APPLIED ORGANOMETALLIC CHEMISTRY
Appl. Organometal. Chem. 2007; **21**: 377
Published online in Wiley InterScience
(www.interscience.wiley.com)

Book Review

EBERHARD BREITMAIER

Terpenes—flavors, fragrances, pharmaca, pheromones

Wiley-VCH, 2006,
214 pp; price €49.90
ISBN 3-527-31786-4 (hardcover)

Natural products chemistry is, almost by definition, a very diverse discipline. The only common denominator is that the chemicals that are studied are formed in living organisms. Thus, one can consider the discipline in a number of ways, e.g. the occurrence of one particular group of natural products in plants or other organisms, the biological functions and pharmacological activities of a compound group, or the biosynthetic pathways or synthetic strategies to produce analogues and semi-synthetic derivatives. In addition, complete textbooks can be written on compound isolation and structure elucidation. In writing an introductory textbook on terpenes, Eberhard Breitmaier had to face choices on what to emphasize and what to leave out, and in his choices his background as first and foremost an organic chemist clearly shows.

After a brief discussion of terpene biosynthesis, the various classes of terpenes are systematically discussed. In Chapters 2–8, the terpenes are arranged according to the number of isoprene units they contain, i.e. hemiterpenes, monoterpenes, sequiterpenes, etc., and their parent skeletons. This logical sequence helps the novice to build up the larger picture, which is especially important given that the nomenclature of terpenes—like that of most other naturally occurring products—is confusing to say the least. In most research papers and textbooks biologically based trivial names are used rather than formal IUPAC names. Even for experienced phytochemists with an interest in terpenes, a discussion of pimaranes, gonanes, germacranes, humulanes, eudesmanes, nardosinanes, or aristolanes may initially cause some confusion. The systematic and clearly laid out chapters will make the book a valuable resource for everyone with an interest in terpenes. Also helpful in this respect is the survey of important parent skeletons of terpenes that is provided as an appendix to the book.

Whereas the provision of a systematic overview of the many trivial names used in terpene chemistry is a real bonus, there are still some minor nomenclature-related issues that might cause confusion and should be avoided in an introductory textbook. When discussing simple acyclic monoterpenes, for example, the correctly named compound 2,6-dimethyloctane is drawn with an incorrect carbon numbering (i.e. as a 3,7-dimethyloctane). Although the incorrect drawing makes sense in the context of the discussion (the compound is compared with 3,7-dimethyloctanol), I can see how a beginner in nutrition chemistry, biology or pharmacy might be put on a wrong track. Another example: cyclofarnesanes formally arise when carbons C-6 and C-7 of a farnesane close to form a ring, but in the numbered farnesane structure in this textbook, it is carbons C-6 and C-11 that close the ring. Then there are the labdanes, which represent 8,11–10,15-cyclophytanes, whereas the drawings do not indicate any bond formation between C-8 and C-11, or C-10 and C15.

A chapter on selected syntheses of terpenes presents a good, comprehensive coverage of synthetic methods used. A number of up-to-date methods are presented, and ample references are made to primary literature for those who want to explore the methods in more experimental detail. The author is clearly in his element here, and does not eschew complex syntheses. The enthusiasm of the author may be lost on undergraduate students, but will be a treat for students starting a PhD in chemistry, biochemistry or nutrition chemistry. In discussing the biological aspects of terpenes, the author seems to be on slightly less familiar territory. Whereas forty pages are dedicated to selected chemical syntheses of terpenes, the biosynthesis is discussed on a mere eight pages. When discussing the plant sources of various terpenes, *Cannabis sativa* (hemp) and *Humulus lupulus* (hops) are mistakenly assigned to the Moraceae, and *Apium graveolens* is still Umbelliferae rather than the now generally preferred Apiaceae.

The book finishes with a chapter on isolation and structure elucidation of terpenes. This chapter is partly a revision of an earlier book by the same author (*Structure Elucidation by NMR in Organic Chemistry*, 2002, Wiley, ISBN 0 470 85007 8), and provides a number of practical guidelines. In spite of the subtitle 'Flavors, Fragrances, Pharmaca, Pheromones', the book only briefly discusses the numerous functions that terpenes have as constituents of flavours for spicing foods, in perfumery, as pharmaceutical compounds, or as pheromones. Throughout the text references are made to applications of terpenes, almost apologetically, as if to justify writing the book in the first place. However, this justification is hardly necessary because Breitmaier has written an excellent introduction to terpenes and terpene chemistry. The book will be a valuable introduction to everyone who has developed an interest in terpenes.

Randolph Arroo
De Montfort University, Leicester, UK

DOI:10.1002/aoc.1209