PgcA: A Protein Specific for Iron Oxide Reduction by *Geobacter sulfurreducens*. L. A. Zacharoff[1] and D. Morrone[2], D. Bond[3], M. El-Naggar[1] [1]University of Southern California, Department of Physics, [2]St. Louis College of Pharmacy, [3]University of Minnesota, Biotechnology Institutue, Department of Microbiology, Immunology and Cancer Biology.

Dissimilatory metal reducing bacteria, such as *Geobacter sulfurreducens*, transfer terminal respiratory electrons to the extracellular space and then to insoluble metals such as iron oxides and manganese oxides as well as to poised electrodes. Iron oxides exist as a heterogeneous mixture of insoluble particles in nature. These particles have a range of redox potentials and also have a tendency to change redox potentials as they are being reduced by bacteria [1,2]. Respiration of recalcitrant iron oxides in anaerobic soil and sediment requires *G. sulfurreducens* to respond to and overcome these challenges by modifying the extracellular space. The composition of the extracellular matrix is complex and regulated. *G. sulfurreducens* secretes polysaccharides [3], pili [4] and multiheme *c*-type cytochromes [5,6] depending on the respiratory conditions.

Metal reduction and electrode reduction by *Geobacter sulfurreducens* had long been assumed to use similar processes in the extracellular space. Here a triheme *c*-type cytochrome is characterized in terms of phenotypic significance and biochemical properties. Cells lacking the *pgcA* gene cannot reduce ferrihydrite or birnessite. Contrarily, these cells have no impairment respiring soluble ferric citrate or poised electrodes. PgcA protein was expressed and purified from a host organism, *Shewanella oneidensis*. The purified protein exhibits secondary structure composed mostly of alpha helices as demonstrated by circular dichroism. By adding purified protein and shuttles to iron reduction assays, PgcA is demonstrated to act in the extracellular space in a manner that is synergistic to a known electron shuttle, flavin mononucleotide.

Data presented here supports a function for PgcA during reduction of insoluble metals, not for reduction of electrodes. Future studies will discern whether or not PgcA acts as shuttle or if PgcA is a necessity in forming direct contact with insoluble metals.

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