

## New trends in applied microbiology

### Focus on Biotechnology.

#### Applied Microbiology. Volume 2.

Edited by Alain Durieux and Jean-Paul Simon  
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*Focus on Biotechnology* is an open-ended series of reference volumes produced in cooperation with the Belgium International Chemistry Society. This volume illustrates the major trends in applied microbiology research with immediate or potential applications. The book consists of specific research papers and overview papers that cover a large range of applications, for example, in the food and health sectors, environmental technology and fine chemical production using various types of microorganisms, particularly yeast, fungi and bacteria.

An important field of application is the production of food – one of the oldest areas of biotechnology – which is described in the first part of the book. A lot of research has been done in this field and modern molecular techniques are nowadays used to improve production strains. Starters for the wine industry, including a good overview on the selection and use of yeast and malolactic starters in winemaking, are also described.

Part 2 includes sections on physiology, biosynthesis and metabolic engineering. With the help of tools from systems theory and systems engineering, biological systems can be seen as information processing units in which complex regulatory interactions occur. This book contains a very short survey of the basic concepts of metabolic pathway analysis, describing metabolic control analysis and metabolic flux analysis. Applications involving the glycolysis and galactose metabolism of *Saccharomyces cerevisiae* are described. An increased understanding of the molecular mechanisms of cellular control is an important requirement for the far-reaching appliance of theoretical tools –

an example, is the role of the stringent response in lysine biosynthesis.

In the production process, the modes and parameters of plant operation have a crucial role. For example, aeration causes various effects on the surface properties and flocculation of brewers' yeast. Preculture conditions, nutritional limitations and therefore feeding strategies also have to be considered. The understanding of signal transduction networks is also an important prerequisite step in the development of the production process. Different signal transduction modules and levels can be described and regulation has to be considered on different levels, for example the cell cycle, genetic level and metabolic levels.

Novel approaches to the study of microorganisms have to be developed; we need to look more closely at the inside of the cell. New analytical methods, such as isotopic ratio mass spectrometry, provide opportunities for the quantitative understanding of metabolism. The examination of the mechanical properties of the cell, especially those of different bacterial species, is introduced in this book.

Many new opportunities are arising in the field of applied microbiology. Some interesting examples are described (e.g. bacterial feather degradation, removal of lead ions and hydrocarbon utilisation by soil bacteria), which shows the variety of feasible biological processes in industry. One of the important steps to advance current and future biotechnology is to open up the different resources and potential of organisms, which is being pushed by many industrial and academic screening centers.

Security and preservation of bioproducts, especially food, is a fundamental requirement. Molecular detection and typing of foodborne bacterial pathogens is one example of the research that is done in this area. Bioencapsulation technology in meat preservation is another.

This book addresses many different fields of applied microbiology within a few papers. It gives ideas on new trends but does not gather the whole area of applied microbiology and so the reader

misses a broader overview of the whole field. Many concepts are sketched and suggestions for further reading are provided. The book will be of interest to researchers working in the relevant fields and for people who want to get some ideas and examples about what kind of work is done in applied microbiology.

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## Modeling and control in bioprocesses

### Bioreaction Engineering. Modeling and control.

edited by Karl Schügerl and Karl-Heinz Bellgardt, Springer, 2000.  
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Modeling of biological processes is an important tool for the optimal design and characterization of industrial processes. This is a complex task because biological reactions are influenced by the chemical environment, such as the level of nutrients and product concentration, and also by the physical conditions. Metabolism and the mechanisms of its regulation are still not fully understood and the variations of physical conditions caused by fluid dynamics and mass transfer have to be looked at in simplified ways. Thus, mathematical descriptions of these processes can be simplified, but can still be useful to describe those effects that are of great importance for process design, scale-up, optimization and automatic control.

The information is arranged in four parts, each of which includes several chapters written by different authors. The contributors have a wide collection of publications in bioreaction engineering. The first part of the book contains general principles and techniques with regard to reactor and process models, control and metabolic