REVIEWS

EDITED BY JOHN P. HUBBARD

The behavior of Spotted Antbirds.—Edwin O. Willis. 1972. Amer. Ornithol. Union Ornithol. Monogr. No. 10. vi + 162 pp., 3 col. pls. 27 text figs. $6.00 ($4.75 to A.O.U. members).—This is the fourth major installment of Willis's field studies on the behavior and ecology of the Formicariidae and their ecological associates, being preceded by studies on the behavior of Red-crowned Ant-Tanagers, Bicolored Antbirds, and migrants at ant-swarm bird flocks. The work is based on 26 months of field study in the period 1960–70 on Barro Colorado Island, Panama. The principal subjects of study were 498 color-banded individuals. The study's dimensions thus set a new standard of endurance, patience, and perspective for tropical field ornithologists.

Over the years, Willis and his field notebook became a normal, unthreatening part of the Spotted Antbird's environment, which increased the proportion of nonalarm behavior he encountered. The importance of prolonged and repeated field study is revealed in Willis's comments to the effect that in many respects he was naive until the sixth year, when he first recognized the tendency for individual Spotted Antbirds to be more alarmed away from flocks. The secrets of antbird behavior thus seem to be revealed to us by an honorary member of the species, reminiscent of young King Arthur's descriptions of goose behavior after Merlin made him a temporary member of the gaggle.

Much of the monograph consists of unquantified descriptions of typical Spotted Antbird behavior, the credibility of which lies in the extent of Willis's familiarity with his subjects. Wherever data are presented and statistically analyzed, as for example in the excellent section on foraging behavior, Willis has degrees of freedom to spare and achieves extremely high levels of significance.

The author is to be commended for producing a monograph of great breadth and depth. Each section, i.e. General Behavior, Reactions to Danger, Agonistic Behavior, Reproductive Behavior, Spatial Behavior, Foraging Behavior, and Interspecific Flocks, presents detailed descriptions of Spotted Antbird characteristics followed by discussion of implications, including apparent adaptive aspects of specific behavior and a broad critique of related theory. The breadth of these presentations provides something of interest for nearly everyone. Accompanied by revealing line drawings of postures, details that could have been trivial or boring here attract one's attention both in the style of presentation (which makes you feel as if you are actually watching antbirds in Panama) and in the final, often unorthodox interpretations, which are not trivial.

Throughout this study thread three recurrent themes that Willis feels have been of principal importance in the evolution of Spotted Antbird behavior. Predation has had a selective influence on nearly all aspects of nesting biology, including nest building, nest structure, egg color, clutch size, and parental care of young. The relevance of predation in this regard is not just speculation, because predators (mainly snakes) robbed over 90 percent of all nests and some pairs renested (after losing a nest) up to 10 times within a single breeding season. Much of Spotted Antbirds' vocal behavior and shyness, including hyperactive panicking and calling, seem to be predator-defense systems. Predation pressures also seem to restrict foraging ranges and preferred habitats, and thus total available food supply. And contrary to recent conclusions by others who study interspecific foraging bird

flocks, Willis concludes that reduced predation is the main advantage gained by joining flocks. His primary evidence in support of this is that Spotted Antbirds are less nervous in flocks than when alone, but he provides other logical arguments as well.

Interspecific competition for food, expressed through aggressive dominance, and patterns of food availability are the other forces that shape Spotted Antbird behavior. Inhabitants of mature forest, such as the Spotted Antbird, do not normally encounter the localized food surpluses found in secondary and edge habitats, and they consequently tend to be monogamous, to have nonelaborate courtship displays, and to be solitary rather than clan-forming. Because Spotted Antbirds are subordinate at ant swarms to larger antbird species such as the Bicolored Antbird, they must be relatively unspecialized and adapt to less predictable food supplies. Slowed growth rate of the young, shortened nesting seasons (because food supply fails earlier than for dominant species that usurp the richest food supplies), increased sexual dimorphism in both plumage and intraspecific aggressive behavior, and greater foraging flexability are all consequences of social subordinance. Unlike Bicolored Antbirds, Spotted Antbirds defend large territories (about 4.6 ha/pair) in which they search for insects on their own or join antwren-mixed species foraging flocks. These territories seem to provide food resources needed to supplement that available at ant swarms.

With respect to the psychological origin of antbird displays, Willis prefers a hypothesis of simple ritualization of unitary drives rather than Tinbergian evolution by means of conflicting drives, which he compares respectively to speciation by divergent evolution versus speciation through hybridization. Neurophysiological evidence favors the single drive hypothesis, and Willis argues that predator escape and distraction displays should evolve as specific decisive adaptations rather than ambivalent actions. Similarly he discounts conflict between escape behavior and attack behavior as the origin of threat and appeasement behavior, and instead considers threat to be a part of, or substitute for, attack behavior. Displacement behavior normally serves as a ritualized display with specific information.

Willis's interpretations are comprehensive and provocative, and are based on levels of insight rarely achieved in studies of bird behavior. But they represent *post factum* hypotheses that must be tested in future studies, rather than the conclusions of studies specifically designed to test particular questions about the adaptive nature of antbird behavior. In most cases I find his arguments logical and convincing, but in some, e.g. unitary drive hypothesis, (p. 37), flocking responses to predation (p. 140), certain evolutionary consequences of aggressive dominance (p. 120), I find the link between the observations and the conclusions tenuous, even if logical. Nevertheless, these areas of speculation, appropriately contained as they are, provide welcome stimulation.

In Willis's field notes must remain much data on the population dynamics of Spotted Antbirds, including survivorship, inbreeding, and dispersal—topics that have never been discussed adequately for a tropical bird species. I hope these will be the subject matter of the next installment of Willis' commendable study.—FRANK B. GILL.

Studies of tropical American birds.—Alexander F. Skutch. 1972. Cambridge, Massachusetts, Publ. Nuttall Ornithol. Club No. 10. Pp. vi + 228, 15 figs., 2 tables. Cloth. $12.00.—This book represents the latest contribution by Alexander Skutch to our knowledge of the life histories of tropical American birds. Most

of the field work was done in Costa Rica, with a few observations being made in Guatemala, Honduras, and Ecuador. The book contains accounts of 28 species from 15 different families. A few of these accounts, such as that of the Blue Tanager (*Thraupis episcopus*) simply are additions to life histories previously published by the author; most are fuller descriptions. Each is subdivided under appropriate headings, and is followed by a summary, making the book very easy to use.

The primary emphasis throughout the book is on reproductive biology. Virtually every account contains careful descriptions of nests, nest sites, eggs, young, and the behavior of adults at each stage of the nesting cycle. Many also contain incidental observations on various other life history characteristics. Clearly, the book represents an enormous amount of excellent and dedicated field work by an extremely patient naturalist.

One criticism I have concerns the lack of tables. The entire book contains only two tables, and only one of these (Table 1, p. 65) deals with more than one species. This table gives feeding rates during the nestling period for 10 species of hummingbirds, yet life history accounts of only three of them appear in this book, and the table is referred to only once. Nor does it indicate how many nests were observed, the weather conditions, or the times of day. Table 2 on p. 133 is much better, giving a clear picture of incubation by a pair of Fasciated Antshrikes (*Cymbilaimus lineatus*). Data of this kind are far more clearly presented in tabular form; if a full description is given, it usually takes more room than a table would, and so often the description becomes simply a broad summary, e.g. "we timed 11 such sessions, ranging from three to 180 minutes in length and averaging 64 minutes" (p. 29). This form of presentation, all too common throughout this book, makes data less readily available for use in future work by other biologists.

A second criticism involves the making of assumptions without having presented the reader with adequate evidence. Several of these assumptions concern the sex of a particular individual. For example, in the White-capped Dipper (*Cinclus leucocephalus*) the more brightly colored of a pair was "doubtless the male," even though the only fledging seen well enough to be described had a mixture of bright and dull (two patches involved; one like the "father" and the other like the "mother"). In many instances where the sexes are alike Skutch assumes that if no changeover was seen near the nest, then only the female incubates. Although this is supporting evidence, it is not conclusive, especially when applied, as Skutch has done, to such monomorphic, strongly song-oriented species as the Striped-breasted Wren (*Thryothorus thoracicus*). A third example of this sort of assumption appears in the account of the Scarlet-rumped Cacique (*Cacicus uropygialis*). Skutch writes that in many pairs the sexes are visually indistinguishable; further on he notes that the female tends to sing in a higher voice. Yet he states categorically "Only the female incubates," even though later in the same paragraph he reports that the incubating bird often sang on the nest, "sometimes in a voice hardly to be distinguished from her mate's, sometimes at a higher pitch and more rapidly" (p. 179). Skutch also tends to assume that most small groups of birds are family groups (see, for example, pp. 152, 164). Finally, in the account of the Tawny-bellied Euphonia (*Euphonia imitans*), discontinuous records of an adult male roosting in various parts of one small tree are assumed to involve the same individual, even though the records range from September 1966 through early 1971, with the largest gap being from October 1968 to early 1971.

It is perhaps unfortunate that Skutch apparently made no attempt to mark

individual birds, as the validity of many assumptions mentioned above could then be checked. Individual marking would also have helped unravel the more complex social interrelationships described for many species, such as the extra female (?) Bronzy Hermit (*Glaucis aenea*), and the numbers attending the nest in both the White-fronted Nunbird (*Monasa morphoeus*) and the Dusky-faced Tanager (*Mitrospingus cassinii*), to mention only a few.

A slightly annoying feature of the book is that scientific names are not given for birds referred to in the text, even when first mentioned. Although there is a published attempt to standardize English names of Middle American birds (see Eisenmann 1955, Trans. Linnean Soc. New York 7: 1–128), Skutch does not always follow this (e.g. "Blue Tanager"). The book does have an index listing the scientific names of most of the birds mentioned in the text, but this is not complete; on p. 104 Skutch refers to a "Swallow-wing" which is not listed in the index.

Finally I find myself disagreeing rather frequently with Skutch's interpretation of a number of social interactions. This is particularly so in cases of possible aggression. For example, in the account of White-fronted Nunbirds, he writes, "I noticed no antagonism, but one alighted rudely almost on top of another, making it move" (p. 107). This appears to me to be an excellent description of a supplanting attack. He explains the contact fights that are "so frequent" among Green Honeycreepers (*Chlorophanes spiza*) as "an expression of excessive, and sometimes misdirected, sexual ardor" (p. 167). He writes that he has found no evidence of territoriality in any bird that roams through the upper levels of the tropical forest, although in the same paragraph he describes a display by White-fronted Nunbirds that "possibly . . . had territorial relevance," and later describes instances of birds chasing away conspecifics from the vicinity of their nest for both the Shining Honeycreeper (*Cyanerpes lucidus*) and the White-vented Euphonia (*Euphonia minuta*), both of which feed regularly in the upper levels of the tropical forest. It is true that the nature of the forest itself makes study of territoriality difficult; again, marking would have helped clarify the situation.

All of these criticisms are relatively minor, considering the overall worth of the book. Alexander Skutch has once again given the scientific world a substantial contribution of new and invaluable information about the life histories of tropical American birds. It is well worth the price.—SUSAN M. SMITH.

Vergelijkende studie van de pterylosis in enkele Afrikaanse genera van de Ploceidae. Bijdrage tot de morfologie en de systematiek van de Passeriformes.—Maria Morlion. 1971. Brussels, Paleis der Academiën. Verhandelingen van de Koninklijke Vlaamse Academie voor Wetenschappen, Letteren en Schone Kunsten van België; Klasse der Wetenschappen, 33 (119): in 3 parts, bound in 2 vols.: xvi + 328 (text); 1–176 (figures), 177–256 (tables).—At the outset I should state that I cannot read Dutch; this review will be based on the many figures and tables in the publication, the 3½ page English summary, my limited use of a Dutch-English dictionary, and personal knowledge of Dr. Morlion's work. A number of colleagues have asked me why this important study was published in Dutch, a language that few ornithologists can read. Although Dr. Morlion is fluent in several other languages, including English and French, I understand that she was required to write her doctoral dissertation in Dutch, the written language of Flemish Belgium. She was fully aware of the drawbacks of a publication in an obscure language for science, hence her heavy use of illustrations. She also adopted a pterylosis nomenclature based on the Latin terms established by C. L. Nitzsch,

the founder of pterylography. The many excellent and detailed figures labeled in an international language thus allow a relatively full understanding of the paper, in spite of the difficulty of the text.

This study was conducted at the Rijksuniversiteit, Ghent, and was under the direction of René Verheyen until his death in 1961. For her work Morlion used 179 alcoholic specimens of 40 species of ploceids: 108 specimens of seven genera of Ploceinae (four genera if one follows the classification in the "Peters" check-list); 63 specimens of eight genera of Estrildinae; and eight specimens representing all three genera (subgenera in "Peters") of Viduinae. The feathers were clipped on each specimen and drawings made of the type and location of *each and every* feather on the body. In the illustrations the remiges and rectrices are shown as double circles, other contour feathers as single circles (all pennaceous feathers are drawn to show the directions in which they lie on the body), semiplumes as closed circles, filoplumes as dots, and bristles as x's. I include this information here because the key to the illustration symbols is within the text, not in the illustrations volume, and also to indicate that the study included the most minute feathers, not just the contour feathers as is usual.

The introductory chapters include a history of pterylography, a discussion of past and present terminologies, and materials and methods; all specimens are listed with their data in the tables. The main part of the text treats each feather tract separately. Morlion recognizes eight tracts: the pterylae alaris and humeralis, caudae, spinalis and femoralis, gastraei (ventral), capitis, and cruralis. The results are discussed in detail, genus by genus and subfamily by subfamily. I lament once again that the discussion of this interesting material is lost to most ornithologists by being in Dutch.

The illustrations are arranged by tracts and are highly detailed. As an example, the spinal and femoral tracts are afforded 31 figures. A detailed drawing of all the feathers, from pennaceous to filoplumes, is given for one species of each of 17 genera (the single specimen available of the 18th genus in the series was too damaged dorsally for study). That detailed species is then repeated in an outline drawing accompanied by outlines of the other species in that genus for comparison. Finally the tracts in all genera of a subfamily are gathered together on additional plates in two kinds of outline drawings for easy comparison: one in true proportions, the other adjusted so that all tracts are the same length. The results clearly show that regardless of body size all species in a genus are essentially identical to one another, that closely related genera are very similar, but that in certain cases the members of a subfamily differ to some degree. Within the sample of Ploceinae the regio dorsalis of the pteryla spinalis (the saddle element of the dorsal tract) is a solidly featured rhombus in *Amblyospiza*, *Coliuspasser* (= *Euplectes*), and *Melanoploceus* (= *Ploceus* in the "Peters" classification). In contrast *Ploceella, Hyphanturgus, Textor,* and *Malimbus* all have saddle apteria of varying sizes and locations; perhaps this is the reason Morlion did not follow the "Peters" classification in lumping *Melanoploceus, Ploceella, Hyphanturgus,* and *Textor* into *Ploceus*. Within both the Estrildinae and Viduinae the regio dorsalis is a solidly feathered rhombus that varies only slightly in shape among the genera.

The number of detailed illustrations is influenced by the complexity, amount of variation, and taxonomic importance of each tract. The wings and tail are given especially thorough treatments, not only in the number, type, and location of the feathers but also through a series of diagrams and tables showing the relative

lengths of the remiges and rectrices *and* their coverts—a potentially useful and more detailed type of wing and tail formula. The major body tracts, spinalis, gastraei, and capitis, are also treated in full detail; the relatively uniform and taxonomically less interesting humeralis and femoralis are given less analysis; and the cruralis is illustrated only by a single sample genus per subfamily.

Morlion summarizes her results (in English) by stating (p. xiii): "The Ploceidae exhibit only a very limited amount of individual variation in their pterylosis. In studying these features, the pterylographer can safely depend upon a single specimen of a species to be typical for that species." She then goes on to describe the differences found among the genera and subfamilies studied. She concludes (p. xvi): "in the three examined subfamilies of the Ploceidae, pterylosis seems to be very constant morphologically. All tracts are present, and their general configuration and regional subdivisions are similar. No striking differences are found, but several minor distinctions can be seen. We believe, however, that these pterylographic differences alone are too small to justify the recognition of two families, Ploceidae and Estrildidae as many contemporary authors suggest. Further comparative pterylographic investigations in passerine and other families are necessary before the exact taxonomic value of this character can be determined."

I found this to be an outstandingly competent study. It illustrates the complete pterylosis of a group of related passerines with a degree of care and detail that is almost unique within the pterylographic literature. One can only wish that René Verheyen had lived longer to continue to stimulate interest in avian morphology within Belgium, to produce more students of this caliber. As it is we have a fine descriptive study of 40 species of ploceids, which although in Dutch, has been made as comprehensible as possible through lavish use of excellent illustrations. Dr. Morlion is to be congratulated.—MARY HEIMERDINGER CLENCH.

The palaearctic-African bird migration systems.—R. E. Moreau. 1972. London and New York, Academic Press. xvi + 383 pp., 31 black-and-white plates, many tables and figures, including map in inner cover. £7.80 (U.S. $24.00).—Moreau estimates that each autumn five trillion palaearctic passerines and untold millions of nonpasserines seek sub-Saharan Africa as a wintering ground. For some species the one-way journey is 10,000 km or even longer, e.g. from the Yakutsk area of Siberia to Nairobi. In birds such as the Greenland race of the Wheatear (*Oenanthe oenanthe leucorhoa*) the ocean crossing alone is 2,000–3,000 km. Even for European species formidable barriers exist en route, including up to 1,100 km of the Mediterranean Sea and at least 1,600 km of the Sahara Desert. For migrants approaching Africa from farther east, the barriers include the Black and Caspian Seas and trans-Caspian and Arabian deserts. For species departing farther south, e.g. *Cuculus poliocephalus*, in lieu of deserts are 3,000 or more km of the Indian Ocean to cross. In spite of these enormous barriers, Moreau calculates that 137 species (62 passerines) regularly migrate between Eurasia and sub-Saharan Africa from the western palaearctic, 82 (52 passerine) from the central palaearctic, and 14 (8 passerine) from the eastern palaearctic. As one might expect, the bulk of the species (especially among passerines) are those that feed primarily on animal matter, with a few seed-eaters (e.g. *Coturnix*, larks, buntings) and none purely frugivorous.

The hostile nature of oceanic environments for migrant land birds is readily apparent, but in their own ways deserts are nearly as hostile (lacking perhaps only in the ability to drown birds). In the Sahara water, shade, and probably food are

lacking or in the scantiest supply over vast stretches, and even during autumn and spring the region is often scorchingly hot. In the North African coastal plain the conditions may be only a little better, particularly in autumn after the long searing summer. For migrant birds grounded in these hostile environments, death through heat exhaustion, lack of water, or starvation must be the rule. To avoid this confrontation migrants could funnel along more verdant routes, such as the Nile Valley, but this does not seem to occur, for rarely are concentrations of migrants large in such places. Moreau holds instead that migration occurs on a broad front across Africa, a contention borne out by radar studies and other data.

If one accepts Moreau's contention of migration on a broad front and the fact that major portions of North Africa are unattractive to most of the trillions of migrants, the inescapable conclusion is that birds fly over most of North Africa without stopping. At a flight speed of 40 kph, Moreau calculates that still air crossings of the Sahara would take 40 hours, which, coupled with over 24 hours to cross the widest part of the Mediterranean, means that migrants spend days instead of hours in continuous flight. Because of the prevailing (north) winds over the Sahara, the actual crossing could take as little as 30 hours in autumn but as much as 50–60 hours in the spring (a spring tail wind is present in some areas from the southwest). Regardless of the exact time required, it is clear that birds cannot cross the Sahara-Mediterranean barrier in the classical dusk-to-dawn style to which we are accustomed in North America (or do Blackpolls really fly direct to South America from New England?). The idea of such long nonstop flights raises many interesting questions, not the least of which are physiological.

Moreau does not contend that all birds cross the combined Mediterranean and the Sahara in one flight, for birds do come down even at oases deep in the desert. Interestingly, these oases seldom seem to attact very many migrants, although occasionally moderate numbers will descend. Moderate numbers of migrants are also caught at banding stations on the North African coast, where recaptures in subsequent years suggest that at least some individuals follow that same route again. Thus for some birds a North African stopover seems to be part of their migratory design, but this hardly applies to trillions of migrants. Even with such a stopover, the journey still involves long flights and many hours on the wing (or do birds possibly alight and rest at night on the desert?).

These are some of the more important points that Moreau has developed in this study of palaearctic-African bird migration. Beyond these, the major emphasis in the work is on distributional and ecological aspects of this migration system, particularly with reference to sub-Saharan Africa. The book is divided into four parts: I, The source of migrants (46 pp.); II, Africa as a receptive area (33 pp.); III, The species (163 pp.); and IV, General topics (14 pp.). Part III deals in detail with 187 species (74 passerine) and is the meatiest as well as the lengthiest segment of the book. In it breeding and especially wintering ranges of species are outlined and discussed, along with information on habitats and often on population, migration, and possible African competitors. The species dealt with are those that are regular south of the Sahara and are neither mainly coastal nor marine (K. D. Smith provides an appendix of 64 species to include these and vagrants to the area).

As boggled as a reader's mind may become with the mass of detail in the above accounts and elsewhere in the book, what Moreau has produced is more a synthesis than a compendium of information. This is not to say that the work is not valuable as a compendium, for it is, particularly for unpublished data.

Still, it is not so much the reservoir of detail as Moreau's earlier works, especially the lengthy review, "Problems of Mediterranean-Saharan migration" (1961, Ibis 103a: 373–427, 580–623).

In some ways the title of the present work is misleading, in that Moreau chooses to emphasize the sub-Saharan aspects of the situation, with relatively less attention given to North Africa and Eurasia (i.e. the palaearctic). Although he may have felt those areas were adequately covered in the Ibis review and elsewhere, certain other subjects are little covered either there or in the book, e.g. the actual timing of migration and some phases of differential migration. Sadly, Moreau died 30 May 1970 before he completed the entire manuscript and after being ill and bedridden for months. J. F. Monk, who actually saw the book into print, tells us in the foreword that some sections planned by Moreau remain undone, such as chapters on physiology of migration and conclusions. While we are not entirely deprived of these aspects in the book, had Moreau been able to carry on his work under better circumstances, including good health, perhaps it would have been more complete.

I note a few discrepancies in the book, including a lack of agreement between the estimated population sizes on page 46 and those given later on in the individual accounts. On page 46 the populational total for the 16 migrant passerines is 3,270 million, whereas in Part III it is 595 million more. The most abundant bird by these estimates is the Willow Warbler (*Phylloscopus trochilus*), at one trillion individuals in autumn (or is it 900 billion?). One might question these estimates anyway, as they are based on Finnish data and extrapolated for the whole of Eurasia; perhaps they are better than nothing. I also question the very superficial discussion of possible African competitors to the migrants, although perhaps this will provide a stimulus for thorough studies of the situation. On the map in the inner covers, Nairobi is shown south of Lake Victoria and in Tanzania—it should be to the east and in Kenya.

In general the layout, printing, and general quality of the book are quite satisfactory, although my copy shows some smearing, on one page the right margin did not print, and on another the ink is pale.

In spite of minor flaws and some question about content and completeness, this book is a good piece of work and a staggering job of collation. It will serve to inform in general as well as in some detail about the palaearctic-African migration systems, and from it one may gain an insight into the many aspects for which information is still lacking. For American readers in particular, the book will provide a view and appreciation of a migration system in which the barriers to successful passage make ours pale by comparison (is this a factor in relative richness of palaearctic versus nearctic avifaunas?).

Before his death at age 73, R. E. Moreau wrote in the foreword to this book that he would be surprised to set eyes on the reviews but that he would be delighted if someone somewhere thought it "no bum swan-song." I hope that Moreau did anticipate delight, for indeed this is no bum swan-song.—JOHN P. HUBBARD.

Perspectives in zoosemiotics.—Thomas A. Sebeok. 1972. The Hague, Janua Linguarium Studia Memoriae Nicolai Van Wijk Dedicata, Series Minor, 122. 188 pp., 16 figs. Paper. 32.00 Dutch guilders.—This book is written by a linguist and published in a linguistics series, and is reviewed here solely for its zoological content

and style. The term "zoosemiotics" refers to the study of signaling behavior, and hence communication, in animals.

The book consists of a series of nine articles (one an annotated bibliography), all of which have been published elsewhere at least once, and appear here with virtually no attempt at updating or revision. The first article, for example, contains no references later than 1962, and refers in a footnote to the "latest" research results on bee language as being in papers published in that year and in 1961. The book is full of similar examples, and even the few attempts at updating the references are rather peculiar. For example, the second article contains no reference later than 1964 except for a footnote referring to an "intriguing" NOVEL, published in 1969.

Another distressing feature of this book is its great redundancy. Sebeok realized this and commented on it in his foreword (p. 4). Yet he left in a section of 18 lines on p. 79 that is almost word-for-word repetition of lines appearing on pp. 39–40. On page 18 he notes that scent, because it lingers, can be likened to writing, rather than speech; he then proceeds to repeat this with equal delight on pp. 42, 68, 90, 98, and 125.

Seboek's use of scientific names is, at best, sporadic, and most of the time scientific names are not given at all. Nowhere is there any index of such names in the book.

My most serious criticism concerns the many mistakes in biology throughout the book, and I mention only a few here. Sebeok seems to feel, as apparently do other linguists, that the imitation of human words by parrots is an effort on the birds' part to start and sustain communication with people. This behavior is considered an example of "phatic communication," which Sebeok defines as messages that establish or prolong communication or check whether the communication channel works in good order (pp. 15–16). One wonders if he would interpret parrots' imitations of creaking hinges as attempting to communicate with inanimate objects and therefore possibly evidence of lack of intelligence.

In discussing food exchange among bees, Sebeok writes, "First, the quality of the fare imparts information to the foragers about the extent of the competition to which their territory is subject (only the best food sources release the alerting dance)" (pp. 42–43). There is no follow-up to this cryptic sentence; one can only wonder about Sebeok's understanding of both competition and territory.

In a discussion of the formation of dialects, which he defines as variations within species, not based on genetic discontinuities, Sebeok gives as an example the lack of communication between crows of North America and France. Apparently he does not realize that distinct species are involved, although the paper he referred to made that perfectly clear. Had he paid more heed to the scientific names for the species he was writing about, he might not have made this kind of error.

Sebeok seems to feel that "heterogeneous summation" must involve more than one sense; indeed he defines it in his inimitable style as the "redundancy which prevails among the multiplicity of bands in natural systems" (p. 70). He repeats this definition almost word for word on p. 128. This is peculiar, as most of the classical examples of heterogeneous summation involve several aspects of an object, all of which are perceived by the same sense, e.g. vision.

One last example is on page 130, where appears the startling sentence: "Müllerian mimicry is exemplified by the series of black longitudinal stripes displayed by a variety of cleaner fish, using this single identification pattern to communicate

with larger predators through a common code, as it were." This is certainly a unique definition.

Sebeok's linguistics may be excellent; his biology certainly is not. I can only regret that other linguists will likely use Sebeok's publications as their sources of biological information. The only price given is 32 Dutch guilders; at whatever the exchange rate, this book is not worth the price.—SUSAN M. SMITH.

Joseph Banks in Newfoundland and Labrador, 1766: his diary, manuscripts and collections.—A. M. Lysaght. 1971. Berkeley and Los Angeles, Univ. California Press. 512 pp., 113 plates (12 in color), 6 text figures, 9 × 11¼ in. Cloth. $40.00.—Once in a while the chasm between Sir C. P. Snow's "two cultures" is perfectly bridged by an individual scholar, and such, without question, is Averil Lysaght. Only those readers of The Auk already familiar with the history of ornithology in eastern Canada will appreciate from the title of Dr. Lysaght's book that it is highly appropriate to notice it in the pages of this journal. This magnificent tome combines history, biography, iconography, literature, and science, and much of it is of ornithological interest.

Sir Joseph Banks was one of the most remarkable men of the 18th century, and Dr. Lysaght has made it her business to rescue him from his reputation as the "Gentleman Amateur of Science." In four and a half months of the year 1766, working under the most rigorous conditions (including illness), Banks collected or recorded 340 species of plants and 91 of birds (as well as miscellaneous other animals) from the then unknown flora and fauna of Newfoundland and Labrador. He was then 23 years old. Later he was to become better known as the naturalist of Captain Cook's first voyage around the world.

The book is in four parts. The first includes general background: a description of the 18th century milieu, biographical sketches of the people figuring most importantly in the rest of the book, a chapter on Banks's birds and the use of his collections by his contemporaries, and a chapter on the paintings made from his specimens and the artists who painted them. All of the paintings are reproduced. The second part consists of Banks's diary of the expedition, annotated by Dr. Lysaght. The third part includes transcriptions and explanations of various pertinent supplementary documents. The fourth and longest deals with Banks's scientific collections and manuscripts, with transcriptions of his notes and translations from his Latin. There is much of ornithological importance here, including Dr. Lysaght's proof that some currently used scientific names of North American birds are antedated by names of Gmelin based on descriptions taken from Banksian specimens. Fortunately these names appear to quality as *nomina oblita* under the International Code of Zoological Nomenclature, so we need not displace familiar scientific names for such birds as the Least Sandpiper and the typical North American race of the Goshawk (*atricapillus*).

Banks collected a Great Auk, then a common bird, in Chateau Bay, but the specimen never reached England. Dr. Lysaght postulates that the skin was so greasy that it was discarded. Another distributional record of interest is that of a Cardinal preserved in spirits, obtained in Newfoundland. Unfortunately we do not know whether this was a wild bird or (as Dr. Lysaght suggests) a caged bird presented to Banks.

Although her own knowledge of birds is extensive, Dr. Lysaght is not a professional ornithologist, so she availed herself of expertise on both sides of the Atlantic. She made a special trip to Pittsburgh to go over pertinent parts of

her manuscript with the late W. E. Clyde Todd, the principal authority on the birds of the areas Banks visited. No desk-bound historian, she traveled to Banks's collecting grounds to see them for herself, and to check questioned localities.

Although the price of the book probably precludes its purchase by individuals other than specialists or collectors of fine examples of book-making, it should be in all university libraries, and I heartily recommend it for (believe it or not) recreational reading. In few books reviewed in The Auk can one learn not only that 18th century bird specimen preparation in Vienna and Leiden was superior to that in England, but also that, in the same century, gin was thought to have an adverse effect on fertility in men!—KENNETH C. PARKES.

Australian bird calls index, series 1, Western Australia.—John N. Hutchinson. 1972. Available as a 12" long play record or one hour tape cassette, each $7.00 (incl. postage) from the author at Gascoyne Research Station, Carnarvon 6701, Western Australia.—Songs and other vocalizations of 50 different Western Australian bird species (in 26 families) are presented in taxonomic sequence. Each species is introduced very briefly, in a pleasant feminine voice, by common name and a number, the latter referring the listener to an accompanying single page leaflet that lists for each species the scientific name, recording locality, and a very few remarks on habitat and the song. All species except four were recorded in natural surroundings.

The overall quality, tone, and volume of the sound are very good, and in general there is little distracting background noise or chatter (although occasionally crows and other species are overly loud in the background). The amount of time devoted to each species varies considerably, and in some cases, such as the Rufous Whistler and Brown Songlark, only a few of the many song variations are presented. The songs for one species, the White-plumed Honeyeater, are broken down into six different functional categories, each identified on the record, and I feel this format would have been valuable for many other species as well. In my opinion too much time was devoted to the Brown Honeyeater, Singing Bushlark, and several other species, and I would also question the wisdom of including the grunts of a captive Yellow-nosed Albatross, the nondefinitive chatterings of a Long-tailed Finch, and the very brief notes of a White-winged Sitella. The vocalizations of the pet Whistling Eagle and caged Cockatiels seemed very unnatural to me, and would have been better omitted.

It should be pointed out that field recordings of all species except one (the Noisy Scrub-bird) were made in the arid "Northwest" and the tropical semiarid Kimberley regions of Western Australia, areas little known and rarely visited by the majority of persons living in Western Australia, or by casual tourists to the continent. Many familiar birds of the more populated "Southwest," within easy driving distance of Perth, are not included. I was particularly disappointed not to hear a Twenty-eight Parrot, Pallid Cuckoo, Frogmouth, Laughing Kookaburra, Western Warbler, Willy Wagtail, or Australian Magpie. A final criticism is that no mention at all is made on the record of the fact that many Australian birds, including some of the ones presented, engage in mimicry and antiphonal singing (although a note on the printed leaflet states that the Black-throated Butcher-bird songs were made by "two, then three birds in polyphony").

In spite of its shortcomings this record has been well-prepared and is definitely worth purchasing by anyone who plans to spend some time in the field in Western Australia. I was particularly thrilled by the songs and calls of the Bar-shouldered

Dove, Koel, Blue-winged Kookaburra, Brown-breasted Shrike-thrush, Crested Bell-bird, Wedgebill, and Black-throated Butcher-bird, common sounds that to me capture the feeling of the more remote parts of the Australian bush.—CHARLES D. FISHER.

Survival studies of banded birds.—Joseph J. Hickey. 1972. A reissued and slightly revised version of the 1952 paper. U. S. Fish Wildl. Serv., Spec. Sci. Rept. 15. 177 pp., paper. No price given.—The reissue of this work over 20 years after completion of the text is testimony to its quality and importance. This can be considered the classic study describing methods for the study of avian populations through birdbanding, and it was the first exclusively bird-oriented paper to deal with the application of statistical and mathematical methods to bird populations. The thought, care, and precision in presentation are as fresh today as in 1952, and the work is still valid and relevant to today's workers. The most useful and important sections are the careful discussion of the assumptions underlying banding studies, the mathematical problems associated with small amounts of data, and the errors introduced into analyses by treating data in different ways.

A major portion of the paper is devoted to analysis of banding data for individual species, and a special section is devoted to problems of interpretation of the data from a hunted species, the Mallard. For most of the species the anlyses have been superceded by subsequent studies and a large volume of new data. However, for each species studied Hickey's work provides a thorough pre-1950 bibliography, which many students will find valuable in locating and in providing a quick review of pertinent literature.

The few inconsistencies in the report are more annoying than substantive. For example the author carefully points out that the cohort is the appropriate unit of reference in population studies. Yet Figure 9 expresses a survivorship curve for Caspian Terns in terms of percent survivors (other survivorship curves in the paper are properly expressed as starting with 1,000 birds alive). Hickey also recognized the likelihood that considerable banding data were biased by band loss (a position that was not exactly popular in 1949), but he made an uncharacteristically unsubstantiated assumption in ascribing the drastically different recovery rates for freshwater over marine cormorants as due to rapid destruction of the bands by salt water. Even today there is very little evidence to support such a contention in aluminum bands.

In summary, this paper is an absolutely essential part of the library of every serious student of avian populations who uses banding data, and it is also a tribute to a careful and understanding scientist.—JAMES P. LUDWIG.

Time lapse ecology, Muskeget Island, Nantucket, Massachusetts.—David K. Wetherbee, Raymond P. Coppinger, and Richard E. Walsh. 1972. New York, MSS Educational Publ. Co., Inc. 173 pp., 33 figs. Paperback. $10.00.—The authors review the natural and human history of a sand island south of Cape Cod, and in doing so provide a number of unusual features. Special attention is given to changes in the island's outline since the 17th century and to the succession of seabirds during the last 100 years: from hundreds of thousands of terns to 25,000 pairs of Laughing Gulls to 20,000–25,000 pairs of Herring Gulls and, in the last decades, increasing numbers of Great Black-backed Gulls.

The authors present a semipoetical review of the interactions between the land

and its fishermen and Coast Guardsmen inhabitants. In a compilation of the fauna and flora they use the knowledge of the fishes of Nantucket Sound gathered by a remarkable naturalist, Clinton Andrews, who has been a commercial fisherman in the area for half a century. Comments are made on Muskeget's special mammals—the populations of *Microtus* and of Gray Seals.

In the main feature of the book the authors use a play on Latin words (*Lares* = gulls and/or household gods) to introduce a "far out" discussion of man and gulls and just who is a problem. It is well worth reading and the latest chapter in the Muskeget story suggests a further affinity of man and gulls. The gulls have affected the vegetation by their excrement and have driven out the previous inhabitants. Now they are abandoning the island; fewer than 5,000 pairs nested there in 1972. Are gulls so like men that they dally with something beautiful, destroy it, and then move on?—WILLIAM H. DRURY.

Charmants voisins—les oiseaux du Québec.—Claude Mélançon. 1969. Montreal, Canada, Éditions du Jour. 255 pp., 66 black-and-white line drawings by Jacques Bédard. $3.50.—The first edition of this book appeared in 1940. In the fifth edition 29 years later one finds few changes: a hard cover with a poorly reproduced color drawing by J. F. Lansdowne, and a three-page list of recent French names and revised total lengths (both taken from W. E. Godfrey's "Les Oiseaux du Canada," 1967, Natl. Mus. Canada Bull. No. 203) for the species mentioned in the text.

A slight but misleading change has been brought into the title, "les oiseaux du Québec," thus implying completeness. This is certainly not the case, for the author covers fewer than 20% of the birds known to occur in Quebec. Otherwise, there appear to be few, if any, changes in this new edition.

The species are grouped into five major divisions but this arrangement is not always a happy one. For example the Killdeer has been placed among the "ground hoppers," between the Eastern Meadowlark and the American Robin, with the Common Crow, the Horned Lark, and the House Wren, to name a few others. The text contains some scientific errors and a number of anthropomorphisms. Generally speaking, the drawings were made by someone who knows little about birds and are of low quality.

The author's writing is accurate and of high quality. He has a great ability to narrate facts and often becomes poetic. Despite the inaccuracies and anthropomorphic interpretation of certain facts, this book has in the past entertained a large number of French-speaking Canadians. Its greatest merit is that it has provided French-speaking Quebecers with pleasantly written accounts of the most familiar birds of the province at a time when such material, produced in Canada, was seldom available in the French language.—HENRI OUELLET.

Directory of environmental information sources, second ed.—Charles E. Thibeau (Ed.). 1972. Boston, Cahners Books. Pp. ix + 457. Cloth. $25.00.—This overpriced directory is an instrument of accessibility that nevertheless should be available to active departments of environmental biology or engineering, research agencies, environmental lobbyists, and society resolutions committees—to name a few. The volume is an impressive compilation, national in scope, of agencies, organizations, and major publications relating to environmental information of all sorts.

Cahners Books thoughtfully provides with each review copy their very own review,

a courtesy presumably intended to arouse enough cynicism that new reviews will not be unnecessarily favorable. Their review notes that the volume includes over 3,700 listings, 1,000 of them new since the first edition. I note that some are duplicates.

Each listing gives a title, address and (sometimes) telephone number, administrator or officers, number of members and staff, functions, publication outlets, and length and price of publications. Listings are categorized in 15 chapters: U. S. Government Executive Agencies; Legislative Committees; Independent Agencies; Citizens' Organizations; Professional and Occupational Organizations; Trade Associations; Educational Institutions and Organizations; Abstracts, Directories, and Indices; Published Bibliographies; Additional Information Sources; Conference and Symposium Proceedings; Documents and Reports; Serials and Periodicals; Books; and Films and Filmstrips. Six of these chapters are indexed thoroughly; the other nine are treated very superficially. The titles of most chapters are self-explanatory but a few deserve special comment. The three chapters on governmental agencies are highly instructive to the uninitiated. The chapter on educational institutions should be of special interest to prospective graduate students and the final eight chapters on publications to educators. The chapter on Serials and Periodicals is woefully incomplete, excluding Auk, Condor, and Wilson Bulletin, but including Audubon Field Notes, Audubon, and Audubon Magazine (and also the British Mycological Society Transactions).

The book is very poorly indexed and therefore cannot fully achieve its potential usefulness. It is difficult to imagine this compilation reaching a second edition with such a fault. The existence of the Pesticide Monitoring Journal can be learned only accidentally by looking under Information Unit, Public Health Service. Ridiculous!

Many minor criticisms could be cited, most stemming from abominable indexing or simple changes of address. Of particular interest to ornithologists, the Cooper Ornithological Society and Wilson Ornithological Society are listed under both Citizens' Organizations and Professional and Occupational Organizations, while the A.O.U. is listed only under the latter. The A.O.U. does not occur in the index but C.O.S. and W.O.S. do.

If you just need the address of an ornithological society or two, ask a friend and save $25. If you need an up-to-date list of environmental information sources, buy the book. The sources that interest you probably are in it somewhere.—Stephen R. Humphrey.

Also Received

The Oxford book of birds, pocket edition.—Bruce Campbell, illustrated by Donald Watson. 1972. London and New York, Oxford Univ. Press. 207 pp., line drawings and many color plates. £1.35. (U.S. $5.00).—As the title indicates, this is a pocket version of the earlier work, which was first published in 1964. Covered are all species authentically recorded in the British Isles, all illustrated in color except for 14 North American vagrants that merit only black-and-white drawings. Each species is described in varying detail, has its range given, and, especially for birds breeding in Britain, information on habitats, habits, nests, and eggs. The plates are opposite the species treated and show many plumage variations, including sex, age, and seasonal differences. Short chapters also cover classification, anatomy, flight, flight patterns, behavior, and breeding. This is a generally serviceable volume for the limited area of coverage, but its tiny print is not recommended for eyes well over thirty.—J.P.H.