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BOOK REVIEWS

Plant Cell Structure and Metabolism by J. L. HALL, T. J. FLOWERS and R. M. ROBERTS. 2nd edn, Longman, London and New York, 1982. £12.95.

In reviewing the second edition of an already well-established work there is a severe temptation to concentrate upon differences between first and second editions and ignore the merit of the book itself. For this reason we should first carefully consider what niche a book devoted to plant cell structure and function fills today. At long last cell biology is being recognized as the great leveller between animal and plant sciences, and university courses are being adjusted accordingly. These courses, in turn, are calling for cell biology text-books capable of covering all multicellular organisms, a call which has quite reasonably been answered by several recent works. Secondly, is it possible to write a book on plant cell structure and metabolism which will provide the student with a firm grounding in the principles of modern cell biology? The authors have clearly not found it so, for the sections of the book on membrane biology, genetics and chromosome cytology rely almost exclusively on examples from the animal kingdom. On the other side of the coin, it is equally true that many so-called 'cell biology' books ignore many of the fundamental processes particular to plant life, but surely the answer to this form of bigotry is not to answer in kind, but to provide either a very full and fair general text, or a smaller and cheaper work concentrating solely on events particular to plants. Unhappily, *Plant Cell Structure and Metabolism* falls into neither of these categories; it is, however, a remarkable book in several respects. Firstly, it is one of the very few texts to truly align structure with function. Some books pretend to do this, this book succeeds. Secondly, it contains one of the best accounts currently available of cell biological techniques and interpretation of the results thereof. Particularly valuable is the sensibly deep consideration of cytochemical techniques, notable in other texts by their virtual or complete absence. The chapter on protoplasts is also a valuable and unexpected bonus.

In many ways plant metabolism is handled better than the cell structure. This is not for lack of detail, or example, but rather that there are several aspects of plant cell structure and behaviour that the authors have left untouched. These, for example, include most reproductive cells and structures, and the large body of knowledge that is now available on organelle genetics and transmission. On the plus side, in addition to those sections mentioned above, the chapters on cell membranes, the nucleus, ribosomes, microbodies, cell walls and the Golgi body are first rate, providing a mix of structure and biochemistry unrivalled elsewhere. The chapter concerning the 'soluble phase of the cell' (a particularly horrid phrase) begins with the contradiction of dealing with those well-known soluble components—the cytoskeleton and microfilaments. Such comment may appear to be nit-picking, but it is about time that the cytoskeleton and microfilaments emerged from rag-bag chapters to be considered in their own rights. Chloroplasts, mitochondria, lysosomes and vacuoles are handled in an adequate, if occasionally uninspired fashion.

The text is well written, strikingly well illustrated with, I am glad to note, no fear of line drawings—anathema to the electron microscopist, but frequently of great help to the student. The authors have succeeded in avoiding the trap of trying to explain every piece of data available on a particular subject, except on odd occasions, such as their consideration of Franke's rather exotic model of the nuclear pore. This book represents a considerable improvement on the first edition and includes much new material, while refining some of the old. At today's prices it is not desperately expensive. In summary, *Plant Cell Structure and Metabolism* is reminiscent of the early MG motor cars; constructed to a dated pattern, considered by many to be vastly out of balance but to contain some very good parts, and held to have vital components missing. Like the MG, however, it works very well, and may well turn out to be a classic, proving useful long after many strictly course-orientated books have gone to the scrap-yard.

Plant Science Laboratories, University of Reading HUGH G. DICKINSON

Experimental Embryology of Vascular Plants: edited by B. M. JOHRI. Springer, Berlin, 1982. 273 pp. Price $43–60 (DM98).

In no way can this volume masquerade as a text-book for undergraduates; it is a collection of working papers intended for use by those already in the field and for library consultation. Indeed, many of the chapters contain sufficient detail to permit experiments to be carried out directly from the book.

The chapters cover quite a large range of interests, admittedly somewhat restricted to those involving the experimental use of embryology as a manipulative process, rather than to the study of embryology *per se*. There is, however, much rare and valuable information in this book. The chapter by De Maggio on pteridophytes is a case in point, covering most aspects of gametogenesis and fertilization, and providing an excellent account of the development of pattern in the embryo. Likewise, *in vitro* experiments are handled well. It would, however, have been good to see some account of experimental modification of sex determination in pteridophytes. The section of gymnosperms by Norstog similarly has no parallel elsewhere. A reasonable chapter on flower culture by Konar and Kitchlue is followed by a review of anther culture by Narayanaswamy and George. The flavour of this latter work in many ways reflects that of the whole book, concentrating in the main on androgenesis (surpris-

ingly treating the electron microscopic observations of Dunwell and Sunderland only *en passant*), and generally ignoring studies of 'normal' development *in vitro*. The experiments of Ito (amongst others) on the physiology of cultured meiocytes thus receive no mention.

Although the chapters on floral development, pollen pistil development, and endosperm and embryo culture are considered in strictly the correct sequence, they contain some duplication. Perhaps the fusion of the female development with embryo culture would have obviated some of this overlap but, no doubt, other difficulties could have arisen. Shivanna's chapter on pollen–stigma interaction and the control of fertilization is perhaps the brightest star of the book—surprising since it is probably the least appropriate to the main theme of the volume. Taken in isolation, however, it is a well written, very comprehensive account, and one which is of far more use than many of the recent small books that have recently been published on the subject. The importance of embryo culture is reflected by a most useful chapter by Raghavan and Srivastava, and a reasonable treatment of protoplast anthers by Rao completes the volume. Protoplast research is currently proceeding at such a pace that no book could be up to date but surely more was known of organelle behaviour in hybrids when this work went to press?

Despite the undoubted quality of its content, this book is nevertheless difficult to read. This, in part, results from the strange addenda to each chapter (surely a small amount of rewriting could have rendered these unnecessary?), and the highly individual style of each contributor. Some decided to write well-chosen prose, others merely to list authors and techniques, while yet others relied heavily on subheadings. However, since this work is not intended to be read from cover to cover at a single sitting, this is probably an unfair criticism. At some £35 this book is not cheap enough simply to buy for 'further reference'. Neither is it quite good enough to be bought as a readable and balanced account of experimental embryology. Nevertheless, for those with a strong current interest in any one of the topics covered, it may well be worth purchasing.

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Progress in Pesticide Biochemistry: edited by D. H. HUTSON and T. R. ROBERTS. Vol. 2, John Wiley, Chichester, 1982. 226 pp. £22.50.

The production of a second volume in this review series so soon after the first (for review, see *Phytochemistry* **21**, 2163) indicates that there must be many aspects of pesticide biochemistry in urgent need of a modern treatment. The main theme of this volume is conjugation and indeed a number of new results have appeared in recent years which have considerably altered current concepts concerning the detoxification of foreign compounds in biological systems. G. D. Paulson, in a thought-provoking review of the effect of conjugation on the biological activities of xenobiotics in animals shows quite clearly that conjugation can, on occasion, increase rather than decrease the toxicity of an administered compound and that conjugates are not necessarily eliminated from animal systems as swiftly as is often assumed.

The commonly held view that conjugates of pesticides and other xenobiotics are always polar has also been upset by recent discoveries of lipophilic conjugates with DDT, cannabinoids and certain fatty acid derivatives. This still small group of mainly organic acid conjugates are discussed here by D. H. Hutson. More familiar conjugates of pesticides in plant tissues are glucosides or glucose esters; their isolation, characterization and interconversions are dealt with in an extensive chapter by V. T. Edwards and his co-workers from Shell Research. It is apparent from this review that surprisingly few of such glucose conjugates have been fully characterized and that there is still uncertainty how far other sugars than glucose can be involved in the conjugation reaction in certain plants. The idea that these glucose derivatives are inactive and do not undergo further metabolism is also now doubtful as a result of recent experiments indicating glucosyl exchange, addition of non-sugar groups and conversion with loss of sugar groups.

Another well-known group of conjugates are those bound to amino acids, and K. R. Huckle and P. Millburn here review the biochemical mechanisms involved in such conjugation, namely the two enzyme systems acyl-CoA synthetases and acyl-CoA:amino acid *N*-acyltransferases. These authors also usefully summarize the more recent findings on species variation in the amino acids used for conjugation. Examples of dipeptide conjugates are also included.

An important feature of most of the chapters so far mentioned is the inclusion of details concerning the methods of isolation and the techniques used for studying pesticide metabolism. A more general chapter on the potential of stable isotopes is provided by Paul Hendley of ICI, Jealott's Hill, who argues persuasively for the use of ^{13}C and ^{15}N labelling for following the fate of certain chemicals because of the greater ease in identifying the products of metabolism by spectral procedures. In his chapter, he draws on examples from other fields, notably from experience of studying alkaloid biosynthesis. In the final chapter, L. O. Ruzo contrasts the ready photochemical breakdown that the natural pyrethroids undergo with the substantial resistance to photodegradation displayed by some of the new synthetic insecticides of this type.

As with Volume 1, this book will be of interest to a wider audience of scientists than is implied in the title. It is well produced, admirably illustrated, completely up-to-date and, by today's standards, very reasonably priced.

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