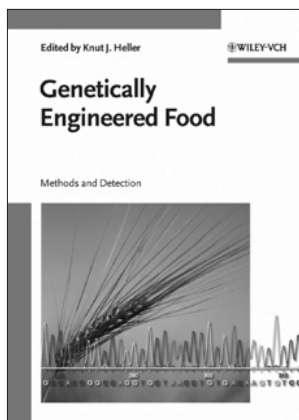


Book Reviews



Knut J. Heller (Ed.)

Genetically Engineered Food: Methods and Detection

Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, 2003; 276 pages, EUR 109.00, ISBN 3-527-30309-X

The 276-page book covers the methods and detection of genetically engineered food from a European perspective. Consequently it is divided into two parts comprising of a total of 13 chapters provided by a variety of experts in the field. The first part on methods describes the production of transgenic animals, plants, fungi and bacteria used in the production of foods. The areas are reflected in which genetic engineering is efficient or promising and examples are provided to highlight these areas, as well as extensive literature for further reading. Some authors go beyond the limits of necessary additional research in their fields and give a prospective of future developments. It is obvious from these chapters that methods of producing recombinant organisms for the use in food are most advanced for microbes, where targeted modifications and single, markerless gene modifications are possible, while there is quite some way to go to reach the same level in animals. Also, application has reached very different levels and is only found in the use of transgenic plants as such or

microorganisms producing compounds or enzymes. Still, the yet frozen possibilities resulting from the use of the most advanced modification techniques available for microorganisms used in food fermentations promise another world. Thus, while the careful reader will therefore find a lot of information which is at the level of state-of-the-art science, one may wonder how we can use this big potential while others try to find out how one could be protected from risks putatively emerging thereof.

In between lies the chapter on legislation, delineating possibilities of control. A clear overview is provided here on the European legislation on Novel Foods, which is still in the process of harmonization. Information is offered, namely on the requirements for marketing of transgenic food (compounds) and labeling. In this chapter address information is provided regarding legal bodies responsible for these regulations in various European countries (before EU expansion). Not only as a result of legislation, but also to control transgenic changes and possible side effects in an organism as well as its distribution in the environment, methods are required which are sensitive and specific enough. After a short general introduction into the basic techniques currently available the following chapters refer to those given in the first part of the book presenting examples for each of the areas. While the general methodology is similar, the specificity of the approaches resides in the behavior or constituents of the transgenic organism. Consequently, the general methodology is revisited and specific approaches are described, e.g., to follow a microbe in a fermentation process or to describe the behavior of (transgenic) DNA during food processing.

It is good to see that it is not intended in the book to add more speculation on potential risks but rather providing a neutral overview of the field describing what is possible and what is detectable to date. It also makes us aware of the fact that we always see what we are looking for.

Rudi F. Vogel, München

U. Stottmeister, K. D. Wendlandt

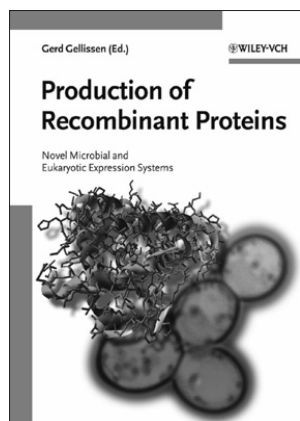
Das technische Potential ungewöhnlicher Prokaryoten: Methanoxidierende Bakterien

Verlag der Sächsischen Akademie zu Leipzig in cooperation with S. Hirzel Verlag, Stuttgart, Leipzig, 2004; 33 pages, 29 figures, 2 tables; EUR 26.00, ISBN 3-7776-1325-8

A well-grounded knowledge of biochemistry, physiology, and the ecology of microorganisms represents the basis of technical applications of biological systems. The goal of Stottmeister and Wendlandt's booklet is to illustrate how the basic research on methane oxidizing bacteria has led to successful applications in the fields of environmental protection, decontamination of water, and production of biopolymers. The authors provide a brief introduction into the biochemistry of methane oxidation and describe investigations of three actual problems. The first problem concerns the protection of trees in urban districts affected by methane gas from leaky gas pipes. The methane does not directly affect the trees, but the activities of methanotrophic bacteria decrease the oxygen concentration in the soil. Therefore, an inhibition of bacterial methane oxidation by a metabolic inhibitor positively affected the oxygen concentration in the soil. In the second study the authors describe the cometabolic degradation of trichloroethylene (TCE) by methane-oxidizing bacteria. The significance of appropriate substrate concentrations in order to optimize the process was discovered. The third chapter illustrates the remarkable effectiveness of polyhydroxybutyrate (PHB) production on biogas as a substrate of methanotrophic bacteria. In summary, the book provides new strategies for the utilization of the biochemical potential of methanotrophic bacteria in biotechnological processes. The special value of the publication lies in the "holistic" approach. A number of clear figures and tables illustrate the text. Thus, with these carefully

selected topics of bacterial biotechnology, the booklet will be of considerable interest to students, scientists, and practitioners in microbiology and biotechnology.

Wolfgang Fritsche, Jena



G. Gellissen (Ed.)

Production of Recombinant Proteins: Novel Microbial and Eukaryotic Expression Systems

Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim 2005;
404 pages, Hardcover, EUR 149.00, ISBN 3-527-31036-3

This book represents the most innovative and new developments in the field of recombinant proteins. With the aid of this technique, a quantum jump was made in life sciences not only towards an understanding of the forces, which, according to Goethe's Faust, holds the cells at heart together, but also to the efficient exploitation of organisms for pharmaceutical or industrial purposes.

Beyond several well-defined microbial and eukaryotic systems, which are described in the book, much new information is given on recently developed systems. Thus a

platform is arranged, where all the necessary knowledge of physiology, genetics and molecular biology including the transformation system as well as product and process examples with these organisms is brought together.

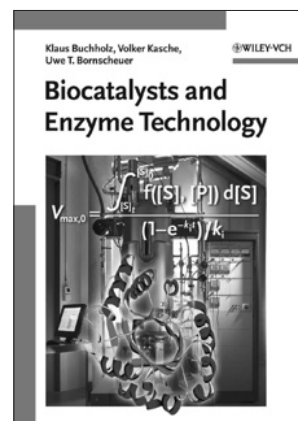
After an introduction discussing the key and the criteria for the selection of an expression platform, a big section including different host systems, genetic elements, vectors and special methods is attached. First the most investigated microbial host, *Escherichia coli*, is described in detail. Another Gram-negative bacterium, *Pseudomonas fluorescens*, is considered, before the Gram-positive bacteria, such as *Staphylococcus carnosus*, are illustrated. Within the big field of yeasts, four well-known representatives are selected for a thorough description. These are the non-conventional yeasts *Arxula adenivorans*, *Hansenula polymorpha*, *Pichia pastoris* and *Yarrowia lipolytica*. Two filamentous fungi, *Aspergillus sojae* and *Sordaria macrospora* are illustrated, before a summary on mammalian and plant cells as hosts for heterologous gene expression is given. This section closes with a consideration of wide-range integrative expression vectors for fungi. Three more biotechnological chapters are added including a closer examination of fermentation strategies, the production of recombinant Hepatitis B Vaccines as an example for the industrial manufacture of recombinant products and biopharmaceuticals within the industrial environment. These chapters complete the comprehensive view of the available book on the increasing number of prokaryotic and eukaryotic systems for the production of enzymes, biocatalysts or vaccines of most different kinds.

The clear arrangement of each chapter is emphasized. The understanding is further supported by numerous beautiful and meaningful figures and tables. The chapters usually end with detailed lists of references in order to deepen information.

This book is a remarkable source of information concerning the state of the art in designing the most suitable expression system for the product of choice and will become a very valuable reference for researchers in industry as well as research

institutes, and also for students due to its review nature. It is a guide for laboratories as well as scientists and graduates in adjacent scientific disciplines. In addition, the supplied information may help to improve the commercialization of these products which is enforcing an interdisciplinary collaboration of scientists of different fields and engineers.

Uta Breuer, Leipzig



K. Buchholz, V. Kasche, U. T. Bornscheuer

Biocatalysts and Enzyme Technology

Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, 2005;
465 pages, paperback US\$ 95.00, EUR 69.00, ISBN 3-527-30497-5

Recently, there have been many efforts, called "White Biotechnology", to improve the traditional chemical technology by intensely using the "toolbox" of life. White Biotechnology can, by that way, reduce pollution and waste, decrease the use of energy, raw materials and water, lead to better quality food products, and create new materials and biofuels from waste. Furthermore, several highly stereo- and regioselective syntheses are impossible using classical catalysts.

However, in order to understand and contribute to this flourishing area of research a detailed knowledge of the "toolbox" (whole cells or enzymes), their origin, scope for de



sign, stability and controllability is urgently required. The aim of this textbook is to provide a deeper insight into all these aspects. The thorough understanding and successful application of enzymes or whole cells as biocatalysts requires a broad knowledge of natural sciences, biology, especially biochemistry, cell and molecular biology, physical chemistry (thermodynamic and kinetics) and physics (mass transfer processes), but also technical sciences (chemical and process engineering). Furthermore, despite the often hardly known role of enzymes in everyday life, enzyme technology and its products have continuously gained increased importance. The biocatalyst application spans from the production of processed foods, such as bread, cheese, juice, beer, pharmaceuticals and fine chemicals, to the processing of leather and textiles. Enzymes are applied as process aids in detergents or environmental engineering.

To facilitate the approach to this broad field of fundamentals and applications the text book is quite logically structured. It is divided into 9 chapters.

Reader's attention is quickly attracted by the first pages showing the potential of biocatalysis. The first chapter continues with a short and entertainingly written overview of the historical highlights of enzyme technology and applied biocatalysis. As expected from an introductory chapter, the strengths and the weaknesses of different aspects of biocatalysis are discussed, e.g., isolated enzymes versus whole cell applications or enzymatic catalysis versus classical catalysis. The introductory chapter closes reflecting the goals and the potential of an extended usage of biocatalysts.

Enzymatically catalyzed reactions meet the demand for new products, such as new or sterically pure pharmaceuticals and fine

chemicals or they are the basis for new sustainable production processes of existing products. This fact justifies the detailed treatment of the fundamentals of enzymes as biocatalysts in Chapter 2. The fundamentals cover enzyme classification, synthesis and structure, kinetics, stability, and evolutions. In addition, possible end-points of enzymatic reactions, Gibbs energy restrictions are discussed. The emerging field of enzymatic catalysis in non-aqueous/non-conventional solvents is also touched. To sum up: the quantitative treatment of biocatalysis is predominantly stressed in this chapter.

The great advantage of using the chemo-, stereo- and regiospecific properties in organic chemistry deserves a special chapter (Chapter 3). The catalytic mechanisms, the catalyzed reaction types and the properties of the different classes of enzymes are here presented in detail.

The broad applications of enzymes are often economically limited. However, when the enzyme costs are too high, they can be reduced by improving the production of enzymes and their purification. The ways of achieving this are reviewed in Chapter 4. In Chapter 5, biocatalysis with enzymes in solution is covered based on examples of industrial relevant enzyme processes.

Immobilized biocatalysts are a way to counteract the influence of enzyme costs on the process economy. Then further aspects, such as the mass transfer of products and educts, the stability of the catalyst, and the changed kinetics and selectivity have to be considered. These aspects are broadly discussed in Chapters 6–8. Ways of immobilizing enzymes (Chapter 6) or of whole cells (Chapter 7) are also presented.

Chapter 9 encompasses the most relevant aspects of reactors and process engineering. General aspects like the types of bio-

reactors, instrumentation, mass transfer and scale-up are reviewed. Two case studies top the chapter off.

I found Appendix I particularly valuable, because it discusses eight points for reflecting the information behavior. Information literacy is a crucial key skill for self-directed learning in scholarly and professional everyday life. Appendix II with a list of symbols and the subject index facilitate a rapid orientation in the textbook.

Each Chapter starts with an introductory survey providing a fast access to the problems discussed. The exercises at the end of each chapter alleviate the understanding and the self-directed learning of the respective matter. The references are further divided into more general literature and original papers, which speed up the access to more detailed knowledge. The presented extensive data material and examples of new processes impressively show the relevance of enzyme technology for industrial practice. Furthermore, the interactions which exist between the scientific and engineering prospects and the political, ethical, economical and environmental boundaries, are discussed. Problems, such as the occurrence of allergy due to enzymes during the first use of enzymes in detergents and the enzymes produced in recombinant organisms directly illustrate the influence of society on enzyme technology/applied biocatalysis.

The textbook gives an instructive and comprehensive overview of our current knowledge of biocatalysis and enzyme technology. It is therefore highly recommended to advanced and graduate students in biology, chemistry and biotechnology and bioengineering, as well as engineers or scientists in industry and academia.

Thomas Maskow, Leipzig

Conference Announcements

XIVth Conference of the International Society for Biological Calorimetry “Heat Exchange and Energy Transformations in Living Systems and Biological Materials”

June 2–7, 2006, Sopot, Poland

The International Society for Biological Calorimetry (ISBC, [www-biocalorimetry.org](http://www.biocalorimetry.org)) is a world-wide association of scientists from different specialties, united by their common interest in measuring of heat exchanges and energy transformations in living systems and biological materials. Hence, the regular ISBC meetings cover a broad range of topics, from new technical achievements and biochemical findings to recent biological studies and clinical applications.

The city of Sopot will be the host for the XIVth ISBC Conference in June 2006.

The topics for this next ISBC Conference will cover all aspects of the broad range of biological calorimetry. Special attention will be paid to the calorimetry of aquatic organisms.

Topics

Instrumentation and Theoretical Approaches
Biological Materials
Biochemical and Pharmaceutical Aspects
Microorganisms and Tissue Cultures
Plants and Photocalorimetry
Insects and Social Communities
Aquatic Animals
Medical Aspects
Miscellaneous

Conference Venue

Hotel Haffner, Sopot / Poland

Conference Workshops

During the XIVth ISBC Conference there will be two workshops: one on Irreversible Thermodynamics (related to biological calorimetry) organized by Prof. Erich Gnaiger

from the D. Swarovski Research Laboratory, Department of Transplant Surgery, University Hospital Innsbruck, and a second one on Thermodynamics of Cellular Energy Transduction led by Prof. Lee Hansen from the Brigham Young University, Provo, USA.

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1st International Symposium on Biothermodynamics

February 16–17, 2006, Frankfurt am Main, Germany

The implementation of profitable biotechnological production processes is strongly dependent on a sound understanding of all aspects of processes: metabolic physiology, equipment engineering, separation techniques, modeling, material properties, etc.

Biotechnological processes are still, to a significant extent, designed without knowledge of thermodynamic fundamentals and based on kinetic approaches, empirical rules and experience.

However, as a method to describe conditions and processes of complex systems thermodynamics offers an excellent supplement by well-founded scientific rules to kinetic and stoichiometric approaches, experience and intuition.

The 1st International Symposium on Biothermodynamics is therefore, directed

towards engineers, biotechnologists and thermodynamics specialists from both, research and industry.

Topics

Estimation and modeling of thermodynamic material data
Protein adsorption on surfaces
Protein interactions and stability
Interactions of kinetics and thermodynamics in bioprocesses
Biocalorimetry
Utilization of non-natural energy rich substrates
Equilibrium in complex biological systems
Thermodynamics of metabolic pathways
Thermodynamics of downstream processing in biotechnology

Scientific Organizing Committee

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