Book Review

The Organic Chemistry of Drug Synthesis, Volume 7 By Daniel Lednicer (North Bethesda, MD). John Wiley & Sons, Inc.: Hoboken, NJ. 2007. xiv + 272 pp. $115.00. ISBN 978-0-470-10750-8.

Katherine L. Seley-Radtke

J. Am. Chem. Soc., **2008**, 130 (10), 3231-3232 • DOI: 10.1021/ja800461a

J|A|C|S
BOOK REVIEWS

Metal Catalyzed Reductive C−C Bond Formation: A Departure from Preformed Organometallic Reagents. Topics in Current Chemistry, 279. Edited by Michael J. Krische (University of Texas at Austin). Springer: Berlin, Heidelberg, New York. 2007. xii + 264 pp. $269.00. ISBN 978-3-540-72878-8.

The organizational principle for this collection of reviews, i.e., the use of transition metals for "reductive carbon−carbon bond formation", is atypical. This is an interesting and, in a word, "organocentric" perspective on a large class of transition metal promoted reactions traditionally organized in "metallocentric" terms. This shift in perspective has allowed the editor of this volume to assemble a unique collection of reviews on transition metal promoted reaction pathways, one that incorporates quite a diverse range of transformations. The concept, however, works very well and makes a compelling argument for the existence of this volume.

For example, transformations that are traditionally construed as oxidative cyclizations, in which two unsaturated organic fragments are cocyclized at a low-valent metal center, are recast here as reductive carbon−carbon bond-forming reactions. Both perspectives are, of course, valid and reasonable. In the metallocentric tradition, such reactions are organized according to the fundamental change at the metal center, which undergoes a formal two-electron oxidation. At the same time, however, the two organic fragments undergo coupling with concomitant formal reduction, providing a thoughtful—and explicitly organic—perspective on the transformation. That such reductive processes can occur without prior formation of a highly reactive organometallic intermediate, e.g., a Grignard reagent, and can involve addition to either a nonpolar (alkene, alkyne) or a highly polarized organic functional group (carbonyl, imine) imbues transition metal methodology with obvious advantages over traditional carbon−carbon bond formation, including neutral or near-neutral reaction conditions, less reactive organic functional groups, and, for most reactions, *catalytic* rather than stoichiometric use of the metal.

This approach is exemplified in the opening chapter, principally a review of nickel-catalyzed reductive and alkylative coupling reactions of alkynes and aldehydes. Several later chapters carry forward this theme, two by covering hydrogenative aldol reactions and the coupling of alkyne or alkene fragments with carbonyl compounds or imines. Although some overlap in content occurs, the contributions are reasonably complementary, highlighting the mechanistic diversity found in superficially similar overall transformations. Related reductive coupling reactions involving dienes and carbonyl compounds are covered separately, and the conceptual parent of all such transformations, catalytic alkene hydroformylation, receives a comprehensive update. The final chapter presents an analogous but hydrocarbon-only process: reactions proceeding via reductive cyclization of two alkenes and/or alkynes at a low valent metal center.

This organizational principle further allows the editor to incorporate transformations of less than obvious reductive character, giving this volume unique coverage. From the metallocentric perspective, metal-catalyzed oxidative cyclization could not be more different from the titanium(III)-mediated one-electron "oxidative" ring-opening/free radical cyclization of epoxides. This latter reaction, however, also proceeds by a formal reductive coupling of the reactive epoxide and, typically, alkene functionality, driven by the one-electron oxidation at the metal. This productive area of research is the subject of the book's second chapter. The theme continues in a subsequent chapter covering a range of less-thoroughly investigated pinacol-like reductive coupling reactions.

The quality of the writing is expectedly somewhat uneven, varying among the contributors, but most of the reviews are very clearly written and a pleasure to digest. As editor of this volume, Krische has done an admirable job, selecting quality researchers, extracting quality contributions, and exercising strong editorial control. Although numerous errors of commission and omission remain, they are largely minor typographical/printing glitches that do not significantly impair the exposition. Referencing is reasonably current, with most chapters including most if not all of the relevant citations through the 2006 literature.

Although the volume is immodestly priced, Springer, to its considerable credit, has made the contents freely available online for those at institutions maintaining a standing order to *Topics in Current Chemistry*.

Jeffrey M. Stryker, *University of Alberta*

JA077019N

10.1021/ja077019n

The Organic Chemistry of Drug Synthesis, Volume 7. By Daniel Lednicer (North Bethesda, MD). John Wiley & Sons, Inc.: Hoboken, NJ. 2007. xiv + 272 pp. $115.00. ISBN 978-0-470-10750-8.

This periodic compilation is the latest in a series chronicling the synthesis of new drugs that have been assigned nonproprietary names by the United States Adopted Name (USAN) council. Traditionally each volume covers only drugs that have been announced since the last volume, and this is indeed the case for Volume 7. The frequency of the series previously was every 5 years; however, Volume 6 was published in 1999, so over 7 years have passed since the last volume. As with its predecessors, this book details the synthetic route to realize these drugs based on the literature and/or patents and is arranged by structural categories rather than biological activity, which is more typical of medicinal chemistry reviews. This arrangement can be somewhat unwieldy, since drugs with very different structures but similar activities are in different chapters. However, the author has, in some cases, helpfully directed the reader to relevant chapters. In addition, the organization of the book can be quite useful when attempting to research a particular

10.1021/ja077019n CCC: $40.75

structural scaffold; thus, its arrangement should not be considered a hindrance.

Although the biological activity for each compound is discussed only briefly, there is enough detail to get the important aspects across. Some of the chapter references are old, but in general most are current and appropriate. The Cross Index of Biological Activity and the Cumulative Index at the end of the book are quite useful, although the Subject Index is extremely thin and should be extensively expanded in future editions. Another weakness is that the author fails to show the structure of known drugs that he mentions when discussing the highlighted drug. This forces the reader to retreat to the literature for comparison, which is ironic since the concept of the book is focused on structure. In addition, the author is often vague: for example in Chapter 2, he mentions an "unusual substituent" on a "derivative of estradiol", but fails to elaborate on what exactly that substituent is, or what compound he's actually discussing. Because there is no compound number associated with that particular discussion and the schemes are not numbered, the example is useless. In a similar vein, many schemes are not on the same page as the actual discussion involving them, thereby requiring constant flipping back and forth between the two pages.

There are numerous typographical and grammatical errors throughout the book. Some examples include the repeated use of $Na(TMS)_2$ instead of $NaN(TMS)_2$, which also should have been defined as trimethylsilyl instead of trimethylsilane; of Ac_{2o} instead of Ac_2O; of AlBn instead of AIBN; and incorrectly depicting thionyl chloride as SO_2Cl throughout — an error that was found in previous volumes and pointed out by other reviewers — to name a few. There are also a number of undefined abbreviations and misspellings in the book, one notable example being the misspelling of Mitsunobu and Knoevenagel throughout — errors also carried over from previous volumes. These types of errors are rampant throughout the book and seriously diminished my initial enthusiasm for this potential resource.

Typographical errors aside, two notable structural errors occur in Chapter 9 in the syntheses of tecadenoson and selodenoson. The nucleosides are incorrectly depicted as carbocyclic nucleosides, leading the reader to assume that the two drugs are derivatives of aristeromycin, when in reality they are derivatives of adenosine. In addition, all of the schemes detailing nucleosides in Chapter 9, and those in Chapters 6 and 7 (as well as the structure of Misoprotol in Chapter 2), appear to have been drawn using different programs and, for that matter, by different people. The stereochemistry depicted for the nucleosides throughout the book is widely inconsistent, and as a result does not meet the standards of quality that one would expect from this author or publisher.

In general, the book is up-to-date with regard to the drugs presented and has the potential to be a good resource for experienced researchers in drug design, keeping in mind, of course, the myriad of errors. Unfortunately, the author states in the introduction that this book is aimed not only at practicing medicinal and organic chemists but also toward graduate and advanced undergraduate students, which is inappropriate given the problems detailed herein. In summary, the sheer number of errors was disappointing, especially since a number of them were pointed out in reviews of previous volumes. This series has traditionally been a strong addition to many chemistry libraries; however, this particular volume falls short.

Katherine L. Seley-Radtke, *University of Maryland*

JA800461A

10.1021/ja800461a