

be taken to keep pace with them. Flour milling certainly promises to be an outstanding biological-engineering process, and when it is realized how much of this biological work has been carried out in the last decade it may well be that before long flour milling as we know it to-day will be radically altered. In any event, the 1960 edition of Mr. Lockwood's book should call for much revision.

The book is well produced and the figures and diagrams are of a high standard. It occupies some five hundred pages including thirty-eight well-balanced chapters; historical detail, more the concern of specialized works, is quite rightly omitted. There is an excellent survey of wheat characteristics and testing, including a scientific analysis of the subjects of wheat cleaning and screen-room separators, particularly in regard to the use of air currents. The conditioning of wheat is discussed in detail, and this chapter includes a useful account of the heat relations of various commercial dryers and conditioners. A series of chapters describes the principles of grinding and sifting and the main divisions of milling—breaking, grading and dusting, purification and the scratch and reduction systems; each is lucid and authoritative. The last five chapters deal with the mill management and costs. Finally, there are a number of appendixes, which will interest the mathematical physicist, as well as a glossary of milling terms in different languages.

This first-class and most stimulating book should be the *vade mecum* of every miller, milling technologist and the cereal chemist who wants to know and understand the practical implications of his work.

T. MORAN

FROST DAMAGE TO FRUIT TREES

Frost and the Fruitgrower

By Raymond Bush. Second edition. Pp. viii + 119 + 23 plates. (London, Toronto, Melbourne and Sydney: Cassell and Co. Ltd., 1946.) 10s. 6d. net.

THE British fruit crop of 1945 was very seriously curtailed by severe frost damage, and many parts of the country have experienced similar trouble in the present season. Mr. Bush shows in this volume that the fruit yield of England and Wales varies from the average by nearly 300 per cent, as against 30 per cent in the United States, 37.5 per cent in Canada, and 17 per cent in Australia. The causes of this large variation are not fully understood, but damage by frost must be important. These facts assault the whole structure of home fruit production, and in a generation much less content to accept 'acts of God' than formerly, it is natural to inquire what can be done to mitigate the trouble.

Mr. Bush's book supplies at least a partial answer to these problems. He reviews many aspects of the problem, chiefly those relating to radiation frosts. It is now well established that damage from such frosts can be minimized by the avoidance of 'frost holes' for the establishment of orchards, the use of certain planting methods, and the modification or elimination of barriers to air drainage. 'Frost holes' are low-lying areas which receive and retain cold air collected from a wide region. The most suitable frost-free sites are gentle slopes with good drainage of cold air from below the orchard. Wind-breaks, hedges, and the fruit trees themselves all impede this downward flow of cold air. Hedges can be replaced with netting; wind-

breaks can be cleared at the base, while trees should be planted at about the rate of one hundred per acre. Standards should be planted at the base of a slope, with bush trees at the top. All this is portrayed with a clarity of text, simple diagram and photograph which should appeal to the practical grower.

The author has performed a great and timely service to British fruit growers. He has interpreted adequately all the knowledge of frost damage control which can at present be applied in practice. Frost damage in the Clyde Valley in 1945 and 1946 does not, however, fit completely into the picture he has painted. There is the additional factor of wind, acting apart from katabatic flow. Research has, however, now been directed to this and other outstanding matters of frost damage and control. The author is only at the mercy of time as the fourth dimension in this respect. The enlightened practice of his present conclusions would go far towards a solution of the problem of frost damage.

The volume also deals with phenology in relation to frost damage, thus involving varietal effects. It figures various types of frost damage to blossom and to mature fruit. Methods of forecasting frost are considered, and would form the basis for future trial. Orchard heating is discussed, not as a finite method of control, but as a useful possibility in certain topographical situations. The book is an intelligent evaluation of present knowledge upon the subject, and research workers have already accepted the challenge to fill the gaps revealed by Mr. Bush's text.

JOHN GRAINGER

SOME COLEOPTERA OF FRANCE

Faune de France

44: Coléoptères Bruchides et Anthribides. Par Adolphe Hoffmann. (Fédération française des Sociétés de Sciences naturelles: Office central de faunistique.) Pp. 184. (Paris: Paul Lechevalier et fils, 1945.) 300 francs.

WE welcome the appearance of another instalment of the Faune de France series of monographs. The present contribution deals with five small groups of Coleoptera which the author regards as constituting separate families. The most important of these are the Bruchidæ, which comprise seven genera and sixty-eight species within the faunal limits of France. The Anthribidæ are represented by six genera and twenty-one species. The genus *Urodon*, which has long been attached to this family, is placed by M. Hoffmann in a separate one of its own—the Urodonidæ, transitional between the Rhynchophora and Phytophaga. Some modern authorities, it may be added, relegate it to the Bruchidæ. Five species of the genus are included in the French fauna. The Brenthidæ also come in for consideration. They comprise but a single French species *Amorphocephalus coronatus*, which lives in association with ants of the genus *Camponotus*. Finally, a separate family—the Nemonychidæ—is erected to replace the tribe Rhinomacerini of the Curculionidæ. It is considered transitional in structure between the last-named and the Scolytidæ. Three genera, each with a single species, are included within the faunal limits. The work, as a whole, is well up to the standard of its predecessors; it is adequately illustrated, the figures of the species of Anthribidæ being particularly effective, and there is the usual compendium of diagnostic keys to the genera and species dealt with.

A. D. IMMS