

Xiaoyuan Wang
Jian Chen
Peter Quinn *Editors*



Reprogramming Microbial Metabolic Pathways

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Subcellular Biochemistry

**National Institutes of Health (U.S.).
Division of Research Grants**



Reprogramming Microbial Metabolic Pathways 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.

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 hydro lysate 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

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

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

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*

Proteins and Proteomics of Leishmania and Trypanosoma André L.S. Santos,Marta H. Branquinha,Claudia M. d'Avila-Levy,Lucimar F. Kneipp,Cátia L. Sodré,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 quite 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.

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 the 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.

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

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 **Metabolic Interactions**

Between Bacteria and Phytoplankton Xavier Mayali, Sonya Dyhrman, Chris Francis, 2018-06-06 The cycling of energy and elements in aquatic environments is controlled by the interaction of autotrophic and heterotrophic processes In surface waters of lakes rivers and oceans photosynthetic microalgae and cyanobacteria fix carbon dioxide into organic matter that is then metabolized by heterotrophic bacteria and perhaps archaea Nutrients are remineralized by heterotrophic processes and subsequently enable phototrophs to grow The organisms that comprise these two major ecological guilds are numerous in both numbers and in their genetic diversity leading to a vast array of physiological and chemical responses to their environment and to each other Interactions between bacteria and phytoplankton range from obligate to facultative as well as from mutualistic to parasitic and can be mediated by cell to cell attachment or through the release of chemicals The contributions to this Research Topic investigate direct or indirect interactions between bacteria and phytoplankton using chemical physiological and or genetic approaches Topics include nutrient and vitamin acquisition algal pathogenesis microbial community structure during algal blooms or in algal aquaculture ponds cell cell interactions chemical exudation signaling molecules and nitrogen exchange These studies span true symbiosis where the interaction is evolutionarily derived as well as those of indirect interactions such as bacterial incorporation of phytoplankton produced organic matter and man made synthetic symbiosis synthetic mutualism **Subcellular Compartmentalization of Plant Antioxidants and ROS**

Generating Systems Francisco J. Corpas, José Manuel Palma, 2021-03-25 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 Cyanobacteria A.K. Mishra, D.N. Tiwari, A.N. Rai, 2018-11-30 Cyanobacteria constitute the most widely distributed group of photosynthetic prokaryotes found in almost all realms of the earth and play an important role in Earth's nitrogen and carbon cycle The gradual transformation from reducing atmosphere to oxidizing atmosphere was a turning point in the evolutionary history of the earth and made conditions for present life forms possible Cyanobacteria From Basic Science to Applications is the first reference volume that comprehensively discusses all aspects of cyanobacteria including the diverse mechanisms of cyanobacteria for the advancement of cyanobacterial abilities towards higher biofuel productivity enhanced tolerance to environmental stress and bioactive compounds and potential for biofertilizers Describes

cyanobacterial diversity stress biology and biotechnological aspects of cyanobacteria Explores the global importance of cyanobacteria Provides a broad compilation of research that deals with cyanobacterial stress responses in both controlled laboratory conditions as well as in their natural environment **Metabolomics of Bladder Cancer** Vishwajeet Singh,Mukul Kumar Singh,2024-09-09 Metabolomics of Bladder Cancer An Emerging Application offers insights into the latest research methodologies and potential therapeutic applications The book examines how applied research on the discovery of metabolomic biomarkers with prognostic and predictive value is needed to stratify patients into different risk groups minimizing overtreatment and the risk of drug resistance development In eight chapters the book gives an in depth analysis of recent findings in both fundamental and applied research with a focus on the metabolomics approach and its potential for identifying major metabolic pathways that characterize various diseases and physiological states It intuitively leads from the discovery of biomarkers for bladder cancer to the metabolisms of glutamine and fatty acids and finalizes with a chapter on the metabolic effect of cancer therapy Overall this book is a comprehensive and insightful resource for researchers clinicians and academic professionals interested in the latest developments in bladder cancer research Gives an in depth analysis of the most recent findings in both fundamental and applied research on bladder cancer Focuses on metabolomics and how this type of research strategy identifies biomarkers to understand the disease and identify targetable therapeutic molecules Provides insight into the technological advancements in metabolomic analysis for bladder cancer

New Insights Into Renal Fibrosis and Therapeutic Effects of Natural Products Dan-Qian Chen,Zhiyong Guo,2022-05-30 **Research Grants Index** National Institutes of Health (U.S.). Division of Research Grants,1970

Research Awards Index ,1976 **High-Throughput Plant Metabolomics** Jen-Tsung Chen,2025-06-27 This book summarizes the current achievements of metabolomics in revealing the roles of primary and secondary metabolisms of plants both used as major crops and for the production of medicines It presents methods and applications of metabolomics for the exploration of stress responses which may pave the way for obtaining climate smart and stress tolerant crops able to face biotic and abiotic stressors in a globally changing climate These technologies can advance the exploration of plant physiology as well as precision crop breeding for future anti stress high quality and high yield plants and in doing so can achieve sustainable agriculture and therefore support the Sustainable Development Goals the Paris Agreement and the vision of sustainable agriculture This book is an ideal reference for students researchers teachers professors and experts in the field of plant science and crop breeding It provides an effective overview of the critical topic of plant science and will help to inspire and assist researchers as they design new experiments and methods *Public Health Service Publication* ,

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