

Cytoplasmic CopZ-Like Protein and Periplasmic Rusticyanin and AcoP Proteins as Possible Copper Resistance Determinants in *Acidithiobacillus ferrooxidans* ATCC 23270

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Resumen

Acidophilic organisms, such as *Acidithiobacillus ferrooxidans*, possess high-level resistance to copper and other metals. *A. ferrooxidans* contains canonical copper resistance determinants present in other bacteria, such as CopA ATPases and RND efflux pumps, but these components do not entirely explain its high metal tolerance. The aim of this study was to find other possible copper resistance determinants in this bacterium. Transcriptional expression of *A. ferrooxidans* genes coding for a cytoplasmic CopZ-like copper-binding chaperone and the periplasmic copper-binding proteins rusticyanin and AcoP, which form part of an iron-oxidizing supercomplex, was found to increase when the microorganism was grown in the presence of copper. All of these proteins conferred more resistance to copper when expressed heterologously in a copper-sensitive *Escherichia coli* strain. This effect was absent when site-directed-mutation mutants of these proteins with altered copper-binding sites were used in this metal sensitivity assay. These results strongly suggest that the three copper-binding proteins analyzed here are copper resistance determinants in this extremophile and contribute to the high-level metal resistance of this industrially important biomining bacterium.

Palabras clave

KeyWords Plus: [ESCHERICHIA-COLI](#); [THIOBACILLUS-FERROOXIDANS](#); [ENTEROCOCCUS-HIRAE](#); [BACILLUS-SUBTILIS](#); [SULFUR-COMPOUNDS](#); [METAL SULFIDES](#); [HOMEOSTASIS](#); [GROWTH](#); [MECHANISMS](#); [EXPRESSION](#)

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