Preface

This two-volume set is a collaborative work aimed to review the *Cupriavidus metallidurans* resistance mechanisms to toxic concentrations of metal ions at the ecological, physiological, genomic, transcriptomic and proteomic level. The main metal ions studied are zinc, nickel, cadmium, cobalt, copper, chromium (chromate), lead, mercury, gold and silver. *C. metallidurans*, a soil β-proteobacterium belonging to the *Burkholderiaceae*, is very well adapted to high concentrations of metal ions and is able to survive in a variety of harsh oligotrophic habitats linked to industrial and other human activities. This volume is completely dedicated to the available structural and catalytic data from *C. metallidurans* bacterial primary and secondary transporters (P-ATPases, tripartite chemiosmotic cation/proton efflux systems, cation diffusion facilitators, major facilitator superfamily and some minor categories), sigma and anti-sigma regulatory proteins, and various periplasmic proteins mainly involved in the response to copper and mercury.

In addition to volume II, volume I contains 3 chapters, each with its own emphasis. Chapter 1 discusses anthropogenic waste as a source of metal-resistant *Cupriavidus* together with mobile genetic elements as vectors of metal-responsive genes and possible actors in evolution driven by the adaptation to such environments. Chapter 2 reviews the genomic context of the metal response genes in *C. metallidurans* CH34 with a focus on its mobile genetic elements. Chapter 3 inventories the catalogs of metal resistance genes, proteins and mechanisms as well as some environmental applications. Mechanisms first discovered in this bacterium such as the RND efflux pumps for cadmium, cobalt, nickel, and zinc, and the cation diffusion factors (with CzcD being one of the first identified) are highlighted together with the resistance determinants to other metals such as chromate, lead, mercury, silver and gold, as well as the intricate regulatory network and accessory genes. Some of these accessory genes are exclusively found in *C. metallidurans* and are likely involved in the adaptation to very high metal concentrations.

We deeply thank John Hobman for his careful and critical reading. We are grateful to Ruddy Wattiez for exciting discussions and exchange of information and to David Gillan, Jacques Covès, Antoine Maillard, Christophe Merlin and Dietrich Nies for making manuscripts available in advance of publication. We are grateful to
Dr. Larry Barton and Springer for giving us this opportunity and to Dr. Sonia Ojo and Ms. Esther Rentmeester for their support and patience. Finally, a special and friendly thought goes to all the past and present collaborators, young scientists, students, colleagues and visiting scientists, who participated in the Cupriavidus (Alcaligenes, Ralstonia, …) work started with Prof. Jean Remacle at the University of Liège and further carried out in Mol (Belgian Centre for Nuclear Energy (SCK•CEN) and Flemish Institute for technological research (VITO) during four decennia, and to the directorates of the corresponding institutions for their interest and support.

Mol, Belgium

Max Mergeay
Rob Van Houdt
Metal Response in Cupriavidus metallidurans
Volume II: Insights into the Structure-Function
Relationship of Proteins
Vandenbussche, G.; Mergeay, M.; Van Houdt, R.
2015, VII, 70 p. 12 illus., 10 illus. in color., Softcover
ISBN: 978-3-319-20623-3