

# 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  $\beta$ -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.

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