

## ORNITHOLOGICAL LITERATURE

### SPECIAL REVIEW

VOICES OF THE NEW WORLD NIGHTJARS AND THEIR ALLIES (CAPRIMULGIFORMES: STEATORNITHIDAE, NYCTIBIIDAE, AND CAPRIMULGIDAE). By J. W. Hardy, Ben B. Coffey, Jr., and George B. Reynard. ARA Records, P.O. Box 12347, Gainesville, Florida 32604-0347. 1989: 44-minute audio cassette, lengthy printed brochure with full documentation, color jacket photo of Gray Potoo (*Nyctibius griseus*) by R. A. Behrstock. \$10.00.

VOICES OF THE NEW WORLD OWLS (STRIGIFORMES: TYTONIDAE, STRIGIDAE). By the same authors and publishers. 1990:65-minute audio cassette, full printed documentation, jacket color photo of Vermiculated Screech-Owl (*Otus vermiculatus*) by R. A. Behrstock. \$10.00.—The printed brochures contain full scientific information on recording sources, recordists, dates, locations, and taxonomic evaluations. The combination of voices and documentation in systematic order is like a scientific monograph, but one in which a voice is worth a thousand words. Professional ornithologists will see that these two taxonomies overthrow the old system based on plumages. Bark and dry leaf patterns are too much alike to reveal relationships, while individual color differences exceed those between populations. The species on these cassettes are defined in the same way that the night birds recognize each other, by voice; and amateur ornithologists are given the means to identify the most difficult birds in the world.

The two cassettes evolved from a common ancestor, Hardy's (1980) "Voices of the New World Nightbirds," a long-play phonograph disc. That classic is remembered for Hardy's jacket cartoon worthy of a Picasso, and for inspiring all of us to fill the gaps. The three authors did the major field work, supplemented by bird tour leaders J. Arvin, R. Behrstock, S. Coats, T. H. Davis, D. Delaney, V. Emanuel, T. A. Parker III, J. and R. A. Rowlett, T. Schulenberg, and B. Whitney; regional or species specialists including W. Belton, M. Castelino, G. Clayton, D. Engleman, N. Johnson, C. König, J. C. and L. Magalhães, J. Marshall, J. P. O'Neill, R. S. Ridgely, M. Robbins, R. Straneck, J. Vielliard, J. Weske, E. O. Willis, and many other recordists and bioacoustic collections. Altogether 13 species of nightjars and 15 of owls, whose voices were unknown in 1980, were added to the original recording by Hardy.

Discovery came the hard way, after hilarious false starts, mistakes, and acrimonious debate by all of us. Like those erroneous 7-day incubation times that go back to Pliny, the bogus recording of the Northern Hawk Owl (*Surnia ulula*) goes back to the founding fathers of tape archives and has just been corrected by König. Mistaking the canopy tree-toad (*Anothea*), for the voice of the Unspotted Saw-whet Owl (*Aegolius ridgwayi*) goes back to Irby Davis in the 1950s. Davis would mount the 42-inch parabola on the roof of his van before retiring to bed inside. When awakened by owls he would turn on the Nagra III tape-recorder, put on his headphones, and focus the parabola by turning a crank. He had to guess the identity of the singer outside in the dark. He guessed right most of the time, but his "Costa Rica mystery owl" was reincarnated in recent contributions to the night bird cassettes. Finally D. Delaney taped the real *Aegolius*, unmasking *Anothea*.

In Yucatán, Davis switched songs between the Yucatán Poorwill (*Nyctiphrynus yucatanicus*) and the Yucatán Nightjar (*Caprimulgus badius*); it took the combined talents of J. Pierson, R. A. Rowlett, and B. Whitney to set things straight (Hardy and Straneck, Condor 91:193–197, 1989). The mellow trill of Belton's male Long-tufted Screech-Owl (*Otus sanctaetatarinae*) from Rio Grande do Sul (Frontispiece) was summarily dropped from early versions of the owl cassette because J. Vielliard insisted it is the peracnema toad (*Bufo*

*peracnemis*). Sure enough, Hardy's sonagrams of the toad and owl are remarkably similar; nevertheless, Belton confirmed that he recorded an owl moving about in the trees, and the call is now restored to the cassette.

We were bamboozled by the angry calls (still on the cassette) representing *O. sanctaecatariinae*, *O. atricapillus*, and *O. hoyi*. Behrstock and Marshall thought they all were *O. sanctaecatariinae*, so they went to São Paulo in August 1989 to clear up the toads and to confirm *O. sanctaecatariinae* at Fazenda Barreiro Rico. Afterwards, they would discover the unknown song of true Nattererian *O. atricapillus* in Paraguay, as collected by Mercedes Foster at Cerro Corá National Park (Frontispiece). To the rescue! What they actually found were the same birds, true *Otus atricapillus*, at both places and their songs were the pure, musical trill of *O. guatemalae*! The strident voice from Barreiro Rico that had deceived us was the apoplectic female *O. atricapillus* responding to territorial invasion. Such provoked songs are useless for taxonomic comparisons because they vary almost infinitely in complexity, overtones, and expansion of (instantaneous) pitch range as the angry bird changes from tone to noise. We thank our generous hosts who introduced us to the live, spontaneously singing males of *Otus atricapillus atricapillus*: J. C. and L. Magalhaes at Fazenda Barreiro Rico and N. Lopez-Kachalka at Cerro Corá. Behrstock and Marshall missed *O. sanctaecatariinae* and *O. hoyi* altogether—by hundreds of kilometers.

A welcome addition to the nightjar cassette is, at last, a trilled song for the Lesser Night-hawk (*Chordeiles acutipennis*), although it is not the long one uttered while perched. These are the only nightjars still unrepresented in voice archives: Rosenberg's Poorwill (*Nyctiphrynus rosenbergi*) of western Colombia and northern Ecuador, Salta Nightjar (*Caprimulgus saltarius*) of northwestern Argentina and adjacent Bolivia, White-winged Nightjar (*C. candidans*) of central Brazil and Paraguay, Cayenne Nightjar (*C. maculosus*) of French Guiana, Roraiman Nightjar (*C. whiteleyi*) of the Venezuelan tepuis, Sickie-winged Nightjar (*Eleothreptus anomalus*) of southeastern Brazil and northeastern Argentina, and the extinct Jamaican Pauraque (*Siphonorhis americana*) of Jamaica. Hardy (in litt.) has just learned that the White-winged Potoo (*Nyctibius leucopterus*) is rediscovered and taped near Manaus and that the song attributed to the Rufous Potoo (*N. bracteatus*) is probably a variant call of the Gray Potoo.

It is simple to judge relationships among nightjars because each species has one male advertising song. But with owls, on the second cassette, things get complicated because most species have two territorial songs, an A and a B, used in ritual duets of the pair. The female's voice is a third to a fifth higher in pitch than the male's and in some species is naturally harsh. That makes four songs per species for most Screech-Owls, with much, much more if we fool around with songs provoked by playback. By recording in stereo, you can sort out the antiphony of different sexes, adjacent pairs, and neighboring other species spacially. Yet Hardy et al. renounce this solution and have their stereo equipment neutered to mono for field use. But the safest way to tackle owl taxonomy is to stick to the pure, musical tones of the males. Several populations have no known "normal" song because they have been searched only by trolling with tape-recordings, which elicit gruff responses.

Although the owl cassette boasts recordings of all New World owls except the Peruvian species Maria Koeppcke's Screech-Owl (*Otus koeppckeeae*) of Amazonas and Long-whiskered Owllet (*Xenoglaux loweryi*) of San Martín; still the A and B songs are not uniformly represented among the species of *Otus*. Let us note here which species on the cassette lack the unprovoked male songs suitable for comparisons:

Flammulated Owl (*Otus flammeolus*) from California. Normal (not bellicose) male, originally in stereo.

Eastern Screech-Owl (*O. asio*) from eastern United States. The lower-pitched songs are normal male A (whinny) and B (trill). Marshall's part originally in stereo.

Western Screech-Owl (*O. kennicottii*) from southeastern Colorado. Unprovoked pair duet of A (bouncing ball) but only the female's B (double trill). Originally in stereo.

Balsas Screech-Owl (*O. seductus*) from Colima. Harsh, provoked A (bouncing ball) song of female, then pair duet of B (double trills). Marshall's field notes mention mellow voices, but such spontaneous male songs have not yet been recorded on tape.

Pacific Screech-Owl *O. cooperi*, *lambi* race from Tehuantepec: Harsh, provoked A song of female followed by pair duet of B (double trills), mellow songs (Marshall, field notes) not yet recorded; nominate race from Guanacaste: Provoked pair duet, A. This taxon also has a double trill and mellow songs of the male (Marshall, field notes).

Whiskered Screech-Owl (*O. trichopsis*) from Miquihuana. Spontaneous A (trill) and B (Morse code) of male. Originally in stereo, impressive for the provoked calls during aggressive flight past microphone.

Tropical Screech-Owl (*O. choliba*) from Loreto. Unprovoked male's A (accented song) and B (short trill).

Peruvian Screech-Owl (*O. roboratus*) from Perú. Rapid, purring trills with prominent octave harmonic tone.

Bare-shanked Screech-Owl (*O. clarkii*) from Monteverde. Normal male songs A and B (Morse code) plus a female whine. All like *O. trichopsis* (Hardy in litt.), but slower.

Bridled Screech-Owl (*O. barbarus*) from San Cristóbal. Marshall has the spontaneous female, Behrstock the angry female response to play of "example 1."

Rufescent Screech-Owl (*O. ingens*) from Merida: Bouncing ball song, by an unprovoked male; from Ecuador: Same as the preceding except for less speed-up in the middle.

Cloud Forest Screech-Owl (*O. marshalli petersoni*) from Cajamarca. Normal male, higher-pitched than *watsonii*.

Tawny-bellied Screech-Owl (*O. watsonii*). Unprovoked male A songs: rapid trill from Taracoa, slow trill from Manu. Behrstock now has a B call, in Morse code, from La Selva Lodge, near Taracoa. An "A" trill of intermediate speed (3.7 notes/sec) is available from M. B. Robbins, proving that northern and southern populations are conspecific.

Variable Screech-Owl (*O. atricapillus atricapillus*) from São Paulo. Strident, highly outraged female, type A (long trill). All three of us have taped spontaneous, pure male tones A (trill) and B (bouncing ball) that are not on the cassette. A mellow female song is unknown in this population.

Long-tufted Screech-Owl (*O. sanctaecatarinae*) from Rio Grande do Sul. Harsh female A (trill) with mellow male A chiming in at the end. Both W. Belton and T. Parker have taped a normal male B (bouncing ball) that is not on the owl cassette. A mellow female song has never been heard.

Montane Forest Screech-Owl (*O. hoyi*) from Salta. Like the duet of *O. sanctaecatarinae*—a harsh female A with mellow male B (short, slow trill) answering farther off. R. Ridgely, R. Straneck, and König have all taped a very long, spontaneous male trill, not on the cassette. At only 11 notes per second, it is slower than the 13 or 14 notes per second usual for *O. atricapillus* and *O. sanctaecatarinae*.

Variable Screech-Owl (*O. atricapillus guatemalae*) from Nayarit and *O. a. napensis* from Huánuco. Spontaneous male A (long trill). The duetting female sings the same song about a fourth higher in pitch (Marshall, field notes) that has not been recorded on tape.

Vermiculated Screech-Owl (*Otus vermiculatus*) from Achioté Road. Spontaneous pair duet of incredibly short trills, setting a record for the genus.

Puerto Rican Screech-Owl (*O. nudipes*) from Ciales. Male A (mellow trill) followed by B (ghoulish duet of pair), all spontaneous and in antiphony with neighboring pairs. Originally in stereo.

Cuban Screech-Owl (*O. lawrencii*). Male unprovoked bouncing ball.

White-throated Screech-Owl (*O. albogularis*). Spontaneous pair duet of doublets. M. B. Robbins has available the even, A-type song, not on the cassette.

The brochure has a built-in propensity to create errors through the use of numbers keyed to species or vocal examples. We have convinced the authors of the cassettes to combine the numbered remarks with the species to which they refer; but the dangling example numbers are still to blame for transpositions such as these: Early versions of the owl brochure reversed the Manu and Taracoa *Otus watsonii*; in the current nightjar brochure, the order of examples for the Whip-poor-will (*Caprimulgus vociferus*) does not follow the cassette, which is first North Carolina, then New Jersey, and finally Michoacán for the gravel-voiced, southwestern form with pure white eggs. We suggest that the silver-throated maestro merely states the locality instead of reciting example numbers; for instance, "*Caprimulgus vociferus*, the Whip-poor-will, from North Carolina . . . from New Jersey . . . from Michoacán . . .," as we have done above. That would protect the many recordists from having their precious vocalizations wind up in the wrong taxon. Getting rid of the abominable example numbers would make the tape free-standing and the system self-correcting.

The cassettes are the triumph of cooperation between professionals and amateurs, benefiting especially from expertise of scientific tour leaders. The tapes are a valuable link with the past. Indeed, when the forest is cleared, the marsh drained, and the prairie paved, the sounds of birds in their natural settings can—besides providing study material—lift the spirits and give hope in a way that no study skin or photograph can. Where the habitat still stands but travel is dangerous, the study of bird sounds from tapes continues in the absence of further observations. It is no coincidence that the two owls not represented by voice are from Perú, currently one of the most volatile countries in South America.

There are still many things nightbirds say that are not on these cassettes, besides the missing species and spontaneous male calls we listed. There are some grunts and howls of the Black-banded Owl (*Ciccaba huhula*) and deep groans of the White-chinned Owl (*Pulsatrix koeniswaldiana*) that are needed. The vocabulary of the Band-bellied Owl (*P. melanota*) remains virtually unknown. Also required are the loud, gruff barks of the Rufous-legged Owl (*Strix rufipes*) and the high, thin nest-begging pleas of the Unspotted Saw-whet Owl (*Aegolius ridgwayi*). The pygmy-owls seem ripe for splitting, and there may be an unnamed potoo (or two) out there. The Buff-fronted Owl (*Aegolius harrisi*) jumps from the paramo fringes of Colombia and Venezuela across Amazonia to the lowland forests of Misiones, Argentina. The vocabularies of its disjunct populations need a work-up comparable to that of the Boreal Owl (*Aegolius funereus*), studied by König. All these novelties await discovery by a cadre of amateur and professional naturalists who enjoy a quest, and who are not intimidated by snakes, mosquitoes, or things that go bump in the night.—JOE T. MARSHALL, ROBERT A. BEHRSTOCK, AND CLAUS KÖNIG.

#### FRONTISPIECE.—VARIABLE SCREECH-OWL (*OTUS ATRICAPILLUS*) AND ITS RELATIVES.

We use the term "*atricapillus* superspecies" for the group of taxa shown here. They are related closely, they occupy two continents, and they nowhere overlap in distribution. Morphological distinctions are few and individual variation is extreme. Irides are yellow except that Peruvian Sira, Paraguay, and São Paulo birds have a brown iris in the dark phase, yellow in the red phase. Tarsus of the holotype of *cassini* is not shown because feathering is the same as the birds to each side of it. Tip of tarsus is less feathered within Panamá and on either side of Panamá than elsewhere. Tarsal feathering becomes luxuriant from Bolivia south, covering base of toes. If you want to see the whole owl, just put a straight-edged mirror on the midline.

Color variation among all the specimens we examined, whose localities are shown as black dots on the map, follows this rule (Marshall, Monogr. W. Found. Vert. Zool. 1:1-72, 1967, p. 25): Individual variation is extreme in the central part of the geographic range and it includes a red phase; whereas, at the periphery, the red phase drops out, specimens are uniform, and the populations resemble each other. Thus the taxa in Sinaloa, Yucatán, Salta, and Rio Grande do Sul have the same coloration—tawny back with those little buff pagodas. This all frustrates the use of scientific names for color races so let's try a system based on the different kinds of male vocalizations shown. Triangles stand for the tape recordings we studied from the Library of Natural Sounds and from the Bioacoustic Archive, whose curators we thank. Red curves enclose areas whence tape recordings sound alike. We will recognize each of those areas as the home of a major taxon, listed from north to south as follows.

Variable Screech-Owl (*Otus atricapillus guatemalae*). We thank J. W. Hardy for suggesting this appropriate common name, better than our "Protean Screech-Owl." From west to east the recordings of the long trill are from San Blas, Nayarit by John Arvin; southwest corner of Durango, Comitán, and Xcan—all by Irby Davis; upper Sarapiquí, Costa Rica by Gary Stiles, and Paramba, 3500 feet, Ecuador by R. S. Ridgely.

Vermiculated Screech-Owl (*Otus vermiculatus*). This identification is based on Behrstock's color photo on the jacket of "Voices of the New World Owls" by J. W. Hardy, Ben B. Coffey, Jr., and George B. Reynard (ARA Records, Gainesville, 1990), reviewed by us in this issue. The photograph was made while G. Clayton tape-recorded the same bird, the upper sonagram, on Achioté Road, Canal Zone. D. Engleman recorded the same pair. The other recorded songs, somewhat different from each other but all short, are from Barro Colorado by Marshall, Pipeline Road by L. Kibler, Isla Majé by P. Polchek, and Cerro Pirre by D. Engleman, the lower of the two short sonagrams.

Variable Screech-Owl (*Otus atricapillus roraimae*). This song was discovered by P. Schwartz in the 1960's and is recorded in great beauty and purity by S. Coats, who associates it with *vermiculatus*-like specimens. The high pitched song has the peculiar timbre and gradual descent in pitch evoking the Asian Barred Owlet (*Glaucidium cuculoides*) of Thailand. From north to south the tapes are from Colonia Tovar and Portachuelo Pass, Aragua, Venezuela, by P. Schwartz and S. Coats; Brownsberg Nature Park, Surinam, by Behrstock; and Jirilla, Perú by T. Schulenberg. The Surinam bird was recorded at 450 m altitude on two trips by Behrstock. He and D. Markley saw the bird well enough one late afternoon to be sure it was a Screech-Owl. This is a new species for the Surinam list.

Variable Screech-Owl (*Otus atricapillus atricapillus*). From central Peru south to São Paulo the tapes are a return to the long trill of México. These are, from west to east, Cerros del Sira, Perú by J. Weske; Cerro Corá, Paraguay by Behrstock and Marshall; Iguazú, Misiones, Argentina by M. Castelino, R. Straneck, and König; and Barreiro Rico, São Paulo by W. Belton, J. C. Magalhaes, Marshall, and Behrstock.

Long-tufted Screech-Owl (*Otus sanctaecatarinae*). From Rio Grande do Sul, Brazil, are tapes of a giant screech-owl whose unprovoked male utters two kinds of territorial calls, A (short trill) and B (bouncing ball), both shown at lower right. It was recorded throughout the state by W. Belton and at São Francisco de Paula by T. Parker.

Montane Forest Screech-Owl (*Otus hoyi*). This new form was tape-recorded at Salta, Argentina by R. Ridgely, R. Straneck, König, and B. Whitney. The unprovoked song sounds like *O. atricapillus atricapillus* but a sonagram shows it is slower; therefore it is left outside the red balloon along with a similar song from lowland Surinam (by B. Whitney). The specimens are uniform, except for a red morph, and look like miniature *Otus sanctaecatarinae* with short tufts.

## SPECIAL REVIEW

A GUIDE TO THE BIRDS OF COSTA RICA. By F. Gary Stiles and Alexander F. Skutch. Cornell Univ. Press, Ithaca, New York. 1989:511 pp., 52 color plates by Dana Gardner, 39 photographs (mostly of habitats), 2 maps, 2 glossary diagrams. Hardcover \$65.00, softcover \$35.00.

A GUIDE TO THE BIRDS OF PANAMA (2nd ed.) WITH COSTA RICA, NICARAGUA, AND HONDURAS. by Robert S. Ridgely (author) and John A. Gwynne (artist). Princeton Univ. Press, Princeton, New Jersey. 1989:534 pp., 48 color plates, 61 black-and-white illustrations of birds (some of multiple species), 2 endpaper maps. Hardcover \$49.50.—In recent years Costa Rica has become arguably the country most frequently visited by birders seeking an introduction to the avifauna of the Neotropics. In an area often compared to that of the state of West Virginia, some 830 bird species have been recorded, and the habitat diversity within such a small area, from cloud forests to ocean beaches, is amazing. Until recently, the only books that covered the birds of Costa Rica were the pioneering work of Carriker (1910) and the ecologically oriented monograph of Slud (1964), both of which are long out of date with reference to distribution, plus the ornithological portion, by Stiles and others, of the massive "Costa Rican Natural History" (Janzen 1983). The latter includes a useful (but already somewhat outdated) table of the abundance and habitat status of Costa Rican birds at eight localities, and accounts written by specialists, of 53 species (or groups as in the case of antbirds). These are arranged alphabetically and inconveniently by generic name (except, again, for the "Antbirds" segment), an editorial policy also followed in the portions on other animals and on plants.

None of these works was in any way a field guide. For identification purposes prior to 1989, birders usually relied on the Mexican guide by Peterson and Chalif (1973) which includes about two-thirds of the birds of Costa Rica, and the Panama guide by Ridgely (1976, with supplementary information added in the 1981 printing). I have not made a count, but I believe that illustrations of fewer than a half dozen Costa Rican species are missing from these combined books. There were, of course, few or no statements in either book on the distributional status of bird species within Costa Rica. I found myself checking the tables in Janzen (1983) or the status statements in Slud (1964) to determine whether a particular sighting was reasonable; this did not help much in the cases of some well-known North American migrants that were almost unknown in Costa Rica (e.g., *Tyrannus verticalis*, *Vireo griseus*, *Dendroica tigrina*).

It was known that a comprehensive book on Costa Rican birds by the two most appropriate authors, F. Gary Stiles and Alexander F. Skutch, was in progress during the early 1980s, but nobody seemed to have any firm idea as to when publication might be expected. The originally planned publisher, Ibis Press, eventually had to abandon the project. It was taken over by Cornell University Press where Robb Reavill, scientific editor, gave periodical progress reports; having birded in Costa Rica, she knew full well how much we needed the Stiles and Skutch book.

"Long awaited" is a cliché in book reviews, but it certainly fits "A Guide to the Birds of Costa Rica." Meanwhile, however, with much less publicity, Robert Ridgely was working on a major revision of his Panama guide, the text of which which allegedly was to be expanded to include the birds of Costa Rica, Nicaragua, and Honduras; these had been briefly listed in a 7-page appendix in the original edition. When the new version appeared, only weeks after the publication of the Stiles and Skutch book, we found that the geographic coverage had indeed been expanded.

A comparison of these two new books with respect to usefulness for birders in Costa Rica

obviously was in order. I was able to take both with me on my fourth visit to that country, 26 March to 6 April 1990, to make just such comparisons. I spent 27–29 March observing birds during my fourth stay at Hacienda Selva Verde on the Rio Sarapiquí in the Caribbean lowlands and 30 March–5 April at Tiskita Lodge, on Bahía Pavones, on the east side of the Golfo Dulce, Pacific lowlands, where many of the birds were new to me. Before taking up the matter of comparative usefulness as field guides, I will discuss the general formats of the two books. To save space, I will refer to Stiles and Skutch as S&S, and to Ridgely and Gwynne (the artist is given full coauthorship in this edition) as R&G.

Although its scope has indeed been extended north to Honduras, R&G is still basically a book on the birds of Panama. A 37-page appendix covers the 162 species of birds that have occurred in Costa Rica, Nicaragua, and Honduras, but not yet in Panama. Eight additional color plates figure 127 of these species, with eight more (including, oddly, Brown Creeper [*Certhia familiaris*], Eastern Bluebird [*Sialia sialis*], and Red-winged Blackbird [*Agelaius phoeniceus*]) shown in line drawings. The rest of the book is a major revision of the original "Guide to the Birds of Panama." A short introduction to the second edition is followed by an essentially unchanged chapter on "Climate" and an updated chapter on "Migration and local movements." The original chapter on "Conservation" is now expanded into an important 6-page chapter called "Recent developments in Panama ornithology and conservation." The chapter entitled "Plan of the book" is essentially the same in both editions, except that in the revision the classification and nomenclature are mostly those of the AOU Check-list (1983), so comments in the "Plan" cover the treatment of departures from names used in the first edition or in the AOU Check-list.

Absent from the first edition (and from S&S) is a nominal (English) checklist with columns for the four countries of southern Middle America, useful for marking off species seen in each country. I have used the Costa Rica column to indicate on which of my four visits I saw a given species, as a handy index to my field notes.

The appendix on "Finding Birds in Panama" has been enlarged and updated and is now credited to Dodge and Lorna Engleman as well as to Ridgely; Dodge Engleman was recorder for the Panama Audubon Society.

The second edition of R&G is 130 pages longer than the first edition, and this is not attributable solely to the new geographic coverage and the expanded chapters mentioned above. Since 1976, 46 species were added to the Panama list, necessitating new species accounts. In addition, many of the species accounts themselves have been substantially enlarged. To give but one example, while in Costa Rica in 1990, I had occasion to study the accounts of the three species of *Formicarius* that occur in Panama. In the first edition, these occupied 93 lines of type; in the second, 138 lines. The upshot is that for anyone planning to visit Panama, purchase of this book is vital, even though one may already own the first edition.

Comparisons between S&S and R&G can be made at two levels. First, how thoroughly do they serve as introductions to their respective countries, and second, how well do they serve for field identification in actual use? The coverage of geography, climate, and avian habitats in S&S for Costa Rica is much more detailed and comprehensive than the similar information for Panama in R&G. Maps in the latter are confined to the endpapers; in the front, a rather simple map of Panama showing political subdivisions, major roads, and some of the most frequently mentioned localities, and at the back an enlarged map centered on the Panama Canal. Neither map has a scale, and neither indicates altitude. In contrast, S&S includes three maps (with scales). The first shows geographical regions, major topographic features, and landforms of Costa Rica. The second shows provinces, cities, major towns, main highways, and protected areas (national parks, biological reserves, and wildlife

refuges). Numbered circles refer the reader to an appendix giving an annotated list of birding localities in Costa Rica, which is accompanied by the third map, of birding localities, towns, and major roads of the Valle Central, centered on the capital city of San José.

The introductory chapters include many photographs of avian habitats, another feature lacking in R&G. However, they suffer from the gray, low-contrast reproduction prevalent in so many recent books.

A useful additional feature is an "Illustrated glossary of anatomical terms used in the text," which goes well beyond the usual diagram found in many bird books. In addition to the descriptive terms identifying areas of the bird (12 for the bill region alone), there is an illustrated list of plumage patterns and markings as well as tail shapes. These should be helpful for beginning birders, and in some instances illustrate the authors' concept of relatively uncommon terms such as "half-hood" and "chevroned."

Both of the authors are long-time residents of Costa Rica (Stiles has since moved to Colombia), whereas Ridgely, master birder though he is, remains a visitor to Panama (as will be most of the users of his book). This is reflected in the depth of information presented in a 10-page introductory chapter on "The Costa Rican avifauna," which includes material on zoogeographic affinities, song, breeding, plumage and molt, movements, and food and foraging. Within the species accounts, S&S have separate paragraphs for voice and nest. In R&G, voice is often, but by no means always, described in the "habits" paragraph, and nesting is mentioned only in general terms in the short paragraph introducing each family. The family introductions are much longer in S&S, and the "habits" paragraph much more comprehensive, reflecting the particular interests of its authors.

Both books present taxonomic and nomenclatural notes where appropriate. This is useful, as the treatments of some taxa differ in the two (for example, in the Nightingale-Wren [*Microcerculus*] complex). English names are also sometimes discordant. Neither book has a table of contents such as that in the AOU Check-list, listing orders and families. However, thumbing through the pages devoted to the Passeriformes, it is clear that R&G fully adopt the sequence of the AOU, whereas S&S frequently depart from this sequence. Some of these departures, such as the reversal of sequence of the Furnariidae and Dendrocolaptidae, are not explained; in other instances, such as the novel arrangement within the Tyrannoidea (Tityridae, Cotingidae, Pipridae, Tyrannidae), have a few words of explanation. The components of the AOU's Emberizidae are given full family status, and their sequence rearranged (Coerebidae, Parulidae, Icteridae [including *Spiza*], Thraupidae, Emberizidae). The authors' preference for smaller families is mentioned under the family account for Emberizidae, but no explanation is given for their revised sequence of "9-primaried Oscines."

A comparison of the color plates by Gwynne (Panama) and Gardner (Costa Rica) obviously is in order. Neither artist is a Guy Tudor, although Gwynne pays homage to Tudor in some of his paintings, notably the flying macaws of plate 11 and the dust jacket, strongly reminiscent of Tudor's rendition in Meyer de Schauensee and Phelps (1978), which was a plate singled out by O'Neill (1979) for particular praise.

With a few exceptions (such as the trogons and the larger tanagers), the figures on Gardner's plates tend to be smaller and more crowded, sometimes severely so, than those of Gwynne. Similar crowding in Gwynne's plates was avoided for several groups by the addition of numerous black-and-white text figures, without counterpart in S&S. The format of Gardner's plates is essentially that of most field guides, with all of the birds facing the same way and in identical poses. Some of Gwynne's plates approach this format (hummingbirds, wood-creepers), but in most the figures vary more in pose and orientation. Most of Gwynne's birds thus look more alive and less stereotyped, with a possible loss in comparability. A few of Gardner's birds border on the grotesque, such as the goggle-eyed Common Potoo (*Nyctibius griseus*) of plate 51. Because of their stylistic individuality, the renditions of



individual species by the two artists are often markedly different; compare, for example, Gwynne's relatively lifelike night-herons on plate 2 of R&G with the stiff and badly proportioned versions by Gardner on plate 5 of S&S.

In some instances the subspecies found in Panama and portrayed in R&G differs noticeably from the Costa Rican subspecies. A good example is the Black-bellied Wren (*Thryothorus fasciatoventris*). Gwynne painted the subspecies *albigularis*, which occupies most of the Panamanian range of the species. It is conspicuously barred black and white on the posterior underparts. The Costa Rican subspecies *melanogaster* is much darker, and in the dense thickets favored by this species the posterior underparts appear solid black.

There are some unaccountable discrepancies between the two books in dealing with a given species. The R&G description of the juvenile Rufescent Tiger-Heron (*Tigrisoma lineatum*) is accurate, as are the description and plate in S&S. However, Gwynne's figure of this plumage (pl. 1, fig. 26b) does not match the description, nor does it look anything like the dozen or so skins I have examined. Both color and pattern are at fault. There is also a text discrepancy in this species; S&S state that *Tigrisoma lineatum* takes "at least 2 years to acquire adult plumage," whereas R&G indicate that this transition "requires about 5 years."

The plates in S&S are arranged in essentially natural groupings, with a few justifiable exceptions (tinamous and galliform birds share plate 12, for example). There are two additional plates at the end, of accidental, hypothetical, and recently added species. In R&G, a decision whose rationale escapes me has deemed that North American migrants be grouped together in their own plates rather than with their tropical relatives. Thus plate 31 contains migrant vireos and wood warblers, and the heterogeneous plate 32 includes the Gray Catbird (*Dumetella carolinensis*), the four migrant forest thrushes, a pair of Indigo Buntings (*Passerina cyanea*) and a pair of Rose-breasted Grosbeaks (*Pheucticus ludovicianus*), females of Blue Grosbeak (*Guiraca caerulea*), Bobolink (*Dolichonyx oryzivorus*) and Dickcissel, pairs of two migrant orioles and two migrant *Piranga* tanagers, the Acadian Flycatcher (*Empidonax virens*) and Eastern Wood-Pewee (*Contopus virens*) (with the Tropical Wood-Pewee [*C. cinereus*] thrown in for comparison!). The flycatchers are thus seven or eight plates away from the tropical species with which they might be confused. Two plates are geographically segregated, which seems justified given the endemism at opposite ends of Panama. Plate 14 includes hummingbirds and furnariids largely confined to the Chiriqui region of western Panama (many of these occur in eastern Costa Rica as well), and plate 40 includes a miscellany of species known in Panama only from the east, particularly Darién.

The critical question for many readers will be whether the Stiles and Skutch book will suffice for field identification purposes—obviously it is vital for its general information about Costa Rica. Unfortunately its text is inferior to that of the Ridgely and Gwynne book for use as a field guide. The "Description" paragraph is in some instances inordinately long and detailed, especially for a figured species, but most critical is the lack of typographical highlighting of the critical characters for identification; the only eye-catchers are bold face for adult versus young or immature (apparently used interchangeably), and large and small capitals for seasonal plumages when appropriate, as in "WINTER" and "BREEDING" for the Rose-breasted Grosbeak (although it hardly needs to be pointed out that this species does not breed in Costa Rica). R&G emphasize with italics, in a relatively short descriptive paragraph, those characters critical for field identification, and follow this with a "Similar species" paragraph. Voice, however, is more consistently presented by S&S. That book also give details about distribution within Costa Rica; this is done adequately by R&G for the non-Panamanian species in the supplement, but not for species in the main text, where a broad general range statement ("Southern Mexico to northwestern Colombia") follows the detailed paragraph on the status and distribution of the species within Panama.

I have been told that Stiles never visited the southeasternmost corner of Costa Rica, at

least not beyond Golfito and the Rio Coto. This would explain a few vaguenesses about the status of birds in this corner of the country, which I visited in April 1990, and the erroneous statement that the Olivaceous Piculet (*Picumnus olivaceus*) does not occur in the Golfo Dulce region; that claim would come as a surprise to the piculet that was avidly tapping away within less than a hundred yards of my cabin at Tiskita! Ridgely attributes this species to "more humid lowlands and foothills on Pacific slope in Chiriqui," which is the area of Panama immediately adjacent to the east side of the Golfo Dulce, Costa Rica. Thus for the Golfo Dulce area, the Panama distribution statements may be more revealing than those given by Stiles and Skutch.

It is impossible to recommend, to visitors to Costa Rica, complete reliance on either of the books reviewed here. Try to fit both into your luggage. As a general reference book on Costa Rica and its birds, rather than as a field guide, the Stiles and Skutch book is irreplaceable. In contrast, in writing his guide to the birds of Panama, Ridgely was fortunate in that the four-volume work by Wetmore (1965–1984) is available as a general reference, and he could thus concentrate on field identification plus current status and distribution in Panama. Both books will be vital for years to come to anyone studying the birds of southern Middle America.

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## SPECIAL CONSERVATION REVIEW

## PARALLEL UNIVERSES: ENVIRONMENTAL PROPOSALS FOR THE 1990S

CONSERVATION OF AVIAN DIVERSITY IN NORTH AMERICA. (Prepared by the Office of Migratory Bird Management, U.S. Fish and Wildlife Service, Washington, D.C., May 1990: 22 pp. Available from O.M.B.M., 634 ARLSQ, FWS, 1849 C St., N.W., Washington, D.C. 20240.)

THREATENED, ENDANGERED & SENSITIVE SPECIES RECOVERY & CONSERVATION: ACTION PLAN, April 1990:14 pp. Available from D. F. Jolly, Southwestern Region, U.S.D.A. Forest Service, 517 Gold Avenue, S.W., Albuquerque, New Mexico 87102.)

A NATIONAL CENTER FOR INTEGRATING ECOLOGICAL RESEARCH. (A report to the National Science Foundation on the results of a workshop organized by the Association of Ecosystems Research Centers, 1989:12 pp. Available from J. E. Hobbie, The Ecosystems Center, Marine Biological Laboratory, Woods Hole, Massachusetts 02543.)

1990'S GLOBAL CHANGE ACTION PLAN UTILIZING A NETWORK OF ECOLOGICAL RESEARCH SITES. (A proposal from sites conducting long-term ecological research workshop held November 1990, Denver, Colorado, 1990:36 pp. Available from the Long-Term Ecological Research Network Office, College of Forest Resources, AR-10, Univ. of Washington, Seattle, Washington 98195.)

NATIONAL INSTITUTES FOR THE ENVIRONMENT: A PROPOSAL. (Published by the Committee for the National Institutes for the Environment, 1990:8 pp. Available from N.I.E. Committee—Washington Office, 730 11th St., N.W., Washington, D.C. 20001-4521.)

RESEARCH PRIORITIES FOR CONSERVATION BIOLOGY. Edited by M. E. Soule and K. A. Kohm. (Published in cooperation with the Society for Conservation Biology.) Island Press, Washington, D.C., 1989:98 pp. \$9.95 paper.—The last two years have not been kind to environmental scientists with limited reading time. The primary literature apparently doubles every few months, and now a new genre of publication has surfaced. The six “documents” listed above are probably not the only ones to have been produced of late; they are merely the ones that have reached my desk. All appear to be attempts to claim or protect turf and request funding. All were drafted before Iraq’s invasion of Kuwait in August of 1990, as well as the more recent economic downturn, and all seem to be probing for part of the apocryphal “peace dividend” many believed would be available at the end of the Cold War. Indeed, one of the publications, the proposal to establish a National Institutes for the Environment, compares the potential and need for creating an N.I.E. at the end of the Cold War, with the establishment of N.I.H. at the conclusion of World War II.

Clearly, all six publications were written for educated lay audiences, not for conservation biologists, although all provide ample background information for anyone considering drafting a proposal of their own. Two of the publications, “A National Center for Integrating Ecological Research” and “1990’s Global Change Action Plan . . .,” both of which result from N.S.F.-sponsored workshops, are slick, full-color presentations that are apparently direct descendants of the Super-Collider proposals, which proved so effective on Capitol Hill several years back. Ecology, thanks to desk-top publishing, is following closely on the heels of Big Science.

Although the six publications have much in common—all of them, for example show little evidence of the others’ existence—each has its own agenda. The two agency publications summarize overly ambitious plans apparently designed to carve substantial niches for both agencies in the field of conservation biology. My only fear is that once carved, large portions of these niches will remain vacant for some time. For example, although fewer than half of the Federally Threatened or Endangered species occurring on land managed by the U.S.

Forest Service currently have recovery plans, the Forest Service's action plan projects that "about 90%" of all Threatened and Endangered species will be recovered within the next 50 years. This goal is especially fantastic when one recalls that the Service currently invests 90% of its T&E budget on only four of 174 currently listed species found on N.F.S. land.

The Fish and Wildlife Service's plan, drafted to "to comply with [federal] legislation," undertakes a similarly ambitious, albeit laudable, goal, i.e., "... to conserve avian diversity in North America." The Service aims to achieve this goal by "maintaining populations of *all native bird species* and their essential habitats at reasonable levels, preventing *any of these species* from having to be listed as Endangered or Threatened, and ensuring continued opportunities for people to enjoy these birds" (*emphases are mine*). But if past is prologue, the U.S. Fish and Wildlife Service's suggestion that it will be able to manage this effort seems, at best, to be overly optimistic. Indeed, the Service is currently unable, or unwilling, to fund appropriately research units that concentrate on nongame species. (For a sobering review of magnitude of related problems involved in implementing the Endangered Species Act of 1973 as of late 1988, see *Endangered species: management improvements could enhance recovery program*, U.S. General Accounting Office Publication GAO/RCED-89-5, Washington, D.C.) On a less ambitious note, the first of 15 objectives listed in *Conservation of Avian Diversity in North America* suggests that the Service will coordinate monitoring nongame bird populations while minimizing duplication of effort. But even this objective will be difficult to achieve, given current and proposed levels of funding. A chilling passage on collection permits signals stormy weather ahead for those of us involved in hands-on research. I quote it without further comment to alert those with interests in this area: "Collection permits will be reviewed to determine the cumulative impact of collection activities on nongame birds. The process for issuing permits and other activities potentially contributing to incidental take will be evaluated."

Perhaps the most ambitious and worthwhile of all of the publications it that from the Committee for the National Institutes for the Environment. S. P. Hubbell, H. Howe, and D. E. Blockstein are spearheading an effort designed to create an N.I.E. that would "set priorities, train necessary scientists to provide critical data, and sponsor mission-oriented research that will address the priority problems." Their goal is to create a federally funded entity that would have a proposed annual budget estimated at \$500 million over the first 5 years of its existence. Although small by N.I.H. standards (i.e., an \$7.8-billion appropriation for FY91), the amount is considerable when compared with funding currently allotted to N.S.F. (i.e., \$2.3 billion for FY91). The National Academy of Sciences is about to initiate a Congressionally mandated \$400,000 feasibility study of the concept. As envisioned by its proponents, N.I.E. would include five distinct institutes (Biotic Resources, Sustainable Resources, Ecosystem Management, Climate Change, and Human Environments), which would oversee the dispersion of funds for extramural research, as well as four intramural centers (a Library for the Environment, centers of Environmental Education and of Data Management and Risk Assessment, and a Grants Office).

Rereading the six documents listed above in rapid succession left me with the distinct impression that environmental scientists are simultaneously developing in a number of parallel universes. Unfortunately, just as their counterparts in the science-fiction literature, these parallel entities give every indication of being oblivious of each other's existence. Several of them are about to collide in a mad scramble for what is fast becoming a shrinking monetary resource. Although competition may be the American Way, the combatants would do well to follow again the example of Big Science: Let's step back and consider a more united front. Unless we do, I fear that arcane Congressional infighting will determine the winners and losers in all of this. As we are all too well aware, that selective force does not

necessarily produce the best outcome. The proposed National Institutes for the Environment, which provides the broadest agenda and base of support, might provide a starting point.—  
KEITH L. BILDSTEIN.

CURRENT ORNITHOLOGY, Vol. 7. By Dennis M. Power (ed.). Plenum Press, New York, New York, 1990: xiv + 388 pp., 36 numbered text figs., 40 tables, 4 appendices. \$75.00—Vol. 7 of the Current Ornithology series contains eight chapters written by 14 authors from the United States, Sweden, USSR, Belgium, and Norway.

Chapter 1, "Population Declines in Migratory Birds in Eastern North America," by Robert A. Askins, James F. Lynch, and Russell Greenberg provides a clear and concise review of what we know and what we don't know about this problem. The chapter follows a logical progression of questions. What birds have shown declines? Where have the declines occurred? And finally, why have the declines occurred? Throughout, the authors point out gaps in our knowledge and problems in research design and survey methods that have made interpretation of the data difficult. The authors suggest ways of improving research methodologies, future research directions that are needed, and implications for conservation.

In Chapter 2, "Avian Energy Storage," by Charles R. Blem, the author reviews the research on energy storage that has been conducted since 1976 focusing specifically on internal energy storage. Birds store energy internally as carbohydrates, lipids, or proteins. For each form of energy storage, the author presents the advantages and disadvantages of the storage form and the extent that it is used by different species. The majority of the chapter focuses on different aspects of lipid storage. One section examines environmental controls of lipid reserves and proximate and ultimate factors that determine the size of the lipid reserves. Three sections examine sources of energy used during periods when birds require unusually high levels of energy, such as for egg production, growth, molting, and migration.

Chapter 3, "Survival Rates and Their Relationship to Life-History Traits in Some Common British Birds," by Andrew Dobson, examines how the enormous amount of banding data generated by amateur and professional ornithologists can be used to estimate annual survival rates, particularly of common species, and to monitor changes in survival rates. The chapter begins by comparing three methods of estimating survival rates (Lack's method, Haldane's method for incomplete data sets, Haldane's combined method) and the biases associated with each. A comparison is made among the three methods using actual and simulated data sets. In the latter half of the chapter, survival estimates are used to compare how factors such as body size and reproductive strategy are related to adult survival rates. Unfortunately, the author assumes the reader is familiar with the three methods of estimating survival rates. As a result, many terms are not adequately explained. For example, in Figure 1 some of the symbols used are not defined which I found frustrating when trying to decipher the figure.

Chapter 4, "Food Storing in Birds: An Evolutionary Perspective," by Hans Kallander and Henrik G. Smith, could be subtitled "everything you ever wanted to know about food storing but were afraid to ask." The authors provide a summary of food-storing behavior showing what families it occurs in, the seasons storage occurs, and the places where food is stored. An extensive list of references is included. The authors develop a general model describing when food-storing behavior should be beneficial in terms of either survival rates or reproductive rates and generate predictions about food-storing behavior from the model. This chapter would make an excellent instant lecture for an avian ecology or ornithology class.

Chapter 5, "Nonbreeding Social Organization in *Parus*," by Erik Matthysen reviews the

existing literature on non-breeding social organization within the genus *Parus*, discusses inter- and intra-specific variation in social behavior, and examines several hypotheses to explain this variation. A similar review by Jon Ekman appeared in the *Wilson Bull.* 101: 263–288. After reading both reviews and working with the Black-capped Chickadee (*Parus atricapillus*), I am convinced that too much time has been spent trying to pigeonhole species into discrete behavioral categories, and too little time has been given to examining how social behavior varies with habitat, food supply, and population density. Matthysen makes the important point that our understanding of how social behavior differs among populations has been hindered by a lack of operational definitions of terms such as flock, group, stable flock, exclusive flock, and compound flock just to name a few.

In Chapter 6, “Age-Specific Variation in Reproductive Performance of Birds,” Bernt-Erik Saether examines age-specific variation in the reproductive performance of birds and hypotheses to explain these differences. He finds that, in general, adults breed earlier and lay larger clutches than juveniles. In addition, for females that are the same age, females with more experience do better than females with less experience. These observations are discussed in terms of life history strategies.

In an interesting chapter by Douglas Siegel-Causey and Sergei P. Kharitonov titled, “The Evolution of Coloniality,” the authors examine colonial behavior within an evolutionary context. They begin by providing a review of bird taxa where colonial behavior occurs and describe species as either obligate or facultative colonial species. They attempt to sort out factors responsible for colony formation and maintenance dividing them into 1) causal factors—those responsible for the transition from solitary to colony nesting, 2) formation factors—those which promote a particular type of colonial breeding, and 3) maintenance factors or those which help maintain this behavior in a population. They conclude by outlining a hierarchy of stages in the development of coloniality.

Chapter 8, “The Ecology and Evolution of Extra-Pair Copulations in Birds,” by David F. Westneat, Paul W. Sherman, and Martin L. Morton, explores the frequency and significance of extra-pair copulations (EPC) in birds. In the past, EPCs have been generally ignored in ecological analyses of social behavior. New techniques using genetic markers have shown not only that EPCs occur, but also that they often result in offspring. These authors examine the costs and benefits of EPCs to both males and females in different ecological settings. Information in this chapter should be included in any lecture on the ecology and evolution of mating systems.

Because of the variety of subject matter presented in this text, some chapters will undoubtedly appeal more to certain people than others. As a whole, the volume is excellent, and the extensive literature reviews provided at the end of each chapter make this valuable for anyone initiating a research study on one of the topics discussed. I recommend this volume and others in the series particularly for libraries and individuals teaching courses in avian ecology or ornithology.—MARGARET C. BRITTINGHAM.

SAVE THE BIRDS. FOR THE WORLD OF TOMORROW. By A. W. Diamond, R. L. Schreiber, Walter Cronkite, and R. T. Peterson. A PRO NATUR Book, Houghton Mifflin Company, Boston, 384 pp., hundreds of color photographs and paintings, \$39.95.—I have recently discovered this remarkable series of books, the most remarkable that I have seen during the past 50 years. “Save the Birds” has been published in 14 countries and in 10 languages.

The series owes its inception to Rudolf Schreiber of PRO NATUR in West Germany. The British edition was published in 1987 with authors Antony Diamond, David Attenborough, and Ian Prestt. The American edition was published in 1989, with authors Antony

Diamond, Rudolf Schreiber, Walter Cronkite, and Roger Tory Peterson. Peterson is, of course, the Dean of American ornithologists and everyone knows the name Walter Cronkite.

This 384-page book has literally hundreds of excellent color photographs and paintings. It discusses birds and their habitats in the "Earth's great ecosystems: from oceans and oceanic islands, to mountains and tropical rain forests, to arid lands and towns and cities," to "Save the Birds—we need them." to "One World for Men and Birds," to "Saving American Birdlife."

The book discusses Jackass Penguins, Ruddy-headed Geese, New Zealand Black Stilts, California Condors, birds-of-paradise, Hawaiian honeycreepers, and a hundred more.

Roger Tory Peterson wrote: "If we are to save the birds, we have to make as many people as possible aware of the threats to their survival. I can think of no better way of doing that than through the publication of 'Save the Birds.' I have contributed my own time and effort to this book because I feel it is one of the most valuable conservation projects of our time. We must save the birds, and in saving them, we will save the earth." In the last analysis, that is what is at stake for mankind.

The obvious point here is that the book will serve as a magnificent encyclopedia, not only for anyone who is interested in birds and conservation, but also to any other group of people: to pro-choice and anti-abortion activists, to farmers and politicians, to businessmen and professors, and to missionaries and city dwellers. That is, to anyone who anticipates being alive in the year 2010.

"Save the Birds" is a remarkable publication triumph, and the price makes it a genuine bargain.—ANDREW J. BERGER.

ORNITHOLOGY: AN ECOLOGICAL APPROACH. By John Faaborg. Prentice Hall, Inc., a Division of Simon and Schuster, Englewood Cliffs, New Jersey 07632. 1988:x + 470 pp., 269 numbered black-and-white figs., 11 numbered tables.—It is quite refreshing to find an ornithology text that is not simply a reprint/revision of an older edition. This well-written book is based, as the title states, on John Faaborg's extensive experience in studying the evolutionary ecology of birds. It is divided into 16 chapters arranged in five parts. Each chapter has a Suggested Readings section and there is an extensive reference section at the end of the book. The index combines subject, common name, and scientific name entries. I used this book for my undergraduate ornithology class, and this review reflects student opinions as well as my own.

Chapter 1 gives an all too brief overview of avian paleontology. Here Faaborg outlines the various theories as to the origin of birds but chooses not to take a stand "until more paleontological evidence is found. . . ." Some difficulty arises as Fig. 1.1 shows birds arising directly from the Thecodonts, while Fig. 1.3 shows three possible avenues of ascent; from Thecodonts, from Saurischian dinosaurs, and from the crocodylian line. This was confusing to my introductory students. Chapter 2 covers functional anatomy, synthesizing this book length topic into a mere 43 pages. The age-old debate resurfaces, should there be a separate text for ornithology labs or should it be combined into the lecture text? To me there is too much lab-related information to be included in a text for the lecture portion of the class. What Faaborg does cover is well done, but it seems superficial to me (e.g., Fig. 2.16 and 2.17). Chapter 3 on bird flight ends the first part and is an adequate coverage of the material. The subsection on flightlessness is very good at tying anatomy to evolutionary ecology.

Part 2, on the diversity of birds, is heavily oriented towards competition theory and, while Faaborg does acknowledge the recent debate, he concludes ". . . competitive interactions are a major force in determining the diversity of characteristics of the birds we see today." For an introductory text, Faaborg gives excellent coverage to modes of speciation, using the

standard examples found in many other books. (Why aren't Fig. 4.10 and its accompanying text referenced?) Neither the caption nor text explanation for Fig. 4.11 tell the reader what is going on. What do the numbers mean? I could figure it out since I had read Haffer's original paper many times. My introductory students had trouble here. Fig. 5.7 is completely uninterpretable without going back to the original paper. (What are the numbers above the bird drawings, and what do the letters in the figure represent?) Is all of this material suitable for the undergraduate student? For example, an entire page is devoted to presenting a phenogram of the Lari (Fig. 6.1) but is only referred to in a single sentence in the text. Moreover, the horizontal axis is not defined, leaving the reader only to guess as to the meaning. Chapter 7 presents an ecological survey of birds, and the approach is unique. Birds are grouped into ecologically similar species and are portrayed with line drawings in group specific figures. The trouble is that the criteria for grouping appears to vary with the figure. For example, Fig. 7.7 lumps the "aerial fish eaters" based on similar prey types. But Fig. 7.8 combines the "long-legged waders," based apparently only on leg length, since there are fish eaters and filter feeders in the same group? This approach is interesting in that it exposes the introductory student to the birds of the world but may confuse the student into thinking the pictures actually represent the same guild membership. Some of the line drawings of birds do need a little work (Fig. 7.22 vireo?).

Part 3, entitled "Strategies for Survival," starts with foraging behavior, territoriality, and optimal foraging theory, continues with survival strategies in extreme environments, and ends with an extensive treatment of migration. In the latter, it is surprising that, given the competition theory slant of the book, Cox's paper on the role of competition in the evolution of migration is ignored. Editorial problems continue in Part 3. What do the open and solid circles in Fig. 10.8 mean? Only by going to the original reference could I figure this out.

The next three chapters comprise Part 4 and summarize reproduction in birds with coverage given to anatomy and physiology; reproductive behavior, including song and nest topics; and a wonderful chapter on adaptive variation. The section on mating systems is current but in too much detail for the needs of a typical undergraduate.

Part 5 deals with birds and humans and covers the value of birds to man, field techniques, and avian management. The chapters are interesting and well written, but it is here that the editorial problems hit their zenith. In Fig. 14.1 what do the letters stand for? In Fig. 15.3, the vertical axis for the top half of the figure is not labeled, and neither axis is labeled for the plots on the bottom half of the figure. By going to the originally cited work, I was able to figure out this figure. My undergraduates were totally lost. Fig. 15.13 is a black-and-white photo of a bird wearing color bands and a FWS leg band. Which is which is up to the reader. Without going to the original paper, Fig. 15.15 is uninterpretable. What are those numbers? Table 16.1 needs a trip to the original to figure out that the numbers represent the number of territories or estimated pairs per 100 acres. I was also concerned that the totals in the original paper didn't match the totals in the book. Then I noticed that the Blue Jay was left out of the book table. Why? Why weren't the correct birds names used (towhee, hummingbird, meadowlark, etc.), and what do the boxes around selected entries mean?

The book layout leaves a lot to be desired. The pages are nearly  $8\frac{1}{2} \times 11$  in. and the text is arranged as a single column 5 in. block, leaving a 3 in. blank on the left side of each page. The five in. block makes reading difficult, and the 3 in. blank is simply a waste of paper. For ease in reading, I favor the double column approach used by, for example, R. L. Smith in the 4th edition of "Ecology and Field Biology."

In sum, the book offers a great deal of useful information for the reader. It uses a new approach that is refreshing, and it is well written. I was able to incorporate a great deal of new information into my ornithology class. However, much of the material is too advanced for a typical undergraduate student majoring in either biology or wildlife biology and the editorial problems are somewhat frustrating.—ROBERT C. WHITMORE.



ON THE WING: THE LIFE OF BIRDS: FROM FEATHERS TO FLIGHT. By Bruce Brooks. Charles Scribner's Sons, New York. 1989:192 pp., numerous photographs. \$40.00.— Before reading or discussing this book, one should take note of Brooks' introductory statement (p. xiv): "This book should not teach anyone to feel secure in a comprehensive knowledge about birds. It should teach us all to be delighted that we can never find out enough." What follows this introduction is not an ornithology text, nor is it in any way a reference work or book of instruction. It is a book meant to instill wonder, not knowledge.

Brooks does this with great gusto. The book is filled with anecdotes about the biology of birds: anatomy and physiology, primarily relating to flight; reproduction, including nesting and parenting; and a chapter on "Birds and Man: Whose World Is This?" This last chapter is somewhat different from the usual plea for conservation. Brooks makes the usual complaints about decimation from habitat destruction, hunting, and the illegal pet trade. He then points out at length the efficiency of birds in controlling agricultural pests, citing examples of avian responses to insect outbreaks, saving crops, and the quantity of weed seeds and rodents consumed by birds. An aside on the last page is about how an ovenbird (probably the Rufous Hornero [*Furnarius rufus*]) ended an epidemic of Chagas' disease. He also brings up the important role birds have played as inspiration, especially in music. He contends that, without birds, our lives would be poorer, not just for the loss of birds to watch and listen to, but for the absence of their effect on our other aesthetic pursuits.

As is typical of a companion book (to the Public Broadcasting System's television series *Nature*), "On the Wing" has a highly readable text illustrated with numerous high-quality, often spectacular, photographs. As is also typical of the genre, the text can be frustrating to an expert in the field because of inaccuracy due to oversimplification. One must realize that, in order to present information at a level comprehensible to the lay reader, an author must gloss over details and complexities to an extent that can leave the reader with the feeling that life is simple, straightforward, and well-understood. Unfortunately, this book goes beyond the usual level of inaccuracy. For example, Brooks states that there are about 8800 species of birds in the world, as compared to about 4000 species of mammals and 7500 species of all other vertebrates combined (p. 3). One must assume that he means amphibians and reptiles, since there are well over 100,000 species of fish. Later, when discussing nesting, Brooks includes Mourning Doves (*Zenaida macroura*) and hermit hummingbirds (*Phaethornis* spp.) among the passerines (p. 97, 107). These and other statements are not oversimplifications; they are simply incorrect.

Another difficulty that authors of natural history books must contend with is the temptation toward anthropomorphism, especially when discussing evolution or behavior. In his zeal to express the wonder of ornithology, Brooks doesn't even try to resist that temptation. As an example, in describing the use of hymenopteran nests by some birds, he states (p. 104), "In a few cases, this is because the insect builds a strong structure of mud or papier-mache and the bird envies its snugness." His descriptions of bird anatomy are far more teleological than can be excused as "writing for a lay audience." He regularly refers to evolved structures and behaviors as if the birds consciously decided to adopt them, with statements like (p. 5) "If *Archeopteryx* needed only to keep warm, why didn't he grow hair and the layer of fat that usually supplements a fur coat?" and (p. 82) "The upper leg renders a service to the foot, without which the bird would never be able to relax on a perch." While it can be difficult at times to express evolutionary results without sounding a bit teleological, Brooks has gone beyond that degree, and the book's credibility suffers as a result. The PBS *Nature* series has a deservedly high reputation for quality, in its subject matter, its photography, and its scripts. While its anecdotes are certainly interesting and informative, this book does not live up to the standards set by other segments of that series.—ROBIN K. PANZA.

A GUIDE TO THE BIRDS OF PUERTO RICO AND THE VIRGIN ISLANDS. By Herbert A. Raffaele, illus. by Cindy J. House and John Wiessinger, with single plates by Cynthia Fisher, Alejandro Grajal, and John Yzary. Princeton Univ. Press, Princeton, New Jersey. 1989:253 pp., 18 black-and-white and 24 color plates with caption figs., 9 location maps, 3 tables. Cloth, \$39.50; paper, \$15.95.—The first edition of this field guide fulfilled an important need for students of the birds of Puerto Rico and the Virgin Islands and was generally recognized as an important and well-written volume. The current version corrects some oversights of the first edition and updates the text to include new records obtained in the seven years since first publication. Plate to text cross-referencing, added in the new edition, eliminates the time-consuming and annoying searches from text to figures that were a drawback of the first edition. Eleven new bird species that have been recently documented from the region are added, bringing the total number of living species described in the text to 284.

One principal virtue of this guide is the collection of information on identification, distribution, biogeography, and conservation in a single volume, along with practical hints on field hazards, where to see birds, and how to get there to see them. Raffaele has designed his field guide with both the full-time ornithologist and the casual birding tourist in mind. The section on good places to find birds is extremely valuable for the visitor who is trying to fit some birding into his vacation or business trip and wants to see as much as possible. The technical information contained in the guide is very detailed and summarized in introductory sections to give the reader a clear overview of the regional avifauna. The section on conservation is based on long experience with the agencies involved and is particularly perceptive; policy makers would do well to heed the cautions raised about development and tourism in the region.

Species accounts are clear and often contain summaries of results from detailed or long-term studies of resident species. For example, we learn that Puerto Rican Todies (*Todus mexicanus*) are common forest birds, difficult to see but easy to hear, forage for insects by hover-gleaning from the undersurfaces of leaves, forage near the ground, catch an average of 1.8 insects per minute, are most active on sunny mornings after rain, and are misnamed. We also are told that they can be attracted by knocking two stones together, although this reviewer has yet to find the right two stones.

The plates are good quality and present the important field marks of each species clearly. All species described in the text are illustrated, making it unnecessary to carry other guides. Facing descriptions emphasize useful field marks and note the size of each species. Species that are widespread and contained in standard North American field guides are illustrated in black and white, but some difficult groups (e.g., small shorebirds and fall plumage warblers) are shown in color to aid identification. Species breeding in Puerto Rico and the Virgin Islands all are illustrated in color except for goatsuckers and swifts. My only complaint about the illustrations is the lack of the artist's signature on several plates.

The paper version of the previous edition (published by another press) tended to lose pages after a short time. This problem has been remedied in the new edition, and neither my hard cover nor paper copies show any signs of loosening pages, even after several months of hard use. Given the large difference in price, most people will probably prefer the paper version.

This work is an important contribution to the ornithology of the West Indies and certainly belongs in the library of any ornithologist with even a casual interest in the region. The wealth of heretofore unpublished information on the natural history of the birds of the area makes this volume a useful reference as well as an excellent field guide. Supplemental material gives a clear view of the regional avifauna and the relationships among resident, migrant, transient, vagrant, and exotic species. Most of all, however, this is the most current and

best produced of any of the field guides devoted to the West Indian islands. I therefore recommend this book for anyone who plans to spend any time in the region covered.—  
ROBERT B. WAIDE.

CONNECTICUT BIRDS. By Joseph D. Zeranski and Thomas R. Baptist, illus. by Sheila McMahon. Univ. Press of New England, Hanover, New Hampshire, and London, England. 1990:328 pp., 4 maps. \$35.00.—The daunting task of synthesizing over 75 years of literature and field observations has been undertaken in this volume, the first comprehensive review of Connecticut ornithology since 1913. The book begins with a historical overview of bird studies in Connecticut. Following sections deal with the ecological zonation of the state and the history of habitat changes. Species accounts are next and consist of reports on present and historic status, distributions, subspecies, and authors' comments. For uncommon breeders, nesting records are also included. The book concludes with three appendices (hypothetical and escaped species, places to watch birds, a checklist of Connecticut birds) and a bibliography of Connecticut ornithology.

Any regional compilation is a monumental task, but one for an area as heavily worked as Connecticut approaches impossibility, especially in terms of ferreting out all available data. Despite the problems involved, the authors have successfully produced a coherent view of the present and historic occurrence of birds in the state. There are inevitably some errors and missed records, but such lapses are few.

My principal difficulties with the text involved its weak coverage of quantitative population phenomena and habitat affinities. Existing data bases (e.g., Breeding Bird Surveys, Christmas Counts, Mid-winter Waterfowl Surveys) could have greatly improved assessments of population trends and current abundance which, as reported in the text were largely subjective assessments. Furthermore, available syntheses of population data were in some instances not well covered. For example, although the authors described populations of Black-capped Chickadees (*Parus atricapillus*) as not significantly changing in historic times, Loery and Nichols (Ecology 66:1195–1203, 1985) reported a substantial drop in chickadee populations when Tufted Titmice (*P. bicolor*) first invaded northwestern Connecticut. Other notable but unreported population phenomena are that in mixed conifer-hardwood forest in northeastern Connecticut, breeding Red-breasted Nuthatches (*Sitta canadensis*) outnumber White-breasted Nuthatches (*S. carolinensis*), at least in some years; Tufted Titmice are relatively rare; and Ovenbirds (*Seiurus aurocapillus*) are frequently the most abundant breeders (Craig, Conn. Warb. 7:27–31, 1987).

I was also disappointed in the limited discussion of morphological variation in Connecticut birds. For example, the weak sexual dimorphism of Connecticut White-breasted Nuthatches was not mentioned. Furthermore, despite an extensive literature on hybridization and introgression in northeastern populations of Blue-winged (*Vermivora pinus*) and Golden-winged warblers (*V. chrysoptera*), only the traditionally recognized hybrids of these species are listed in the text.

With respect to the principal thrust of the volume, the status and distributions of individual species, I found the authors' assessments generally very reasonable despite their subjectiveness. Documentation of rarities was particularly thorough. In certain instances, however, because there was little population quantification, I found assertions about status without substantiation. For example, no evidence presented leads to the conclusion that Ruby-throated Hummingbirds (*Archilochus colubris*) are declining. In addition, the commonness of some breeding species such as the Canada Warbler (*Wilsonia canadensis*) was underrated. In the hardwood forests of northern Connecticut it is actually common and widespread,

and scattered pairs breed to the coast even in eastern Connecticut. Yellow-rumped Warblers (*Dendroica coronata*), although reported as rare breeders, have proven to be widespread in northern and portions of southeastern Connecticut at least since the 1970s. Similarly, Virginia Rails (*Rallus limicola*), described as breeding uncommonly inland to fairly commonly along the Connecticut River, actually breed abundantly in brackish cattail marshes along the river, and pairs may be found in many small and shrubby wetlands in northern Connecticut.

Other lesser concerns include the format for literature citations. In places, author and date were cited, in others only the author was referenced, and in still others only the periodical was cited. The bibliography of Connecticut birds also appeared sparse. Some key references from the state bird journal, *The Connecticut Warbler*, were perplexingly omitted.

Despite its several shortcomings, I found the book to be a significant accomplishment for Connecticut ornithology. The review of historic records is impressively thorough, and it is this historical review that comprises the book's most important contribution. The book is also well-written, well-edited, and makes for quite interesting reading. It is an essential volume for students of Connecticut birdlife, and it will be a standard reference on Connecticut's avifauna for many years to come.—ROBERT J. CRAIG.

HABITAT MANAGEMENT FOR MIGRATING AND WINTERING WATERFOWL IN NORTH AMERICA. Edited by Loren M. Smith, Roger L. Pederson, and Richard M. Kaminski. Texas Tech. Univ. Press, Lubbock. 1989:xii + 560 pp., 4 color and 59 black-and-white photos, 89 figs. and 96 tables. \$25.00 (cloth), \$20.00 (paper).—This book is a collection of 20 commissioned review papers by over 60 knowledgeable authors on the management of migration and wintering habitats for waterfowl in the United States and Mexico. The title is slightly misleading as the book does not cover Canada, except for a small superficial look at British Columbia, and excludes Alaska.

Each paper describes and quantifies major migrating and wintering waterfowl habitats in the area it covers, stressing their importance and relative use by waterfowl. Other topics covered include wintering strategies of waterfowl, management techniques, importance of agricultural areas as a source of food for wintering waterfowl, mortality due to diseases, threats by environmental contaminants, nutritive value of foods, habitat loss, threats to wintering habitats, and research needs. The breadth and coverage of these topics varies between papers, but overall they provide a good overview.

The papers are grouped by flyways. Five habitats and/or regions are covered in the Atlantic flyway chapter: the tidal and nontidal wetlands of the northern Atlantic States, the Chesapeake Bay and North Carolina sounds, the south Atlantic coastal wetlands, the southern reservoirs and lakes, and the beaver pond wetlands. The Mississippi flyway chapter includes papers on Great Lakes marshes, riverine, and deepwater habitats for diving ducks, upper Mississippi valley wetlands, Mississippi alluvial valley and southern coastal marshes and lakes. The central flyway chapter has six papers: the northern great plains, high plains reservoirs and sloughs, playa lakes, rice prairies, Texas coast, and the east coast of Mexico. The Pacific flyway is covered by four papers: northwest riverine and Pacific coast, great basin marshes, central Imperial and Coachella valleys of California, and the Pacific coast of Mexico. The book concludes with a paper on the biopolitical strategies for waterfowl habitat preservation and enhancement.

As expected from such a wide geographical review, details of management techniques are lacking, but the papers provide a good source of reference, consolidating and summarizing published and unpublished literature up to 1989. The greatest value of the book is in its global view of the topic, which highlights similarities and differences throughout the wintering range.

The coverage is heavily biased toward the management of geese and dabbling ducks, reflecting in part the lack of information on wintering diving ducks, especially seaducks, but also their lesser economic importance. With a few exceptions, waterfowl population estimates are presented without any measure of precision and/or accuracy, which reduces the value of the information. I was annoyed a few times by the use of name abbreviations such as SAV for submerged aquatic vegetation, as I had difficulty finding some definitions.

The large number of figures and black-and-white photographs make the book easy and enjoyable to read. The style is surprisingly uniform, given the number of different authors.

I found the book interesting and informative. It provides a good overview of the diversity of wintering waterfowl habitats, wintering waterfowl ecology, and management strategies used in the United States and Mexico. It identifies research areas and consolidates a wealth of information on waterfowl management techniques. I strongly recommend it to anyone interested in waterfowl management and research.—JEAN-PIERRE L. SAVARD.

FLIGHT STRATEGIES OF MIGRATING HAWKS. By Paul Kerlinger. Univ. of Chicago Press, Chicago, Illinois, 1989: xv + 375 pp., numerous figures and tables in text, two appendices, \$19.95 (paper), \$60.00 (cloth).—This book is the culmination of almost 10 years of research by the author, who is the outstanding investigator of hawk migration of the decade. There are 13 chapters: ecology and geography of hawk migration, methods of study, natural selection, atmospheric structure, flight mechanics (theory and empirical observations), factors influencing flight direction, altitude of flight, flocking behavior, water crossing behavior, flight distances and strategies, and a conclusion. The appendices list 133 species of Falconiformes in categories of migration distance, water crossing during migration, flocking behavior, tendency to follow insect swarms, and which age or sex precedes the other in migration. The book is intended for both the professional and the amateur “who will take the time to think about the material.” I fear that some sections of the book will confuse all but a few professionals and that the average reader will skip too many sections, or perhaps even worse, accept statements of the author uncritically. At times even Kerlinger appears confused; I present two examples. In the summary of his chapter on the influence of wind topography and geography on flight direction (p. 183) he states: “An alternative means of studying orientation behavior, proposed by Alerstam and others, incorporates partial drift, prevailing winds, and overcompensation. The resulting flight between breeding and non-breeding ranges is a curved line, ellipse or loop migration.” These are hypotheses or models, not methods of study. The concepts in the first sentence do not lead to those in the second; indeed, overcompensation would tend to preclude loop migration. In his section on circling performance and turning radius within thermals (p. 150) he states: “Measurements of soaring performance of pelicans and Black Vultures, species with different aspect ratios but similar wing loadings, showed that the pelicans have similar turning envelopes (table 6.5). This means that in addition to wing loading, wing shape is important for determining soaring performance (turning envelope).”

The book is more of a personal statement than a dispassionate summary of our current knowledge of hawk migration. My prejudices are often the opposite of Kerlinger's biases, and I think a reader should be aware that his versions of several controversies may not be the best. For example, Kerlinger has a very low opinion of hawk counts, allowing only that they have value for such “nonscientific uses” as monitoring population fluctuations. He believes that the analysis of hawk counts, e.g., in respect to wind conditions, . . . “tell us little about migration strategies, especially flight behavior.” Are his direct observations of flight behavior so vastly superior? Kerlinger et al. (Can. J. Zool. 63:755–761, 1985) tracked with radar 35 Sharp-shinned Hawks (*Accipiter striatus*) soaring and climbing in thermals. The tracks deviated a mean of 66° to the right of downwind, a remarkable performance

because this means that they moved 2.25 m perpendicular to the wind for every meter that they drifted downwind within the thermal. The high mean climb rate ( $2.7 \text{ ms}^{-1}$ ) indicates that the birds were in the central core of the thermal during their mean of 54 s of soaring. Kerlinger does not give the mean wind velocity; a reasonable estimate for diurnal wind 750 m altitude at Berne in September and October is  $10 \text{ ms}^{-1}$ . At this wind speed, a hawk would move 540 m downwind with the drifting thermal and 1213 m perpendicular to the wind within the core of the thermal. This leads to an impossibly large average thermal size, probably by a factor of three or more, even if we assume that all hawks somehow entered and left the thermals at the extremes of the diameter perpendicular to the wind. Obviously, something is wrong with these calculations, and it gives me pause about the accuracy of all of the radar data.

Kerlinger uses his observations of hawks flying between thermals to evaluate the effects of wind direction on flight direction. For observations of Sharp-shins at Woodbine, 36 km NNE of Cape May, New Jersey, Kerlinger and Gauthreaux (*Anim. Behav.* 32:1021–1028, 1984), he used: (1) a simple linear regression of wind direction on flight tract direction, a calculation that ignores wind velocity completely. He used the daily mean of flight direction for the regression, thus reducing the data to 15 points, with all days equal regardless of the number of tracks (a peculiar grouping of data that he used in no other analysis in any of his papers) and (2) he sorted all tracks into those occurring on either west, east or calm winds and calculated the mean track direction and again ignoring wind velocity. For observations at Berne he regressed flight directions on the wind components perpendicular to the PAM (principal axis of migration, basically the direction the birds prefer to fly). This is a method superior to the other two but its accuracy hinges on the estimate of the PAM. Kerlinger's estimate of the PAM for sharp-shins is based on recoveries of birds banded at Cape May, a distribution that has been constrained by the Atlantic Coastline and other geographic features, and, arguably, by wind drift. He then uses this PAM to evaluate the effects of wind and geography on individual flight paths. The logic of this method is elusive. Kerlinger concluded that there was no evidence for drift at Woodbine but that compensation for drift was incomplete at Berne. The disagreement between sites may be the result of differences in analysis, sampling error, or a real difference between localities. A simple analysis of hawks counted, using a method similar to (2), above, also yielded no relationship between wind direction and migration and thus no evidence for wind drift at Cape May during the sampling period, a fact mentioned only in passing by Kerlinger. At least in this case, the direct methods of Kerlinger appear to be almost as indirect, and require as much interpretation, as the indirect methods of using counts and do not appear to provide different or less equivocal results.

The chapter on the influence of wind and topography on flight direction is largely an overzealous effort to disprove the wind drift hypothesis and is a good example of Kerlinger's biased presentation. He characterizes recoveries of banded birds as "a neglected source of data," but he dismisses the suggestion of Mueller and Berger (*Wilson Bull.* 79:397–415, 1967) that recoveries of Sharp-shinned Hawks banded at Cedar Grove show evidence of wind drift because their sample is small, particularly if age and sex classes are considered separately. There are no significant sex or age differences in the geographic distribution of band recoveries in any sample, including the large sample of Clark (*Proc. Hawk Migration Conf. IV*, 1985) from Cape May, New Jersey. My calculations show that 16 of 17 sharp-shins banded at Cedar Grove and recovered in the next six months north of  $35^{\circ}\text{N}$  were east of  $88^{\circ}\text{W}$ , the longitude of Cedar Grove, but only 10 of sixteen recoveries south of  $35^{\circ}\text{N}$  were east of  $88^{\circ}\text{W}$  (Fisher exact  $P = 0.0319$ ). This small sample is confirmed by another of birds banded at Duluth, Minnesota,  $92^{\circ}\text{W}$  longitude (Evans and Rosenfield, *Inst. Council for Bird Preservation, Tech. Publ. No. 5*, 1985). Fourteen of 16 birds recovered in fall or winter

north of 35°N were east of 92°W but only eight of 22 birds recovered south of 35°N were east of 92°W ( $\chi^2 = 7.95$ ,  $P < 0.01$ ). The geographic distribution of these recoveries agrees with the distribution of the direction of prevailing winds and I interpret this as evidence of wind drift.

Kerlinger concurs with Clark (1985) in arguing that wind drift cannot explain the concentrations of sharp-shins at Cape May because there are too few summer recoveries of banded birds to the northwest. The southeasternmost of the multiple ridges of the Appalachian Mountains lies only 150 km to the northwest of Cape May. The wind drift hypothesis predicts that few hawks would cross these ridges onto the coastal plain, and I would expect that the birds occurring at Cape May would be comprised almost entirely of the many birds breeding in Maine, New Brunswick, and Nova Scotia that would seem to have little choice but to migrate along the coast. It is thus surprising that five of 16 summer band recoveries are from localities north and west of the mountains. Indeed, the westernmost recovery is only about 180 km northeast of the eastern end of Lake Ontario; hawks breeding west of here are likely to be diverted westward by the Great Lakes, and probably as far west as Michigan, before continuing southward.

Kerlinger used the winter recoveries of sharp-shins banded at Cape May for his estimate of the PAM. Any user of any data from Cape May should consider the following: (1) Most sharp-shins at Cape May are young of the year (the age ratio of birds trapped at Cape May is 22.3 juveniles to each adult, compared to only, e.g., 1.3:1 at Cedar Grove. (2) *One third* of the winter recoveries of birds banded at Cape May are from localities *north* of the latitude of Cape May. (3) Two (2.7%) of the winter recoveries south of Cape May are from Bermuda! Few birds that are lost at sea will find their way to Bermuda, and it is thus likely that more than a small fraction of the sharp-shins that attempt to cross Delaware Bay end up dead in the ocean.

I believe that the key to the explanation of the above observations is as follows: adults have a specific goal, the locality where they spent the previous winter. Young birds lack a specific goal, are inexperienced, have a less well-defined migratory direction, are more likely to be led astray by adversely oriented leading lines and wind drift, are more likely to become lost on the peninsula of southern New Jersey, finally ending up at Cape May. Migration through Cape May thus appears to be maladaptive but obviously not so much so that the tendency for young birds to become lost there has been reduced appreciably by selection. Nothing in Kerlinger's book agrees with this hypothesis.

I have been extravagant in my demonstration of Kerlinger's excessive zeal for his ideas and the resulting bias in the book. I disagree with many other interpretations of Kerlinger but I found reading this book a very useful and stimulating experience. I highly recommend the book to all persons, professional and amateur, who have a serious interest in either migration or diurnal raptors. It should be read, thought about, and effort should be made to understand difficult material. It is the best summary of a variety of aspects of hawk migration available, and I expect it to retain this distinction for some time.—HELMUT C. MUELLER.

EVOLUTIONARY DYNAMICS OF A NATURAL POPULATION: THE LARGE CACTUS FINCH OF THE GALÁPAGOS. By B. Rosemary Grant and Peter R. Grant. University of Chicago Press, Chicago, Illinois. 1989:350 + xix pp., 12 color plates, 96 figs., 71 tables. \$65.00 (\$24.95, paper).—Long-term studies of populations of marked individuals, begun in the 1960s and 1970s, make ideal subjects for monographic treatment. The Grants began their investigation of the Large Cactus Finch (*Geospiza conirostris*) on Isla Genovesa (Tower) in 1978 and ended it in 1988. Their focus was variation because variation is what they found. With

regard to bill dimensions, some Ground Finches (*Geospiza* spp.) are more variable than finches from North and Central America and on other island groups, and *G. conirostris* is the most variable of all. In addition, the bill of young birds is dimorphic in color, some pink, others yellow. Furthermore, male *conirostris* can be distinguished as A-males or B-males on the basis of song type. Variation is enhanced by hybridization, as evidenced by birds with intermediate dimensions and inappropriate songs. Several mixed pairings in fact were observed, one with a Sharp-beaked Finch (*G. difficilis*) and two with Large Ground Finches (*G. magnirostris*) (about 1–3% of all pairings).

Not only are the birds variable, but the climate can be extraordinarily variable. Although generally less than 200 mm, rainfall can vary from zero (in 1985) to about 2400 mm from December to July (1982–1983, an El Niño year). Differences in temperature from year to year are “detectable but moderate.” As P. R. Grant and his colleagues have shown earlier, and again here, the El Niño rains have tremendous impact on vegetation, flowering, and fruit and seed production.

The climatic regime imposes variation on survivorship and reproduction. Cohorts differ in annual survivorship and life expectancy. Survivorship and reproduction are generally high in wet years and low in dry years. After a drought, survivorship can be high because of low density. Males of the 1976 cohort survived an average of 4.3 years after their second year, whereas in five other cohorts they averaged 1.6 years beyond their second year. Number of fledglings per pair varied from none in 1985, when no breeding occurred, to 9.9 in 1987. Lifetime reproductive success varied greatly, as in other species, but success was dependent on the year in which an individual hatched. The most successful female bred in nine seasons and produced at least 110 eggs and 58 fledglings, whereas median lifetime reproduction of breeders was only 11 eggs and 6 fledglings.

As in most studies of this kind, data are analyzed in every way imaginable. I was overwhelmed with analysis after analysis, graph after graph, table after table. There is something for everyone. Everyone, that is, except me. I happen to be interested in long-term average values for survivorship, clutch size, age of first breeding, and number of clutches laid and broods reared per female. In focusing on detailed comparisons between cohorts, morph types, age groups, and so on with regard to their responses to a variable environment, the Grants do not make most of these values readily available or even calculable. But, this is characteristic of the genre. I have not found all of these data in *any* long-term study, even though the authors must have the data. I am hopeful that by my raising this point, investigators making long-term studies will calculate and report their long-term average values, as well as their detailed comparisons.

What I found interesting were several of the Grants' conclusions and observations. For example, that the major source of new alleles in the *conirostris* population on Genovesa is hybridization with *magnirostris* and *difficilis*. Including putative hybrids in the sample of breeding birds increased the coefficient of variation of bill dimensions by 20% and the variance by 35%. Hybrids, however, had short lives and were relatively unsuccessful. Second, that *conirostris* is so dependent on *Opuntia* on Genovesa that extinction of *Opuntia* (from, say, a pathogen) would result in extinction of *conirostris*. Third, particularly fascinating, that in the first year of the study A males and B males, distinguished by their songs, differed in bill length, diets, and foraging behavior. Breeding males with the same song type did not occupy adjacent territories. Could this be a case of incipient sympatric speciation? Alas, no. These differences did not persist.

This book reports a careful and detailed study of the effects of environmental variation on morphological, ecological, and behavioral variation of a species. I can recommend it without reservation.—BERTRAM G. MURRAY, JR.



A PARROT WITHOUT A NAME. By Don Stap. Alfred A. Knopf, New York. 1990:230 pp. \$19.95.—Stap does an admirable job of introducing the reader to the Peruvian rain forest. His vehicle is the documentation of his experiences during expeditions to Peru with John P. O'Neill and Ted Parker of Louisiana State University. Because of his numerous collecting expeditions to Peru since 1963, O'Neill has catapulted LSU to the forefront of Neotropical ornithology. In recent ornithological literature, the descriptions of several new species from South America have been published. Invariably, O'Neill's name has been associated with them. A recent issue of the *Wilson Bulletin*, for instance, contains a paper on the distribution and systematic status of a screech-owl from northern Peru, and sure enough, O'Neill's name appears in the acknowledgments.

The expedition's destination, the Cordillera Divisor, is a small isolated outlier of the Andes near the Brazilian border where O'Neill had earlier discovered several birds new to science. The party of 15 persons, plus an additional 1500 pounds of equipment, traveled slowly upriver by dugout. Progress was frequently hindered by logjams, shallow water, or simple misfortune. After several days, the group was at last entirely cut off from civilization, immersed in the wild, unspoiled beauty of the Amazon rain forest. Anticipation ran high: at any time, the party knew that there was the real possibility of discovering a species never before known to the outside world. But O'Neill and his younger associate, Ted Parker, were painfully aware that even though this region encompassed one of the last truly wild stretches of Peru, they must work quickly, for a transcontinental highway was soon to be built through it.

Obviously, birds are what this book is all about—tropical birds. Avian systematics, distribution and behavior are the major chords, but the author also strikes occasional minor ones as well: species diversity of plants and insects in the jungle, for example. A discussion of the very real danger of the two poisonous snakes found there is another case in point. Some large mammals were encountered on the expedition, including several species of monkeys, a tapir (*Tapirus terrestris*), a capybara (*Hydrochoerus hydrochaeris*), and two jaguars (*Felis onca*). However, I was surprised to find not a single mention of any crocodilian! Nor is geography neglected, as Stap ties together the importance of the Andes and the mighty Amazon River system in controlling continental weather patterns. Woven throughout the book are lessons in conservation such as the consequences of human "progress" and our startling lack of knowledge about the biota of areas that are being decimated at an alarming rate.

This delightful narrative, a real adventure in tropical biology, will be required reading for my ornithology students. It is a well-written, timely plea for preservation of the remaining rain forest before there is none left to preserve.—JACK D. TYLER.

BIOLOGY OF THE EARED GREBE AND WILSON'S PHALAROPE IN THE NONBREEDING SEASON: A STUDY OF ADAPTATIONS TO SALINE LAKES. By Joseph R. Jehl, Jr. Studies in Avian Biology No. 12, Cooper Ornithological Society, 1988:74 pp., 39 numbered text figs., 10 tables, 3 appendices. \$14.00.—Those of us involved in studies of breeding birds often forget that there are another nine months of the year during which individuals of our study species have to engage in the unending "quest for survival." In some ways, this is a more tractable period for studying avian adaptations, since in most species it is not complicated by the compromises a nesting bird must constantly make between questions concerning reproductive fitness and those concerning survival. Jehl's studies of the phenomenal molt migrations and concentrations of Eared Grebes (*Podiceps nigricollis*) and Wilson's Phalarope (*Phalaropus tricolor*) are a case in point. During migration, large flocks of these two species

sometimes build up in highly saline lakes, where they exploit temporarily abundant food resources. By mid-October, Jehl estimates that from 625,000 to 875,000 Eared Grebes (perhaps 30% of the continental population) are on Mono Lake, California, exploiting the temporary abundance of brine shrimp (*Artemia monica*) and brine flies (*Ephydra hians*) available to those few avian species that can tolerate the highly saline water. Upon arrival, Eared Grebes become flightless while concurrently laying on vast fat stores, often doubling their arrival weights. During this period, brine shrimp comprise 98% of their diet, and Jehl estimates that at peak numbers grebes on Mono Lake may consume daily 60 to 100 tons of shrimp. By confronting the reader repeatedly with figures such as these, Jehl strikes home the importance of this period in the overall life cycle of the species. He then examines the feeding behavior and molting biology of Wilson's Phalaropes on Mono Lake, drawing parallels between these two halophilic species.

The switch from grebes to phalaropes is rather abrupt, and some readers may question whether the comparisons between two species so different in their taxonomy and biology really work. Each species has its own separate methods and results sections, and my first impression was that this monograph was essentially two manuscripts spliced together under one package for convenience, rather like the modern dissertation written in paper form. The introduction and discussion tie the two studies together well, however, and I found that Wilson's Phalaropes provided a nice comparative contrast to the grebes, even though their overall numbers are much less impressive. As emphasized in the title of the book, what links these two species together is their heavy reliance on inland saline lakes for meeting their fall energy needs.

I recommend this monograph to anyone interested in the migration and post-breeding biology of birds. It provides a nice case history of one of the most striking molt migrations found in North America. —GARY L. NUECHTERLEIN.

#### SHORT REVIEWS

BIRDS OF COLONIAL WILLIAMSBURG: A HISTORICAL PORTFOLIO. By Alan Feduccia with paintings by H. Douglas Pratt. The Colonial Williamsburg Foundation, Williamsburg, Virginia. 1989:162 pp., 75 colored paintings. \$29.95.—A "coffee table" book illustrating 75 species of birds which are more or less common in the Williamsburg area. The short accounts of each species by Alan Feduccia generally are informative, and in most cases include remarks by Mark Catesby, John Lawson or other early naturalists about the birds. The centerpiece of the book is the collection of full-page portraits by Doug Pratt. These are usually successful in depicting the species, but in a few of them the birds are much too plump. In many cases the backgrounds suggest the ambience of the Williamsburg scene. Pratt is not afraid to draw the birds in unconventional poses and is usually successful in this, although in some cases he loses the Gestalt of the bird.

The paintings of the Bald Eagle, (*Haliaeetus leucocephalus*), Passenger Pigeon (*Ectopistes migratorius*), and Carolina Parakeet (*Conuropsis carolinensis*) are excellent reproductions of the paintings by Catesby. The reproduction of all the paintings is excellent.—GEORGE A. HALL.

FIELD GUIDE TO THE BIRDS OF BRITAIN AND EUROPE. By Jim Flegg. Cornell University Press, Ithaca, New York. 1990:256 pp., many color plates, and maps. \$43.50 (cloth), \$19.95 (paper).—Another field guide to British Birds! How many are there? The strong point of this guide is the set of photographs. While there is argument as to the suitability of photos

as illustrations in an identification manual, this book is well worth having for the collection of color photographs alone. Most of these were taken by Eric and David Hosking, and to my eye are one of the finest collections of portraits of European birds available. As a field guide it follows standard form: a paragraph on identification, some hieroglyphics indicating habitat, and a small range map, which for once has a good contrast between the colors representing seasonal distribution.

There is a brief introductory discussion of bird biology, a section describing the habitats, and a closing section entitled "Practical Birdwatching."

Readers of the *Bulletin* who do not own a European guide might consider this one, and all American bird students might desire this excellent set of photographs.—GEORGE A. HALL.

MEN AND BIRDS IN SOUTH AMERICA 1492–1900. By R. Stowell Rounds. Q.E.D. Press, 155 Cypress Street, Fort Bragg, California. 95437. 1990:190 pp., 11 black-and-white photos and drawings, 3 maps. Paperback. No price Given.—While arranging specimens of Dendrocolaptids at the Carnegie Museum, I was puzzled by the number of specimens collected by "Mrs. H. H. Smith." Who was she? Among the many other things in this little book, I learned about her and her husband. Mr. Rounds has compiled for us a brief history of ornithological exploration in South America prior to 1900, including short biographical sketches of practically everyone who worked in South America during the time period selected. These range from people even more obscure than Mrs. Smith to such well known scientists as Darwin, Alexander Agassiz, and Frank Chapman. Of particular interest are the sketches of many people known to most of us only as the describers of bird species, i.e., DeLatre, von Berlepsch, or Natterer. Unfortunately there are some errors of fact in the text, and the number of misspellings and typos indicate that editing or proof-reading has been minimal.—GEORGE A. HALL.

SURVEY DESIGNS AND STATISTICAL METHODS FOR ESTIMATION OF AVIAN POPULATION TRENDS. Edited by John R. Sauer and Sam Droege. U.S. Fish and Wildlife Service Biological Report 90(1), 1990:166 pp. (Available gratis from Publications Unit, U.S.F.&W.S., Room 130 Arlington Square Building, 18th and C Streets N.W., Washington, D.C. 20240).—This is a collection of 26 papers given at a workshop held by the Branch of Migratory Bird Research and the Office of Migratory Bird Management in 1988. Ten papers comprise the first part, Surveys used to Estimate Avian Trends. These describe the Common Bird Census in the United Kingdom, the International Shorebird Survey, as well as the more familiar Breeding Bird Survey and Christmas Bird counts. Part II consists of thirteen papers discussing Methods of Trend Analysis. Part III illustrates the application of the methods in three papers giving an analysis of trends in the Scissor-tailed Flycatcher. The section on Methods should be read by all those interested in interpreting population data.—GEORGE A. HALL.

PROTECTING INTERNATIONALLY IMPORTANT BIRD SITES. By David A. Stroud, G. P. Mudge, and M. W. Pienkowski. Nature Conservancy Council, Peterborough PE 1 1UA. 1990:230 pp., many maps. £17.—This is a useful summary of the establishment of the E.E.C. Special Protection Area Network in Great Britain. Besides listing the sites of importance, and the basis for their selection information is given on the conservation needs of 48 "vulnerable" species and 75 other migratory species. Sixteen of the former and about 40 of the latter are North American birds.—G.A.H.

CHARACTERIZATION OF HABITAT USED BY WHOOPING CRANES DURING MIGRATION. By Michael J. Armbruster. U.S. Fish and Wildlife Service Biological Report 90(4), 1990:16 pp. (Available gratis from Publications Unit, U.S.F.&W.S., Room 130 Arlington Square Building, 18th and C Streets N.W., Washington, D.C. 20240).—G.A.H.

BOLETIN SAO. Sociedad Antioqueña de Ornitología, Medellín, Colombia. Vol. 1 No. 1, Junio de 1990—This is an interesting new journal written (in Spanish) at about the level of *American Birds*. The Sociedad hopes to promote local interest in birds and their conservation. Interested North Americans can obtain the journal from the Sociedad at Apartado aereo 60010, Medellín, Colombia for \$10 (US).—G.A.H.

### XXI INTERNATIONAL ORNITHOLOGICAL CONGRESS

The XXI International Ornithological Congress will be held at the Austria Center in Vienna, Austria from August 21–27, 1994. Its President (Dr. C. M. Perrins, Oxford), General Secretary (Prof. J. Dittami, Vienna) and Scientific Program Committee Chair (Prof. J. C. Wingfield) would like to invite suggestions for symposia and discussion groups to be sent to Prof. Wingfield:

Department of Zoology  
University of Washington  
Seattle, Washington 98195 U.S.A.

or the organisers:

XXI International Ornithological Congress  
Interconvention  
Austria Center  
A-1450 Vienna, Austria Europe

by July 1991. Symposia should be aimed at reviewing topics of general interest while discussion groups can be more specific.

Suggestions must include a statement of the general theme as well as a list of prospective conveners (including oneself) and contributors with their topics and, if possible, addresses. Lastly, interested participants are asked to contact the organisers to be put on the mailing list.

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