Guiana. It includes descriptions of the general environment of one display area, the territorial arrangements within this area, the display patterns performed by three adult males in the area, and the interactions between the males, plus some brief discussions of the various sign stimuli presented by displaying males and the external stimuli that may influence their behavior. The display patterns include vocalizations, mechanical noises, special movements, and "static" postures. The descriptions of these displays, and the immediate circumstances in which they occur, are very detailed. As a result, it is possible to deduce the probable causation (motivation) of many of the displays, in spite of their very high degree of ritualization.

(One semantic difficulty might be mentioned in this connection. Gilliard uses the term "lek" quite frequently. This term was originally, and is still usually, applied to a communal display ground as a whole; but Gilliard applies it only to individually owned territories within the display ground, and uses the term "arena" for the area as a whole. This is apt to lead to some confusion.)

Several females were seen to approach males in the display area, but unfortunately no copulations were observed.

Gilliard suggests that "the ground-visiting lek behavior of the Cock-of-the-rock originated as a displacement activity for nest-building or nest care, or both." In favor of this hypothesis, he cites certain similarities, in form, between nesting patterns and some of the display patterns of males. It seems to this reviewer, however, that the similarities are too slight, and too general, to be convincing evidence of evolutionary derivation. (Gilliard also suggests that nesting patterns are too "deeply seated" to be easily lost in the course of evolution, and that they are much more easily "diverted" and incorporated into new activities. This would appear to be an unwarranted assumption, especially in the case of male birds. And even if the displays of male Cock-of-the-rocks have been derived from nesting, it seems most improbable that they have evolved in this way because the birds had no other convenient method of disposing of superfluous nesting tendencies.)

The Cock-of-the-rock is usually classified as a member of the "family" Cotingidae; but this supposed family may be polyphyletic, and it has long been suspected that the Cock-of-the-rock might be more closely related to manakins than to all or most of the other "cotingids." Gilliard believes that the behavioral evidence indicates that the numerous characters shared by the Cock-of-the-rock and the manakins are due to convergence. This conclusion is also debatable. The behavioral evidence cited by Gilliard does not, in the present state of our knowledge, either support or contradict the theory of a specially close relationship between the Cock-of-the-rock and the manakins. Gilliard's conclusion seems to be largely based upon the fact that the nest of the Cock-of-the-rock is quite different from the known nests of typical manakins in both form and structure; but the phylogenetic significance of such characters remains thoroughly obscure (*vide* the very different nests of different species in the "families" Tyrannidae and Furnariidae).

This account of the Cock-of-the-rock is supplemented by a brief survey of communal displays in other species and some comments on the evolution of such behavior. Gilliard points out some of the advantages that may be secured by polygynous habits, the absence of pair-bonds between males and females, brilliant plumage and conspicuous displays by males, and care of the nest and young by cryptically colored females alone. He does not, however, discuss the problem of why such characters have been evolved by some species and not by others.

SNOW'S excellent account of the Black and White Manakin is based upon observations of a large population (including many color-ringed birds) in the Arima Valley of Trinidad over a period of 4½ years. It contains a very complete description of the ecology of the birds as well as their behavior. The specific topics covered include the vegetation and climate of the area, the distribution and numbers of the birds, their feeding habits and local movements, the organization of the communal display grounds of males, the displays of the males, relations between males, relations between males and females, the annual cycle, nesting behavior and rearing of young, breeding success and reproductive rate, and annual survival of adults.

The description of the reactions between males and females is particularly valuable, as it is based upon many more observations than any other published account of the corresponding behavior of any related species. Females tend to visit and display with several males, and males tend to display with several females. Both sexes are probably promiscuous. Some males are much more successful than others in attracting females.

Snow also discusses the evolution of communal arena or lek displays, in detail, and with special consideration of the ecological factors that have permitted or facilitated the development of such behavior.

He points out that Black and White Manakins can satisfy their food requirements (primarily fruits of the families Melastomaceae and Rubiaceae) in a very short time in each day, and that their clutch-sizes are small (probably as a result of very high predation upon nests, which gives a selective advantage to inconspicuous nests that do not need to be visited very frequently). The rest of his argument may be quoted directly. "Where nest predation is heavy and clutch-size low, the emancipation of the male from attendance at the nest presents obvious advantages, especially if he is more brightly colored than the female. This is possible if the female does not need much time to find food for herself and her family. Thus her absences from the nest during incubation need not be long and when the eggs hatch she will have no difficulty in feeding the two nestlings as well as herself. Selection will thus favor the progressive dissociation of the male from the care of the nest and young. Once the

male is free of nesting duties, the pair-bond can be broken and he becomes free to mate with as many females as he can attract. Thus sexual competition between the males will intensify, and selection will promote the development of all structures and behavior enhancing the effectiveness of the male's display. The ability to find food quickly will enable the male to devote a great part of his time to attracting prospective mates."

Snow suggests that the food supply that enables individuals to get nourishment in a short time is probably the most important prerequisite for the development of such behavior. He also suggests that this is equally true in the cases of the other manakins, hummingbirds, cotingas, tyrant flycatchers, and birds of paradise that are known to show similar behavior. All these species are primarily frugivorous or nectarivorous. No primarily or purely insectivorous species are known to have reproductive behavior of this type.

Snow recognizes that these factors will favor the development of communal arena or lek displays only if the conspicuousness of the males on their display grounds does not expose them to particularly severe predation. And, in fact, his data would indicate that the annual survival rate of male Black and White Manakins is surprisingly high, "probably nearly the same as that of females, which are far less conspicuous."

It seems to this reviewer that the factor of predation upon adults may deserve to be emphasized even more strongly. There are many other species of Neotropical birds, e.g., some icterids and finches and many tanagers and honeycreepers, that are also primarily frugivorous or nectarivorous, and that have small clutch-sizes, but which do form pair-bonds and do not have communal arena or lek displays like the Cock-of-the-Rock and the Black and White Manakin. In most of these species, pair-bonds are maintained throughout the year and neither sex performs communal displays of any sort. In a few cases, communal displays by males do occur, but they are either not confined to special display areas or, in the case of the large oropendolas and caciques, occur in "colonies" where the nests are also built.

The absence of typical lek or arena displays by males alone in these species may be correlated with their habitat preferences. They are all primarily birds of second growth, light scrub, forest treetops, or "edge" (or have been derived from ancestors with such preferences). The cotingas and manakins that display in leks or arenas, in the same or adjacent areas, are all birds that tend to remain inside forest, below the treetops, or inside thick scrub. Adult birds of the former species are probably more exposed to predators that react to visual and auditory stimuli (i.e., diurnal birds of prey) than are the adults of the latter species. Thus the disadvantages of conspicuous communal displays must be greater for the former species than for the latter.

The predation factor may also tend to discourage communal displays by species living in exposed habitats in another, indirect, way. Many or most of the frugivorous or nectarivorous icterids, finches, tanagers, and honeycreepers are markedly gregarious, tending to associate in flocks, either mixed flocks or flocks of their own species alone. Their gregarious tendencies seem to be considerably stronger, and expressed in a wider variety of circumstances, than the corresponding tendencies of lek-displaying cotingas and manakins away from their leks. This gregariousness probably subserves several functions, but its principal advantage often seems to be that it facilitates detection of, and perhaps defense against, predators. It is usually maintained, or repeatedly renewed, throughout the non-breeding season. As a result, males and females are almost inevitably brought together, repeatedly, and

this may be one of the reasons why pair-bonds are long sustained in most of these species. The fact that mates remain together reduced the need for elaborate and frequent displays between them (at least in the case of the species that are not colonial nesters). This, in turn, may help to explain why there seems to have been a general tendency for displays to become reduced, simplified, or even lost, during the evolution of several different groups of tanagers and honeycreepers—exactly the opposite of what seems to have been the general tendency during the evolution of the cotingas and manakins of most similar habits.

In his discussion of the evolution of communal displays, GILLIARD makes the interesting suggestion that such behavior "must accelerate the processes of evolution," as the combination of polygyny with high predation upon males (and Gilliard assumes that predation must be high, at least at times) "permits natural selection to operate much more severely, and the same is true of sexual selection." Such an acceleration might be another advantage of communal displays, but there is little or no evidence that it has actually occurred (it is perhaps difficult to imagine what evidence should be valid in this connection, in the absence of an extensive fossil record).

It should be mentioned, however, that the attachment of males to traditional display grounds may reduce interbreeding between adjacent populations. It might be expected, therefore, that local populations of species exhibiting such behavior would be more differentiated than local populations of species with less specialized reproductive behavior but otherwise similar habits and ranges. This does seem to be true in the case of some species (or superspecies) of manakins.

Gilliard also suggests that the extreme ritualization of displays (and the specialization of correlated morphological structures) that is so characteristic of the males of almost all lek-displaying species is a direct result of the supposed acceleration of evolution in such species. But SNOW points out that these features are highly adaptive, facilitating and synchronizing appropriate reactions between males and females that are not familiar with (or habituated to) one another.

BOTH of these papers should be read by all students of avian behavior. From an ethological point of view, the principal differences between the two papers may be summarized by stating that both contain excellent descriptions and stimulating discussions of communal display behavior, but Snow's analysis of the functions and evolution of this behavior are more penetrating and convincing, and based upon more extensive knowledge of the whole biology of the species studied.—M. MOYNIHAN.

A treasury of birdlore.—Joseph Wood Krutch and Paul S. Eriksson (editors). Garden City, New York, Doubleday & Co., 1962. Pp. xviii + 390. 9⅛ × 6⅛ in. $7.50.—This is a collection of some 85 essays, by almost as many authors, collected from many sources in both the popular and scientific literature of ornithology. These are divided, by none too obvious criteria, into five parts headed Flight, Family matters, Birds of a feather, Birds and men, and Extinction and conservation. The selections were made according to the editors' conceptions of literary quality combined with general interest, and range from the eighteenth century to very recent.

No one, probably, will ever be wholly satisfied with any anthology but one of his own making, and I am, consequently, more or less unsatisfied with this one. In my own estimation it contains approximately equal representations of the fatuous and the fine, the great and the mediocre, but another reader may think differently. The beginning bird student, anyway, should not try too hard to exercise critical facilities as yet undeveloped, but should read constantly what others have said about birds. He can do a lot of that with this book.—ROBERT M. MENGEL.

The birds of Sikkim.—Salim Ali. University of Oxford Press (printed in India), 1962. 414 pp., 14 photos. (uncredited), 17 color pls., by P. Barruel, R. Scholz, and D. Reid-Henry, cloth.—Sikkim is a small principality, but it spans a great vertical range on the flanks of the Himalayas and has a rich birdlife. The species are treated in standard handbook manner, with range, nesting and general habits, and brief description of plumage. Some species are covered in less formal fashion; perhaps they were added to the known fauna after the main part of the manuscript was completed. The measurements are also given in rather casual fashion. They are, however, supplemented by comparison with a few well known birds, and verbally (though to find the splendid Monal, for example, described as "a large, dumpy pheasant" is jolting). Salim Ali has never been a great admirer of subspecific refinements. Why then does he follow the old-fashioned system of tacking a cumbersome vernacular name on each racial entity?

The book has a brief but informative discussion of the ecology of Sikkim and the history of its ornithology. The color plates, of course, add greatly to its value as a popular reference work. Reid-Henry seems to be the most gifted of the artists by a rather noticeable margin.

"Birds of Sikkim," in addition to being a treatise on the birds of that country, will provide a good introduction to birds of the Himalayan area in general.—DEAN AMADON.

Development of behavior in precocial birds.—Margaret Morse Nice. Transactions of the Linnaean Society of New York, vol. 13, 1962. xii + 211 pp. $4.00.

The scope of this work is considerably broader than its title suggests, and a more extensive indication of the content is given in the preface: "It is a study of behavior development in animals with chief emphasis on the Class Aves, particularly on representative precocial birds."

Chapters I and II are brief reviews of the functions of parental care and of post-embryonic development of behavior in vertebrates. Chapter III discusses and classifies degrees of maturity at hatching in birds based on physical development and behavior. The categories recognized are Precocials (with four subdivisions according to relative independence of parental care), Semi-precocials, Semi-altricials (two subdivisions—eyes open or closed) and Altricials. The extremes are represented by megapodes (Precocials 1.) and passerines (Altricials). The category considered most appropriate is assigned to each order of birds or each family within the order when there are differences. In Chapter IV, five stages in the development of altricial birds are recognized:

"I. Post-embryonic: first four days. Coordinations mainly concerned with nutrition; hearing present, but not sight.

II. Preliminary: five and six days. Beginnings of comfort movements; eyes open.

III. Transition: seven, eight and nine days. Crouching; maturation of comfort movements.

IV. Locomotory: 10 to 16 days. Leaving the nest; start of self-feeding.

V. Socialization: 17 to 28 days. Aggression; flight; perfecting of self-feeding."

Using these as a guide, comparisons are made with developmental stages in a small mammal and precocial birds. Chapter V, on megapodes, summarizes the available data on development in these remarkable birds. Chapters VI through XI discuss behavior development in examples from all the other categories of maturity at hatching, drawn from the author's own investigations on 30 different species and data

from many other sources. Whenever the data are adequate, behavior is discussed in terms of the five stages of development previously outlined. Chapter XII compares behavior development in precocials and altricials and includes discussions of imprinting, aggression, and "play-fleeing." Chapters XIII and XIV survey briefly the literature on embryological development of precocials and altricials and the development of temperature regulation.

Mrs. Nice has surveyed her subject with characteristic thoroughness, relying on her own detailed observations as well as appropriate references from the world literature. If the more casual reader finds that some of the detail makes for heavy going, there is a concise summary to be found at the end of each chapter, and a general summary at the end of the book.

All students of avian behavior and of ethology in general will find this compact volume of great value. Interest in animal behavior and the bulk of literature on this subject have increased logarithmically in recent years, and data on the critical early stages in the development of behavior are widely dispersed. The author has made a significant original contribution to this topic and has done a great service by organizing a mass of scattered information into a much-needed, up-to-date review.

In her well-known work on the Song Sparrow, the author first recognized five stages in the development of behavior in the young birds. A major part of the present study is an attempt to determine to what extent the young of other birds, especially the more precocial forms, follow the same pattern of development shown by highly altricial species. The author finds these activities are related to nutrition, comfort, body maintenance, safety from predators, and progressively more complex locomotor and social activities such as flight and aggression. She recognizes 17 and usually 18 "basic motor coordinations," 15 of which appeared at the same stages in all species studied. The stages and coordinations appear in essentially the same sequence but on different time scales depending on the degree of maturity at hatching. Stage I of altricials is passed through by precocials while still in the egg, and stages II and III are completed by precocials within a few hours after hatching instead of in several days as in altricials. The author concludes that "the course of development runs parallel in all the birds, but with modifications adapted to the varying conditions of life of each species. Precocials and altricials pass through the same stages, but the latter are hatched in what corresponds to an embryonic condition in the former. Most of the coordinations of the precocials maturate before hatching, so that within a few hours of liberation from the egg the chick is capable of leaving the nest, caring for its plumage, finding its own food (Precocials 1, 2 and 3), and responding with appropriate behavior to the threat of enemies." The patterns of embryonic development and development of temperature regulation are cited in support of this conclusion.

The concept of these stages is indeed (p. 158) ". . . a helpful device in organizing our thinking on the development of behavior of many birds." Many of the "basic motor coördinations" appear as components of displays at later times and in different contexts; it is important to trace these back to their earliest manifestations, and also to recognize which activities may be absent in the beginning stages of behavior. One may safely predict that this book will be used and cited by investigators of avian behavior for many years to come.

A few minor criticisms and comments should be made in conclusion. Production of heat during incubation by pythons (p. 8) has been confirmed for *Python molurus* by Dowling (*Animal Kingdom*, 63: 202–207, 1960). Tropicbirds (Phaëthontidae) should probably be classed as semi-precocials rather than as semi-altricials 2 (p. 20);

their eyes may be open at hatching, and the failure to walk about should not be given much weight in view of the extremely limited ability of the adults in this respect. The Heliornithidae are not included in Table 3 (pp. 20–21) in which degree of maturity at hatching is designated, but this is really the fault of those ornithologists (including the reviewer) who have observed these birds in nature but have failed to discover anything about the nest, eggs, and young. On pp. 25–26, it is not specified in most cases whether the percentages of yolk were determined by weight or by volume.

Pen-and-ink sketches by the author illustrate the appearance and activities of nestlings of a number of the species discussed. Some of the drawings lack the technical facility of professional illustration but achieve a unique charm and effectiveness through the author's sincere affection for her subjects—for example, the bittern series (p. 149). Indices of species and subjects, both very useful, are included. Finally, there is an excellent bibliography of more than 15 pages; it lacks references from the Russian literature, but not even Mrs. Nice can be expected to include *everything*.—THOMAS R. HOWELL.

Zur Entstehung und Entwicklungsgeschichte der Musik.—P. Szöke. 1962. *Studia Musicologica,* Budapest, Acad. Sci. Hungary, tom 2, fasc. 1–4, pp. 33–85.—From the title one would not expect this to be an important ornithological paper, as in fact it is. The author, a famous Hungarian musician and trained ornithologist by profession, contributes seriously here both to the physiology, psychology, and mechanics of bird song and the origin and development of human music. His conclusions are based on a relatively large amount of material. From several hundred counts of over 50 bird species, he has discovered some basic principles, which can be evaluated here only as to certain merits but not in full (the reviewer lacking sufficient musical competence).

The technique used by the author is, in short, as follows: bird songs, in some cases of the same individuals over a period of several years, have been registered on tape at 76 cm/second, then slowed down, first to 19 cm/second, and finally to 9.5 cm/second. The songs are then analyzed and notated. Some of the findings: the calls and songs of birds move generally in the higher octaves of the physical high-tone series (I, II, and III); song is not primarily physical but physiological in birds; the human ear is inadequate to hear all tones and their combinations, therefore the whole impression and image of bird song in the human brain is false (in one valid philosophical sense, at least); the song of birds is a true music, but it is not an art; the song of birds is a physical, physiological, and psychological process; important parallelism has been found between phylogeny, systematic rank, and the song of birds. There are highly developed birds (some passeriforms) with relatively primitive songs (regression of development or stagnation in evolution), but no "primitive" birds with well-developed song; the females of most species show a delay or stagnation in the development of song; among the most primitive calls of birds is that of the Goshawk, which is not song or music at all, while a step toward music is evident in the call of the buzzard (*Buteo*). The most fully developed song (considered) is that of the Wood Lark (*Lullula arborea*). A male was recorded singing 103 melody-rows (!) and that song is the closest to human music in its elements.

Comparisons are made between bird song and folk music of humans, the strong influence of the first on the second is stressed, and a parallel development of both supposed. Although probably most ornithologists will not agree with the theoretical conclusions of this work, the basic information in the paper causes it to merit attention from musician and ornithologist alike.—F. J. TURČEK.

The Rough-winged Swallow *Stelgidopteryx ruficollis* (Vieillot). A study based on its breeding biology in Michigan.—William A. Lunk. Cambridge, Massachusetts, Nuttall Ornithological Club, Publ. no. 4 (c/o Mus. Comp. Zool., Harvard Univ.), 1962. 155 pp., 19 figs., 3 pls. Cloth, $4.00 postpaid.—Until the appearance of this monograph, the Rough-winged Swallow has been a little-understood species. Although this monotypic genus is widely distributed in the New World and has been known for well over 100 years, previous accounts of its breeding behavior have been mostly fragmentary and anecdotal. Even some of the most elementary facts have been in dispute.

This report is based on Lunk's 1955 doctoral thesis at the University of Michigan, but it has had later attention and contains references up to 1961. The field work was carried out in four years, 1949–52. The account is well illustrated with photographs, drawings, and charts. The treatment of each topic is complete and precise.

The book opens with a general discussion of the bird (classification, range, appearance, behavior) and a description of the methods of study. Then it follows the swallow through the nesting season from its arrival in late April, through courtship and all the stages of nesting, to its departure from the nesting area in July. Finally, there is a separate treatment of miscellaneous subjects: timing of the nesting season, nesting success, mortality and nest failure, contacts with other species, gregariousness, population dynamics, and wing serrations. The comparative material on other swallows will make this report and its 12-page bibliography valuable to a student of any member of the family.

Lunk was able to gather excellent information about the eggs and young of this burrow-nesting species by using ingenious artificial nest tubes. With these, he was able to pull out the whole nest cavity for inspection without damaging the contents and, seemingly, without seriously disturbing the birds. In three years' use of these artificial burrows, Lunk had more than 80 per cent of them occupied by Rough-winged Swallows each season. Although others have reported Rough-winged Swallows excavating burrows, Lunk saw no evidence of digging beyond an occasional instance of a bird kicking out a few spurts of sand as it was investigating a possible nesting site. Every one of his pairs used existing cavities as they found them.

Some measure of the importance of Lunk's contribution is suggested by his data on incubation period. Satisfactory information on this subject was available previously from only two nests, and those were in tropical America. Lunk, however, offers detailed information from 17 nests (111 eggs) in which each egg was individually marked on the day laid, and from 13 nests (80 eggs) in which the eggs were not so marked. He found the typical egg hatching in 16 days, and a few hatching sometime the previous or the following day.

Whereas very little has been known about the development of the young, Lunk provides an excellent series of measurements and weights of nestlings, and noted the approximate ages at which 98 nestlings left the nest.

Various speculations have been offered about the function of the curious serration along the outer primary, from which this swallow gets its name. Lunk now offers a new and plausible suggestion that this roughness of the wing may produce a faint high-pitched sound in flight. One also wonders if the sound might have more energy in the higher frequencies inaudible to the human ear.

The exact identity of predators at nests is usually in doubt, but Lunk, with the aid of his artificial burrow, was able to catch several in the act and preserve small clues to the identity of others. The most important nest predator in this study was the long-tailed weasel, *Mustela frenata*.

I have no criticisms of this work that reflect on its general quality, but for the possible benefit of others engaged in projects of this kind, I make two suggestions. First, I think an alphabetical index is desirable, although it may be argued that a table of contents is sufficient in a work of this length. Second, I would prefer an explicit statement of the time interval in calculations of the probability of success at each nesting stage. Still, be it noted, Lunk follows the usual practice in this regard, and so many of his nests were observed from the very start that my comment applies here to the nomenclature rather than to the data.

My views on this subject have been expressed at greater length elsewhere (*Wilson Bull.*, 73: 255–261, 1961). Briefly, I maintain that the term "probability of hatching" is not clear unless we also specify the time our observations began for purposes of this calculation. That is, do we mean "probability of hatching" (a) at the time the eggs are laid, (b) at the time incubation begins, or (c) at hatching time? Similarly, I believe "probability of fledging from egg" needs also to specify one of these time points in the history of the eggs. And finally, I believe "probability of fledging from nestling" should also specify "from time of hatching," if this is what is intended. In the last instance, the meaning might seem obvious without the addition, but we are not safe in assuming so. Figures for "success" are often inflated by including nests found after incubation or the nestling period is well along.

The addition of this fine work to the growing shelf of monographs on single species prompts us to hope that other doctoral theses of high quality are not languishing in the stacks of university libraries, barred from publication by their length.—HAROLD MAYFIELD.

Our wildlife legacy. Second edition.—Durward L. Allen. 1962. New York, Funk and Wagnalls Co., Inc. 422 pp., frontisp. + 25 black and white photos. $6.50.—The first edition of this book, published in 1954, was reviewed in the *Journal of Wildlife Management* for October, 1954, by Oliver H. Hewitt who summed up his impressions by stating, ". . . one of the best writers in our field has completed an awesome task, and handed to us a volume which can have tremendously beneficial influence, if it reaches the people. It is our opportunity to use it and our responsibility to promote it!"

Allen states that his intent "is to cover a wide range of popular interest—from the hunter and fisherman to the bird lover and naturalist. The job at hand is to extract the significant facts (from many wildlife investigations) and relate them in such a way that the citizen can do his own thinking." The author uses 19 chapters to relate these facts and explain the ecologic functioning of our wild animal populations with discernment and persuasiveness. The book is rich in plant, animal, and human ecology.

The reader will find each chapter of the revised edition more clearly written. Fewer vernacular and popular expressions are used, and more precise statements concerning ecological principles and their applications have been incorporated into this book. Much significant information, obtained during the last decade, has been synthesized into the original work thus bringing the second edition up to date.

Progress made in scientific management of American wildlife is "marked by many a bitterly-fought controversy" (p. 135), catalyzed too frequently by sentiment and fragmentary observations of non-technical groups. The deer harvest, economics of stocking pen-reared pheasants, and costs of predator control rank near the top of all major management problems. The positive and dramatic statements made by Allen in elucidating the progress achieved, might lead some readers to conclude that these

and other major problems are solved. However, the reader's attention is directed to the beginning of Allen's discussion of deer-harvest problems (p. 135) where he states that, ". . . on a broad front the situation still is unsettled and the old issues regularly revive." The hard-earned management triumphs of Wisconsin made in 1949 and 1950, Michigan in 1952, and California in 1956 have shown retreat to the traditionally accepted bucks-only season (p. 152). Also, too many dollars of management funds are still wasted on predator control and propagation schemes. Although there is sufficient technical knowledge for more efficient management, progress is retarded because our wildlife resources are being managed by politically minded legislatures under the influence of organized lay groups. A long time ago, Aldo Leopold pointed out that it takes about as long to educate the public to a new problem as it takes nature to correct this problem by herself.

Throughout the book Allen relates facts that indicate a changing philosophy of wildlife management. The old biological myths that ruled management of our wild animals are being gradually replaced by an entirely new and utilitarian concept. All wild animals reflect in reproduction, survival, and density the quality of the range that supports them. On land and in water, life exists in measured quantities governed by principles of cause and effect. These principles allow us to forecast fluctuations in population numbers and thus indicate the size of harvest available in any given year. The old concept called for restrictive legislation that prevented sufficient and efficient harvests. Now it is known that annual production of wild animals cannot be stockpiled and, unless some of these animals are harvested, a valuable resource is lost. As a reflection of management's efforts to govern and obtain an adequate harvest of the wildlife resource, the present trend is toward more liberal seasons and bag-limits with resultantly higher kills of wild animals throughout the nation. This trend plus a contagious emphasis on the dollar-value of wildlife makes it apparent that the present era of wildlife management can be marked as one of economic utilization.

I could find no bias in Allen's treatment as a result of his employment in state or federal agencies. He writes directly, clearly, and with extraordinary skill in the portrayal of many elements of ecology. I was particularly pleased that in extracting and relating so many facts he also revealed the enjoyment of wildlife, pointed out that it is a part of our standard of living, and urged that it should continue indefinitely as a part of our life.—IRVEN O. BUSS.

Handbuch der Oologie.—Max Schönwetter. Edited by W. Meise. Fascicles 1–5, pp. i–viii, 1–320, pls. 1–6 (one col.). Berlin W 1, Akademie-Verlag. 1960–61. Price, DM 9.50 (about $2.40) per fascicle.—This work, being published in fascicles of 64 pages, will describe the eggs of about 10,000 species and subspecies of birds. The last egg monographs of world-wide scope were the catalogues of the British Museum (1901–1912) and of Adolph Nehrkorn (*Katalog der Eiersammlung* [etc.], Berlin, 1910, 1914). The publication of the present work is being continued, despite the death of the author in 1961. Information will be included on the eggs of thousands of forms whose nidification was unknown at the time of the earlier books. The first division of the work treats in systematic order (following Peters' *Check-list of birds of the world*) each family, and the included genera and species whose eggs are known. For each family there is first a discussion of egg characteristics of the whole group and of the various genera (sometimes of individual species and subspecies) often with comparisons. Then follows a table indicating for each included species and subspecies, geographic distribution, the number of eggs examined, measurements (range and

average) of length, width, and shell weight, computed fresh egg weight, computed shell thickness, and often various other dimensions and ratios. Where eggs of a particular form were not measured by the author, he cites other authorities. Color and pattern characters are usually mentioned in the main text rather than in the table. The preliminary discussion under each family is especially informative, frequently containing data on egg structure and on reproductive biology, for example, the ratio of egg to body weight. This book will therefore be of interest to general ornithologists and other biologists, as well as to oölogists.

The five fascicles presently available cover the ratites, tinamous, loons, grebes, Procellariiformes, Pelecaniformes, Ciconiiformes, Anseriformes, diurnal birds of prey, Galliformes, and part of the Gruiformes. The eggs of a number of subspecies and of several species appear to be described here for the first time.

As the editor in his foreword asks for information on the eggs of species not mentioned but belonging to families treated, a few comments may be useful. *Las aves de Chile* (1951) by Goodall, Johnson, and Philippi, a work exceptionally rich in oölogical information, apparently was overlooked; it supplies egg measurements of a number of subspecies not listed and extensive data for several forms of which the author had scanty material. The eggs of the crane-hawk, *Geranospiza nigra,* are not described, although Sutton (*Wilson Bull.,* 66: 241–242, 1954) reported on several clutches. No mention is made of the interesting monotypic genus *Gampsonyx,* variously allocated to the Falconidae and the Accipitridae (families said to have distinguishable eggs); Cherrie (*Brooklyn Inst. Mus. Sci. Bull.,* 2: 346–347, 1916) described a Pearl Kite egg from Venezuela. The egg measurements of the hawk-eagle *Spizastur melanoleucus* are so placed in the table between two subspecies of *Spizaëtus cirrhatus* that the reader is left with some uncertainty as to identification. *Circus brasiliensis* and *C. buffoni* are separately listed; they are synonyms for the same form.

Schönwetter points out that the eggs of all species of tropicbird (*Phaëthon*) differ remarkably from those of other Pelecaniformes in being strongly pigmented instead of white and in lacking chalky coating. The eggs of the Shoebill or Whalehead (*Balaeniceps rex*), a species whose affinities have been disputed, are not at all like those of storks or flamingos, with which it is usually placed as a family of the Ciconiiformes, but closely approach those of pelicans although differing in the color of shell translucence.

Before the work is completed, an over-all judgment can only be tentative. At this stage it may not be amiss to suggest a few changes that would greatly enhance the usefulness of the work to ornithologists. It would be helpful to have listed under each family those genera (and possibly species) whose eggs are still unreported. This would stimulate students to fill the gaps in our knowledge, where mere omission does not call attention to the *lacunae.* For example, no eggs of any species of forest-falcon (*Micrastur*) are mentioned; their nidification seems to be unrecorded, despite the fact that some forms are not uncommon. It was disappointing not to find indication of egg dates, localities, and clutch size for birds treated on which published detail is inadequate or nonexistent. Such data are usually found on egg labels. While their omission was doubtless influenced by space considerations, I would strongly recommend their inclusion if possible, for the general biological value of the book as a work of reference would be materially increased. Regardless of these omissions, it is to be hoped that complete publication of this useful monograph will not be long delayed.—E. Eisenmann.

Check-list of birds of the world A continuation of the work of James L. Peters. Volume XV.—Ernst Mayr and James C. Greenway, Jr., editors. Cambridge, Massachusetts, Museum of Comparative Zoology, 1962. x + 315 pp., 9 × 6 in. $7.50. —James Lee Peters may well have been the last of a race of dedicated giants typified, among earlier workers, by Sharpe, P. L. Sclater, Salvadori, Ridgway, and Hellmayr. From 1934 through 1951, Peters advanced the present great series through seven volumes, covering all of the non-passerine birds and the "sub-Oscine" passeres with a rare combination of accuracy, consistency, and moderate conservatism, based on keen insight, that has caused almost universal acceptance of the work as a standard systematic list of world birds.

Whether the modern world no longer produces workers of this type, or whether its pressures simply preclude the undertaking of such projects by single authors, we have now entered irrevocably, it seems, upon the day of authorship by committee. Such was the case with the first volume (IX, published, for reasons of expediency, out of order like the present one) of this series to appear since Peters' death in 1952. To that volume no less than 10 authors contributed, and 6 have prepared volume XV. As indicated in contents (an improvement over volume IX) as well as in text, these are: Reginald E. Moreau and James C. Greenway, Jr., Ploceidae and (Greenway alone) Oriolidae; Dean Amadon, Sturnidae, Callaeidae, Cracticidae; Charles Vaurie (see also Blake), Dicruridae; Ernst Mayr, Grallinidae, Artamidae, Ptilonorhynchidae, Paradiseidae; Emmet R. Blake (with Vaurie), Corvidae. This, the ultimately terminal volume, treats the "end" of the Passeriformes, arranged according to the so-called Basel sequence (see Mayr and Greenway, 1956, *Breviora*, no. 58), in which, by a sort of against-the-current compromise (see Storer, 1959, *Condor*, 61: 152–153), the highly intelligent crow-like birds are considered the most advanced.

Considering the variety of authorship and the inevitable variability of systematic philosophy that is an intrinsic feature of the multi-contributor system, volumes IX and XV are probably as consistent in treatment as can be hoped for.

This weakness of multiple authorship, admitted by the editors, has been dwelt upon in more detail in a remarkably thorough review of volume IX, by Kenneth C. Parkes (*Wilson Bull.*, 72:415–419, 1960), wherein numerous suggestions were made for minor improvements in style and method, particularly with reference to the indication of responsibility for various portions of the text and for new names proposed. None of the latter seem to appear in the present volume but, whether or not as a result of Parkes' constructive suggestions, most of the trivial faults found in volume IX are absent from volume XV. An exception, it appears, is found in the treatment of English vernacular names (first installed in volume IX), which are still somewhat inconsistently used and, for no very compelling reason, not applied to forms from many vast areas of the world where English has long been an important language and where many English vernaculars are thus available for the birds.

Since Parkes' similarly thorough review of the present volume has already appeared in the American literature (*Wilson Bull.*, 75: 100–103, 1963), there would be little point in here duplicating some of its most useful features (which few reviewers would have the dedication to assemble), e.g., a carefully made list of differences in treatment of forms also treated in the A.O.U. Check-list, and a detailed list of minor typographical errors and *lapsi* (which are remarkably scarce withal). To Parkes' latter list, which should be seen by those interested in detailed correction of their copies, I can make only three small additions: *Ploceus superciliosus* Cretzschmar is dated 1826 on p. 52 (footnote 1) and 1827, apparently the correct date, judging from Zimmer's tentative dating of Rüppell's *Atlas Vögel*, on p. 6 (synonymy of *Plocepasser*

superciliosus); in footnote 3 of p. 38 it is indicated that *Ploceus melanogaster*, *P. ocularis*, and *P. nigricollis* form the *nigricollis* species group, and it is puzzling, therefore, to find *P. alienus* between *nigricollis* and *melanogaster*, especially since in the reference cited (Moreau, *Ibis*, 102: 453, 1960) it is indicated that *alienus* is best left unassigned to a group; finally, for extent, in footnote 1, p. 275, read extend.

Forsaking trivial matters, one word of caution, hopefully unnecessary, is suggested by a point noticed on p. 75 and representative of a recurrent situation. Here (footnote 1) it is indicated by Amadon that the puzzling genus *Pityriasis* does not belong with the Sturnidae (as suggested by some writers), but rather is probably a "?subfamily of Prionopidae." But in volume IX (p. 364) *Pityriasis* is treated by Rand as a monotypic subfamily (Pityriasinae) of the Laniidae, at the opposite end of the family from the Prionopinae, which Rand regards (after numerous proper omissions from the group as of Sharpe's day) as a part of the Laniidae also. Suppose Rand had declined to own *Pityriasis* at all in his Laniidae, or that Amadon had owned it also in his Sturnidae. In such circumstances, a genus could conceivably appear either twice or not at all. In view, therefore, of the long time required to complete the various volumes, and of the changing multiplicity of contributors, one can only hope that an infallible system of liaison, not to mention compromise, is maintained. The apparent absence of errors of this sort to date (clearly a missing genus would be less evident than a duplicated one) is, of course, sanguinary evidence that such a system exists, but the ever-present danger is underscored by an error detected by Parkes, in which nomenclatural rather than biological considerations are involved (*cf.* volume IX, pp. 177 and 193, wherein *panayensis* appears twice as a trivial name under *Coracina*).

A final point concerns the preface of volume XV (p. vi), where it is somewhat ambiguously stated that: "The Estrildidae, now no longer considered closely related to the Ploceidae, as well as the Viduinae, will be included in Volume 14." All but the most up-to-date specialists in passerine systematics will be unable to avoid wondering, until volume XIV appears, to what group the waxbills etc. are considered most closely related (Meliphagidae?) and by whom, and to what assemblage the whydahs will be assigned, if *not* the weavers. A few additional words would have alleviated the suspense. It appears likely, ambiguity notwithstanding, that the viduines (if not estrildids) will remain with the ploceids, if so introducing the slight inconvenience of a family split between volumes.

The reviewer, as should by now be obvious, has been forced to dwell either upon philosophical generalities, or upon trivia. The work is, in essence, exemplary and indispensable, and an early completion of the series is to be hoped for.—ROBERT M. MENGEL.

The Living Bird First Annual of the Cornell Laboratory of Ornithology 1962.—Olin Sewall Pettingill, Jr., editor. Ithaca, New York, The Laboratory of Ornithology, Cornell University, 15 June 1962. Pp. 1–170, col. paper covers (with tempera painting by R. T. Peterson), many illustrs., including 4 col. photos. and 2 col. pls. (by W. C. Dilger). $3.75.—The first number of *The Living Bird* is an ambitious and worthwhile addition to the long list of serial sources in ornithology. Neatly timed for issue at the XIII International Ornithological Congress at Ithaca, the first *Annual* was a bonus in the instructive kits provided each member of the Congress upon arrival.

Fledged in this environment, the first number understandably is partly devoted to a review of the long and distinguished history of ornithology at Cornell, and of the current scene there. To this purpose pp. 7–50 are addressed; they contain "Cornell's Laboratory of Ornithology" by A. A. Allen, "Bird-sound studies at Cornell" by P. P. Kellogg, and "Ornithology at Cornell today" by G. A. Swanson. There are also terminal lists (pp. 161–170) of current staff and former graduate students, with titles of their dissertations.

Aside from an inquiring look at "bird art" by George M. Sutton (pp. 73–78) and two illuminating reviews of trends in ethology (to which the research programs of the Laboratory are largely directed), by Niko Tinbergen ("Behavioral research at the Cornell Laboratory of Ornithology"; pp. 79–82) and William C. Dilger ("Methods and objectives of ethology"; pp. 83–92), the remainder of the *Annual* is devoted to scientific papers resulting from various aspects of the Laboratory's research program.

A short summary of most of these is provided in Tinbergen's article, above-cited, from which for expediency I quote: "Mrs. [Barbara F.] Brockway reports ["The effects of nest-entrance positions and male vocalizations on reproduction in Budgerigars"; pp. 93–101] on the effect of visual and auditory stimuli from colony members on the reproductive activities of single birds of Budgerigars, and adds valuable and much-needed material to the problem of social activation of reproduction. The Fickens [Millicent S. and Robert W.; "The comparative ethology of wood warblers: *a review*"; pp. 103–122] have tackled a formidable task of trying to understand the evolutionary radiation of wood warblers. They suggest various connections between the general ecology and the character of displays (such as those between ground-feeding and tail-wagging) and they argue that the fact that distraction displays occur in 34 species, including many arboreal ones (while it is absent in sympatric species belonging to other taxonomic groups), suggests that the wood warblers are descendants of ground forms. . . . Klopman [Robert B.; "Sexual behavior in the Canada Goose"; pp. 123–129] gallantly refuses to be beaten by the baffling complexities of the behavior of geese, animals so fascinating that Lorenz, after 40 years of concentrated study, is still discovering new aspects of their behavior almost every day. Hartshorne [James M.; "Behavior of the Eastern Bluebird at the nest"; pp. 131–149] reports on part of his prolonged Eastern Bluebird studies, for which he developed not only a system of windowsill nest boxes, but also his now famous Hartshorne Sound Isolation Chamber. . . . Payne's [Roger S.; "How the Barn Owl locates prey by hearing"; pp. 151–159] work on the acoustical localization of prey by the Barn Owl penetrates into the mysteries of the most highly developed ear to be found among birds. . . . Payne's experiments with 'probe-tube microphones' [inserted in the ears of the owls], revealing the directional capacities of the ear, and his experiments in which owls were trained to strike at a concealed loudspeaker, open up many possibilities for the analysis of acoustical orientation."

Still to be mentioned is a study by Robert C. Stein ("A comparative study of songs recorded from five closely related warblers"; pp. 61–71), whose marshalling of data concerning both songs and habits is valuable. Stein's conclusions (with which I disagree on the basis of zoogeographical evidence currently being readied for publication) are that the Black-throated Gray Warbler is more closely related to the Townsend's Warbler than to other members of this interesting species group, and that the Hermit and Golden-cheeked warblers are more nearly related than other combinations; a similar relationship (with this I do agree) is postulated between Townsend's and Black-throated Green warblers. Finally (pp. 51–60), George B. Reynard's "The rediscovery [through recording techniques] of the Puerto Rican

Whip-poor-will", *Caprimulgus noctitherus* (Wetmore), a long-lost and reputedly extinct species, is of considerable interest and contains a review of the pertinent history by Alexander Wetmore. An earlier mention of the name of the species would have prevented the first four pages of this article from reading like a detective story, but perhaps it was meant to.

The *Annual* is attractively produced and copiously illustrated. The many line drawings and one of the two (not the *Agapornis* parrots) color plates by Dilger conspicuously lack the sensitivity and skilled execution of many of his drawings. The *Annual* seems to be too tightly bound in its rather stiff, temporary covers, having a tendency to snap shut unless ripped open, and it is unfortunate that the handsome and well-reproduced cover drawing, appropriately, in view of the Laboratory's home at "Sapsucker Woods," of *Sphyrapicus varius*, could not have been used as a frontispiece, since it will pose an awkward problem in binding. The price, although probably necessary, seems a trifle high to promote sales.

The Laboratory of Ornithology and editor Pettingill are to be congratulated on this publication and wished all success with future installments.—ROBERT M. MENGEL.

The wild Danube Portrait of a river.—Guy Mountfort. Boston, Houghton Mifflin Co., 1963. Pp. 1–207, col. photogr. frontisp. and photogr. pls. I–LVI (107 photos. in all, chiefly by Eric Hosking), 10 line vigns. 9½ × 6½ in. $6.00.—The indefatigable Guy Mountfort and two able teams (partly the same) of his stout-hearted countrymen have twice more taken to the field to record by camera, sound tape, and copious notebook an invaluable record of the avifauna (and other biota) of the more obscure, inaccessible, and faunally little known parts of Europe. Since a fair number of the species there, alas, like those of many another area, are making precarious and perhaps losing stands against the inroads of industrial and agricultural progress, the results are of special scientific importance.

The present handsome book, which forms a natural sequel to Mr. Mountfort's *Wild paradise*, describing similar work on the Coto Doñana of Spain (see *The Auk*, 76: 370, 1959), is an account of two expeditions, in May and June 1960 and 1961, to Bulgaria and Hungary, respectively, with special attention to the delta and central basin of the fabled Danube (thus the subtitle—title of the parallel British edition—"Portrait of a river").

These areas are ornithologically rich (228 species were studied in all, 205 in Bulgaria and 166 in Hungary, and a large proportion photographed), and have been little heard from recently. Certainly no part of the world is more mysterious to and more vaguely comprehended by most Americans, laymen and scientists alike, than middle Europe, set off for centuries by opaque barriers of language, geography, and (especially of late) politics.

The technical results, properly, have been published elsewhere, at least in part (*Ibis*, 103a: 443–471, 1961). Although this book touches the ornithological highlights and provides minimal appendices of species observed, it is essentially popular. It is, moreover, a travelog in a charming style, containing sympathetic observations of many kinds of birds, some nearly the same as ours, some much like ours, some totally different (it is advantageous to equip oneself with a copy of Peterson, Mountfort, and Hollum's *Field guide to the birds of . . . Europe* before settling down with this volume); there are, too, fascinating glimpses of the culture and artistic heritage of an ancient cradle of European civilization; finally, there are penetrating observations on the common folk of the countries visited and their open, generous humanity.

While leaning generally away from politics, the author is understandably unable to suppress completely a vein of politically oriented commentary concerning matters of compelling interest to all of us, considering that these were the first such expeditions of westerners to enter the outer fringe of the Iron Curtain countries since the late war. Much hope is to be found in the warmth exchanged between the expeditioners and their hosts on several levels. It is interesting, too, to learn that many species (and biotopes) have been threatened as much by the agricultural and other reforms burgeoning under communism as by those long familiar in capitalistic countries, and it is heartening to note that, especially in Bulgaria, the communists are proving as sensitive as the capitalists to the dangers and equally conscientious in remedial measures.

The American ornithologist cannot fail to be impressed by the ebullient vigor of his English "amateur" counterpart, and jarred from any complacency that may threaten him. For those who believe that Eric Hosking may be judged the world's leading photographer of birds, there is nothing here to dim their faith. The phenologically and statistically minded might ask for a more liberal interjection of dates in the text (it is nearly impossible to tell when some things happened, and just when either expedition ended), but this is a mild criticism.—ROBERT M. MENGEL.

Sea birds of the south Pacific Ocean.—A handbook for passengers and seafarers.—P. P. O. Harrison. Narbeth, England, H. G. Walters Ltd., 1962. 144 pp., map, numerous photos., half-tones. Price, 15s.—This little volume was published by The Royal Naval Bird Watching Society; the author is characterized as a "Master Mariner." According to the title page the book contains "a description of all birds that may be encountered on a voyage from New Zealand to Panama, with notes, illustrations and a guide to their identification." It is based on observations, on 15 voyages between New Zealand and Panama, apparently made from the deck of a passenger liner. The book definitely does *not* list or describe all sea birds "that may be encountered" in this transect of ocean; on the other hand some are included as occurring that either are unrecorded from the area of the book or at least at the localities of attribution. The author seems not to have been familiar with the distributional literature for the American part of his area. For example, he lists various birds as being present in Panama Bay, for which there is no record in that sector—without any corroborating details or explanation, and without apparent realization of the unusualness of the observation or of the possibility that the bird listed might be confounded with others that do regularly occur.

It is most regrettable that, if the seagoing author could not do the necessary literature checking himself to determine local status, adequate assistance was not obtained from others. The book is attractive in format, has many good photographs from various sources, and the arrangement is convenient. A preliminary chapter divides the route covered into four major divisions, listing the species supposedly to be found at various sections of the route during various seasons. The major part of the book is devoted to an account of each species mentioned (about 100) giving an extremely brief (two to six line) description (sometimes quite inadequate for field identification), an indication of Pacific range, and often supplementary comment. Probably the most useful feature is a table showing comparative characters of the shearwaters and petrels included, illustrated by drawings of many of the larger species made by Commander A. M. Hughes from field sketches by the author.

Sea birds are notoriously difficult to identify and their distribution is in many cases inadequately known. We need reliable information from interested travellers and seamen; but as observers using this book, and even subsequent writers, may otherwise be misled, the reviewer believes it desirable to comment on certain statements regarding Panama. The author states (pp. 40, 41) that during the northern winter "in the Gulf of Panama and in Panama Bay there will be" certain species, including Great Frigatebird, Red-footed and Blue-faced boobies, Sabine's and Bonaparte's gulls, Least and Sooty terns, White-capped and Common noddies. All these species (except for the two gulls) are also stated to occur in the same area during the northern summer. The reviewer's personal experience in these waters, which is corroborated by data from cruises of other experienced ornithologists, indicates that none of the species mentioned can be *expected* in Panama Bay, while even in the more open deeps of the Gulf of Panama their occurrence, if any, would be irregular or even casual, except possibly, and very locally, for the Sooty Tern and the Common Noddy. In fact, the Great Frigatebird, Bonaparte's Gull, and White-capped Noddy are totally unknown from Panamanian waters; Bonaparte's Gull seems to be unrecorded south of Mexico and the Greater Antilles, and separation at sea of the Great Frigatebird from certain plumages of the abundant Magnificent Frigatebird, or the White-capped Noddy from the Common Noddy, would require great expertise and the most favorable circumstances. For the Red-footed Booby I know of only one old published sight report from the Gulf of Panama; it is certainly not regular there. The Least Tern (stated by the author to occur "often in large flocks") is apparently unknown on the Pacific coast of America south of Guatemala; it could not be distinguished at sea from certain small South American terns that *might* also occur (for example, the Peruvian Tern, *Sterna lorata*). But what renders its identification in flocks most questionable is that the Common Tern (which does regularly and commonly occur, often in large flocks) is not even included in the book; nor are the Gull-billed and Sandwich terns, also regular in the area. Although Sabine's Gull doubtless occurs occasionally on migration in the Gulf of Panama, a shadow is cast on its identification, because the best field character—the white triangular patches on the wings—is not even mentioned in the description included. The Wedge-rumped or Galápagos Petrel is not listed among birds of the Gulf and Bay of Panama, although it is the only white-rumped petrel that commonly occurs and has been taken there. In view of the limited extent of oceanic collecting, many sea birds are certain to occur in areas from which specimens are as yet unrecorded. But a sight report of a locally unknown species, to be worthy of credence, should give full details indicating knowledge of the significance of the observation, as well as of the characters distinguishing the species in the field.

This reviewer has not had personal experience in the other sectors covered by this book. Nevertheless, for the Galápagos area it is surprising that the Swallow-tailed Gull (mentioned in the geographical chapter) is completely omitted from the species descriptions and the systematic list. Dr. Robert I. Bowman, who has studied in the Galápagos, writes me that several sea birds known to breed on those islands, or to occur in the surrounding waters, are not credited to them, while others listed as found there (e.g., *Pterodroma alba, Fregetta tropica, Sula leucogaster, Phaethon lepturus*) are without substantiated published records and could readily be confused with congeners of definite occurrence. As to New Zealand birds the information may well be reliable, for good popular literature was readily available and the author acknowledges the assistance of two New Zealand ornithologists.—E. Eisenmann.