EXPRESSION OF THE COFACTOR REGENERATION ENZYME PHOSPHITE DEHYDROGENASE IN THE CHLOROPLAST OF *CHLAMYDOMONAS REINHARDTII*

Samaneh Noor-Mohammadi*
T.W. Johannes
The University of Tulsa
800 S. Tucker Drive
Tulsa, OK 74104
Voice: 918-631-2226
Fax: 918-631-3268
snoor-mohammadi@utulsa.edu

Microalgae has the ability to produce a variety of natural products ranging from therapeutic proteins to nutraceuticals, yet the full potential of microalgae has not been fully realized. Genetic engineering may hold the key to unlocking the full potential of microalgae. Genetic engineering of microalgae can be achieved through modifications to the mitochondria, nuclear, or chloroplast genomes. To this date, the most efficient and successful transformations have been achieved by introducing genes into the chloroplast genome. This work focuses on expressing the cofactor regeneration enzyme phosphite dehydrogenase (PTDH) in the chloroplast genome of the microalgae *Chlamydomonas reinhardtii*. The PTDH enzyme converts phosphite into phosphate and $NAD(P)^+$ into NAD(P)H. The reduced nicotinamide cofactor NAD(P)H plays a pivotal role in countless biochemical oxidation and reduction, thus this enzyme would allow regeneration of NAD(P)H in a microalgae strain over-expressing a NAD(P)H-dependent oxidoreductase. A codon optimized *PTDH* gene was introduced into the chloroplast genome of *C. reinhardtii* by biolistic transformation and successful expression of the heterologous protein was confirmed by colorimetric assay.

###