

BOOK REVIEWS

Physiological Plant Pathology: edited by R. HEITEFUSS and P. H. WILLIAMS. Volume 4 in the new series *Encyclopedia of Plant Physiology*. Springer-Verlag, Berlin, 1976. 890 pp + 92 figs. DM 194 (\$79.60).

One of the most important interdisciplinary areas of plant research today is the study of the biochemistry and physiology of plant disease. The subject has made enormous advances during the last decade, a period which has seen the establishment of a journal specifically devoted to this topic. Physiological plant pathology was last dealt with at the textbook level by R. K. S. Wood in 1967 so that this new treatment fills a significant gap in the literature. Since it aims to provide a comprehensive, up-to-date account of the field, it has a great deal of new information to impart. By and large, I believe it succeeds in putting across recent developments, without ignoring the historical background set by such pioneers as DeBary, Gümman and Marshall Ward, upon which these latest experiments have of necessity been based.

The book begins with two succinct historical essays by W. H. Fuchs and J. M. Daly. Various contributors then discuss in turn: spore germination and its regulation (3 chapters), the cytology and physiology of penetration (5 chapters), pathotoxins (5 chapters), host response to infection (14 chapters), modification of the host response (C. E. Yarwood), biotrophic parasites in culture (K. J. Scott and D. S. Ingram) and the genetics of host-parasite interactions (A. H. Ellingboe). The large section

on host response to infection—the size of this section reflecting the current interest in this aspect of disease resistance—includes several chapters on the involvement of growth regulators in plant pathogenesis (by H. M. Dekhuijzen and G. F. Pegg). These chapters highlight the paucity of hard facts in this research area and the difficulties of establishing a causative connection between plant hormones and the expression of disease. There is also a chapter on phytoalexins by J. A. Küc, which I found disappointing in view of the much better reviews this author has provided on this topic elsewhere. A companion chapter by F. Schönbeck and E. Schlösser on preformed substances as potential protectants is much more useful and includes mention of a number of significant new developments.

In summary, I suspect this book may please pathologists more than biochemists and physiologists but this does not mean that biochemical and physiological aspects have not been adequately dealt with. For a book published in 1976, it is not quite as up-to-date as one would wish. On the credit side, however, it must be pointed out that the volume is beautifully produced, written throughout in idiomatic English (compare the large German element in the earlier *Encyclopedia* series) and is excellently documented and indexed. It is a book that should be widely available in all plant science libraries.

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Phytochemistry, 1977, Vol. 16, pp. 1465–1466. Pergamon Press. Printed in England

Biochemical Interaction Between Plants and Insects: Edited by J. W. WALLACE and R. L. MANSELL. Volume 10 in the *Recent Advances in Phytochemistry* series. Plenum Press, New York, 1976. 425 pp. Price not available.

Much has been written in recent years about plant–insect coevolution and any new book on the subject has to stand comparison with several excellent reviews and volumes already published. Fortunately, this is an area which is being very actively explored, so that any new book will almost inevitably contain information of value to those anxious to keep up with the recent literature. The present text, which is based on the proceedings of a meeting of the Phytochemical Society of North America held in August 1975, is relatively up-to-date in this respect. It consists of a series of essays which individually have much of interest in them but which overlap in such a way that they fail to provide an overall perspective of the field which would have been so appropriate at this period in time. To my mind, at least, this book does not replace H. F. van Emden's *Insect–Plant Relationships* (1973) which remains the most useful well balanced account of the topic yet available.

As already mentioned, a feature which mars this volume is the overlap between chapters, and in fact there are no less than five general reviews which cover *inter alia* much the same ground. Of these, undoubtedly the best is the first chapter by Paul Feeny, *Plant Appearance and Chemical Defense* where he puts forward an attractive new theory about the relative ecological importance of different classes of toxin to different kinds of plants. In essence, he suggests that perennial plants, especially trees, because of their long lifespan, are all too apparent as feeding materials to insect herbivores and they have to store in their leaves large amounts of deterrent toxins, based, e.g. on tannins. By contrast, ephemeral herbs are largely unapparent to insects and can survive over-predation more simply by adopting a chemical defense based on quite low amounts of physiologically active chemicals, such as alkaloids or mustard oils.

A similar argument to this is also put forward by D. F. Rhoades and R. G. Cates in a later chapter, which is to some extent complementary since it emphasizes nutritional aspects. Yet a third chapter by S. D. Beck and J. C. Reese, entitled *Insect–plant interactions: nutrition and metabolism* again goes over much the same ground.

A fourth chapter by E. Rodriguez and D. A. Levin, *Biochemical parallelisms of repellents and attractants in higher plants and arthropods*, is novel in its consideration of arthropod defense substances, but unfortunately at least half the chapter again catalogues the various secondary compounds in turn as they are concerned in insect-plant interactions. This essay would have been much more useful if it had concentrated on the arthropod compounds and discussed them in more detail, particularly with regard to their possible plant origins.

The final and fifth review chapter by K. Mothes is a curious addition to this volume since the author has always been a fierce critic of the idea that secondary compounds have any *raison d'être*. Perhaps Professor Mothes has mellowed a little in his retirement; at least, here, after his usual attack he does entertain, towards the end of his chapter, the possibility that a few secondary substances might conceivably have a useful part to play in the 'social structure of living nature.'

There remain three other chapters, which deal with individual plant-insect interactions, and these are perhaps the most useful in the book. The first by L. P. Brower and his coworkers, discusses at considerable

length "milkweed cardenolides and their comparative processing by Monarch butterflies" while the second by P. A. Hedin *et al.* concentrates on the cotton boll weevil and its predations on the cotton plant. A third by Lawrence Hendry and his associates deals in rather muted fashion with the subject of insect pheromones and their possible plant origin, with reference to the oak leaf roller moth and several other insect pests.

As a compendium of recent literature, this book is a valuable source and all phytochemists will find new points of interest to them. There are some minor errors, e.g. in the spelling of plant names and in the structure of calotropagenin which differs on p. 48 from that on p. 102. More serious to me were some failures in the bibliography to include all the textual references. Another frustrating feature of at least one bibliography was the citing of authors with papers in press without any mention of the journals where they are to appear. An attractive feature of the volume are the many illustrations; there are several pictures of insects and at least one of a plant, the oak tree!

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