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Book Reviews

Comprehensive Natural Products Chemistry
Sir Derek Barton, Koji Nakanishi (Eds.), Otto Meth-Cohn (Executive Editor), Pergamon, an imprint of Elsevier Science, Oxford. ISBN 0-08-042709-X, in 9 volumes (Volume 9 being a Cumulative Index), EUR 3,744, US$ 3,744.

Comprehensive Natural Products Chemistry, Volume 1: Polyketides and Other Secondary Metabolites Including Fatty Acids and Their Derivatives
U. Sankawa (Volume Editor), Pergamon, an Elsevier Science Imprint, Oxford, 1999, 1007 pp., ISBN 0-08-0431453-4. Price EUR 387.50, US$ 387.50.

This is the first of an 8 volume series aimed at providing a unifying theme in natural products of "How does nature make all these molecules of life". It was with some delight that I undertook to review this large volume, containing 31 separate chapters, especially as several genomes have now been completely sequenced and the next major biological problem is one of functional genomics. This will have to address how metabolites are made, what their biological importance is and how their biosynthesis is regulated. International efforts are being focused in this area and a treatise pulling together diverse fields of Natural Product chemistry is invaluable as a starter to gain insight into the challenges facing biologists of the future. The major bottleneck when applying genomic (DNA chip), proteomic and metabolomic technology will be one of bioinformatics. To reduce the need to consult the literature at a primary level reviews are invaluable. Good reviews give an evaluation of what has been done and are not simply a record of what is out there—this collection of articles is excellent and up to date. The authors not only review the literature but also add significant insights to biosynthetic pathways. For those requiring specialist knowledge on topics in Natural Product Chemistry this provides an excellent starting place. I was a little disappointed at some obvious minor errors on the pyridine nucleotide specificity of the enzymes of fatty acid biosynthesis—enoyl reductase uses NADH as reductant! Not withstanding that this is an exceptionally valuable reference textbook for the library and a good balance between biology and chemistry. The introductory historical perspective is full of interesting details required to stimulate undergraduate lectures and areas as diverse as polyketide biosynthesis, fatty acid biosynthesis and degradation, eicosanoid metabolism, platelet-activating factor, aflatoxins, coumarins, lignans, flavonoids/isoflavonoids and cyanogenic glycosides are covered amongst others. I doubt if any one individual would have sufficient interest and time to read every chapter in detail—I had occasion to as I was in hospital and learned quite a lot. The chapters are well written, easy to follow and I think this text is not liable to be outdated. The contributing authors should be thanked for their efforts. I would strongly recommend it for purchase by libraries serving both Biological Sciences and Chemistry Departments. The one pity is that it is not available on disc or can be pulled down from the WEB. The authors of such a comprehensive treatise should have perhaps thought of this.

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Comprehensive Natural Products Chemistry, Volume 2: Isoprenoids Including Carotenoids and Steroids
D.E. Cane (Volume Editor), Pergamon, an Elsevier Science Imprint, Oxford, 1999, 446 pp., ISBN 0-08-043154-2. Price EUR 387.50, US$ 387.50.

This book is the second volume of a series of eight dealing with natural products. The title of the series is slightly misleading, as the aim of the series is to cover biosynthesis, rather than chemical structure or biological function, although there are sections in most chapters on these two topics in this volume. In the case of the isoprenoids, there are 14 chapters, which mainly cover biosynthetic pathways, and to a lesser extent gene cloning and expression and the isoprenylation of proteins. The sequence of chapters is largely in order of the biosynthetic pathway, starting with acetate.

The first chapter is an overview of isoprenoid biosynthesis by the volume editor, David Cane. This provides a summary of isopentenyl diphosphate (IPP) synthesis and its metabolism to a broad range of higher isoprenoids. The second chapter, written by a group from Purdue University, describes the formation of mevalonic acid from acetyl CoA, with particular reference to HMG CoA reductase. This section has a good coverage of the literature and comparisons of this key regulatory enzyme in plants, animals and bacteria. It also has some helpful coloured 2-D illustrations of the active site of the enzyme.

It is not often these days that a novel biosynthetic pathway is discovered. This occurred in isoprenoid formation a few years ago, when it was found that IPP can be formed through a non-mevalonate pathway. This is the route to higher isoprenoids, such as the carotenoids. Michel Rohmer was at the forefront of this discovery. Indeed, the pathway is often called the 'Rohmer pathway' in his honour. It is good to see, therefore, that he has contributed an excellent chapter on the work leading to its discovery and the current state of knowledge of the sequence of intermediates.

The next chapter describes the properties of IPP isomerase and prenyltransferases. Given the breadth of this topic, I would have liked to have seen a longer review. Chapter 5, written by Wise and Croteau, details monoterpene biosynthesis. As one would expect from these experts, this is an excellently written review of the field and an enjoyable read. The editor, David Cane, has written the next chapter on sesquiterpene biosynthesis, with an emphasis on cyclisation mechanism: lots of good chemistry here to get one's teeth into.

Chapter 7 moves from the chemistry and biochemistry of the pathway to cloning and expression of terpene synthase genes. At a mere 14 pages, this seems somewhat out of place and the topic could have been included in the appropriate chapters elsewhere. The following chapter, on diterpene biosynthesis, has been written by undoubted experts in the field, Jake MacMillan and Mike Beale. It covers a wealth of information on the four kinds of GGPP cyclases especially with respect to reaction mechanisms.

The next three chapters describe the pathway from squalene to triterpenoids and sterols, starting with squalene synthase, then key enzymes in cholesterol formation and finally cycloartenol and other triterpene cyclases.

Chapter 12 summarizes carotenoid genetics and biochemistry in 30 pages. Yes, I am biased, but I think more could have been included, especially on regulation and genetic engineering. The final two chapters cover protein prenylation and ginkgolide biosynthesis, respectively.

Overall, this volume is a very useful reference text that will be worthy of purchase by libraries and perhaps by those with a keen interest in isoprenoids, if they can afford the price. Inevitably, in such a fast moving area, some of the information is already out of date, but I think that there is still sufficient important fundamental material to justify its purchase.

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Comprehensive Natural Products Chemistry, Volume 3: Carbohydrates and Their Derivatives Including Tannins, Cellulose and Related Lignins
B. Mario Pinto (Volume Editor), Pergamon, an Elsevier Science Imprint, Oxford, 1999, 939 pp., ISBN 0-08-043155-0. Price EUR 387.50, US$ 387.50.

The first thing that might strike a reader about Volume 3, even before its weight, is its title. The title of this volume is convoluted and, like the proverbial camel, seems to have been created by a committee. Taking the cast in order of appearance: 'carbohydrates'—fine; 'and their derivatives'—OK; 'including tannins'—not really, unless we regard *all* natural organic products as carbohydrate-derivatives because their source can be traced back to glucose 6-phosphate; 'cellulose'—well, surely it goes without saying that the world's most abundant carbohydrate will be included in a comprehensive book on carbohydrates; 'and related lignins'—this one really had me stumped (related to what?).

The contents of this megalith of a volume (939 large pages) make a welcome addition to the reference shelf. Any multi-author work tends to be patchy, with parts of the topic covered more thoroughly or more masterfully than others; this volume is no exception. For example, perhaps of particular interest to readers of *Phytochemistry*, the volume contains a block of 7 chapters on plant-specific products (starch, pectins, celluloses, hemicelluloses, lignins, hydrolysable tannins and condensed tannins): some of these chapters focus on the structure of the substances