

## ORNITHOLOGICAL LITERATURE

A COMPARATIVE LIFE-HISTORY STUDY OF FOUR SPECIES OF WOODPECKERS. By Louise de Kiriline Lawrence. Ornithological Monographs No. 5, American Ornithologists' Union, 1967: 156 pp., 33 graphs and line drawings, 15 tables. \$3.75 (\$3.00 to members of the AOU).

To study life histories of woodpeckers requires special dedication. Because each pair needs a large area for its support, nests tend to be widely scattered and not easy to find in numbers. The nest holes are often high in dying or dead trees, difficult or dangerous to climb. Even if they can be reached, special procedures are necessary to reveal the contents of the deep, poorly lighted cavities. Despite these obstacles, the woodpeckers, highly specialized anatomically yet remarkably versatile in foraging habits, exert a peculiar fascination on those who become intimately acquainted with them. Among the dedicated students of woodpeckers are Thomas R. Howell, Lawrence Kilham, William E. Ritter, Althea R. Sherman, and James T. Tanner in America; Dieter Blume and Heinz Sielmann in Europe. To this list must now be added the authoress of the present monograph.

This work presents detailed accounts of the general behavior and breeding of four species: Yellow-bellied Sapsucker (*Sphyrapicus varius*), Yellow-shafted Flicker (*Colaptes auratus*), Hairy Woodpecker (*Dendrocopos villosus*), and Downy Woodpecker (*D. pubescens*). All four were studied in the mature, second-growth, mixed forest surrounding Mrs. Lawrence's home at Pimisi Bay in central Ontario, Canada, where in a single day 40 to 50 individuals might visit the feeding station situated amid their territories. Intensive observations of these woodpeckers covered seven of the 25 years during which they were banded and their activities recorded. The banded woodpeckers included 13 sapsuckers, 77 Hairies, and 60 Downies. Some 800 hours of concentrated observation, sometimes continued from dawn to dusk, went into this study.

The Hairy Woodpeckers were resident in the study area throughout the year. Although at first all the Downies were migratory, after the feeding station had been in operation for 14 years some stayed through the winter. The sapsuckers and flickers always migrated. Whether stationary or migratory, all the pairs under observation remained mated for life. This matrimonial fidelity seemed to result not so much from personal attachment of the partners as from faithfulness to the territory; the pair-bond was renewed at the outset of each breeding season. A distinction is made between the "territory" and the "territorial range." The former, a space from about 40 to 100 feet in diameter encircling the potential or actual nest tree, is defended not only against other woodpeckers of the same species but against all intruders which might interfere with the privacy of the resident pair or the rearing of their family. The "range," which includes the "territory," is the much larger area over which the pair forage. From five to eight acres in extent in the sapsucker and the two species of *Dendrocopos*, it has flexible boundaries that are not consistently defended, and it is shared with woodpeckers of other species. Contrary to published statements, Mrs. Lawrence found that the paired male and female of the Hairy Woodpecker normally occupied the same territory throughout the year.

Although the female Downy usually chooses the nest site, in the other three species the male commonly does so; and in all four species he takes the major share in excavation, incubating, feeding the young, and cleaning the nest. He alone stays with the eggs and nestlings during the night, as is usual in the woodpecker family with the

exception of a few tropical American species in which the mated pair sleep in the same hole at all times. The nestlings' meals are much more widely spaced in the flicker, which feeds by regurgitation, than in the other three species, which feed directly from the bill. Incubation periods of these three species ranged from 11 to 13 days, which agrees closely with other determinations for the smaller woodpeckers in both the temperate zone and the tropics. Nestling periods were 20 to 22 days in the Downy and from 25 to 30 days in the three larger species. Parents continued to give some food to the fledglings for one to two weeks after nest-leaving in the sapsucker, slightly longer in the Hairy, and up to three weeks in the Downy. This is much shorter than the period of parental care in certain tropical woodpeckers, which may continue for two months after nest-leaving, as in the small Golden-naped Woodpecker (*Tripsurus chrysauchen*) of southern Central America.

These are only a few of the highlights in a report in which a wealth of detailed information and thoughtful interpretation is presented in a clear, forceful style pleasant to read.—ALEXANDER F. SKUTCH.

MECHANISMS OF ANIMAL BEHAVIOR. By Peter Marler and William J. Hamilton III. John Wiley and Sons, Inc., New York, 1966: 6½ × 9¼ in., xi + 771 pp., many figs. \$14.95.

The last decade has seen a tremendous growth of interest in the field of animal behavior. One direct consequence of this has been the addition of courses in behavior to the zoology curricula of numerous colleges and universities. The development of such courses, however, has been hampered by a lack of suitable texts to supplement lecture material. With the appearance of Marler and Hamilton's book, "Mechanisms of Animal Behavior," this deficiency has been at least partially overcome.

The book is an outgrowth of lectures given in Peter Marler's animal behavior course at the University of California, Berkeley. It covers an extremely broad spectrum of topics which, for convenience, can be grouped into four major sections. The first stresses the interplay of exogenous and endogenous factors in controlling various behaviors. This theme, which recurs throughout the book, is well illustrated in chapters discussing the control of locomotor activities, feeding and drinking behavior, circadian rhythms, and reproductive cycles.

This is followed by a group of chapters concerned with external stimuli and stimulus filtering. The basic principles of ethology laid forth by Lorenz in "Der Kumpan in der Umwelt des Vogels" (1935. *J. Ornithol.* 83:137-213; 289-413) and Tinbergen in "The Study of Instinct" (1951) are presented here along with numerous examples of the use of chemical, visual, and auditory cues in inter- and intraspecific communication. Throughout this discussion, appropriate emphasis is placed upon the adaptive function or selective advantage of different behavior patterns. In addition, considerable space is devoted to problems of sensory physiology and psychological studies of visual and auditory preception. This integrated approach allows valuable correlations to be made between the capabilities and limitations of various sensory receptors on the one hand, and the types of stimuli effective in different communication systems on the other.

The next four chapters discuss experimental studies of animal orientation and navigation. This section, contributed by W. J. Hamilton III, provides a fairly complete, up-to-date review of such topics as gravity detection in invertebrates, echolocation by bats, and celestial, topographic, and possible magnetic orientation by birds.

The ontogeny of behavior is the subject of the final section of the book. Marler goes into considerable detail in these chapters describing the behavior of embryos as well as the role of early experience upon the development of both sensory mechanisms and motor patterns. And interwoven throughout this discussion is the now-familiar theme of the integration of intrinsic and extrinsic factors in controlling animal behavior.

As indicated by this quick résumé, the subject material covered in *Mechanisms of Animal Behavior* is extremely broad. There are, in this author's opinion, only two serious omissions (both of which are acknowledged by Marler and Hamilton). First, there is little discussion of the evolution of behavior and the use of comparative behavioral data in studies of phylogeny and systematics. And second, certain important aspects of behavioral ecology receive no mention. Specifically, I would have expected coverage of J. H. Crook's pioneering studies on the adaptability of avian social systems to different habitat-types, as well as some discussion of Wynne-Edwards' controversial hypotheses of the possible functioning of social behavior in population regulation. But these omissions notwithstanding, this book is without doubt the most comprehensive behavior text compiled to date.

Within each chapter, the authors have selected numerous important studies which they discuss in considerable detail, and it is through elaboration on these examples that an understanding of general behavioral concepts emerges. In many instances the experimental techniques employed in these studies are presented, and the original graphs and tables of data are reproduced frequently in their entirety. No attempts are made to impose specific viewpoints upon the reader; on controversial or unsolved topics, data supporting various opinions are presented with a minimum of editorial comment. As a result, the student is constantly encouraged to evaluate critically both the experimental design and the results of various studies, and to formulate his own opinions concerning the optimal course for future work in areas of his particular interest.

This method of presentation, which deviates radically from that found in many texts, is excellent for advanced students. It conveys a feeling for the experimental approach to zoological problems as well as providing the necessary broad overview of work which has been, and currently is being, performed in the field of animal behavior. This latter function is performed so well, in fact, that *Mechanisms of Animal Behavior* is an extremely valuable reference source. The extensive chapter bibliographies alone make this book worth its seemingly exorbitant price.

But the listing of repetitive examples also makes reading somewhat dull and encyclopedic for students whose primary interest does not lie in the area of animal behavior. Since general discussions are infrequent, it is easy to become overburdened with trivial facts and to lose sight of the concepts under consideration. In addition, the text assumes a basic background knowledge of neurophysiology and evolutionary theory. Latin names are often used without adequate "translation" into the vernacular, and ethological and psychological jargon is occasionally employed without sufficient definitions or a glossary being provided.

Although these points do not represent serious detractors, they do cause a decrease in both interest and comprehension among untrained readers. When students in Cornell's course in Neurobiology and Animal Behavior were asked to comment upon this book (which had been adopted as the basic text), the predominant criticism was the overemphasis placed upon specific facts and examples and the de-emphasis upon general behavioral concepts. (One student referred to the book as "Marler's Believe It or Not.")

In large part, however, this criticism merely reflects the recent emergence of

animal behavior as an experimental science. We are only now beginning to amass sufficient comparative data to allow formulation of hypotheses concerning general trends in the evolution of behavior. Studies providing experimental confirmation of the adaptive significance of particular behavior patterns are still rare. And the gap between neurophysiological and ethological analyses of behavior remains discouragingly wide.

In summary, *Mechanisms of Animal Behavior* provides comprehensive coverage of a wide spectrum of topics, making it an extremely useful reference source. For advanced students interested in behavior, it can also serve as an excellent, stimulating text. But for introductory behavior courses aimed at the sophomore or junior levels, the ideal textbook has yet to be written.—STEPHEN T. EMLEN.

**THE SPECIES OF BIRDS OF SOUTH AMERICA AND THEIR DISTRIBUTION.** By Rudolphe Meyer de Schauensee. The Academy of Natural Sciences of Philadelphia. Distributed by Livingston Publishing Company, Narberth, Pennsylvania, 1966: 6½ × 9¼ in., xvii + 577 pp. \$10.00.

The better one is acquainted with the vast avifauna of South America, the more appreciative is he of the tremendous task accomplished by the author and his collaborator in bringing forth this much-needed publication.

Here is a tool needed not only by the museum ornithologist working with neotropical birds, but equally of use to the zoological park curator, the aviculturist, the live bird importer, and the ever-increasing number of persons who pursue the avocation of neotropical bird study.

The museum ornithologist is continually faced with the query from the public as to the availability of a handbook covering all of the birds of South America, the inquirers not realizing that such a "handbook" would have to embrace a formidable array of more than 2,900 species.

Rudolphe Meyer de Schauensee, with the able assistance of Eugene Eisenmann, has come closest to giving us that kind of book. The author lists a total of 22 orders, 95 families, 917 genera, and 2,906 species. The treatment of species, although restricted primarily to the continent proper, does include those species of the peripheral islands with certain exceptions.

By limiting the treatment to the species level and indicating polymorphic species by means of an asterisk, the author presents a believable, but nonetheless impressive, picture of this immense avifauna.

If the reviewer must find fault with this meticulous and exhaustive work, the target would be in the area of common names. It is anticipated that any ten ornithologists, selected at random, will have ten separate views of this controversial subject. The author wisely turned the matter of common names over to the person most experienced in that field. Eugene Eisenmann cut his teeth on the subject of common names of neotropical birds when he published his 1955 work entitled, "The Species of Middle American Birds." Eisenmann handles the common name problem in this present volume most ably and although most of the errors have been picked up in the four published pages of "corrigenda," a few flaws still remain unreported. With "nit picking" not intended, the following minutiae are noted. Considerable emphasis is placed on the use or non-use of the hyphen, yet on page 142 one finds both Screech-Owl and Screech Owl. On page 157 the reader has the choice of Lancebill and Lance-bill. Crane-Hawk (p. 60) and Forest-Falcon (p. 61) are hyphenated, but Bat Falcon (p. 64) is not. Quail-Dove (p. 119) seems to require the hyphen, but Pheasant Cuckoo (p. 139) for

reasons obscure to this reviewer, does not. Then on page 157 and obviously a typographer's error, one finds both *Metaltail* and *Metaltail*. In some instances distributional directions (p. 216) say "westward" when the author obviously meant "eastward." Somewhere between the printing of the title page and the bindery the title is changed from ". . . *And Their Distribution*" to ". . . *With Their Distribution*." These small errors and inconsistencies in no way detract from the overall excellence of this book, and anyone working with neotropical birds cannot afford to be without it.—KENNETH E. STAGER.

THE BIRDS OF COCOS ISLAND. By Paul Slud. Bulletin of the American Museum of Natural History, Volume 134, pages 261-296, 1967:  $7\frac{3}{4} \times 10\frac{5}{8}$  in., 4 pls. (photos), 1 map. \$2.00.

Slud's avifaunal survey of Cocos Island has a two-fold function: to provide a checklist of the birds found on and near the island, and to present an annotated list based largely on his sojourn there for two months in 1963. Cocos Island is part of the volcanic ridge that extends from Costa Rica to the Galápagos Islands. The nearest land mass to this small island (roughly  $2 \times 5$  miles) is about 325 miles to the northeast. In three introductory pages Slud discusses the physiography and climate of Cocos, mentions the previous ornithological work done there, and lists the species of birds that have been recorded from Cocos and surrounding waters. Its sheer-cliffed coast line and dense vegetation are vignettted in four excellent photographs. The remainder of the paper discusses each species.

Of the 77 birds recorded for Cocos and environs, Slud recorded no less than 30 for the first time. Eighteen others were seen by others, but not by Slud. He mentions an additional seven species of doubtful occurrence. One of these, a booby, he saw but could not identify. Six were included by others in writings on their visits to the island or were obviously mislabeled specimens.

Slud's account of the Cocos Island Flycatcher (*Nesotriccus ridgwayi*) show how Rica. As in the larger monograph, his style flows easily. His treatment of the avifauna contributes to the paper's readability, for he prefers an ecological approach to a taxonomic one.

Land birds on islands far from the mainland draw the most attention because of their unexpected occurrence. Until Slud's visit, the endemic race of the Yellow Warbler (*Dendroica petechia*) was the only parulid reported from the island. Slud added nine warblers to the Cocos Island avifauna. Of these the most unexpected included three that inhabit eastern North America: the Prothonotary Warbler (*Protonotaria citrea*), the Prairie Warbler (*Dendroica discolor*), and the Palm Warbler (*D. palmarum*). Slud collected specimens of the latter two species. Other passerines recorded for the first time include the Great Crested Flycatcher (*Myiarchus crinitus*), Bank Swallow (*Riparia riparia*), Wood Thrush (*Hylocichla mustelina*), Red-eyed Vireo (*Vireo olivaceus*), Baltimore Oriole (*Icterus galbula*), and Savannah Sparrow (*Passerculus sandwichensis*). Only twelve species reportedly nest on Cocos, of which four are land birds: three endemic species and a distinct race of the Yellow Warbler. Slud's notes provide an excellent insight into the ecology and behavior of these birds. The Cocos Island Cuckoo (*Coccyzus ferrugineus*) is the least common of the indigenous land birds.

Slud's account of the Cocos Island Flycatcher (*Nesotriccus ridgwayi*) show how natural selection may promote the adaptation of a species to a variety of habitats and niches if it can evolve in an isolated environment—one relatively free of competition and with a number of unfilled niches. Slud encountered the flycatcher everywhere, "from

the tide-mark scrub to the mangrove-like tangles behind the beach, up the forested slopes, and along the wooded ridges and ravines. It frequented all vegetational levels, from shrub height to the treetops, and temporarily descended almost to the ground."

Of the four nesting land birds the Cocos Island Finch (*Pinaroloxias inornata*) is the most abundant. Slud provides an excellent account of this bird's versatile feeding behavior. The bird clings, hangs, hops, and creeps in its search for food, using its bill to probe flowers for nectar, to pick or peel off bark for insects, to pry up or turn over fallen leaves, fruit, and sticks, to lever up stones, to pick at fruits and blossoms, to obtain seeds by passing the bill along spikes of grass.

For several reasons future surveys will undoubtedly add to the Cocos Island avifauna: (1) The island visits by ornithologists have been relatively few and usually of short duration; (2) the physiography—steep cliffs along the shore, rugged inland terrain, and dense vegetation—handicap a thorough island-wide search for birds; (3) finally, many of the species found there are so few in number that their occurrence must be accidental. Slud's account includes many species recorded only from observations of a single bird (24 species) or two or three individuals (14 species).

Birds of Cocos Island is an excellent survey of that island's avifauna gleaned from the literature, from the author's visit to the island, and from correspondence with recent visitors to Cocos. A useful contribution to the study of island avifaunas.—D. A. LANCASTER.

ECOLOGY AND FIELD BIOLOGY. By Robert L. Smith. Harper & Row, New York, 1966: 7½ × 10¼ in., xiv + 686 pp., many figs. and photos. \$12.75.

This book is written as a college text in ecology or field biology at the sophomore or junior level. In a field where half-a-dozen good texts are already in print, Smith's work is noteworthy in that it draws heavily on the literature of wildlife and fisheries biology, including much material from state fish and game agencies. With this orientation, the author hopes that his text will serve as a reference work for amateur naturalists as well as for applied ecologists in forestry, fisheries, wildlife, and sanitary engineering. Smith has been remarkably successful in achieving this goal.

The main body of the book is organized into 27 chapters which give the conceptual background of ecology. The author begins with an excellent discussion of the nature of field biology wherein he traces the evolution of ecology from efforts to quantify natural history. The rest of the text is divided into five parts which begin with a discourse on the ecosystem and the community. Energy flow, material cycling, environmental influences, periodicity in biological clocks, and ecological succession are subjects considered in this basic portion of the book. Subsequent sections include thorough treatments of aquatic and terrestrial habitats, population ecology, natural selection and speciation, and, lastly, three chapters on the behavior of animals.

The balance of the book serves as an instructional guide for the reader or student who wishes a further introduction into the literature of natural history and ecology. These supplementary materials include a list of suggested readings for each chapter of the text, a list of recommended books and guides to identification of flora and fauna by each major group, and a list of journals of interest to field biologists, with a brief description of the special character of each journal. A list of general bibliographies is also presented with annotations. This is followed by five generous appendices which begin with an annotated bibliography of statistical methods and continue with a discussion of a list of environmental measurements followed by plant ecology methods. These

appendices serve as an excellent introduction to quantitative methods currently in use in the study of plant communities. Similarly, a fourth appendix summarizes basic techniques for studying animal populations. The last appendix is a description of methods for studying animal behavior which, insofar as I know, is the first compilation of this subject in a text book. The book concludes with an 18-page index.

The format of this text is very attractive. Illustrator Ned Smith has been highly creative in interpreting information from technical publications. Photographs are also used to good effect, and include a high proportion by the author.

Students and naturalists will find that Smith has done a commendable job of assembling literature in rapidly developing fields which have not previously been reviewed in ecological texts. The chapter on periodicity and biological clocks, for example, brings new subject matter into focus. Ornithologists will be especially interested in the chapters dealing with the behavior of animals. Bird behavior inevitably forms the core of much of this material.

In a work of this scope, it would be difficult for the author to avoid errors. While a high degree of readability is one of the merits of this text, some clumsy sentences have escaped the copy editor's notice. For example, on page 380, last sentence of second paragraph: "The cause of this behavior appears to be caused by . . ." Spot checks of the accuracy of documentation reveal some regrettable lapses. Chapter 10 contains one error, chapter 14, six, and chapter 21, seven errors. Most of these are minor discrepancies; however, in two cases (see page 274—Murphy, 1962, and Kempson, et al., 1963), references cited in the text do not appear in the bibliography. Again these are items which should have been picked up by a careful copy editor.

My last criticism of the book would point to the inadequacies of the index. Nearly two pages of the text are devoted to vole and lemming population biology, yet neither mammal appears in the 18-page index. Clearly, the index should be reworked and bolstered if this book is to serve as an adequate reference in field biology. This feature is not so important in a class text and, perhaps, the author and publishers have chosen to compromise at this point.

Despite these shortcomings, one's overall reaction is high admiration for the deft manner in which the author handles a wide range of complex ecological literature. One is also thoroughly impressed with the prodigious amount of reading and notation which underlies this work. In conclusion, whether one wishes an introduction to ecology or a review of new material in a rapidly growing body of knowledge, Smith's textbook will serve him well and serve him with pleasure.—DANIEL Q. THOMPSON.