

cluding sections on the ecology of the nest site with reference to other birds were the episodes which showed the perfect indifference of the breeding males of *praticola*, in April, to intruding *O. a. alpestris* (birds of the latter race were obviously ignored as belonging physiologically to another world), and the ecological series, passing from the frequenters of the heaviest to those of the scantiest vegetation—Dickcissel, Bobolink, Savannah Sparrow, Meadowlark, Vesper Sparrow, Prairie Horned Lark. The Vesper Sparrow, too, suffers displacement by increase of vegetation, and, "Of all resident birds the Vesper Sparrow is nearest the Prairie Horned Lark ecologically."

Results of compression are evident and leave us sometimes not quite satisfied. There are a few curious omissions. For instance, no direct information, beyond what is implied in the diagrams of territories and in their discussion, is given on the maximum or average number of broods brought off by the subspecies, nor the relation of the old to the new breeding activities. We are not told how the identity of the same pairs on the successive territories at Ithaca was established. Isolated statements, such as "the development of feathers depends entirely upon growth in weight, that is, upon amount of food", or "the age of the young at nest-leaving depends upon the manner and amount of food they have received", suggest the existence of valuable data for the presentation of which no room was found.

Probably no other work is so important in the advancement of the science of birds as such unified and modern studies of behavior and its relationship to the surroundings. The time is not far off when we shall compare such factors throughout our avifauna as readily and as concretely as we compare birdskins today, and build new and hardly less trenchant doctrines on the results. Yet this alone is not enough. The perfect combination will be reached when such work is done *inter-dependently* with laboratory investigations of comparative anatomy and ontogenesis, each bent upon a common, and not merely descriptive, end. Then and only then can we hope to explain, as well as to describe, the peculiarities of the Horned Larks—perhaps even of the Prairie Horned Larks.

It is a pity that a piece of work of such permanent and unquestionable importance should have been marred by slovenly editing. The following are a few of the minor

atrocities which reached final printing. "Nutall" twice on page 4; "From a territory such as this, a male bird will not leave" on page 50; a printer's jumbling renders a quotation from Sutton incoherent on page 58; "the initiatory temperatures was" on page 62; April 9 should read April 19 on page 73; a "the" is omitted and the phrase "first heard in April 21" occurs, both on page 114; etc., etc.—T. T. MCCABE.

THE RIDDLE OF MIGRATION.*—This latest contribution of Rowan's to the study of bird migration is a summarization of his experiments and arguments on the subject. The presentation of new data seems not to have been the object of the book, for the material used has appeared in several shorter papers by the author in various scientific journals. These papers unfortunately are not cited or listed in a bibliography. The chief preliminary paper (Experiments in Bird Migration) I have already reviewed in these columns (Condor, xxxii, 1930, pp. 166-168). The book before us for consideration is written in a style which should make for easy understanding on the part of amateur bird students. The biologically trained ornithologist probably will overlook certain descriptions of the commonplace in his appreciation of the ingenious and thoroughly valuable discussions.

Opening with an esthetic picture of the marvel of northern migration in the section headed "Prologue," the author turns to a matter-of-fact viewpoint in the first chapter which deals with the living bird. Here for the sake of biological background is an interesting running discussion of certain features of avian structure and physiology, with special emphasis on the nervous system, sense organs, powers of flight, and endocrine glands. The large amount and the ease of flight performed by species or individuals that may be entirely non-migratory is emphasized as indicating the potentialities for migration. His contentions that birds are undoubtedly more successful in the air than bats and that the spectacular migrations of birds are unknown to the latter are rather sweeping and are open to criticism.

Under a section on "Environment, Past and Present," he proposes to pay particular attention to the well-known migra-

*The Riddle of Migration, by William Rowan. Baltimore, The Williams and Wilkins Company. 1931. xiv+161 pages, 11 figures in text.

tions of the north. "If we can analyse them here we can apply our findings to migration elsewhere after due allowance for other factors." Perhaps it could be argued that instead one should work in the opposite direction, that is, from the incipient migrations of other regions to the well-marked migrations of the north in order to understand the latter. Important is his attitude, with which I agree, that migration is suited to conditions of the environment as they exist today. Migration in many instances doubtless existed in pre-Pleistocene time under conditions similar to the present, but migration is not dependent today on some set of factors that are not operative now. Migration is maintained and may arise in adaptation to existing environments. (See also Grinnell, *Auk*, 48, 1931, pp. 22-32.) Certain migrations of shorebirds may best be explained by supposing them to be remnants of adaptations to conditions peculiar to the past, but these cases constitute exceptions to the general rule. Consequently the Pleistocene ice age as a cause of present day migrations is not considered important. This is in line with more recent concepts of the Pleistocene ice which is thought to have been less continuous than once supposed. In considering northern winter environments, food supply and ultra-violet radiation are singled out as being the most important selective factors. Temperature is not important. The possible function of the oil gland in relation to vitamin D storage and ultra-violet radiation is an interesting angle which he introduces. Some discussion is presented of cyclical variation in numbers of animals in the north over periods of several years.

Elimination by natural selection of those individuals or groups failing to migrate from among populations of a species of variable migratory habit preserves stirps composed of migrating individuals. This does not indicate a learning and subsequent inherited habit to migrate but merely a selection of variations in habit which presumably already are heritable. The failure to migrate and the consequent death of Mallards that remain in Alberta during normal winters is cited as a case in point. These remaining Mallards fail to migrate even though the lakes may entirely freeze over. The assumption seems to be that they have not inherited the migratory response mechanism which

most other Mallards of the north possess. They are not able to originate migration in response to the immediate situation, that is, the freezing of the lakes. Selection in such cases which involve food supply he feels is obvious; it may not be so clearly demonstrated in instances of ultra-violet deficiency. Whether the original ability to migrate was acquired in a Lamarckian sense or not must be left unanswered. Rowan feels that some time in the distant past the ability to migrate or wander was developed in bird ancestry, probably in connection with increasing mobility. This general heritable aptitude to migrate or wander some birds now make use of whereas others do not.

Set apart from the discussions of the evolution and utility of migration is a consideration of the mechanism which is in operation in the control of migration each year. This is shown to be variation in day length. Variation in day length affects the activity of the bird which in turn induces increases or decreases in the gonads. During certain stages in the process of increase and decrease interstitial tissue becomes prominently developed in the gonads. This tissue is known to produce sex hormones. In Juncos the appearance of interstitial tissue coincides with the time of migration and it is assumed that a hormone is produced by the tissue which induces the bird to migrate. Temperature and other weather conditions have either limited or no effect on the gonad-migration rhythm. This concept of the mechanism of migration is the same as that which I previously reviewed. Since then some additional evidence has been brought out in experiments with crows, but the migration hormone must still be regarded as an assumption, as Rowan himself admits. I do not feel that the possibility of simultaneous and independent action of the bird's activity, or its activity controlled by day length, upon the nervous system and the gonads is as yet ruled out. There is only circumstantial evidence that the interstitial tissue of the gonads and its hormones stand in causal relation to the migration rhythm.

The attitude of Rowan in advancing these theories in this book is admirable and, it seems to me, much less dogmatic than in certain earlier papers. He says: "The arguments on which they (the theories) are based apparently fit the facts, but it must be borne in mind that

any theory that is new must remain subject to correction until fully substantiated by repeated effort and the critical investigations of fellow workers looking at the problem from some other angle. . . . Experimental biology, however, is peculiar in this respect, that the investigator must of necessity have a preconceived theory upon which to work."

Rowan's concept of the mechanism of migration gains weight with each additional experiment. The present volume brings under one cover his work to date in this field, which work is the most searching and thorough investigation of its kind. In the foregoing discussion I have freely transcribed into my own words only a very few of the author's ideas. A careful reading and study of the book is to be highly recommended to all students of birds.—ALDEN H. MILLER, *January 23, 1931.*

MINUTES OF COOPER CLUB MEETINGS

SOUTHERN DIVISION

NOVEMBER.—The regular meeting of the Cooper Ornithological Club, Southern Division, was called to order by Vice-President Harold Michener, at the Los Angeles Museum, Exposition Park, Los Angeles, at 8 p. m., Tuesday, November 24, 1931. Minutes of the October meetings of both divisions were read, and those of the Southern Division were approved.

Applications for membership were read as follows: Marie Everett, Randsburg, California, proposed by Loye H. Miller; Miss Mary E. Fancolly, Apt. 1, 819 North First Ave., Tucson, Arizona, proposed by Walter P. Taylor; and Miss Elizabeth Hager, 2322 Observatory Ave., Los Angeles, proposed by Berry Campbell.

The matter of a delegate to the Fifth Pacific Science Congress having been held over from the last meeting, the secretary stated that Dr. Miller had received a later announcement that the Congress has been postponed for one year.

A letter was read from the Secretary, Pacific Division, A. A. S., requesting that representatives be appointed to meet with the Affiliation Committee in San Francisco in January. Harold Michener stated that it is customary in such cases to ask any representative who may be appointed by the Northern Division to represent the Southern Division also.

The following resolution was read:

Whereas, The all-wise power that controls the destinies of men has seen fit to withdraw from our companionship our friend and fellow worker, John Eugene Law; and

Whereas, We realize that for many years our Club has benefited from his unselfish and devoted efforts for its betterment, and that the science of ornithology has been materially advanced through his earnest endeavors to solve many of its complex problems; then be it

Resolved, That we, the members of the Southern Division of the Cooper Ornithological Club, hereby express our appreciation of the great loss that has come to us individually, to our Club, and to the science of ornithology at large; and, be it further

Resolved, That the Secretary be instructed to extend our sympathy to the bereaved family of our friend.

It was moved by Dr. Miller that the resolution be adopted, and that a standing vote be taken. The motion was seconded by Chester Lamb and was carried unanimously. A short note from Mrs. Laura B. Law, expressing her appreciation of the flowers sent to Mr. Law's funeral by the Southern Division, was read.

As there was no regular program the meeting was opened for discussion. Chester Lamb told of some of his recent experiences collecting in Lower California. Dr. Miller reported the finding of fossil bird remains in a new horizon near the breakwater at San Pedro, and of having recently seen a Summer Tanager in Los Angeles. Chester Lamb spoke of having recently seen the Great-tailed Grackle in Las Cruces, New Mexico. Dr. Miller told of the Mearns Quail in southern Arizona hatching young in late August after the rains had brought on spring-like conditions.

J. W. Sugden was present and told how some of the Cooper Club members in Salt Lake City still meet although the Inter-Mountain Chapter has not functioned for a number of years. He also reported the Eastern Kingbird, the Arkansas Kingbird and the Cassin Kingbird to be found nesting within a mile of each other in Utah. He also gave some interesting observations on the nesting waders of the Salt Lake region.

Chester Lamb reported a man at Santa Rosalia, Lower California, who claimed to have taken 11,000 Heermann Gull eggs from the islands in the Gulf of California, and told of others who had taken 6,000 more. The eggs are sold for food.

J. W. Sugden said that the California Gull, the sacred bird of Utah, has been reported to be a menace to the cherry crop in some sections of Utah, picking the ripe fruit from the trees as they fly past. After some further discussion the meeting adjourned.—JOHN MCB. ROBERTSON, *Secretary.*