other less familiar fields some of the articles are of interest and value to them. For example, the articles of Nickerson, Nickerson and Schultz, and Thorne are good and useful summaries of the literature up to about 1952 and in one short section to 1955; Pyke's articles summarize the literature up to about 1950 and give a fair idea of industrial practice; the article by Thaysen gives a very detailed description of the evolution and working of a plant for the production of *Torula utilis*; and Arima's short description of the preparation and composition of sake is probably the only one available in English. The book is adequately bound and printed, it contains eighteen figures and four plates, and carries on its dust-cover the reproduction of a very pleasant painting of sake barrels and bowl.

R. B. GILLILAND

MAGNESIUM IN PLANTS AND SOILS

Magnesium

The Fifth Major Plant Nutrient. By Dr. A. Jacob. Translated from the German by Dr. Norman Walker. Pp. xii+159+8 plates. (London: Staples Press, Ltd., 1958.) 40*s*. net.

THE importance of magnesium in crop nutrition has probably been under-estimated in many areas both by growers and to some extent by agronomists also. Dr. Jacob has undertaken through his book to rectify this failing by emphasizing the widespread significance of magnesium deficiency and correctly classifying magnesium as a major element in relation to the effects of nitrogen, phosphorus, potassium and calcium.

The first of twelve chapters deals with the chemistry of magnesium with reference to geochemistry, co-ordination and complex salt formation. The second and longest describes symptoms of magnesium deficiency in more than forty crops. Many descriptions are detailed and effective; some, however, for example, legumes and tomato, seem unduly brief and lacking in detail. Colour plates and black-and-white prints illustrate symptoms in several crops, but a number are either indistinctly reproduced or are not sufficiently close up to reveal diagnostic details. The association of 'sickle-leaf' in cocoa (p. 36) with magnesium rather than zinc deficiency without reference to other evidence may be questioned.

The discussion on ion antagonisms of magnesium is a useful contribution and it is gratifying to find an account of effects of nitrogen supply on magnesium requirements. Four chapters deal with magnesium content of plants and soils, selected methods of determining soil magnesium status, and the balance between plant uptake, soil content and fertilizer practice. In general these subjects are discussed in detail, informatively and widely. A chapter deals with results of fertilizer experiments with general crops including some tropical ones. The account of work on fruit trees and tomatoes is, however, brief and inadequate, though some further details are provided elsewhere in the final chapter on types of magnesium fertilizers.

Animal and human nutritionists will also find useful data in the chapter allocated to this field.

The functions of magnesium in plants are reviewed in Chapter 5, which provides much information on the effects of magnesium on their organic composition. In other respects, however, this important chapter is superficial in its treatment of biochemical aspects of magnesium function. References to specific phosphokinase and transferase enzymes are omitted. The glycolysis cycle and other major pathways of carbohydrate metabolism, many steps of which in plants depend upon magnesium-activated enzymes, are dismissed in some seven lines including but one reference of twenty years ago to 'saccharolytic cozymase', and a few references of doubtful relevance to unspecified phosphatase activity.

It is probably fair to suggest that Dr. Jacob intended his book to be read mainly by agronomists and soil chemists to whom these simplified ideas were addressed. It would be desirable, however, in a future edition to expand this treatment with a more detailed account of the biochemical role of magnesium in plants and in general, for the benefit of readers who do not normally study closely the literature in this field. The inclusion of an index would be helpful.

Soil advisory chemists, agronomists and all interested in mineral nutrition will nevertheless find this book useful and informative and will benefit from an appreciation of the widespread practical importance of providing the optimum magnesium status for soils and crops.

E. J. HEWITT

CALCIUM IN THE ANIMAL ECONOMY

Calcium Metabolism

By Prof. J. T. Irving. (Methuen's Monographs on Biochemical Subjects.) Pp. xi+177. (London: Methuen and Co., Ltd.; New York: John Wiley and Sons, Inc., 1957.) 11*s*. 6*d*. net.

ACCORDING to the final sentence of this book, "there is hardly any physiological action which does not involve the intervention of calcium". A reader unaware of this fact beforehand would certainly agree after reading Prof. Irving's monograph, where are to be found discussions on many different aspects of calcium metabolism. Confronted with so vast a field, the selection of topics for the space allowed must have been difficult. In the event, the choice will please many readers; especially those working on bones and teeth, for whom, in several ways, the author seems to have catered best. Cytologists, protozoologists and physiologists, on the other hand, and others interested in extra-skeletal calcium, may be a little disappointed.

The actual plan of the book seems logical. Dealing first with the calcium value of foods, the question of intestinal absorption is next considered; separate chapters discuss the role taken by phytic acid and vitamin D. There follows an account of the calcium content of the body and its various tissues. This might be made more complete by brief mention of the actual localization of the calcium in the tissues as revealed by methods such as microincineration. Subsequent chapters are concerned with the utilization and retention of calcium, and dietary requirements. There is an account of the calcium of the blood. Next follow three chapters on bone. The first of these deals with the histological features, the formation of bone, and the factors known to influence ossification. The usefulness of this chapter to the