discusses topics that lie on the borders of logic ; the relation of form and content in assertion and inference ; the nature of symbols, meaning, concepts, fictions and probability, and the logic of ethical judgments.

A reading of both books raises the old puzzle of what logic really is. Both writers repudiate the psychological interpretation. Prof. Feibleman says that logic is the general science of system or of types of order, and that pure mathematics are branches of logic. But surely the value of the mathematical sciences comes from dealing with specific types of order which are definitely of one sort and not another sort ; as, for example, arithmetic deals with what has certain sorts of serial order and not with anything else. Can there be an entirely general science of order or system as such ? Would it not be like that science of pure being, which, in spite of Aristotle and the Schoolmen, has never yet appeared ? Aristotle's logic may be, as Prof. Feibleman says, a calculus of substance and a rather inferior business, while recent symbolic logic is a calculus of relation and far superior. Even so, they remain distinct specific sciences, and where is the generic science ? Prof. Cohen in his preliminary statements says that logic is the formal element within any science, and does not appear to commit himself further. There seems to be no objection to this view, and perhaps this is all that needs to be said. A. D. RITCHIE

RECLAMATION DISEASE IN AGRICULTURE

Koper als onmisbaar element voor plant en dier

Door W. J. Melchers en H. J. Gerritsen. Pp. 56+25 plates. (Wageningen : Gebr. Zomer en Keuning, 1944.) 1.90 fl.

"RECLAMATION disease", due to a faulty copper balance in the soil, is of considerable importance in Holland, and much research has been done on it. Melchers and Gerritsen have set out the more recent results dealing with the control of the disease, and an English summary renders the book accessible to a wider circle of readers.

Reclamation disease was originally thought to occur only on peaty-humus soils, but it is now known that it may be associated with various other types, such as pure sandy and also peat bog soils. Apparently soil containing black pitchy heather humus and/or bleached sand is the most susceptible to the disease. Early work assumed that reclamation disease was the result of definite copper deficiency ; it is now realized that copper may be present in the soil but fixed in such a form as to make it difficult for the plant to absorb and utilize it.

The susceptibility of crops to reclamation disease varies with the species, cereals and leguminous plants suffering most. The symptoms vary, but usually the reproductive phase is more affected than the vegetative, though white clover offers a good example of profuse flowering and feeble leaf formation in sick plants. The chief agricultural crops are listed according to their liability to reclamation disease, with the special symptoms in each case. On grassland the botanical composition of the herbage may indicate copper deficiency, and the colour is usually strikingly dull and yellow. The better-quality grasses disappear, and the inferior varieties predominate. Cattle grazing on such grassland exhibit symptoms of disease which vary with the type of soil, and these have been proved to be associated with copper deficiency.

The degree of copper deficiency in the soil is usually determined by tests with *Aspergillus niger*, a fungus which requires minimal quantities of copper for its growth and spore formation. The only remedial measure at first used was the application of town compost ; but this was limited to areas where transport costs were not prohibitive. Stable manure proved inefficient in action, but good results have been obtained by covering the deficient soils with a layer of sand about 10 cm. thick.

The application of sulphate of copper at the rate of 50–100 kgm. per hectare has proved successful in preventing reclamation disease on ploughed land. On grassland direct application is of little use, and it is necessary to plough up and cultivate the land with other crops for about two years until the lime and copper contents have been adjusted, after which grass can again be sown with more hope of success. The beneficial effect of the copper sulphate will last for several years, but for some crops, as wheat, that are more susceptible to reclamation disease, it may be necessary to give a second application sooner than with others. Finely ground slags containing a low percentage of copper produced by copper foundries are as efficient as copper sulphate, and they may be of special advantage owing to the better distribution obtained by the larger quantities necessary to supply the requisite amount of copper. Such slags are also a useful source of supply of various minor or trace elements. It may well be that continued experiments along these practical lines will do much to improve crop production in areas where reclamation disease is liable to occur.

TEMPERATURE MEASUREMENT

Methods of Measuring Temperature

By Dr. Ezer Griffiths. Third edition, revised and reset. Pp. x+223. (London : Charles Griffin and Co., Ltd., 1947.) 20*s*. net.

THE adequate control of temperature is of fundamental importance in nearly all branches of science, and there are numerous applications in industrial and technical fields. Courses of study and text-books for students of physics, chemistry, engineering and metallurgy, invariably include, in the heat section, a discussion of the methods of temperature measurement ; but, in general, the treatment is too brief and inadequate. The practical difficulties inherent in all thermal measurements are very rarely appreciated, and insufficient regard is paid to the necessity of a correct choice of instrument and method for the temperature or temperature-difference measurement.

Those responsible for research or for the successful operation of industrial processes involving the precise measurement of temperature, therefore, have need of a suitable book, which, while giving a general survey of the subject, pays particular attention to the experimental basis of the methods in general use, to the accurate calibration of the instruments, and which points out clearly the errors, and the means of countering such errors, to which pyrometric observations are liable. Dr. Ezer Griffiths, who, as a principal scientific officer in the Physics Division of the National Physical Laboratory, is engaged in directing research