

some other part of the book for an explanation of often a long series of numerals—a case of mistaken and vexatious economy. The Appendix contains much interesting matter in the way of geographical and technical notes. His *Zenaida richardsoni* (Auk, IV, 1887, p. 4) he now refers to *Z. zenaida* (p. 138). He adopts the name *Zenaida castanea* Wagl. for what has previously passed currently as *Z. martinicana*, on the ground of the latter name being untenable.

Mr. Cory recognizes four species of Sparrow Hawks from the West Indies, namely *Falco sparverius*, from the Bahamas, etc.; *F. dominicensis*, from San Domingo and Haiti, probably straggling occasionally to eastern Cuba; *F. sparverioides*, from Cuba, where it is represented by a light and dark phase; and *F. caribbeæarum*, from Porto Rica and the Lesser Antilles. He thus differs from Mr. Ridgway's conclusion (Auk, 1891, p. 113) that *sparverioides* is a synonym of *dominicensis*.

The Burrowing Owls from the Bahamas he considers (p. 140) should all be referred to *Speotyto cunicularia floridana*, including his own *S. c. bahamensis*. *Lampornis ellioti* Cory is now referred to *L. virginialis* Gould. On the authority of Dr. L. Stejneger (ined. MS. letter, pp. 147, 148) the generic name *Loxigilla*, long in current use for *Fringilla noctis* Gm. and allies, is supplanted by *Pyrrhulagra* Bon., the type of *Loxigilla* being an Australian species to which and its congeners the name properly belongs. Mr. Cory characterizes as new subspecies *Pyrrhulagra noctis grenadensis* from Grenada and St. Vincent, and *P. n. ridgwayi* from Dominica and the Lesser Antilles situated to the northward of this island. Mr. Cory has also extended critical notes on *Vireo calidris* and its allies, on *V. crassirostris*, and on *Cæreba bartolemica*, etc.—J. A. A.

Dixon's 'The Migration of Birds.'¹—Mr. Dixon is well known as a popular writer on British birds, among which he easily takes high rank. In his present work he has attempted a weighty task, which is no less than a serious attempt "to bring our present knowledge of migration within the limits of order, or to reduce it to law." His book, he tells us, "embodies the result of twelve years of diligent general study and research, and of at least two years' close application and thought, and will, I earnestly hope, serve at least the humble purpose of paving the way towards a more important record." "The whole subject of migration is so vast, so wide reaching, and so complicated, that it would be absurd to regard it as exhausted, and the present volume must be looked upon only as a pioneer."

Mr. Dixon has succeeded in bringing together, in a very readable and suggestive way, an extensive array of general facts bearing upon the

¹ The Migration of Birds | an Attempt | to Reduce Avian Season-Flight to Law |
By Charles Dixon | author of 'Rural Bird-Life,' 'Evolution without Natural Selection,'
. . . . [= 5 lines of additional titles of books, and motto of 3 lines.] London: Chap-
man and Hall, Ltd. | 1892. — 8vo., pp. xvi+300.

subject in hand, mixed with many assumptions which the general reader would hardly be able to distinguish from the really sound data. Here and there, however, are lapses that betray the amateur rather than the scientific investigator, as where at page 69 he speaks of young birds as being "in the normal course of things the first to be in position to migrate; they travel in their first plumage, and consequently are ready to go as soon as they can fly." While this may be true of a few water birds, it is notoriously untrue of the Passeres and the great majority of land birds. Again (p. 66) Swallows and Shrikes are mentioned as birds "in which the plumage is renewed in early spring," in contrast with others in which the "change is undergone in autumn." We fear Mr. Dixon's field experience, at least as a collector, has been limited, evidence of which is unfortunately not lacking in various parts of the work.

The book consists of twelve chapters, having the following headings: 'Ancient and Modern Views of Migration'; 'Glacial Epochs and Warm Polar Climates'; 'The Philosophy of Migration'; 'Routes of Migration'; 'Emigration and Evolution'; 'Internal Migrations and Local Movements'; 'Nomadic Migration'; 'The Perils of Migration'; 'The Destinations of the Migrants'; 'The Spring Migration of Birds'; 'The Autumn Migration of Birds'; 'Migration in the British Islands.' These titles serve to give a general idea of the character of the book.

In the first chapter some fifteen pages are devoted to a discussion of the theory of hibernation, the author reciting the well-worn evidence and familiar arguments in its favor, the former dating from the seventeenth century onward; he adduces nothing new on the subject. "Hibernation," he says, "so far as we can learn, only applies to a few individuals, and no species of bird has yet been discovered in which the practice is universal, if we except conditionally the [American] Swift (*C. pelagica*), to which allusion has already been made. As for myself, I neither accept nor deny it, having personally seen nothing to refute or confirm it, although fully believing it possible," etc.

Mr. Dixon generalizes with great freedom respecting all of the more prominent features of the general subject of migration, often thereby disclosing an ignorance of the facts in the case naturally to be expected in one who has a ready explanation for nearly every problem. Thus at page 24, after instancing the various degrees of migration exhibited in different species, he says: "From the above facts, we may propound the law that wherever the breeding area of a species intergrades with its winter range, migration among individuals breeding in the infringing districts has been suffered to lapse." In this country the contrary is well known; while this 'infringing district' may be permanently occupied by the species, it is evident that it is not occupied the whole year by the same birds; the summer representatives moving more or less to the southward in winter and their places being taken at that season by birds of the same species which have passed the breeding season further north.

Respecting the cause of migration we have the following: "Birds migrate from necessity, not from choice; . . . I do not know of any

instance where some or all of the individuals of a species quit their breeding-grounds unless compelled to do so by severity of climate, failure of food, or both" (p. 24). "Amongst birds in which the habit of migration is dominant, the impulse to migration is unquestionably instinctive, in the sense of being transmitted from parent to offspring, which has become so deeply rooted in the uninterrupted course of countless ages of passage to and fro, that in many species nothing but death can eradicate it. . . . This desire to migrate gradually becomes an overwhelming desire, before which all other inclinations bow, and at last the great flight is commenced. But here instinct, hereditary desire, ceases its sway; reason, memory, knowledge of locality and perception take its place" (p. 26). Again he says (p. 70): "It must not be supposed, however, that because the impulse to migrate is inherited from their parents, the *ability* to do so is equally hereditary. That has to be acquired; the road has to be pointed out by the more experienced guiding birds, and the long, often circuitous, route has to be *learnt* by the experience of not one but many annual journeys to and fro."

How this is brought about, Mr. Dixon proceeds to explain. The pioneers, the "*avant-courrières* of the migrating army," he tells us, are the barren or unmated birds which have no home ties, or else those that have lost their eggs or young broods, and are thus free from any restraining influence due to parental instinct, in which "the desire to migrate often becomes so prematurely strong that they begin to leave their summer quarters in some cases even before their moult is absolutely completed." The young birds of the year are next to follow, as, since "they travel in their first plumage," "they are the first to be in position to migrate," and "consequently are ready to go as soon as they can fly." (!) "A week or so after the young birds have left, the adult males begin their migration, having got over the moult a little earlier than the females, the latter being delayed somewhat by maternal duties, so that their departure is a little later still. The rear of the great migrating army" is brought up by the halt and the lame, or by birds delayed "from various causes," either in starting or on the way. In the spring migration the order of return is somewhat reversed, the adult males going first, followed soon by the females, later by the young of the previous year, and last of all by "the weakly and the wounded." "Unquestionably the one grand dominating impulse of migration in spring is reproduction" (p. 202).

We have thus the complete history of the migratory movement, including its causes, manner of inception, and the methods of its execution, down to even minute details. Unfortunately, however, many of his statements are purely assumptions, impossible of verification, and often improbable, though given with the positiveness of observed facts; and he fails to note their occasional lack of harmony, amounting in some instances to complete contradiction.

He states that "we can only make the wildest guesses at the time occupied by individual birds in reaching their summer or winter quarters. . . . Probably migrating birds do not average more than 300 miles per

day, during their journey north or south." A little attention to the report on 'Mississippi Valley Bird Migration,' by Professor Cooke (which, by the way, there is nothing in the book to show that our author ever heard of) would have shown that we are not left to the "wildest guesses" on this subject, or that anything like an average journey of "300 miles per day" is ordinarily made by birds while on migration. The Dotterel (*Eudromias morinellus*), which "breeds on the tundras of Arctic Euro-Asia, and winters in Africa, north of the Equator," he supposes to make the "enormous flight of quite 2000 miles" between these two points, "without a rest, and between sunset and sunrise,"—or, to put the case more definitely, by flying at the rate of 200 miles an hour from 7 P.M. of one day till 5 A.M. of the next—an average rate of three and one-third miles per minute for ten consecutive hours! "Each migratory bird," he says, "must have a wonderful knowledge of the topography of its own particular routes, aided by its marvellous power of memory and keenness of sight. I would suggest, however, that the migration flight reaches its highest altitude when passing over seas. These offer no landmarks, no bearings, nothing that may serve as a guide; consequently the line of flight rises to a sufficient altitude to enable the bird to bridge the passage with its keen powers of vision." Besides: "The mere mechanical labour of flight is rendered much easier of performance in the more rarefied atmosphere of these lofty regions of space."

Although the author so modestly characterizes his book "as only a pioneer" in this interesting field, where previously was merely a "chaos" of "raw and tangled data," the reading of the two chapters entitled 'The Philosophy of Migration,' and 'Routes of Migration,' to say nothing of the one on 'Glacial Epochs and Warm Polar Climates,' begets the feeling that if all Mr. Dixon says is to be taken as sound "Philosophy" and knowledge "reduced to Law," little is left for future investigators to settle among all the many hitherto troublesome problems relating to the migration of birds. However extensive Mr. Dixon's researches may have been into the literature of the subject, he rarely gives his readers any clue to the sources of his information, or any opportunity for verification of alleged facts. There is, in fact, hardly a direct citation of any work or paper on the subject, excepting a few references to some of the author's former works, and a few references given in the chapter in which the subject of hibernation is treated. Many of his assumptions and theories, however, are not new.

For the most part the author's treatment of the subject is more or less oracular. His agreeable style and considerable power of imagination, aided by a fair conception of the general subject, despite a rather loose grasp of the underlying facts, will doubtless render his book an attractive one to the general reader, and a profitable venture for both author and publisher. The book, though at many points untrustworthy, is suggestive, and it may be read with interest and profit by even those who may not approve of all of the author's generalizations. — J. A. A.