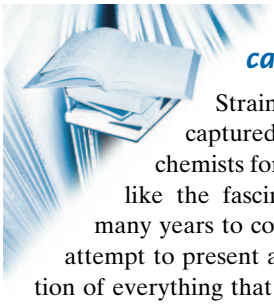


Strained Hydrocarbons

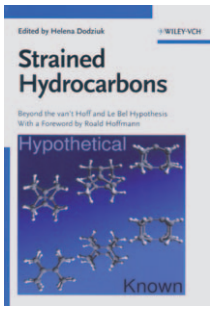
Strained hydrocarbons have captured the attention of organic chemists for a long time, and it looks like the fascination will continue for many years to come. This book makes no attempt to present an encyclopedic compilation of everything that is known about strained hydrocarbons. Rather, it provides a nice overview of the subject and some in-depth discussions of selected topics in the field. Everyone from students to seasoned experts will find interesting new molecules to ponder in this book, including some that have yet to be synthesized. As I read it, I found myself stopping periodically to draw structures of unknown molecules, wondering whether or not they could be made in the laboratory and what their properties might be. Any book that stimulates new ideas belongs in the personal collections of practitioners in the area and in the chemistry libraries of all major research universities. In addition to reading most of this book myself, I solicited input from six graduate students in my laboratory who are at various stages of their Ph.D. studies. This review represents the distilled essence of their impressions integrated with my own.

The editor of this book has organized about half of the chapters along functional group lines, for example, distorted saturated hydrocarbons (chapter 2), distorted alkenes (chapter 3), strained aromatic molecules (chapter 4), and angle-strained cycloalkynes (chapter 7). The larger chapters are additionally subdivided into individual topics, each covered by a different author, for example, nonstandard benzenes (chapter 4.1), distorted cyclophanes (chapter 4.2), helicenes (chapter 4.3), and cycloproparenes (chapter 4.4). These four chapters, together with the 30 pages of introduction in chapter 1, make up roughly 50% of the book.

This organizational scheme works well for the most part, but some topics did end up being covered by more than one author. Bridged annulenes, for example, are treated in both chapter 3 and chapter 8. Other topics, unfortunately, fell through the cracks and were overlooked completely. There is no mention, for example, of Bodwell's spectacular cyclophanes with short bridges connecting the distantly separated tips of pyrene. In fact, cyclophanes involving aromatic hydrocarbon cores larger than benzene are almost completely ignored. Cyclopropenes and other in-plane distorted alkenes are also curiously absent.

The sections in these "functional group" chapters systematically look at the propellanes, paddlanes, fenestranes, prismanes, asteranes, pericyclynes, and numerous other molecules that chemists have been able to prepare or design and calculate, which contain inverted or planar carbon atoms, ultra-long or ultra-short bonds, planar cyclohexanes, nonplanar alkenes (both twisted and pyramidalized), benzene rings bent in-plane and out-of-plane, and non-linear sp-hybridized carbon atoms in cyclic allenes, cumulenes, and alkynes. Haddon's p-orbital axis vector (POAV) analysis of pyramidalization at trigonal carbon atoms would have been appropriate to include in the discussion of nonplanar alkenes but was not mentioned in that chapter. Synthetic routes to the molecules of interest are included only rarely. The emphasis is on structures, bonding, and reactivity.

The largest chapter in the book by far (chapter 5, 130 pages) is devoted to fullerenes and contains sections and subsections written by ten different sets of authors. Some sections are quite good, but I disagree with the editor's decision to include fullerenes in a book entitled "Strained Hydrocarbons". Chapter 6 on carbon nanotubes likewise seems out of place, to me, in this book. Fullerenes and carbon nanotubes are certainly strained, but they are not hydrocarbons. Including them here as "honorary hydrocarbons" may make sense thematically, but then a broader title should have been chosen for the book. More than a hundred full length books and edited volumes have already been published on fullerenes and nanotubes, and it seems unlikely that students and scholars seeking the information presented in these chapters would ever discover their existence, except by accident or by word of mouth. *Chemical Abstracts* lists the book itself and says that it contains 471 pages, but there are no clues about the contents of the chapters other than the title of the book. *Chemical Abstracts* searches for reviews on "Endohedral Fullerenes" or "Applications of Fullerenes," for example, do not find this book, even though it contains recent scholarly surveys on both topics.



Strained Hydrocarbons
Beyond the van't Hoff and Le Bel Hypothesis.
Edited by Helena Dodziuk.
Wiley-VCH, Weinheim 2009.
471 pp., hardcover
€ 159.00.—ISBN 978-3527317677

Other subjects covered in this book that may likewise escape discovery by scientists who would find them informative and useful include the chapters on molecules with labile bonds (Chapter 8), on graph-theoretically nonplanar molecules (Chapter 9), and on short-lived species stabilized in molecular or supramolecular flasks (Chapter 10).

The book suffers from several unfortunate shortcomings. An author index would have been useful, but there is none. More serious is the paucity of recent literature citations. Of the approximately 2600 references cited, more than 98% were published in 2006 or earlier. The preface is dated 2009, and the copyright date for the book is 2009, so I was disappointed to find only 61 references from 2007 and only 4 from 2008 in the entire book. This suggests a relatively long delay between the time when most authors submitted their contributions and the time when the book finally went to press. Some sections of the book cite a number of "http://www…" references, which will remain useful only as long as the individual web sites are maintained. The unusually large number of typographical errors and linguistic irregularities is also distracting and unexpected for a Wiley-VCH monograph.

Despite its shortcomings, this book is still full of good chemistry. It represents the first book-length update on the subject of strained organic compounds since the publication of the six volume series *Strain in Organic Chemistry* edited by Brian Halton from 1991–1996. Any student or professional chemist who is interested in the concept and consequences of strain in organic molecules will find this book engaging, and all major research universities should have a copy in their library.

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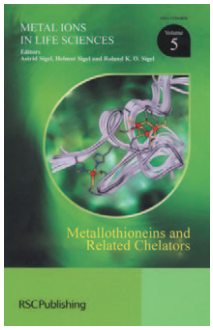

Metallothioneins and Related Chelators
Metal Ions in Life Sciences Vol. 5. Edited by Astrid Sigel, Helmut Sigel and Roland K. O. Sigel. Royal Society of Chemistry, Cambridge 2009. 514 pp., hardcover
$ 299.00.—ISBN 978-1847558992

Metallothioneins and Related Chelators

Metallothioneins (MTs) are cysteine-rich proteins that were first discovered more than 50 years ago by Margoshes and Vallee in equine renal cortexes as an usual cadmium-binding protein. Since that initial discovery, interest in this unique and somewhat enigmatic protein has grown exponentially and today generates significant attention in the arenas of inorganic biochemistry, environmental toxicology, pharmacology, physiology, cancer biology, neurochemistry, and medicine. The ubiquitous expression of related members of the metallothionein family across species ranging from bacteria, to yeast, to plants, and finally to mammals lends credence to the importance of these proteins despite the fact that metallothionein gene-knockout animals are viable. MT has been implicated in various cellular functions, including toxic metal sequestration, essential metal metabolism and trafficking, and free radical scavenging.

The book "Metallothioneins and Related Chelators" edited by A. Sigel, H. Sigel, and R. K. O. Sigel discusses in eloquent detail the different facets of metallothionein research focusing primarily on the differences and similarities between related metallothionein proteins from different organisms. Examining the structural and functional properties of metallothionein species, spanning evolutionarily related and divergent organisms, presents an interesting perspective on metallothionein's role in the cellular biology.

The book is organized into 15 chapters written by 30 experts in their respective sub-field of metallothionein research. Since each chapter is individually authored there is some degree of repetition, however this allows each chapter to be independent of the others if a reader should be interested in only a single topic within the book. Chapter 1 opens with a comprehensive historical summary of metallothionein research over the last 50 years which includes structure, function, gene expression, role in disease and methods for quantification as an introduction to the more focused chapters that follow. This chapter provides a lot of detail which is sure to be of interest to those working directly in the metallothionein field, but may be a bit overwhelming to a reader whose first introduction to metallothionein is this book. Chapter 2 discusses the topic of transcriptional regulation of metallothionein gene expression which includes a nice summary on the metal-response element binding transcription factor (MTF-1) and how it compares across species ranging from insects to mammals. The bulk of the book is devoted to species comparison of MT. Each chapter from Chapters 3–10 reviews the respective metallothionein protein from a specific organism including bacteria, yeast, fungi, plants, diptera, earthworm and nematode, aquatic organisms, fresh water animals, and vertebrates. The general format of these chapters is to review the literature regarding the structure, function, and gene organization/regulation of the species-specific MT with comparison to the most well-studied mammalian MTs as a point of reference. Chapters 11–13 wrap up the metallothionein portion of the book with the focused topics of brain-specific mammalian isoform MT-3, the function of metallothionein in metal -ion