ORNITHOLOGICAL LITERATURE

THE BIRDS OF THE REPUBLIC OF PANAMÁ. By Alexander Wetmore. Smithsonian Institution Press, Washington, D.C., 1965: Part I: Tinamidae (Tinamous) to Rhynchopidae (Skimmers). Smithsonian Misc. Coll. Vol. 150, part 1. 6⅛ × 9¼ in., 483 pp., 1 col. pl., 73 figs. Paperbound $6.00, clothbound $12.50; 1968: Part II: Columbidae (Pigeons) to Picidae (Woodpeckers). Smithsonian Misc. Coll. Vol. 150, part 2. 6⅛ × 9¼ in., 605 pp., 1 col. pl., 75 figs. Clothbound $15.00; 1972: Part III: Dendrocolaptidae (Woodhewers) to Oxyruncidae (Sharpbill). Smithsonian Misc. Coll. Vol. 150, part 3. 6⅛ × 9¼ in., 1 col. pl., 48 figs. Clothbound $15.00.

This large-scale and ambitious publication represents the culmination of Dr. Wetmore's many years of field work in Panama, begun in 1944 and carried out for several months each year from 1946 through the mid-sixties. The first three volumes comprise detailed species accounts, with only perfunctory introductory material and no maps of the country. The contemplated final volume (four) is meant to finish the passerines and to provide a gazetteer, the main discussion of the avifauna, a review of ornithological studies (including Wetmore's field work), a complete bibliography, and, hopefully, one or more maps.

The published volumes dwell largely on taxonomy and distribution, although there is considerable information on natural history as well. For each family there is a brief introduction, generally covering range and number of species in the world and in Panama, something of habits, and other commentary, including taxonomic. For families with several species in Panama there is a key, usually based on specimens in the hand but also applicable in the field to some groups. For each species there is a general heading and discussion; for those which are polytypic in Panama there are additionally individual subspecies headings and discussions. Covered overall in each species account are the scientific, English, and Spanish names, literature citations for the accepted taxonomic names, descriptions, measurements, status in Panama, observational information, and oological data. For subspecies there are statements on comparative characters by which they are distinguished, specific measurements, records, and other data applying to that race. In some cases natural history information is broken down by subspecies within a species. I suppose this is the most accurate way to signal possible differences between populations, but it consumes more space and scatters the information. Additional space is taken up by rather drawn out accountings of specimens, collectors, and other data, a luxury that could have been decreased with some abbreviating and tightening.

Part I treats 202 species and 247 subspecies as definitely occurring in Panama, but of these 19 and 22, respectively, appear not to have been actually collected there. The uncollected species include all three phalaropes, two of three albatrosses, and three of four in the skua-jaeger group. Not included above are four additional hypothetical species and three introduced species (i.e. *Phasianus colchicus*, *Colinus virginianus*, *Numida meleagris*). I fail to discern how the line is drawn between species that are uncollected and those that are hypothetical, and the point is not explained in the volume. For example, *Laterallus jamaicensis* is considered hypothetical, yet it was reportedly seen by several people, its voice taped, and a set of eggs collected in Panama. *Phalacrocorax bougainvillii* is also called hypothetical, although the sight record of it by Robert Cushman Murphy seems no less valid than the evidence for accepting such species as *Diomedea irrorata*, *Pterodroma phaeopygia*, *Oceanites gracilis*, *Larus modestus*, and *Creagus furcatus*. *Ictinia misisippiensis* and *Pardirallus maculatus* are the other hypothetical species in this volume.

The 206 non-introduced species in Part I fall in 10 orders and 35 families, of which the largest of the latter are the Accipitridae (37 species/44 subspecies) and Scolopacidae (24/26). Interestingly, Phoenicopteridae and Burhinidae appear not to have been recorded in Panama.

In Part II, 208 species and 262 subspecies are accepted (and all collected) from Panama. These are assigned to 9 orders and 18 families. Not included in the above total is the unsuccessfully introduced *Streptopelia risoria*, two species recorded in Panama from questionable specimens (*Zenaidura auriculata*, *Forpus passerinus*), and two vaguely ascribed to the country in the literature (*Coccyzus lansbergi*, *Celeus immaculatus*). The largest family in this volume is the Trochilidae (54 species/69 subspecies), followed distantly by Columbidae, Psittacidae, and Picidae with around twenty species each. Interestingly, the Oilbird is known from the country only on the basis of one recently-taken specimen.

In Part III, I count 197 species (not 196 as stated there) and 292 subspecies accepted as occurring in Panama; of these all but *Pyrocephalus rubinus* appear to have been collected there. Another species, *Contopus ochraceus*, is listed as hypothetical, based on a questionable specimen and a possible sight record. The species are assigned to eight suboscine families, the largest of which is the Tyrannidae (88 species/117 subspecies). Included in that family are several genera often considered as members of the Cotingidae (i.e. *Attila*, *Laniocera*, *Lipaugus*, *Rhytipterna*), based on the work of Ames (Peabody Mus. Nat. Hist. Bull. 37, 1971) and S. L. Warter (unpubl.). This is the only volume in which a new form is described, that being the manakin *Schiffornis turdinus acrolophites* (p. 357).

In general Dr. Wetmore is conservative in his taxonomic approach, although as the examples above suggest, he is not close-minded on the subject. In most cases he chooses to keep as species those entities that are morphologically distinct, and this includes *Empidonax alnorum* as separate from *E. traillii*. Many admittedly minor subspecies are also recognized, although in a departure from the A.O.U. Check-list of 1957 he considers *Anas acuta* and *Ceryle alcyon* as monotypic. Another change is the lumping of all Caribbean and Middle American jacanas (except those of northwestern Mexico) into one race, instead of three as accepted in the past. These he calls *Jacana spinosa spinosa*, which he considers distinct from *J. jacana* of South America and adjacent Panama. Besides retaining a broad version of the Apodiformes, Wetmore also continues to recognize some families that have been merged recently by others, including the Cochlearidae, Phalaropodidae, and Stercorariidae, along with a number of sometimes lumped genera, including *Mareca*, *Spatula*, *Squatarola*, *Totanus*, *Erolia*, *Ereunetes*, *Thalasseus*, and *Nuttallornis*. On the other hand, he transfers *Aphriza* and *Arenaria* to the Scolopacidae and merges *Leucophoyx* (but not *Casmerodius*, etc.) into *Egretta*, *Caracara cheriway* into *C. plancus*, *Columbigallina* (but not *Claravis*) into *Columbina*, and *Phloeoceastes* into *Campephilus*, further evidence of a degree of taxonomic openmindedness. Overall, I find Dr. Wetmore's generally consistent approach preferable to wholesale lumping, especially of allopatric taxa, which would be especially questionable in poorly known tropical birds—particularly in view of transgressions that have been committed among better-known temperate zone forms, e.g. *Otus scops.-O. flammeolus*.

Each volume is illustrated by a color frontispiece and line drawings by Walter Weber. The plate in Part I is of the endemic wood quail, *Odontophorus dialeucos*; that in Part II, the rare (in Panama) woodpecker *Chrysoptilus punctigula*; and that in Part III the little-known antbird *Xenoris setifrons*. The line drawings show all or parts of just under

200 species of Panamanian birds, or about 30 percent of the here treated avifauna. While realizing that this is not intended as a field guide, it is unfortunate that the drawings were not confined to less familiar species as an aid to identification. Such species as the Pied-billed Grebe, Marsh Hawk, Mourning Dove, Black-billed Cuckoo, and Great Crested Flycatchers are among those illustrated that could have been traded in for more exotic ones. In the Threskiornithidae (Part I) both the White Ibis and the Roseate Spoonbill are figured, whereas *Mesembrinibis cayennensis* and perhaps *Theristicus caudatus* would have been more appropriately shown, in my opinion. In several instances the drawings have been used to full potential, e.g. in Part I to show the three tiger-bitterns and two jacanas, and in Part III to show two distinctive races of the manakin *Corapipo altera*. The quality of the drawings is variable, but most seem satisfactory. There are some flaws, including figure 23 in Part II (p. 156), showing the foot of *Otus clarkii*, that looks quite anisodactyl. The bird in Figure 67, Part I (p. 403), is actually *Tringa solitaria*, not *Actitis macularia*.

I regret the lack of maps in these three volumes, and wish that it would be rectified by the Smithsonian Press. I suggest that a one- or two-page basic map be made available that can be glued to the inside cover of each volume. This would make each more self-contained (as they are now by being individually indexed) and avoid the inconvenience of having to go to Part IV for all mapped information. The maps could be obtainable by writing the publisher, and Part IV could have a complete set issued with it for the first three volumes.

The reader will note that Part I is available paperbound ($6.00) or clothbound ($12.50), while subsequent parts come only in cloth ($15.00 each). The increase in price of the clothbound volumes between 1965 and 1972 is expected, based on inflation, and the differential between paper and cloth covers in Part I can also be appreciated. What is less understandable is the Smithsonian Press's decision not to continue to offer the choice between paper and cloth covers in subsequent volumes—especially in view of the precedent set by Part I. At any rate, because of changes in Smithsonian publication policies (too intricate to go into here), cloth binding is now standard for this work. As a result, part of the market for the book has undoubtedly been reduced, particularly among those who are not keenly interested in the birds of Panama. Based on a guess that Part IV may also cost $15.00, buyers of the entire set in cloth covers stand to spend $57.50 ($63.50 if they repurchased Part I after cloth binding was offered), whereas in paper covers I'd estimate the set would have sold for about $27.60, based on the differential in Part I. While we can all understand the desire for having scientific publications do more to pay their own way, I, for one, lament the possibility that one of Dr. Wetmore's most important works may have become so expensive that its proper dissemination may not be achieved in his lifetime.

Dr. Wetmore has made many contributions to ornithology, and in my opinion the present work is among his best. Any criticisms I might make of the work pale beside its merits, and details such as maps and prices are extraneous to the central issue of this review. This work should serve as the basic compendium on Panamanian birds for some time to come, at least so far as taxonomy and distribution are concerned. Furthermore, the glimpses it gives of natural history should spur further and deeper research, which would be constructive in itself. In the meantime, investigators working in Panama will have for their great benefit this product of the efforts of a truly indefatigable scientist.—JOHN P. HUBBARD.

THE PALAEARCTIC-AFRICAN BIRD MIGRATION SYSTEMS by R. E. Moreau. Academic Press, London and New York, 1972: 6¼ × 10 in., xvi + 384 pages, 31 photos, figures and tables, 162 species distribution maps. $24.00.

This scholarly work concludes an era of ornithology. Reg Moreau died in May 1970 after virtually completing the text, his swan-song (his own phrase) after a score of years, and more of papers, devoted to problems of migration between Africa and the temperate zone. The era of ornithology is the duration of Moreau's close association with Africa, an appreciation of which belongs more properly to his obituary (See Ibis, 112:549–564, 1970) than to this review. Suffice it to note here that no one else could have undertaken this work; few other ornithologists had such a great number of correspondents to draw upon, and none had the ability so well to integrate information from numerous and diverse sources and disciplines. The synthesis that results is an invaluable contribution to bird biology, and will stimulate the ecologist, energeticist, and physiologist, as well as the ornithologist with no particular academic pretensions.

The book appeared six months after the date that was first intimated by the publishers, a frustrating delay not entirely due to the difficulties of posthumous publication. It was painstakingly edited by Moreau's literary executor, Dr. J. F. Monk, and sections of the proof were made available to several workers in the field of Palaearctic and African bird migration. Notwithstanding, there are many trivial errors, and a few nonsenses such as the inaccurate representation of great circle migratory routes between Asia and Africa in Figure 5; Nairobi marked in Tanzania on the endpaper political map of Africa; and on the dust jacket the space photo of Earth printed on its side—north pole to the left. More seriously, despite a vigorous and voluminous correspondence conducted up to the week of Moreau's death, a lot of germane observations by correspondents in recent years—especially in eastern Africa—have not found a place, while some publications (e.g. Dowsett on *Lanius minor*, Ostrich, 1971) have received no mention.

To emphasize the book's small faults is not my purpose, and anyway criticism is disarmed in the Preface: "I know it is full of imperfections and inadequacies and that readers will find errors from which I cannot be absolved. They will enjoy spotting them but I know too that in not a few places in the book they will find themselves surprised and stimulated." As it closes an era of ornithology—essentially African—it opens another in global context. This is the first work to examine in depth the ecology of intercontinental migration—the circumstances of species on their breeding, passage, and wintering grounds. Of hundreds of books on European birds, this is the first to examine those two thirds of their lives passed elsewhere.

As with Moreau's "The Bird Faunas of Africa and Its Islands" (1966), to which the present work is a companion volume, the bulk of the text is a detailed species account which is unlikely to be of first interest to readers not conversant with the birds themselves. Part III deals in 166 pages with the 187 species of Palaearctic migrants to Africa, each one in respect of wintering range, habitats and season, banding recoveries and the nature of the journey, recurrence, fattening, etc. A 57-page section is appended giving distribution maps for 162 of these migrants, while a further appendix by K. D. Smith deals briefly with each of 73 marine, coastal and vagrant visitors to Africa from the Holarctic. Most readers will refer constantly to the maps, which embody much distributional data. They are visually pleasing, with Asia outlined and African vegetation zones infilled in colour. For African ranges the choice of hatching is unfortunate, and where records are sparse they would have been better given by individual dots than by fragments of hatching.

Indications of *Zugunscheiden* and loop-migration might also usefully have been incorporated.

The remainder of the book in effect uses Palaearctic examples to discuss the biology of migration and can confidently be recommended to the general biologist and all regional ornithologists alike. Some chapter titles, to give an idea of the scope: Part I (Palaearctic)—The Fluctuating Ecology of the Source Areas—The Numbers of Birds Involved; Part II (Africa)—Topography and Climate—The Availability of Food; Part IV (General)—The Maintenance Needs of the Migrants in Africa—Recurrence in Winter Quarters and Itinerancy. Much of the text has an ecological flavor, important considerations being how Africa can accomodate something like five thousand million immigrants, and the distribution of the avian biomass in the various biomes of the northern and southern tropics. A selection of points that emerge: (1) The maintenance needs of Palaearctic birds in Africa average at least 33 percent less than on their breeding grounds. (2) Contrary to expectation, the greatest abundance of wintering Palaearctic passerines is reached in the arid northern savannas and not in the moist equatorial ones. (3) Migrants from Siberia may cross 100° of longitude to central Africa and if they follow a great circle route they start by flying north of west. In autumn the environment that they encounter from Turkestan to Saudi Arabia is mostly desert almost as inhospitable as the Sahara. (4) The insectivorous falcon *Falco amurensis* breeds in far eastern Asia and somehow circumnavigates the Himalayas to India where it fattens (and is reputedly "very good eating") prior to a 3,000 km crossing of the Indian Ocean in November with the monsoon winds; aggregations of 100,000 occur in Rhodesia; the return migration is by a different, as yet unknown, route. (5) Greenland Wheatears (*Oenanthe oenanthe*) have a shorter continuous sea crossing, 2,500 km, but against adverse winds; having arrived in Europe they fatten again for the trans-Saharan passage to Senegal. Wheatears from the Bering Straits area may winter in Africa rather than America. (6) The enormous navigational problems posed are quite unresolved.

The Palaearctic-African Bird Migration Systems is a mine of information and will be indispensible for students of migration and of African and western Palaearctic ornithology. Since three fifths of the 500 references cited were published within the last decade, the book will inevitably need updating in less than a decade's time. Not for a very long time, however, will it be displaced as the definitive treatise on the subject, a fitting tribute to a remarkable man.—C. H. Fry.

Natural History of the King Rail. By Brooke Meanley. North American Fauna Number 67. U.S. Dept. of the Interior, Bureau of Sport Fisheries and Wildlife, Washington, D.C., 1969: 6 × 9 ins. vii + 108 pp., bl. and wh. photos, 12 tables. $0.60. Available from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.

This monograph is chiefly concerned with the ecological relationships of the King Rail toward its breeding habitat and food habits. The adaptability of this bird to the various types of marsh—brackish, delta, prairie, and ricefield—explains its wide distribution over the eastern half of the United States. The description of its breeding biology is the first presented for the species, and is a definite contribution to our scanty knowledge of the marsh-dwelling Rallidae. Perhaps the most interesting subject is Meanley's discovery that King Rails and Clapper Rails hybridize in the brackish marshes where their

habitats adjoin or overlap. The book also includes diverse topics ranging from migration to hunting and capture methods to mortality factors.

In general, Brooke Meanley has taken a broad approach to the biology of the King Rail, and while certain aspects may be incomplete, he has delineated the problems. This reviewer was impressed with the breadth of the monograph. Till now, little has been added to our knowledge of marsh rails since the days of Bent, and many of the additions have been anecdotal notes of questionable value, especially in reference to sex identification. This lack of knowledge is not without reason, for rails are shy, though not wary, they lack sexual dimorphism of plumage, and most important, they inhabit marsh vegetation, seldom permitting observation. To gather his data, Meanley has slogged 17 years in the marshes, where data are acquired at an agonizing expense of time and energy. No wonder that most amateur ornithologists are pleased with themselves at the sighting of a rail, and most researchers have shunned the Rallidae.

In view of the scope of the monograph and the special difficulties of working with marsh rallids, I hesitate to criticize any details of Meanley's work. I feel that the descriptions of the displays associated with pair formation and copulation may be incomplete. The close similarity of vocal and territorial behavior between the King Rail and the Virginia Rail, with which I am familiar, leads me to expect that they also have very similar breeding behavior. If this is true, then additional observations must be made, particularly on the earliest displays in pair formation, the presence and role of allopreening and duetting in maintaining the pair bond, precopulatory chases, and postcopulatory displays. I hasten to admit that most of my own data on the Virginia Rail came not from seven years of field work but from one year with color-marked captives. Meanley's descriptions of behavior he observed could have been more complete, for example that of copulation itself: "Copulation is performed with the female assuming a crouch and the male mounting with legs and feet on the female's back." This statement leaves me with a number of questions. Does the female bow forward after the male mounts, as do Soras and Virginia Rails? Does the male balance by holding the nape of the female like a rooster, or arch his wings outward like a Virginia Rail, or rapidly flap his wings like a Sora? Does the male tread on the female's back just prior to the cloacal kiss?

I also object to some of the terms used to label the displays. Such labels should be descriptive of the postures or sounds, such as the grunt-whistle of waterfowl courtship, rather than the use of functional names as "advertising display," "invitational display," "mating call," and "advertising call" given to the King Rail. Functional names present several difficulties. If further investigation proves a display to have a different or additional function, then either the name must be changed or the name is misleading and must always be explained. Functional names also make comparisons of homologous displays of closely related species difficult, especially if a homologous display has different functions. I found the distinction between "prenuptial courtship" and "nuptial courtship" rather hazy, and wondered if they referred to behavior associated with pair formation, maintenance of the pair bond, or the preliminaries to attempts at copulation. In fact, I wondered if this distinction were rather artificial in view of the statement on page 51: "Following pair formation, much of the posturing and calling that characterized the period of prenuptial courtship continues, at least in the earlier phases of nuptial courtship." The adjective "symbolic" used in reference to nest building and courtship feeding has too many implications, such as whether or not a bird is actually thinking that these are symbols of his love. I question whether an observation of one male making initial and incomplete nest building movements is sufficient to justify a separate heading of

"Symbolic Nest Building," and whether or not courtship feeding is a "type of symbolic display," I wonder too why courtship was the only behavior described under the heading of "Display."

For those interested in marsh management, the study's lack of comparison of breeding populations estimated by call counts and by intensive nest searching may be a disappointment. I think an attempt to ascertain the reliability of the call count should have been made in view of its intensive use (pp. 18, 20, 21, 22, 29, and 31), and would not have been too difficult to accomplish after the intensive nest searches in the ricefields.

The wing claw of the day old chick is termed "vestigial" on page 66. I think this is improper because I believe the claw functions in the chick's locomotion. The precocial young of the Sora and the Virginia Rail are rather unstable on their feet and they sit upon their metatarsi and feet; they use their wing claws in scampering during their first few days. The book is nearly free of typographical and editorial errors.

Notwithstanding my criticisms, I would particularly recommend this fine monograph to anyone interested in adding to his library of life histories or books on marshes, marsh management, or the problems of hybridization and speciation.—GERALD W. KAUFMANN.

AT A BEND IN A MEXICAN RIVER. By George Miksch Sutton. Paul S. Eriksson, Inc., New York, 1972: 8½ × 11 in., 184 pp., 12 col. pls. and 18 half-tone paintings by the author; 17 photographs by Olin Sewall Pettingill, Jr., Robert B. Lea, and William B. Heed. $14.95.

One fall evening nearly thirty years ago I opened a copy of *Audubon Magazine* to the lead article written by Major George Miksch Sutton. Its title duplicated that of the book here under review. The book-length story was introduced by a striking double-page photograph of the Río Sabinas overhung by epiphyte-laden cypress branches; in the background rose a hazy forested mountain. The image of the photograph, and those produced by the author's words, remained in my mind a very long time. Some of them are there to this day.

Shortly after reading that article I met George Sutton and learned first-hand of his boundless enthusiasm for Mexican birds. A few years later *I* was by that stream in southern Tamaulipas, and Sutton's word-pictures assuming reality before me provided an enormously satisfying experience. The clicking butterflies; the colorful, shrieking parrots; the macaws just overhead; a displaying Wedge-tailed Sabrewing; the first, distant, penetrating *ooomp* of a Great Curassow—all are treasured recollections. I never would have been there, and likely would never have undertaken serious study of Mexican birds, had it not been for Sutton. I later learned a vast amount as one of his students but probably nothing eclipsed the impact of his semipopular writing. (And my experience was not unique. Only recently I learned that a mammalogist friend of mine had his interest in Mexico's fauna sparked by the very same Sutton article; doubtless there were numerous other budding naturalists to feel the same influence.) Each of my subsequent visits to the Sabinas, even those of the past two years, brought to mind the *Audubon Magazine* story. I always thought it should be available in book form. Now, with two additional essays about Sutton's other Mexican expeditions, it is.

Once opened this handsome book is difficult to lay aside. Perhaps only those who know well the places and birds discussed can find it truly exciting, but at very least it is genuinely interesting. The full-page color plates add a great deal. Only one, I believe,

has been reproduced before: that of the Blue-crowned Motmot appeared as a *Wilson Bulletin* frontispiece in 1946. Reproduction generally is good, although two plates in my copy appear a trifle too pale. Four of the half-tone paintings appear in color in the author's "Mexican Birds: First Impressions." These and the others seem to have been carefully chosen as subjects which would lend themselves well to black-and-white reproduction.

Several of Pettingill's fine photographs have appeared before in various papers (e.g. Birds of the Gómez Farías Region, Southwestern Tamaulipas by Sutton and Pettingill, Auk 59:1–34, 1942), where some were better reproduced than they are in the book. It looks as if the negatives of the Buff-bellied Hummingbird and Social Flycatcher pictures were treated very carelessly by the printer. I was disappointed to find no photograph whatsoever of the Río Sabinas. Such would have been a most appropriate and useful inclusion. Meaningful photographs depicting the tropical thickets and riparian vegetation (and which accompanied the *Audubon Magazine* feature) also are strangely lacking here.

But the writing leaves nothing to be desired. At the book's end one only wishes for more. Some may be quick to criticize Sutton's frequent anthropomorphisms but they should note that he so labels them and justifies his use of such language.

The first essay displays a few minor changes from the material originally published in the 1940s, mostly the names of birds. "Gray Hawk" has replaced "Mexican Goshawk," for example, and several more have been brought into line with current usage. Not all are changed, however. Among others it's refreshing to read once again of Alta Mira (instead of Lichtenstein's) Orioles.

The second and longest narrative deals with a more extensive expedition than either of the others. This material has never been in print before. Most of the third section was published in the November 1972 issue of *Audubon*, there with the scientific names of the birds in the text. These are relegated to a separate list in the book, along with alternate vernaculars.

The book is very personal, for Sutton shares with his readers a vast range of thoughts and happenings including those which most of us would never record in our field notes, much less publish. Years ago Edwin Way Teale wrote, "Read 'Birds in the Wilderness' [Sutton's fourth book] and you have met George Miksch Sutton." The present work provides, perhaps better than his other recent publications, a reacquaintance with the author. To review the book in any detail would be to review Sutton himself. The book *is* Sutton—acutely aware and knowledgeable of his surroundings, viewing and interpreting as both scientist and artist. Surely there are few men who appreciate more fully than he what they see and have seen. Through keenly sensitive eyes he efficiently absorbs and savors even the smallest (and, to many, the most inconsequential or transient) of things, wrings delight therefrom and selectively transmits them to his reader in an utterly charming manner.

This is a book not only about birds but also about the warmth and friendliness of the Mexican people and the small but choice sections of their diverse country which the author knows so intimately. There is no preaching, but his thoughtful "forward" reflects deep concern for the vanishing wild places and their animals. Sutton expresses the belief that the necessary conservation measures will be taken before it is too late. But I wonder. If not already the case, it will not be long before the last macaw flies over the Sabinas and the last Tamaulipan curassow is silenced. If these things can indeed be avoided Sutton's book may well be one of the few effective, available instruments to convince the Mexican officials that an extraordinary resource is rapidly slipping into oblivion.—DALE A. ZIMMERMAN.

AN ANALYSIS OF THE POPULATION DYNAMICS OF SELECTED AVIAN SPECIES WITH SPECIAL REFERENCE TO CHANGES DURING THE MODERN PESTICIDE ERA. By Charles J. Henny. Wildlife Research Rept. 1, U.S. Dept. of the Interior, Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife, Washington, D.C. 1972: 7 × 10 in., iv + 99 pp., 7 figs., 62 tables + 3 in appendix, pencil sketches by Janice Chapman, paperbound. $1.00.

The purpose of this paper was to compare the numerical status of 16 selected avian species before and after the era of modern (organic) pesticides began (i.e. before and after 1946 when DDT came on the market). The general conclusion is that birds with long food chains, particularly those eating other birds or fish, have declined since 1946, while birds with short food chains, eating herbivorous animals, have shown no such decline. Henny further proposes that the decline is not due to any change in the survival of post-fledging birds but due to a decline in reproductive rates (due to eggshell thinning and breakage). This is not an original suggestion but the documentation to support this numerical decline is impressive. Henny found evidence for a decrease in fledging rate for Brown Pelican, Osprey, Cooper's Hawk, Red-shouldered Hawk, and Sparrow Hawk. Mortality rates had also decreased in three of these: Brown Pelican, Red-shouldered Hawk, and Sparrow Hawk (attributed to decreased shooting). Great Blue Herons also show evidence of a decreased mortality rate but no evidence of a decreased fledging rate (in spite of a high fish diet). The other species examined included the Great Horned Owl, Black-crowned Night Heron, Barn Swallow, Chimney Swift, Blue Jay, Black-capped Chickadee, Cardinal, Robin, Barn Owl, and Red-tailed Hawk. No significant changes in either mortality rates or reproductive success were found for these species, which are mainly primary carnivores or even lower in trophic level.

The text is in very readable type and free from typographical errors. The sketches of the birds are attractive but not essential to a research paper. Most criticisms are rather trivial. The species were not discussed in the usual taxonomic order, or in any other obvious order. Figure 6 is unorthodox in having the dependent variable plotted on the abscissa rather than on the ordinate. The abstract implies that the mathematical models used were developed in the paper but one has to go to a previous paper (J. Wildl. Mgmt., 34:690 et seq., 1970) to find this development or indeed to gain any real understanding of the methods used. The paper is well organized and well documented so these shortcomings are not serious.

The use of laying date, rather than fledging date, would seem to be more appropriate as the initial date for calculating mortalities, since this is when recruitment to the whole population takes place (in the form of eggs) and also when recruitment to the breeding population takes place, when the females lay those eggs. This also makes it simpler to calculate the pre-breeding mortality, which has given the author some difficulty (because he has chosen fledging date and in some cases January 1 as his initial dates). January 1 has no biological significance and fledging date has all of the disadvantages of egg dates and none of its advantages. The data points for the survival curve of the Black-capped Chickadee in Figure 1 appear to bear no obvious relationship to the data given on pages 66 and 67 in the text dealing with this species. The mortality data in Appendix 1 for this species appear to apply to the 1946–64 period, not the pre-1946 period (compare pp. 66 and 99). I found some other disturbing details when checking the information for this species and for the Robin, the two species of particular interest to me.

However, I believe that the author has made an important contribution to the study of avian population dynamics and the impact of pesticides on bird populations.—J. MURRAY SPEIRS.

THE AVIAN BRAIN. By Ronald Pearson. Academic Press, New York and London, 1972: 6¼ × 9¼ in., xi + 658 pages, 140 figs., 88 tables. $31.00.

Birds are perhaps the most complex of vertebrates evincing stereotyped behavior as a way of life. This fact, their generally efficient visual and auditory organs, and the possession of structures and motor "programs" for flight are more than enough to entice neuroscientists to study the avian nervous system. Making this effort somewhat difficult is the fact that few neuroscientists know anything about birds, let alone about their nervous systems. And, I think this is the correct order.

For the neuroscientist who does know something about birds, Ronald Pearson's volume, "The Avian Brain," will be, with reservation, a fair place to begin one's education. This is a tough and thorough reference work, a dazzling effort to synthesize information on structure with function, biochemistry, endocrinology, and histochemistry. In addition to chapters summarizing the histology and microscopic anatomy of various brain areas, special chapters are also given on ontogenesis, the vascular system, vision and audition, biochemistry, and the electroencephalogram. Peripheral receptors, nerves, nerve-muscle junctions, and the autonomic nervous system are not included.

The book is essentially free of unnecessary comparison of avian with mammalian brain. It is the author's conviction that, given 280 million years of phylogenetic divergence between birds and mammals, homologies of structure and function are risky. It is Pearson's objective that this work shall kindle interest in the use of birds for study of their own neural uniqueness.

As its title alone should sell it—at a time of quickening interest in all phases of neuroscience—more practical aspects of its publication can be considered: Who will use the book; how complete is the information therein; and, as a reference source, could it provide an efficient "lift-off" for a better general understanding or starting a new project with birds?

First, who will use the book? In its 16 chapters, Avian Brain is very technical, unquestionably written for individuals with a mastery of some current field of neuroscience. I do not mean beginning graduate students, naturalists, or necessarily any of the professionals including ornithologists mentioned on the book jacket blurb. The price of admission to Pearson's scholarship is a current working knowledge of at least one of the fields covered.

By working knowledge I mean the reader must supply context, vocabulary, and insight in order to deal with any of Pearson's chapters. For example, in Chapter 3 on biochemistry, you had better be familiar with electron transfer system nomenclature e.g. NADH, NADPH, etc., the significance of phospholipid and cerebroside concentrations in sub-cellular fractions of brain, the ins and outs of glutamate metabolism, and the distribution of various catecholamines. You should know that the opening lines of section VI of this chapter (amino acid metabolism): "In general terms glutamate is the only amino acid which is used at an appreciable rate by vertebrate brain tissue" (p. 55) is a statement of immense theoretical importance, representing a monumental amount of rather recent neurochemical work, actually little substantiated in birds. Here Pearson utilizes information from mammals to fill the gap in data from birds; but the fact that the gap exists is something you must know; it is not mentioned. Without understanding the limitations of histochemical technique, the reader cannot evaluate either the use of this technique in birds or the direction of such work, essentially derived from mammalian findings. You would not know from this chapter that audioradiographic tracers and immunoflourescent techniques add more precision to methodology of neurochemical locali-

zation and are now being widely and rapidly used throughout the world. These things you must furnish. Similar levels of background are requisite for handling other chapters intelligently.

Now, about information content. If you are knowledgeable in a field of neuroscience and want to know what has been done with birds, how well does a Pearson chapter hold up? Chapter 8 (The Cerebellum) was chosen for scrutiny. Here trouble emerges. There is no reference, for example, to climbing fibers, or the fact that interneurones of cerebellar cortex are inhibitory in the mammal and frog and probably so in birds, or that the giant Purkinje cell—the output neuron of cerebellar cortex—is also inhibitory in its action. This leads Pearson into further difficulties when he attempts to deal with older literature on the deep cerebellar nuclei and the vestibular system. Whether you are dealing with frogs, birds, or mammals, the activity of the cerebellar neuropil is believed to be roughly comparable, given certain histologic differences. Take away the powerful excitatory climbing fiber input, the interneuron story, and Masai Ito's observation in 1964 that the Purkinje cell output is inhibitory (well established in mammals but not yet confirmed in birds) and you are left with a dated and completely erroneous picture of the cerebellum even if gaps do exist in our knowledge of the avian central nervous system. In addition to these serious omissions and an evident lack of understanding of the significance of material referenced (a text cited covers the missing items in detail), studies which are included can also be faulted, at least from the methodologic point of view of the 1970's. These things being so, the usefulness of this particular chapter collapses. Whether such criticism would hold for some or all other chapters, I cannot say. I did consider that Pearson, in an effort to keep strictly to the text of published avian studies, might have deliberately ignored what he knew to be the case for reptile and mammals. But, as this would serve no one, the notion was dismissed. This negative mark might well be balanced against some chapter where Pearson is obviously stronger as in Chapter 13 which deals forthrightly with the complex matter of forebrain histology and anatomy, and the renowned nomenclatural abyss centered here.

Finally, is the use of such a reference work as Avian Brain a good starting place for background material on a problem of interest? If we are talking either of completeness of information or current material, say in the last five years, the answer is no. This can be illustrated by a recent experiment. In October of 1972, as this review was underway, I asked a national library of medicine, Remote-Access Retrieval Service (Medline) terminal operator to make a search (no charge) of recent publications on the avian visual system. Two code words were given: "Birds" and "Vision." In a few minutes, 105 citations from 38 journals were printed out for a 1968–1972 period, 16 of these (through May) were from 1972. Pearson's Chapter 9, The Avian Eye and Vision contains 81 references, 60 of which were published before 1965 (a comparable four year period viz. 1965–1969, his review was not complete for 1970). In Medline (30 references) vs. Pearson (4 references) the overlapping two years 1968–1969 contain only one reference in common. Medline does not reference well the zoologic literature and Pearson's coverage proved skimpy on visual discrimination, acuity, nystagmus, and electroretinogram studies. But the point remains: this is 1973, and if I were to review background material for a problem, I would start with a Medline or similar retrieval service, supplemented with zoologic abstracts.

It would be churlish to insist that Avian Brain also serve this impossible feat of information i.e. being both complete and up-to-date. But coverage of all bases by Pearson does focus attention on his bibliographic effort which, in turn, uncovers a quite reasonable

but unfortunate trade-off of analysis for comprehensiveness. At a stage when there is uneven depth of information available, Pearson chose to live with coverage rather than a hazardous critique. It is an understandable trade-off. The reader by applying his own critique can certainly profit from a Pearson chapter and be in a position to make his own contribution to the literature. The book remains on my shelf for especially this reason, and serves well one of Pearson's goals.—ROBERT J. GRIMM.

THE COMPLETE ECOLOGY FACT BOOK. Edited by Philip Nobile and John Deedy. Doubleday, New York, 1972: 5¾ × 8½ in., xx + 472 pp., maps and charts. $10.00.

It would be much easier to appraise this book dispassionately if it were not for the evangelistic hard sell on the dust cover, e.g. "*You* can save the environment if you know the facts about: Pesticides," etc. The fact is that this book is far from complete (it's hard to imagine what *would* constitute completeness in this field) and it says little or nothing about what to do about our environmental ills.

Obviously the word "ecology" in the title denotes the popular rather than the academic field. Basic (academic) ecology is neatly polished off in the foreword, where Pierre Dansereau's twenty-seven "Laws of Ecology" are quoted without explanation. The degree to which this misses the boat as a layman's guide to ecological understanding can be demonstrated with the observation that of the few professional ecologists who are aware of Dansereu's "Laws," virtually none have a ready recall of their specifics. Such obscure materials illustrate the editors' lack of understanding of ecology better than any other feature.

The book is divided into eight major areas, each represented by a chapter in which pertinent statistical data are presented. The rationale for the topic choices and their organization is obscure. For instance, although one chapter is devoted to Pollution including a subchapter on Rivers, Lakes and Streams, a separate chapter is devoted to detergents. A chapter on energy production is conspicuously absent although the three-page chapter Nonrenewable Mineral Resources (titled "Non-renewable Mineral Wastes" in the Table of Contents) does mention the subject.

Some of the statistics presented seem to be good choices; the inclusion of the Population Reference Bureau's World Population Data Sheet seems appropriate even though it could be had for about twenty-five cents directly from PRB. Excerpts from the *Red Data Book* do come from the best source of information on endangered species, but the inclusion of such groups as marsupials seems to be of questionable value for the average American.

To go on further about this book would be disproportionate to the amount of attention it deserves. Suffice it to say that at ten dollars, a successful attempt at an ecological almanac would be a good value; this attempt is no bargain at all.—SHAUN BENNETT.