Analysis of TacA Overexpression on Phenotypic Characteristics of *Sinorhizobium meliloti*

Lauren A. Ozdowski, Department of Biology, University of Great Falls, Great Falls, MT. 59405
Karla B. Schailles, Department of Biology, University of Massachusetts Boston, Boston, MA. 02125
Katherine E. Gibson, Department of Biology, University of Massachusetts Boston, Boston, MA. 02125

Sinorhizobium meliloti is a nitrogen-fixing bacterium that forms a symbiosis with legumes. These bacteria colonize plant roots within nodules and undergo a novel cell cycle as a symbiont. Free-living in soil, it undergoes asymmetrical cell division with one round of DNA replication per cell cycle. We are interested in identifying cell cycle regulators and understanding their function during free-living growth and symbiosis. We hypothesize that TacA is a cell cycle regulator since deletion of the TacA ortholog in *Caulobacter crescentus* shows morphology, motility, and cell membrane defects. To test this, we examined IPTG-induced overexpression of tacA for exopolysaccharide, membrane, and motility defects. Our results show low IPTG levels decrease motility of wild type and ΔcbrA strains. Surprisingly, higher amounts of IPTG restore motility to each strain's original level. Additionally, tacA overexpression causes a membrane defect in WT that is similar to ΔcbrA, while tacA does not appear to regulate exopolysaccharide production. In conclusion, tacA overexpression has several cell cycle phenotypes, which makes it a good candidate for further investigation. *S. meliloti* is an important model organism, not only for its potential to replace synthetic nitrogen fertilizers, but also because it is related to bacteria that cause brucellosis and plant tumors.