

Colluricincla and *Grallina* for which the author retains Sharpe's family *Prionopidae* because it was impossible to include them in the place to which he would refer them next *Pachycephala*, and *Piezorhynchus* respectively. In this part also begins the treatment of the Australian Magpies (*Gymnorhina*) better known in our Zoological Gardens as Piping Crows. The following appear to be new names (in Part 4) *Magnamytis alligator* (p. 212) Alligator River, N. Territory, and *Austrartamus melanops normani* (p. 255) Normanton; (in Part 5) *Colluricincla harmonica kingi* (p. 289). King Isl.—W. S.

Economic Ornithology in Recent Entomological Publications.—

Bird enemies of certain insects have been considered in recent publications devoted to entomology and the points made are briefly summarized and commented upon below.

Corn earworm (*Heliothis obsoleta*).—"The most destructive insect enemy of corn in the United States is the corn earworm" and its ravages cause a loss to growers of \$40,000,000 or more annually. Preying upon this pest is therefore especially creditable to birds. Records of the Biological Survey quoted in a bulletin¹ prepared by the federal Bureau of Entomology show that "17 species of birds feed on the corn earworm and that the most important of these seem to be the Brewer's and California Red-winged Blackbirds, the Boat-tailed Grackle, and the Downy Woodpecker. As many as 10 larvae of the earworm have been found in a single stomach of the Cardinal and more than 50 in one of the Boat-tailed Grackle."

The clover-leaf weevil (*Hypera punctata*).—This is a European insect that has thrived and spread in the United States and which regularly takes an important toll from our clover crops. Our birds have shown their eustomary lack of prejudice in the matter of food items by feeding freely upon this immigrant. Quotation by authors' of a recent bulletin on the pest of results published by the Biological Survey in 1916 serve to emphasize the fact that knowledge of the enemies of practically every insect constantly increases. In 1916 we knew of 25 species of birds which preyed upon clover-leaf weevils, now the list has grown to 43. The most important of these avian enemies is the Starling, in 1125 stomachs of which these weevils have been identified; 206 stomachs of Crows, and 100 of Crow Black-birds also yielded this insect. Largest numbers of adult weevils were recovered from stomachs of the Starling (26), Night-hawk (24) and Crow (20); and of larvae from stomachs of the Starling (49) and Vesper Sparrow (31).

European corn borer (*Pyrausta nubilalis*).—Another unwelcome immigrant from the old-world, the corn borer, threatens to become a pest of the first magnitude. The insect is now established in localities scattered

¹ Farmers' Bul. 1310, by W. J. Phillips and Kenneth M. King, Jan., 1923, p. 12.

² Herrick, G. W. and Hadley, C. H., Jr., Bul. 411, Cornell Agr. Exp. Sta., July, 1922, p. 10.

from eastern Massachusetts to Ontario and Michigan and is doing tremendous damage to corn in addition to attacking numerous other cultivated plants. The larvae of the pest are concealed within the host plant during most of their existence and consequently are screened from the attacks of birds. However, the list of American birds known to feed upon the borer in the United States is steadily growing and now includes the introduced Pheasant, Woodpecker, Starling, Blackbirds, and the Robin.¹

A study² of the insect and its enemies in Ontario has yielded additions to this list of bird enemies besides interesting information about their activities. "In Ontario," the authors say: "so far, only a few natural enemies have been found to prey upon the European Corn Borer. Of birds, the Downy and Hairy Woodpeckers have frequently been seen digging the borers out of the stalks and stubbles in the field. In one field these birds were computed to have taken 60% of the borers during the winter months of 1921. Robins were observed eating borers which had come to the surface after a heavily infested field had been plowed down. They were also seen taking them from cages in experiments. Blackbirds were noticed in great flocks in the fall in a badly infested field of sweet corn, but it was not determined whether they were eating borers or not, though there seemed little doubt that they were. Other birds, such as Kingbirds, Phoebes and Wrens were observed catching the moths in the morning when these were emerging. Doubtless there are several other birds, such as Crows, which feed to some extent upon the insect."

Sugar-cane beetles in Queensland.—A number of species of the family Scarabaeidae attack sugar-cane in Queensland where it has been estimated they do about £ 100,000 damage annually. The natural enemies of these pests are treated in some recent bulletins³ of the Bureau of Sugar Experiment Stations, and in every case highest rank in efficiency is given to birds. The Ibises (*Carphibis spinicollis*, and *Ibis molucca*) are said to be of tremendous importance wherever they occur. They are assiduous in following the plow and have been observed to clear fields of the grubs when so doing. They also probe the ground at the base of stools of cane and remove the grubs. In the opinion of some authorities the Crow (*Corvus australis*) should be given first place as a grub-destroyer. Like its American relatives, however, the Australian crow has certain injurious habits which cause farmers to discourage its presence. A Hawk (*Hieracidea berigora*), the Laughing Jackass (*Dacelo leachii*), the Pewee Lark (*Grallina picata*) and the Indian Myna (*Acridotheres tristis*) also are given special mention as enemies of the cane-beetles.

Tussock moth (*Hemerocampa leucostigma*).—Mr. Alan G. Dunstan summarizes⁴ an interesting study of the natural control of this insect

¹ Caffrey, D. J. and Worthley, L. H., Farmers' Bul. 1294, January, 1923, p. 27.

² Spencer, G. J. and Crawford, H. G., Bul. 295, Ont. Dept. Agr., March, 1923, p. 7.

³ Div. Ent. Bul. No. 13, 47 pp. 8 Pls., 1921, Bul. No. 16, pp. 77-81, 1921.

⁴ Proc. Acadian Ent. Soc., 1922, p. 109.

pest as follows: "Investigations carried over a period of two years have shown that in cities the insect is controlled chiefly by three factors: non-hatch of eggs, starvation of the larvae hatching from eggs laid on buildings, and insect parasites. In the forest, however, a totally different condition exists, and there we find that birds and ants are responsible for holding the insect at par and preventing it from reaching a state of outbreak."

Although this writer did not observe birds preying upon the tussock moth in cities, the reviewer has observed robins feeding freely upon the larvae in Washington, D. C.. Mr. Dunstan reports that in the forest "practically every egg-mass laid above the snow-line (and over ninety per cent of them are) had been either partially or wholly destroyed by birds." (p. 119.) Observation of the kinds of forest birds feeding on larvae proved impossible, but by exposing larvae where they would be accessible to birds and apparently to no other enemies it was found that the supplies regularly disappeared, sometimes at the rate of 25 to 30 caterpillars a day. Birds are credited with destroying half of the larvae hatching in forests.

In the United States twelve species of birds are now known to feed upon one stage or another of the tussock moth, and the list does not include a single species of the groups (such as Paridae) that must be concerned in the extensive destruction of the eggs of the insect pointed out by Mr. Dunstan.

Lace-wing flies (*Chrysopidae*).—In an exhaustive paper on The Biology of the Chrysopidae,¹ a very fair attitude in general is taken relative to the value of protective adaptations of these insects. Of the adults it is said that the color "so closely simulates their environment that considerable protection is afforded. But more striking is the repellent odor of most species. This odor is sickening and very objectionable . . . but . . . is only a partial protection from the insects' enemies, though predacious enemies have been observed to be less serious than parasitic ones." It is interesting to note that stomach examination by the Biological Survey so far has revealed 17 species of birds as predators upon Chrysopidae, most of them taking adults, but 5 having eaten larvae. The nighthawk led in the attack on lace-wings, ten birds having taken these flies, in numbers up to 10 and 12 to a meal. The fact that such groups of birds as the Caprimulgidae and Hirundinidae have been developed as practically indiscriminate feeders on flying insects would indicate that these insects have few or no qualities really noxious to the birds.—W. L. M.

Success in Prairie Tree Planting.—In an interesting bulletin² with the foregoing title, relating to trees for the prairies of Manitoba, Saskatchewan, and Alberta, it is clearly brought out that a valued part of the success with trees is the attraction of birds. "The birds build in them and flocks

¹ Smith, Roger C. Mem. 58, Cornell Agr. Exp. Sta. (June, 1922) 1923, p. 1330

² No. 72, Forestry Branch, Can. Dept. Interior, by Norman M. Ross, 34 pp., 1922.