Bacteriocins Of Lactic Acid Bacteria Microbiology Genetics And Applications

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.

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.

Production of and Immunity Against Bacteriocins in Lactic Acid Bacteria

Common Mechanism of Action of Bacteriocins from Lactic Acid Bacteria

The Study of Bacteriocin-producing Lactic Acid Bacteria from the Brewing Environment

Examining the Structure, Function and Mode of Action of Bacteriocins from Lactic Acid Bacteria

Characterization of Bacteriocins Produced by Lactobacilli and Their Use to Control Calcium Lactate Crystal-forming Lactic Acid Bacteria in Cheddar Cheese

Lactic Acid Bacteria (LAB) are a heterologous group of microorganisms that have been isolated from numerous ecological niches, including fermented foods, plants, and the gastrointestinal tract of animals. Because of their "generally regarded as safe" status (GRAS), there has been great interest in using these microorganisms in food production, as probiotic microorganisms or as biotechnological tools. This book describes some of the many benefits of LAB including i) their use in foods where advances in the fight against spoilage and pathogenic microorganisms in foods, their thermotolerance, their microencapsulation, and responses to osmotic challenges will be discussed; ii) their capacity to produce beneficial compounds including bioactive peptides, biosurfactants, gamma-aminobutyric acid, and antimicrobial products such as organic acids, hydrogen peroxide, bacteriocins, and peptidoglycan hydrolases; and iii) their effect on health and other applications such as their use as a DNA vaccine delivery system, bile-salt hydrolase, and exopolysaccharides production as well as the use of spore forming LAB. This new book is a compilation of topics that have been written by experts from all over the world (Argentina, Brazil, Greece, Mexico, and Thailand) who work in different research settings offering varying viewpoints on the most up-to-date information currently available on the uses and many benefits of Lactic Acid Bacteria.

In spite of modern technologies and safety concepts such as Hazard Analysis and Critical Control Point system (HACCP), the reported numbers of food-borne illnesses and intoxications are still on the increase. In addition, in recent years, the consumer demand towards high quality and safe foods is growing. These, in turn, have increased the need for using the protective cultures and associated antagonistic compounds (biopreservation) as additional factors to support good manufacturing practices, thereby reducing risks of growth and survival of pathogens and

spoilage microorganisms. Lactic acid bacteria (LAB) have traditionally been used in food processing because of their ability to improve the organoleptic characteristics and healthiness of foodstuffs. Bacteriocins produced by LAB have received considerable attention in recent years because of their possible use as biopreservatives in food processing with resultant reduction in the use of chemical preservatives. Therefore, the main aim of the present study is evaluating the application of bacteriocin-producing LAB or their bacteriocins as biopreservatives.

New Horizons in Biotechnology

The Production of Bacteriocins from Lactic Acid Bacteria : Bacteriocins from Lactic Acid Bacteria and Their Potential to Inhibit Foodborne Pathogens

The Many Benefits of Lactic Acid Bacteria

Food Spoilage Microorganisms

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.

The control of microbiological spoilage requires an understanding of a number of factors including the knowledge of possible hazards, their likely occurrence in different products, their physiological properties and the availability and effectiveness of different preventative measures. Food spoilage microorganisms focuses on the control of microbial spoilage and provides an understanding necessary to do this. The first part of this essential new book looks at tools, techniques and methods for the detection and analysis of microbial food spoilage with chapters focussing on analytical methods, predictive modelling and stability and shelf life

assessment. The second part tackles the management of microbial food spoilage with particular reference to some of the major food groups where the types of spoilage, the causative microorganisms and methods for control are considered by product type. The following three parts are then dedicated to yeasts, moulds and bacteria in turn, and look in more detail at the major organisms of significance for food spoilage. In each chapter the taxonomy, spoilage characteristics, growth, survival and death characteristics, methods for detection and control options are discussed. Food spoilage microorganisms takes an applied approach to the subject and is an indispensable guide both for the microbiologist and the non-specialist, particularly those whose role involves microbial quality in food processing operations. Looks at tools, techniques and methods for the detection and analysis of microbial food spoilage Discusses the management control of microbial food spoilage Looks in detail at yeasts, moulds and bacteria

Production, Purification, Genetic Control and Application

Microorganisms in Sustainable Agriculture, Food, and the Environment

Bacteriocins of Lactic Acid Bacteria

Food Microbiology Protocols

Genetics and Biotechnology of Lactic Acid Bacteria

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 economie 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 medieine 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.

The September 1996 proceedings summarize current research in the area of lactic acid bacteria in respect to fundamental biology,

application, and the potential possibilities for use in promoting human and animal health and nutrition. The 14 papers discuss topics in genetics, metabolism, and applications including the biosynthesis of bacteriocins in lactic acid bacteria, the proteolytic systems of lactic acid bacteria, lactococcus lactis and stress, the barriers to application of genetically modified lactic acid bacteria, the acceleration of cheese ripening, and lactic acid bacteria as vaccine delivery vehicles. Includes illustrations. Annotation copyrighted by Book News, Inc., Portland, OR

Lactococcins from Lactococcus Lactis and Pediocin PA-1 from Pediococcus Acidilactici

Bacteriocins of the Lactic Acid Bacteria

Biotechnology of Lactic Acid Bacteria

Investigation of Bacteriocins from Lactic Acid Bacteria and Their Impact in Winemaking

Characterization of Bacteriocins Produced from Lactic Acid Bacteria

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 by 99.9% from initial valued of 5.5 x 105 to approximately 5 x 102 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.

This thesis represents an analysis of bacteriocin-producing lactic acid bacteria (LAB) from barley and demonstrates, for the first time, the variety of previously identified and novel inhibitory peptides produced by isolates from this environment. It also highlights the potential of these cultures to be used as biological controlling agents in the brewing industry. Bacteriocin

activities produced by eight LAB isolated from malt, were purified and by ammonium sulphate precipitation followed by three chromatographic steps. Four non-identical Lactobacillus sakei strains produced sakacin P, while four Leuconostoc mesenteroides strains produced bacteriocins similar or identical to leucocin A, leucocin C or mesenterocin Y105. Two strains, Lb. sakei 5 and Leuc. mesenteroides 6 were shown to produce more than one bacteriocin. Lb. sakei 5 produced sakacin P as well as two novel bcteriocins, designated sakacin X and sakacin T, respectively. The inhibitory spectrum of each purified bacteriocin was determined and included a range of beer spoilage microorganisms. The genes encoding sakacin T and sakacin X are part of a locus consisting of two adjacent, divergent gene clusters. The first gene cluster includes stxP, stxR, stxK and stxT, believed to encode an inducing peptide, and proteins involved in regulation and secretion of these bacteriocins. The second gene cluster includes the structural and immunity genes for sakacin T and sakacin X. A transport accessory protein was absent from the locus, and based on our results, does not seem to be required for processing and transport of sakacin T and X. Three distinct promoters within the sakacin TX locus were identified by primer extension alaysis , indicating that the three-component regulatory system in this locus is atypical. Quantitative real-time PCR analysis showed that a transient increase in the expression of the two regulatory operons precedes transcription of the bacteriocin genes and bacteriocin activity. The promoters of the sakacin TX locus contain putative regulatory sequences in front of their 10 regions, which are likely to play a role in gene regulation.

The Bacteriocins of Lactic Acid Bacteria

Production of Phytase from Bacteriocin from Lactic Acid Bacteria, Strain Kv 1, for Potential Use as Probiotics

Methods and Protocols

Applications and Fundamentals

Investigation of the Antimicrobial Effect of Bacteriocins of Lactic Acid Bacteria in Alcoholic Beverages

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 heterogenous 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.
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.
The Lactic Acid Bacteria and Food Biopreservation
Lactic Acid Bacteria: Genetics, Metabolism and Applications
An Overlooked Benefit for Food : Science, Application, Legislation
The Use of Bacteriocins of Lactic Acid Bacteria to Reduce Escherichia Coli0157:H7 and Salmonella in Apple Cider and Orange Juice
Biotechnology: Prospects and Applications
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.

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.

Inhibition of Listeria Innocua by Bacteriocins of Lactic Acid Bacteria; Characterization of Bacteriocin Resistant Isolates of Listeria Innocua 4202

Bacteriocins from Lactic Acid Bacteria

Continuous Production of Bacteriocins by Lactic Acid Bacteria from Whey Permeate and Applications in Food Systems

Microbiological and Functional Aspects

Isolation and Characterization of Bacteriocin and Lactic Acid Bacteria Isolated from Food Samples in Jamaica

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

This detailed book provides a collection of protocols for numerous experimental approaches perfected by the authors

for lactic acid bacteria (LAB) research. Split in to three parts, the volume delves into the identification and metabolism of LABs, the applications of the bacteria for the food industry, as well as healthy functions of LAB. Written for the highly successful Methods in Molecular Biology series, chapters include introduction to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Authoritative and accessible, Lactic Acid Bacteria: Methods and Protocols serves as an ideal inspiration for many research efforts in the domains of food science and health science.

Their Isolation, Characterization and Application in Food Systems

Microbiology, Genetics and Applications

A Functional Approach

Lactic Acid Bacteria

Proceedings of the Fifth Symposium Held in Veldhoven, The Netherlands, 8–12 September 1996

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.

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.

Lactic Acid Bacteria: Microbial Metabolism and Expanding Applications

Novel Applications

Characterization of Bacteriocins Produced by Lactic Acid Bacteria Isolated from Meat

Bioengineering and Industrial Applications

Purification and Characterization of Bacteriocin from Lactic Acid Bacteria Isolated from Fermented Foods

LAB previously isolated from a variety of foods and shown to produce antimicrobial compounds, were screened for antagonistic activity against strains of lactic acid bacteria isolated from beer, stout, and cider. Inhibiting strains were evaluated on the basis of size of inhibition zone and the ability to produce the agent into cell-free supernatant (CFS). In addition, the sensitivity of the inhibitor compounds to different pH and temperature regimes was assessed. Enterococcus faecalis NFBC 37 and Lactococcus lactis subsp.lactis NFBC 117 each produced an antimicrobial compound into cell-free supernatant that inhibited the common spoilage bacteria isolated from alcoholic beverages. Both compounds were inactivated by one or more protease enzymes which strongly indicated that they were bacteriocins. E. faecalis NFBC 37 produced maximum bacteriocin levels after 12 h growth in MRS broth at 30C. This compound was relatively heat stable, retaining 50% of its original activity of 4000 AU/ml following treatment at 60C for 20 min. Lower pH values of 2.0-3.0 had a significant effect on activity resulting in a reduction from 4000 AU/ml to 500 AU/ml and at pH 7.0 it was reduced to 2000 AU/ml. L.lactis subsp. Lactis 117 was found to be a nisin producer. This was detected in cell-free supernatant at maximum levels following 8 h of growth of the producer in MRS. It was very stable following exposure to a range of temperature treatments and it retained full activity after exposure to 60C for 20 min. pH values of between 2.0 and 6.0 had no effect on the stability of BAC 117, but at pH 7.0, there was a 50% reduction in activity. Bac 37 and Bac 117 were concentrated using 55% ammonium sulphate and activity was concentrated 64-fold with a 56% yield in both cases. PH-controlled growth experiments were performed to optimise conditions for bacteriocin production and an 8-fold increase in activity levels was obtained at pH 5.5 for NFBC 37 compared to when pH was not controlled. In beverage trials both bacteriocins wee more effective against Lb.malefermentans 2344 than against P.damnosus 1830. Levels of Lb. malefermentans decreased from 106 CFU/ml in 2 days and remained below this

level for the 30 day duration of the experiment. Bac 37 and Bac117 were judged to be similar in their effectiveness as preservatives in an alcoholic beverage system.