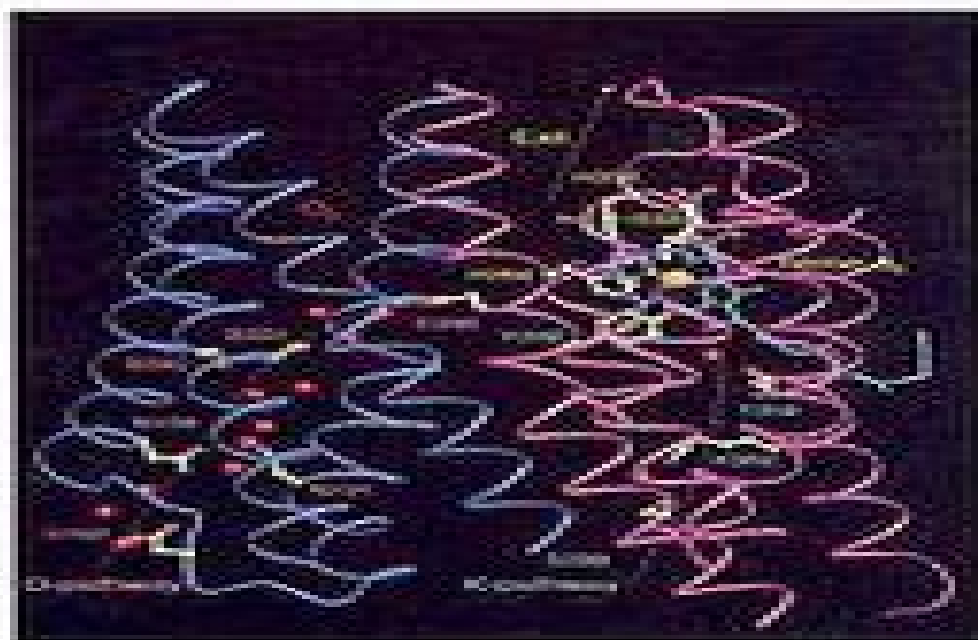


Advances in Photosynthesis and Respiration

Volume 53

# Respiration in Archaea and Bacteria

Diversity of Prokaryotic Electron  
Transport Carriers



Edited by  
Davide Zannoni

Kluwer Academic Publishers

# Respiration In Archaea And Bacteria Diversity Of Prokaryotic Electron Transport Carriers

**Lingsheng Yao**



## **Respiration In Archaea And Bacteria Diversity Of Prokaryotic Electron Transport Carriers:**

Respiration in Archaea and Bacteria Davide Zannoni, 2004-03-31 Respiration in Archaea and Bacteria summarizes the achievements of the past decade in the biochemistry bioenergetics structural and molecular biology of respiratory processes in selected groups of prokaryotes It includes a series of Chapters providing an extensive coverage of the respiratory membrane bound bacterial redox complexes and enzymes it also covers evolution of respiration cytochrome c biogenesis bacterial haemoglobins and oxidases as redox sensors

*Respiration in Archaea and Bacteria* Davide Zannoni, 2005-02-17 The book summarizes the achievements of the past decade in the biochemistry bioenergetics structural and molecular biology of respiratory processes in selected genera of the domain Bacteria along with an extensive coverage of the redox chains of extremophiles belonging to the Archaeal domain The volume is a unique piece of work since it contains a series of chapters dealing with metabolic features having important microbiological and ecological relevance such as the use of ammonium iron methane sulfur and hydrogen as respiratory substrates or nitrous compounds in denitrification processes Particular attention is also dedicated to peculiar groups of prokaryotes such as Gram positives acetic acid bacteria pathogens of the genera Helicobacter and Campylobacter nitrogen fixing symbionts and free living species oxygenic phototrophs Cyanobacteria and anoxygenic purple non sulfur phototrophs The book is intended to be a long term source of information for Ph D students researchers and undergraduates from disciplines such as microbiology biochemistry and ecology studying basic and applied sciences medicine and agriculture

*Respiration in Archaea and Bacteria* Davide Zannoni, 2008-01-20 The book summarizes the achievements of the past decade in the biochemistry bioenergetics structural and molecular biology of respiratory processes in selected genera of the domain Bacteria along with an extensive coverage of the redox chains of extremophiles belonging to the Archaeal domain The volume is a unique piece of work since it contains a series of chapters dealing with metabolic features having important microbiological and ecological relevance such as the use of ammonium iron methane sulfur and hydrogen as respiratory substrates or nitrous compounds in denitrification processes Particular attention is also dedicated to peculiar groups of prokaryotes such as Gram positives acetic acid bacteria pathogens of the genera Helicobacter and Campylobacter nitrogen fixing symbionts and free living species oxygenic phototrophs Cyanobacteria and anoxygenic purple non sulfur phototrophs The book is intended to be a long term source of information for Ph D students researchers and undergraduates from disciplines such as microbiology biochemistry and ecology studying basic and applied sciences medicine and agriculture

*Plant Respiration* Hans Lambers, Univ. de les Illes Balears, 2006-03-30 Respiration in plants as in all living organisms is essential to provide metabolic energy and carbon skeletons for growth and maintenance As such respiration is an essential component of a plant's carbon budget Depending on species and environmental conditions it consumes 25-75% of all the carbohydrates produced in photosynthesis even more at extremely slow growth rates Respiration in plants can also proceed in a manner that produces neither metabolic energy nor carbon skeletons but heat This type of

respiration involves the cyanide resistant alternative oxidase it is unique to plants and resides in the mitochondria The activity of this alternative pathway can be measured based on a difference in fractionation of oxygen isotopes between the cytochrome and the alternative oxidase Heat production is important in some flowers to attract pollinators however the alternative oxidase also plays a major role in leaves and roots of most plants A common thread throughout this volume is to link respiration including alternative oxidase activity to plant functioning in different environments

**Plant Respiration: Metabolic Fluxes and Carbon Balance** Guillaume Tcherkez, Jaleh Ghashghaie, 2018-02-20 There are currently intense efforts devoted to understand plant respiration from genes to ecosystems and its regulatory mechanisms this is because respiratory CO<sub>2</sub> production represents a substantial carbon loss in crops and in natural ecosystems Thus in addition to manipulating photosynthesis to increase plant biomass production minimization of respiratory loss should be considered in plant science and engineering However respiratory metabolic pathways are at the heart of energy and carbon skeleton production and therefore it is an essential component of carbon metabolism sustaining key processes such as photosynthesis The overall goal of this book is to provide an insight in such interactions as well as an up to date view on respiratory metabolism taking advantage of recent advances and concepts from fluxomics to natural isotopic signal of plant CO<sub>2</sub> efflux It is thus a nonoverlapping complement to Volume 18 in this series Plant Respiration From Cell to Ecosystem which mostly deals with mitochondrial electron fluxes and plant scale respiratory losses

Photosynthesis, Respiration, and Climate Change Katie M. Becklin, Joy K. Ward, Danielle A. Way, 2021-05-31 Changes in atmospheric carbon dioxide concentrations and global climate conditions have altered photosynthesis and plant respiration across both geologic and contemporary time scales Understanding climate change effects on plant carbon dynamics is critical for predicting plant responses to future growing conditions Furthermore demand for biofuel fibre and food production is rapidly increasing with the ever expanding global human population and our ability to meet these demands is exacerbated by climate change This volume integrates physiological ecological and evolutionary perspectives on photosynthesis and respiration responses to climate change We explore this topic in the context of modeling plant responses to climate including physiological mechanisms that constrain carbon assimilation and the potential for plants to acclimate to rising carbon dioxide concentration warming temperatures and drought Additional chapters contrast climate change responses in natural and agricultural ecosystems where differences in climate sensitivity between different photosynthetic pathways can influence community and ecosystem processes Evolutionary studies over past and current time scales provide further insight into evolutionary changes in photosynthetic traits the emergence of novel plant strategies and the potential for rapid evolutionary responses to future climate conditions Finally we discuss novel approaches to engineering photosynthesis and photorespiration to improve plant productivity for the future The overall goals for this volume are to highlight recent advances in photosynthesis and respiration research and to identify key challenges to understanding and scaling plant physiological responses to climate change The integrated

perspectives and broad scope of research make this volume an excellent resource for both students and researchers in many areas of plant science including plant physiology ecology evolution climate change and biotechnology For this volume 37 experts contributed chapters that span modeling empirical and applied research on photosynthesis and respiration responses to climate change Authors represent the following seven countries Australia 6 Canada 9 England 5 Germany 2 Spain 3 and the United States 12     Plant Mitochondria: From Genome to Function David Day,A. Harvey Millar,James

Whelan,2013-11-09 Mitochondria in plants as in other eukaryotes play an essential role in the cell as the major producers of ATP via oxidative phosphorylation However mitochondria also play crucial roles in many other aspects of plant development and performance and possess an array of unique properties which allow them to interact with the specialized features of plant cell metabolism The two main themes running through the book are the interconnection between gene regulation and protein function and the integration of mitochondria with other components of plant cells The book begins with an overview of the dynamics of mitochondrial structure morphology and inheritance It then discusses the biogenesis of mitochondria the regulation of gene expression the mitochondrial genome and its interaction with the nucleus and the targeting of proteins to the organelle This is followed by a discussion of the contributions that mutations involving mitochondrial proteins have made to our understanding of the way the organelle interacts with the rest of the plant cell and the new field of proteomics and the discovery of new functions Also covered are the pathways of electron transport with special attention to the non phosphorylating bypasses metabolite transport and specialized mitochondrial metabolism In the end the impact of oxidative stress on mitochondria and the defense mechanisms that are employed to allow survival are discussed This book is for the use of advanced undergraduates graduates postgraduates and beginning researchers in the areas of molecular and cellular biology integrative biology biochemistry bioenergetics proteomics and plant and agricultural sciences     **Photosynthesis**

Julian J. Eaton-Rye,Baishnab C. Tripathy,Thomas D. Sharkey,2011-11-04 Photosynthesis Plastid Biology Energy Conversion and Carbon Assimilation was conceived as a comprehensive treatment touching on most of the processes important for photosynthesis Most of the chapters provide a broad coverage that it is hoped will be accessible to advanced undergraduates graduate students and researchers looking to broaden their knowledge of photosynthesis For biologists biochemists and biophysicists this volume will provide quick background understanding for the breadth of issues in photosynthesis that are important in research and instructional settings This volume will be of interest to advanced undergraduates in plant biology and plant biochemistry and to graduate students and instructors wanting a single reference volume on the latest understanding of the critical components of photosynthesis     The Structure and Function of Plastids Robert R. Wise,J. Kenneth Hooper,2007-09-07 The Structure and Function of Plastids provides a comprehensive look at the biology of plastids the multifunctional biosynthetic factories that are unique to plants and algae Fifty nine international experts have contributed 28 chapters that cover all aspects of this large and diverse family of plant and algal organelles     **Biophysical**

**Techniques in Photosynthesis** Thijs Aartsma, Jörg Matysik, 2008-02-01 Since the first volume on Biophysical Techniques in Photosynthesis Research published in 1996 new experimental techniques and methods have been devised at a rapid pace The present book is a sequel which complements the first volume by providing a comprehensive overview of the most important new techniques developed over the past ten years especially those that are relevant for research on the mechanism and fundamental aspects of photosynthesis The contributions are written by leading scientists in their field The book is divided into 5 sections on Imaging Structure Optical and laser spectroscopy Magnetic resonance and on Theory respectively Each chapter describes the basic concepts of the technique practical applications and some of the scientific results Possibilities and limitations from a technical as well as a scientific point of view are addressed allowing the reader not only to recognize the potential of a particular method for his her own quest but to assess the resources that are required for implementation

**Photosystem II** T. Wydrzynski, Kimiyuki Satoh, 2006-01-27 The most mysterious part of photosynthesis yet the most important for all aerobic life on Earth including ourselves is how green plants algae and cyanobacteria make atmospheric oxygen from water This thermodynamically difficult process is only achieved in Nature by the unique pigment protein complex known as Photosystem II using sunlight to power the reaction The present volume contains 34 comprehensive chapters authored by 75 scientific experts from around the world It gives an up to date account on all what is currently known about the molecular biology biochemistry biophysics and physiology of Photosystem II The book is divided into several parts detailing the protein constituents functional sites tertiary structure molecular dynamics and mechanisms of homeostasis The book ends with a comparison of Photosystem II with other related enzymes and bio mimetic systems Since the unique water splitting chemistry catalyzed by Photosystem II leads to the production of pure oxygen gas and has the potential for making hydrogen gas a primary goal of this book is to provide a molecular guide to future protein engineers and bio mimetic chemists in the development of biocatalysts for the generation of clean renewable energy from sunlight and water

**Sulfur Metabolism in Phototrophic Organisms** Rüdiger Hell, Christiane Dahl, David B. Knaff, Thomas Leustek, 2008-03-19 Sulfur is one of the most versatile elements in life due to its reactivity in different oxidation and reduction states In phototrophic organisms the redox properties of sulfur in proteins and of sulfur containing metabolites are particularly important in the interaction between the reductive assimilation processes of photosynthesis and reactive oxygen species that arise as by products of electron transport chains Thiol groups in proteins and metabolites are targets of reactive oxygen species resulting in potential damage and at the same time giving rise to redox signal cascades that trigger repair reactions and adaptation to environmental stress Further reduced sulfur compounds play a prominent role as electron donors for photosynthetic carbon dioxide fixation in anoxygenic phototrophic sulfur bacteria Interest in the investigation of the multiple functions of sulfur related processes has increased exponentially in recent years especially in molecular and cellular biology biochemistry agrobiotechnology and ecology This book provides for the first time in depth and integrated coverage of

the functions of sulfur in phototrophic organisms including bacteria plants and algae it bridges gaps between biochemistry and cellular biology of sulfur in these organisms and of biology and environments dominated by them This book is designed to be a comprehensive resource on sulfur in phototrophic organisms for advanced undergraduate and graduate students beginning researchers and teachers in the area of photosynthesis bacterial energy metabolism biotechnology plant nutrition plant production and plant molecular physiology Chlorophylls and Bacteriochlorophylls Bernhard Grimm,Robert J. Porra,Wolfhart Rüdiger,Hugo Scheer,2007-03-14 The first dedicated new work since 1991 this book reviews recent progress and current studies in the chemistry metabolism and spectroscopy of chlorophylls bacteriochlorophylls and their protein complexes Also discussed is progress on the applications of chlorophylls as photosensitizers in photodynamic therapy of cancerous tumours and as molecular probes in biochemistry medicine plant physiology ecology and geochemistry Each section offers an introductory overview followed by concise focused and fully referenced chapters written by experts

*Photosystem I* John H. Golbeck,2007-05-20 This book summarizes recent advances made in the biophysics biochemistry and molecular biology of the enzyme known as Photosystem I the light induced plastocyanin ferredoxin oxidoreductase The volume provides a unique compilation of chapters that includes information highlighting controversial issues to indicate the frontiers of research and places special emphasis on methodology and practice for new researchers **Plastid**

**Development in Leaves during Growth and Senescence** Basanti Biswal,Karin Krupinska,Udaya C. Biswal,2013-07-08

Chloroplast development is a key feature of leaf developmental program Recent advances in plant biology reveal that chloroplasts also determine the development the structure and the physiology of the entire plant The books published thus far have emphasized the biogenesis of the organelle but not the events associated with the transformation of the mature chloroplast to the gerontoplast during senescence This book with 28 chapters is unique because it describes how the chloroplast matures and how it is subsequently transformed to become the gerontoplast during senescence a process required for nutrient recycling in plants This book includes a state of the art survey of the current knowledge on the regulation and the mechanisms of chloroplast development Some of the chapters critically discuss the signaling process the expression potential of plastid DNA the interaction of cellular organelles and the molecular mechanisms associated with the assembly and the disassembly of organellar complexes and finally the modulation of chloroplast development by environmental signals Chlorophyll a Fluorescence G.C. Papageorgiou,Govindjee,2007-11-12 Chlorophyll a Fluorescence A Signature of Photosynthesis highlights chlorophyll Chl a fluorescence as a convenient non invasive highly sensitive rapid and quantitative probe of oxygenic photosynthesis Thirty one chapters authored by 58 international experts provide a solid foundation of the basic theory as well as of the application of the rich information contained in the Chl a fluorescence signal as it relates to photosynthesis and plant productivity Although the primary photochemical reactions of photosynthesis are highly efficient a small fraction of absorbed photons escapes as Chl fluorescence and this fraction varies with metabolic state

providing a basis for monitoring quantitatively various processes of photosynthesis The book explains the mechanisms with which plants defend themselves against environmental stresses excessive light extreme temperatures drought hyper osmolarity heavy metals and UV It also includes discussion on fluorescence imaging of leaves and cells and the remote sensing of Chl fluorescence from terrestrial airborne and satellite bases The book is intended for use by graduate students beginning researchers and advanced undergraduates in the areas of integrative plant biology cellular and molecular biology plant biology biochemistry biophysics plant physiology global ecology and agriculture

**Lipids in Photosynthesis** Hajime Wada,Norio Murata,2009-11-07 Lipids in Photosynthesis Essential and Regulatory Functions provides an essential summary of an exciting decade of research on relationships between lipids and photosynthesis The book brings together extensively cross referenced and peer reviewed chapters by prominent researchers The topics covered include the structure molecular organization and biosynthesis of fatty acids glycerolipids and nonglycerolipids in plants algae lichens mosses and cyanobacteria as well as in chloroplasts and mitochondria Several chapters deal with the manipulation of the extent of unsaturation of fatty acids and the effects of such manipulation on photosynthesis and responses to various forms of stress The final chapters focus on lipid trafficking signaling and advanced analytical techniques Ten years ago Siegenthaler and Murata edited Lipids in Photosynthesis Structure Function and Genetics which became a classic in the field Lipids in Photosynthesis Essential and Regulatory Functions belongs with its predecessor in every plant and microbiological researcher's bookcase

**Photosynthesis: Molecular Approaches to Solar Energy Conversion** Jian-Ren Shen,Kimiyuki Satoh,Suleyman I. Allakhverdiev,2021-09-09 In the modern world to meet increasing energy demands we need to develop new technologies allowing us to use eco friendly carbon neutral energy sources Solar energy as the most promising renewable source could be the way to solve that problem but it is variable depending on day time and season From this side the understanding of photosynthesis process could be of significant help for us to develop effective strategies of solar energy capturing conversion and storage Plants algae and cyanobacteria perform photosynthesis annually producing around 100 billion tons of dry biomass Presently the detailed studies of photosynthetic system structure make functional investigations of the photosynthetic process available allowing scientists to construct artificial systems for solar energy transduction This book summarizes exciting achievements in understanding of photosynthetic structures and mechanisms of this process made by world leaders in photosynthesis field and contains information about modern ideas in development of revolutionary new technologies of energy conversion Organized according to the natural sequence of events occurring during photosynthesis the book includes information of both photosynthetic structures and mechanisms and its applications in bioenergetics issues

**Cytochrome Complexes: Evolution, Structures, Energy Transduction, and Signaling** William A. Cramer,Toivo Kallas,2016-06-14 An Introduction that describes the origin of cytochrome notation also connects to the history of the field focusing on research in England in the pre World War II era The start of the modern era of studies on structure function of



cytochromes and energy transducing membrane proteins was marked by the 1988 Nobel Prize in Chemistry given to J Deisenhofer H Michel and R Huber for determination of the crystal structure of the bacterial photosynthetic reaction center. An ab initio logic of presentation in the book discusses the evolution of cytochromes and hemes followed by theoretical perspectives on electron transfer in proteins and specifically in cytochromes. There is an extensive description of the molecular structures of cytochromes and cytochrome complexes from eukaryotic and prokaryotic sources: bacterial, plant, and animal. The presentation of atomic structure information has a major role in these discussions and makes an important contribution to the broad field of membrane protein structure and function.

**Photosynthesis in Bryophytes and Early Land Plants** David T. Hanson, Steven K. Rice, 2013-10-21 Bryophytes, which are important constituents of ecosystems globally and often dominate carbon and water dynamics at high latitudes and elevations, were also among the pioneers of terrestrial photosynthesis. Consequently, in addition to their present-day ecological value, modern representatives of these groups contain the legacy of adaptations that led to the greening of Earth. This volume brings together experts on bryophyte photosynthesis whose research spans the genome and cell through whole plant and ecosystem function and combines that with historical perspectives on the role of algal, bryophyte, and vascular plant ancestors on terrestrialization of the Earth. The eighteen well-illustrated chapters reveal unique physiological approaches to achieving carbon balance and dealing with environmental limitations and stresses that present an alternative yet successful strategy for land plants.

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