

Preface

During the past three decades, the microbial physiology has been significantly changed by the advent of molecular biology. Indeed, the way to approach the degree of metabolic sophistication of prokaryotes, reflecting the type of habitat in which they exist, was greatly enhanced by the possibility to study gene expression and regulation. The creation of the prokaryotic Archaeal domain, mainly based on the pioneering molecular studies of Carl Woese at the University of Illinois in the early 1970s, not only has modified the bacterial taxonomy but resulted in a tremendous rise in efforts aiming to define the so called 'microbial diversity.'

In this book, entitled *Respiration in Archaea and Bacteria*, I have attempted to provide an extensive coverage of one of the most ancient biochemical processes: respiration. The book has been operationally divided into two volumes of the series *Advances in Photosynthesis and Respiration* (Govindjee, Ed.). The first volume has recently been published (Vol. 15) and is sub-titled *Diversity of Prokaryotic Electron Transport Carriers*. It includes a group of chapters covering all molecular, functional and structural aspects of the membrane-bound bacterial redox complexes and respiratory co-factors such as pyrrolo-quinoline quinones and hemoglobins. Volume 15 also includes a chapter illustrating the evolution of respiration in the prokaryotic world along with two chapters on topics such as cytochrome *c* biogenesis and membrane oxidases as redox sensors regulating the expression of photosynthetic genes in facultative phototrophs.

The current volume, Vol. 16 of the series, is sub-titled *Diversity of Prokaryotic Respiratory Systems*, and contains 13 chapters. This book is conceived as a comprehensive account of respiratory systems in selected genera of the domain Bacteria along with an extensive chapter (Chapter 1) on the redox chains and bioenergetics of extremophiles belonging to the Archaeal domain. The present volume contains six chapters dealing with metabolic features having important microbiological and ecological relevance such as the use of ammonium (Chapter 6), methane (Chapter 7), iron (Chapter 9), sulfur (Chapter 10) and hydrogen (Chapter 11) as respiratory substrates or nitrous compounds in denitrification processes (Chapter 8). The remaining chapters are dedicated to respiration of selected groups of bacteria such as

Gram positives (Chapter 2), the pathogenic micro-aerophilic genera *Helicobacter* and *Campylobacter* (Chapter 3), acetic acid bacteria (Chapter 4), nitrogen fixing symbionts and free-living bacteria (Chapter 5), oxygenic phototrophs (Cyanobacteria) (Chapter 12), and anoxygenic (purple non-sulfur) phototrophs (Chapter 13).

In view of the extensive on-going research on the functional annotation of microbial genomes revealing new insights into respiratory metabolism, I'm conscious that a few of the topics selected in this book might require some reappraisal within a year or so. To partially overcome this problem, I had recommended to all the contributing authors to make a serious effort to describe not only what we know at present but also try to indicate those aspects deserving our future attention. I hope that these two volumes will be a long-term source of information for Ph.D. students, researchers and undergraduates from disciplines such as microbiology, biochemistry, chemistry and ecology, studying basic sciences, medicine and agriculture.

As explained in the 'Preface' of the preceding Volume 15, there are many persons that I would like to thank since they have been crucial for the completion of this work. Primarily, I wish to remember Professor A. Kröger, who tragically passed away a few months after the conclusion of his chapter (see his obituary written by Professor M. Klingenberg); secondly, I like to thank all the contributing authors and the series Editor of the *Advances in Photosynthesis and Respiration*, Govindjee, who provided me encouragement and useful suggestions to complete a project of such a magnitude. In the end, I'm glad to thank Larry Orr for his friendly and wonderful assistance in producing the page layout of the two volumes.

This work is dedicated to my family and my parents.

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