

wood anatomists is not always familiar to other anatomists, when pharmacognosicists sometimes tend to use terms in senses that do not always agree with those used in botany departments, and when electron microscopists and classical anatomists do not mean quite the same thing when they use a term as familiar as 'primary wall'. Most of the terms that Prof. Esau has adopted should be readily accepted by all, but botanists in Great Britain may be surprised to find the white- and yellow-coloured tissue in the rind of an orange referred to as the 'albedo' and 'flavedo' respectively.

Prof. Esau lays special emphasis on the unity and interdependence of the parts of a plant as revealed by developmental studies. This unity is further stressed in the introduction to this book where we read that: "The separation of the plant into organs can be made only approximately. It is impossible, for example, to draw a clear demarcation between the shoot and root and between stem and leaf, and the flower in many ways resembles the vegetative shoot. The internal structures, similarly, are not sharply delimited, and the categories of cells and tissues show much intergrading". How true this all is, and how helpful it would be if it were more generally recognized among botanists that Nature abhors distinct lines of demarcation. The classification of cells and tissues, like that of the plants themselves, is by no means easy.

In this book the author successfully vitalizes the whole subject, and the reader can scarcely fail to realize at the outset that he is being asked to consider cells and tissues in living organisms and not in dead corpses. It is to be hoped that this vital approach will stimulate a widespread desire among students to know more about this important aspect of plant science which is often so needlessly thought of as being dull.

C. R. METCALFE

AN ANATOMY OF GRASSES

Anatomy of the Monocotyledons

By C. R. Metcalfe. Vol. 1: Gramineae. Pp. lxi+731. (Oxford: Clarendon Press; London: Oxford University Press, 1960.) 84s. net.

METCALFE AND CHALK is a name as familiar to the botanist as Mrs. Beeton is to the cook and, like Mrs. Beeton, it contains a vast amount of information largely derived from first-hand observation.

The present work is another monument to the skill and indefatigable industry of Dr. Metcalfe, who once again puts plant anatomists and taxonomists in his debt.

The main part of this volume consists of a systematic account of the anatomy of 206 genera and 413 species of grasses which have been investigated by Dr. Metcalfe in the past ten years; to this is added information obtained from the literature about a further 139 genera, so that something of the order of half the genera in the family are considered. Since the genera of grasses, like those of most other families of flowering plants, do not fall readily into a linear sequence, an alphabetical order has, very sensibly, been adopted for this 'histological dictionary' section of the book. The bamboos are regarded as sufficiently distinct in their leaf anatomy to be treated separately after the grasses belonging to other

tribes have been discussed. The merit of this arrangement is perhaps open to question, since there are genera, such as *Anomochloa* and *Pariana*, which have many bambusoid features, and the distinction between the panicoid and festucoid types of leaf seems to be almost as clear-cut as that between those types and the bamboos. There might therefore have been something to be said in favour of a completely alphabetical arrangement; this is, however, a minor point.

The introductory chapters on the general morphology of the grass plant and on anatomical characters and their value to the taxonomist provide both a basis for the understanding of the dictionary and an admirable summary and discussion of the detailed information. Dr. Melville is himself very cautious in considering the implications of his anatomical observations for taxonomy, but to one whose knowledge of grass taxonomy is slight and of anatomy even slighter they seem to be of the first importance. Some of them have already been incorporated in taxonomic works by Dr. C. E. Hubbard and others; no doubt the remainder will be speedily utilized.

In this connexion a particularly valuable service is performed in directing attention to genera such as *Danthonia*, which are anatomically heterogeneous, as the desirability of a re-examination of their floral morphology and an investigation of their chromosomes is clearly indicated.

In conclusion, mention must be made of two other excellent features of this book. One is the account of the fairly simple but not generally known methods used in preparing both fresh and dried material for microscopic examination, and the other is the beautiful drawings of the main types of structures described in the text.

One is left with an enhanced feeling of admiration for both the Gramineae and Dr. Metcalfe, and a pleasurable anticipation of further volumes on other families of Monocotyledons. T. G. TUTIN

SURVEYS IN APPLIED MATHEMATICS

Elasticity and Plasticity

By Prof. J. N. Goodier and Prof. P. G. Hodge. (Surveys in Applied Mathematics, Vol. 1.) Pp. ix+152. 50s. net.

Dynamics and Nonlinear Mechanics

By E. Leimanis and N. Minorsky. (Surveys in Applied Mathematics, Vol. 2.) Pp. xii+206. 62s. net.

Mathematical Aspects of Subsonic and Transonic Gas Dynamics

By Lipman Bers. (Surveys in Applied Mathematics, Vol. 3.) Pp. xv+164. 62s. net.

(New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1958.)

THE great flood of papers in applied mathematics which now pours endlessly through scientific journals from individuals and research groups throughout the world makes it impossible for the practising mathematician to keep fully abreast with new developments, except in some special field in which he is himself working. It follows that surveys of recent work written by authorities in their respec-