

Enantioselective Chemical Synthesis

The development of efficient enantioselective methods for the synthesis of complex organic molecules, in particular of natural products and pharmacologically relevant analogs, has made breathtaking progress in the past few decades. The speed of scientific development, especially in the area of asymmetric organic and metallo-organic catalysis, and the multitude of publications (including specialized reviews and monographs) makes it difficult for students, researchers, and teachers to keep track of advances, to be aware of the latest possibilities when planning a synthesis, and to adequately evaluate new publications.

Against this background, the book by Corey and Kürti undertakes the very welcome and difficult attempt to compile the “most important and useful” methods of enantioselective synthesis, first in encyclopedic form (Part 1, 150 pages), then by introducing some strategic concepts for the planning of enantioselective syntheses (Part 2, 20 pages), and finally by describing nearly fifty total syntheses as examples (Part 3, 150 pages).

At first sight, the very attractively designed book, with some figures in color, a well-arranged structure, clear graphic formulas and reaction schemes, and an enormous number of references, creates a very good impression. A second look reveals that the book—like an earlier monograph by the first author and Nobel laureate E. J. Corey (*The Logic of Chemical Synthesis*, John Wiley & Sons, 1990)—emphasizes the author’s scientific contributions to an appreciable extent. Thus, the syntheses described as examples are a compilation of total syntheses carried out in Corey’s laboratory in the past two decades, and the references (and the list of methods introduced in Part 1) are also by no means complete, but reflect a personal choice by the authors.

The reader who is aware of these limitations and does not regard this book as a “reference source”, but is willing to look at the world of enantioselective synthesis through the eyes of synthesis grandmaster E. J. Corey, will be rewarded with many interesting, stimulating, and helpful insights. And in that manner the book fully serves its purpose.

Part 1 presents many important chirogenic synthetic transformations in a clear manner, arranged under methods for the formation of C–H, C–O, C–N, C–Y, and C–C bonds. A separate section deals with cycloadditions and other cyclization reactions. Within this thoughtfully chosen structure, the authors present a relevant selection of useful enantioselective protocols, with the focus

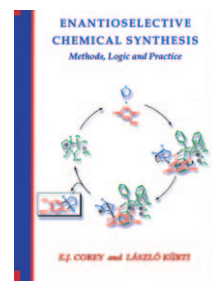
appropriately placed on catalytic systems, whereas only a few auxiliary-based methods are mentioned. The general concepts are always illustrated with a number of well-chosen examples, and the structures of the necessary chiral catalysts and ligands are shown separately. Even though some renowned specialists will search in vain for their own contributions, the compilation reflects the present state of the art in the area of asymmetric organic and metallo-organic catalysis in an impressive and convincing manner. The only cause for regret is that biocatalytic (enzymatic) methods are not covered at all.

Part 2 of the book ties in directly with the already mentioned work *The Logic of Chemical Synthesis*, and begins with a brief recapitulation of Corey’s terminology of retrosynthesis and the various transform types, before introducing various concepts for the stereo-controlled building of complex structures. Selected examples are described to illustrate how the examination of highly-ordered pre-transition-state assemblies makes it possible to rationalize and/or predict the stereochemical course of enantioselective processes.

Part 3 presents a multitude of total syntheses, showing in each case the complete reaction scheme (including reaction conditions and yields), followed by a description of the underlying retrosynthetic plan. In many cases the stereoselectivity is highlighted. Each section is rounded off by a short explanation of the importance of the target molecule and a summary of the key steps of the synthesis. A table at the beginning of Part 3 gives an overview of all the target structures, which not only makes it easy for the reader to navigate through the contents but also illustrates the great structural variety and complexity of the (predominantly polycyclic) natural products that Corey and co-workers have successfully synthesized in the past years. The crystal-clear descriptions of the syntheses and the genius displayed in the manner of achieving them, as well as their orderly classification, make this part a real treasure-trove of stimulating ideas, and they offer ideal case-studies for advanced lectures and seminars in organic synthesis.

Anybody who chooses to do so may criticize the book for its (intentional) subjectivity. But really we must raise our hats to the authors who have collected an enormous wealth of information and prepared it in a well-arranged manner. The rather terse and economical presentation of the material, and the way in which it is rationalized with the help of tables, certainly sets an interesting standard, and is appropriate in our world that is so used to colorful visual signals.

It is beyond question that this comprehensive, stimulating, and highly up-to-date book is worth the price and will get a wide distribution. It

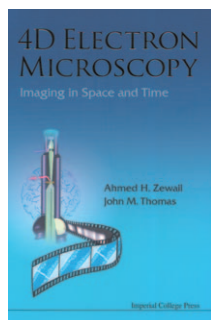


Enantioselective Chemical Synthesis
Methods, Logic and Practice.
By Elias J. Corey and László Kürti. Direct Book Publishing, 2010. 334 pp., hardcover, \$ 75.00.—ISBN 978-0615395159

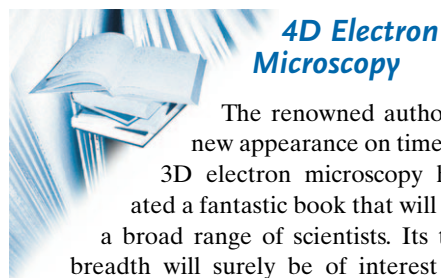
deserves its place on the bookshelves of all who are interested in synthesis. It will surely be a long time before this book, as part of the scientific legacy of a great pioneer of chemical synthesis, begins to gather dust in our libraries.

Hans-Günther Schmalz
Department of Chemistry
University of Cologne (Germany)

DOI: 10.1002/anie.201100655



4D Electron Microscopy
Imaging in Space and Time.
By Ahmed H. Zewail and
John M. Thomas. Imperial
College Press, 2010. 360 pp.,
softcover, £36.00.—ISBN
978-1848164000



The renowned authors of this new appearance on time-resolved 3D electron microscopy have created a fantastic book that will appeal to a broad range of scientists. Its topic and breadth will surely be of interest to those interested in physics, material science, and solid-state chemistry. The attraction of this book stems from the deep knowledge of the authors, who are clearly the leaders in the field. On the one hand, there are currently only a few labs that are experimenting with 4D electron microscopy, but on the other hand, everybody is talking about it. The expertise of the authors and the clear, well-documented nature of the book combine to lend it great potential to set the standard in this field.

Time-resolved spectroscopy and electron microscopy are familiar to many potential readers. This book describes the combination of aspects of both subjects in this completely new and exciting field. While the book and the topic it covers break new scientific ground, the authors take care to make their work accessible to a broad readership. It is well-structured and includes many references with background information for readers outside the field. Different facets of the complex subject matter are well balanced, and aspects likely to be unfamiliar to many readers are explained with care. It is clear that experienced book writers were at work.

To fully understand the content, a degree of background knowledge in optics, solid-state physics, and quantum mechanics is necessary. Nevertheless, I have the feeling that less qualified or experienced readers will also be interested in the book. Its general appeal is attested to by my own experience: As the book was lying on my desk while I prepared this review, nearly every young researcher entering my office, regardless of whether his or her background was in biology, mineralogy, or solid-state physics, had a look at it and showed interest, usually with the remark: “When you finish it, could I have a look?”

Gustaaf Van Tendeloo
EMAT research group
University of Antwerp (Belgium)