

that demonstrate the huge number of potential quadruplex-forming sequences that are present in the human genome and that appear to cluster in particular regions, such as gene promoters.

The final chapter, by Davis and colleagues, presents a very different aspect of quadruplex studies and highlights the potential of these structures as nanomaterials in supramolecular chemistry. Amongst many possibilities, Davis describes their potential as cation sensors, nanomachines, G-wires and ion channels.

Overall this book is a very useful resource that is an up-to-date record of the state of the field at the end of 2006. My fear, and indeed my hope, is that the current rapid advances in this area will be such that it will quickly become out of date. Indeed recent developments in bioinformatics, high-resolution structures, RNA-forming quadruplexes and new potential quadruplex-forming sequences confirm this notion. Nonetheless I am sure that this book will remain as a useful resource for many years.

Keith Fox

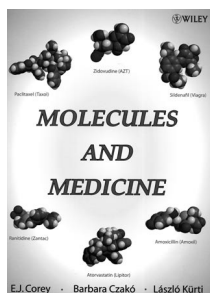
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## Molecules and Medicine

By E. J. Corey, Barbara Czakó, and László Kürti.

Wiley, New York 2007, 272 pp., softcover \$ 49.95.—ISBN 978-0-470-22749-7

The book "Molecules and Medicine" written by E. J. Corey (1990 Nobel Laureate in Chemistry), Barbara Czakó, and László Kürti, claims to bring to a broad readership ranging from college undergraduates to university professors and researchers in the life sciences an integrated look at chemistry, biology, drug dis-



covery, and medicine. Attracted by this far-reaching goal of bringing something for everybody, we were curious as to whether the book would really live up to it.

As a first impression, the book was prepared in a thorough manner, and the numerous colorful illustrations that help to explain the various topics covered make it easy and interesting reading.

As an introductory chapter to the book, Part I starts by explaining the basic concepts of organic chemistry to the reader. Over roughly 30 pages, the authors give a short course on the basic rules of chemical bonds and structures, a brief description of hybridizations, and an overview of important functional groups. Heterocyclic molecules, which are, of course, the basis of many drugs, are explained as well as stereochemical principles. The chapter concludes with three-dimensional structures of proteins that are important for medicinal chemistry optimization efforts. This introductory chapter on organic chemistry, which presents a lot of facts in a very brief way, prepares readers for the following parts of the book and gives a basic understanding especially for readers who might be not trained so well in chemistry. On the other hand, the big challenge of this book, which is described by the authors in their preface, becomes obvious here, as for some readers the pace of the chemistry introduction might be far too quick, whereas for others the level might be too low. Nonetheless, the authors can be congratulated for providing with "Molecules and Medicine" an intellectually pleasing mixture of drug discovery, chemistry, biology, and history that most importantly is easily readable.

Part II starts with a chapter on inflammatory, cardiovascular, and metabolic diseases, and the first entry is dedicated to one of the classical and best-known drugs acetylsalicylic acid (aspirin). The overall framework of the book is that usually one drug is described per page. Key literature references to the individual agents are provided on each page. At the end of each part, a much more comprehensive bibliography gives the reader an even better insight into the current knowledge of the various research fields. The drug descriptions are only interrupt-

ed for more general short explanations of biochemical principles and pathophysiological mechanisms of certain diseases. These pages explaining underlying biological systems connect the details of the discussed drugs to the overall picture of a certain disease.

In the following chapters, the authors take the readers on a journey through the major classical and modern drug classes. Continuing the broad overview of the various aspects of medicinal chemistry, the reader gets an introduction to reproductive medicine, osteoporosis, and autoimmune diseases. The infectious-diseases section (Part IV) is subdivided into antibiotics, antiviral agents, and antifungal agents. Drugs for the treatment of parasitic diseases, with a special focus on malaria, are the topic of the last part of this chapter. Problems and advances in cancer chemotherapy are the topics of Part V. The book ends with a chapter on central-nervous-system-related topics and drugs for pain, analgesia, hypnotics, neurodegenerative, and psychiatric diseases.

Despite the rather short descriptions of the individual drugs, the book offers the reader a high information content. Each drug is shown as a structural formula, as a ball-and-stick model, as a space-filling model, and, in many cases, the three-dimensional interaction of the drug with its target protein is also depicted, thereby giving the reader an idea of how the drug acts on a molecular level. Furthermore, the coverage includes the disease condition the drug treats, a summary of its industrial development, the year of market entrance, the biological target, its metabolism and interacting side effects, and related drugs. These very interesting drug descriptions and the colorful illustrations offer a rapid entry to each drug, and the literature references give the interested reader the possibility of studying case histories in further detail. The various aspects, covering medicinal chemistry, history of medicine, biochemistry, cell biology, and structural biology, are combined into a broad picture of how these molecules were discovered and developed. Under these circumstances, it is especially interesting to see how much time was necessary in certain cases until a drug discov-

ered long ago finally reached the market. For example, the antiretroviral agent Zidovudine (Retrovir™, AZT) was discovered in 1964 but only entered the market for the first time 23 years later.

Given the background of the authors, particularly of Prof. Corey, who is one of the leaders in the field of synthesis of complex natural products, it is somehow surprising that there are no descriptions of the drug syntheses contained in this book. However, although this might have added some additional value to the book for the chemically more experienced reader, it could be overwhelming and distracting for others. Overall the book is about drug discovery and drug application and not about synthesis. It is remarkable how this focus on drug discovery and drug usage is maintained throughout the book. In a relatively limited space (248 pages), the authors guide the reader through the most important aspects that have driven pharmaceutical research for the past century. The reader can easily trace by common name or trade name most of the currently important drugs and quickly track their history. "Molecules and Medicine" is extremely well researched, with more than 850 literature citations. With its description of more than 100 of the most significant molecules now used in modern medicine, the book nicely serves varying needs ranging from those of interested high-school students and teachers to newcomers and practitioners in the field of medicinal chemistry and drug discovery. Overall the book is highly recommendable to everybody with interest in modern biomedical research and its historic development.

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## Mass Spectrometry of Protein Interactions

Edited by Kevin M. Downard.

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A major challenge of the post-genomic era is the large-scale study of proteins, their structure and expression, their diverse levels of regulation, their modifications, and, last but not least, the interactions among them, with DNA, and with other biomolecules. Mass spectrometry is the central technology for the qualitative and quantitative study of proteins due to the low sample amounts required and its ability to analyze highly complex mixtures without the need for purification. A comprehensive guide to the analysis of protein interactions by mass spectrometry is therefore a valuable contribution to the current literature, especially since, in general, the number of useful books on mass-spectrometry-based proteomics is surprisingly low and also since there is no book available that covers all the experimental techniques described here in one volume.

The contributions to this book can be sub-divided into two parts. The first part consists of two chapters introducing the basic analytic techniques for the direct detection of protein complexes and assemblies. Electrospray ionization mass spectrometry is routinely employed in proteomics, and the first chapter describes how it is applied to the study of noncovalently bound protein complexes. Furthermore, it is explained how ion-mobility spectrometry can be combined with mass spectrometry to form a powerful means for examining protein conformers and potentially also protein complexes. Another chapter highlights the application of matrix-assisted laser desorption/ionization mass spectrometry to the study of protein interactions.

The remaining four chapters deal with specific indirect techniques for the inves-

tigation of interactions between proteins, but also between proteins and DNA, as well as between proteins and small ligands. They mostly derive from methodologies developed for the analysis of tertiary protein structure based on varying the accessibility and exposure of different parts of the protein to their surroundings. Since the presence of a non-covalent binding partner will alter the accessibility of the protein surface in the binding region, many techniques appropriate to the analysis of tertiary protein structure can be just as well applied to the study of interactions. The methods described include hydrogen–deuterium-exchange techniques, limited proteolysis, chemical cross-linking and radical probe mass spectrometry. For each of these approaches, the general ideas are explained in a comprehensible way; examples of their successful application to specific problems are given, but also specific difficulties are indicated. If applicable, strategies are described in a bottom-up and top-down context, as, for instance, in the chapter about chemical cross linking.

One shortcoming of the book is that the collection of mass-spectrometry-based methodologies described is not complete. For example, a chapter on the screening of protein–protein interactions by pull-down experiments coupled to mass spectrometry is not included. Furthermore, it would have been desirable to have a section that puts mass-spectrometry-based interaction studies into the broader context of other popular methods for the investigation of protein–protein interactions—not only compared to the structure-determination methods X-ray crystallography and nuclear magnetic resonance spectroscopy, which are mentioned frequently in the book, but also to conventional interaction experiments, like yeast two-hybrid screens.

The contributions are written in a concise style and highlight the state of the art in the respective methodologies, but also point out shortcomings and challenges. Each chapter serves as an extensive resource of references to the primary literature. If applicable, suitable software packages for the support of the data analysis are indicated. The book is

