

Xiaoyuan Wang
Jian Chen
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Reprogramming Microbial Metabolic Pathways

Reprogramming Microbial Metabolic Pathways 64

Subcellular Biochemistry

Xiaoyuan Wang, Jian Chen, Peter Quinn



Reprogramming Microbial Metabolic Pathways 64 Subcellular Biochemistry:

Reprogramming Microbial Metabolic Pathways Xiaoyuan Wang, Jian Chen, Peter Quinn, 2012-10-20 Metabolic engineering has been developed over the past 20 years to become an important tool for rational engineering of microorganisms. This book has a particular interest in the methods and applications of metabolic engineering to improve the production and yield of a variety of metabolites in microorganisms. The overall goal is to achieve a better understanding of metabolism in different microorganisms and provide a rational basis to reprogram microorganisms for improved biochemical production. This book brings together contributions from leading researchers at the cutting edge of these topics. The subject matter is divided into two sections. The first section deals with novel and emerging methods for redesigning microorganisms exploiting systems biology and gene regulation. The second discusses practical aspects of metabolic engineering for over production of a variety of valuable chemicals and materials by fermentation.

Wine Fermentation Harald Claus, 2019-03-28 Wineries are facing new challenges due to actual market demands for the creation of products exhibiting more particular flavors. In addition, climate change has led to the requirement for grape varieties with specific features such as convenient maturation times, enhanced tolerance towards dryness, osmotic stress, and resistance against plant pathogens. The next generation of yeast starter cultures should produce wines with an appealing sensory profile and less alcohol. This Special Issue comprises actual studies addressing some of the problems and solutions for the environmental, technical, and consumer challenges of wine making today. Development of sophisticated mass spectroscopic methods enable the identification of the major metabolite spectrum of grapes, wine, and deliver detailed insights in terroir and yeast specific traits. Knowledge of the origin and reactions of reductive sulphur compounds facilitates the avoidance of unpleasant wine odors. Innovative physical chemical treatments support effective and sustainable color extraction from red grape varieties. Enological enzymes from yeasts used directly or in the form of starter cultures are promising tools to increase the juice yields, color intensity, and aroma of wine. Natural and artificial *Saccharomyces* hybrids as well as collections of adapted wild isolates from various ecological niches will extend winemakers repertoire allowing individual fermentations. Exact process control of wine fermentations by convenient computer programs will guarantee consistently high product quality.

Bioethanol and Natural Resources Ruben Michael Ceballos, 2017-11-22 Bioethanol and Natural Resources: Substrates, Chemistry, and Engineered Systems provides a comprehensive review of feedstocks, physiochemical and biological pretreatments, molecular substrates, cellulolytic and ligninolytic enzymes, and advanced technologies for producing bioethanol. Although this book provides a review of first generation bioethanol feedstocks, chemistry, and processes, there is an emphasis on second generation cellulosic ethanol production. With rapid advances in biofuels technologies and the continued global dependency on unsustainable extraction of fossil fuels, this text is timely. Although it is intended to be used as a supplemental text for advanced undergraduate or graduate level courses, the book is accessible to a non-academic audience. This book provides a unique opportunity to

understand bioethanol production from the basic concepts and processes to the most cutting edge technologies under development

Amino Acid Fermentation Atsushi Yokota, Masato Ikeda, 2017-05-11 This book presents the latest findings on amino acid fermentation and reviews the 50 year history of their development The book is divided into four parts the first of which presents a review of amino acid fermentation past and present The second part highlights selected examples of amino acid fermentation in more detail while the third focuses on recent advanced technologies The last part introduces readers to several topics for future research directions in amino acid production systems A new field amino acid fermentation was created by the progress of academic research and industrial development In 1908 the Japanese researcher Kikunae Ikeda discovered glutamate as an Umami substance Then a new seasoning MSG monosodium glutamate was commercialized Although glutamate was extracted from the hydrolysate of wheat or soybean in the early days a new production method was subsequently invented fermentation in which glutamate is produced from sugars such as glucose by a certain bacterium called *Corynebacterium* The topic of this volume is particularly connected in a significant way with biochemical biotechnological and microbial fields Both professionals in industry and an academic audience will understand the importance of this volume

Lipid Hydroperoxide-Derived Modification of Biomolecules Yoji Kato, 2013-12-28 Lipid peroxidation is an important cellular process which can lead to detrimental effects if it is not regulated efficiently Lipid hydroperoxide is formed in an initial step of lipid peroxidation Lipid hydroperoxide is also known as a potential source of singlet oxygen Harmful aldehydes are formed when the lipid hydroperoxide is degraded The formed aldehyde has high reactivity against thiol or amine moieties Therefore it could act as a signaling molecule which might induce the changing of gears inside a cell Recent studies have shown that lipid hydroperoxide or a slightly modified product of the lipid hydroperoxide reacts with biomolecules such as proteins and aminophospholipids which leads to formation of amide type adducts Amide type adducts could be one of markers for oxidative stress and could also be an important player in some diseases In this book the chemistry and biochemistry of lipid hydroperoxide along with their conjugates with biomolecules are described

Cytochrome P450 2E1: Its Role in Disease and Drug Metabolism Aparajita Dey, 2013-02-12 The book deals with various clinical aspects of cytochrome P450 2E1 CYP2E1 which is a potent source for oxidative stress Oxidative stress is critical for pathogenesis of diseases and CYP2E1 is a major contributor for oxidative stress Several clinical disorders are associated with changes in regulation of CYP2E1 and the consequent abnormalities which include alcoholic liver disease alcoholic pancreatitis carcinogenesis non alcoholic fatty liver disease non alcoholic steatohepatitis obesity hepatitis C virus infection reproductive organ toxicity hepatocellular and cholestatic liver cirrhosis inhibition of bone repair cross tolerance in smokers and people treated with nicotine disorders of central nervous system changes in metabolism of protoxicants in the circulatory system and susceptibility to human papillomavirus infection Hence CYP2E1 emerges as a new and potent player in aggravating injury and furthering disease complications

Proteins and Proteomics of Leishmania and Trypanosoma

André L.S. Santos, Marta H. Branquinho, Claudia M. d'Avila-Levy, Lucimar F. Kneipp, Cátia L. Sodr , 2013-11-22 This book contains a collection of critical reviews on the expression of biologically functional proteins in *Leishmania* and *Trypanosoma* which was written by renowned researchers on this field. Species belonging to these trypanosomatids genera are etiological agents of leishmaniasis, Chagas disease and sleeping sickness that are extremely debilitating human infection diseases which remain a major health problem especially in countries from Latin America, Africa and Middle East. Substantiating the problem, the currently accepted drugs for these diseases are quiet unsatisfying due to their low efficacy and high toxicity. In order to solve these real problems, several research groups around the world have become involved in the study and identification of novel potential targets in the trypanosomatid cell. Since proteins are key macromolecules involved in crucial metabolic processes of all living cells, studies have focused on the expression of specific proteins produced by *Leishmania* and *Trypanosoma* by means of different biochemical, molecular and proteomic approaches in order to explore them as targets for understanding the parasite life cycle and developing new strategies against trypanosomiasis. With these proposals in mind, the book *Proteins and Proteomics of Leishmania and Trypanosoma* encompasses i) an integrated view about the biochemistry of parasites belonging to the *Leishmania* and *Trypanosoma* genera; ii) an updated review on the expression of biologically relevant proteins by human pathogenic trypanosomatids and their possible role in the interaction with host cells; molecules as well as a target for development of both alternative chemotherapies and vaccine; and iii) several pictures, diagrams and tables that can be used to illustrate both undergraduate and postgraduate teaching as well as scientific lectures, being a useful resource for students and researchers.

Regulated Proteolysis in Microorganisms David A. Dougan, 2013-03-12 This book contains an extensive collection of critical reviews from leading researchers in the field of regulated protein degradation. It covers the role of regulated proteolysis in a range of microorganisms from Gram positive Gram negative and pathogenic bacteria to Archaea and the Baker's yeast *Saccharomyces cerevisiae*.

Carbonic Anhydrase: Mechanism, Regulation, Links to Disease, and Industrial Applications Susan C. Frost, Robert McKenna, 2013-10-22 The study of carbonic anhydrase has spanned multiple generations of scientists. Carbonic anhydrase was first discovered in 1932 by Meldrum and Roughton. Inhibition by sulfanilamide was shown in 1940 by Mann and Keilin. Even Hans Krebs contributed to early studies with a paper in 1948 showing the relationship of 25 different sulfonamides to CA inhibition. It was he who pointed out the importance of both the charged and uncharged character of these compounds for physiological experiments. The field of study that focuses on carbonic anhydrase (CA) has exploded in recent years with the identification of new families and isoforms. The CAs are metalloenzymes which are comprised of 5 structurally different families: the alpha, beta, gamma, and delta, and epsilon classes. The alpha class is found primarily in animals with several isoforms associated with human disease. The beta CAs are expressed primarily in plants and are the most divergent. The gamma CAs are the most ancient. These are structurally related to the beta CAs but have a mechanism more similar to the alpha CAs. The delta CAs are found in marine

algae and diflagellates The epsilon class is found in prokaryotes in which it is part of the carboxysome shell perhaps supplying RuBisCO with CO₂ for carbon fixation With the excitement surrounding the discovery of disease related CAs scientists have redoubled their efforts to better understand structure function relationships to design high affinity isotype specific inhibitors and to delineate signaling systems that play regulatory roles over expression and activity We have designed the book to cover basic information of mechanism structure and function of the CA families The authors included in this book bring to light the newest data with regard to the role of CA in physiology and pathology across phylums and in unique environmental niches

Reprogramming Microbial Metabolic Pathways Xiaoyuan Wang,Jian Chen,Peter Quinn,2012-10-19 Metabolic engineering has been developed over the past 20 years to become an important tool for the rational engineering of industrial microorganisms This book has a particular interest in the methods and applications of metabolic engineering to improve the production and yield of a variety of different metabolites The overall goal is to achieve a better understanding of the metabolism in different microorganisms and provide a rational basis to reprogram microorganisms for improved biochemical production

Peroxisomes and their Key Role in Cellular Signaling and Metabolism Luis A. del Río,2013-07-03 Peroxisomes are a class of ubiquitous and dynamic single membrane bounded cell organelles devoid of DNA with an essentially oxidative type of metabolism In recent years it has become increasingly clear that peroxisomes are involved in a range of important cellular functions in almost all eukaryotic cells In higher eukaryotes including humans peroxisomes catalyze ether phospholipids biosynthesis fatty acid alpha oxidation glyoxylate detoxification etc and in humans peroxisomes are associated with several important genetic diseases In plants peroxisomes carry out the fatty acid beta oxidation photorespiration metabolism of ROS RNS and RSS photomorphogenesis biosynthesis of phytohormones senescence and defence against pathogens and herbivores In recent years it has been postulated a possible contribution of peroxisomes to cellular signaling In this volume an updated view of the capacity and function of peroxisomes from human animal fungal and plant origin as cell generators of different signal molecules involved in distinct processes of high physiological importance is presented

Exploring Cancer Metabolic Reprogramming through Molecular Imaging Franca Podo,Zaver M. Bhujwalla,Egidio Iorio,2017-07-27 The inclusion of oncogene driven reprogramming of energy metabolism within the list of cancer hallmarks Hanahan and Weinberg Cell 2000 2011 has provided major impetus to further investigate the existence of a much wider metabolic rewiring in cancer cells which not only includes deregulated cellular bioenergetics but also encompasses multiple links with a more comprehensive network of altered biochemical pathways This network is currently held responsible for redirecting carbon and phosphorus fluxes through the biosynthesis of nucleotides amino acids lipids and phospholipids and for the production of second messengers essential to cancer cells growth survival and invasiveness in the hostile tumor environment The capability to develop such a concerted rewiring of biochemical pathways is a versatile tool adopted by cancer cells to counteract the host defense and eventually resist the

attack of anticancer treatments Integrated efforts elucidating key mechanisms underlying this complex cancer metabolic reprogramming have led to the identification of new signatures of malignancy that are providing a strong foundation for improving cancer diagnosis and monitoring tumor response to therapy using appropriate molecular imaging approaches In particular the recent evolution of positron emission tomography PET magnetic resonance spectroscopy MRS spectroscopic imaging MRSI functional MR imaging fMRI and optical imaging technologies combined with complementary cellular imaging approaches have created new ways to explore and monitor the effects of metabolic reprogramming in cancer at clinical and preclinical levels Thus the progress of high tech engineering and molecular imaging technologies combined with new generation genomic proteomic and phosphoproteomic methods can significantly improve the clinical effectiveness of image based interventions in cancer and provide novel insights to design and validate new targeted therapies The Frontiers in Oncology Research Topic Exploring Cancer Metabolic Reprogramming Through Molecular Imaging focusses on current achievements challenges and needs in the application of molecular imaging methods to explore cancer metabolic reprogramming and evaluate its potential impact on clinical decisions and patient outcome A series of reviews and perspective articles along with original research contributions on humans and on preclinical models have been concertedly included in the Topic to build an open forum on perspectives present needs and future challenges of this cutting edge research area

Cumulated Index Medicus ,1999 *Index Medicus* ,2001 Vols for 1963 include as pt 2 of the Jan issue

Medical subject headings **Public Health Service grants and awards. 1963 pt. 1-5 & pt. 2 suppl. A [publ 1963-64 ,1959***

Plant Responses to Salt Stress Keni Cota-Ruiz,Zulfiqar Ali Sahito,Adalberto Benavides-Mendoza,2024-09-13

Feeding the growing world population will require a significant increase in agricultural production However food overproduction needs to be achieved while crops and plants face salinized soils water deficits lesser arable lands drought and climate change among other factors Salinity impairs plant functioning at multiple levels For instance excess salt contents cause higher osmotic pressures nutritional disorders seed germination inhibition and growth suppression Plants respond to this aggression by activating several metabolic pathways including but not limited to regulating hormone dependent processes repressing growth related genes and eliciting the antioxidant response system Worldwide lands under irrigation practices are experiencing higher salt content impacting plant performance and causing significant drops in yields Therefore understanding how cultivars and plants respond to adverse environments such as salt excess in soils as well as investigating novel approaches to boost stressed plant physiological performance are vital components that need to be addressed if we are to achieve food security Multiple genes involved in the ABA signaling pathways are known to respond and start plant adaptive responses when facing salt stress In addition several transcription factors such as the phytochromes and zinc finger proteins play roles in regulating the morphological responses of plants under stress Antioxidant enzymes are also upregulated in response to higher content of salt Recently nanobiotechnological approaches aimed at delivering cargoes such

as micronutrients or chemicals in a cell specific manner are a promising alternative to aid plants in combating stress Similarly using nanofertilizers shows favorable effects in plants under hostile environments CRISPR CAS is an emerging powerful and feasible tool to modify genes and be applied to plants to make them more tolerant to salt in excess

Metabolic Reprogramming Salvatore Papa, Concetta Bubici, 2023-05-31 This volume provides state of the art methods and protocols from researchers in the field of metabolism Chapters guide readers through methodologies measuring different aspects of lipid metabolism quantifying the amino acids mitochondrial and intracellular by products detect enzyme and kinase activities detecting a variety of metabolic pathways and intracellular networks including nucleotide metabolism and the metabolic response to hypoxia and cytotoxic drugs Written in the format of the highly successful Methods in Molecular Biology series each chapter includes an introduction to the topic lists necessary materials and reagents includes tips on troubleshooting and known pitfalls and step by step readily reproducible protocols Authoritative and cutting edge Metabolic Reprogramming Methods and Protocols aims to be a useful and practical guide to new researchers and experts looking to expand their knowledge *Metabolic Dynamics in Host-Microbe Interaction* Sameh S. M. Soliman, Mohamed I.

Husseiny, 2025-02-05 This book is a ground breaking that delves into the fascinating world of metabolism and its pivotal role in the survival attack and defense strategies in human microbe interaction This book explores the intricate biochemical processes that enable organisms to thrive adapt and protect themselves against various challenges they encounter in their environments The book will describe the importance of metabolism in defense and attack by bacteria and fungi in the human microenvironment and the reverse immuno metabolic responses by the human Different metabolites from different organisms will be described in addition to their changes due to interaction with other organisms during infection or defense The book also will describe the methods of detection and identification of metabolites including metabolomics The use of artificial intelligence in prediction of metabolic patterns following interaction between different organisms will be included as well The metabolism in microbiome will be described in relation to infection and other metabolic diseases in addition to their effects on therapeutic drugs The book combines the latest scientific research with accessible explanations providing readers with a deep understanding of how metabolism empowers organisms to thrive and protect themselves in diverse environments It will be an invaluable resource for researchers students physicians and anyone fascinated by the wonders of biology and the intricate workings of life **Metabolic Pathways in Microorganisms** Vernon H. Cheldelin, 1961 *The Future of*

Metabolic Engineering Abhishek Sharma, Dhruti Amin, 2021-12-28 The last two decades of scientific research have progressed to the point where metabolic engineering which involves the modifying of metabolic pathways of animals plants and bacterial cells at biochemical and molecular levels is feasible Conceptually metabolic engineering takes into account the identification of major blocks or control points in a metabolic pathway at the molecular level followed by removal of these limitations with the help of various cellular engineering interventions Understanding the metabolic pathways requires

appropriate experiment setup molecular biology and biochemistry methods computational modelling data analysis and interpretation to allow the researchers to manipulate them as per their needs This book comprises a total of 12 chapters from multiple contributors of different countries around the world including Brazil Egypt India Saudi Arabia and Turkey This book provides deep insight into the past present and future of metabolic engineering in the animal microbial and plant system communicating interdisciplinary research and relevant results in biochemistry molecular biology applied microbiology cellular physiology cellular nutrition in health and disease and biochemical engineering

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