

Alfred Hassner (Ed.)
Advances in Asymmetric Synthesis

JAI Press Inc., London, 1995, Vol. 1,
XII + 320 pages, 6 chapters.
ISBN 1-55938-699-1

This edition of JAI Press deals with synthetic procedures for the preparation of enantiomers and other molecules with asymmetric carbon atoms. These methods have become very popular in recent times because every chemist who deals with the synthesis of natural product needs them. Like other editions of the JAI Press, this book is aimed mainly at graduate students and postdoctoral fellows.

In the first chapter (44 pages, 94 references), written by K. Mikami (Tokyo Institute of Technology), asymmetric carbonyl-ene reaction is described which yields a stereochemically pure product up to 100% (> 99%), especially when reactants in the form of trimethylsilyl derivatives and reagents like SnCl_4 and EtAlCl_2 are employed. The use of these synthetic procedures in preparations of α -amino acids, β -amino alcohols, cholesterol and other pharmacologically interesting compounds are described, and the mechanism of the reaction is discussed referring to the results of X-ray analysis.

The chapter (50 pages, 54 references) written by R. M. Williams (Colorado State University) is devoted to asymmetric synthesis of α -amino acids. After a short overview of six categories of methods for the asymmetric synthesis of amino acids, the author in five subsequent paragraphs describes the preparation of optically active glycinates, electrophilic glycinates, derivatives of 1-aminocyclopropane-1-carboxylic acid, glycine enolates and the use of asymmetric (1,3)-dipolar cycloadditions in the synthesis of amino acids with highly substituted pyrrolidine carboxylic acid ring systems. It is interesting to note that nearly all of these synthetic procedures gave enantiomeric excess (ee) > 99%.

I. Ojima (State University of New York at Stony Brook) wrote the chapter on asymmetric synthesis by means of the β -lactam synthon method. This synthesis, which starts from cleavage of N-C4 bond in β -lactam skeleton, was used for the synthesis of α -amino acids (especially α -alkyl- α -amino acids) and their derivatives, oligopeptides, labeled peptides, polyamines, poly-

amino alcohols and polyamino ethers. The author and his group developed » β -Lactam Synthon Method« (β -LSM) for polypeptide synthesis which was used for synthesis of enkefalin. The enantiomeric excess of the reaction varied, but usually reached 99%.

H. C. Brown and P. V. Ramachandran (Purdue University, Indiana) devoted their article (63 pages, 178 references) to the asymmetric syntheses *via* organoboranes, the research field which »is now so large that it is no longer possible to review them completely in a chapter such as this«, but they concentrated only on the derivatives of α -pinene, namely on diisopinocampheylborane and monoisopinocampheylborane. These reagents are so efficient that the other reagents prepared from terpenes were used only for comparative purposes. The syntheses of loganin, Corey-lactone intermediate for prostaglandin synthesis, capsorubin (carotenoid from red paprika), and chiral aldehydes, acids, amines, olefins, acetylenes and natural products as insect pheromones, sugars and amino acids are described.

The chapter (58 pages, 83 references) written by K. Mori (University of Tokyo) is some kind of a chemist's overview of insect chemistry and the reader should not find only the interesting synthetic routes, but should become familiar with the diversity and complexity of the chemistry of insect hormones, antifeedants and pheromones. Detailed syntheses of 23 natural products are presented and – interesting to note – these syntheses were performed in order to prove the structure of the natural product (in the old-fashioned manner!) because most of them were volatile oils and, consequently, their structure could not be determined by X-ray analysis.

The last chapter (41 pages, 95 references) is essentially a story by J. W. Reed and T. Hundlicky of the Virginia Polytechnic Institute and State University about the application and development of the methods of enzymatic oxidation of aromatic compounds in their laboratory. The starting material for their syntheses were monosubstituted benzenes (mostly chlorobenzene) which were converted to *cis*-cyclohexadiene-1,2-diols and by the use of toluene dioxigenase and similar enzymes converted to a number of natural products, like cyclitol, inositol, carbohydrates and pinitols. At the end, they present 20 aromatic compounds synthesized by their group in 1988–1993, among which were PGE_{2 α} , specionin, conduritol and kifunesine.

In my opinion, the book can help the chemist in designing the syntheses, but should be interesting to everybody wanting to know what can be obtained by the modern methods of organic synthesis. Therefore, I recommend the book also to biochemists, stereochemists and to all those whose interests are not limited to their research field.

Nenad Raos