Respiration in Archaea and Bacteria
Diversity of Prokaryotic Electron Transport Carriers

Edited by
Davide Zannoni
Department of Biology University of Bologna, Italy
Contents

Editorial v

Contents x

Preface xiv

Color Plates CP-1

1 Evolution and Phylogenetic Analysis of Respiration 1-14
   Jose Castresana
   Summary 1
   I. Introduction 2
   II. Chemical Composition of the Primitive Atmosphere and Oceans 2
   III. Heterotrophic vs. Autotrophic Origin of Energy Conversion 3
   IV. The Comparative Genomics Evidence on the Evolution of Respiration 3
   V. Ancient Respiratory Mechanisms 5
   VI. Respiratory Mechanisms Evolved in Archaea 8
   VII. The Last Universal Ancestor Was a Generalist Organism 9
   VIII. The Respiration-Early Hypothesis: Photosynthesis Came Later 9
   Acknowledgments 10
   References 10

2 NADH Dehydrogenase (NADH-Quinone Oxidoreductase) 15-40
   Takao Yagi, Salvatore Di Bernardo, Eiko Nakamur-Ogiso, Miou-Chien Kao, Byoung Boo Suro, and Akemi Matsuno-Yagi
   Summary 15
   I. Introduction 16
   II. Genes and Regulations of H+-Translocating NADH-Quinone (Q) Oxidoreductase (NDH-1) and NADH-Q Oxidoreductase (Non-Energy Transducing, NDH-2) 17
   III. NDH-1 20
   IV. NDH-2 31
   Acknowledgments 33
   References 33

3 Bacterial Hydroquinone: Cytochrome c Oxidoreductases. Physiology, Structure and Function 41-55
   Jason W. Cooley, Elisabeth Darrouzet and Fawzi Daldai
   Summary 41
   I. Introduction 42
   II. Experimental Systems Used in the Study of the Cyt bc1 44
   III. Structure of the Cyt bc1 46
   IV. Function of the Cyt bc1; The Modified Q cycle 50