NON -TECHNICAL ABSTRACT: *(State in layman's terms the application's broad, long-term objectives and specific aims, making reference to the potential public benefits of the project for California.)*

Bacteria play an important role in cycling the elements on our planet. For instance, Manganese (Mn) oxidizing bacteria oxidize the metal Mn orders of magnitude faster than chemical processes alone. This oxidation reaction results in the formation of a solid Mn oxide mineral from dissolved Mn(II). The Mn oxide mineral is very reactive and can oxidize both metal and organic pollutants, making this process a potentially important tool for bioremediation of contaminants in the natural environment and expanding the tools available to clean contaminated sites throughout California. Before this process can be widely used, it's essential to understand the biological process that results in Mn(II) oxidation. Our goal is to understand why bacteria catalyze this reaction. We propose to do this by 1.) examining whether the Mn oxide mineral can protect cells from oxidative stress and 2.) determining if oxidative stress can induce this reaction. Understanding the physiological role and regulation of this process in bacteria can lead to better control of this process for bioremediation applications and a better understanding of important elemental cycling on our planet. Masters and undergraduate students will play an integral role in the research, enriching their educational experiences. This research experience will also provide excellent training for students interested in biotechnology, the environment, and health; keeping California at the forefront of these technical fields.