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BOOK REVIEWS

Plant Growth Substances 1979, edited by F. Skoog. *Springer, Berlin, 1980. 527 pp. DM 98.*

This substantial volume contains the proceedings of the 10th International Conference on Plant Hormones, which was held in Madison, Wisconsin in July 1979. Thanks to an excellent editor, it has most of the virtues and very few of the vices of symposia volumes. Thus it is almost entirely restricted to the review lectures delivered at the meeting, although there are some short review reports derived from contributed paper sessions.

Held within a year of the 100th anniversary of the publication of Charles Darwin's *The Power of Movement of Plants*, the Conference appropriately included a historical retrospect by J. Heslop-Harrison of Darwin's contribution to the science of botany. More recent studies of plant movements are also described here in seven review chapters derived from a minisymposium held during the meeting under the chairmanship of A. W. Galston.

The remainder of the volume is concentrated expectedly on the five major classes of growth substance, their role in the regulation of plant growth and their practical utilization in agriculture. Once again here, there is a fascinating historical chapter, with illustrations, by the doyen of present day plant physiologists, K. V. Thimann, who recalls in these pages the last 60 years of hormone research beginning with Choldnody's 1927 paper on tropisms and concluding with Skoog and Miller's discovery of kinetin. The other chapters variously review recent developments in hormonology and only a few highlights can be mentioned here. The complexity in the conjugation in plants of growth substances is becoming more and more apparent; Bandurski here lists over 10 derivatives of IAA that have been found in *Zea mays* seed alone. Much progress has been made also in identifying hormone metabolites. This is particularly true of the cytokinins and some of metabolites of zeatin are recorded in a chapter by D. S. Letham and his co-workers. Gibberellin and abscisic acid metabolites are likewise numerous, as reviewed here by V. M. Sponsel and B. V. Milborrow in respective chapters on these compounds. The further metabolism of ethylene has only very recently been scrutinized but as reported by E. M. Beyer and D. C. Blomstrom, ethylene glycol and its glucoside are now well established intermediates in the removal of ethylene from plant tissues.

While our understanding of the biochemistry of growth substances moves securely onwards, our appreciation of the control on growth exerted by these substances is still far from clear. There are still many problems to be tackled. This is clear from an account by P. F. Wareing and A. M. V. Jennings of their unsuccessful attempts to understand tuberization in the potato and their frustrated efforts in the isolation of a factor in tuberization, which appears to be as intractable as the flowering hormone, florigen.

Unlike the proceedings of some of the earlier conferences on growth substances which were of rather limited appeal, this 1979 volume can be warmly welcomed as an attractive and worthwhile contribution to the plant physiology literature. Its particular merit is that it provides a concise, up-to-date overview of the subject, by leading workers in the field, which is not available in any other form. It can be recommended to interested phytochemical readers, as well as to botanists in general.

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Progress in Pesticide Biochemistry: edited by D. H. HUTSON and T. R. ROBERTS. John Wiley, Chichester, 1981. Volume 1, 346 pp. £24.

Pesticide biochemistry impinges in many ways on ecological biochemistry so that this book will be of interest to others besides those scientists directly concerned in developing new pesticides. In the volume under review, plant, insect and mammalian biochemistry are each represented in one or other of the seven chapters. Even microbial biochemistry is mentioned, for example, in the chapter by J. A. Guth, which considers experimental approaches to studying the fate of pesticides in the soil. Emphasis on the possible environmental threats of new pesticides is such today that even before new compounds come onto the market, much information has already accumulated on their further metabolism. Thus in this volume, one of the editors T. R. Roberts is able to write with authority and at length on the turnover of the recently developed synthetic pyrethroid insecticides in both plants and soils.

Although the metabolism of the new pyrethroid insecticides has not yet been studied in man, D. H. Hutson in a later chapter is able to refer to work on their turnover in rat, mouse, dog, goat and cows to indicate how safe they are. Their very favourable mammal–insect toxicity ratio is apparent from the data on deltamethrin, which has an LD_{50} to houseflies of 0.0003 μg but which is only toxic to rats at doses as high as 50 mg/kg.

In contrast to the synthetic pyrethroids, phenoxyacetic acid herbicides have been around for a long time, and yet the biochemistry of their toxicity is scarcely known and the reasons for their selectivity have not been fully defined. Progress over the last 5 years in outlining the fate of these herbicides in plants is reviewed by J. B. Pillmoor and J. K. Gaunt.

Compared to the novel pyrethroids, insecticides which are juvenile hormone analogues have not so far

proved to be of wide commercial application. Nevertheless, the metabolism and mode of action of juvenoids have been extensively studied and a timely review by B. D. Hammock and G. B. Quistad outlines recent developments here. The mode of action of the plant anti-juvenile hormone substances, the precocenes, is also described. The remaining two chapters in this wide ranging review volume are concerned entirely with the activities of pesticides in animals. In an important general review, C. H. Walker considers how far it is possible to employ *in vitro* studies as a reliable guide to the *in vivo* metabolism of pesticides in vertebrates. Finally, J. Seifert and J. E. Casada consider the teratogenic effects induced mainly in birds by organophosphorus and methylcarbamate insecticides.

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Chloroplast Metabolism: by BARRY HALLIWELL. Clarendon Press, Oxford, 1981. 257 pp. £20.

As the author points out, standard biochemistry textbooks give a cursory treatment of photosynthesis and, although books exist which deal with the light reactions, there is relatively little coverage of chloroplast metabolism in text books (but there are a large number of reviews). Dr. Halliwell briefly covers the light reactions and then discusses in more detail questions concerning the isolation and purification of chloroplasts, the Calvin cycle and its regulation, transport across the envelope membrane, C-4 and CAM metabolism, photorespiration, oxygen toxicity, synthesis of fatty acids, phenols, chlorophyll, and nitrogen and sulphur metabolism. I personally found the treatment of oxygen toxicity and photorespiration particularly interesting, and it is very useful to have a clear account of the sometimes neglected aspects of chloroplast metabolism, like nitrogen, sulphur, phenol, chlorophyll and fat metabolism, in a form that comes readily to hand. There is a timely emphasis on the need to consider the quality and purity of chloroplast preparations which are being used to study chloroplast metabolism. The discussion of carbohydrate metabolism is clear and deals with questions which are still controversial, but is perhaps already suffering in details (especially concerning enzyme regulation) from the 'induction lag' associated with publishing; nevertheless it should provide a good basis from which excursions into the most recent literature can be made. The book is well indexed and contains a rich supply of references to the original literature. It provides a useful and concise introduction for readers who are new to chloroplast research, while for those already occupied in some corner of chloroplast metabolism, it could be a stimulating way to look about the room without having to search out and plough through numerous review articles.

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The Biochemists' Songbook: by HAROLD BAUM. Pergamon Press, Oxford, 1982. 62 pp. Flexicover £2.45.

Biochemists, like most scientists, tend to take themselves and their discipline rather too seriously; also biochemistry textbooks sometimes overwhelm the uninitiated student with their welter of complex and apparently unrelated metabolic pathways. Any attempt to lighten the burden of memorizing these pathways and to throw some humour into the learning of basic biochemical facts must be warmly applauded. These are the dual purposes of this little booklet by Professor Baum of Chelsea College, who confesses to having composed this collection of songs entirely on the upper decks of London transport buses plying between Putney Bridge and Manresa Road.

Each song is set to a well known, usually folk, tune and deals either with a common metabolic pathway or important biochemical concept. Thus we have the TCA cycle set to Waltzing Matilda and beginning 'Once a jolly pyruvate enters the matrix—of a mitochondrion, so they say'. There is a song on photosynthesis set to Auld Lang Syne beginning 'When sunlight bathes the chloroplast and photons are absorbed—the energy's transduced so fast that food is quickly stored'. My favourite among the set of 13 is undoubtedly the Battle Hymn of the Aerobes, which opens with 'Mine eyes have seen the glory of respiratory chains—in every mitochondrion, intrinsic to membranes', but I suspect this is due more to the fact that I can still remember how the tune goes than to my desire to memorize once more the order of the cytochromes *a–c* along the chain.

Undoubtedly this book will be a must for any biochemistry departmental party. Its use could well be extended to liven up the proceedings of biochemical society symposia. What discussion session on lipid metabolism would not proceed better after a spirited rendering of 'If you gobble tagliatelli, chicken soup with vermicelli, you'll acquire a sagging belly—what's the use of that?' to the tune of Men of Harlech? This delightful little book deserves to be wildly popular and one can hardly wait to enjoy the fruits of further cogitations on the upper decks of the No. 22 bus. Let us hope that there will be a second series of songs from this fertile source before too long.

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