

ORNITHOLOGICAL LITERATURE

THE KIRTLAND'S WARBLER. By Harold Mayfield. Cranbrook Institute of Science, Bloomfield Hills, Michigan, 1960: $6\frac{1}{4} \times 9\frac{1}{4}$ in., xvi + 242 pp., 8 pls., 9 figs., 44 tables, col. front. by Roger Tory Peterson. \$6.00.

This long-awaited and excellent book provides our most complete account of the life of a wood warbler. It has, in addition, independent significance as a study of the history and present ecology of a small relict population of birds, and it will surely play an important part in the efforts of those whose duty it is to save the Kirtland's Warbler (*Dendroica kirtlandii*) from extinction.

Field work began over 30 years ago, when in 1930 Josselyn Van Tyne decided to study the Kirtland's Warbler. Among a number of ornithologists aiding him on occasion was Harold Mayfield, who participated in a trip in 1944 and thereafter collaborated as a full partner in the project until Van Tyne's death in 1957. The bird's breeding grounds were many miles distant from the homes of both investigators; the study required not mere field trips, but expeditions, and there was relatively little opportunity for sustained daily observation of individual birds or nests. To appreciate the difficulties, one might contrast the Kirtland's Warbler with the Song Sparrow (*Melospiza melodia*), for which, as a subject for her classic, Margaret Nice (1943. *Trans. Linn. Soc. N.Y.*, 6:1) listed these advantages: "it is abundant, thus affording many individuals for observation; it is widely distributed (having been available to me [at my homes]); it is easily watched, since it nests at our doorsteps and its territories are small; it readily enters traps, and can be easily reared by hand and kept in captivity." Lacking all of these advantages, Mayfield and Van Tyne nevertheless compiled remarkably voluminous data, and their project has succeeded. Direct evidence was sometimes difficult to accumulate on subjects requiring daily visits to the study area (e.g., duration of incubation, hatching sequence within the clutch, pair stability, and time required for mate replacement); but even on matters of this sort, skillful analysis of fragmentary data has yielded Mayfield much circumstantial evidence to throw light on the direct observations.

There is in the book a natural emphasis on ecology, and the opening chapters on the known history of the Kirtland's Warbler and on the summer and winter habitats are of great interest. So restricted is the species' breeding range in Michigan that no nest has ever been found more than 60 miles from the place in which Norman Wood discovered the first, in 1903. Equally limited is the seral stage of vegetation inhabited: small jack pines (*Pinus banksiana*), springing up in clumps a few years after forest fires, are the dominating feature, for a brief period (typically 10 to 12 years), of the requisite plant association; then the trees become too large, the openings between them close, lower branches are shaded out, and the warbler leaves. There are still further requirements, that the burned-over tract be extensive enough to attract and accommodate the cluster or colony of territories which the males establish, and that the soil be sufficiently porous to drain off surface water before the nests depressed in the ground are injured. Thus, although the jack pine is widely distributed in northern North America, Mayfield believes that the reason the bird breeds only in Michigan is that only there has there been, *continuously*, the required combination of highly specialized conditions. The period of greatest abundance of the Kirtland's Warbler, since it entered the state in the wake of jack pines spreading northward as the Wisconsin glacier retreated, he puts in the 1880's and 1890's. Since that time of forest fires and extensive burning following early timber cutting, numbers of the Kirtland's Warblers declined to fewer

than 1,000 in 1951. For the future of the habitat Mayfield finds "no immediate cause for alarm" (p. 28), but a subsequent chapter on population dynamics suggests little reason for optimism about the prospects for the species itself.

Why this narrow restriction as to habitat? The Kirtland's Warbler seems not to be a food specialist, limited by the distribution of organisms comprising its diet. Part of the answer to the question, Mayfield believes, is a high degree of vulnerability to nest predators as the result of an exceptionally long incubation period, 14 days as compared with from 11 to 13 days for other open-nesting parulids. A general unwariness in adults he thinks may put an additional premium on sanctuary, and there is a suggestion that the bird does not prosper against competition. In any event, pine barrens provide greater immunity from predators and isolation from competitors than does deciduous scrub; and it is pointed out that once the species became restricted to jack pines a high precision in orientation may have been an obstacle to potential dispersal into new habitat.

Of that portion of the work, about half of it, devoted to breeding behavior and biology, little summary is needed. The stages of reproduction and of development of the young are treated consecutively, with separate chapters on voice and on weights and plumages. The description of adult behavior surpasses in comprehensiveness any in the literature on parulids, while one seldom sees for a perching bird so detailed an account of intra-family relations and the development of fledglings in the period between nest-leaving and independence. Data on matters of breeding biology have been subjected to rigorous standards of exclusion, and this fact and the meticulous attention to definition of terms and conditions of observation assure the lasting utility of the book as a source.

The longest chapter in the book is devoted to the relations between the warbler and a serious, perhaps the most serious, enemy, the Brown-headed Cowbird (*Molothrus ater*). This material will be an important reference for students of the latter species and of brood parasitism. Although the rate of parasitization of Kirtland's Warbler nests, about 55 per cent, is paralleled or surpassed in the cases of populations of a few other hosts, Mayfield makes a convincing argument that no other *species* is known to suffer comparable pressure. Considering the factor that is ultimately decisive, i.e., loss in net annual production of young, if the Kirtland's Warbler were unmolested by the cowbird, as it probably was until the 1870's, it would bring off 60 per cent more fledglings. This conclusion is supported by analysis of losses, stage by stage, in parasitized nests as compared with nests containing only host eggs. The chapter also contains contributions on the cowbird's selection of nests in which to lay, and on other aspects of its behavior in connection with laying.

The final substantive chapter is a population study. Equally as interesting as the conclusions presented is a novel method of using fragments of data on reproductive success. These data are first presented conventionally, but there is recognition of the error of arriving at hatching or fledging percentages from nests discovered after the incubation or nestling periods have begun; and the sample of nests observed from the laying of the first egg until the fate of the nest was determined was too small to be used. Mayfield is able, however, to determine rates of loss *per day* at each stage of development until fledging and thus to derive the probability of success of nests and eggs in a hypothetical sample. Further, the number of nests and eggs produced by a large sample of pairs can be predicted, and these figures when combined with those on success yield a hypothetical annual rate of production, which proves to be 1.4 fledglings per pair of adult warblers. The complexity of the calculation will be apparent upon consideration that many factors (e.g., probability of renesting, clutch size) are constantly

varying as the nesting season advances; and there are other difficulties to be taken into account. I thought the reasoning logical and clear.

Survival of adults is at the rate of about 60 per cent per year, so that the remaining life expectancy of an adult in June is about two years. The conclusion is based on returns of banded birds; there is the usual assumption that the annual mortality rate is unaffected by age. Given the accuracy of the calculated rate of production of fledglings and of that of adult mortality, the rate of survival of fledglings to the following breeding season would have to be 57 per cent to maintain the population. In fact, as Mayfield makes clear, it is most unlikely that so high a percentage of young survives this period. Therefore Kirtland's Warbler numbers may be declining. Undoubtedly there will be more to say on this subject after Mayfield completes his second decennial census of the population, during the present summer.

The book concludes with a list of "Problems for Further Study," which will be useful to future students of the species, but it is one of the merits of the work that his familiarity with the literature and with current problems enables Mayfield to raise many interesting and unanswered questions throughout the report. In this respect he fulfills the functions of a good teacher as well as those of a model.

On points of form and format, the volume can be enthusiastically endorsed. It is well written, attractively bound, and free from errors. The index is a little too general to lead to some subjects with maximum speed and not quite imaginative enough to refer to all pages on which appears material possibly relevant to various indexed words. However, sub-headings within each chapter and summaries at the end compensate for this shortcoming and add much to the convenience of use. In sum, this is a fine and important book, and it deserves hearty recommendation.—VAL NOLAN, JR.

THE WONDERS I SEE. By John K. Terres. With drawings by Walter Ferguson. J. B. Lippincott Company, Philadelphia and New York, 1960: 5¾ × 8¾ in., 256 pp. \$5.00.

People who like *Audubon Magazine* may be expected to enjoy this collection of nature sketches—and not surprisingly, since the author of the book was an editor of that magazine for eleven years.

The book consists of 84 selections, nearly half of them about birds. The rest touch on a variety of subjects, particularly insects, mammals, and conservation. Included are original observations, explanations of puzzling questions, retelling of historical events, and personal comment. These jottings range in length from one paragraph to eight pages. They are arranged according to the time of year, and each begins like an entry in a field journal, with date, location, and weather. Since the parts are mostly short and unrelated to the others in sequence, a reader is likely to pick up the book and read it a little at a time rather than continuously from cover to cover.

Examples of items especially interesting to bird students are the following: "Why Don't Birds' Feet Freeze in Winter?" "The Great Lapland Longspur Tragedy," "Why Does the Mockingbird 'Flash' Its Wings?" "How the Cattle Egret Got to America," "When Do Birds First Learn Fear?" "The Mystery of Bird 'Anting,'" "McAttee: Food Analyst of the Birds," and "Where Do Birds Sleep at Night?"

The treatment of subjects is factually accurate but simple enough to be within the comprehension of an interested child. (Words such as "mammalogist" and "gestation" are defined.) A book of this kind intended for recreational reading inevitably will be judged in part for its literary quality, and I think it is fair to say that a person with an

ear sensitive to grace and elegance of expression will find passages to criticize. Most readers who share the author's enthusiasm for nature, however, will not be severe in their literary judgments of this work.—HAROLD MAYFIELD.

DICTIONARY OF WORD ROOTS AND COMBINING FORMS. By Donald J. Borror. N-P Publications, Palo Alto, California, 1960: 5 × 7 in., v + 134 pp. Stapled in stiff paper cover. \$2.00.

This modest publication is aimed at "the beginning student [of biology], the medical student, and the taxonomist." The introduction contains general directions for the use of the dictionary, plus a handy set of rules for the pronunciation of scientific names (I have more than once found myself conversing with a colleague who pronounced some scientific name so differently from my own concept of its pronunciation that I failed at first to understand what animal he was discussing, and neither of us certain as to who was correct).

The body of the work is an alphabetical list of word roots, prefixes, and suffixes, mostly derived from Latin and Greek but with a few words that have found their way into scientific nomenclature from other languages—and even from onomatopoeia, as in "phoebe (from its call). The phoebe." There follows a very brief guide to the formation of scientific names of plants and animals, and a list, classified by subject (colors, habitats, structures, etc.), of common combining forms intended as a help in selecting roots for the formation of new names.

This booklet (for it is scarcely more than such) will probably be most useful as an introduction to word meanings for the beginner who does not intend to pursue the subject at any length. There are several more complete publications of this nature, which Borror's book will not replace. I myself use "Composition of Scientific Words," by Roland W. Brown of the U.S. Geological Survey (published by the author, 1956: 882 pp.), which is about as complete a guide to word formation and derivation as one could wish for. Brown's book, unlike Borror's, has the advantage of having the classical roots and English words cross-referenced in the same glossary. Thus, Borror gives "anas (L). A duck." while Brown gives "**anas**, L. duck; *anaticula*, dim., duckling; *anatinus*, of ducks; see **duck**." Under **duck** we find no less than eleven Greek and Latin words which were applied to various kinds of ducks, together with examples of the use of each word or root in a scientific name: "L. *querquedula*, f. a kind of duck: *Querquedula cyanoptera* (cinnamon teal)."

The modest price will permit wide distribution of Borror's little book, but the serious student of nomenclature and the practicing taxonomist with a continuing need to coin new names will wish to own a more complete work.—KENNETH C. PARKES.

THE TRUMPETER SWAN: ITS HISTORY, HABITS, AND POPULATION IN THE UNITED STATES. By Winston E. Banko. U. S. Department of the Interior, Fish and Wildlife Service, North American Fauna No. 63, 1960: x + 214 pp., 6 × 9½ in., front., 54 figs. (including photos., drawings, and maps), 16 tables. Paper covered. \$1.00.

This publication will appeal to everyone interested in birds, from bird lovers to professional management personnel. Its wide appeal is due to a broad approach which includes historical, behavioral, and statistical data, all arranged in a logical fashion and presented with extraordinary clarity. An abundance of remarkably fine photographs by Banko and others provide the best illustrations of Trumpeter Swans that I have seen. The

text is further enlivened by a series of crisp line-cuts by Shirley A. Briggs. This is a successful monographic treatment of a single species, although the omission of much Canadian data (a separate study by Ron H. Mackay of the Canadian Wildlife Service is in progress) is unfortunate. Still, the status of Trumpeter Swans in Canada is briefly sketched and reference is made to most published Canadian reports. Saskatchewan birders, however, will be disappointed to learn that their province is omitted in the discussion of recent breeding records in Canada (see *Blue Jay*, 1953, 11: 26-27).

The author states in the foreword: "This account includes a historical record of this bird in the United States and Alaska, an outline of its habits and characteristics in its native Rocky Mountain environment, and furnishes information necessary to guide its future." The Trumpeter Swan is introduced as a member of a group of birds (i.e., swans) which have played a prominent role in human history and which have long been admired for their grace and beauty and large size. Their systematic position is also presented. The occurrence of the Trumpeter Swan in North America from the ancient past, through pioneer days and up to 1957, is well documented in a chapter headed: "Distribution and Status." This section includes accounts of the marketing of swan skins by the thousands, an activity which apparently was a major factor in the near extinction of the trumpeter. Strangely, it is evidently not even clear what use was made of these skins! Admirers of Sir John Richardson will be pleased to note from the historical section that he was the first to describe a positive method of differentiating the Trumpeter Swan from the Whistling Swan. The tracheal anatomical difference which he discovered is still the only reliable character. Ecological aspects are considered in the chapter on "Habitat" and include discussions of the former general environments and, specifically, characteristics of the swan's breeding grounds at Red Rock Lakes Refuge. Although it formerly occurred as a breeding species across the continent and throughout several life zones, its ecological niche is shown to be very limited. Both summer and winter habitat requirements are described.

The "Life Cycle" section includes a useful description of the Trumpeter Swan and comparison with the similar Whistling Swan. The difficulty of using bill coloration to separate these species is pointed out. I was surprised to learn that the reddish streak on the bill of the Trumpeter Swan is "confined almost wholly to the basal section of the lower mandible edge . . ." Delacour (1958. *The Waterfowl of the World*. Vol. 1) states: "The massive bill is wholly black except for a narrow red border to the anterior part of the upper mandible." Peter Scott's accompanying illustration, however, favors Banko's description. According to Banko, not even this character is consistent.

The behavior notes constitute an important contribution to our knowledge of this species. Observations of several displays are described briefly and directly and are illustrated by good photographs. I cannot wholly agree with Banko that analysis of displays "should await that time when extensive recordings of their vocal efforts have been made in synchronization with motion pictures of their various actions." This may be very desirable but in the interim I think it would be useful to proceed as we can. The behavior observations reported by Banko might have been described in more detail and a greater attempt might have been made to relate displays to function. Although there is a considerable discussion of territorialism, the size of the territory is not quite clearly stated, apparently because of the effect of irregular habitat, although maximum area available is reported as from 70 to 150 acres per nesting pair.

Information on the "Life Cycle" also includes breeding data, nesting habits, development of the young, feeding habits and food, and a discussion of limiting factors and longevity. In spite of the lengthy list of mortality factors of natural origin, man may

still be considered the most significant limiting factor. However, man's recent activities on behalf of the Trumpeter Swan have clearly been of benefit to the species. Banko estimates the total continental population of Trumpeter Swans now at probably 1,500 or more. A detailed analysis of Trumpeter Swan population dynamics is presented which will be of interest to students of natural populations. The data concern chiefly the population of Red Rock Lakes and Yellowstone Park, both of which were carefully censused annually over a 27-year period. It is shown that a saturation point was reached and that breeding productivity was depressed at this time through a decline in cygnet production. In broader terms the rate of productivity of mated pairs varied inversely with changes in population density. The data to support these conclusions are very clearly presented in table and graphs, but, as the author indicates, the exact mechanism affecting cygnet productivity is not known. Since maximum populations appear to have been attained on the present refuges, Banko concludes that it is highly desirable to keep close check on isolated breeding areas and to make further efforts to establish wild populations in suitable areas within the former known breeding range of the species. He says: "It is the objective of the Bureau [U. S. Fish and Wildlife Service] to maintain the wild population of these rare fowl at an optimum level—the greatest number which can be consistently supported in their natural environment."

An extensive bibliography supports the work and the index appears to have been carefully prepared. Proofreading seems to have been thorough. The U. S. Fish and Wildlife Service and Winston Banko deserve congratulations for this successful exposition of a remarkable species.—ROBERT W. NERO.

THE AUDUBON BOOK OF TRUE NATURE STORIES. Selected and edited by John K. Terres. Thomas Y. Crowell Company, New York, 1958: 6 × 9½ in., x + 294 pp. Illustrated by Walter W. Ferguson. \$5.00.

THIS IS NATURE: THIRTY YEARS OF THE BEST FROM *NATURE MAGAZINE*. Selected and edited by Richard W. Westwood. Thomas Y. Crowell Company, New York, 1959: 7 × 10¼ in., x + 214 pp. Illustrated by Walter W. Ferguson. \$5.95.

The selections in both of these books are entertainingly informative and just the right length for "pick-up" reading. Those in "The Audubon Book," all from *Audubon Magazine*, deal mostly with birds and mammals, particularly their relationships to human beings, while those in "This is Nature" cover a wider variety of topics ranging from boulders deposited by glaciers, sight and hearing, pollen, and mangroves to turtles, sea-horses, prairie dogs, and Snowy Owls. The charm of both books is greatly enhanced by Walter Ferguson's sensitive drawings. "This is Nature" is further embellished with photographs.—OLIN SEWALL PETTINGILL, JR.