

## Bacteriocins Of Lactic Acid Bacteria Microbiology Genetics And Applications

Lactic acid bacteria (LAB) and bifidobacteria are among the most important groups of microorganisms used in the food industry. For example, LAB are used in the production of fermented products, such as yogurts, cheese, and pickled vegetables. In addition, LAB can inhibit the growth of spoilage microbes and/or pathogens in their environment by lowering the pH and/or through the production of antimicrobial peptides, called bacteriocins. Both LAB and bifidobacteria are also thought to have health-promoting abilities and many are used as probiotics for the prevention, alleviation, and treatment of intestinal disorders in humans and animals. In this comprehensive book, expert international authors review the most recent cutting-edge research in these areas. Topics include: lactobacillus genomics \* bifidobacterium gene manipulation technologies \* metabolism of human milk oligosaccharides in bifidobacteria \* proton-motive metabolic cycles \* oxidative stress and oxygen metabolism \* bifidobacterium response to O<sub>2</sub> \* bile acid stress in LAB and bifidobacteria \* protein structure quality control \* bacteriocin classification and diversity \* lactococcal bacteriocins \* lactobacilli bacteriocins \* other bacteriocins \* production of optically pure lactic acid \* antihypertensive metabolites from LAB \* the anti-H. pylori effect of lactobacillus gasseri \* probiotics for allergic rhinitis \* probiotics health claims in Japan and Europe.

Lactic acid bacteria (LAB) have historically been used as starter cultures for the production of fermented foods, especially dairy products. Over recent years, new areas have had a strong impact on LAB studies: the application of omics tools; the study of complex microbial ecosystems, the discovery of new LAB species, and the use of LAB as powerhouses in the food and medical industries. This second edition of *Biotechnology of Lactic Acid Bacteria: Novel Applications* addresses the major advances in the fields over the last five years. Thoroughly revised and updated, the book includes new chapters. Among them: The current status of LAB systematics; The role of LAB in the human intestinal microbiome and the intestinal tract of animals and its impact on the health and disease state of the host; The involvement of LAB in fruit and vegetable fermentations; The production of nutraceuticals and aroma compounds by LAB; and The formation of biofilms by LAB. This book is an essential reference for established researchers and scientists, clinical and advanced students, university professors and instructors, nutritionists and food technologists working on food microbiology, physiology and biotechnology of lactic acid bacteria.

A prime reference volume for geneticists, food technologists and biotechnologists in the academic and industrial sectors. Fermentations with lactic acid bacteria determine important qualities such as taste, shelf-life, and food values. New methods of food production require fast and reliable manufacture, which has led to a dramatic surge of interest in the

genetic, microbiological and biochemical properties of lactic acid bacteria.

As antibacterial compounds, bacteriocins have always lived in the shadow of those medically important, efficient and often broad-spectrum low-molecular mass antimicrobials, well known even to laypeople as antibiotics. This is despite the fact that bacteriocins were discovered as early as 1928, a year before the penicillin saga started. Bacteriocins are antimicrobial proteins or oligopeptides, displaying a much narrower activity spectrum than antibiotics; they are mainly active against bacterial strains taxonomically closely related to the producer strain, which is usually immune to its own bacteriocin. They form a heterogeneous group with regard to the taxonomy of the producing bacterial strains, mode of action, inhibitory spectrum and protein structure and composition. Best known are the colicins and microcins produced by Enterobacteriaceae. Many other Gram-negative as well as Gram-positive bacteria have now been found to produce bacteriocins. In the last decade renewed interest has focused on the bacteriocins from lactic acid bacteria, which are industrially and agriculturally very important. Some of these compounds are even active against food spoilage bacteria and endospore formers and also against certain clinically important (food-borne) pathogens. Recently, bacteriocins from lactic acid bacteria have been studied intensively from every possible scientific angle: microbiology, biochemistry, molecular biology and food technology. Intelligent screening is going on to find novel compounds with unexpected properties, just as has happened (and is still happening) with the antibiotics. Knowledge, especially about bacteriocins from lactic acid bacteria, is accumulating very rapidly.

Lasso peptides form a growing family of fascinating ribosomally-synthesized and post-translationally modified peptides produced by bacteria. They contain 15 to 24 residues and share a unique interlocked topology that involves an N-terminal 7 to 9-residue macrolactam ring where the C-terminal tail is threaded and irreversibly trapped. The ring results from the condensation of the N-terminal amino group with a side-chain carboxylate of a glutamate at position 8 or 9, or an aspartate at position 7, 8 or 9. The trapping of the tail involves bulky amino acids located in the tail below and above the ring and/or disulfide bridges connecting the ring and the tail. Lasso peptides are subdivided into three subtypes depending on the absence (class II) or presence of one (class III) or two (class I) disulfide bridges. The lasso topology results in highly compact structures that give to lasso peptides an extraordinary stability towards both protease degradation and denaturing conditions. Lasso peptides are generally receptor antagonists, enzyme inhibitors and/or antibacterial or antiviral (anti-HIV) agents. The lasso scaffold and the associated biological activities shown by lasso peptides on different key targets make them promising molecules with high therapeutic potential. Their application in drug design has been exemplified by the development of an integrin antagonist based on a lasso peptide scaffold. The biosynthesis machinery of lasso peptides is therefore of high biotechnological interest, especially since such highly

compact and stable structures have to date revealed inaccessible by peptide synthesis. Lasso peptides are produced from a linear precursor LasA, which undergoes a maturation process involving several steps, in particular cleavage of the leader peptide and cyclization. The post-translational modifications are ensured by a dedicated enzymatic machinery, which is composed of an ATP-dependent cysteine protease (LasB) and a lactam synthetase (LasC) that form an enzymatic complex called lasso synthetase. Microcin J25, produced by *Escherichia coli* AY25, is the archetype of lasso peptides and the most extensively studied. To date only around forty lasso peptides have been isolated, but genome mining approaches have revealed that they are widely distributed among Proteobacteria and Actinobacteria, particularly in *Streptomyces*, making available a rich resource of novel lasso peptides and enzyme machineries towards lasso topologies.

Gain new insight on utilizing bacterial stress responses to better combat bacterial infection with antibiotics and improve biotechnology. • Reviews the vast number of new findings that have greatly advanced the understanding of bacterial stress responses in the past 10 years. • Explores general regulatory principles, including the latest findings from genomics studies, including new research findings on both specific and general stress responses. • Details how stress responses affect the interactions between bacteria and host cells and covers bacterial stress responses in different niches and communities, with an emphasis on extreme environments.

The use of microorganisms and their metabolites for the preservation of foods began in prehistory. Lactic acid bacteria are generally recognized as safe (GRAS) for this purpose. They produce organic acids, diacetyl, acetoin, hydrogen peroxide, reuterin, reutericyclin and bacteriocins, all of which inhibit foodborne pathogens and spoilage microorganisms. Bacteriocins and the strains that produce them are particularly effective as bio-preservatives in cheese, meat and vegetables. They hold the promise of ensuring the quality and safety of ready-to-eat, extended-shelf-life, fresh-tasting and minimally processed foods without chemical preservatives. This Research Topic provides an overview of bacterial cultures, bacteriocins and other metabolites that have shown promise for use as antimicrobial bio-preservatives in foods in general. Articles describing novel analytical technologies, strategies to reduce or eliminate pathogens in food systems or emerging technologies for the production or use of protective cultures or their bacteriocins are presented.

The second edition of the book begins with the description of the diversity of wine-related microorganisms, followed by an outline of their primary and energy metabolism. Subsequently, important aspects of the secondary metabolism are dealt with, since these activities have an impact on wine quality and off-flavour formation. Then chapters about stimulating and inhibitory growth factors follow. This knowledge is helpful for the growth management of different microbial species. The next chapters focus on the application of the consolidated findings of molecular biology and regulation the functioning of

regulatory cellular networks, leading to a better understanding of the phenotypic behaviour of the microbes in general and especially of the starter cultures as well as of stimulatory and inhibitory cell-cell interactions during wine making. In the last part of the book, a compilation of modern methods complete the understanding of microbial processes during the conversion of must to wine. This broad range of topics about the biology of the microbes involved in the vinification process could be provided in one book only because of the input of many experts from different wine-growing countries. While lactic acid-producing fermentation has long been used to improve the storability, palatability, and nutritive value of perishable foods, only recently have we begun to understand just why it works. Since the publication of the third edition of *Lactic Acid Bacteria: Microbiological and Functional Aspects*, substantial progress has been made in a number of areas of research. Completely updated, the Fourth Edition covers all the basic and applied aspects of lactic acid bacteria and bifidobacteria, from the gastrointestinal tract to the supermarket shelf. Topics discussed in the new edition include: Revised taxonomy due to improved insights in genetics and new molecular biological techniques New discoveries related to the mechanisms of lactic acid bacterial metabolism and function An improved mechanistic understanding of probiotic functioning Applications in food and feed preparation Health properties of lactic acid bacteria The regulatory framework related to safety and efficacy Maintaining the accessible style that made previous editions so popular, this book is ideal as an introduction to the field and as a handbook for microbiologists, food scientists, nutritionists, clinicians, and regulatory experts.

*Biotechnology: Prospects and Applications* covers the review of recent developments in biotechnology and international authorship presents global issues that help in our understanding of the role of biotechnology in solving important scientific and societal problems for the benefit of mankind and environment. A balanced coverage of basic molecular biology and practical applications, relevant examples, colored illustrations, and contemporary applications of biotechnology provide students and researchers with the tools and basic knowledge of biotechnology. In our effort to introduce students and researchers to cutting edge techniques and applications of biotechnology, we dedicated specific chapters to such emerging areas of biotechnology as Emerging Dynamics of Brassinosteroids Research, Third generation green energy, Bioremediation, Metal Organic Frameworks: New smart materials for biological application, Bioherbicides, Biosensors, Fetal Mesenchymal Stem Cells and Animal forensics. *Biotechnology: Prospects and Applications* will be highly useful for students, teachers and researchers in all disciplines of life sciences, agricultural sciences, medicine, and biotechnology in universities, research stations and biotechnology companies. The book features broader aspects of the role of biotechnology in human endeavor. It also presents an overview of prospects and applications while emphasizing modern, cutting-edge, and emerging areas of biotechnology. Further, it provides the readers with a comprehensive knowledge of

topics in food and agricultural biotechnology, microbial biotechnology, environmental biotechnology and animal biotechnology. The chapters have been written with special reference to the latest developments in above broader areas of biotechnology that impact the biotechnology industry. A list of references at the end of each chapter is provided for the readers to learn more about a particular topic. Typically, these references include basic research, research papers, review articles and articles from the popular literature.

In ancient times foods fermented with lactic acid bacteria already constituted an important part of the human diet. From then on, lactic acid bacteria have played an essential role in the preservation of food raw materials and have contributed to the nutritional, organoleptic and health properties of human food products and animal feed. The important function that lactic acid bacteria still have in the production of foods all over the world has resulted in a growing scientific interest in these micro-organisms by academic research groups as well as by industry. During the last 15 years, this research has been stimulated by major internationally coordinated funding efforts that have resulted in a variety of important scientific breakthroughs and have led to new applications. Written by international experts in the field, this issue of Antonie van Leeuwenhoek documents these developments with respect to genetics, metabolism and the application of lactic acid bacteria for industrial and potential medical applications. In this book the first complete genome of a lactic acid bacterium is presented. The book will serve as a reference source and also as an indispensable source of information for further development and exploration of the field.

Presented here are recent findings on bacteriocins: plasmid-encoded toxins produced by bacteria, which differ from traditional antibiotics in killing only bacteria that are closely related to the producing strain. Included are introductory chapters on bacteriocins, microcins (low molecular weight bacteriocins), and lantibiotics (peptide antibiotics containing lanthionine), further, contributions on pore forming bacteriocins, the mechanisms of immunity to bacteriocins, uptake and secretion, as well as evolution of bacteriocins. It is of particular interest that the lantibiotic nisin is approved for use as food preservative and another lantibiotic, epidermin, has potential as a therapeutic drug against acne.

"This book reviews the recent advancements in the dairy industry and includes the latest scientific developments in regard to the 'functional' aspects of dairy and fermented milk products and their ingredients. Since the publication of the first edition of this text, there have been incredible advances in the knowledge and understanding of the human microbiota, mainly due to the development and use of new molecular analysis techniques"--

This volume presents a wide range of new approaches aimed at improving the safety and quality of food products and agricultural commodities. Each chapter provides in-depth information on new and emerging food preservation techniques including those relating to decontamination, drying and dehydration, packaging innovations and the use of botanicals as

natural preservatives for fresh animal and plant products. The 28 chapters, contributed by an international team of experienced researchers, are presented in five sections, covering: Novel decontamination techniques Novel preservation techniques Active and atmospheric packaging Food packaging Mathematical modelling of food preservation processes Natural preservatives This title will be of great interest to food scientists and engineers based in food manufacturing and in research establishments. It will also be useful to advanced students of food science and technology.

Fermented food can be produced with inexpensive ingredients and simple techniques and makes a significant contribution to the human diet, especially in rural households and village communities worldwide. Progress in the biological and microbiological sciences involved in the manufacture of these foods has led to commercialization and heightened interest among scientists and food processors. Handbook of Animal-Based Fermented Food and Beverage Technology, Second Edition is an up-to-date reference exploring the history, microorganisms, quality assurance, and manufacture of fermented food products derived from animal sources. The book begins by describing fermented animal product manufacturing and then supplies a detailed exploration of a range of topics including: Dairy starter cultures, microorganisms, leuconostoc and its use in dairy technology, and the production of biopreservatives Exopolysaccharides and fermentation ecosystems Fermented milk, koumiss, laban, yogurt, and sour cream Meat products, including ham, salami, sausages, and Turkish pastirma Malaysian and Indonesian fermented fish products Probiotics and fermented products, including the technological aspects and benefits of cheese as a probiotic carrier Fermented food products play a critical role in cultural identity, local economy, and gastronomical delight. With contributions from over 60 experts from more than 20 countries, the book is an essential reference distilling the most critical information on this food sector. Bacteriocins produced by three strains of *Carnobacterium piscicola* and by a *Lactobacillus sake* strain were isolated, partially characterized and purified to homogeneity. These were termed carnocin 124, carnocin 109, carnocin 75 and sakacin 38. The synthesis of all four antimicrobials was shown to be inducible by extracellular peptides, which were specific, controlling the production of both the bacteriocins and their cognate immunity proteins. Amino acid sequence analysis of the purified bacteriocins indicated that carnocins 75, 109, and 124 were homologous to piscicolin JG126 (also described as piscicocin V1a) while sakacin 38 showed homology to sakacin P. The locus of carnocin 75 was cloned from *C. piscicola* NFBC75 and the amino acid sequence of the putative bacteriocin-inducing peptide and immunity protein were determined by translation of their genetic determinants. In addition, enterocin 37 produced by *Enterococcus faecalis* NFBC37 was shown to be identical to enterocin AS48 by amino acid sequence analysis and mass spectroscopy of the purified peptide. Curing and Southern hybridization analysis showed the enterocin 37 operon to be associated with a 60 Kb plasmid in *E. faecalis* NFBC37. The plasmid was transferred by conjugation into *E. faecalis* JH2SS, conferring both bacteriocin production and immunity to the recipient strain. It was observed that the level and rate of enterocin 37 production was determined by the pH of the growth media. Also the production of enterocin 37 shown to be affected at a transcriptional level on the basis of sugar utilization in both the wild type and transconjugant strains. The bacteriocin carnocin 124 was evaluated as a means of preservation in fresh pork sausage, where it could allow for the reduction or replacement of sulfites currently employed in the product. The bacteriocin producing culture was used to ferment a milk based growth medium to produce a buttermilk-like product which was pasteurized, condensed and spray dried to yield a fermented milk powder. The resultant powder was subsequently incorporated into fresh pork sausage. The inclusion of the fermented ingredient did not result in an increase in the shelf-life of the product; however, it was shown to be effective against *Listeria* for the duration of the trial, reducing the levels

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by 99.9% from initial valued of  $5.5 \times 10^5$  to approximately  $5 \times 10^2$  CFU/g. Chitosan glutamate was also added to the product formations. Under chilled conditions its inclusion resulted in a 10-fold decrease in the total microbial load compared with the control for the first 10 days of the trial indicating its potential as a natural preservative at chilled temperatures.

For a long time, lactic acid bacteria have played an indispensable role in food production. This book provides an overview and recent findings on their genetics and biochemistry as well as possible applications. The development and use of non-pathogenic lactic acid bacteria in vaccine delivery systems for mucosal immunizations are discussed. Their role in food fermentation, their use in carbohydrate modification and key systems for proteolysis and lantibiotic production are treated in detail. Further, the transformation of organic wastes into food and fertilizers is covered. The volume contains a wealth of useful information and can serve both as an introduction to the field for beginners and as a reference book.

This book introduces readers to basic studies on and applied techniques involving lactic acid bacteria, including their bioengineering and industrial applications. It summarizes recent biotechnological advances in lactic acid bacteria for food and health, and provides detailed information on the applications of these bacteria in fermented foods. Accordingly, it offers a valuable resource for researchers and graduate students in the fields of food microbiology, bioengineering, fermentation engineering, food science, nutrition and health.

Bioinspired systems, technologies and techniques known as “biomimetics” or the “mimicry of nature,” represent a ground-breaking method of scientific research based on innovation and a creative design approach of the ‘nature’ laboratory to be applied to any scientific discipline. This approach and the associated way of thinking facilitates the cross-fertilization of scientific fields, integrating biology and the interdisciplinary knowledge featuring the evolution of models that have refined in nature within any scientific discipline.

Food Biopreservatives of Microbial Origin provides basic and applied information regarding how antimicrobial metabolites of safe, food-grade bacteria (used in food fermentation) can be utilized as food preservatives. The authors discuss why biopreservation of food is important, identify the foods and microorganisms for which biopreservation is suitable, and explore the potential of bacteriocins of food-grade starter culture bacteria and the antimicrobial proteins of yeasts as possible food biopreservatives. The book is a valuable reference resource that will benefit students of food science and researchers in food industries, regulatory agencies, and advisory groups.

In agricultural education and research, the study of agricultural microbiology has undergone tremendous changes in the past few decades, leading to today’s scientific farming that is a backbone of economy all over the globe. Microorganisms in Sustainable Agriculture, Food, and the Environment fills the need for a comprehensive volume on recent advances and innovations in microbiology. The book is divided into four main parts: food microbiology; soil microbiology; environmental microbiology, and industrial microbiology and microbial biotechnology.

Through four editions, Lactic Acid Bacteria: Microbiological and Functional Aspects, has provided readers with information on the how’s and why’s lactic acid-producing fermentation improves the storability, palatability, and nutritive value of perishable foods. Thoroughly updated and fully revised, with 12 new chapters, the Fifth Edition covers regulatory aspects globally, new findings on health effects, properties and stability of LAB as well as production of target specific LAB. The new edition also addresses the technological use of LAB in various fermentations of food, feed and beverage, and their safety considerations. It features the detailed description of the main genera of LAB as well as such novel bacteria as fructophilic LAB and novel probiotics and discusses such new targets as cognitive function, metabolic health, respiratory health and probiotics. Key Features: In 12 new chapters, findings are presented on health effects, properties and stability of LAB as well as production of target specific LAB Covers such novel bacteria as fructophilic LAB and novel probiotics Presents new discoveries related to the

mechanisms of lactic acid bacterial metabolism and function Covers the benefits of LAB, both in fermentation of dairy, cereal, meat, vegetable and silage, and their health benefits on humans and animals Discusses the less-known role of LAB as food spoilers Covers the global regulatory framework related to safety and efficacy

Bacteriocins of Lactic Acid Bacteria is based on the 1990 Annual Meeting of the Institute of Food Technologists held in Dallas, Texas. It describes a number of well-characterized bacteriocins and, where possible, discusses practical applications for those that have been defined thus far from the lactic acid bacteria. The book begins with an introductory overview of naturally occurring antibacterial compounds. This is followed by discussions of methods of detecting bacteriocins and biochemical procedures for extraction and purification; genetics and cellular regulation of bacteriocins; bacteriocins based on the genera of lactic acid bacteria *Lactococcus*, *Lactobacillus*, *Pediococcus*, and *Leuconostoc*, and related bacteria such as *Carnobacterium* and *Propionibacterium*; and the regulatory and political aspects for commercial use of these substances. The final chapter sets out the prognosis for the future of this dynamic area. The information contained in this book should benefit those with interest in the potential for industrial use of bacteriocins as preservative ingredients. Anyone interested in lactic acid bacteria or the biosynthesis, regulation, and mechanisms of inhibition of these proteinaceous compounds will also appreciate the material presented. These include food scientists, microbiologists, food processors and product physiologists, food toxicologists, and food and personal product regulators.

Probiotic microorganisms are recognised as being beneficial for human health. Prebiotics are substrates that are used preferentially by the probiotic bacteria for their growth. A great deal of interest has been generated in recent years in identifying probiotic bacteria and prebiotics, their characterization, mechanisms of action and their role in the prevention and management of human health disorders. Together they are referred to as synbiotic. This book is in response to the need for more current and global scope of probiotics and prebiotics. It contains chapters written by internationally recognized authors. The book has been planned to meet the needs of the researchers, health professionals, government regulatory agencies and industries. This book will serve as a standard reference book in this important and fast-growing area of probiotics and prebiotics in human nutrition and health.

Microorganisms participate in both the manufacture and spoilage of foodstuffs. In Food Microbiology Protocols, expert laboratorians present a wide ranging set of detailed techniques for investigating the nature, products, and extent of these important microorganisms. The methods cover pathogenic organisms that cause spoilage, microorganisms in fermented foods, and microorganisms producing metabolites that affect the flavor or nutritive value of foods. Included in the section dealing with fermented foods are procedures for the maintenance of lactic acid bacteria, the isolation of plasmid and genomic DNA from species *Lactobacillus*, and the determination of proteolytic activity of lactic acid bacteria. A substantial number of chapters are devoted to yeasts, their use in food and beverage production, and techniques for improving industrially important strains. There are also techniques for the conventional and molecular identification of spoilage organisms and pathogens, particularly bacteria, yeasts, and the molds that cause the degradation of poultry products. Each method is described step-by-step for assured results, and includes tips on avoiding pitfalls or developing extensions for new systems.. Comprehensive and timely, Food Microbiology Protocols is a gold-standard collection of readily reproducible techniques essential for the study of the wide variety of microorganisms involved in food production, quality, storage, and preservation today.

The practice of biotechnology, though different in style, scale and substance in globalizing science for development involves all countries. Investment in biotechnology in the industrialised, the developing, and the least developed countries, is now amongst the widely accepted



avenues being used for economic development. The simple utilization of kefir technology, the detoxification of injurious chemical pesticides e.g. parathion, the genetic tailoring of new crops, and the production of a first of a kind of biopharmaceuticals illustrate the global scope and content of biotechnology research endeavour and effort. In the developing and least developed nations, and in which the 9 most populous countries are encountered, problems concerning management of the environment, food security, conservation of human health resources and capacity building are important factors that influence the path to sustainable development. Long-term use of biotechnology in the agricultural, food, energy and health sectors is expected to yield a windfall of economic, environmental and social benefits. Already the prototypes of new medicines and of prescription fruit vaccines are available. Gene based agriculture and medicine is increasingly being adopted and accepted. Emerging trends and practices are reflected in the designing of more efficient bioprocesses, and in new research in enzyme and fermentation technology, in the bioconversion of agro industrial residues into bio-utility products, in animal healthcare, and in the bioremediation and medical biotechnologies. Indeed, with each new day, new horizons in biotechnology beckon.

Fermentation is a theme widely useful for food, feed and biofuel production. Indeed each of these areas, food industry, animal nutrition and energy production, has considerable presence in the global market. Fermentation process also has relevant applications on medical and pharmaceutical areas, such as antibiotics production. The present book, *Fermentation Processes*, reflects that wide value of fermentation in related areas. It holds a total of 14 chapters over diverse areas of fermentation research.

Fluid milk processing is energy intensive, with high financial and energy costs found all along the production line and supply chain.

Worldwide, the dairy industry has set a goal of reducing GHG emissions and other environmental impacts associated with milk processing. Although the major GHG emissions associated with milk production occur on the farm, most energy usage associated with milk processing occurs at the milk processing plant and afterwards, during refrigerated storage (a key requirement for the transportation, retail and consumption of most milk products). Sustainable alternatives and designs for the dairy processing plants of the future are now being actively sought by the global dairy industry, as it seeks to improve efficiency, reduce costs, and comply with its corporate social responsibilities.

*Emerging Dairy Processing Technologies: Opportunities for the Dairy Industry* presents the state of the art research and technologies that have been proposed as sustainable replacements for high temperature-short time (HTST) and ultra-high temperature (UHT) pasteurization, with potentially lower energy usage and greenhouse gas emissions. These technologies include pulsed electric fields, high hydrostatic pressure, high pressure homogenization, ohmic and microwave heating, microfiltration, pulsed light, UV light processing, and carbon dioxide processing. The use of bacteriocins, which have the potential to improve the efficiency of the processing technologies, is discussed, and information on organic and pasture milk, which consumers perceive as sustainable alternatives to conventional milk, is also provided. This book brings together all the available information on alternative milk processing techniques and their impact on the physical and functional properties of milk, written by researchers who have developed a body of work in each of the technologies. This book is aimed at dairy scientists and technologists who may be working in dairy companies or academia. It will also be highly relevant to food processing experts working with dairy ingredients, as well as university departments, research centres and graduate students.

Starter cultures have great significance in the food industry due to their vital role in the manufacture, flavour, and texture development of fermented foods. Once mainly used in the dairy industry, nowadays starter cultures are applied across a variety of food products, including meat, sourdough, vegetables, wine and fish. New data on the potential health benefits

of these organisms has led to additional interest in starter bacteria. *Starter Cultures in Food Production* details the most recent insights into starter cultures. Opening with a brief description of the current selection protocols and industrial production of starter cultures, the book then focuses on the innovative research aspects of starter cultures in food production. Case studies for the selection of new starter cultures for different food products (sourdough and cereal based foods, table olives and vegetables, dairy and meat products, fish and wine) are presented before chapters devoted to the role of lactic acid bacteria in alkaline fermentations and ethnic fermented foods. This book will provide food producers, researchers and students with a tentative answer to the emerging issues of how to use starter cultures and how microorganisms could play a significant role in the complex process of food innovation.

Beginning with an introduction to relevant genetic techniques, chapters cover all major groups of LAB, including the Bifidobacteria; plasmid biology, gene transfer, phage, and sugar metabolism; gene expression of various LAB; applications for genetically engineered LAB, including the emerging field of medical applications; and the legal and consumer issues that arise from such applications. This resource will set the benchmark for the state of knowledge of LAB genetics and should be of value to food scientists and other researchers working with LAB in its present and future capacities. Professionals using lactic acid bacteria (LAB) for research and/or as working organisms, whether in food and dairy fermentations or in the exciting new field of clinical delivery agents, will find this book invaluable. In addition, professors teaching under- and post-graduates in microbiology, and postgraduate research students will also find this an essential reference work.

The book will provide an overview of the advancement of fundamental knowledge and applications of antimicrobial peptides in biomedical, agricultural, veterinary, food, and cosmetic products. Antimicrobial peptides stand as potentially great alternatives to current antibiotics, and most research in this newly-created area has been published in journals and other periodicals. It is the editors' opinion that it is timely to sum up the most important achievements in the field and provide the scientific community in a reference book. The goals of this project include illustrating the achievements made so far, debating the state of the art, and drawing new perspectives.

Lactic acid bacteria (LAB) are a diverse group of bacteria that comprise low GC content Gram-positive cocci or rods that produces lactic acid as the major end product of the fermentation process. Bifidobacterium genera may also be considered as a part of the LAB group for possessing some similar phenotypical characteristics despite the higher GC content. The key feature of LAB metabolism is efficient carbohydrate fermentation. This contributes to the production of several microbial metabolites that result in the improvement of flavor and texture of fermented foods, in addition to its positive impact on the human health when LAB is administered as a probiotic. The book deals with advances made in the

functionalities of LAB, such as their effect on vitamin D receptor expression, impact on neurodegenerative pathologies, production of B-vitamins for food bio-enrichment, production of bacteriocins to improve gut microbiota dysbiosis, production of metabolites from polyphenols and their effects on human health, effect on reducing the immunoreaction of food allergens, as biological system using time-temperature to improve food safety, and the use of probiotics in animal feed. The book also reviews the use of LAB and probiotic technologies to develop new functional foods and functional pharmaceuticals.

Bacteriocins of Lactic Acid Bacteria Academic Press

Pocket Guide to Bacterial Infections provides information pertinent to the behaviour of bacterial cells during their interactions with different cell types of multiple host systems. This book will present the role of various bacterial pathogens affecting the host system. The book is to be organized flexibly so that chapters and topics are arranged with continuity from the former chapters. Each chapter has been made as self-contained as possible to promote this flexibility. This book will discuss each of the virulence properties of the bacteria with reference to their interacting hosts in a larger perspective. Key selling features: Summarizes the role various bacterial pathogens affect the host system Reviews recent advances for combating different types of bacterial infections that infect different body parts Designed as an effective teaching and research tool providing up to date information on bacterial infections Defines important terms Written in a readable and direct writing style

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