ing in antituberculosis measures, but no appointments were actually made in 1918. A commission for the prevention of tuberculosis, at the head of which was Dr. Livingston Farrand, opened a campaign in France in July, 1917. Although there were in existence examples of every agency effective in combating tuberculosis, they were few in number and there was no centralized organization for a combined attack on the disease. The commission, in cooperation with the Tuberculosis Bureau of the American Red Cross, set about demonstrating the value of "team play" by organizing and coordinating the essential agencies. In 1918 four central dispensaries and six secondary centers were opened. Nurses attached to these centers visited patients at their homes; the Red Cross provided hospital accommodation, opened sanatoriums, and supplied food and clothing. Efforts were made to establish local committees in the leading towns. At the time of the first visit twenty-one dispensaries were in existence in twenty-seven departments. By the end of the year fifty-seven new dispensaries had been opened, twenty others were in process of installation, and plans had been agreed upon for forty-nine more. Besides these dispensaries, fifteen laboratories were in course of establishment and forty new committees organized. An active propaganda was carried on throughout the country by means of "tanks," posters, lectures, demonstrations, pamphlets, postcards, exhibits and games. The services of the press and of art were enlisted as agents in the education of the people. The Foundation has also made experiments in the control of malaria. In four towns in Arkansas measures for the extermination of anopheline mosquitos were carried out with marked success. By draining and filling pools, ditching sluggish streams, and oiling surface water, the breeding of the insect was almost entirely prevented. The results were striking. In Hamburg, Arkansas, the number of visits paid by doctors to patients suffering from malaria fell from 2,312 in 1916 to 259 in 1917 and to 59 in 1918, a reduction for the period of 97.4 per cent. In four other communities the percentage of reductions varied from 95.4 to 80 per cent. In Sunflower county, Mississippi, it was believed that a malaria control of 80 per cent. was achieved. In regions where surface water can not be dealt with "carriers" are looked for and treated. In Guatemala an epidemic of yellow fever was checked. Work for the relief and control of hookworm disease was carried out in cooperation with twelve states of the union and with twenty-one foreign countries. In China the construction of the fifteen buildings of the Peking Union Medical College College was steadily proceeded with in 1918. An account of this institution was given in the *British Medical Journal* of August 2, 1919. On account of the glazed green tiles used to cover the roofs the College is called by the Chinese "the Green City."—*The British Medical Journal.*

## SCIENTIFIC BOOKS

*Life Histories of North American Diving Birds, Order Pygopodes.* By ARTHUR CLEVELAND BENT. Bull. 107, U. S. Nat. Mus., August 1, 1919. Pp. i–xiii; 1–245; Pls. 1–55.

Since the discontinuance of Major Charles E. Bendire's "Life Histories of North American Birds" there has appeared no comprehensive work on this subject. Students of the life and behavior of most North American birds have been much handicapped by the lack of published information, and the widely scattered character of such as is available. In preparing a biography of a North American bird it is frequently still necessary to turn back to the works of Audubon and Wilson for data. In few groups is this lack more evident than in those that form the subject of the present work, *i. e.*, the three families, Colymbidæ (grebes), Gaviidæ (loons), and Alcidæ (auks), unwisely associated in the "Order" Pygopodes of the classification of the Check-List of the American Ornithologists' Union.

The present author has done science a service by bringing together and presenting in serviceable form the obtainable data on these groups of birds. From a large number of ornithologists to whom due acknowledgment is made, the author has received original con-

tributions or other assistance. The geographic distribution of the various species has been largely compiled by Dr. Louis B. Bishop and Mr. F. Seymour Hersey, while the biographies of two species—*Fratercula arctica arctica* and *Plautus impennis*, have been written by Dr. Charles W. Townsend. An effort has been made to have the account of each species as complete as possible, and judicious quotations from literature have been used whenever original information was not available; yet, as is with naïve modesty said in the author's introduction, "No one is so well aware of the many shortcomings and omissions in this work as the author. Allowance must be made for the magnitude of the undertaking. If the reader fails to find mentioned in these pages some things which he knows about the birds, he can blame himself for not having sent them to the author."

The method of treatment is decidedly modern, and facilitates reference to any portion of the information presented. Each one of the 36 species and subspecies is treated separately, but undue repetition is avoided under subspecies. These individual biographies range in length from less than two to nearly thirteen pages, and, notwithstanding their scientific accuracy, are for the most part pleasantly written. The account of the loon (*Gavia immer*) is particularly interesting. We are sorry to see, however, that the author still retains the possessive case for common names of birds dedicated to individuals.

The data under each species is arranged in two general categories, "Habits" and "Distribution." Under the former the subheadings are arranged, it will be noticed, as far as possible according to the sequence of the seasons. "Spring," "Courtship," "Nesting," "Eggs," "Young," "Plumages," "Food," "Behavior," "Fall," and "Winter." Under "Distribution" appear "Breeding Range," "Winter Range," "Spring Migration," "Fall Migration," "Casual Records," and "Egg Dates." Of course, owing to the lack of information, all these headings are not to be found under every species. An introductory paragraph under "Habits" gives general information that could not be satisfactorily distributed under the subheadings.

Under "Spring" general information is given regarding spring migration and habits during this period and until the breeding season, except that relating to courtship, which is reserved for a special paragraph. "Nesting" includes the dates of breeding, the location and description of the nest and its environment, and the habits of the species during this period. The paragraph on eggs concerns their number, character, color, dimensions, incubation, and similar facts. The section devoted to the young gives principally their habits until they are able to take care of themselves, together with the manner in which their parents provide for them. Under the heading "Plumages" there is a great deal of original and valuable information, including more or less complete descriptions of the various stages of plumage and succession of molts from that of the nestling to that of the adult, which in the birds covered by the present contribution has been little understood. Under "Food" there is given a résumé of the present knowledge of the kinds of food and their relative importance, together with notes on feeding habits. Under "Behavior" there is a general account of the various activities of the birds, particularly their flight, swimming and diving habits, vocal powers, general actions, and their enemies. The paragraph headed "Fall" concerns chiefly the autumn migration and the habits of birds during this period; and that relating to "Winter" contains similar data.

The information regarding geographic distribution has evidently been worked out with considerable care, and is one of the most valuable parts of this bulletin. For this purpose indebtedness is acknowledged to the files of data in the Biological Survey of the United States Department of Agriculture. The breeding range is given in considerable detail and, as we like to see it, with the limits in each direction outlined. The same is true of the winter range. In "Spring Migration" and "Fall Migration" no general statement of routes is given, but simply various data of arrival and departure at different points through-

out the North American ranges of the species. The casual records are added separately, but, we regret to see, with altogether too little specific data. The egg dates are generalized records taken from a great mass of data and are usually given for one or two states with only inclusive dates.

Disclaiming any attempt at critical treatment of the questions of relationship, our author, however, occassionally adds comments of this character. One of the most interesting of these relates to that peculiar form *Uria ringvia,* which some ornithologists consider a distinct species, and others a mere aberration of *Uria troille.* Mr. Bent presents the data on both sides of this question, but seems to think that the bird is a distinct species. Other important critical remarks are given under *Gavia arctica arctica,* which is shown to be extralimital so far as North America is concerned. The records ascribed to this are considered all properly referable to the recently described *Gavia viridigularis* Dwight, which is here treated as a subspecies of the European *Gavia arctica.*

"The Life Histories of North American Diving Birds" is unusually well illustrated. The 43 black and white full-page plates represent nearly twice that many scenes in the life of the various species, and consist of half tones showing habitat, nests, eggs, young, and sometimes also adult birds; many of these are of much scientific interest and add greatly to the instructiveness and interest of the book. The 12 colored plates represent the eggs of many of the species. These are apparently of natural size, but there is, unfortunately, no indication on the plates or elsewhere that this is the case.

It is manifestly impossible in the brief space of a review to do justice to this work, crowded as its pages are with information; but one thing we may say, and with truth, that "The Life Histories of North American Diving Birds" is one of the most important contributions to North American ornithology, and will for a long time be the recognized authority on biography of the species that it treats.

HARRY C. OBERHOLSER

## SPECIAL ARTICLES

### VISIBILITY OF BRIGHT LINES

THERE has been a material amount of investigation regarding the visibility of dark lines against a light background. Seeing a linear object is much easier than seeing a spot of similar minimum dimension, and totally different from resolving parallel lines, which must be distinct as a whole before there is the least chance of resolution. In general terms distinct lines or spots can, with difficulty, be resolved when distant 1′, to judge from the average of many experiments,[1] depending on relative contrast of the objects and other experimental conditions, and barring occasional cases of highly abnormal acuity, $V = 5$–$8$, such as those reported by Cohn.[2] A single spot, white on black or black on white can be detected by one with fairly keen vision down to a diameter of 30″, by an occasional observer to half this value, again depending on conditions and background, with some advantage on the side of white on black as being less adversely affected by irradiation. A careful distinction should be drawn between the case here considered of contrasted bodies returning light diffusely, and that of directed specular reflection as from a mirror reflecting the sun. This latter visibility, as in the observation of a star, seems to depend chiefly on the minimum stimulus value for the retina under the existing conditions of adaptation. Humboldt records in his "Cosmos" the observation of a heliograph mirror when subtending an angle of only 0″.43, and Professor Hosmer (M.I.T.) tells me that his students could readily pick up signals from a very small heliograph at about 20 miles—angle subtended a scant 0″.2.

Some experiments by Barnard[3] with a dark wire 0″.009 inch in diameter showed that it was visible when suspended against moderately bright sky up to 356 feet, angle subtended 0″.44. a figure down to something like 1/60 the diameter of the smallest spot ordinarily visible.

[1] Nagel, "Handbuch d. Physiologie d. Menschen," III., 340.

[2] *Berl. Klin. Woch.,* 1898, 20–22.

[3] *Pop. Ast.,* 1898, p. 1.