

bark of trees. Tabulated statements are given of the percentages of different kinds of food found in the stomachs of the species examined, and excellent uncolored illustrations are given of five of the seven species treated.

Mr. Lucas describes and figures the tongue as found in 11 species, representing all the genera of North American Woodpeckers, and reaches the conclusion that the evidence thus gathered "favors the view that modifications of the tongue are directly related to the character of the food and are not of value for classification." Granting that the facts are as stated, we are reluctant to agree with Mr. Lucas's conclusion, for on the same grounds we should have to rule out of the list of taxonomic characters any structural feature adaptatively modified to special modes of life; and these involve, in a more or less marked degree, every part of the organism. It would be very surprising if the form of the tongue should not vary markedly in accordance with the nature of the food and the manner of obtaining it. Mr. Lucas's descriptions and figures of Woodpeckers' tongues is a welcome and valuable contribution to the subject treated, which is, furthermore, one of great interest.—
J. A. A.

Barrows and Schwarz on the Food of the Common Crow.¹—This extended report on the food of the Crow (*Corvus americanus*), based on the examination of about 1,000 stomachs, from Crows killed throughout the year and over a very wide extent of country, shows with some degree of accuracy and detail the real nature of the food of this much maligned and commonly outlawed bird. Everybody has long known that Crows pull the farmer's sprouting corn, and will pilfer a little fruit, and destroy the eggs and young of poultry and wild birds. The good they do has not been so evident, although they have been generally credited with feeding to some extent on cutworms, grasshoppers, field-mice and reptiles. The present Bulletin shows statistically and in detail the proportionate amount of the animal and vegetable food consumed by the Crow and the principal elements of which it consists. The verdict on the whole is decidedly favorable to the Crow, his worst trait being his decided predilection for the eggs and young of our native birds. Of 616 Crows killed during April, May, June, and July, 50 had in their stomachs when killed the remains of wild birds or of their eggs. As many of these 50 Crows were nestlings, Professor Barrows concludes "that not more than 1 Crow in 20 ever becomes addicted to this sort of stealing"—a generalization for which we fail to see adequate basis in the data presented. We should rather say that not more than 1 Crow in 20 habitually partakes of the

¹ Bulletin No. 6 | U. S. Department of Agriculture | Division of Ornithology and Mammalogy | The Common Crow | of the | United States | — | By Walter B. Barrows and E. A. Schwarz | [Seal] | Washington | Government Printing Office | 1895. 8vo., pp. 96.

young or eggs of wild birds, during the four months named, as a part of its daily diet. For we do not believe, from what we have seen of Crows in life, that 86 per cent of the race are too virtuous to indulge in such dainties when the opportunity is available. Professor Barrows says: "The actual quantity of bird remains found in the stomachs is comparatively small. In very few cases did it form as much as half of the entire stomach contents, though in one or two stomachs it exceeded that proportion. The average for the 50 stomachs was about 18½ per cent; or only 1½ per cent for the 616 stomachs taken during the season. The average annual amount in the 909 stomachs was almost exactly 1 per cent." This is certainly a very considerate way of putting the case—for the Crow, since such food is available for only about one third of the year. But suppose that, as here assumed, only 1½ per cent of the food of millions of voracious Crows for four months of each year consists of the eggs and young of wild birds, who can calculate the immense destruction of bird life here admitted?

The Bulletin consists of four chapters, as follows: I. 'General Habits of the Crow,' under which is treated its geographic distribution, migration, and Crow roosts, the latter occupying about 16 pages, and giving a list of the principal known Crow roosts. II. 'Animal food of the Crow' (pp. 26-56), considered under various subheadings. III. 'Insect food of the Crow' (pp. 56-72). This includes a special report (pp. 57-68) on the character of the insect food found in Crows' stomachs by Mr. E. A. Schwarz, of the Division of Entomology, who renders the following verdict: "The facts on the whole overwhelmingly speak in favor of the Crow, and taken alone would be at variance with the prevalent opinion hitherto held and yet held regarding the economic status of the Crow as an insectivorous bird." IV. 'Vegetable food of the Crow' (pp. 72-85). Although other grains than corn are eaten by the Crow, and although fruits are eaten to a small extent, the only real damage done to crops is occasioned by the persistent habit of Crows everywhere of pulling the newly planted corn to get at the swollen kernel, which they devour with avidity. The damage thus caused is sometimes serious, but is easily guarded against, as shown in Chapter IV, 'Protection of Crops' (pp. 88-94), as by 'tarring' the corn before planting it, to render it distasteful, and by using various devices for frightening the Crows away. Another safeguard we have often known practiced with success is to scatter small quantities of corn about the field, which the Crows and other corn-loving birds will eat in preference to pulling up the growing sprouts.

Under the head of migration, Professor Barrows states that the fact that "Crows are regularly migratory has been generally overlooked, chiefly because in most localities in the United States where Crows breed they are represented in winter by at least a few individuals. . . . The great center of Crow population in the eastern part of this winter zone [lat. 35°-40°] is in the neighborhood of Chesapeake Bay and its

tributaries; a more western center is found near the junction of the Ohio and Mississippi Rivers, while large numbers winter farther west, along the Arkansas and lower Missouri." As Mr. Barrows implies, their winter distribution is largely governed by the food supply; an unharvested field of corn, as far north as Massachusetts, we have observed, is sure to become the winter feeding grounds for hundreds of Crows, however deep the snow or severe the weather.

The Bulletin as a whole is a most painstaking and laborious investigation, and goes far to settle satisfactorily the economic status of a bird unrelentingly persecuted for crimes that are to a large extent imaginary, or at least grossly magnified.—J. A. A.

Forbush on 'Birds as Protectors of Orchards.'—Another valuable contribution to economic ornithology is Mr. E. H. Forbush's paper on 'Birds as Protectors of Orchards,' recently published in the 'Bulletin of the Massachusetts Board of Agriculture.'¹ The paper relates largely to the destruction of the eggs of the canker-worm moth by winter birds, notably the Chickadee (*Parus atricapillus*), which also feeds in fall on the wingless females of the same destructive insect. An account is given of an attempt to protect an old and neglected orchard from insect ravages by getting winter birds to make it their haunt by suspending in it pieces of meat, bone, suet, etc. The experiment shows not only that birds can thus be attracted in numbers to a particular area, but that they prove wonderfully destructive to insect pests infesting fruit trees. Kinglets were found to have eaten largely of bark borers, while Woodpeckers appeared to confine themselves to the larvæ of borers, wood-ants, and other insects which bore into the wood of the tree. Notes are given on the beneficial work of summer birds in destroying caterpillars and other destructive insects infesting orchards. Winter birds are also shown to be great destroyers of the eggs of the canker-worm moth, and of scale insects. "No birds," it is said, "were seen to eat the eggs of the tent caterpillar, nor were any found in the stomach of any of the birds examined. It seems probable that these eggs are so protected by a hard covering that they are not eaten by most birds." While this may be true, the Blue Jay is evidently an exception, as we have found by examination of the stomachs of birds of this species taken in orchards in winter.² Mr. For-

¹ Massachusetts Crop Report for the month of July, 1895. Issued by Wm. R. Sessions, Secretary State Board of Agriculture. Series of 1895, Bulletin No. 3. Boston, 1895, 8vo, 32 pp. Birds as Protectors of Orchards, by E. H. Forbush, Ornithologist to the Board, pp. 20-32.

² Cf. Proc. Essex Inst., IV, 1864, p. 75. Also an article by the late Dr. T. M. Brewer on 'The Blue-Jay Family,' published in the Atlantic Monthly, April, 1870, p. 482, in which is given a detailed account of the usefulness of the Blue Jay in destroying the larvæ of the tent-caterpillar, on the authority of Dr. J. P. Kirtland.