

the dry summers of 1930 and 1931. W. B. Noble reports¹ upon them and says something of interest about birds. "Natural enemies," he states, "play a rather important part in the control of webworms. Birds were particularly active in this respect during the summer of 1931. Blackbirds, Flickers, Robins, and Starlings were attracted to the infested areas in large numbers and ate many of the larvae" (p. 2). In addition to the birds named by Noble, Crows, the Crested Mynah, English Sparrow, and Savannah Sparrow are known, according to Biological Survey records, to feed on the larvae, and the Nighthawk and Roadrunner upon adults of Crambinae. Entomological literature contains a number of references to birds eating moths and larvae of this group, scanning of which adds the following species to those already listed, Bobwhite, Kingbird, Wood Pewee, Red-winged Blackbird, Meadowlark, and Barn Swallow.

Abaca slug caterpillar (*Thosea sinensis*).—This larva a serious enemy of coconut and abaca in the Philippines "is a thorned species of poisonous character" of a group supposed by theorists to be avoided by birds. Pedro Sison, however, in a comprehensive report² on the insect says, "The Crows prey upon the larvae by picking them up with their bills and squeezing out the soft content. The thorny skin or skeleton is not swallowed. As many as fifty of them are to be seen in a flock working every day from morning until late in the afternoon. They never leave the field until only a few of the larvae are left." (p. 179).

Elder borer (*Achalodes zeae*).—This insect sometimes forsakes elder to damage corn but is not especially destructive. In making studies of the borer, J. C. Silver found "The Northern Downy Woodpecker x x x attacking young elder shoots in search of x x x [the] larvae. x x x Several clumps of elder in various localities showed distinct signs of attack by birds" (p. 18).³ The bird work is illustrated.—W. L. M.

Lid on Food of Taimyr Ptarmigans.⁴—This is a very detailed account of crop contents of three Ptarmigans (*Lagopus mutus*) from a remote locality on Taimyr peninsula in northernmost Siberia. This time the food items, consisting entirely of vegetable matter, chiefly leaves and stems of willows and saxifrages, were weighed when dry, counted, measured, and tabulated. No percentages are given. For comparison, literature dealing with the food of Ptarmigans from other northern localities is referred to.—LEON KELSO.

Manuel on Food of the Philippine Weaverbird.—Canuto G. Manuel, educated in part at the University of Michigan, where he carried on food-habits research, is now fortunately able to do similar work in his native country. The report⁵ here reviewed is one of the first fruits of his efforts. The methods of study of the Philippine Weaver, a rice pest, are described in some detail and the results given by localities. In about half of the study Manuel used the ordinary volumetric system of stomach analysis and in the remainder adopted a numerical method. He checked the latter,

¹ U. S. Dept. Agr. Circ. 248, Sod Webworms and Their Control in Lawns and Golf Greens, 4 pp., Nov. 1932.

² The Slug Caterpillar on Abaca (*Thosea sinensis* Wlk.), Its Life History and Habits as observed in Davao, and suggestions for Control, Phil. Journ. Agr. 3(3), 1932, pp. 163-187. PIs. 1-6.

³ U. S. Dept. Agr. Tech. Bul. 345, Biology and Morphology of the Spindle Worm, or Elder Borer, 19 pp., 9 figs., Feb. 1933.

⁴ Crop Contents of Ptarmigans from Taimyr. By Johannes Lid. The Norwegian North Polar Expedition with the "Maud" 1918-1925, Scientific Results, Vol. V, No. 2, September 20, 1933. Pp. 3-7.

⁵ Observations on the Philippine Weaver, *Munia jagori* Martens, II: Foods and Feeding Habits, Phil. Journ. Sci. 53(4), April 1934, pp. 393-418, 1 fig. (map), 2 tables.

however, by actually measuring the volume of the food items by their displacement of water. Proportions of rice and weed seeds arrived at by the former procedure were 48 and 52, and by the latter, 43 and 57, respectively. Selection of food depended much on availability, as birds collected in rice fields had fed largely on the grain, while those taken at a distance had consumed chiefly weed seeds. The species is almost exclusively a seed-eater, even the young being reared on a diet of weed seeds. The large amount of weed seeds destroyed does not appear significant to the author considering the tremendous annual crop. Experiment indicated that seeds are not passed through the alimentary tract in viable condition. The author concludes that: "The species is harmful to a certain degree when the rice is in head, but otherwise of neutral importance" (p. 417).—W. L. M.

Gorsuch's 'Life History of the Gambel Quail in Arizona.'—This is a condensed report¹ of the information gathered during one of the game bird studies financed by the Sporting Arms and Ammunition Manufacturers' Institute.

Although the Gambel's Quail lives in a widely different habitat from that of the Bobwhite, the findings of Gorsuch are much similar to those obtained by Stoddard in his well-known study of the latter bird.

First, the great esthetic and sporting value of Gambel's Quail is discussed, followed by a brief account of plumages and distribution and an extended account of its life history, the early winter being taken as the starting point.

The appearance of winter annuals in limited exposed areas causes the Quail to congregate temporarily in winter flocks of 30 to several hundred birds and unlike the Bobwhite, this species has a resting and a feeding period both in the morning and late evening.

At least four and a half months are required for mating, nesting, and rearing of the young; hence there cannot be two broods a year per pair as has been supposed. Selection of nesting site and nest construction requires about ten days; egg laying and incubation, 38 to 42 days; and rearing of young, two and a half to three months. After this, attention to the young decreases, and the family blends into the covey.

The report on food habits of Gambel's Quail is of especial value, being the first comprehensive one for the species. In the contents of 178 stomachs of adults, vegetable matter comprised 91.6 per cent of the food. Seeds and herbage of mesquite were first in importance, making 22.21 per cent; members of the pea family second, 16.73 per cent; and a wild mustard third, 9.04 per cent. The amount of animal matter, 6.99 per cent, is less than half that taken by the Bobwhite. Grasshoppers were first in importance followed by ants and bugs. Salt was frequently eaten by adults and drinking water is not necessary to the bird's existence.

Gambel's Quail is as sedentary as the Bobwhite, if not more so, moving from its territory only in winter flocks or when pressed by enemies.

Parasites and diseases were found to be of little consequence. Nest losses however, constitute a strong limiting factor. In only 11 of the 44 nests observed did eggs reach the hatching stage.

Ground squirrels, cotton rats, house cats, skunks and ants are the chief enemies of the nests, while Cooper's and Sharp-shinned Hawks are the chief enemies of the adults.

Overgrazing and clean farming are strong checks to the birds' increase. Heavy rains and low soil temperatures during the nesting season are adverse climatic factors.

¹ Life History of the Gambel Quail in Arizona. By David Gorsuch. University of Arizona Bulletin, Vol. V, No. 4, Biological Science Bulletin, pp. 1-89, pls. I-V, figs. 1-4, tables 1-4, May 15, 1934.