

forage as improving crops, whatever the starting point. In one sense the practice of leaving land in grass for long periods may be conservation of soil; but we must realize that fertility is fruitfulness rather than some latent quality. One conceives a level of fertility as the rate of all those soil cycles of growth and decomposition which stimulate soil production. In any country, pasture-breaking or forage-cropping accelerates these processes.

Agriculturists in the United States are not only conservation-conscious. As Mr. Wheeler indicates in his introduction, there has also recently developed a spirit of inquiry in the attitude towards range grazings, and the indigenous species are being zealously explored.

For the foregoing reasons we should be acquainted with developments in the United States, and it is from this point of view that we judge Mr. Wheeler's encyclopaedic work.

The collation of agricultural experience is an arduous task. The scientific evidence is often meagre, and a host of advisory bulletins is largely compounded from general observation and more than a little speculation. Mr. Wheeler has devoted almost one-half of his book to an agronomic treatise based, with due acknowledgment, on this type of publication. Difficult though the task may be, the material needs more facts and much more winnowing before it is acceptable as a work of reference. Even in view of the enormous amount of material used, and the impressive list of references, it would not be unfair to criticize the disjointed and often repetitive reading which this section makes, because much of it is clearly intended for continuous reading.

The serious deficiency, however, is in basic facts. A chapter on inoculation of legumes contains numerous statistics but little scientific information. The sponsors of the work might have invited specialists to contribute directly to this and another section on fertilizers. Mr. Wheeler shows better acquaintance with seed authentication; but his chapter on plant improvement which begins to leaven the treatise with stimulating thoughts eventually disappoints the reader through lack of detail in describing breeding methods.

A chapter on pests, diseases, weeds and poisonous plants makes brief reference to a good range of these visitations. Shades of the advisory leaflet are cast by the frequent appearance of the magic symbols DDT and 2,4-D.

References are listed at the end of each chapter. This may be the only practical way in which they could be cited, owing to the indirect nature of much quotation. A complete bibliography is appended under author and geographical indexes. The subject index is thorough in itself, but relates to pages, and the reader must work his way through chapter references in order to identify authors with their work.

The description of species which forms the major part of the book is historical and agricultural, as distinct from botanical. There is much repetition of the information contained in the general part of the book. To the non-American student of forage and pasture plants, however, this descriptive portion remains the more informative. This is a relative term. A volume clearly offered as a reference book should be a comprehensive yet scrupulously distilled source of information. The present edition cannot be said to attain these standards, and is therefore disappointing.

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ASPECTS OF X-RAY CRYSTALLOGRAPHY

Selected Topics in X-Ray Crystallography from the Delft X-Ray Institutes

Edited by J. Bouman. (Monographs on Theoretical and Applied Physics, Vol. 3.) Pp. xv+375. (Amsterdam: North-Holland Publishing Co., 1951.) 76s.

AS its title implies, this book consists of a selection of articles by certain acknowledged experts in the field of X-ray crystallography, the common link being their proximity to each other in Delft. It is divided into eight sections ranging from purely general subjects such as structure analysis, distortion in crystals, and investigations in the biological field, to completely specialized ones such as the recrystallization of aluminium, investigations of photographic emulsions, and the degree of crystallinity in natural rubber. Certain types of apparatus, such as the reciprocal-lattice goniometer of de Jong and Bouman, the curved-crystal monochromator, and microcameras, are also dealt with in detail. It will be seen, therefore, that the range of interest is very wide, and opportunity is given for the various contributors to deal deeply and intimately with their own subjects. The book is well produced, and, despite occasional lapses in construction and spelling, the English is of a reasonable standard.

Yet the result is unsatisfactory. 'Selected topics' do not form a book, and the present volume has no general theme to give a sense of unity: the selection of contents appears to have been dictated rather by what the various contributors wished to write than by what the editors wished to include, and consequently the range is too wide to be of great value to specialists, and too casual to form a work of reference for the student.

Consider, for example, the first section—on structure analysis. This deals in great detail with the reciprocal lattice and its direct photography; but then there is a jump to the subject of termination errors in Fourier series. The main part of the subject—the determination of the relative phases of the structure factors—is completely omitted.

Moreover, it is difficult to see the justification for the placing of certain chapters. The section on structure analysis continues with chapters on the broadening of Debye-Scherrer lines and on stereographic pole figures. Still more surprising, in this same section there is mention of the Patterson function; but this turns out to be completely different from what is normally understood by that term, and is, in fact, concerned solely with diffraction by small crystals. Such departures from accepted nomenclature can be very misleading, and indicate a lack of contact with workers in other countries.

These faults could perhaps be tolerated if the various articles formed adequate reviews of the particular subjects. By this test, also, the book fails. The articles cover only the particular interests of the authors, and the lists of references are all quite short and far from comprehensive. (For example, although the biological field is included, the name of Bernal does not appear in the index.)

One must therefore regretfully conclude that the effort spent in producing this book has not been worth while. Despite the brilliance of some of the individual contributions, it is not a work that the specialist will feel he must have at his elbow, nor one to which the student can be referred. H. LIPSON