

tion, that is, a counterclockwise northward flow of relatively warm, saline, Pacific and subarctic neritic water and a clockwise westward flow of colder and less saline polar water meeting along a seasonally fluctuating boundary east of Point Barrow. He concludes with possible economic implications of differences in biological productivity between these two marine regions.

Although the author's general conclusions will probably be substantiated by further investigations, the reader might wonder whether vertical tows (100-0 meters) alone provide samples of surface plankton that are adequate for correlation with surface circulation in these relatively shallow coastal plain regions. The hydrographical significance of the distribution of larval barnacles would have been illustrated more positively had they been specifically identified; at least two and probably three or more species of these dominant benthic crustaceans having different ecological requirements and different distributions were probably involved. The author has ascribed geographical differences in the abundance of zooplankton to the relative shallowness of the western region which is more favorable to the neritic plankton, and to the strong river-derived influx of fresh water in the eastern region which would presumably suppress stenohaline marine forms. In this respect further investigation might show to what extent the greater prolongation of ice cover in the eastern region would be accompanied by decreased production of zooplankton through decreased wind stirring and upwelling bottom nutrient materials, and through decreased light penetration and reduced photosynthetic activity of phytoplankton in surface waters.

E. L. BOUSFIELD

### **The Bird Biographies of John James Audubon**

Selected and edited by ALICE FORD. New York, The Macmillan Company and Toronto, Brett-Macmillan Ltd., 1957. 12 plates, 282 p. \$10.00.

A great many naturalists know Audubon almost entirely through the plates of *Birds of America*, either the original elephant folio or octavo editions seen in some library or museum, or the Macmillan reproductions. Their acquaintance with his writings is largely confined to brief quotations in books or articles by modern authors. The editor and publishers have accordingly performed a definite service in presenting the first edition of Audubon's *Ornithological Biography* to appear since 1870.

The biographies were published, between 1831 and 1839, to serve as a text for the original elephant folio edition of *Birds of America*. In a foreword to the present selection of biographies Miss Ford tells us something of how Audubon struggled to complete this work. We all know people who seem to be struck by agraphia when required to write a report upon their observations. Audubon must have suffered severely in this respect. "For my part," he wrote despairingly to Bachman, "I would rather go without a shirt, or any inexpressibles, through the whole of the Florida swamps in mosquito time than labor as I have hitherto done with the pen." He had more cause than many to find his writing laborious, for his formal education had been sketchy, and the notes from which the account of each species had to be prepared were scattered through old journals in which they had been jotted down with no thought of future publication.

Miss Ford has selected eighty of the most complete and satisfactory biographies for her book. This seems a small proportion of the total; but she points out that many of the accounts are fragmentary, or are based on extralimital species, western species that Audubon never saw alive, or misinterpreted color phases or immature specimens. The chosen accounts are taken in part from the original *Ornithological Biography* and in part from the revised text that accompanied the octavo edition of *Birds of America*.

Within the selected accounts editing has been kept almost to a minimum. Modern bird names are given as necessary to avoid misunderstanding. Other errors or inaccuracies are generally ignored with the curious exception that many of Audubon's figures for clutch size are emended in footnotes. With almost nothing but his own observations to draw upon, Audubon generally could not give the full range of clutch, and the editor has in many instances supplemented it with a figure of her own. Unfortunately the corrected figure is often highly arbitrary and sometimes little or no better than Audubon's. These slightly aggravating notes might better have been left out and the reader simply reminded that the accounts contain errors and half-truths that would be inexcusable in a book written today. The selected accounts actually contain much more explicit errors than the ones that are corrected by the editor. Such are the statements that the tree-nesting ducks carry their young to the ground, and that the teals are



the fastest of the ducks—two favorite errors of many a later author.

Despite its incompleteness, this book will give the reader who does not have ready access to an ornithological library a greatly enhanced appreciation of Audubon as a naturalist rather than merely as an artist. Nevertheless a prominent feature of this book, and one that partly accounts for its price, is that it includes twelve of Audubon's drawings that most of us have never seen. These hitherto unpublished drawings in the possession of Harvard University, some in water color and some in pastel, have been excellently reproduced by four-color photogravure. As Audubon himself protested, many of the plates in *Birds of America* acquired a harshness, particularly of the feathers, at the hands of the engraver. The illustrations reproduced in this volume show, by contrast, a delicacy and softness that are astonishing.

All in all, this book provides the public with a fresh insight into Audubon's achievements both as an artist and as a keenly observant field naturalist.

D. B. O. SAVILE

### The Mammals of Keewatin

By FRANCIS HARPER. Lawrence, University of Kansas Museum of Natural History (Copies available from Arctic Institute of North America, 1530 P Street N.W., Washington 5, D.C.), 1956. 6 plates, 8 fig., map, 94 p. 75 cents postpaid. (Miscellaneous Publication No. 12)

This is the eleventh publication to appear about the results of a six-month field study which Dr. Harper carried out in 1947 on the west side of Nueltin Lake, District of Keewatin, N.W.T. The paper is a record of information obtained by Dr. Harper together with accounts of other investigators. It is an attempt to present in one volume current knowledge of Keewatin mammals.

Short treatments are given the physiography and vegetation of the study area, and of the comparative abundance of species. Harper has used the nomenclature of Miller and Kellog (1955) for his taxonomic categories. Sixty-eight pages are devoted to the accounts of 34 species with an additional page and a half to 13 other terrestrial forms. A systematic list of mammalian ectoparasites, with host records completes the presentation of data.

Harper's most valuable contribution is his section on rodents. Habits, reproduction,

pelage, changes and ectoparasites are some of the topics he discusses. The section on carnivores is less extensive, with the exception of his treatment of the tundra wolf. The ungulates receive relatively little consideration.

Harper's field work was largely restricted to the Windy River area, and much of the original data in the paper came from the observations of Charles and Fred Schweder, then about 12 and 19 years old, respectively, of that region. For these reasons, the title of the paper is somewhat misleading, for Keewatin District is a large area of some 228,000 square miles. More properly, perhaps, the title should read "Mammals of the Windy River Area, Keewatin District, N.W.T., with notes on other Keewatin mammals."

It would be a rare paper with which one could find no fault and Harper's is no exception. Taxonomic usage can be a matter of personal interpretation, but one wonders why the genus name *Spermophilus* was used. One could wish for a standard presentation of measurements and weights of the rodents, particularly in tabular form.

In his discussion of the Arctic hare *Lepus arcticus andersoni*, Harper emphasizes its migratory character. One might argue for a dispersal onto the barrens rather than for a real migration. Because a youth has never seen evidence of a fox, red or Arctic, or a wolf catching Arctic hares, the reader shouldn't assume that hares are invulnerable to those predators. This reviewer has seen enough hare remains in the scats of wolves and Arctic foxes, as well as having observed a wolf catch a hare, to know otherwise.

If white whales are considered to be Keewatin mammals, one wonders why walrus and the several marine seals weren't also included in the paper. The size of a big white whale is given as 25 feet. This must be a typographical error, as a 15-foot animal would be large. Of 699 white whales measured in 1952 at Churchill, Manitoba, the longest was 13 feet 6 inches.

There are many other records of polar bears apart from those centering in Churchill, Manitoba, to indicate their presence in Keewatin District, particularly on Simpson Peninsula and Southampton Island. The more frequent recent records of red foxes and moose for Keewatin reflect a northern spread of these species.

It is to be regretted that Harper did not discuss the barren-ground caribou to a greater extent, for not all readers will have access to





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