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# A review of: "Advances in Heterocyclic Natural Product Synthetis, Vol. 3"

S. Z. Zard[a]
[a] Département de Chimie Organique, Ecole Polytechnique, Palaiseau, France

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# BOOK REVIEW

W. H. Pearson (Ed.), *Advances in Heterocyclic Natural Product Synthetis, Vol. 3*, JAI Press Inc., London, 1996, 288 pp., £69.50, US $ 109.50, ISBN 1-55938-426-3.

This book is a collection of six essays pertaining to some aspects of heterocyclic natural product synthesis as developed in the authors' research groups. The first, by M. A. Ciufolini, is a light-hearted description of work in progress aimed at the synthesis of pyridoacridine alkaloids of marine origin (cystodytins, kuanoniamines, dercitins, etc.; some of which have been completed) and alkaloids of the discorhabdin family with a spirocyclic skeleton. For the former derivatives, a new preparation of arylpyridines had to be designed and implemented; the construction of the latter called for a Paterno-Büchi photocycloaddition of quinones to alkylidenecyclohexanes. An unexpected ene-like reaction was discovered in connection with the pyridine work which will certainly have important synthetic consequences. Design and misconception intertwine with failure and success in this superbly written and fascinating story.

The second chapter by S. Knapp deals with his group's struggle to accomplish clean iodolactamizations. Ordinary unsaturated amides usually lead to lactones by cyclisation through the oxygen when exposed to iodine and base; however, *in situ* preformation of an *O,N*-bissilylated iminoether shifts the nucleophilicity to nitrogen and provides the desired lactams upon subsequent treatment with the electrophilic agent. These iodolactams as well as the phenyl selenides derived therefrom exhibit an interesting and rich chemistry, illustrated by the total synthesis of ezoaminuroic acid and salframine.

The following chapter is a delightfully candid account by Aubé and Ghosh of the hardships and joys encountered while developing an asymmetric approach to the yohimbine alkaloids. The key step is a photochemical ring expansion of chiral oxaziridines, studied first on simple systems, then applied to the construction of yohimbane, yohimbone, and eventually to (+)-yohimbine itself. Special attention has been given to the intricate

behavior of the oxaziridines, with ample credit allocated to previous workers in this field.

The fourth chapter, written by Hua and Chen, deals with the application of chiral α-sulfinyl ketimines to the asymmetric synthesis of a plethora of alkaloids representing the indolizidine (elaeokanines A and B, salframine, epicastanospermine), the quinolizidine (lupinine and epilupinine, yohimbane), and pyrroloindole (physostigmine) families. Various amino acids, amino alcohols, and β-lactams were also accessible by the same technology.

The use of palladium-catalyzed reactions for the construction of heterocyclic natural products is the subject of the fifth chapter by P. G. Andersson and J.-E. Bäckvall; it reflects the authors' long-standing interest in palladium chemistry, especially for the functionalization of dienes. With such a powerful tool in hand, a number of synthetic targets representing insect pheromones (*cis*-2-methyl-5-hexanolide, pheromone of the carpenter bee), terpenes (marmelo oxides A and B; mentha *sp* terpene alcohol), and various alkaloids (2,5-dialkyl pyrrolidines, present as components of some ant venom and in skin extracts of *Dendrobates* frogs; tropane derivatives such as tropine and scopine; depentylperhydrohistrionicotoxin; α- and γ-lycoran; heliothridane, a member of the pyrrolizidine family) were rapidly assembled, in some cases in an enantioselective manner.

Finally, the chapter by Czerwinski and Cook offers in a first section a very detailed overview of the mechanistic and stereochemical aspects of the Pictet-Spengler reaction, mirroring the authors in-depth knowledge of this important process. In a second part, several examples of application to the total and partial synthesis of a number of indole and bisindole alkaloids with impressive structures (suaveoline, alstonerine, macroline, villalstonine, the raumaclines) are presented and commented. Practically all of these illustrations have been selected from seminal work in the authors' group.

On the whole this book has been carefully prepared and contains very few, minor errors (misprints in the names of Huisgen and van Tamelen on pages 48, 110, and 111 and in the corresponding references; other misprints can be found on pages 87, 144, 199; **63** is missing in the first line of page 122, and **61** and **70a** should be replaced by **64** and **70** on the same page; a reagent is missing in the conversion of **95** to **96** on page 128). Like the previous volumes in this series, it makes for excellent reading and contains a

wealth of information on various aspects of heterocyclic chemistry; it should therefore find its place in every decent library and on the shelves of chemists interested in synthesis.

*S. Z. Zard*
*Département de Chimie Organique,*
*Ecole Polytechnique,*
*F-91190 Palaiseau,*
*France*