Phytochemistry, 1969, Vol. 8, pp. 1611 to 1612. Pergamon Press. Printed in England.

BOOK REVIEW

Physiology of Stomata. H. MEIDNER and T. A. MANSFIELD. McGraw-Hill Publishing Co., New York. 36s.

THIS book is the first in a new series of botanical texts which the publisher has called a European Plant Biology Series. The significance of the regional designation is not clear to me, but presumably the series is aimed principally at readers in Europe. There seems no reason however why a well-written scientific text-book in English should not be equally acceptable throughout the world and this certainly applies to the book under review. Few aspects of plant physiology have aroused more widespread interest than has the physiology of stomata.

In Great Britain, the outstanding stomatal physiologist in recent years is Professor O. V. S. Heath. Both Meidner and Mansfield have been associated with him and they acknowledge their indebtedness to his teaching. Their book shows Heath's influence in the emphasis that is placed on the design of porometers and on the responses of stomata to environmental conditions. The need for further study of the interactions between such factors as light, carbon dioxide concentration, temperature and water-supply is an echo of Heath's teaching. It is not surprising in view of the experimental difficulties that few such studies have been attempted so far.

Consideration of the influence of various factors on stomatal movement leads inevitably to a discussion of mechanism and it is disappointing to discover that this problem is hardly any nearer solution today than in 1908 when Lloyd proposed the starch⇌sugar hypothesis. Clearly, the interconversion of starch and sugar is often of paramount importance in causing the changes in the osmotic potential of the guard cells which occur during stomatal opening and closure, although recent evidence suggests that movement of ions may also play a part. However, the mechanism(s) by which these changes are controlled is still obscure. The most important advance in recent years has been the recognition that CO_2 level in the intercellular spaces of the leaf is important and this has led to renewed speculation about the role of CO_2 fixation in the biochemical changes associated with alterations in guard cell turgidity.

A serious difficulty in the study of stomatal physiology is that it seems to be almost impossible to observe stomatal behaviour without at the same time inducing changes in the system. Undoubtedly, further advances in the field will be dependent on the development of new techniques of investigation which overcome this problem. The suggestions for practical work that appear as an appendix to the book will undoubtedly convince any budding stomatal physiologist of the inadequacy of present techniques.

The book will be useful to teachers of plant physiology but I must confess that I found the introductory chapter which deals with the morphology of stomata and their distribution rather inadequate. The description of stomatal structure regrettably perpetuates the idea current among so many students and teachers that there are only two kinds of stomata—the "elliptical" and the "graminaceous". The account of the development of stomata gives little indication of the variation in the pattern of cell divisions that occur in different plant groups or of how these patterns arise and are controlled. Some figures, mainly based

on original observations by the authors, are given of stomatal frequency in different parts of various plants but the value of these is limited because there is no discussion of the effect of environmental conditions on the stomatal index.

For a paperback of 179 pages without expensive photographic illustrations this book is rather highly priced at 36s. This is more than the average undergraduate can afford to pay for a book which covers only a small part of plant physiology.

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