

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 inter-conversions 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. Ruza 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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