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ORNITHOLOGICAL LITERATURE

DISTRIBUTION AND TAXONOMY OF BIRDS OF THE WORLD. By Charles G. Sibley and Burt L. Monroe, Jr. Yale Univ. Press, New Haven, Connecticut, and London, England. 1990: xxiv + 1111 pp., 25 pp. unnumbered maps. $125.00.—At the outset, the authors present their five goals in preparing this massive work: "(1) to delineate the present distribution of the species of birds of the world in moderate detail and up-to-date to the beginning of 1990; (2) to arrange species in a classification based primarily on evidence of phylogenetic relationships from the comparisons of their DNAs; (3) to provide a numbering system for the species of living birds; (4) to include a gazetteer with maps indicating the positions of localities mentioned in the distributional accounts; and (5) to provide an index to scientific and English names of species."

The first goal is admirably achieved. Each entry consists of the scientific name, describer's name, date of description, English name, world number, a brief description of the habitats and elevations in which the bird is found, geographic range, and where appropriate, alternate names. A list of 46 errata is included. More will certainly be found, but this is a modest number for a work of this size and complexity.

The total number of the world's species of birds may never be determined because of the blurred line between species and subspecies. The 9672 "biological" species treated in this work are more than generally are recognized, but erring in this direction is better than the reverse. In a time like this, when there is a trend away from "lumping" toward recognizing species formerly considered subspecies, there is a distinct advantage in having separate data sets for infraspecific taxa that might be raised to the specific rank in the future.

The index to the scientific and English names of the species covers 171 three-column pages and is vital to finding a species in what to almost everyone is a new sequence. It will also be useful to those who know only the scientific or English name of a species.

Furthermore, a gazetteer and maps can prove useful, especially in times when geographic names are in a state of flux. The maps, however, leave something to be desired. The lines on many are too fine and the lettering so bold as to make the geographic divisions even more difficult to follow. On the map of North America, the names of the United States appear, but the lines between states are omitted. This may well confuse those unfamiliar with the geography of our country.

What is most controversial is the sequence in which the species are presented. This is based on the phylogeny and classification of birds by Sibley, Ahlquist, and Monroe (Auk 105:409–423, 1988). This in turn is based on studies, primarily by Sibley and Ahlquist, on the DNA-DNA hybridization data from 1700 species, representing all but a few of the major groups of birds. These studies are a major advance in providing a phylogeny of birds based on data from a molecular system that can provide not only evidence for the sequence of branching in the family tree of birds but also an estimate of when each branching occurred. (The latter assumes an equal rate of DNA sequence divergence across taxa, which is controversial.) Therefore, in spite of its controversial nature, it gives us the most complete series of hypotheses to date for reconstructing the evolution of birds.

It has long been recognized that phylogenetic hypotheses can be strengthened by congruent patterns from different lines of evidence. In many instances, such patterns have also been provided by Sibley and Ahlquist in their publications. Thus, the phylogeny has been based on a tremendous amount of new data to which has been added a formidable review of the available information on the subject. Nevertheless, no phylogeny can be taken as carved in stone. Newer, more powerful molecular techniques have been developed in the sixteen years

since Sibley and Ahlquist settled on their technique for DNA-DNA hybridization, and the amino-acid sequences of molecules have been shown to be subject to convergent or parallel evolution much as are morphological structures. Because DNA-DNA hybridization by its nature is a phenetic method providing information on the amount but not the direction, of genetic change, some claim it is an inappropriate method of constructing phylogenies. It also appears that DNA-DNA hybridization may not be the most accurate molecular method for this purpose (see Hillis and Moritz [eds.] 1990. "Molecular systematics: context and controversy. Sinauer Assoc. Inc., Sunderland, Massachusetts, and Springer and Krajewski. 1989. Quart. Rev. Biol. 64(3):291–318 for critiques of this technique and comparisons of it with other molecular ones.) Finally, the methods used by Sibley and Ahlquist in analyzing their data have been questioned (Gill and Sheldon, 1991, Science 252:1003–1005), and several recent studies have provided evidence against the branching pattern of parts of the tree.

While the work presents well documented advances in both the phylogeny and classification of birds, it also presents phylogenetic hypotheses and classifications that are not well supported. This is especially true at the higher levels of the classification, where the DNA evidence is weak. Traditionalists will find particularly disturbing the expansion of the Ciconiiformes to include what were formerly the Charadriiformes, sandgrouse, diurnal birds of prey, grebes, Pelecaniformes (variously broken up), penguins, loons, and petrels. The breaking up of the pelecaniform birds can be questioned on strong morphological grounds. There are several places where groups (e.g., the grebes) are placed within specific groups without strong evidence, instead of being labelled "*incertae sedis.*" Many non-systematists will accept these placements as gospel and will question the desirability of conducting further systematic research where, in fact, much is needed.

With new up-to-date studies we can hope to keep extending our understanding of the phylogeny of birds, but making a linear classification from even a perfect tree is another complex matter. It takes 9671 branchings to produce a tree of 9672 twigs. To place these twigs in a linear sequence requires a decision at each branching point as to which branch to put first and which second. A set of guidelines is needed to make these decisions repeatable. Such guidelines have been proposed, but, unfortunately, none have been formally accepted and used uniformly by ornithologists. If we are to approach a stable linear classification, some action on this is needed.

The method of sequencing taxonomic groups used in this work is not clearly stated, except that the branchings were treated in the order of the estimated time they occurred, and the ramifications of each branch are followed to the end before going back to the second branch. This is the only logical choice, but how to determine which of any two branches to list first is unclear. Where DNA-DNA hybridization and/or other new data were available, new arrangements were made. Many of these are at the level of the family or higher or are on groups which had been studied by Sibley and Ahlquist. The remaining 80+% of the branching sequences, most of them at the genus or species level, were taken from other works, primarily Peters' "Check-list of Birds of the World." Most, if not all, of the contributions to the latter work, including mine, used subjective criteria from "advanced" or "specialized" characters in arranging sequences. Thus, it is inevitable that as research on the phylogeny of birds continues and a set of criteria for sequencing phylogenies is formally established and followed, we can expect to see continued changes in our classification.

The numbering system proposed in this work was expanded from that long in use in the AOU check-lists of North American birds, and that has not been altered with changes in the systematics of these birds since its inauguration. Birds not found in the original AOU check-list area have been given numbers, the first digit of which corresponds to the major geographic region in which the birds are found. We are thus presented with a hybrid system,

geographic as well as taxonomic. North Americans may be glad that the numbers of their birds can remain constant through further changes in classification, although others may label the numbering system parochial and may object to its dual basis.

While much of the phylogeny in this work is probably valid, much of it may well prove wrong, and the Sibley-Ahlquist-Monroe classification has resulted in much controversy, some of it acrimonious. In matters of taxonomic change, I confess to a conservative attitude based on the fact that an incorrect change requires another change to remedy it. I am therefore against changes based on a single line of evidence unless there is strong corroborative information. If we take this conservative approach and if we adopt an objective code for sequencing phylogenies, when the dust settles on the controversy, we should have a classification that in the end will require relatively few changes. In the meanwhile, we can use this book as a most valuable source of information on the distribution and habitats of the world's birds and as a stimulus for further studies on their phylogeny.—ROBERT W. STORER.

A COMPLETE CHECKLIST OF THE BIRDS OF THE WORLD. (Second Edition). By Richard Howard and Alick Moore. Academic Press, London. 1991:xxxiv + 622 pp. $49.50.—Since the original edition of this world list appeared in 1980 (reviewed in *The Wilson Bulletin,* 93:437, 1981) the final two volumes of the Peters Checklist and the Sixth Edition of the A.O.U. Checklist, as well as some other important works have been published. This new version appears to make use of such material through 1988.

The result is a convenient, well-produced list of more than 9200 species. This is the only world list that treats subspecies. These are all listed, together with very abbreviated statements about their ranges. An English name is given for each species which, unfortunately, in many cases will differ from the names that will result from the program initiated at the recent I.O.C. meeting to compile an agreed-upon list of such names.

For each of the recognized families, a list of publications on the taxonomy of the family is given. This makes a convenient resume of recent taxonomic literature. Another strong point is the inclusion of very thorough indices of both scientific and English names, making it easy to look up a desired species.

As in the earlier version the classification used is that of the Peters "Checklist of the Birds of the World." This arrangement may now be obsolete with the publication of the totally different classification proposed by Sibley, Ahlquist, and Monroe (1990) (see review elsewhere in this issue). The authors recognize this and remark, "This may therefore be one of the last opportunities to produce an up-to-date usable list which bears some relationship to the historical order and form of traditional checklists, that is to say a list we can use because we know where to look and what to look for."—GEORGE A. HALL.

THE BIRDS OF JAPAN. By Mark A. Brazil, illus. by Masayuki Yabuuchi. Smithsonian Institution Press, Washington, D.C. 1991:466 pp., 6 color plates, 65 numbered text figs., 578 range maps. $49.95.—Publications on Japanese natural history abound, but most are in Japanese, their contents not intelligible to most foreigners. In recent years, such books written in English have brought the rich biota of these islands to the attention of more and more biologists, both professional and amateur. The present book fills a need for information about the distribution and occurrence of Japanese birds, a rapidly expanding area of knowledge.

Unlike many regional bird books, this one makes no attempt to be a field guide. Instead, the author concentrates on occurrence and aspects of the biology of each species. The species

accounts include very detailed summaries of distribution and seasonal status; a description of preferred habitats (including seasonal changes); a brief account of breeding biology (breeding season, nest location, clutch size, and incubation period) for breeding species; a description of vocalizations; an account of subspecies recorded from Japan; and occurrence by island, often with a chronology of known records. The accounts of Japanese endemics average longer than those of widespread species, presumably by design.

There is also a brief introduction to Japan's climate and habitats, its avifauna, its ornithological history, and birdwatching in the country. The climate descriptions are particularly interesting, as is the description of changing (and not-so-changing) attitudes toward Japanese wildlife. There is even a list of 43 "anticipated species," mostly migratory species that occur to the northeast or northwest of Japan. The bibliography of over 1300 titles (cited by number in the text) is astonishing because only a tiny proportion of them are in Japanese; this list presents a monumental record of the author's diligence. I am not qualified to comment on its accuracy or thoroughness, both important in a regional survey, but the abundance of detail promotes confidence.

Each of the 583 species recorded from Japan is listed with its current status. Occurrence throughout the archipelago is summarized, not an easy matter, as few species have the same status from one end to the other. Only 52 (33%) of 158 native land-bird species that breed in Japan breed throughout the main islands, and only 14 of these species (9% of the total) occur through all or most of the southern archipelago. No generalities emerge from this assessment other than that a high proportion of the most widely distributed breeders are resident. That list includes widespread species such as Common Kingfisher (*Alcedo atthis*) and Great Tit (*Parus major*) and narrow endemics such as Japanese Pigmy Woodpecker (*Dendrocopos kizuki*) and Varied Tit (*P. varius*).

Students of avian biogeography will find much of interest in this book, as no fewer than 12 biogeographic boundary lines are associated with Japan (p. 8). Distribution boundaries tend to be within rather than between the main islands, probably corresponding to habitat boundaries, but the Soya Strait between Sakhalin and Hokkaido has been a major gap. Thirty-three land and freshwater species breed on southern Sakhalin but not Hokkaido and 28 on northern Hokkaido but not Sakhalin. The islands are similar in size and habitat and less than 40 kilometers apart, yet there is a substantial avian disjunction between them.

Because it lies along a coast and extends through many latitudes, Japan has a substantial list of rare and casual visitors. Most, of course, come from the Asian mainland, but, surprisingly, many visitors from North America have been recorded. These include seven species of waterfowl, Sandhill Crane (*Grus canadensis*), 11 shorebirds (including Lesser Golden-Plover [*Pluvialis dominica dominica*]), three gulls (including Franklin's Gull [*Larus pipixcan*] and Thayer's Gull [*L. thayeri*]), and, more surprisingly, four emberizine sparrows (with numerous records of both Savannah Sparrow [*Passerculus sandwichensis*] and White-crowned Sparrow [*Zonotrichia leucophrys*]).

Records of rare species are plotted individually on the maps, an excellent feature although probably indicating the distribution of ornithologists and birdwatchers at least as much as the distribution of rare birds; the Tokyo area and Okinawa are the sites of many such records.

The diversity of the Japanese avifauna is a consequence of two factors that influence diversity in opposite directions. First, it is an island nation, with reduced diversity compared with the mainland. Second, although it is a small country, smaller than California, it extends over 25° of latitude, slightly more than the lower 48 states. The series of large and small islands stretches from Hokkaido, with strong elements of the Russian taiga, to the southernmost Nansei Islands, almost tropical. The country is rich in birdlife, considering that it has been highly disturbed for a long time. Perhaps this disturbance accounts for what seemed to me a surprising scarcity of birds, both species and individuals, on several brief visits to

Japan. Is this because of long inhabitation by humans, or are there other, more interesting, ecological factors?

Other tidbits that can be gleaned from this book include the long isolation of Japan from the mainland and from other islands such as Taiwan and Sakhalin, as indicated by its many endemic species (including 7 seabirds) and subspecies; hopeful reports of the slow recovery of Short-tailed Albatross (*Diomedea albatrus*) and Japanese Crane (*Grus japonensis*) populations; the distinct host preferences of the four species of *Cuculus* breeding in Japan; the confusion surrounding the names of Japanese (*Erithacus akahige*) and Ryu Kyu (*E. komadori*) robins; the documentation of the spread of the European Starling (*Sturnus vulgaris*) into Japan from the west (one might say it now occurs from Seattle to Tokyo) as well as the first occurrence and breeding of the House Sparrow (*Passer domesticus*) in 1990; and the fact that this very advanced country still allows thousands of passerines to be caught in mist nets and sold to be grilled.

The color plates and black-and-white text drawings are superb, and I could only regret that the same artist could not have been employed to produce both beautiful and *accurate* paintings for the Wild Bird Society of Japan's 1982 field guide. Fortunately, a great number of eastern Asian endemics are illustrated by Yabuuchi.

What else might have been included but wasn't? A brief statement of the overall geographic range of each species would have placed its occurrence in Japan in context. Also, it is not obvious why vocalizations were not described for some species, even breeding ones. There would have been much for an avian ecologist here if the author could have presented means as well as ranges for such variables as clutch size, nest height, perching height, and habitat preference. Also, a concise summary of food habits (included for some species) would have rounded out the wealth of biological information presented. However, these additions would have necessitated considerably more effort on the part of the author, and the amount of effort put into this book has been prodigious in any event. Otherwise, the book fulfills its obligations well.

The author has done more than anyone else to promote the visitation of Japan by foreigners interested in birds, having written three books on bird finding in Japan and now this very useful book. Perhaps the most interesting message of the book, to me, was that it is written for birdwatchers rather than ornithologists. The introduction makes this clear, and I see that scholarly books such as regional avifaunas will be increasingly intended for the large number of amateurs rather than for the professionals for whom such books were written in the past. This shows, as much as anything I have seen, the extraordinary significance of amateurs to ornithology.—DENNIS R. PAULSON.

ANNOTATED CHECKLIST OF THE BIRDS OF ONTARIO, Second edition, revised and expanded. By Ross D. James. Royal Ontario Museum, Toronto, Life Sciences Miscellaneous Publications, 1991:128 pp., 2 figs., $13.95.—Fifteen years after the first edition of a book bearing this title, one of the original authors has undertaken a much needed updating. In doing so, he has drawn thoroughly on the extensive literature on Ontario bird distribution that has accumulated in the intervening years. The book is unquestionably the most complete attempt at listing the birds of Ontario. It is unlikely that any published records have been overlooked, and I know of very few unpublished records that have escaped the author's attention.

The book is organized with an introduction, a checklist of species comprising the bulk of the text, and appendices dealing with probable escapees and subspecific variation, providing enough detail for the scope of such a book. Within each species listing, there is information on its breeding status, its distribution frequency and relative abundance, all on a season-by-season basis, its dates of occurrence in the province, egg dates when appropriate, and,

where the distinctions are obvious, some details of subspecies found in Ontario. Published records of rarities are cited, and the nature of the documentation of unpublished records of rarities is described in many cases.

While the completeness of the listing is exceptional, it is regrettable that, probably because of space constraints, many of the records referred to, especially in the case of vagrants, are lacking in details. One is left to wonder about the summer records of Harlequin Duck (*Histrionicus histrionicus*) and Barrow's Goldeneye (*Bucephala islandica*), for example, the latter in "the south," which is a vast area larger than several states in the U.S.A. Similarly, it would be interesting to have a little more information about the scattered records of American Swallow-tailed Kites (*Elanoides forficatus*), spring and summer Sabine's Gulls (*Xema sabini*), Lark Bunting (*Calamospiza melanocorys*) at James Bay, and Rosy Finch (*Leucosticte arctoa*) on Manitoulin Island, for example.

The author systematically uses a standard terminology in describing the relative abundance, season by season, of the species listed. In applying the terminology, however, he necessarily relies on his own field experience, which in a few cases differs from my own. As an example, in his experience the Magnolia Warbler (*Dendroica magnolia*) is an "abundant" migrant, meaning that more than 500 could be seen in a day, whereas the Yellow-rumped Warbler (*D. coronata*) is, except locally, described as a "common" migrant, meaning that the numbers seen in a day are seldom more than 500. In my experience, the relative abundance of these two species is the reverse.

Technically, the book is almost flawless. To find only one minor typographical error in 85 pages of text and an additional 43 pages of acknowledgements, appendices, references, and index is a rare treat. Any ornithologist or birder with a serious interest in Ontario bird distributions will want to have this inexpensive reference book on his/her shelf.—FREDERICK M. HELLEINER.

THE BIRDS OF BRITISH COLUMBIA. By R. Wayne Campbell, Neil K. Dawe, Ian McTaggart-Cowan, John M. Cooper, Gary W. Kaiser, and Michael C. E. McNall. Mitchell Press, Vancouver, British Columbia, Canada. 1990: Volume 1, 514 pp., 1 color plate, 71 range maps, 340 numbered figs. and black-and-white photographs, and 17 tables. Nonpasserines, Introduction, Loons through Waterfowl. Volume 2, 636 pp., 153 range maps, 324 figs. and photographs, and 19 tables. Nonpasserines, Diurnal Birds of Prey through Woodpeckers. $99.00.—After years of rumors that a book on the birds of British Columbia was being written, followed by years of more positive rumors, made still more real by tales of woe and extended deadlines, the long-awaited, up-to-date treatise on the B.C. avifauna has finally appeared (19 years after conception) in two large volumes. Another volume (I suspect this will become two volumes, just to add to the new rumors) is alleged to be in the works. What I have in front of me is quite different from any other provincial or state bird book I know. Solid data, presented in a crisp, organized manner, form the bases of these volumes. I like them.

Volume 1 starts with a general introduction covering 150 pp., subdivided into three sections. The first of these (11 pp.) deals with the national and international importance of British Columbia as a region for birds, the history of how the two volumes came to be, and how the subject matter is organized. The data base is impressive. Under the able baton of maestro R. Wayne Campbell, some 4600 enthusiasts of all stripes collected the field data, consisting of more than 150,000 records of nests and their contents and an additional 900,000 distribution records on nonpasserines alone. In a way these volumes are a well deserved salute to the members of the orchestra.

The second section (39 pp.) of the introduction deals with the ornithological history of British Columbia, from the earliest explorer, William Anderson, James Cook's official nat-

uralist, to present day naturalists, researchers, conservationists, and managers, with photographs of many of them. The photographs clearly show the historical shift from the shotgun, so important in the early days, to binoculars.

The third and last section (97 pp.) of the introduction deals with a new way of dividing the British Columbian landscape into ever smaller recognizable vegetation units, starting with four ecodomains, seven ecodivisions, 10 ecoprovinces, 30 ecoregions and 68 ecosections. This section, written by a different set of four authors, forms an anomaly: a book within a book, and what is proposed here really needs a separate review that is well beyond the scope of this one. Table 5 struck me. It provides data on the total number of bird species present in each ecoprovince and the percentage of all birds in British Columbia that nest in each ecoprovince. The three ecoprovinces showing the greatest diversity of breeding species are precisely those that are most threatened by human population pressure and large scale habitat alteration. It is unfortunate that the species accounts that follow do not refer to the vegetation section which makes it stand out as an anomaly even more. It is not clear whether this lack of integration is an oversight, the result of time constraints, or a silent admission that if a landscape unit becomes too small, it is hard to find a species that fits it. Pages 143 and 144 document the huge changes in the environment that have taken place, mostly in the last 50–100 years. These two pages might be profitable reading for those provincial politicians who have learned only recently how to spell environment.

The rest of Volume 1 and all of Volume 2 is devoted to species accounts. The species accounts provide information on the following topics: *Range* of the species within and outside of B.C., *Status* within B.C., *Nonbreeding* distribution and migration patterns, *Breeding,* including breeding habitat, nest site, materials, nest dimensions, egg dates, clutch size, incubation period, period when young are present, and nestling period. A *Remarks* section deals with a wide range of important or interesting aspects not mentioned earlier as well as references to additional literature. The data base for the species accounts includes B.C. specimen data gathered from museums throughout North America, transcribed field notes from naturalists and ornithologists, and documented observations from naturalists and birders, the published and unpublished ornithological literature, the B.C. Nest Record Scheme and the B.C. Photo-Records File—a vast undertaking. Rigorous criteria were used to accept or reject evidence of breeding. The data in the breeding section are quantified in a useful and precise manner, and when information is lacking, this is stated to stimulate further investigation.

For each species, there is a large distribution map on which circles depict the presence or absence of a species within a grid of 15 minutes latitude and 30 minutes longitude. A simple, but very effective, color-coding system within the circles shows where and when each species breeds and/or occurs. The number of sightings or nests for each month is shown at the bottom of the map. Considering where most people in British Columbia live and the remoteness of much of the province, it comes as no surprise that large areas are without circles. There is lots of room here for further study and exploration. Each species map has a small illustration by Michael Hames. These illustrations add much to the appeal of the volumes, and they help to reinforce the impression that these books were put together with great care.

Both volumes provide information on casual, accidental, extirpated, and extinct species, as well as species of hypothetical occurrence lacking adequate documentation. Three appendices provide, respectively, the dates of arrival and departure and peak movement dates of regular spring and fall migrants for various locations in British Columbia, published Christmas Bird Counts from 1957–1984, and a list of the 4626 contributors to the project. A bibliography of ca 2000 entries completes each volume.

The last summary of the bird fauna of B.C. (J. A. Munro and I. Mct. Cowan, British

Columbia Provincial Museum Special Publication No. 2, Victoria, B.C.) appeared in 1947. That important work in British Columbian ornithological history stressed taxonomy, distribution, and migration. The current volumes provide much new material on distribution and migration and quantitative information on breeding biology heretofore not available for the province and they point out the gaps in our knowledge. The challenge is there.—N. A. M. VERBEEK.

THE ATLAS OF BREEDING BIRDS OF MICHIGAN. By Richard Brewer, Gail A. McPeek, and Raymond J. Adams, Jr. Michigan State Univ. Press, East Lansing, Michigan. 1991:xvii + 594 pp., numerous figures, maps, and tables. $39.95.—This is a handsome, scholarly book which summarizes a comprehensive survey of the breeding birds of Michigan, including 233 species (215 confirmed breeders, 12 probables and 6 possibles). Each species is treated separately in an individual description of occurrence and habitat. Each account has a black-and-white line drawing of the species and a full-page map of the breeding evidence for that bird. Individual species accounts were written by one or two authorities. As a result, several dozen people contributed to the accounts or the accompanying artwork.

Anyone glancing at this text will immediately be impressed by the attractive illustrations, readable text, and colorful and sturdy binding. Those familiar with state atlas work will be struck by the thorough coverage of the species of the state and the clarity of analysis and illustration of the breeding activities of these species. The authors should be congratulated for their achievements in incorporating and organizing the efforts of so many ornithologists.

Those who look more closely at this book will be rewarded by the rich amount of information available in it. Furthermore, typographical errors seem to be nearly absent and the style and format are consistent. The line drawings of each species also maintain remarkable consistency, given that several artists were involved. I was impressed with many of these since they often gave the impression that the artist understood the behavior of the bird being represented.

Those interested in Michigan birds absolutely must have a copy of this book. It is amazing that the price is so reasonable. Books of this quality and mass typically cost twice as much as the present volume. I encourage birders in the process of producing a state atlas to see this volume. It will rank as one of the finest of its kind.—C. R. BLEM.

UTAH BIRDS: HISTORICAL PERSPECTIVES AND BIBLIOGRAPHY. By William H. Behle. Utah Museum of Natural History, University of Utah, Salt Lake City, Utah 84112 USA. 1990: 355 pp., 139 illustrations. $25.00.—It is a great honor to offer this review of William H. Behle's latest book. This "grand man" of Utah Ornithology has produced yet another solid piece of ornithological information. This book, coupled with his earlier works, provides us with as complete a description as possible of Utah birds, bird habitats, ornithologists (both professional and amateur), collections, and suggestions for future research. In fact, this series of publications rivals that of any other single state.

This book takes a different slant than Behle's previous works. It focuses on people and events rather than on the distribution and systematics of birds. The approach is refreshing. I was captivated by the nature and tone of the book and amazed at the scholarship involved at piecing together such a complex mass of facts into a coherently wonderful story. Where did he find such detail?

Early chapters deal with three major time periods of ornithological development in the region; the pre-pioneer period (1776–1846), the colonization of the area by members of the Church of Jesus Christ of Latter-day Saints (Mormons) beginning in 1847, and the rise of

U.S. government sponsored natural history surveys during the years of 1849–1891. The now apocryphal story of the "crickets and the seagulls (sic)" is covered in detail and, I might add, put in its appropriate place.

Next, the emphasis shifts to independent collectors and university/museum-sponsored research in the Great Basin Region. In addition, these middle chapters cover the lives and contributions of all people who, even tangentially, contributed to the body of knowledge dealing with Utah birds. As the title says, this book is about Utah ornithology and contributions made by these folks to other locales largely are ignored. Nonetheless, this portion of the book is absolutely fascinating. Much of this section is made up of biographical sketches of each person who contributed to Utah ornithology. These biographies are organized in chapters or subchapters by occupation, avocation employing institution, or geographic region.

Two chapters of biological interest deal with avifaunal changes in recorded times (Chapter 16), the distinctive aspects of Utah birds, and the ornithologists who studied them (Chapter 17). Behle documents the wanton destruction, of almost anything that flew, that took place from the time the pioneers arrived until surprisingly recent times. Also documented as causing the current decline seen in many species of birds are the use of pesticides, habitat change caused by severe overgrazing and land development, and regional climatic changes (seasonal drought, etc.). Utah holds a unique place in the study of ornithology. The state possesses a wide range of very diverse ecosystems, ranging from boreal forests in the high Uintah Mountains and Deep Creek Mountains (the latter being an island completely surrounded by Great Basin Desert, to lower desert habitats such as those of the southwestern corner, Washington County or "Utah's Dixie," including the Beaver Dam Wash where, with the help of the Nature Conservancy, Brigham Young University has established a field station. The Great Salt Lake, by itself, is biologically unique but the avifauna that is attracted to it borders on amazing. Several bird species are found there that are found nowhere else in the region, e.g., White Pelican (*Pelecanus erythrorhynchos*). The Beaver Dam Wash features such southern desert species as the Wied's Crested Flycatcher (*Myiarchus tyrannulus*), Cassin's Kingbird (*Tyrannus vaciferans*), Abert's Towhee (*Pipilo aberti*), Summer Tanager (*Piranga rubra*) and Lucy's Warbler (*Vermivora luciae*), which are not commonly found in other parts of the state.

As with many locales, game birds take center stage when funds are allocated, and this is definitely true in Utah. However, research on raptors was elevated to a high level in the 1970s led by groups of professors at both Utah State Univ. and Brigham Young Univ., notably James Gessaman, Joseph Murphy, and Clayton White. This work produced numerous graduate degrees and resulted in many publications, all of which are summarized in this book.

Behle is overly modest in summarizing his own contributions to the study of birds in Utah, although most would agree that he has led the way for many of us who have studied in the state. I have noted, over the years, that he always has time to talk "birds" with anyone any time. He has been willing to provide specimens, field notes, reprints, etc. often at short notice and his enthusiasm for the study of birds in Utah is boundless. This is certainly reflected in his latest book.—ROBERT C. WHITMORE.

CHEYENNE BOTTOMS, WETLANDS IN JEOPARDY. By John L. Zimmerman. University Press of Kansas, Lawrence, Kansas. 1991:197 pp., 15 color photos and 40 line drawings. $19.95.—Wetlands continue to be in jeopardy. Cheyenne Bottoms has been under seige for some time. In this book, John Zimmerman provides us a popularized account of the lengthy and rather technical work released in 1987 by the Kansas Biological and Geological surveys

entitled "Cheyenne Bottoms. An Environmental Assessment." Each of the chapters summarizes a portion of the story that intertwines into an enlightening and enjoyable description of what is known about this wetland ecosystem, its geologic and political history, the societal and cultural impacts and developments that have led to its recent troubles, an assessment of the short term solutions and last, the impact of saving Cheyenne Bottoms. Saving Cheyenne Bottoms will not only solve the critical needs of the wildlife there but it will also provide us hope for solving other environmental problems of a long-term nature. This book is well written and edited. It contains numerous personal anecdotes that bring the book to life. The color photos add to the appeal of the book and the line drawings by Martin B. Capron add a special touch in helping the reader relate to the topic. It is easy to read and understand. The book is of primary interest to those that have an interest in nature but will educate the novice as well as the expert about this fascinating habitat. Too many of our environmental problems today tend to cause frustration or apathy because of a sense of hopelessness. This book could serve as a primer on environmental problems of today, but with a twist, for it uses an example that does have hope of being solved. Cheyenne Bottoms may be given a second chance, thanks to the efforts of highly motivated people such as Jan Garton, who wrote the book's foreword. I recommend this book to community, high school and college libraries and to readers who are looking for an educational and entertaining book.—ROGER L. BOYD.

A NATURALIST IN NEW GUINEA. By Bruce M. Beehler, illus. by John Anderton. Univ. of Texas Press, Austin, Texas. 1991:251 pp., 26 color photos, 30 line drawings, 7 maps. $26.95 cloth.—This book chronicles more than a decade of ornithological research by the author, mostly on the ecology of birds-of-paradise. In the introduction, Beehler describes the plan and purpose of the book, which he decided to write after watching his wife's reactions to the novelty of New Guinea on her first visit. The purpose of the book is to ". . . serve as a lay introduction to the island's natural history and a sort of catalog of the things naturalists do when out in the forest." This purpose has been admirably achieved. Although most of Beehler's research is on birds, he is clearly a broadly based naturalist/ecologist, and the book presents a balanced ecological perspective, with botany receiving a major focus, and with amphibians, insects, and mammals skillfully woven into the ecological fabric. The author's digressions into the cultural aspects of the Papuan natives add flavor and interest.

This is a very personal narrative describing, essentially chronologically, the author's many trips to wild places in New Guinea. He describes his research on birds-of-paradise in layman's terms, and, although much of his work has been published in journals, the often harsh conditions and unpredictable circumstances under which much of the research was conducted provides some new insight into the challenges faced by researchers working under primitive conditions in remote tropical forests.

The book is organized into an introduction and nine chapters, with maps that provide a useful visual context for the narrative. The first three chapters concern Beehler's first impressions as he learns about his new environment at and around the Wau Institute of Ecology. We read of the capital city, Port Moresby, with the betel nut (mildly narcotic) chewing natives, his initial experiences with setting up camps in the rainforest, muddy conditions, and cutting trails through "a wall of raspberry vines and bamboo," which was ". . . like trying to cut through barbed wire with a bread knife." The descriptive text is interspersed with digressions into the possible evolution of mimicry of the Helmeted Friarbird (*Philemon buceroides*) by the Brown Oriole (*Oriolus szalayi*) and a general discussion of bowerbirds and bowers. A trip to the Huon Peninsula involved collecting birds for the National Museum of Natural History of the Smithsonian Institution, and Beehler offers a rather eloquent

defense of bird-collecting for museums. A substantial account of New Guinea during World War II adds an interesting historical and cultural perspective.

Succeeding chapters deal with expeditions to Goodenough Island, Beehler's doctoral dissertation work near Wau, the highlands of western Papua, Irian Jaya (western New Guinea), the lowland forests, and the tropical mountain tundra. On Goodenough Island the author searched unsuccessfully for a reported "black bird," which might have been an undescribed bird-of-paradise, but concludes that getting out into the field for ". . . sights of little-known birds in rarely visited forests" was worth the effort and hardship.

His dissertation work focused on the evolution of bird-of-paradise reproductive behavior through an interspecific comparison of a monogamous manucode and three polygamous species. There is much of interest for the ornithologist as well as the target lay audience. Of particular note are the complex bird and food-plant relationships. For example, the manucode specializes in figs of low nutritional value, and Beehler concludes, "It seems safe to say that the manucodes are monogamous because both parents are required at the nest to provision the offspring." His highland work concerned bird-of-paradise species not found in his dissertation study sites. Tales of astrapias and sicklebills are interspersed with descriptions of the highland natives and their fantastic ceremonial dress for *sing sing* tribal gatherings, the purchase of wives, and the still prevalent tribal warfare. Lowland expeditions in the ". . . claustrophobic, breathless humidity of the jungle interior," one of which was on his honeymoon, featured contrasting tales of leeches, biting insects, tropical ulcers, and torrential rains on one hand, and of Palm Cockatoos (*Probosciger aterrimus*), crowned pigeons, and cassowarys on the other. Scientific aspects focused on the little-known Pale-billed Sicklebill (*Epimachus bruijnii*).

The final chapter tells of the long and difficult trek to the alpine tundra where the author hoped to unravel some of the mysteries surrounding the Macgregor's Bird-of-Paradise (*Macgregoria pulchra*). He reports some of his previously unpublished results concerning the ephemeral nature of this species's major food resource, *Dacrycarpus* fruit, and the resulting disappearance of the birds from his study site. Some tropical environments, apparently, are neither predictable nor benign. It is perhaps in his descriptions of camping for the first night in these surroundings, huddled beside a campfire watching the stars, that best exemplifies his passion for the wilds of New Guinea, "My memory of that first night at Lake Omha burns through the mist of passing years. It is for memories of nights like that, in places like that, that I keep returning to New Guinea."

Beehler concludes with a discussion of the complexities of New Guinea forest ecology and the corresponding difficulties that conservationists face in long-term planning. He suggests that the international community must foster educational opportunities for native New Guinea naturalists and concludes, "It is now time to share the excitement and responsibilities of studying these tropical forests with those who will ultimately have to decide their fate."

I found little to fault in this book. It is attractive and apparently error-free. The line drawings are excellent and nicely compliment the color photographs by the author. The only thing that bothered me was the type face which reduced punctuation marks to near invisibility. I was also surprised by the inclusion in the text of scientific names for plants and all animals except for birds, a sacrifice to readability I presume. The scientific names of birds are, however, included in the index so they can be looked up.

This book paints a vivid picture of wild conditions on a major ornithological frontier. The science is presented clearly and with much insight. It should prove very informative for the lay audience for which it is intended, and there are lots of nuggets for the ornithologist to mine as well. I recommend this book to anyone who plans to travel or work in New Guinea, or enjoys informative vicarious adventures in natural history.—WILLIAM E. DAVIS, JR.

THE FRAGILE SOUTH PACIFIC: AN ECOLOGICAL ODYSSEY. By Andrew Mitchell. Univ. of Texas Press, Austin, Texas. 1991:280 pp., 39 color photos, 7 maps. $24.95 cloth.—This book describes the personal odyssey of the author who followed from west to east through the major islands of the South Pacific the probable historical dispersal path of plants and animals, including man. At each stepping-stone along the way, he asks the questions: "How did plants and animals reach this archipelago? How has evolution shaped the present day flora and fauna? What happened when man arrived? What is the state of the environment today?"

The narrative is a broadly based natural history and cultural exploration which is well written, very readable, and spiced with imagery and descriptive metaphors—describing volcanic islands as ". . . remnants of ancient high volcanoes which poke their heads above the blue surface like fluted emeralds," ". . . Simbo lay on the horizon like a crouching turtle, a grey outline against the stormy Solomon sky," or ". . . the sky darkens to a bruise." The book is a charming description of modern travel and ecological adventure. The author presents the geological setting with a discussion of plate tectonics, coral reefs, and deep water trenches. The seven maps provide a helpful visual framework for the text.

The book is organized into 10 chapters which are mostly narratives of visits by the author to island groups including the Carolinas, Solomons, Fiji, Tonga, Samoa, Hawaiian, Society, and ending with Easter Island, interwoven with commentary on the geology, natural history, and cultural history of man. The chronicle of human adventure includes the discovery of each island group by western man, and traces the exploitation and effects, mostly negative, which followed. There are stories of head hunters, cannibals, the discoveries and violent death of Captain Cook, discussion of the three major groups of peoples who are indigenous to the islands (Micronesians, Melanesians, and Polynesians), and the origin and evolution of the various languages. There is an ample smattering of archeology and anthropology, early theories of lost continents, and arguments over the ancestry of the occupants of Easter Island.

The ecological discussions are broadly based taxonomically, ranging from botany to coral reefs, iguanas, skinks, fruit bats, and, of course, birds. Birds, however, are not the major focus of this work. Seven of the 39 color photographs are bird related, and this is a good index of the ornithological content of the book. The treatment of ornithological matters is somewhat uneven. For example, the author describes megapode farming but does not give the common or latin name of the megapode species, but does provide both names in his discussion of pygmy-parrots. He provides general natural history commentary on many of the more exotic birds such as hornbills and echolocating swiftlets. He describes the adaptive radiation of the Hawaiian honeycreepers, the demise of Hawaii's endemic bird species, the influence of avian malaria, the conservation story of the Nene or Hawaiian Goose (*Nesochen sandvicensis*). He talks of moas, the feather trade, and a host of conservation issues involving birds. In a book of such broad ecological scope the treatment of birds is necessarily superficial, and statements such as ". . . the lek is not an open piece of grassland, as for the cock-of-the-rock . . . ," or "Petrels tend only to fly at night . . ." do not inspire great confidence in some of the ornithological pronouncements. The author also does not adequately discuss the recent avian paleontologic work which suggests that the effect of man on island avian communities is even greater than had been previously recognized.

The author presents a conservation message, often in a somewhat polemical tone, but the large number of endemic species, burgeoning human population, and difficult political situations make this tone appropriate. He presents case histories, such as the Levers Pacific Timbers deal in the Solomon Islands, in an even handed manner and points out the complexities involved in conservation issues. He discusses the ecological disasters resulting from nuclear testing, the geopolitics of U.S. military strategy and island bases, and the tenacious

colonialism of the French. One cannot escape the realization that the islands of the South Pacific need more attention from the conservation organizations of the world. Excluding Hawaii, there are only 50 islands which have protected areas, and the author's guide to national parks and protected areas is only six pages long.

The bibliography contains 71 references which include a few journal articles and reports, but unfortunately there is no referencing in the text, a sacrifice to readability no doubt, so that the value of the bibliography is severely diminished. Although the book has only limited ornithological value, I would recommend it to anyone who plans to travel to the South Pacific. Its broad cultural and ecological scope provides a wealth of information which should be of interest to any visitor to the area.—WILLIAM E. DAVIS, JR.

LIFE OF THE PIGEON. By Alexander F. Skutch, illus. by Dana Gardner. Cornell Univ. Press, Ithaca, New York. 1991:130 pp., 24 color plates with caption figs., 29 text figures, 4 tables. $49.95.—Alexander Skutch has few peers as an observer of the life of birds. With more than 20 books to his credit, he also has few peers as a prolific communicator of his observations. In "Life of the Pigeon," as in his previous books, "Life of the Tanager," and "Life of the Woodpecker," Skutch teams up with artist Dana Gardner to produce a book that is both readable and educational.

Skutch combines his personal knowledge of pigeons that he has watched near his Costa Rican home with a masterful summary of the published literature on columbids of the world. After a brief introduction to the family Columbidae with its nearly 300 species, Skutch provides a chapter-by-chapter accounting of the main elements of their behavioral ecology. Consistent with Skutch's interests, reproductive aspects—from courtship to the rate of reproduction—take up the bulk of the book. The final brief chapters discuss pigeon-human relations, homing pigeons, navigation, and a fascinating description of the various races of pigeons kept by Charles Darwin. A bibliography and an index follow the text.

Skutch's writing style is unusual, to say the least. Each chapter is a nonstop narrative, unimpeded by headings or breaks of any sort. Within each chapter, there is little discernable pattern to the arrangement of topics and facts about the various species that illustrate those topics. Anecdotes are thrown in along with data, mixing trivia with important information. Although acknowledgements are given to authors of major studies, no distinction is made between Skutch's personal observations and those of other naturalists. For example, in a discussion of foraging behavior, Skutch notes that Galapagos Doves (*Zenaida galapagoensis*) dig with their bills. Then it is stated, "A Galapagos Dove continued for many minutes to dig beneath an opuntia bush . . ." (p. 13). It is unclear whether Skutch had seen this himself or is reporting on something he read. It is also unclear why this observation even merits repeating.

Despite these difficulties in presenting scientific information in a popular style, the book is very readable. The text flows well. At the end of each chapter, the reader will have a feel for how doves and pigeons eat and drink, nest, navigate or whatever the topic may be.

I found no errors in the text, although poorly substantiated information such as the assertion of life-long pairbonds among permanently resident Mourning Doves (*Zenaida macroura*) is presented as fact (p. 22). Also, the illustration of the Tooth-billed Pigeon (*Didunculus strigirostris*) perpetuates the fallacy that this species is a ground-dweller. Skutch's well-known species-selectionist views and slight anthropomorphism surface at times, but can easily be ignored without detracting from the information content.

The two dozen plates by Dana Gardner dispel any notion that pigeons are drab, dull birds. A sampling of the showier pigeons around the world emphasizes the diversity of plumages and sizes within the basic body format. Gardner's images are vivid, but many of the shapes

look like cardboard cut-outs against a bare background. The beautiful painting of a pair of Victoria Crowned Pigeons (*Goura victoria*) in their natural habitat, which graces the book jacket, is an exception but still does not illustrate the behavior of the birds.

The doves and pigeons of the world are a fascinating lot. Alexander Skutch, aided by Dana Gardner, captures the essence of their life and presents it in an easily digestible form. Although scientists may be exasperated by some of the elements of the presentation, any student of birds will be enlightened and entertained by reading "Life of the Pigeon."—DAVID E. BLOCKSTEIN.

HUNTERS OF THE AFRICAN SKY. Text by Peter Steyn, color plates by Graeme Arnott. Struik Winchester (P.O. Box 3755, Cape Town 8000 South Africa). 1990:96 pp., frontispiece (soaring Bateleurs!), 34 numbered, 9 unnumbered color plates (10 × 14½) by Graeme Arnott. (Dust jacket with Bateleurs and Bearded Vulture.) ISBN Q 947439 17 2. Standard edition, cloth, R 135. $48.00—This handsome volume is a raptorphile's delight. Featuring enlarged versions of the original 24 plates illustrating the "Birds of Prey of Southern Africa" by Steyn (1982), it includes another 10 plates of 'illustration' and also a number of 'Artist's plates' showing anatomical features and feather detail necessary for completion of definitive plates.

The larger format does for Arnott's paintings much of what the publication of the plates for Robert's "Birds of South Africa" some years back did for the paintings of Norman Lighton.

In the present 1990 volume, American viewers not only have an arresting fresh view of Africa's unmatched raptor assemblage but also an opportunity to appraise and admire the artistry of Graeme Arnott, a relative newcomer in the front rank of wildlife artists. A native of Zimbabwe, he has worked closely with Peter Steyn for many years and recently contributed a number of plates to Valerie Gargett's "The Black Eagle" (1990).

I find the plates so fascinating that I wish I had each of them separately framed . . . even the repeated figures of the 'overhead' views appear freshly anew each time I look at them. . . . plate 15 with 18 figures of eight species of vultures and two of the Secretary Bird, each vividly distinct, painted against a pale blue sky; plate 18 with 16 figures of 10 species of some perhaps lesser known eagles; plate 20 with 17 figures of nine species: Crowned Eagle (*Stephanoaetus coronatus*), Martial Eagle (*Polemaetus bellicosus*), Bateleur (*Terathopius ecaudatus*), Verreaux's Eagle (*Aquila verreauxii*), hawk-eagles (Sp.?), and Long-crested Eagle (*Lophaetus occipitalis*); . . . these plates simply have to be seen as I can't find words for them.

The text by Peter Steyn is well-suited to the plates and contains much up-to-the-present information, but the real impact of this splendid volume is in the aesthetic . . . even the 'dust-jacket'!—WALTER R. SPOFFORD.

COMPUTER INTENSIVE METHODS FOR TESTING HYPOTHESES. By Eric W. Noreen. John Wiley, New York. 1989. $39.95.—This book will be helpful and thought-provoking for anyone who analyzes data. The three chapters that make up the body of the text provide an accessible introduction to three powerful statistical tools: randomization, Monte Carlo simulations, and bootstrapping. Noreen's last chapter summarizes all three methods, compares them to each other and to their corresponding parametric equivalents, and suggests when each might best be used. These are easily used alternatives to traditional parametric tests and are appropriate whenever an experimenter (or critical reviewer) isn't certain that parametric assumptions are appropriate. Although these methods are not new to ornithology, e.g., Schoener (pp. 254–281 in Strong et al. [eds.]. Ecological communities: conceptual issues and

the evidence, Princeton, 1984) uses randomization tests in examining *Accipiter* communities and Lanyon (Auk 104:144–146, 1987) describes the use of bootstrapped Monte Carlo sampling in ornithological studies, Noreen's discussion of these tests will make them more accessible to many ornithologists. Noreen takes an economic perspective in his examples, but they are readily transferable to many ornithological problems. This review briefly describes these methods, their advantages over traditional parametric tests, and some of their limitations.

Computer-intensive methods are statistical methods which use substantially more computer resources than traditional parametric tests (hence their name), but which can be used easily on personal computers. Parametric tests were developed when it was prohibitively expensive to conduct the precomputer-era equivalent of computer-intensive statistics. Parametric assumptions (e.g., that errors have mathematically "nice" distributions) permit researchers to calculate the *ex ante* probability of certain associations relatively simply. However, the tradeoff for this simplicity is that the underlying assumptions are also implicitly being tested with every hypothesis test. For example, a least squares univariate regression is a *joint* test of the underlying parametric assumptions and the hypothesis that the independent variable's coefficient is zero; if the null hypothesis is rejected, it means either that the underlying assumptions are violated and/or that the independent variable's coefficient is nonzero. Consequently, a "statistically significant" rejection of a null hypothesis is often accompanied by a nagging uncertainty about whether the results reflect a nonrandom association or merely inappropriate parametric assumptions. Computer-intensive statistics let researchers avoid the standard parametric assumptions often without having to give up the power of parametric tests.

Randomization (Chapter 2) is used to test hypotheses about relationships between variables, and can be a substitute for a *t*-test of differences between means, *t*-tests on coefficients in parametric regression, analysis of variance, etc. A typical null hypothesis for a randomization test is that one dependent variable is independent of other variables. For example, a positive correlation is observed to exist between two variables in a sample; the null hypothesis is that this observed correlation is due to chance. Randomization tests are conducted by "shuffling" (on a computer) the observed dependent variable many times with respect to the observed independent variable. The correlation is measured in each random sample. The null hypothesis is rejected only if a significantly small percentage (e.g., $<5\%$) of the random samples have correlations greater than the absolute value of the originally observed correlation (for a two-tailed test). Because randomization tests offer the power of many parametric tests without the parametric assumptions, many researchers will find them to be useful additions to their repertoire of statistical tests.

Monte Carlo sampling (Chapter 3) tests hypotheses concerning the population from which a random sample is drawn. A typical null hypothesis is that the data are a random sample from a population with a parameter which has a specified value (e.g., mean = 50 cm). Monte Carlo simulations are done by (1) drawing random samples from the theoretically specified (i.e., null hypothesis) population, (2) computing the test statistic (e.g., mean) for each random sample, (3) comparing the simulated test-statistics to the test statistic from the original data, and (4) accepting the null hypothesis if larger-than-original values of the test statistic occur in a substantial proportion (e.g., $>5\%$) of the total samples (and rejecting otherwise). Monte Carlo sampling with bootstrap resampling (see below) is especially appropriate for estimating the dispersion of statistics whose distribution is unknown, e.g., factor loadings from principal components analysis (Lanyon 1987).

Bootstrap resampling (Chapter 4) is one method for creating the null-hypothesis population from which samples are drawn in Monte Carlo simulations. (Some authors also use "boot-

strap" or "bootstrap method" to refer to Monte Carlo sampling with bootstrap resampling.) Bootstrap resampling is random sampling with replacement from the sample population.

Computer-intensive methods have limitations as well as great promise. One limitation is that these methods presently require a modest amount of programming; however, Noreen includes many examples (in Basic, Fortran, and Pascal) of programs for each method. Another important limitation is, because these methods are based on random sampling from a set of observations, hypothesis tests with computer-intensive methods are actually joint tests of the random sampling and the null hypothesis. Yet, on a computer, the "random" sample is created by a known algorithm that will always produce a predictable sequence of values (from a given starting point). One is forced to use "pseudorandom" samples (i.e., samples that are hard to distinguish from random samples if you don't know the algorithm) and, consequently, one must handle the randomizing part of computer-intensive statistics carefully. Poor "random-number" generating programs are not uncommon, and users should be cautious about using untested programs to create their pseudorandom sampling. This important point should be given greater prominence in future editions of Noreen's text. As Noreen mentions, Press et al.'s (1986, Cambridge) "Numerical Recipes" is an excellent source of simple, yet powerful, programs for creating pseudorandom numbers.—CHRISTOPHER H. STINSON.

ALSO RECEIVED

THE CONSERVATION OF LOWLAND DRY GRASSLAND BIRDS IN EUROPE. Proceedings of an international seminar held at the University of Reading 20–22 March 1991. Paul D. Goriup, Leo A. Batten, and John A. Norton (eds.). Joint Nature Conservation Committee, Peterborough, England. 1991:136 pp., many black-and-white photos and graphs. No price given.

BIRDS AND PASTORAL AGRICULTURE IN EUROPE. Proceedings of the Second European Forum on Birds and Pastoralism. Port Erin, Isle of Man, 26–30 Oct. 1990. D. J. Curtis, E. M. Bagna, and M. A. Curtis (eds.). Scottish Chough Study Group, Peterborough, England. 1991:137 pp., many black-and-white photos and figures. £12.50.

WADERS BREEDING ON WET GRASSLANDS. Wader Study Group Bulletin, No. 61 Supplement. Hermann Hötker, (ed.). Joint Nature Conservation Committee, Peterborough, England. 1991:107 pp., many black-and-white photos and figures. No price given.

These three symposia volumes are available from the Publications Branch, Joint Nature Conservation Committee, Monkstone House, City Road, Peterborough, PE1 1JY, England.

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