*Phytochemistry*, Vol. 22, No. 4, pp. 1067–1068, 1983.
Pergamon Press Ltd. Printed in Great Britain.

# BOOK REVIEWS

**Nucleic Acids and Proteins in Plants I**: edited by D. BOULTER and B. PARTHIER. Vol. 14A, Encyclopedia of Plant Physiology New Series, Springer, Berlin, 1982. 768 pp. DM 268 (*ca* £67).

After a long period of comparative neglect, there has been a marked revival of interest in plant proteins. Much new material has accumulated in the last decade and this first volume of two in the Encyclopedia of Plant Physiology series has some considerable ground to cover. From the subtitle of Vol. 14A 'Structure, biochemistry and physiology of proteins' it should be clear that proteins predominate, although nucleic acids are inevitably included to some degree, most noticeably in the more physiological chapters.

Some idea of the rate of recent progress on plant proteins can be gauged from the excellent chapter of J. A. M. Ramshaw on amino acid sequences. In 1969, only six complete sequences for plants were available, compared to over 230 from other sources. By 1979, the cut off date for most of the chapters in this volume, 107 complete sequences had been published variously for 28 different proteins and in addition many partial sequences (e.g. of plastocyanin) were available. The longest sequence must be that of the large subunit of RuBP carboxylase from *Zea mays* which has 475 residues. Interestingly, this sequence was determined indirectly from the DNA of the coding gene. Other sequences available include those of a variety of enzymes and electron transfer proteins, as well as those of toxins and sweet proteins. Sequence data for DNAs do not appear in detail in this volume but those for transfer RNAs are included *inter alia* in a valuable account by J. H. Weil and B. Parthier of transfer RNAs and aminoacyl tRNA synthetases in plants. The processes of protein synthesis receive separate treatment in a chapter on ribosomes by A. Marcus. Protein synthesis, of course, begins with amino acids and a succinct review of amino acid metabolism by B. J. Miflin and P. J. Lea opens the volume. The final steps of protein elaboration, i.e. post-translational modifications, are comprehensively reviewed by L. Beevers. The processes of protein turnover and degradation are then dealt with separately by D. D. Davies and by P. Mathile.

One of the reasons for renewed interest in plant proteins lies in their increasing nutritional importance to man and it is appropriate that seed proteins should be extensively reviewed here. Two chapters, by M. N. Miège and by P. I. Payne and A. P. Rhodes, provide the reader with authoritative accounts of recent developments. Topics discussed include legumin and vicilin, cereal seed proteins, lectins, isozymes and high-lysine barley and maize. Protein changes during seed germination and development are discussed by J. D. Bewley and K. Muntz in further chapters. Leaf proteins are not forgotten, since there are chapters by R. C. Huffaker on their biochemistry and physiology and J. L. Stoddart and H. Thomas on their changes during leaf senescence. Finally, the proteins and other macromolecules of the cell wall receive some attention in a more general chapter by D. H. Northcote on cell wall differentiation.

Other chapters not so far mentioned deal with plant peptides, tubulin and immunology. Some minor gaps may be noted but in general very little of importance is omitted. Personally, I would have welcomed more on the enzymic properties, but of course certain plant enzymes, notably those of photosynthesis, have already received adequate coverage in earlier volumes. In all, the editors are to be congratulated on assembling together such a talented band of contributors. This volume is a wide-ranging and comprehensive account of a most important subject, which makes it a valuable addition to the plant biochemistry literature.

*Plant Science Laboratories, University of Reading*

J. B. HARBORNE

---

**Anthocyanins as Food Colours**: edited by P. MARKAKIS. Academic Press, New York, 1982. 263 pp. £23.20.

The major justification for this publication is the possibility that the coal tar-based dyes that have been used in the food industry for many years might be replaced in the near future by either natural anthocyanin concentrates or by closely related synthetic flavylium salts. The problem, remains, of course, that such preparations require toxicological testing, a highly costly hurdle to surmount. It is clear from the final chapter in this book, which is provided by the editor, that it may be some time before anthocyanins are widely employed for this purpose. However, the book contains much useful information on anthocyanin chemistry and biochemistry and it will, therefore, be welcomed by all those involved with these fascinating but contradictory natural colouring materials.

While anthocyanins provide intense and vivid colours *in vivo* in flower, fruit or leaf, it has not been entirely clear how these colours are achieved since *in vitro* anthocyanins are unstable in solution and at the pH of the cell sap they show only weak visible absorption. Studies of the reactions anthocyanins undergo in solution are the bases for comprehending how they are stabilized in nature by copigmentation, by acylation or by self-association and it is very fitting that an experimenter who has recently extended our knowledge of these reactions in solution,

namely R. Brouillard, should contribute the first chapter in this book on their chemistry. The problem of copigmentation in flowers is taken-up again in the second chapter by Y. Osawa, who usefully surveys recent experiments in this field. The more practical aspects of controlling the stability of anthocyanins in fruits and vegetables is considered by Markakis in a later chapter, where he describes the effects of temperature, light, pH, metals, oxygen and sulphur dioxide on anthocyanin food colours.

An excellent survey of the natural distribution of anthocyanins in food plants is then presented by C. F. Timberlake and P. Bridle. The anthocyanins of grapes and wine, not surprisingly, receive separate treatment and there is an authoritative chapter by the doyen in this field, P. Ribéreau-Gayon. The successful analysis of anthocyanins in food plants requires considerable care and attention to detail because of their instability and their readiness to complex with other plant materials. It is valuable to have an up-to-date and masterly summary of analytical procedures provided in this volume by F. J. Francis. The remaining two chapters on anthocyanin biosynthesis (H. Grisebach) and on proanthocyanidins (K. Weinges and F. W. Nader), while useful, seem to be somewhat marginal to the main theme of the book.

In summary, this is a book principally aimed at food scientists but which will be of interest to a wider audience, since it generally reviews much recent progress in anthocyanin research. It is extensively illustrated with formulae, tables and diagrams and will be an invaluable reference to anyone working in the laboratory with these pigments.

*Plant Science Laboratories, University of Reading* JEFFREY B. HARBORNE

---

**The Chemistry of Pesticides: Their Metabolism, Mode of Action and Uses in Crop Protection**: by KENNETH A. HASSALL. MacMillan Press, London, 1982. 372 pp. Hardback £30; paperback £15.

The science of pesticides is wide ranging across the disciplines of chemistry, biochemistry, biology, soil science and . . . (I leave the reader to fill in his own particular subject). This indicates that traditional college courses are not likely to deal with pesticides in anything but a perfunctory manner. The other side of this coin is that the courses specifically teaching about pesticides are of interest to a wide range of people from a very diverse spread of background—and there is a dearth of good textbooks covering the basic information.

Ken Hassall's text sets out to remedy this situation and I believe he has succeeded better than most who have attempted to meet this information gap, particularly in the amount of information he is able to impart in such a reasonable and readable compass. This stems from his long experience in such teaching in England and Africa. The book will also serve as a reference volume for people with an expert knowledge of one aspect of pesticides, but who need background in another area.

An expert, examining a painting on such a wide canvas, is bound to find deficiencies. "Naturally many of these generalizations are, at best, rather facile oversimplifications." (p. 250). To take the reader deeper there are both specific references for each chapter, and a bibliography of useful sources of information. From time to time I came across interesting facts that were not annotated, and in a few places there was more detail than I would have expected, or a rather peripheral paper was referenced.

After a general introduction and background chapters on formulation and metabolism, insecticides are given pride of place even though herbicides are commercially more important. Possibly we understand more about insecticides! The chapters are here based upon chemical class (e.g. organophosphorus insecticides), whereas fungicides are divided according to their systemicity in plants, and herbicides by whether foliage or soil applied. Each major class of well established pesticide is discussed with information on physical properties, toxicity, metabolism and mode of action.

This is a fast moving subject and I would have valued more information on the recent chemicals that are revolutionizing pesticide science at present (such as synthetic pyrethroids, the azole fungicides that are ergosterol biosynthesis inhibitors, and the newer diphenylether herbicides) together with a short chapter on the new ideas that are in vogue (e.g. insect hormones, pheromones, and naturally occurring protectant chemicals, such as phytoalexins).

This is not a chemistry book, despite its title, but it is a welcome general source of background in pesticide science well worth reading.

*Jealott's Hill Research Station, Bracknell, U. K.* BRIAN C. BALDWIN