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Book and Media Review

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Review of *Molecules That Amaze Us*

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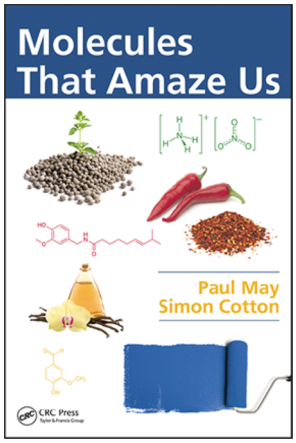
Molecules That Amaze Us by Paul May and Simon Cotton. CRC Press: Boca Raton, FL, 2015. 721 pp. ISBN: 978-1466589605 (paper). $59.95.

Molecules That Amaze Us is a wonderful and easy-to-read book that would be of interest to a wide audience, ranging from chemistry faculty to high school teachers to anyone who is simply interested in learning about a variety of molecules that have impacted the human condition. There are 67 chapters, with each chapter devoted to a molecule of interest, or a closely related class of chemicals (e.g., chlorofluorocarbons). Examples range from molecules of medicinal value such as quinine and digitalis, to molecules of biological interest such as dopamine and glucose to those of societal interest such as methamphetamine and TNT. The actual chapters are presented in alphabetical order and comprise 568 pages of text, with 125 pages of bibliographic reference and image credits, and a 26-page index.



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Let's start with the title, *Molecules That Amaze Us*, and ask—what is a molecule, and why would a molecule amaze us? The answer to such a question brings forth a balance between the science of chemistry, and the interplay between humans and chemicals. There are many challenges to writing a book like this. Part of what is "amazing" with molecules, which can be of naturogenic or anthropogenic origins, is their ability to influence the quality of our lives. This influence can be beneficial, or detrimental, or both, and has resulted in a myriad of popular predispositions toward chemicals and the discipline of chemistry.

Many of these predispositions are founded in science, while others are not, as evidenced by illogical concepts such as "chemical-free" products, that are often marketed as "green" or "natural". A book like this not only needs to address potential erroneous concepts and prior biases in a neutral manner, but do this on multiple levels of proficiency in the chemical sciences. From this perspective, the examples presented in this book provide a wealth of educational material that relate both molecules, and many of the principles of chemistry, to a wide variety of contextual situations of interest to the general public.

There is also an interesting story behind this book. Since 1996 Paul May has run a Web site, "The Molecule of the Month"[1] (MOTM), where for two decades, with contributions from multiple colleagues, they have posted a molecule every month. This has resulted in one of the longest continuously updated chemistry Web sites in existence, and as one browses the archive, two interesting observations arise that probably influenced this book.

First, the authors pioneered "hyperactive 3D images" and in fact have five different types of MOTM Web pages, which they have labeled as H (HTML only), C (Chemscape Chime), J (ChemSymphony Java Applet), V (Virtual Reality Markup Language), and JM (JMol). The issue is that the Web has changed over the past 20 years and legacy software such as Chemscape Chime and Chemsymphony are no longer supported by modern Web browsers. This has resulted in nonsustainable archiving issues where many of the old MOTM pages have degraded and lost some of their original functionality. By publishing this book, the authors have preserved their work over almost two decades in a form that does not have the evolving browser compatibility issues that many of the MOTM Web pages have.

The second aspect deals with the interesting format of the book, in which each chapter's information is presented through a storyline of multiple sections that are introduced with a question that is followed by an answer. This Q&A format effectively chunks the information in a manner that is easy to digest, providing value to a diverse group of readers with varied backgrounds in chemistry. A quick look at the MOTM site shows that the earlier pages were formatted like an encyclopedia entry, while in January 2001, Simon Cotton made his first MOTM entry, which has the Q&A format of this book. Further investigation shows that this format dates back to the mid-1990s when Simon Cotton was creating the single page "soundbite molecule" for RSC *Education in Chemistry*,[2] and the 1996 article "Image Breakers" gives an eight-step outline for this process.[3] Slowly, other authors started adapting this format and now almost all of the recent entries use it. That is, this book takes on a style that evolved out of almost 20 years of actively creating MOTM Web pages, with the books readability being further enhanced by the extensive usage of images and artwork, many in color. Although it also needs to be noted that although the book evolved out of the MOTM Web site, each chapter for which there is a MOTM Web page was extensively

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rewritten, and at the time this review was written, 16 of the chapters did not have a corresponding MOTM Web page.

Another challenge for a book like this is to navigate molecules in a "neutral manner", especially those molecules whose impact on society has been complicated and often polarizing, in the sense that molecules can be both beneficial and detrimental to our general well-being. For example, is DDT a good or a bad molecule? Most people will already have an opinion on the answer to a question like this, which makes DDT an excellent molecule to illustrate how this book uses questions to present the material. The following bullets shows the questions this chapter asks, and then provides information in the framework of an answer.

- DDT, Surely No One Uses That Now?
- I Thought It Was Banned?
- Why Did People Use DDT?
- So Why Do People Say It Is Such a Bad Substance?
- What Does DDT Stand For, Anyway?
- Why Did DDT Get the Blame?
- So What Went Wrong with DDT?
- Does It Kill All the Insects?
- What Is the Future of DDT?

By the end of the chapter you not only get a feel for what DDT is, but also for the complicated issues related to both the beneficial and detrimental effects associated with the use of a molecule like DDT. Not only do the authors use this Q&A style to chunk the material in an easily understood manner, but they are also able to use it to present the underlying concepts of complicated multifaceted topics in a neutral manner.

In its entirety, *Molecules That Amaze Us* is a trove of facts and exemplars for a wide variety of chemicals that could be useful to many members of the *JCE* readership. The authors provide a storyline for each chemical, usually starting with some question to get you to think about "why" this chemical is of interest, and then run through some of the history of the chemical, and then move on to its modern use or relevance to society. Chemical concepts and terminology that require some formal training in the discipline of chemistry are used throughout the text, but the Q&A format with extensive use of images allows the novice to follow the material without getting bogged down in the details. The authors maintain a good balance of presenting controversial topics in a neutral manner.

I think educators would also find the Q&A format of this book to have some advantages over the more traditional encyclopedia-style format of presenting information, in that they can navigate the material based on the questions, and not statements of facts. That is, getting students to think is more than stating some basic facts, and with this book, you can quickly choose a chemical, browse through a bunch of questions, and potentially find concepts that would interest your students.

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Notes

The authors declare no competing financial interest.

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