Preface

Iron is considered to be one of the most important biologically active metal ions because of its role in many vital metabolic reactions and in energy generation. In spite of its abundance in nature, microorganisms living either inside or outside the host body struggle to acquire iron from the environment. Outside the body the shortage is due to the majority of iron being in an insoluble ferric form. Inside the body, several iron binding proteins produced by the host create a shortage of iron available to the microorganisms. There is a fierce competition for acquiring iron among microorganisms in an aquatic or terrestrial environment. Inside the human body limiting iron availability to the pathogens is a part of host defense mechanism to restrict the pathogens' growth. The virulence of pathogenic bacteria is enhanced significantly by the presence of a number of iron acquisition systems and pathogens' ability to efficiently acquire iron from the host body. Therefore, iron acquisition systems have become important targets for novel drug design. Microorganisms, especially, bacteria have developed many innovative ways to acquire iron. Among these, the siderophore-mediated iron transport systems have been investigated thoroughly by investigators around the world. Siderophores are small organic molecules secreted by many bacteria and fungi under iron restricted conditions. Siderophores chelate iron with a high affinity and are transported back to the cell, where the iron is released for either storage or immediate use. The transport systems use a variety of proteins, which serve as transporting channels, binding proteins, or a part of energy transducing machinery. There are several pioneering scientists whose work and dedication led to the development of the field of iron-biology. However, as far as structural chemistry of siderophores and the siderophore receptor proteins is concerned, Dr. Dick van der Helm's contribution has been staggering. Dr. Dick passed away in 2010 and this book is humbly dedicated to him. It briefly describes his contributions to the knowledge of siderophore-mediated iron transport systems. The past decade has seen a tremendous amount of information gathered on the genetics, structure, and function of the components involved in not only the siderophore mediated, but also other types of iron acquisition systems. Chapter 1 discusses the structural advancements made during the past decade in the siderophore-mediated transport systems of

Escherichia coli. Chapter 2 reviews the different means of iron acquisition in bacteria, while Chap. 3 examines the iron transport systems in *Pseudomonas*.

I want to thank my co-authors Drs. Volkmar Braun, Klaus Hantke and Pierre Cornelis for their contributions. I am also thankful to Dr. Larry Barton and to Springer for giving me the opportunity to edit and publish this short book. I am greatly indebted to Dr. Sonia Ojo and Ms. Ilaria Tassistro for their constant support and patience. My sincere gratitude goes to Dr. Hans Vogel of University of Calgary, Dr. Allan Forsman, Dr. Chris Pritchett, Dr. Bert Lampson, and Mr. William Wright of Department of Health Sciences, East Tennessee State University for editorial assistance.

Johnson City, TN, USA Ranjan Chakraborty

http://www.springer.com/978-94-007-6087-5

Iron Uptake in Bacteria with Emphasis on E. coli and Pseudomonas

Chakraborty, R.; Braun, V.; Hantke, K.; Cornelis, P. (Eds.)

2013, XI, 89 p. 17 illus., 14 illus. in color., Softcover
ISBN: 978-94-007-6087-5