ABSTRACT

TITLE:	Nmr Metabolite Profiling of Acidobacterium Capsulatum Grown in Minimal Media with Glucose as the Sole Carbon Source
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PRESENTED AT:	8th Annual Natural & Behavioral Sciences Undergraduate Research Symposium Program, Fort Lewis College, 2013

ABSTRACT: Acidobacterium capsulatum is an acidophilic chemotrophic organism first cultured in 1991. Its genome was reported in 2009. Organisms in this phylum are ubiquitous in the environment. Genomic information suggests that A. capsulatum may be a key decomposer in soil and aquatic environments because of the number of potentially encoded polysaccharide-degrading enzymes capable of providing simple sugars. However, A. capsulatum may not be able to metabolize glucose and other sugars directly through the glycolytic or Entner-Dourdoroff pathways because no F1, 6BP aldolase, or KDPG dehydratase genes were identified in the genome. A. capsulatum does have a transaldolase and most of the genes for the pentose phosphate shunt (PPS) suggesting that these organisms use PPS to distribute carbon between biomass production, energy generation, and polysaccharide synthesis. To test this hypothesis, A. capsulatum growth under aerobic conditions in a minimal media with glucose as the sole carbon source was characterized. Free glucose was found to be completely consumed after about 90 hours at ambient temperature and distributed about 40% in biomass, 40% consumed for energy, and 20% used for polysaccharide synthesis. Aqueous cell lysates of A. capsulatum quenched with perchloric acid at thetop of exponential were shown by 1H-NMR to be rich in ribonucleotides, sugars, alcohols, and precursors to membrane components. However, from these results we could not conclude that the PPS is the central metabolic pathway for the catabolism of glucose. Future studies will use 13C-labeled glucose, 13C-NMR, and LC-MS to better determine the glucose metabolites under these conditions.