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BOOK REVIEWS

Phytochemical Diversity: A source of new industrial products, edited by S. WRIGLEY, M. HAYES, R. THOMAS and E. CHRYSTAL, Royal Society of Chemistry, Letchworth, Herts., 1997, 254 pp., £59.50. ISBN 0-85404-717-4.

Here is yet another symposium volume reviewing the possibilities of producing new plant drugs from the richness of this planet's flora. Also considered are new agrochemical and cosmetic products, but the emphasis is on medicinal plants. As in so many similar publications, the really 'hot' new discoveries do not appear because of the needs of commercial secrecy, but nevertheless there is a wealth of new information in many of the chapters.

The opening contribution is an authoritative account of the search for new anti-cancer drugs by the team of scientists from the National Cancer Institute in Bethesda. There are chapters on plants and microbes as complementary sources of new drugs, on the ups and downs of the ethnobotanical approach to drug discovery and on modern science and traditional healing. I was cheered to read the account by Rob Nash and co-workers of novel biologically-active alkaloids from British plants. These authors show that the humble bluebell and harebell are better sources of certain polyhydroxyalkaloids than the tropical plants from which they were originally characterized.

Another British contribution is the chapter by A. M. Stafford and C. J. Pazoles of Phytera, who explore the phytochemical diversity of plant tissue culture for new drug discovery. The final word in this review, however, belongs to Ben Gilbert, who provides an important account of industrial production of Amazonian natural products. He hopefully concludes his review as follows: 'The industrial development of Amazonian natural products is perfectly feasible, would bring economic betterment to a large and increasing rural population, would satisfy a repressed demand in the world market and would at the same time provide a means of preserving and restoring the native forest of the Amazon basin'.

Plant Science, Laboratories, University of Reading, U.K. JEFFREY B. HARBORNE

Natural Product Chemistry by KURT. B. TORSSELL, second edition, Apotekarsocieteten, Stockholm, 1997, 480 pp., 320 Swedish Krona. ISBN 91-8627-463-5.

Readers of this journal might well disagree with Torssell's assertion that only '10% of the Earth's plants have been properly identified', but they would surely agree that natural product chemistry is still of vital importance. When the first edition of this book was published in 1983, it was the most comprehensive textbook on natural products then available. But like any textbook which covers a fast-moving area, the book began to age fairly rapidly. A year later, the Royal Society of Chemistry began publishing the (now) indispensable *Natural Product Reports*, and it suddenly became much easier to stay abreast of the literature of natural products. So is there justification for a new edition? The answer is a qualified yes.

As with the first edition the book concentrates on the biosynthesis of natural products (secondary metabolism), and all classes, including the oft-forgotten porphyrins, are included. There is a much-expanded and updated coverage of ecological chemistry and biological oxidation, and a good range of questions for students to tackle (with answers provided); and for many teachers these features will be sufficient enough reason to recommend the book. However, like the previous edition, there is a slightly surreal air about the book, as if the pharmacology and toxicology of natural products were of only passing interest. For example, the single paragraph on steroid hormones contains the sentence: 'Contraceptives are modified sterols suppressing ovulation'; but there are no structures or further information. Similarly the aflatoxins merit the briefest of figures and five lines of text ending with the comment: 'The aflatoxins occur in mouldy foodstuffs, which afflict poultry farming'. One might also add that the latest reference to aflatoxin biosynthesis is 1983! Additionally, there is no mention of erythromycin and the seminal work being carried out on engineering the genes of polyketide biosynthesis.

But to concentrate on omissions would be unfair. Torssell has produced a very worthy and comprehensive book of natural product biosynthesis, which will be widely used by those who teach such courses. It is a sobering thought, that after two hundred years of natural product chemistry, the all-encompassing text has yet to be written!

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Plant Molecular Biology: A Laboratory Manual, edited by M. S. CLARK, Springer, Berlin 1997 pp. xxix + 529, DM120.

One of the features of the molecular biology revolution which has taken place since the invention of recombinant DNA technology, is an explosion in the number of techniques available for working with nucleic acids and proteins. I am especially conscious of this when I read Ph.D. theses, whether as a supervisor or examiner. Materials and Methods sections, if presented in the traditional way, run into many many pages. But how is a graduate student, or indeed an established research worker, to learn all these techniques, particularly if there are no experienced molecular biologists within easy reach? Many of us turn to that well-established and widely-used manual of practical molecular biology, Molecular Cloning by Sambrook, Fritsch and Maniatis (Cold Spring Harbor, 1989). However, plants present their own particular problems and for this reason it is helpful that there are also available a number of texts which deal specifically with plant molecular biology. The volume reviewed here is the most recent such book to appear on the market.

Plant Molecular Biology: A Laboratory Manual is a very full text, up-to-date as far as 1996. It covers a very wide range of techniques, wider than most, if not all, of its immediate 'rivals' and does so in more detail than most other texts. It is good, for example, to see chapters on fluorescent *in situ* hybridization (FISH) and genomic *in situ* hybridization (GISH). It is also pleasing to note that the publishers have recognized the vital importance of colour in these fluorescence-based *in situ* techniques and have published a full-colour plate.

As I have already indicated, this book is very wide in its scope. This is best illustrated by describing the organization of the book. Part I is devoted to Basic Molecular Techniques. It is further subdivided into four sections: 1, Genomic DNA isolation, Southern blotting and hybridization; 2, Cloning from genomic DNA and production of libraries; 3, Extraction of RNA, cloning and subtractive hybridization and 4, Characterization of clones. Each of those four sections contains between two and five chapters. Part II is entitled Characterization of Plant DNA and is divided into three Chapters; Part III, Genetic Engineering; Methodology and Analysis, contains a further five chapters and an addendum; finally there is an appendix on plant nuclear genome sizes. Each chapter is well-referenced, further adding to the overall usefulness of the book.

The book has been written by over 40 different authors and inevitably there are differences in the writing style and readability of the chapters. There are also significant numbers of spelling and grammatical errors (and at least one scientifically misleading statement: there are certainly more than 20 tRNAs, for example) and I feel that the book would have benefited from a stronger editorial hand. However, I should also add that very few readers will do as I did, which was to read the text straight through. Taken one chapter at a time, the errors will certainly not be as obtrusive as I found them. Further, I would not wish to deter potential readers and users of this book. It is a mine of information which will be of use in any plant biochemistry or molecular biology laboratory. Indeed, my group has already made good use of it.

The publishers, Springer, are not renowned for low prices, but on this occasion I am bound to say that DM120 for over 500 pages of very useful text, including a colour plate, is good value.

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Photosynthesis and the Environment, edited by N. R. BAKER, Kluwer Academic Publishers, Dordrecht, 1996, 491 pp. £198.

Climatic change is currently receiving intense publicity, both in the scientific and non-scientific press. Whilst the extent to which global warming constitutes a threat to life on Earth will doubtless be hotly debated for some time yet, other changes, such as depletion of the ozone layer, are well-documented and are, rightly, of great concern to us all. The attention of scientists has, therefore, been directed towards how living organisms might respond to environmental changes, and this volume is a timely attempt to cover this topic from the standpoint of photosynthesis.

The book contains 20 chapters broadly covering the

measurement of photosynthesis in intact plants, the mechanisms by which photosynthesis is regulated and its response to changes in environmental parameters such as illumination, atmospheric CO_2, temperature, availability of water, UV-radiation and atmospheric pollutants. The bias is very much in favour of terrestrial plants. Whilst this is understandable since mankind has a major interest in how crop plants will respond to changes in the environment, I was disappointed to see that the substantial contribution that algae and cyanobacteria make to the global carbon cycle, especially in the marine environment, was largely ignored. It has been estimated, for example, that the ocean absorbs 30% of the CO_2 added to the atmosphere every year by burning of fossil fuels. The environmental factors limiting photosynthesis in the oceans also differ from those faced by terrestrial plants. Thus, whilst water is freely available, the same is not always true of CO_2 (as opposed to dissolved bicarbonate), nitrogen, phosphorus and iron, all of which can limit photosynthesis by marine algae. As a consequence, I would have thought that at least one chapter dealing with this particular system could have been justified. As it is, apart from biochemical studies on *Synechocystis* 6803, algae and cyanobacteria get only the briefest of mentions in the chapters dealing with the responses of photosynthesis to temperature changes and with CO_2-concentrating mechanisms. Another disappointment was the lack of discussion of atmospheric pollutants apart from ozone. What about oxides of nitrogen and sulphur?

However, these negative comments should not be allowed to detract from the overall value of a book that, after all, covers a very wide field. Moreover, it is well written, authoritative (each chapter is written by one or more expert in that area) and up to date. Since reviewers' preferences usually reflect their own interests in particular topics, it is perhaps invidious in the case of a book such as this to pick out individual chapters for special mention. However, I especially liked the chapters on photodamage and repair, on radical scavenging and on the molecular biology of stress responses in plants. The latter I found particularly valuable as a review of current technology in this area. The book concludes with a useful overview chapter and is also very well indexed.

This is a specialist and expensive book that will largely be of use as a reference volume. All phytochemists should have an interest in photosynthesis and, in this day and age, also in how plants might respond to anticipated changes in the environment. Therefore, they will need access to this volume. However, unless they are working directly with photosynthesis, I would suspect that this is a book for the library rather than a personal purchase.

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