

Excitation Energy and Electron Transfer in Photosynthesis: edited by GOVINDJEE, J. BARBER, W. A. CRAMER, J. H. C. GOEDHEER, J. LAVOREL, R. MARCELLE and B. ZILINSKAS. Martinus Nijhoff, Dordrecht, 1987, 372 pp. £51-25.

Most, if not all, phytochemists and plant biochemists will have a working knowledge of the process of photosynthesis. However, I suspect that, unless their chosen research field is closely related to that topic, they will not be familiar with the fine detail of current understanding of photosynthesis—and it is that fine detail that is covered by this volume.

The book is dedicated to the memory of the late Warren L. Butler, one of the doyens of the field of photobiology. His influence of biophysical aspects of photosynthesis is seen throughout the book, for example, his models to explain the characteristics of chlorophyll fluorescence pervade several of the 39 chapters in this volume. Each chapter has been written by a leading expert on photosynthesis. As might be expected, therefore, the book is both authoritative and reasonably up to date, including references to the primary literature of 1985. The chapters are arranged into six sections concerned, respectively, with the photosynthetic unit, pigment excitation and energy migration, reaction centres, electron transfer, O_2 evolution and bacterial photosynthesis. Each section starts with one or more overview papers followed by a number of rather more specialized research communications. It is not a book to be read from cover to cover (except, perhaps, by reviewers) but it does constitute an excellent reference work covering all aspects of the so-called 'light reactions' of photosynthesis. It will be invaluable for all research workers interested in the biophysical aspects of photosynthesis and an essential library purchase of all departments of biophysics, biochemistry and plant science. However, unlike the publishers, I do not see this book as being purchased by graduate students. At £51-25 it is too expensive and in addition I doubt whether

many chapters, even the overview articles, would be readily comprehensible to readers unless they already have a quite detailed knowledge of photosynthesis. Some of the terms used (e.g. optical cross section, random walk, hydrophathy index plots) were not always clearly defined and would mean little to the uninitiated. In addition several of the chapters were rather mathematical and likely therefore to discourage those readers from the less physical end of the biology spectrum.

However, having said that, my overall impression of the book was very favourable and I found it useful for updating my own lecture notes. I liked the idea that each chapter should start with an abstract, though a few of these were less helpful than I would have hoped. Nevertheless, as far as I could judge, all the chapters were well written. Those I particularly liked were the chapters by Geacintov *et al.*, Barber, Ames and Duysens, Govindjee and Eaton-Rye, Trebst and Draber, Shahak and Avron, Witt *et al.* and Knaff, but these were a personal choice and I would not wish to belittle the other contributors.

The book contains the usual sprinkling of typographical errors, though none that I found were serious. However, I was disappointed by the lack of an Index and, furthermore, I found the page numbering rather curious. Each page has two numbers and the number used in the contents section is that which is less obvious when flicking through the book. I imagine that this numbering system stems from the book's having been compiled from part of Volume 10 of the journal 'Photosynthesis Research'; nevertheless it was confusing.

In conclusion therefore, this is a valuable book that adequately updates the literature in this fascinating and fast-moving area of research. However it is a book for specialists, not for someone who lacks any background knowledge of photosynthesis.

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Immunology in Plant Sciences (Modern Methods of Plant Analysis. New Series, Vol. 4): edited by H.-F. LINSKENS and J. F. JACKSON. Springer, Berlin, 1986. 263 pp. DM 169 (DM 146 if the complete series is purchased).

In the last ten years the development of immunological procedures for use in plant analyses has been an important innovation. This volume forms an essential component of the New Series and should be expected to attract a large readership. In general the volume fulfils its purpose well in that it covers a broad range of immunological techniques, from antibody production to immunoassays, and, in most cases, provides detailed experimental instructions, usually associated with specific examples. Despite its 'Experimental' nature I found the book quite readable and many of the chapters are of high quality. However, it is very much a collection of individual contributions with little overall structure.

Four of the 12 chapters cover the immunoassay of small molecules, including plant hormones, phytoalexins and secondary products. These give comprehensive treatments of radio- and enzyme-linked immunoassays as well

as methods for coupling the haptens to protein to improve their immunogenicity for antibody production. The general principles of immunoassays are described in several chapters and I feel the editors could have avoided this unnecessary repetition. It might have been useful to have started with one or two chapters on theory and general methods in antibody production and immunoassays. Subsequent chapters could then be confined to specific examples of their use. The very long chapter by R. J. Robins on 'The measurement of low-molecular-weight, non-immunogenic compounds by immunoassay' gives a great deal of background information and could serve as an Introduction. Unfortunately it comes in the middle of the volume and was the last contribution on small-molecule immunoassays.

One of the most serious difficulties with the use of immunoassays in plant analysis, especially with small antigens, is cross reactivity and interference due to non-specific binding. This has been a considerable problem in plant hormone analysis and it is essential that before a new series of analyses is undertaken these effects are checked for and, where necessary, eliminated by further purification of the plant extract. A great deal has been

published on immunoassay validation and, although the subject is discussed briefly by E. W. Weiler in his chapter on plant hormone immunoassays, I feel this aspect should have been given far more prominence. On first reading the chapter titles I expected immunoassay validation to be the main theme of the second chapter on radioimmunoassay and gas chromatography-mass spectrometry of cytokinins. However, no such justification is given to describing GC-MS in this volume and its inclusion remains a mystery to me.

Two omissions from the group of chapters on small-molecule immunology are immunocytochemical localisation and immunoaffinity purification, although both techniques are described for proteins. The immunocytochemical localization of small molecules is an extremely difficult technique and the methods may not yet be well established, but immunoaffinity columns are now being used methods may not yet be well established, but immunoaffinity columns are now being used routinely for the purification of plant hormones, for example, and I am surprised this method was not discussed.

The eight remaining chapters deal with protein antigens such as phytochrome, oat globulins and a range of

enzymes, and provide a comprehensive coverage of techniques, including radioimmunoassay, immunoblotting and immunocytochemistry. This last procedure is particularly well covered and there are descriptions of immunofluorescence detection of cells by light microscopy and the use of the peroxidase antiperoxidase and colloidal gold procedures for examining sub-cellular antigen distribution by electron microscopy.

As with the other volumes in this series the presentation is generally of high quality. Unfortunately, in one chapter two figures have been transposed. Apart from the lack of overall structure commented on above, there is also on unevenness in style and English for which the editors must take responsibility since many of the contributors are non-English speaking. However, these are minor criticisms. I am sure many readers will find this book extremely useful and it is an essential addition to any library catering for plant scientists. The high price will render it less attractive to the individual.

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Plant Growth Substances 1985: edited by M. BOPP, Proceedings of the 12th International Conference on Plant Growth Substances, Springer, Berlin, 1986. 420 pp. DM 118.

This well-produced book opens with a characteristically thoughtful recapitulation, by Professor Wareing, of the conceptual aspects of plant cell responses to growth substances. Following this there are five sections of reportage covering methods, metabolism, mechanisms, effects and applications of plant hormones.

Reflecting the current fashion, the Methods section deals exclusively with immunological techniques. All of the authors are careful to warn of the pitfalls present even with this panacea. Of special interest, Crozier *et al.* and the Monsanto group demonstrate the specificity of immunoaffinity chromatography, a procedure which promises to greatly assist the analysts.

The metabolism section is lead by a review from Phinney *et al.* of the role played by dwarf mutants in the elucidation of the control of shoot elongation in maize by GA₁. Other aspects of metabolism are similarly discussed by a number of predictable, but prestigious, authors. Although not inductive to nail-biting excitement this is how science grows and scientists operate, slowly building on hard facts with hard work.

In the section headed 'Hormones: Mechanism', we find

a surprisingly narrow range of subjects discussed. Out of 14 reports there is one each on membranes, calmodulin, and gene expression. These are followed by two papers on hormone biosynthetic genes encoded in *Agrobacterium tumefaciens* and *T_i* plasmids. The following nine contributions are linked in that they all attempt to elucidate some aspect of auxin transport and the consequences of that transport. These vary somewhat, and range from a discussion of the development of polar transport models from the early days of Went, through membrane carriers, binding sites, and back again to Went. Obviously this is representative of renewed interest in, or perhaps frustration with, one of the earliest studied and, apparently, simplest of hormonal phenomena. Taken together, these reports show the diverse approaches being followed, both technically and conceptually; however, I fear the frustration will be with us for some time to come.

The two final sections dealing with hormonal effects and applications range widely over the subject demonstrating that developmental plant physiology is very much alive and well. Overall the standard of reports is high and the production excellent. These proceedings continue to provide a welcome review and a useful stimulus, and as such deserve a wide circulation.

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