

**EXECUTIVE SUMMARY [NON-CONFIDENTIAL, NON-TECHNICAL ABSTRACT FOR PUBLIC INFORMATION OR PROGRAM PROMOTION]:** 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 relevant to California. Do not include proprietary or confidential information. This may be distributed before the funding decision has been finalized.

We are investigating whether the unicellular green alga *Chlamydomonas reinhardtii* can synthesize and assemble complex foreign proteins, such as the anti-cocaine antibody. *Chlamydomonas* is an attractive organism for protein expression as it can be cultured in very large volumes, reproduces rapidly, and poses little to no risk of bacterial or viral contamination. Using polymerase chain reaction, the anti-cocaine antibody genes have been assembled for optimal expression within *Chlamydomonas*. The synthesized genes were sent for sequence analysis to ensure that the correct DNA sequence was maintained during their assembly. The goal for the coming year is to express the Fab component of the anti-cocaine antibody within *Chlamydomonas*. The foreign genes will be introduced into *Chlamydomonas* cells along with an antibiotic resistant gene in order to screen for cells containing the anti-cocaine antibody genes on selective media. Southern blot analysis will be performed to detect the presence of anti-cocaine genes in transformed cells, while accumulation of mRNAs and proteins will be evaluated using Northern and Western blot analysis, respectively. The immunological activity of this algal-derived anti-cocaine antibody will be tested. Production of large quantities of active anti-cocaine antibodies will confirm *Chlamydomonas* as an attractive system for heterologous protein expression and possibly provide a therapeutic molecule that can be utilized in drug testing and the treatment of overdose and addiction.