Evidence for a functional quorum-sensing type AI-1 system in the extremophilic bacterium Acidithiobacillus ferrooxidans

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Acidithiobacillus ferrooxidans is one of the main acidophilic chemolithotrophic bacteria involved in the bioleaching of metal sulfide ores. The bacterium-mineral interaction requires the development of biofilms, whose formation is regulated in many microorganisms by type AI-1 quorum sensing. Here, we report the existence and characterization of a functional type AI-1 quorum-sensing system in A. ferrooxidans. This microorganism produced mainly acyl-homoserine lactones (AHL) with medium and large acyl chains and different C-3 substitutions, including 3-hydroxy-C8-AHL, 3-hydroxy-C10-AHL, C12-AHL, 3-OXO-C12-AHL, 3-hydroxy-C12-AHL, C14-AHL, 3-OXO-C14-AHL, 3-hydroxy-C14-AHL, and 3-hydroxy-C16-AHL. A quorum-sensing genetic locus that includes two open reading frames, afeI and afeR, which have opposite orientations and code for proteins with high levels of similarity to members of the acyl synthase (I) and transcriptional regulator (R) protein families, respectively, was identified. Overexpre