under discussion (celluloses, condensed tannins), others on their biosynthesis; turnover and biodegradation receive scant coverage. Although this approach has the advantage that the authors have been able to concentrate on their personal areas of expertise, one is led to question the claimed 'Comprehensiveness' of the series. The chapters also vary greatly in their depth of coverage and length: that dealing with lignin (by Lewis and colleagues) is notable for its thoroughness.

The 'comprehensiveness' of the book is also open to question in respect of the range of natural products covered. Topics you might look for in vain in this volume include fructans, chitin, oligosaccharides, hydroxyproline-rich glycoproteins, arabinogalactan-proteins and ascorbate. On the other hand, there is quite detailed coverage of sugar nucleotides (e.g. in Mohnen's excellent chapter on pectin biosynthesis) and of certain sugar phosphates (scattered in various chapters).

Another chapter with a particularly phytochemical flavour is that on the 'alkaloids' that can inhibit glycosidases. This chapter contains a valuable directory of such compounds; however, the emphasis is on their therapeutic use and on their use as laboratory tools to investigate glycoprotein processing rather than on their biosynthesis or roles in the organisms (mainly plants) in which they occur. The discussion of plant growth inhibition by one such alkaloid, nojirimycin, is rather off-target in claiming that cell wall loosening is caused by the action of *exo*-glycanases on xyloglucan. However, the effect of castanospermine on cell elongation is highlighted and appears to be an interesting area requiring further study.

Half the volume is devoted to the chemistry and enzymology of carbohydrates that either are of general occurrence in living organisms or are unique to non-plant organisms. Many of these chapters appear to be well produced and are a valuable model of what we should hope will one day be achieved in *phyto*chemistry. Topics covered well include *N*-linked glycoproteins, some *O*-linked (Ser/Thr but not Hyp) glycoproteins, glycolipids, glycosaminoglycans, lipopolysaccharides, and bacterial peptidoglycans. This last topic is covered by Bugg in an exemplary chapter showing a thorough and logical compilation of both structure and biosynthesis, including reaction mechanisms, highly accessible to the non-specialist and containing ideas that may well prove transferable to phytochemistry.

In conclusion, this is a heavy tome, with some considerable strengths, and a mass of facts. Whether enough of these lie within the reader's (Department's) field of interest to warrant purchase of the 9-volume work, at $3744, can only be judged by test-driving the book, which I strongly recommend.

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Comprehensive Natural Products Chemistry, Volume 4: Amino Acids, Peptides, Porphyrins and Alkaloids
J.W. Kelly (Volume Editor), Pergamon, an Elsevier Science Imprint, Oxford, 1999, 429 pp., ISBN 0-08-043156-9. Price EUR 387.50, US$ 387.50.

Natural products excite our notice not only because of their intrinsic *scientific* interest but because of their huge importance in agriculture, medicine and indeed social anthropology. No one can look at the structures of complex natural products and not marvel as to not only 'why' but 'how' they are made. Consequently, many studies are still focused on the pathway, genetics and control of the biosynthesis of these molecules.

This is a not a small book, and it is part of a large series. The executive editor, Professor Otto Meth-Cohn, remarks that it is surprising indeed that this series is the first to attempt to produce a 'comprehensive' overview of natural products beyond the student text level, and as such it is greatly be commended. But the reason for its primacy is surely to be found in Peter Medawar's comment: ''Biology is not hard in the sense that physics can be hard. If biology is hard it is because of the number and nature of things that one must hold in one's head at one time.'' There is just a lot of literature out there!

The present volume concentrates on molecules in which nitrogen is a major component—amino acids, peptide, porphyrins, alkaloids and so on. It contains 14 chapters, which are fairly evenly matched in terms of mass though more variable in terms of range and scope.

Koji Nakanishi and Jeffrey Kelly kick us off with, respectively, a useful historical perspective and a short but well paced piece on the biosynthesis of mainly aromatic amino acids. Other more specific chapters include ones on protein palmitoylation and glycosylphosphatidylinositol biosynthesis (these are possibly a little

out of place here), and on the detailed biosynthesis of haem, of vitamin B12 and of selenocysteine. Other small molecules meriting individual chapters include β-lactams and penicillins (two chapters) and strictosidine, billed as 'the biosynthetic key to monoterpenoid indole alkaloids'. Some other gaps are filled by a chapter covering various alkaloids grouped according to the amino acid from which they are derived.

Many peptide molecules are synthesized non-ribosomally, and synthases for gramicidin S are covered by Vater and Stein, while Narayan Rajendran and Mohamed Marahiel cover more generally the large, functional synthases that make peptides in a way somewhat analogous to the way in which polyketides are made by modular, complex polyketide synthases. Here too combinatorial biosynthesis strategies are proving an attractive direction.

It is inevitable that with a topic as broad as this a book of this character can attract criticism both for what it puts in (how coherent and comprehensive is it *really*, or is it a bit of rag-bag?) and what it leaves out. It does not entirely escape the former criticism, and however unfairly (given the vast literature) there are many many more secondary metabolites in the described classes that have not been picked. Indeed, the knowledge that underpins the existence of a major amino acid fermentation industry, centred largely in Japan, is virtually unremarked.

So overall, this is certainly a useful addition to the library, if not the individual bookshelf, but readers with just a general interest would find an Internet search engine as good a starting point. Thus my meta-search engine (Copernic2000) finds 49 hits for strictosidine while Web of Science picks up 133 entries for this word. It is the electronic media, as much as the vast amount of knowledge out there, that makes truly 'comprehensive' anthologies at once desirable yet an impossible dream.

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Comprehensive Natural Products Chemistry, Volume 5: Enzymes, Enzyme Mechanisms, Proteins and Aspects of NO Chemistry
C. Dale Poulter (Volume Editor), Pergamon, an Elsevier Science Imprint, Oxford, 1999, 495 pp., ISBN 0-08-043157-7. Price EUR 387.50, US$ 387.50.

This is volume 5 in the excellent series *Comprehensive Natural Products Chemistry*. Previous volumes have dealt with polyketides, isoprenoids, carbohydrates and amino acids. This one is devoted to ''enzymes, enzyme, mechanisms, proteins and aspects of NO chemistry''. Given the impressive high resolution 3D structures now available for a wide range of enzymes and other proteins, it was disappointing to see so few colour figures in the book (Chapters 10 and 14 were welcome exceptions). Other missing items included a discussion of how protein structure is determined, especially for proteins in solution.

The book includes chapters on ''stabilization of reactive intermediates and transition states by H-bonding'', with a particular focus on enolate ion intermediates, ''keto-enol tautomerism in enzymatic reactions'', and ''nucleophilic epoxide openings'', focusing on the epoxide hydrolases and GSH transferases. Chapter 5 deals with deamination reactions, especially adenosine and cytidine deaminases. Esterases (Chapter 6), including phospholipase A_2, phosphatases (Chapter 7), and ribonucleoside diphosphate reductases (Chapter 8), are considered in depth. Chapter 9 gives an interesting account of radical reactions in lysine 2,3-aminomutase, PFL-activating enzyme and methane mono-oxygenases. Equally interesting is the discussion of cyclo-oxygenases I and II in Chapter 10. Cobalamin-dependent enzymes and glycosyltransferases are the subjects of the next two chapters.

Chapter 13, entitled ''electrophilic alkylations, isomerizations, and rearrangements'', focusses on farnesyl pyrophosphate synthetase (the FPP abbreviation used by the authors is not included in the abbreviations list), protein farnesyltransferase and isoprene cyclases. Chorismate mutases are the subject of Chapter 14 and dehalogenating enzymes that of Chapter 16. Chapter 15 gave a fascinating account of thymine dimer photochemistry (although I am not sure how it fits into this book since it deals with the chemistry of the lesion rather than its enzymic removal). Chapter 16 explained the mechanism of antibody-mediated catalysis. Puzzlingly, there was no chapter on NO chemistry despite its inclusion in the title of the volume.