brings to bear his extensive knowledge of avian anatomy. In referring to the "Speed of Flight" he cites data that disprove the tremendous velocities sometimes credited to birds.

Under the heading "Food," the discussion extends from the herbivorous habits of such birds as the Ostrich and the Goose, through those that feed upon insects, seeds, and living prey to the scavenging habits of the Vultures, which are remarkable in that these birds "eat with impunity where death from poison from bacillary action would be the fate of another creature." Reference is made in this section to the storing habits of some birds, as certain of the Woodpeckers; to the remarkable pellet forming action of the stomachs of the Hawks, Owls, Albatrosses, Flycatchers, and Hummingbirds; and to the maintenance by human friends of nesting boxes and lunch counters, a practice that has had a rapid rise in popularity during recent years.

Two full pages are devoted to the presentation of a modern "Systematic Classification," in which the birds of the World are treated down to family. As an introduction to this section there are several interesting paragraphs on "Origin and Evolution," the progress of the avian group being traced from the earliest reptile-like *Archaeopteryx* and *Archaeornis*. Here Doctor Wetmore's extensive researches in the field of ornithological palaeontology are of inestimable value and are interpreted in a thoroughly readable and enlightening account. The article ends with a well-selected bibliography of the different phases of the subject.

The whole account is such an excellent survey of the great ornithological field that one could wish that separates might be made available for distribution to the constantly growing number of bird students, many of whom, more or less bewildered by the extensive literature of ornithology, would unquestionably welcome this digest of the subject. It is most fortunate, however, that Doctor Wetmore's article is available to anyone in position to consult the encyclopaedia. In this connection, it is interesting to recall that the ninth edition of the Encyclopaedia Britannica (1885) contained Alfred Newton's article under the same title. This essay, which was considered the most masterful treatment of the subject that had then appeared, formed the basis for the 'Dictionary of Birds.'—F. C. L.

Economic Ornithology in Recent Entomological Publications.—Recent reports on bird enemies of insect pests that are of interest to ornithologists refer to the following:

Mormon cricket (*Anabrus simplex*).—This is the cricket that threatened the very existence of Utah settlers in early days, but which was checked in the midst of a most destructive invasion by flocks of Gulls. It was in commemoration of this event that the monument to Gulls was erected within the Mormon Temple Grounds in Salt Lake City. An account of these matters is given in a bulletin[1] on the cricket by Frank T. Cowan, who notes

[1] Tech. Bul. 161, U. S. Dept. Agr., 28 pp., 24 figs., Dec. 1929.

that the insect periodically causes more or less trouble to farmers in most of the States in the Rocky Mountain region. He gives (p. 21) a list of 19 species of wild birds known to feed upon the pest. In a State publication[2] upon the Mormon cricket also Mr. Cowan in collaboration with S. C. Mc Campbell, gives full credit to birds and says they "greatly reduce the cricket population, and deserve protection for this if for no other reason" (p. 11).

Pea aphid (*Illinoia pisi*).—In commercial pea growing areas this aphid causes an average annual loss of from 10 to 20 per cent of the crop. It has numerous natural enemies of which three birds, the Red-winged Blackbird, the English Sparrow, and the Chickadee are mentioned (p. 39) in a comprehensive bulletin[3] on the subject.

Pacific flathead borer (*Chrysobothris mali*).—One of the worst enemies of newly planted deciduous trees and shrubs on the Pacific Slope, the flathead borer is not greatly checked by natural enemies. The author of a recent bulletin[3] on the insect says, however, that "Such observations as 'birds apparently have helped considerably in keeping *Chrysobothris* down,' and 'birds have dug out a great number of the insects, even from the pupal cells,' occur occasionally in field notes." (p. 26). No definite species of bird is associated with these records but the Biological Survey is quoted to the effect that 13 species of birds are known to feed on adult beetles of the genus *Chyrsobothris*.

Chestnut curculios (*Curculio* spp., formerly called *Balaninus*).—It is not unusual for from 50 to 75 per cent of the nuts to be wormy, and in some experimental plantings the percentage of infestation reached 100. More than 80 kinds of birds, however, are known to feed on nut curculios[4] and in Biological Survey work birds have been increased in one of the experimental chestnut orchards to such an extent that the infestation by the weevils has been materially reduced.

Tobacco cutworms (Twenty-two species).— Tobacco is a crop especially vulnerable to cutworm attack, and in a comprehensive bulletin[5] on these larvae Mr. S. E. Crumb treats of the structure, classification, and natural history of numerous species of cutworms. Of avian enemies it is said that 88 species of southeastern birds feed upon cutworms and that during the month of May these larvae constitute an average of over 20 per cent of the food of several common birds (pp. 49–50).

Pandora moth (*Coloradia pandora*).—Thousands of acres of yellow pine have been defoliated by this insect in Oregon. The larvae and pupae are extensively eaten by Indians, and have many "natural" enemies also.

[1] Circ. 53, Colo. Agr. Exp. Sta., 28 pp., 10 figs., March, 1929.
[2] Fluke, C. L., Research Bul. 93, Wis. Agr. Exp. Sta., 47 pp. 2 figs., June 1929.
[3] Burke, H. E., Tech. Bul. 83, U. S. Dept. Agr., 36 pp., 12 figs., Jan. 1929.
[4] Brooks, Fred E. and Cotton, Richard T., Tech. Bul. 130, U. S. Dept. Agr., 23 pp., 6 pls., 1 fig., Aug. 1929.
[5] Tech. Bul. 88, U. S. Dept. Agr., 179 pp. 9 pls., 19 figs., May, 1929.

Among these are birds, of which Steller's Jay and Vireos are said[1] to eat the larvae, and Creepers and Nuthatches the eggs (p. 17).

European corn borer (*Pyrausta nubilais*).—There is no need to comment on the seriousness of this pest, which despite great efforts and expenditures in fighting it, is now spreading over our maize growing region, doing great damage, and forcing drastic changes in farm practice. As a result of a study of the corn borer in Europe[2] much valuable information has been brought together by Messrs. K. W. Babcock and A. M. Vance, in which we find a little on the relation of birds to the pest. The species mentioned (p. 35) as preying upon the corn borer are Sparrows, Chimney Swallows, and Rooks.

Giant sugar cane borer (*Castnia licus*).—In Trinidad and northeastern South America this insect has developed into a serious enemy of cane, even exceeding in importance the small moth borers and froghopper, formerly regarded as pests of the first magnitude. In discussing the insect, Mr. H. Martyn Skinner, says,[3] "Certain insectivorous birds are the principal natural enemies of Castnia in the adult stage, notably the 'kiskidee' (*Pitangus trinitatis*) and the 'boat-tail' (*Holoquiscalus lugubris*), the latter being very partial to the larvae also." These birds are protected, and encouraged by the erection of bamboo perches throughout the fields, latterly also by the establishment of bird reserves.—W. L. M.

Food Habits of Tyrannus dominicensis vorax in Barbados.—Mr. R. W. E. Tucker reports[4] on the examination of 100 stomach contents of this Flycatcher which was suspected of being destructive to various beneficial insects. It was found that insects were the largest element of the food with fruits and lizards following in importance. The insects taken, however, were chiefly destructive forms and included larger numbers of the cane root borer and cane stem weevil, both important pests, than any other kinds. Only a few beneficial insects were taken and it is recommended that the bird be protected during a period when further investigations are made of its economic status.—W. L. M.

Economic Notes on Birds of the Malay Archipelago.—In a book by K. W. Dammerman on 'The Agricultural Zoology of the Malay Archipelago'[5] is a chapter (VII) on mammals and birds in which 25 pages (294–319) are devoted to sketches of the more important groups of birds with special emphasis on their economic status. The author is favorable to bird protection but notes that the native youths have much to learn in this respect. The most injurious birds are Weaver-birds of the genera Ploceus and Munia which damage rice and cane, the Flower-peckers (Dicae-

[1] Patterson, J. E., Tech. Bul. 137, U. S. Dept. Agr., 19 pp., 18 figs., Oct., 1929.
[2] Tech. Bul. 135, U. S. Dept. Agr., 54 pp., 10 pls., 3 figs., Nov. 1929.
[3] Suppl. Tropical Agriculture, Jan. 1930 (1929), p. 6.
[4] Tropical Agriculture, Vol. VII, No. 3, pp. 68–69, March, 1930.
[5] J. H. de Bussy Ltd., Amsterdam, 1929, 473 pp., 40 pls., 179 figs.