

bohydrates". "It is intended to support the teaching of graduate students in bioorganic chemistry." To this end, the editor has divided the book into 14 chapters which correspond to the average number of weeks in a semester at most Universities. Each chapter begins with a broad overview of the general principles and summarizes the key findings that form the basis of current dogma in that subdiscipline. The chapters finish with more in-depth examples of current studies, generally from the work of the chapter authors, who, for the most part, are the world's leading authorities in their particular area. To make the job of teaching even easier, a set of overheads is available for each chapter (not reviewed). Professor Hecht reports that the material presented in this book has been used with great success by himself and others as a text book for an advanced graduate special topics course.

Chapter 1, "Introduction to Peptides and Proteins", by Professor Axely, is an excellent beginning to a book of this type which is to be potentially used as a text to a group of graduates with diverse undergraduate training in that it provides a quick review of the structures, one and three letter codes of the 20 amino acids found in most peptides and proteins, as well as a staccato overview of almost all aspects of protein science, such as folding, structural analysis, enzyme purification, enzyme kinetics, etc., some of which are covered in more depth later in the book. At the end of this chapter, the student will have been exposed to "the main vocabulary of the area". This introduction is followed immediately by the chapter, "Chemical Synthesis of Peptides", by Professors Hruby and Meyer, which provides insight into basic SPPS, side chain protection, various methods for coupling including methodologies for rather difficult coupling, amino protecting groups, and deprotection, as well as a section on the generation of peptide libraries. Several chapters on structural analysis, structure determination, and protein folding follow which provide the student or reader with an in-depth overview of cutting edge protein science in these areas. Chapter 9, "Site-directed Mutagenesis", is a representative example of the excellence of most of the chapters in this book in which the authors have presented a topic which most students perceive as either incredibly difficult or in some way akin to magic in a straightforward understandable style. The chapter presents many of the current methods of mutagenesis except for my favorite method, marketed as "QuikChange" by a to-be-unnamed vendor. The chapter, "The Structural Basis of Antibody Catalysis", by Professor Hilvert et al., is cutting edge science, again reduced to a level of understanding of most graduate students yet still at the level to be useful to the more experienced researcher. Professor Hilvert utilizes the excellent example of catalytic-antibody rearrangement of chorismate to prephenate (chorismate mutase) from his own laboratory to demonstrate the potential of this area. A chapter that even the hard-core organic synthetic-type graduate student should find interesting, in addition to Chapter 2, is the chapter, "Use of Enzymes in Organic Synthesis", which provides an overview of the advantages and disadvantages of biocatalysis, the type of reaction for which enzymes are available, as well as an excellent selection of examples of each type of reaction.

Since I did not discuss all the chapters in this book, I have listed the title of each chapter to give the readers of this review at least a chance to peruse the titles of all the chapters, listed in order of appearance: "Introduction to Peptides and Proteins", "Chemical Synthesis of Peptides", "Total Synthesis of Proteins", "Structural Analysis of

Proteins", "Protein Structure", "Protein Folding", "Nucleic Acid Interactive Protein Domains That Require Zinc", "Understanding the Mechanisms and Rate of Enzyme-catalyzed Proton Transfer Reactions to and from Carbon", "Site-directed Mutagenesis", "The Structural Basis of Antibody Catalysis", "Peptide Hormones", "Peptide Mimetics", "Use of Enzymes in Organic Synthesis", "Engineered Proteins in Material Research".

The references for all the chapters are at the end of the book which was no doubt an editor's nightmare; however, my preference would have been to have the references for each chapter at the end of that chapter. The present arrangement is difficult for the user of single chapters. Overall, I would highly recommend this book not only for its potential use as a text book for an advanced topic for a graduate or senior honor's course but for research directors to give the beginning graduate student, postdoctoral fellows, or technicians as a primer in the area because *Bioorganic Chemistry: Peptides and Proteins* is also for the everyday practitioner even at the \$75.00 price.

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**Practical Polyphenolics: From Structure to Molecular Recognition and Physiological Action.** By Edwin Haslam (University of Sheffield). Cambridge University Press, New York, NY. 1998. xv + 422 pp. 17 × 24.5 cm. \$100.00.

This book summarizes the work of Professor Haslam's distinguished career devoted to defining the significance of plant polyphenols. For that reason alone, it must be in the library of chemists and biologists interested in phenolic plant metabolites. The book is written in a friendly way, with excerpts taken from his personal correspondence that are especially interesting to those who have labored for years with these compounds. That historical perspective allows a nice focus on how far we have come in this science over the last 30 years. Most important, I believe, is that this book demonstrates the myriad ways that plant polyphenols influence our lives. Professor Haslam makes a strong argument for continued study of intermolecular association of plant polyphenols with other biopolymers.

At first glance, a reader with knowledge of the chemistry of plant polyphenols might be put back a bit by the claims that "this is the only book to describe the scientific basis for the action of plant polyphenols in a wide range of technologically important phenomena" because Professor Haslam himself has written other fine books and made important contributions to books edited by others. That claim, and the very selective treatment of the structure and biosynthesis of condensed and hydrolyzable tannins in Chapter 1, starts the book out on what I believe is a slow pace. For example, there is virtually no discussion of the chemistry of commercially important wattle or quebracho tannins and references to chestnut tannins are scarce. While largely a review of material that can be found in his previously published work, this chapter does provide a useful summary of the chemistry of these compounds for a reader new to the field.

Professor Haslam can be forgiven for the moderate pace at his start, however, because he warms to the real subject

of this book in Chapters 2 and 3 on molecular recognition and the interaction of plant polyphenols with other compounds. In these two chapters, he gains momentum and really begins to get into his usual stride. Here we find a nice series of thought-provoking essays. His insights are keen, and he challenges his readers to take up the task of learning more about how plant polyphenols interact with other biopolymers to express biological activity.

Professor Haslam's book continues to gain strength as he moves into Chapters 4 and 5, dealing with the role of plant polyphenols in the taste, bitterness, and astringency and the chemistry underlying the "maturation" of those properties in foods. Here he reaches full stride and engages us in discussions of the chemistry that might be considered the most important commercial and ecological aspects of these compounds. Readers are asked to study carefully as he carries us through a series of analyses of the significance of plant polyphenols in foods and beverages. His treatment of teas is especially nice. Here, associations between polyphenols and caffeine are highlighted. Similarly, the oxidation and complexation of condensed tannins with proteins define the properties of chocolate. The discussion of persimmon tannins and their use in Japan for a wide array of applications (including the removal of proteins from sake!) once more highlights the important associations between plant polyphenols and other biopolymers in their commercial use.

Chapter 5 also contains an interesting analysis of competitive binding of tannins to carbohydrates and proteins as an explanation for the loss of astringency in ripening of fruits. That leads the reader into a valuable summary of the chemistry of carbohydrate gels and mechanisms by which these gels can associate with and "encapsulate" polyphenols. A similar mechanism is proposed for the sequestration of tea polyphenols by casein to explain the loss of astringency resulting from milk in the tea. This chapter concludes with an analysis of the chemistry that occurs in aging of wines and the significance of oak polyphenols on the quality of whiskey.

In Chapter 6, Professor Haslam asks us to change our focus to our visual rather than taste senses. Inter- and intramolecular recognition once again comes to the fore in

providing an explanation of how more than 250 million colors can be produced from such a few basic anthocyanin chromophores. This chapter especially makes one appreciate the great impact molecular associations have on the quality of our lives.

Favorite reading for many will lie in Chapters 7 and 8 because of the strong interest of the influence of plant polyphenols on human health. Professor Haslam has done well to stay with the fundamental science that supports the biological impacts of herbal medicines. Chapter 8 deals with perhaps the most important property of plant polyphenols, centering on their antioxidant properties and the chemistry of the oxidation of these extremely reactive compounds.

Chapter 9 appropriately closes the book with a valuable analysis of the physical chemistry that helps us understand the vegetable tanning process dating back at least 3000 years. Leather manufacture with vegetable tannins remains the predominant industrial use of these compounds, and they retain their market because of the high-quality heavy leather produced. Perhaps the earliest applications of intermolecular recognition and oxidation of *o*-quinones lie here. A reader can't avoid the thought that there is so much to do to bring our science to reasonable parallel with the art that we have applied to improve our lives.

Professor Haslam's book is attractively presented and reasonably priced at only \$100/US. There are problems with some of the references, but readers with the intent of seriously studying these compounds will easily work through those minor errors. I, and I'm certain many others, will read this book many times over to appreciate the insights Professor Haslam shares with us.

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