

A genomic island provides *Acidithiobacillus ferrooxidans* ATCC 53993 additional copper resistance: A possible competitive advantage

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There is great interest in understanding how extremophilic biomining bacteria adapt to exceptionally high copper concentrations in their environment. *Acidithiobacillus ferrooxidans* ATCC 53993 genome possesses the same copper resistance determinants as strain ATCC 23270. However, the former strain contains in its genome a 160-kb genomic island (GI), which is absent in ATCC 23270. This GI contains, amongst other genes, several genes coding for an additional putative copper ATPase and a Cus system. *A. ferrooxidans* ATCC 53993 showed a much higher resistance to CuSO_4 (>100 mM) than that of strain ATCC 23270 (<25 mM). When a similar number of bacteria from each strain were mixed and allowed to grow in the absence of copper, their respective final numbers remained approximately equal. However, in the presence of copper, there was a clear overgrowth of strain ATCC 53993 compared to ATCC 23270. This behavior is most likely explained by the presence of the additional copper-resistance genes in