Molecules of Murder

Very few authors have done more to bring chemistry into the everyday lives of non-experts as John Emsley has. His latest work, *Molecules of Murder*, is intended as a sequel to his book *Elements of Murder*, also reviewed in *Angewandte Chemie*.[1] The content of *Molecules of Murder* is divided into two sections. The first section focuses on natural substances that can be used as poisons. Some of them are deadly in minute quantities, such as ricin, the topic of Chapter 1. Others have medicinal uses and are only deadly when overdosed. Examples of such compounds are hyoscine, atropine, diamorphine, and adrenaline, the topics of Chapters 2 to 5. Part II deals with man-made chemicals, namely chloroform (Chapter 6), carbon monoxide (Chapter 7), cyanide (Chapter 8), paraquat (Chapter 9), and polonium (Chapter 10). Carbon monoxide and cyanide occur naturally as well, but the victims in *Molecules of Murder* all succumbed to synthetic versions.

As tales of murder, especially by poison, are fascinating to almost everyone, the topic is certainly well-chosen for a popular science book. Moreover, telling the story from the perspective of the poison is a novel approach. Generally, the book is very entertaining, because Emsley knows how to simplify chemistry without dumbing it down. Many of the cases are well-known, such as those of Dr. Crippen, who poisoned his wife with hyoscin, and Alexander Litvinenko, whose death was most likely politically motivated. The tragic deaths of Alexandra Agutter, killed by a poisoned cocktail prepared by her husband, and Edwin Bartlett, who died from a large quantity of chloroform in his stomach without damage to his mouth and throat, may not be as famous, but their stories are no less interesting. All is not murder and mayhem, however. Intertwined with the narrative, one can read about the history of chloroform as an anaesthetic, the uses of caster oil and the shenanigans of Cold War spies, and this is what makes this book such a treasure trove of trivia.

Unfortunately, *Molecules of Murder* is poorly proof-read, which makes for rather difficult reading at times. Also, the reader certainly still needs a decent amount of chemical background knowledge to understand it. Those who seek detailed information of the chemistry, on the other hand, will be disappointed, although most of the terminology and chemical structures are contained in a Glossary at the back of the book. There are also no pictures of the perpetrators and their victims.

On the whole, I would recommend this book to anyone with more than a passing interest in the history of poisons and with some fundamental knowledge of chemistry. It is very interesting and packed with fascinating stories, so if you know someone who likes a tale of mystery spiced with some science, this book would be a great idea for a gift.

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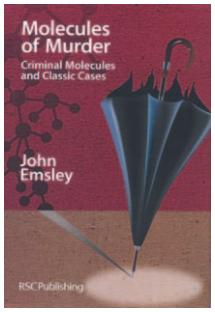

Molecules of Murder
Criminal Molecules and Classical Cases. By John Emsley. Royal Society of Chemistry, Cambridge 2008. 242 pp., hardcover € 23.99.—ISBN 978-0854049653

[1] Book review: *Angew. Chem. Int. Ed.* **2005**, *44*, 7332.

Fundamentals of Asymmetric Catalysis

When the 2001 Nobel Prize in Chemistry was awarded to W. S. Knowles, R. Noyori, and K. B. Sharpless for "their development of catalytic asymmetric synthesis," the Royal Swedish Academy of Sciences pointed out that the discoveries made in this field "have had a great impact on academic research and the development of new drugs and materials and are used in many industrial syntheses of drugs and other biologically active compounds." Despite decades of study in the field of asymmetric catalysis, much remains to be discovered at the cutting edge of organic and organometallic synthesis. The field is far too broad to be comprehensively summarized in a single textbook, so this new book by Walsh and Kozlowski, *Fundamentals of Asymmetric Catalysis*, was deftly designed to provide an introduction to the fundamental principles of asymmetric catalysis. To this end, the book is organized according to the underlying concepts rather than classified by reaction types. For knowledge-transfer purposes, this structuring works perfectly. Over the course of 16 chapters, in which both metal-catalyzed and organocatalyzed reactions are discussed equally, the reader is afforded access to a variety of up-to-date topics in asymmetric catalysis.

In Chapter 1, the major modes of asymmetric induction are introduced at a basic level. Simple asymmetric catalysis with prochiral substrates, kinetic resolution, and dynamic kinetic resolution are discussed along with their energy diagrams. Examples of concrete reactions facilitate the understanding of the fundamentals, although the chosen examples appear to be far too specific for this chapter.

Chapters 2 and 3 deal with the topics of Lewis acid and Lewis base catalysis, as well as with Brønsted acid/base catalysis and π activation. For each mode of activation, the interaction between

the catalyst and substrate is given due attention, with a clear focus on understanding the principles that underlie this chemistry. Therefore, from an instructors perspective, both chapters strictly follow the general structure of the book in terms of discussing concepts. On the other hand, these two chapters cover mostly all of the activation strategies found in today's asymmetric metal catalysis and organocatalysis, and, unfortunately, the choice of reaction types that are included to exemplify the fundamentals of substrate activation lacks a central theme. By reading Chapters 2 and 3, the advanced reader might think of a huge number of reaction types that are not covered by the specific examples. Nevertheless, those readers looking for information on a particular reaction type will find the relevant examples covering most of the commonly employed reactions and catalysts scattered throughout the book. It is noteworthy that many reaction types that are not apparent from the section headings, but are hidden within the discussions of concepts, can be easily found by using the excellent index.

Chapter 4 deals with the fundamental issues of asymmetric induction. By the use of detailed figures, it is clarified how asymmetry is transmitted in enantioselective reactions from chiral catalysts possessing different types of three-dimensional structures. Chapter 5 then discusses the transfer of stereochemical information through additional secondary interactions, such as π stacking and H bonding, between the catalyst and substrate.

Chapters 6–16 cover an equally diverse and exciting set of topics. Each chapter can be read separately in combination with the most significant examples to understand the underlying concepts. Chapters 7–9 on kinetic resolution, parallel kinetic resolution, and dynamic kinetic resolution, in particular, do a nice job of explicating the basic principles involved. The examples are taken from both organocatalysis and metal catalysis, and represent the most intriguing resolutions one can find in the literature. Chapter 10 encompasses a broad range of symmetry-breaking reactions. In Chapter 11, the authors address the concepts of nonlinear effects and autocatalysis, whereas the short discussion on the possible origin of homochirality on Earth fits perfectly into the context. Chapter 14 provides an overview on how catalytic asymmetric reactions can be integrated into multistep processes to enhance the efficiency with which target molecules can be assembled.

The chapters vary considerably in length, as well as in their level of coverage. In general, the chapters are written to provide the background needed to appeal to a wide audience. The appropriate references to the original literature are given with the title, which enables the reader to look for more details, but leading reviews are sometimes omitted. Some chapters, particularly those on catalyst optimization through techniques such as chiral poisoning and asymmetric activation (Chapter 6) and on supported catalysts (Chapter 15), will be of interest primarily to specialists in their respective fields.

If there is any main weakness to this well-written book, besides a few typographical errors, I would argue that short chapters on the historic developments as well as on industrial applications are missing.

In summary, this fascinating book captures the diversity and applicability of an area of research that has emerged as one of the fastest growing fields in organic chemistry. As a text that addresses the major concepts of asymmetric catalysis, it could serve as an excellent aid for a university course on asymmetric catalysis. Hence, this book is destined to become a firm favorite for advanced graduate students. Additionally, the book can be recommended to all scientists in academia and industry with an interest in asymmetric catalysis—as a source of information and for references. As a potential standard work on this subject, *Fundamentals of Asymmetric Catalysis* is worth the price and should appear on many bookshelves and in many libraries.

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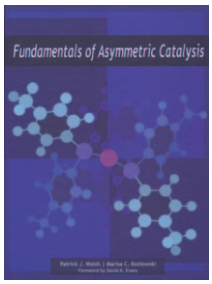

Fundamentals of Asymmetric Catalysis
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