

craft, have enabled him to bring together a most wonderfully interesting and instructive series of pictures of wild birds in life, illustrating the nesting habits, poses, and manner of flight of a large number of species, some of which have not heretofore been so successfully and fully portrayed by the camera. The scenes visited include not only many portions of the Atlantic coast from the Florida Keys to Labrador, but many points in the interior. The accompanying text is always pertinent, and full of first-hand information, rendering the book of permanent value as a record of bird-life. The publishers have done their share in making the book attractive in its general make-up, and in the care evidently bestowed upon the reproduction and printing of the illustrations.—J. A. A.

Sharpe on the Birds of the Antarctic Regions.¹—Naturally the list of species here treated is not large, numbering only 25, and consists wholly of Water Birds, of which 3 are Penguins (Sphenisciformes), 17 are Procellariiformes, 4 are Lariformes, with a single species of Cormorant (Pelecaniformes). Nearly half of the text and nearly all of the text illustrations relate to the Adelia Penguin (*Pygoscelis adeliae*), of which there are two colored plates, representing the adult, the young, and the eggs. Under each species is given first its synonymy and other bibliographical references, with a list of the specimens brought home by the expedition, followed by appropriate biographical matter. Much of this is compiled from the reports of previous Antarctic expeditions, thus bringing together practically all that is known of the life-histories of the species treated. Many extracts are made from the private diary of the late Nicolai Hanson, the naturalist of the 'Southern Cross' Expedition, who died before the conclusion of the voyage.² The fourteen half-tone illustrations, from photographs of the Adelia Penguin rookeries, of the birds singly and in groups, in various attitudes and under diverse conditions, afford a most welcome contribution to the life-history of this exceedingly interesting species.—J. A. A.

Butterfield on Bird Migration.—In a recent paper entitled 'Remarks upon some theories in regard to the Migration of Birds,'³ Mr. J. Ruskin

¹ Report on the Collections of Natural History made in the Antarctic Regions during the Voyage of the "Southern Cross." 8vo, London, 1902. Published by order of the Trustees of the British Museum (Natural History). IV. Aves. By R. Bowdler Sharpe, L. L. D., F. R. S., etc. Pp. 106-173, pll. (col.) vii-x, and numerous half-tone illustrations.

² This diary, translated from the Norwegian language by his father, Anton Hanson, forms Part III (pp. 79-105) of the Report on the Collections of the 'Southern Cross,' and is a most valuable contribution to the natural history results of the Expedition.

³ Remarks upon some Theories in regard to the Migration of Birds. By W. Ruskin Butterfield. *Novitates Zoologicae*, Vol. XII, pp. 15-20, Jan., 1905.

Butterfield comments briefly, considering the breadth of the subject, on a few of the many theories respecting the origin, manner, and causes of the migration of birds. His criticisms are mainly destructive rather than constructive, and he offers us little in the way of a clear and sharp formulary of even his own views on the several points discussed. His remarks are grouped under the subheadings (1) 'Incentives to Migration,' (2) 'Migration Routes,' (3) 'How do Birds find their Way?' and (4) 'Origin of Bird Migration.'

Taking the last topic first, the author seems to accept, in a general way, the hypothesis that "the changes of climate induced in the northern hemisphere by the decline of the Glacial Period as the ultimate cause of migration in this part of the globe"; although, under present conditions, "the migratory impulse tends to strengthen in some forms and to weaken in others." He cites the case of the varying degrees of migration presented by different forms of the Horned Larks; but almost any widely dispersed group of closely related birds offer equally pertinent illustrations of this rather obvious condition.

Under 'Incentives to Migration' he believes that too much stress has been laid upon "scarcity of food" as the impelling cause of the autumn migration, inasmuch as in species of wide latitudinal dispersion, the places of individuals that live in the middle districts are taken, for a time, later in the season, by individuals of the same species from further north. "While admitting," he says, "that want of sustenance may prompt the autumn migration in some cases, it may be doubted whether it is so important a factor as is generally supposed." He believes that the completion of the moult and (in adults) "the decline of the stimulus of reproduction" are also factors. The first is undoubtedly an important one in the case of certain groups of birds, as the Anserine series and some others, which suffer simultaneous loss of the wing-quills during moult and are thus for a time almost flightless, and it doubtless affects others less effectually crippled by the annual moult. It is also true that many migratory species of birds lead a less sedentary life after the close of the breeding season, and in many cases become wanderers, quite deserting their immediate breeding grounds, and in some cases even depart for more southern latitudes long before the decline in either temperature or (apparently) the food supply would necessitate such a movement. Yet, sooner or later, migration from these causes would become compulsory, and while under present conditions few migratory species wait for a crisis from such conditions before moving from their breeding stations, it is hardly to be doubted that far back in the history of bird migration they were the impelling factors. They may even still be accounted as the primary cause, and that for reasons not at present quite clear to us many species anticipate the ultimate necessity by a movement somewhat in advance of compulsory conditions, they being free to roam at large as soon as the restraining duties of reproduction are fully past.

Regarding the incentive to the spring migration, Mr. Butterfield hardly

makes his opinions clear. While apparently not discarding the idea that the spring movement is incited by the periodic activity of the reproductive organs, he seems hardly to adopt it; and cites the "demonstrations" of Cooke and Clarke of "the importance of temperature as a factor," only to say that "the remarkable uniformity of climatic conditions prevailing in the Tropics makes it clear that we must look elsewhere for an explanation of the departure of migratory species which winter in this zone."

That the incentive is primarily physiological seems more and more to be confirmed with the advance of our knowledge of the manner and conditions of the movement. That temperature is a powerful regulating factor as regards the rapidity of the journey after the birds are under way, the researches of Cooke and others may be considered as having unquestionably demonstrated. That warm and cold changes in the weather respectively accelerate or retard the northward bound birds in their spring journey is at least one fact in bird migration that is not open to question.

Respecting the impulse to migrate in spring, the following from a paper on the 'Origin of Bird Migration' by Mr. F. M. Chapman, published some ten years ago (*Auk*, XI, Jan. 1894, pp. 12-17), may well be recalled in this connection: "Many animals," he says, "have an instinctive desire for seclusion during the season of reproduction . . . Many species of tropical sea-birds resort each year to some rocky islet, situated perhaps in the heart of their habitat, where they may nest in safety. This is not migration in the true sense of the word, but nevertheless the object is the same as that which prompts the Plover to migrate to the Arctic regions, and, be it further noted, the movement is just as regular. These sea-birds pass their lives in the tropics, their presence or absence in any part of their range being largely dependent upon the food supply. But, as in the case of a Warbler which nests in Labrador, they are all affected at nearly the same time by an impulse which urges them to hasten to a certain place. This impulse is periodic and is common to all birds . . . It is evident, therefore, that external conditions have not created this impulse, though it is possible that in many instances they may have governed its periodicity. On the contrary, its causes are internal. In the case of the sea-birds, for example, dissection will show an enlargement of the sexual organs and it is this physiological change which warns the birds that the season of reproduction is at hand"

Under 'Migration Routes,' and 'How do Birds find their Way?' the author's remarks presents little that calls for comment, being for the most part a brief reference to more or less generally accepted views. He is inclined, however, to combat the idea that birds either follow, or are guided in their journeys by, physical features. He says: "Where physical features are followed, we may be sure it is not from the guidance they afford, but because they mark out convenient highways." This assertion appears to be based on what "the Swallow" does in England; from which he concludes: "In the great masses of land, the guidance afforded

by following rivers or mountain ranges would, as often as not, lead birds right out of their course." In the first place, the conditions furnished by a small island like England are far from those that characterize a large continent, like Europe-Asia or North America. In the second place, we are unable to recall where it has been alleged that birds follow, in their long migratory journeys, either mountain ranges or large streams. Our author says: "There is some indubitable evidence that migration at times proceeds at great heights." The claim is, so far as we are aware, that birds passing at these great heights are able to see the leading features of the landscape beneath them, and that, presuming birds to have memory, they may be thus guided by the principal physical features of the country over which they are passing, and thus follow or cross mountain ranges or river valleys or coast lines as their route may require.

Just how, or by what means, birds find their way our author fails to tell us, though he admits belief that "birds possess a sense of direction," for how else could Albatrosses and other pelagic birds find their way back, at the proper season, to their breeding stations; in other words, he says: "The faculty whereby they direct their flight back to their breeding stations, over hundreds [sometimes thousands] of miles of open water, is doubtless akin to that exhibited by savages and pigeons." There is doubtless a problem here man will strive long to fathom before reaching a wholly satisfactory solution, but the suggestion made by Mr. Austin H. Clark in the April (1905) issue of this Journal (Auk, XXII, pp. 134-140), that the prevailing winds of certain latitudes, especially the trade-winds, may be an important aid, particularly in the case of pelagic wanderers, seems at least worthy of serious consideration.—J. A. A.

Riley's 'Birds of the Bahama Islands.'¹—In this paper is given a carefully prepared summary of our present knowledge of the ornithology of the Bahama Islands, consisting of a list of the 204 species and subspecies known to occur there, and notes on their relative abundance and manner of occurrence, preceded by a résumé of ornithological explorations in the archipelago, and by eight pages on 'The Zoögeographical Position of the Bahama Islands.' The 44 endemic species are considered with reference to their derivation or origin. Of these 14 appear to have reached the islands from the eastern United States by way of Florida, and 17 from the Greater Antilles, chiefly by way of Cuba, leaving 13 of doubtful or fortuitous origin.—J. A. A.

¹ Birds of the Bahama Islands. By Joseph H. Riley, Aid, Division of Birds, U. S. National Museum. From 'The Bahama Islands,' pp. 347-368. Published by the Geographical Society of Baltimore, 1905, George Burbank Shattuck, Ph. D., editor.