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.)*

This project will identify genes and proteins involved in formation of lipid globules in the photosynthetic cyanobacterium *Nostoc punctiforme.* These lipid globules contain long carbon-chain molecules that would make excellent starting material for biodiesel fuel production. The long-term goal of this research is to understand lipid globule formation in cyanobacteria, and to use this knowledge to develop a strain that produces large quantities of lipids. Cyanobacteria fix CO_2 using photosynthesis, and therefore recycle the CO_2 released from burning biodiesel made from their own lipids. This essentially eliminates the "carbon footprint" associated with burning fossil fuels and would greatly benefit the entire planet. As a first step toward this goal, this project aims to identify genes and proteins associated with lipid globule formation. This will be accomplished using two simultaneous approaches. The first specific aim is to find mutants that over-produce lipid globules, and use them to identify genes associated with lipid over-production. The second specific aim is to purify cyanobacterial lipid globules, extract the associated proteins, and identify several of the major proteins associated with lipid globules.