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► To cite this version:

Sabrina Hedrich, Anne-Gwenaelle Guezennec, Mickaël Charron, Axel Schippers, Catherine Joulian. Development of molecular assays to efficiently monitor and quantify microbial species during bioleaching of copper-rich ores. Biohydromet'16, Jun 2016, Falmouth, United Kingdom. hal-01309327

HAL Id: hal-01309327

<https://brgm.hal.science/hal-01309327>

Submitted on 29 Apr 2016

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Development of molecular assays to efficiently monitor and quantify microbial species during bioleaching of copper-rich ores

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Monitoring of the microbial community in bioleaching processes is essential in order to control process parameters and enhance the leaching efficiency. Suitable methods are, however, limited as nucleic acid extraction is sometimes inefficient and often no specific assays are described for these types of consortia. Therefore we have developed reliable assays to monitor a specific microbial consortium used for bioleaching of copper-rich ores. Our investigations comprised the efficient recovery of nucleic acids from bioleaching reactors and subsequent quantification of the microorganisms at species level via T-RFLP and qPCR. Therefore we developed novel qPCR assays specific for bioleaching species. The qPCR assays were validated in two different labs and also successfully applied to monitor various bioleaching experiments. Furthermore, a pre-treatment method for efficient fluorescence staining of whole cells from these reactors was developed and approved.

These novel assays can be applied to various bioleaching operations for fast and efficient community monitoring.