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BOOK REVIEW

Stereoselective Biocatalysis

(Patel, R. N., ed., Marcel Dekker, New York-Basel, 2000, 932 p., $250)

This book consists of 30 chapters written by an international collective of authors who are unquestioned leaders in the field of stereoselective catalysis.

Chapter 1 (written by J. Ogawa and S. Shimizu) deals with the use of hydantoinases and carbomylases for stereoselective synthetic reactions. Both groups of enzymes are employed for the synthesis of optically pure D- and L-amino acids. The authors consider enzyme specificity for amino acid synthesis and some peculiarities of the industrial application of both groups of enzymes.

Chapter 2 (by T. Sonke et al.) deals with the use of amidases for synthesis of substituted amino acid amides. It contains information on modifications of more than 100 natural and synthetic D- and L-amino acids.

In chapter 3, K. Mori considers chemoenzymatic synthesis of pheromones, terpenes, and other biological regulators.

In chapter 4, R. N. Patel considers stereoselective catalysis of some pharmaceutical intermediates. The reader will find the discussion of catalysis of angiotensin-converting enzyme inhibitors (captopril, zophenopril, ceranopril). This chapter also describes biosynthesis of paclitaxel (taxol); this compound inhibiting microtubulin depolimeriation is employed for chemotherapy of ovary cancer and metastasizing breast cancer. A special section of this chapter deals with the use of enzymes for preparation of antagonists of thromboxane A2, which plays an important role in pathogenesis of various vascular disorders. In other sections syntheses of anti-cholesterol preparations, calcium channel blockers, sodium channel opening compounds, antiarrhythmic, antipsychotic, antimicrobial, and antiviral preparations are given. One section of this chapter was reserved for description of prostaglandin biosynthesis.

In chapter 5, H. L. Holland considers stereoselective hydroxylating reactions.

Chapter 6 (by R. Azerad) deals with synthetic approaches for hydroxylation of terpenoids by using microbial enzymes.

In chapter 7, W.-R. Abraham considers the employment of microbial catalysts for biotechnological elaboration of epoxides.

In chapter 8, W. Kroutil and K. Faber describe stereoselective syntheses catalyzed by microbial epoxide hydrolases.

Chapter 9 (by W.-D. Fessner) is about the use of various aldolases (pyruvate aldolase, dihydroxyacetone phosphate aldolase, 2-deoxy-D-riboso-5-phosphate aldolase, threonine aldolase) for enzymatic assymmetric syntheses.

In chapter 10, O. P. Ward and M. V. Baev discuss the use of decarboxylases in stereoselective catalysis.

In chapter 11, J. Brussee and A. van der Gen describe methods of biocatalytic preparation of cyanohydrins which employ various lipases.

Chapter 12 (by F. Effenberger) deals with the application of hydroxynitryl lipases in stereoselective synthesis.

In chapters 13 (by J. Hasegawa and N. Nagashima) and 14 (by P. D'Arrigo et al.), the authors discuss syntheses of chiral β-hydroxyacids and other chiral compounds, respectively.

In chapter 15, S. Taylor et al. analyze advantages of biocatalysis in the development of industrial methods of syntheses of biologically active compounds.

Chapter 16 (by E. Santaniello et al.) describes synthesis of chiral synthons by using enzymatic acylation and etherification reactions.

In chapter 17, M. Wieser and T. Nagasava characterize stereoselective nitryl-converting enzymes.

In chapter 18, H. Ohta and T. Sugai discuss a role of enzymes in decarboxylation reactions.

Chapter 19 (by R. Csuk and B. Glanzer) contains data on the use of yeast enzymes in stereoselective biocatalysis.

The three following chapters, 20 (by M. Ferrero and V. Gotor), 21 (by P. Berglund and K. Hult), and 22 (by A.-R. Alcantara et al.), are about methods of biosynthesis of steroids, use of lipases in synthesis of stereoselective compounds, and chemoenzymatic synthesis of (S+)-2-arylpropionic acids with antiinflammatory activity.

Chapter 23 (by N. Serizava) is about biocatalytic synthesis of the anti-cholesterol compound Pravastatin (known in Japan as Mevalotin), which is widely used (in 76 countries) for medical treatment of hypercholesterolemia.

Chapter 24 (by Y. Kodera et al.) deals with the use of enzymes bound to low molecular weight polyethylene glycol (PEG) in biotechnology. More than 40 various proteins bound to PEG (including chymotrypsin, asparaginase, adenosine deaminase) have been tested in clinical practice.

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In chapter 25, I. Gill et al. consider new trends in biotechnology which include the use of enzymes in biosensor systems, preparation of various membranes, and in effective microreactors and biochips.

In chapter 26, T. Pathak and H. Waldman consider a role of enzymes for formation of protective groups in intermediates of multistage organic syntheses. Enzymes may also be used for unmasking of certain chemical groups.

Chapter 27 (by T. Hartman et al.) is about enzymatic reactions in supercritical carbon dioxide. This new direction in bioorganic synthesis allows to stabilize the enzymes.

In chapter 28, M.-R. Kula and U. Kragl summarize data on the use of dehydrogenases in biosynthesis of chiral compounds.

In chapter 29, A. Banerjee discusses Bayer–Villiger oxidation reactions catalyzed by microbial enzymes.

In chapter 30, T. Ohshima and K. Soda consider the employment of (mainly bacterial) dehydrogenases for stereoselective biocatalysis.

The book is well illustrated with more than 1000 tables, equations, figures, and microphotographs. Each chapter contains a bibliography. (In the entire book there are more than 4000 references). At the end of the book, there is an index with page numbers, which helps reader to find desired information.

This book is very useful for specialists working in biochemistry, bioorganic synthesis, biotechnology, chemical engineering, and pharmacology. The book is valuable for students, PhD students, and teachers of corresponding institutes and universities.

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