not protect birds solely because they are useful, but chiefly from ethical and æsthetical reasons, as birds give beauty and animation to nature. We also wish to preserve their species, and hence the protection of birds signifies the preservation of the monuments of Nature." The very full and reasonable instructions here given would be of great service to those in any country who are willing to make a little effort for the preservation and increase of birds, and it is thus fortunate that the National Association of Audubon Societies is an agency for the sale of the work in America.—J. A. A.

Economic Ornithology in recent Entomological Publications.—The oak pruner (*Elaphidon villosum*), a longicorn beetle that seriously injures oaks, hickories, peach and pear trees, is the subject of a recent circular of the Bureau of Entomology.[1] The author, Dr. F. H. Chittenden, says: "Among natural enemies of the oak pruner, Mr. F. H. Mosher records the Downy Woodpecker (*Dryobates pubescens*), the Blue Jay (*Cyanocitta cristata*), and the Black-capped Chickadee (*Penthestes atricapillus*). Mr. W. L. McAtee of the Bureau of Biological Survey, states that a species of *Elaphidion* is preyed upon by the Downy Woodpecker and by the Great-crested Flycatcher (*Myiarchus crinitus*)." Dr. Chittendon has also recently published an account[2] of the wild bird enemies of the potato beetle (*Leptinotarsa decemlineata*) in which the Chipping Sparrow receives fullest mention. Four species not recorded by Dr. Chittenden are the Starling, Chewink, Cliff Swallow, and Cedarbird, the complete list being: Bobwhite, Prairie Chicken, Sharp-tailed and Ruffed Grouse, Red-tailed Hawk, Nighthawk, Yellow-billed Cuckoo, Crow, Starling, English Sparrow, Chipping Sparrow, Chewink, Cardinal, Rose-breasted Grosbeak, Scarlet Tanager, Cliff Swallow, Cedarbird, Wood, Hermit and Olive-backed Thrushes, and Robin.

The writer of 'The Life History and Control of the Hop Flea-Beetle,'[3] the subject of which is a chrysomelid beetle which has destroyed 75 per-cent of the crop in some seasons in certain parts of British Columbia, thinks it possible that the insect has some bird enemies, but mentions none. Biological Survey records furnish the names of two, the Killdeer (*Oxyechus vociferus*) and the Cliff Swallow (*Petrochelidon lunifrons*).

A few paragraphs in the Report on the Field Work against the gipsy moth and the brown-tail moth[5] shows that interest in the bird enemies of these pests is unabated. As there has been but one[4] complete list of the bird enemies of the gipsy moth published since the original report by Forbush and Fernald in 1896 and none complete for the brown-tail,[6] revised lists will not be out of place in the present connection.

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[1] Circular 130, Bur. Ent., Dec., 1910, p. 7.
[2] Bull. 82, Pt. VII, Bur. Ent., Feb. 1911, p. 87.
[3] Parker, W. B., Bull. 82, Pt. IV, Bur. Ent., May, 1910, p. 48.
[4] Forbush, E. H., Massachusetts Crop Report, July, 1900, pp. 33, 34.
[5] Bull. 87, Bur. Ent., Aug., 1910, pp. 26–27.
[6] The Gypsy Moth. Massachusetts State Bd. Agr., Boston, 1896, pp. 207–208.

The following list is made to show the number of known bird enemies of both the gipsy and brown-tail moths, by prefixing the initials G and B respectively before the names of birds to which these credits are due. Forty-six birds receive the G and thirty-one the B.

G B Yellow-billed Cuckoo.....*Coccyzus americanus*
G B Black-billed Cuckoo.....*Coccyzus erythrophthalmus*
G Hairy Woodpecker.....*Dryobates villosus*
G Downy Woodpecker.....*Dryobates pubescens*
G Yellow-bellied Sapsucker.....*Sphyrapicus varius*
G Flicker.....*Colaptes auratus*
G B Kingbird.....*Tyrannus tyrannus*
G B Great-crested Flycatcher.....*Myiarchus crinitus*
G Phœbe.....*Sayornis phœbe*
G Wood Pewee.....*Myiochanes virens*
G B Least Flycatcher.....*Empidonax minimus*
G B Blue Jay.....*Cyanocitta cristata*
G B Crow.....*Corvus brachyrhynchos*
G B Red-winged Blackbird.....*Agelaius phœniceus*
G B Baltimore Oriole.....*Icterus galbula*
G B Crow Blackbird.....*Quiscalus quiscula*
G B English Sparrow.....*Passer domesticus*
G B Chipping Sparrow.....*Spizella passerina*
B Field Sparrow.....*Spizella pusilla*
G B Song Sparrow.....*Melospiza melodia*
G Chewink.....*Pipilo erythrophthalmus*
G B Rose-breasted Grosbeak.....*Zamelodia ludoviciana*
G B Indigo Bunting.....*Passerina cyanea*
G B Scarlet Tanager.....*Piranga erythromelas*
G B Red-eyed Vireo.....*Vireosylva olivacea*
G B Yellow-throated Vireo.....*Lanivireo flavifrons*
G White-eyed Vireo.....*Lanivireo griseus*
B Warbling Vireo.....*Vireo gilvus*
G B Black and White Warbler.....*Mniotilta varia*
G B Golden-winged Warbler.....*Vermivora chrysoptera*
G B Nashville Warbler.....*Vermivora rubricapilla*
G Parula Warbler.....*Compsothlypis americana*
G B Yellow Warbler.....*Dendroica æstiva*
G B Chestnut-sided Warbler.....*Dendroica pensylvanica*
G Black-throated Green Warbler.....*Dendroica virens*
G Oven-bird.....*Seiurus aurocapillus*
G Maryland Yellow-throat.....*Geothlypis trichas*
G B Redstart.....*Setophaga ruticilla*
G B Catbird.....*Dumetella carolinensis*
G Brown Thrasher.....*Toxostoma rufum*
G House Wren.....*Troglodytes aëdon*
G White-breasted Nuthatch.....*Sitta carolinensis*

	G	Red-breasted Nuthatch.....*Sitta canadensis*
G	B	Chickadee.....*Penthestes atricapillus*
G	B	Veery.....*Hylocichla fuscescens*
G	B	Wood Thrush.....*Hylocichla mustelina*
G	B	Robin.....*Planesticus migratorius*
	G	Bluebird.....*Sialia sialis*

Messrs. Rogers and Burgess, authors of the report on the gipsy and brown-tail moths, note that "A few species, among which may be mentioned the Crow, while destroying many of the larvæ, undoubtedly aid the spread of the gipsy moth by dropping live caterpillars in uninfested sections." The subject of the distribution of the moth by birds has nowhere received as full consideration as in the original report referred to above (pp. 235–240). It is recorded there that the Wood Thrush, Chickadee, and Least Flycatcher were seen to drop caterpillars or female gipsy moths from their beaks, and that a young Baltimore Oriole refused a larva which the parent bird brought, dropping it over the side of the nest. Circumstantial evidence points to the formation of new colonies about Crow's nests.

The authors, Messrs. Forbush and Fernald, remark that "A bird may overlook a few caterpillars near its nest, preferring to go where caterpillars are plentiful rather than to search for them where they are scarce. It is probable, then, that the bird which is most useful in destroying caterpillars and which feeds the largest number to its young will be the most likely to aid in the distribution of the moth. The danger of distribution would probably be greater in the case of the larger species of birds, were it not that a caterpillar seized in the bill of a Crow would be more likely to be seriously injured than one taken in the bill of a small bird. The danger of distribution to distances of much more than half a mile by birds in this way does not seem to be great. . . . The distribution of caterpillars by birds goes to prove the rule that nature does not usually work for the extermination of species. While the birds are very useful as assistants in the work of extermination by destroying the gypsy moths, they hinder the work to some extent by distributing the larvæ and the female moths.

"No appreciable distribution of caterpillars by birds will occur, however, except when caterpillars are present in large numbers, for then only will birds go to a distance to secure caterpillars as food for their young. Probably no other form of dissemination of caterpillars by birds will materially extend the moth's distribution even under the most favorable conditions. Whenever the caterpillars are present in large numbers in a settled country, they will be carried much farther and scattered abroad more widely by man and domestic animals than by birds. In woodlands remote from civilization, birds may be the principal factor in diffusing the moth to a short distance from badly infested spots, but the distribution of the moth in such places is not of so much moment as in cultivated and settled regions. If the moth were allowed to increase and spread over the whole State, we

may infer that all possible distribution by birds would be of little importance as compared with the good they would do in checking the increase of the moth."

The question as to distribution of gipsy moth eggs by birds has recently been revived and as a coincidence by two independent investigators whose results were published in the August issues of different entomological journals.[1] Both of these articles deal with experimental feedings of caged birds. Mr. William Reiff used the European Yellow-Hammer, Chaffinch, Canary and Carrier Pigeon, the Japanese Robin, and one native species, the Screech Owl. The moth eggs were mixed with or placed within other food before they were given to the birds. The Canary and the Chaffinch picked out and rejected most of the eggs, but a few that passed through the alimentary canal of the former failed to hatch. Twelve eggs passed by the Yellow-hammer likewise failed to hatch. Three out of 52 eggs passed by the Japanese Robin hatched. Of 120 eggs concealed in the abdomen of a mouse which was fed to a Screech Owl, 112 came through the alimentary canal of the bird. Seven of these hatched. None of the eggs fed to the Carrier Pigeon were found in the excrement. The writer concludes that "Gypsy moth eggs can withstand the action of digestive fluids of birds belonging to at least two families, Turdidæ and Bubonidæ, without suffering any, or only slight, injury. In regard to the family, Fringillidæ, also an insectivorous group," he says, "I am inclined to believe that these birds might also occasionally distribute gypsy moth eggs in spite of the negative results obtained in my experiments. Since the members of the pigeon family grind up their food in a gizzard filled with small stones it is very unlikely that gypsy moth eggs could pass through their intestines without being destroyed."

These conclusions are too sweeping; it would have been better to have said that the eggs can sometimes withstand the action of digestive fluids or that they have been shown to do so in a few cases under experimental conditions. The conclusion regarding sparrows has no justification in the experiments reported. Objections to this paper which apply equally the one discussed below will be united with comments on that article.

Mr. C. W. Collins experimented with English Sparrows and a pigeon. The writer says: "The sparrow was chosen.... mainly because it has been known to feed upon the eggs in confinement; the pigeon, merely to determine if the eggs would be digested. In all cases it was necessary to force the birds to eat them." In the case of the English Sparrows this was done by putting the eggs well into the mouth by means of a toothpick; and a mixture of dough and eggs was forced into the pigeon's beak. Three of the sparrows were confined in small boxes, and the ten used in the experi-

[1] Reiff, W., Some Experiments on the Resistance of Gypsy Moth Eggs to the Digestive Fluids of Birds. Psyche, XVII, 1910, pp. 161–164.

Collins, C. W., Some Results From Feeding Eggs of *Porthetria dispar* to Birds. Journ. Ec. Ent., III, 1910, pp. 343–346.

ments lived on the average only about 34 hours after capture. "Approximately 356 *P. dispar* eggs were fed to the last three sparrows. One hundred and forty-two of these eggs or 40 per cent. were found intact in the excrement. Seven of the 356 (2 per cent) or 5 per cent of the 142 that were passed intact hatched. One hundred and thirty-five or 38 per cent was the approximate number found to be digested or partly so." The excrement of the pigeon contained no intact eggs.

The writer admits that the "experiments were conducted under abnormal conditions. The birds were not only forced to swallow the food, but were deprived of their freedom, which is essential to rapid and vigorous digestion." We would add that it would have been much better to have selected for experiment birds such as Chickadees that are known habitually to feed upon lepidopterous eggs. Observations on these birds in a roomy cage and with choice of a variety of food, including gipsy moth eggs, might furnish some data having a bearing on the natural distribution of the eggs.

But experiments upon an owl and such preëminently granivorous species as the fringilline birds and pigeons, especially when these birds are very closely confined and have their few last mouthfuls of food, in which gipsy moth eggs are concealed, forced upon them, depart too far from natural conditions. So abnormal were both sets of experiments that it is doubtful if the results shed any light on the distribution of gipsy moth eggs by genuine egg-eating birds in the state of nature.

One other entomological paper to which we wish to draw attention also deals with insect eggs. This is Mr. Henry H. P. Severin's 'Study on the Structure of the Egg of the Walking-Stick *Diapheromera femorata* Say, and the Biological Significance of the Resemblance of Phasmid Eggs to Seeds."[1] The writer says: "Sharp in all the species which he has examined believes that these resemblances in the eggs have no bionomic importance for the species and I am strongly inclined to accept his view in the case of the egg of *Diapheromera femorata*." This statement is very welcome to economic ornithologists, who have suffered long, though chiefly in silence, from the deluge of theoretical essays on the supposed relations of birds to mimicry and kindred phenomena among insects.

Mr. E. G. Titus is the author of an interesting bulletin of the Utah Experiment Station[2] dealing with the alfalfa leaf-weevil (*Phytonomus murinus*), a pest of foreign origin recently introduced and doing immense damage in the State. Some attention was paid to natural enemies, and it is said that "wild birds do not appear to relish the weevil, or perhaps they have not become accustomed to its presence." Twenty out of 80 English Sparrows shot in alfalfa fields had eaten the weevil. One Black-headed Grosbeak was collected and found to have eaten the weevil. These results do not warrant the statement made in this Bulletin and elsewhere that "wild birds do not appear to relish the weevil," for really only one bird

[1] Ann. Ent. Soc. Am., III, 1910, pp. 83–92.

[2] Bull. 110, 1910, pp. 19–72.

was examined that could be reasonably expected to feed extensively on the insect, and its stomach contained remains of some of the pests. Judging from the fondness of birds for the clover leaf weevil (*Phytonomus punctatus*) and other species of the genus, a large number of birds will probably be found to prey upon the alfalfa weevil.— W. L. M.

Corrections and Additions to January Installment of Economic Ornithology.— In the list of mosquito-eating birds on p. 141 of the January, 1911, Auk is included the Whip-poor-will (*Antrostomus "carolinensis"*). The specific name should of course be *vociferus*. On the authority of Jas. H. Gaut, formerly of the Biological Survey, the name of the Northern Violet-green Swallow (*Tachycineta t. lepida*) may be added to this list. The writer has recently found mosquitos in the gizzard of a Mallard (*Anas platyrhynchos*).

Three additional species also are noted in Bulletin 3 of the West Virginia Experiment Station; but the correctness of these records is said to be open to question.

An additional reference to tick-eating birds is Auk, XXIV, 1907, p. 401, where E. S. Cameron states that the Brewer Blackbird (*Euphagus cyanocephalus*), the Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*), and the Red-winged Blackbird (*Agelaius phœniceus arctolegus*) feed upon sheep ticks in Montana. A newly discovered enemy of the Texas-fever tick is the Fish Crow (*Corvus ossifragus*).— W. L. M.

Faxon on Brewster's Warbler.[1]— This paper is a most important contribution to our knowledge of Brewster's, or the White-throated Warbler, *Helminthophila leucobronchialis*, and practically settles the question whether this is a hybrid or a legitimate species. It is a record of a series of observations made on three families of warblers during the summer of 1910.

In two cases the male birds were Golden-winged Warblers and the females Brewster's Warblers; in the third instance both parents were Golden-wings; the young of the first two pairs lacked the clear markings of the Golden-wing, the young of the third pair were unmistakable Golden-wings. The detailed observations on the three families just noted are followed by a statement and discussion of the various hypotheses advanced as to the status of Brewster's Warbler, some sixteen cases being reviewed briefly. Finally the known facts are viewed in the light of Mendel's Law, the inference from this, and from the known facts being that Brewster's Warbler is a hybrid between *Helminthophila pinus* and *H. chrysoptera*, a deduction quite in keeping with the fact that no instance is known of a mated pair of Brewster's Warbler.

[1] Brewster's Warbler. By Walter Faxon. Memoirs of the Museum of Comparative Zoölogy at Harvard College, Vol. XL, No. 2, pp. 57–78, with one colored plate (to be supplied).