ORNITHOLOGICAL LITERATURE

A Population Study of Penguins. By L. E. Richdale. Oxford; Clarendon Press, 1957: 6 × 9¼ in., 195 pp., 2 plates, 8 figs., 87 tables. $6.75.

This highly informative volume is the third among Richdale's major works concerned with penguins. One of these publications covered the first 12 years of research, and another dealt mainly with sexual behavior. The present study, which was written at the Edward Grey Institute of Field Ornithology, Oxford University, is based on a vast amount of data gathered in eighteen seasons (August 1936 to March 1954) of intensive field work on the Otago Peninsula of southern New Zealand. It is concerned principally with a population of Yellow-eyed Penguins (*Megadyptes antipodes*), although there are comparisons with other species of penguins and with certain procellariiform birds. Some 1,318 visits were made in different breeding areas, of which four comprised the "main study area." With ingenuity and perseverance Richdale evolved a satisfactory technique by which individuals were footmarked (with leather-punch perforations in the webs) and banded (with home-made, numbered aluminum bands). An explanation of terms used, as, for instance, "keeping company," "divorce," and "guard stage," is provided in the introductory chapter.

The author outlines the annual cycle of the Yellow-eyed Penguin, thus: (1) the winter period (end of the molting in April until the time when the birds begin spending days ashore in preparation for breeding); (2) the pre-egg stage (ends with the laying of eggs—mid-September to mid-October); (3) the incubation phase (ends in November, in which month nearly all chicks are hatched); (4) the period with young (lasts some 16 weeks, until the end of March, when all chicks have entered the ocean); and (5) the molt period (successful parents molting chiefly in March and later birds in April, but ones without chicks doing so mainly in February). There follow detailed chapters on the following topics: the pair bond, incubation, the chick period, movement, juveniles, influence of age on breeding biology, the penguin community, survival and mortality, and the molting season.

The copious data on population dynamics and associated problems have been manipulated in masterly fashion. The numerous tables are set up clearly and relatively simply, and the text, which is written in lucid and straightforward manner, includes careful and thorough interpretations of tabular matter. One is impressed with the size of most of the samples employed in the analyses. For example, in table 2 is given the annual fate of 737 mated pairs of Yellow-eyed Penguins. "On the average, 60 per cent. of the mated pairs remained intact from year to year, but the annual score varied from 35 to 81 per cent."

Some other gleanings (a tiny sample of what the book contains) might here be offered. The penguins are non-migratory and breed in small colonies. Two eggs are laid; the second appears 3 to 5 days after the first. Both sexes incubate. The incubation period ranges from 40 to 51 days, averaging 43.5 days (N = 200, no less). After a discussion of other species of penguins, Richdale concludes that "the incubation period . . . seems to depend somewhat on a generic basis. Certainly it is not on a migratory or geographical basis." There is an excellent descriptive account, based on observations from a blind, of the procedure by which the parents feed the chicks. In the "guard stage," in which one parent is always in attendance, the chicks are normally fed three times every two days. "Once both parents begin to fish simultaneously at the post-guard stage, feeding time procedure changes abruptly." It is easy to see that much painstaking research went into studies of weights of chicks (90–93 grams at hatching, increasing to about 13 pounds at 90 days) and the amount of food they require (one conclusion: "it is . . . understandable why the clutch size could not be greater. I doubt if two parents could successfully rear

three chicks."). There is good evidence that parents normally feed their own chicks but not others; the idea of communal feeding in a "crèche" system is considered to be untenable not only for the Yellow-eyed but also for other kinds of penguins. Of the fledglings that disperse, "some 52 per cent. die in the succeeding months, a few return to the place where they were hatched, and the remainder settle at varying distances." The investigator found "not a single instance of a parent or a grandparent mating with its own progeny," although in dispersal areas some inbreeding takes place among relatives (as brothers and half-brothers with sisters and half-sisters) which have wandered. Most females start breeding in their second or third year, but only about 47 per cent of the males do so (33 per cent more start in their fourth year). It was found that breeding birds comprise about 60 per cent of the total resident population; the rest are non-breeding adults, juveniles, and birds "in transit." The author "never observed a female penguin unmated once it was old enough to produce eggs" (p. 122); yet "males after they have once bred are liable, on the average, to find themselves unmated once in every 7 or 8 years" (p. 135). These observations can be related to the unbalanced sex ratio, which "widens steadily from 100 males to 98 females at the age of 3 years to 100:52 for the oldest group (13 to 17 years)." The greater physiological wear and tear to which females are exposed throughout their lives may be the main factor in their higher mortality rate. Survival-rate values are 88.8 per cent for males, 84.2 per cent for females. As brought out in table 72, "the average expectation of further life for males is 6.8 years and for females 6.0 years." There were records of three birds which lived at least 19 years, and theoretical maximum longevity was estimated to be in excess of 22 years. One interesting conclusion, among others, in the chapter on molting season is that "irrespective of the age of the bird, month of moult, or initial weight, Yellow-eyed Penguins lose on the average about 45 per cent. of their weight from the time when they come ashore to moult until they re-enter the sea after the old feathers have been replaced."

There seem to be few ways indeed in which this book could have been improved. Some readers might wonder whether many of its passages ought to contain more words—including more about the general environment—and fewer quantitative data (percentages, etc.). The reviewer's feeling is that this would not be a valid criticism of a technical study of this sort. Although the study is readable enough, its aim, certainly, is not to "kiss the reader and tuck him in." The statistical analyses and presentations leave little to be desired. The exact way in which certain measurements of chicks (as "bill" and "toe") were taken is not explained, but many other workers, including the reviewer, have also been lax in this respect. There is no indication as to how tests of significance were carried out, or whether P-values as well as t-values (or their equivalent) were employed. The appendix, in which methods of marking penguins are well described, might have been amplified somewhat to include certain other aspects of methodology.

In an age when so many scientific studies are being conducted by teams or super-teams, it is refreshing to find now and again a person who is intimately involved in all phases of his investigations. It looks as if Richdale, despite his gracious acknowledgments of aid from others (including his wife and ornithologists at Oxford), is a notable example of the ornithological individualist who never hesitates to get his hands dirty or his back tired as he assumes, month in and month out, the full work-responsbility for his projects. In this type of researcher and his products there is, in the reviewer's opinion, a certain shade of dignity and integrity which is wanting in the more gregarious workers and their contributions. May the teamless researcher prosper and continue to make himself felt!

"A Population Study of Penguins" is, in brief, a remarkably fine study. By Raymond Paynter it is deemed a classic (1958. Ecology, 39: 176), and the present reviewer would

not disagree. Both the ornithologist, who may be interested chiefly in the ways in which penguins make a living and maintain their kind, and the population ecologist, whose interests may incline toward vital statistics or biodemography, will find in L. E. Richdale's monograph a well-arranged harvest of facts, figures, and ideas about populations and related characteristics of the Yellow-eyed Penguin and kindred species of birds.—ROBERT A. NORRIS.

THE COMPARATIVE BIOLOGY OF THE MEADOWLARKS (STURNELLA) IN WISCONSIN. By Wesley E. Lanyon. Publ. Nuttall Ornithological Club No. 1, 1957: 8½ × 5½ in., 1–67 pp., 31 pl. (Available from Massachusetts Audubon Society, 155 Newbury Street, Boston, Mass., cloth bound, $2.00; paper, $1.50.)

Within the framework of avian systematics today are those knotty problems which deal with geographically sympatric and similar-appearing species. Among these problem species are the Eastern (*Sturnella magna*) and Western (*S. neglecta*) meadowlarks, the controversy over which has ranged since at least the time of Audubon. Various systematists have regarded them as distinct species whereas others have listed them as conspecific, principally on the basis of "hybrids." In an attempt to settle once and for all this issue, Dr. Lanyon has effected a four-year intensive study near Madison, Wisconsin, where the two forms are geographically sympatric but ecologically allopatric.

The present analysis, then, has been a field study wherein the author has compared *magna* and *neglecta* with respect to habitat preferences, adult vocalizations, breeding biology, and the questions of interbreeding. Generally, it was shown that *magna* prefers the moist lowlands whereas *neglecta* shows a preference for the drier uplands. Spectrographic analyses of call notes and primary songs revealed significant differences in frequencies and duration, even though there was considerable variation especially in *magna*. As far as territoriality was concerned, there were rather identical behavior patterns in the two species, and yet there was always complete segregation of territories and interspecific territorialism. Breeding biological data (incubation periods, clutch size, etc.) evinced no significant differences.

Perhaps the most significant part of this report revolves around the question of interbreeding since "hybrids" have been reported in the literature on the basis of vocalizations and/or specimens. Lanyon presents evidence to show that typical *magna* males may, at times, deliver *neglecta*-like songs and vice versa. Furthermore, he reports on a mixed pair in central Illinois. Such a union, however, was apparently unsuccessful, even though an occasional hybrid has been produced in captivity. "Hybrid" and bivalent songs are interpreted by Lanyon as follows—"males of either species are potentially capable of learning and rendering primary song of the other species," (p. 51) so that the bivalent repertory could well be the result of "a more continuous and proximate exposure to singing males of the opposite species." (p. 52). As a conclusion, he states, "The literature contains no clear case of hybridization of Eastern and Western Meadowlarks in the wild and no such evidence was found in this study" (p. 60), but he does concede that hybridization may occasionally occur especially at the periphery of a range.

It would seem that this report has conclusively dispelled conspecificity for these meadowlarks by ecological and song differences which, when coupled with morphological and perhaps ethological data, present effective isolating mechanisms in wild populations. Whereas this is clearly a biological approach, it seems to me that the entire thesis would have been strengthened by at least a cursory treatment of morphological differences.

In so doing, so-called intermediate or hybrid specimens might be more correctly interpreted. —DAVID W. JOHNSTON.

NEW LIFE MEMBER

J. Murray Speirs is a graduate of the University of Toronto. His M.A. thesis deals with fluctuations in the numbers of birds in the Toronto region, and his Ph.D. thesis (University of Illinois) deals with movements of American Robins in the region east of the Rocky Mountains. Both were analyses of field data. He is working on a life history of Lincoln's Sparrow, edits the Bulletin of the Federation of Ontario Naturalists, is a member of the Toronto Ornithological Club and a new life member of the Wilson Ornithological Society.

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