

BIRD-MIGRATION.<sup>1</sup>

THIS book has been long expected, and it is certainly one worth waiting for. The author remarks "that no country in the world is more favourably situated than our own for witnessing the movements of migratory birds; that there is none in which the many phases of the phenomenon are of a more varied nature; and none in which

indeed, a striking fact that although the book deals almost wholly with the author's own work, it has a completeness and scope far superior to that of any other book on migration. It represents the spare-time industry of a quarter of a century, a remarkable persistence of observation under difficult conditions on lighthouses, lightships, and lone islands of the sea, a resolute courage in facing and accomplishing the dreary task of analysing

the immense masses of data provided by the British Association Committee, and a remarkable restraint in dealing with a fascinating subject which has repeatedly proved itself fatally provocative of romantic treatment. It is scarcely necessary to say that the author has given us from time to time instalments of his results, but here we have a revised and unified presentation of the whole—an achievement calling for the warmest congratulation.

The plan of the book is simple. After a pleasant chapter on antiquated views (such as the "hibernation" theory, which lasted from Aristotle to Gilbert White and longer) and another—tantalisingly short—on some modern views, the author plunges *in medias res*. He classifies our migratory birds—summer visitors, partial migrants, winter visitors, and birds of passage—gives a summary of the movements of these several groups under their seasons, and indicates in a general way—the only possible way as yet—whence they come to us and whither they go from us. The next chapter, on "The Geographical Aspects of British Bird-Migration," is a masterly account of a very complicated subject, with rather more insistence on definite routes than we have been accustomed to from recent writers. Perhaps a more



Photo.]

[W. Norris.

FIG. 1.—Fair Isle: a rift in the western cliffs. From "Studies in Bird Migration."

critical attitude might have been adopted towards the earlier work of Palmen and others. The next three chapters, which are devoted to "Round the Year among British Migratory Birds," bring out very clearly the contrasts between the spring, autumn and winter movements, and there are two valuable appendices giving the dates of the arrivals and departures of the various species. The last general chapter deals with the vexed

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<sup>1</sup> "Studies in Bird Migration." By William Eagle Clarke. Vol. ii., pp. xvi+323. Vol. ii., pp. vii+346+25 plates. (London: Gurney and Jackson; Edinburgh: Oliver and Boyd, 1912.) Price 18s. net, 2 vols.

question of "Weather Influences," and is an admirable instance of careful scientific discussion. So much nonsense has been written on this subject that an authoritative statement is doubly welcome; and not only has Mr. Eagle Clarke had the vast data of the British Association Committee to draw upon, but he has secured the valuable cooperation of Dr. W. N. Shaw, Director of the Meteorological Office.

To those who glibly theorise on insufficient data with regard to migrants' supposed preference for "tail-winds," "beam-winds," and such like, we commend what is said on page 173: "The direction of the wind has in itself nothing to do with the results described. The winds and the performance, or non-performance, of the migratory movements are the effects of a common cause—namely, the particular type of weather prevailing at the time, which may be favourable or unfavourable for the flight of birds to or from our islands." Furthermore we learn that similar conditions—including wind directions—are favourable for a movement both in spring and in autumn, although the direction of the movement is, of course, exactly the opposite at one season to what it is at the other. Thus "south-easterly weather" (a large continental anticyclone to the east of our shores but extending to them, and south-easterly winds in the British area) favours migration across the North Sea in either direction (according to the season), but is unfavourable to intermigration between Britain and Iceland.

The remainder of the book may be divided into two parts. Chapters ix.—xvi. deal in detail with the migrations of eight typical birds—swallow, fieldfare, white-wagtail, song-thrush, skylark, lapwing, starling, and rook. Much of this valuable work is already well known to those who have followed the author's separate papers, but the whole has been thoroughly revised. The second volume and one chapter of the first deal with the author's observations at typical stations round the British coasts—the Eddystone Lighthouse (shown on a "bird-night" in a fine frontispiece by Marian Eagle Clarke), the Kentish Knock Lightship, Fair Isle ("the British Heligoland"), St. Kilda, the Flannan Isles, Sule Skerry (west of Orkney), Ushant (where the author was treated as a spy!), and Alderney. An account is given of the movements observed at each station, and what is known in regard to each species of bird is tersely summarised.

It must be clearly understood that this admirable piece of work is not intended as a treatise on bird-migration, summing up all that has been done by various methods in different parts of the world; it is an account of the author's personal observations and inductions. This explains what we cannot help regretting—the deliberate condensation and reserve of the second chapter, which is intended as a general introduction for the non-expert, as the majority of zoologists, for instance, must in this connection be called. But even for such as these—the most appreciative of all readers after ornithologists proper—the terseness is surely overdone. Let us illustrate. In the few lines devoted to migration in the southern hemisphere an important point has surely been obscured in ignoring the great difference between

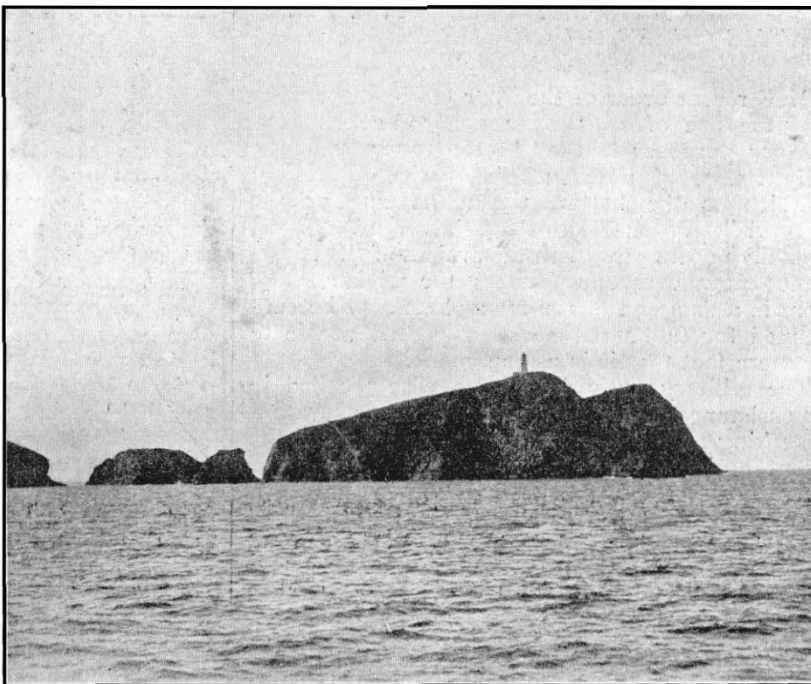


Photo.]

[C. Dick Peddie.

FIG. 2.—Flannan Islands: Eilean Mor from the east. From "Studies in Bird Migration."

migration in the two hemispheres, that while many northern summer birds go far south of the equator to "winter" in the southern summer, only a few petrels and others from the south perform a reverse journey of corresponding extent. Similarly some mention of alternative views on the origin of the migratory habit might well have been given. Again, Mr. Clarke quotes with apparent approval Mr. Chapman's opinion that the recent experimental proof of the homing power of the noddy and sooty terns dispels "the so-called mystery" of how migrants find their way, placing it on a par with "any other instinctive functional activity." But this is an obvious *non sequitur*. Nor does it help matters to describe the special sense of direction (in which Mr. Clarke firmly believes) in Prof. Newton's phrase as "inherited but unconscious experience." An interest-

ing point in this chapter is the author's suggestion that night travelling is an adaptation to the necessity that most birds have of devoting the daytime to the search for food.

The book is lucidly and carefully written and the author occasionally slackens his rein and reveals his power as a stylist, the description of a "bird-night" at Eddystone being perhaps the finest example. There are several good photographs of various stations, notably those of Fair Isle by Mr. W. Norrie, but the chief illustrations are maps and weather-charts—all conspicuous for clearness and simplicity. We have already referred to the admirable first frontispiece. The book is dedicated to the Duchess of Bedford, herself an ardent ornithologist, who has given the author valued assistance.

#### THE QUESTION OF THE BIPLANE VERSUS THE MONOPLANE.

THE recent order of the War Office suspending the use of monoplane flying machines for military purposes has led to the renewal, in the daily Press, of a discussion of the old riddle, "Which is the better, the monoplane or the biplane?" When Blériot crossed the Channel, the daily papers rang with the praises of the monoplane; now everyone favours the biplane, and there is a danger lest the monoplane may be condemned for faults not necessarily attributable to the mere fact that it is a monoplane.

The military authorities have wisely called in the assistance of the National Physical Laboratory in seeking an explanation of why so many of the recent accidents have occurred with monoplane machines. Even if the work placed in the hands of the Teddington department does not extend beyond overhauling and testing the machines used in the Army, the physicists ought to have sufficient scope for arriving at many important conclusions regarding essential features of aeroplane construction. For the purposes of an inquiry of the type proposed, it appears desirable that the same tests should be applied to biplanes as to monoplanes; but the value of the work will be greatly enhanced if the investigation is conducted on general lines, and not confined to the mere testing of the Army machines. It is easy enough to say that when a stay has broken it should be replaced by a stronger one, and to draw up a report which would suffice to enable any defects in existing machines to be patched up, but it is essential for real progress that the Laboratory authorities should have a free hand to assist in the evolution of a more perfect type of flying machine than either the existing monoplane or biplane.

It must not be forgotten that the terms monoplane and biplane usually imply something more than the mere difference between a "single-decker" and "double-decker" (to quote the German equivalents). The former usually has the propeller in front, the latter behind. Thus an inquiry necessarily turns on at least two points, namely, the relative advantages of the single- and double-decker, and whether the propeller is better

placed in front or behind. Further subjects suggested are the gyrostatic effect of the propellers, the relative merits of rotary and oscillating engines, and so forth.

In regard to the first point, it must be remembered that even Lillenthal experimented successfully with the double-decked type; that Chanute, after trying not only "single-" and "double-decked" gliders, but also "multiple-winged machines," finally decided on the glider with two superposed surfaces as the best on which to experiment; that his experiments were continued by the Wrights, and led to their first realisation of artificial flight. One advantage of the two-surfaced arrangement is that, with an equivalent area, the wings can be made of lesser span, and thus the bending moments they have to sustain are proportionately reduced; moreover, these bending moments are much better sustained by the framework, which naturally takes the form of a latticed girder. Of course, from this point of view a triplane would even be better than a biplane, but the gain would be less important.

There would be no difficulty in constructing a "two-decker" with a propeller in front, and, from the point of view of the physicist, the position of the propeller depends largely on whether it is better for the propeller to receive the wash from the planes or for the planes to receive the wash from the propeller. One advantage of the latter plan has not, perhaps, received the attention that it deserves. It must not be forgotten that the action of the propeller sets up a rotation in the "wash" behind it, and, as Sir G. Greenhill has pointed out, so far from being negligible, the amount of this rotation is directly related to the horse-power and rate of revolution of the engine. In fact, the propeller exerts on the air a constant torque, which tends to produce angular momentum, and is equal in amount to the torque of the engine. If, then, the main planes are placed in the wash of the propeller, the rotating air on striking them will produce a difference of pressure on the two sides tending to counteract the corresponding torque on the aeroplane, and the machine will not heel over sideways to the same extent that it would if a single propeller were placed behind. For the purposes of the War Office, the propeller in front is disadvantageous, as it interferes with scouting or shooting from an aeroplane. On the other hand, we have the recommendation of a well-known engineer that the engine should be in front of the aviator, so that the latter shall not be crushed underneath the former in case of an accident.

Apart from these essential differences between monoplane and biplane, great importance attaches to an investigation into the gyrostatic couples caused by both rotary engines and propellers. At present, apart from setting up strains in the framework, which require the latter to be adequately stayed, these cause a mixing-up of the longitudinal and lateral motions of the machine which must necessarily greatly increase the danger of accidents when the machine is being navigated in gusts of wind. It is important that more