

ers; and a census of migrating swifts, from which it appears that mortality during migration is of little significance, and that "prudential restraints on the marriage of birds" are an important factor in keeping their number permanent.

The author's observational basis, though not contemptible, is of course dwarfed by the monumental work of Howard: it is no detraction from the latter to point out that before his work began his conclusions had been reached by Moffat, who set them forth in lucid and pleasing language, but buried them in an obscure publication.

1. HOWARD, H. E. 1920. Territory in Bird Life. London. 308 pp.
2. NICE, Margaret H. 1933. The Theory of Territorialism and its Development.
3. NAUMANN, J. F. 1820. Naturgeschichte des Vogels Deutschlands, Bd. 1. Leipzig.
4. ALTUM, Bernard. 1868. Der Vogel und sein Leben. Münster. 168 pp.
5. MOFFAT, C. B. 1903. The Spring Rivalry of Birds. Irish Naturalist. XII. pp. 152-166.

—E. G. McDOUGALL.

*The essential evidence of the territorial guardianship of the male bird is presented by H. Mousley in *The Singing Tree or how near to the Nest do the Male Birds sing?* in *The Auk*, 36: 339-348, 1919, though without developing the theory to its ultimate conclusion.—*Ornith. Ed.*

REVIEWS

FLUCTUATIONS IN NUMBERS OF RUFFED GROUSE, *Bonasa umbellus* (Linne) with special reference to Ontario. By C. H. Douglas Clarke. University of Toronto Studies, Biological series No. 41, pp. 108, several maps. University Press, Toronto, 1936.

Of late years the interest of students has been directed towards the periodic variations in density of wild-life populations. It is evident that in many cases these fluctuations are too regularly recurrent to be the result of adventitious conditions and there has been considerable investigation to discover the laws and causes of the phenomenon. This paper is the result of three years' intensive study of the problem in relation to Ruffed Grouse in various areas in Ontario. Experience has not been long enough for unquestionably final decision upon the critical phases of the question, not even one complete cycle having been studied through, but a large amount of data has been gathered and considerable progress made towards the objective.

The cyclical nature of the accelerated increase in population over a series of years followed by a sudden crash and extraordinary disappearance of numbers followed by repetition of the process is well demonstrated by history and observation. The period of the cycle is between nine and ten years kept with remarkable regularity. Though extending over the whole range of the species and involving some of its allies, it is not synchronized in phase throughout the country, even throughout the province, some localities being as much as half a cycle out of step. It thus does not seem that

general meteorological or astronomical factors are determining causative agencies. Given favourable ecological conditions, the gradual building up of population over a series of years to saturation point does not cause surprise, but the sudden crash at the climax with an epidemic of mortality when all seems favourable is in need of explanation. The mortality seems chiefly to affect chicks, occurs in mid-summer, and prevents the survival of more than a fraction of the normal hatch. How far the adults are involved is not as yet certain. Various disease parasites have been found in association at this time but most of them are allowed only contributory importance in the disaster. One, however, a protozoan blood parasite, *Leucocytozoon bonanasae*, described and named by the author in 1935, is regarded as a more responsible organism than the others and the possible, if not the probable, immediate cause of the wholesale dying off. It is to be noted that a similar *Leucocytozoon*, carried by that pest the Black Fly, has been postulated as having a fatal effect upon young ducks. The similarity of the two cases is suggestive. Granting, as seems probable, that Dr. Clarke is correct in his designation of the immediately fatal organism there remains to be explained the cause and method by which it regularly occurs in epidemic virility with long and definite periods of innocuousness between. When we consider how difficult it has been to understand the etiology of many human diseases when we have cases under full observation and control, we may realize that it may take experience through several or many grouse cycles to master the problem.

In process of, and pertaining to, his investigations, Dr. Clarke has embodied in this report much ecology and life history of the Ruffed Grouse that may be of great value in lines outside the direct objectives of this particular research. — P. A. T.

relief what is lacking in the same to suggest profitable effort. The second and completing part of this paper will be looked for with interest. — P. A. T.

THE DISTRIBUTION OF BREEDING BIRDS IN ONTARIO, Part I, By J. L. Baillie and P. Harrington. pp. 50, one map. Contribution No. 8, Royal Ontario Museum of Zoology. Reprinted from *Transactions of the Royal Canadian Institute*, Vol. 21, Part 1, 1936. University of Toronto Press, 1936.

The above title expresses the scope and bearing of the paper. It summarizes all the definitely established breeding records of the province following the order of the 1931 A.O.U. Check-List from the Loons through the Owls. It is to be assumed that the remainder of the list will follow in a subsequent publication. It is the result of a number of years' investigation of the subject by the Royal Ontario Museum of Zoology and is probably one of the most reliably accurate lists of the kind available. The value of such a carefully compiled and assembled list is not only to summarize and validate present evidences but to throw into visible

FIELD NOTES, Vol. 1, No. 4, October 10, 1936, price 10 cents. A mimeographed quarterly issued by the Junior Field-Naturalists Association (of British Columbia) Editor, Ann Clemens, Nanaimo, British Columbia.

This is quite a professional-looking little journal and evidently the work of a junior organization from the drawn cover to the typing of the text. The contents are surprisingly good and show that the young folks are familiar with good natural history and editorial practice. They include a list of associated members; some short notes; a paper on Nesting Notes of the District about Vernon for 1936 (over a hundred nests noted) by C. David Fowle (a suggestive name for a budding ornithologist); a list of The Higher Animals of the Cowichan District (concluded) by David A. Munro; Notes by John R. Quirk; an account of some faunal aspects of The Forbidden Plateau by Ann M. Clemens; Financial Report and the Regulations of the Association. When the young idea can carry out a scheme like this it speaks well for the nature study of the future. — P. A. T.



Taverner, P. A. 1937. "Fluctuations in Numbers of Ruffed Grouse, by C. H. Douglas Clarke [Review]." *The Canadian field-naturalist* 51(4), 61–62.
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