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Book Review

***Immunomodulatory Agents from Plants*; Edited by H. Wagner, Birkhauser Verlag, Basle, 1999. 365 pp. ISBN: 3-7643-5848-3, 218 Swiss Francs**

Having had to daily imbibe an immunosuppressive drug for the last six years, I picked up this volume with pleasure and relief to find that there are plant extracts which have been shown to stimulate the immune system when required. Indeed, quite a wide range of plants have been found to contain active constituents. Of course, like most plant drugs they have to be administered either at intervals or continuously but can be applied either orally or intravenously.

As Professor Wagner, the editor, points out in the opening chapter, progress in evaluating immunomodulatory agents has been delayed because of the lack of reliable screening methods. However, successful procedures have become available during the last decade and there is now a considerable body of information about this novel class of plant drug. This book provides a comprehensive treatment of a rapidly developing field of plant medicine.

After the excellent introductory chapter by H. Wagner and co-authors on the search for potent immunostimulants, there is a chapter by R. Bauer on *Echinacea purpurea* extracts. Its inclusion here follows on from the facts that 12% of herbal supplement sales in USA in 1997 consisted of *Echinacea* products and that 800 different preparations of *Echinacea* expressed sap are on the market in Germany. Three further chapters cover different aspects of the *Echinacea* drugs. M.J. Parnham, for example, assesses the benefit and risks of the squeezed sap for long-term oral immunostimulant therapy. There then follows a chapter by A. Vlietinck from Antwerp University on the various low molecular weight compounds with complement activity. Quite a range of plant metabolites are mentioned here, from phenylpropanoids and flavonoids to triterpenoids and alkaloids. Of course, the most active agents are particular polysaccharides and there is a wide-ranging account here of complement-activating polysaccharides by H. Yamada and H. Kiyohara.

Further chapters in this book cover fungal polysaccharides, mistletoe lectins, saponins and garlic preparations. Finally, there are two chapters describing the place of immunostimulants in Ayurdeva and in traditional Chinese medicine.

In this day and age when more and more hospital patients have to cope with suppression of their immune system following chemotherapy or transplant surgery, it is as well that efforts are made to discover compensatory prophylactic agents, as outlined here. This volume provides a valuable synopsis of recent research results on immunomodulators of plant origin and provides an excellent basis for further scientific research on these important plant drugs.

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***Plant Amino Acids — Biochemistry and Biotechnology*; edited by Bijay K. Singh. Marcel Dekker, Inc., New York, 1999, ISBN 0-8247-0204-2, 621 pp. $195.00**

Publication of this book on biochemistry and biotechnology of plant amino acids was overdue. The last comprehensive one on this topic was published two decades ago (*The Biochemistry of Plants, Vol. 5, edited by B. J. Miflin*) and meanwhile great progress has been made in both pure and applied research on amino acids.

The book, written by 35 experts in the various fields of research on amino acids, is divided into 21 chapters devoted to three theoretical parts. In part one (that is covered only by chapter 1) P. J. Lea and R. J. Ireland describe the integration of amino acids and their derivatives into the large scheme of nitrogen metabolism in

plants. The chapter considers the flow of nitrogen from ammonia to the diverse range of nitrogenous compounds found in plants, including developmental and environmental conditions of nitrogen flow. Despite the complexity of the scheme it is clear now, that nitrogen is constantly being recycled as ammonia and is re-assimilated by the action of glutamine synthetase and glutamate synthase.

The second part deals with enzymology of synthesis and degradation, molecular genetics and regulation of amino acid metabolism as well as amino acid uptake and transport. The first chapter of this part, written by R. J. Ireland and P. J. Lea, is of fundamental importance. It describes the basic roles of glutamine, glutamate, asparagine, and aspartate in a model of the major pathways of amide amino acid metabolism. J. Bourguignon, F. Rébeillé and R. Douce wrote a most interesting chapter on serine and glycine metabolism, covering the parallel chloroplastic and cytosolic "glycolytic" pathways or the glyoxylate pathway as well as the catabolism of serine and glycine in the photosynthetic (photorespiratory cycle) and nonphotosynthetic tissues. These amino acids are integrated into a complex metabolic network, tuned up to the metabolism of various cellular compartments. The chapter makes clear that there are still many problems to be solved, especially on regulation. Recent progress in research on amino acid long-distance transport and membrane-located transporters will help in understanding resource allocation across the plant (D. R. Bush). In research on compartmentation of the shikimate pathway, leading to tryptophan, tyrosine, and phenylalanine, the long-standing debate on whether or not there is a cytosolic as well as a chloroplastic location obviously came to an end (J. Schmid and N. Amrhein; D. L. Siehl). All evidence points to an exclusive chloroplastic location, except for the mysteric cytosolic chorismate mutase isoenzyme.

The third part discusses applied aspects, such as design of herbicidal inhibitors and examination of herbicide-resistant crops (D. L. Shaner) as well as molecular approaches to enhance the nutritional value of plant products, e.g. by enhancing the content of essential amino acids (G. Galili and B. A. Larkins; S. S. M. Sun) or by reducing amino acid-derived secondary products, such as glucosinolates (R. M. Wallsgrove, K. Doughty and R. N. Bennett) or cyanogenic compounds (B. L. Møller and D. S. Seigler). And there might be a fruitful connection between academic and applied aspects. Excellent examples of progress in finding novel herbicides that increases our knowledge on the particular enzymes is found in the chapter on inhibitors of histidine biosynthesis (J. Dancer, S. Lindell and M. J. Ford). Such enzymes, e.g. the histidinol dehydrogenase, are the subject of patent applications relating to their role as potential herbicide targets.

Future work on amino acid metabolism will definitely concentrate on biotechnological approaches (raising mutants and transgenic plants) to elucidate the regulatory signals which are integrated into the control of crucial steps of nitrogen metabolism (R. J. Ireland and P. J. Lea). This might also hold true for the sulfur metabolism in plants. A detailed understanding of cysteine biosynthesis at the molecular level has recently been achieved and might open the window to molecular engineering of sulfur metabolism (K. Saito).

The book is absolutely essential for scientists working on amino acids. It can equally be recommended to any scientific worker interested in plant metabolism, phytochemists, physiologists, biochemists, and molecular biologists as well as agricultural engineers and biotechnologists. It will also attract undergraduate and graduate students in plant biology and will be of great help for those starting their scientific work in the various fields of plant amino acid metabolism.

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***Naturally Occurring Glycosides*; edited by Raphael Ikan. John Wiley and Sons, Chicester, 1999, ISBN 0-471-98602-X, 444 pp. £120**

The twelve chapters in "Naturally Occurring Glycosides" focus on structural, biochemical and biological aspects of plant glycosides. Topics include metabolites from a variety of plant biosynthetic pathways, i.e. aminoglycoside antibiotics, anthocyanins, cardiac glycosides, cyanogenic glucosides, glucosinolates, glycoalkaloids, glycosidically bound volatiles, saponins and terpenoid glycosides.