

Preface

This two-volume set is a collaborative work aimed to review the *Cupriavidus metallidurans* resistance mechanisms to toxic concentrations of heavy metals at the ecological, physiological, genomic, transcriptomic and proteomic level. The main heavy metals 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 heavy metals and is able to survive in a variety of harsh oligotrophic habitats linked to industrial and other human activities. This volume contains three 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 catalogues 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 heavy metal concentrations. Volume II reviews the available structural data of *C. metallidurans* proteins involved in heavy metal resistance.

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