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Application of geomicrobial techniques to constrain mechanisms of arsenic mobilisation in anoxic aquifers

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Geogenic arsenic contamination of groundwater in South and South-East Asia poses a significant human health threat, causing a range of health conditions including but not limited to cardio-vascular disease, cancer and skin lesions [1][4]. Arsenic contamination also hosts a range of dire socioeconomic implications for the affected areas. A variety of mechanisms for arsenic release in anoxic aquifers have been proposed, however, the most widely accepted mechanism is the microbial reduction of As-bearing Fe(III) (oxyhydr)oxide minerals coupled with the oxidation of organic carbon [2][3]. Recent research has implicated methane as a possible carbon source in the reduction of Fe(III) (oxyhydr)oxide minerals and the subsequent release of arsenic into the groundwater[3][4]. The research suggests that methanotrophs have the ability to drive anaerobic oxidation of methane, AOM, coupled to Fe(III) (oxyhydr)oxide reduction. In this study, we aim to provide unequivocal evidence for the occurrence of AOM coupled to Fe(III) (oxyhydr)oxide as well to further explore the exact mechanism(s) involved which is yet to be characterised. Here we present an overview of our work so far.

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