ABSTRACT

TITLE:	An Examination of Ferric Iron and Nitrate Reduction Activity in Acidobacterium Capsulatum
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ABSTRACT: Acidobacterium capsulatum is an acidophilic, heterotrophic, aerobe ubiquitous to soils and aquatic environments throughout the world. It is capable of growing on glucose as its sole carbon source. Comparative studies of Acidobacteria genomes suggests A. capsulatum may be capable of reducing Fe(III) and nitrite, while other Acidobacteria may be able to reduce nitrate. Additional in situ studies showed iron reduction capabilities in Acidobacteria is prevalent. The ability to reduce Fe(III), nitrite and nitrate allows these organisms to potentially play a significant role in carbon, nitrogen and iron cycling in soil and aquatic environments. In order to test this hypothesis and better understand these capabilities, A. capsulatum was grown in defined media containing an insoluble Fe(III) substrate, Goethite (FeOOH), or KNO3 for several days, with glucose as the sole carbon source. Ferrozine was used as the indicator of Fe(II) in solution and protein concentration was used as a measure of bacterial growth. Under these conditions it was confirmed that A. capsulatum can reduce Fe(III), however, little evidence coupled iron reduction with cell growth. It also lacks the ability to reduce nitrate. Surprisingly, A. capsulatum growth was completely inhibited with 1.0% potassium nitrate. Future studies continued to define the relationship between iron reduction, nitrate toxicity, growth and glucose consumption. Other studies will focus on the putative nitrite-reducing gene (NirBD) in A. capsulatum to determine whether this is for dissimilatory or assimilatory nitrite reduction. Additionally, Arsenic species, Arsenite [As(III)] and Arsenate [As(V)], reduction is being investigated. These studies will enable us to better understand A. capsulatum's ability to grow in soil and provide a crucial role in soil maintenance.