Phytochemistry, 1980, Vol. 19, pp. 2515–2516 Pergamon Press Ltd. Printed in England.

BOOK REVIEWS

Progress in Phytochemistry, Vol. 6: edited by L. REINHOLD, J. B. HARBORNE and T. SWAIN. Pergamon Press, Oxford, 1980. 294 pp. £31.00.

This volume maintains the tradition of this series in bringing together articles dealing with more static descriptions of plant constituents and articles dealing more with the dynamics of processes in plants or with the mechanism of action and importance of groups of plant constituents. The present volume contains seven articles covering a very wide range of topics. Rathnam and Chollet undertake the difficult tasks of reviewing once again the much described topic of photosynthetic carbon metabolism in C_4 plants and C_3–C_4 intermediary plants. They have succeeded admirably and have discussed the subject comprehensively and interestingly while paying attention to many of the unresearched questions. The occurrence of a plant with well defined properties intermediary between C_3 and C_4—*Panicum miliodes*—is especially interesting and the description of some of its biochemical characteristics poses new questions. Any discussion of this problem inevitably raises the question: why if C_4 plants are relatively so efficient are there not far more of them, why do C_3 plants have the apparently inefficient photorespiration and how exactly have the C_4 plants evolved? Is the process of evolution of this type still proceeding and can we help it along?

Synthesis and turnover of membrane phospholipids are discussed by Mazliak. The progress in this field of plant biochemistry in the last ten years or so is extremely encouraging. The major biosynthetic and degradative patterns are by now reasonably clear, at least for some of the subcellular particles. Less is still known about the membranes of the plasmalemma, tonoplast, Golgi apparatus, no doubt because of methodological difficulties. Mazliak points to some of the major unresolved questions. One of the most challenging ones is to investigate the relation between the ambient temperature and the nature, composition and turnover of plant membranes and their phospholipids. One suspects that there is a problem which must be followed up and which may raise exciting new areas in plant chemistry and biochemistry. The review of cellular compartmentation and channelling of secondary metabolism by Luckner, Diettrich and Lerbs is extremely comprehensive in its coverage. Its main value lies in its three summarising tables, which gives a lead into the relevant literature. Obviously this vast array of the literature cannot be reviewed critically and at times the nomenclature used is not entirely clear. What is exactly meant by non-cytoplasmic compartments?: do the authors really imply that phenoloxidases, peroxidases, glucosidases, etc., are located either in the cell wall or the nucleus? At least for some of them, this is definitely incorrect. To state that vacuoles, ER and golgi vesicles are non-cytoplasmic compartments seems to this reviewer a rather peculiar definition. One cannot help feeling that a more detailed analysis of fewer examples in the text would have served the reader better than the attempt to cover everything listed in the tables.

Niklas discusses paleobiochemical techniques and their application to paleobotany. I am convinced that many phytochemists will be fascinated by this review, because it brings to our attention an area almost certainly novel and almost unexpected. Probably the key to all of this area is diagenesis, i.e. alterations occurring in the chemical constituents resulting from geophysical and geochemical factors. A correct understanding of such processes is vital if the presence of chemical compounds in fossils is to be used in order to interpret correlations among organic profiles of fossil plants. Whether the cluster analyses in Figs 5–13 are really helpful to the uninitiated is at least debatable. However there is much food for thought in the review.

Towers discusses concisely the chemistry of photosensitisers in plants, the way they act and their possible role. These substances have long roused interest because of the unpleasant effect of some of these compounds on man and animals on the one hand, and their use in the treatment of certain skin diseases on the other hand. Chemically the compounds are quite diverse and their activity on different organisms has yet to be studied systematically. Towers very tentatively speculates that the photosensitisers in nature function in some way as protective agents. Obviously this suggestion merits detailed study.

The stilbenoids, the topic of a review by Gorham, are described as compounds having the carbon skeleton of stilbene or are derived from it. They are very widely distributed in nature and it is therefore puzzling that stilbenoids are apparently absent from mosses. Perhaps they have just not been looked for sufficiently intensively? Some of the stilbenoids have been shown to act as phytoalexins, e.g. orchinol, as well as affording some resistance to heartwood against bacterial and insect attack. The evidence provided for a role of stilbenoids as endogenous growth regulators seems far from convincing. The fact that an inhibitory substance may be extracted from a tissue or that its level correlates with certain physiological processes is not evidence for a regulatory role. As long as we don't know how the known plant-growth regulators act it seems unnecessary to invoke additional ones. It seems that on p. 219 a mistake has crept in—surely pinosylvic acid must be 3,5-dihydroxystilbene-2-carboxylic acid. The last article, by Marré, discusses the mode of action of some fungal phytotoxins. The overall suggestion, put with much reservation, is that they all might act by affecting plasmalemma function. The author is very careful to point out that next to nothing is known about the mechanism of action and that most results relate to *in vivo* studies. It is puzzling that, apparently, host specific and host non-specific fungi excrete phytotoxins with apparently the same kind of action namely on the plasmalemma. This would imply that host specificity is not due to the phytotoxin. One would like to know more about the responses of susceptible and non-susceptible races of the same species to some of the phytotoxins. Also do

virulent and non-virulent species produce the same toxins and in the same amounts? As indicated by Marrè there is a great deal left to be done.

This volume as its predecessors is well produced, diagrams and structures are clearly presented and there are few mistakes. As in previous volumes, the index is rather inadequate and many compounds are missing. I have pleaded before and plead again with editors and publishers to go over to an alphabetical listing of references. This is much easier both for the writer and especially for the reader. The price is high but not unusually so, as book prices tend to go. A volume well worth having.

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Biochemical Systematics and Evolution: by ANDREW FERGUSON. Halsted Press, John Wiley and Sons, New York, 1980. 194 pp., illus., $42.95.

The text reviewed here would have been more appropriately entitled, Introduction to Electrophoretic Approaches to Animal Systematics and Evolution; or some such title. In his preface the author acknowledges that 'the greater part of this book is devoted to the application of gel electrophoresis' and 'that most examples concern animals'. Indeed, nearly all of the text pages are preoccupied with that approach and that Kingdom. There are 14 pages of bibliographic citations, only a few of which contain botanical references. With 6 pages devoted to a topic index we have a text of 194 pages which contain about 70 illustrations. Most of the latter are histograms, electrophoregrams, dendrograms, or yet other line drawings designed to portray the presentation of electrophoretic data.

Practically all of the published work discussed or reported upon are from the zoological literature. Only 4 of the 170 pages of text and 12 references (from among *ca* 286 citations) are devoted to the botanical literature, most of this relating to polyploidy and its detection by electrophoresis. One searches in vain among the references for such well-established botanical chemosystematic workers as Alston, Fairbrothers, Harborne, Hegnauer, Mabry, McNair, Mirov, Swain, to name but a few. Surprisingly, Boulter's extensive comparative work on cytochrome *c* is omitted (although this is portrayed in diagram from yet some other reference). Even the section entitled 'History of the Biochemical Approach' neglects the botanical side, ignoring completely the historical roots which clearly began, at least in principle, with De Candolle in the early 1800s and, at least in practice, by lichenologists (using secondary compounds) during that same century. Ferguson erroneously states (p. 13) that 'The term *chemosystematics* is sometimes used synonymously with *biochemical systematics*, although the former tends to be favoured by botanists and the latter by zoologists. In part this stems from the use by botanists, in the past, of low-molecular-weight chemicals—the study of which is the realm of the chemist—while zoologists have concentrated on proteins and nucleic acids—the concern of the biochemist.' In fact, the present reviewer fancies that he coined the term chemosystematics (perhaps along with several others in the 1950s; it was loosely interchanged with chemo-taxonomy and biochemical taxonomy) simply because it was a shorter, quicker, way to refer to the discipline of biochemical systematics. In short, chemosystematics was intended as an abbreviation of biochemical systematics. After all, micromolecules, both plant and animal, are biochemicals, much as are macromolecules.

According to its author, the book is designed primarily for 'the advanced undergraduate student but the postgraduate and research worker should find parts of interest and benefit.' In my opinion, this is so because the author has organized his material well and communicates this clearly and concisely. He does not attempt to overload the reader with 'such and such have found this and that, however...'. Rather the text is a simple telling of the contribution, both real and potential, of electrophoretic methods for systematic purposes, albeit animal. He covers that field admirably, weaving in, when appropriate, peripheral but germaine accounts of polymorphism, selectionism vs neutralism, Hardy-Weinberg expectations, parthenogenesis, hybridization, genetic distance and identity, DNA hybridization, amino-acid sequence studies and molecular clocks. All that. But as a botanical worker I can't help but believe that the text could have lived up to its title had the author taken the time to digest the rich field of literature in botanical chemosystematics, both micromolecular and macromolecular.

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