

## Scientific Report – DE-FGO2-01ER15261

(September 15, 2001-September 14, 2004)

Our studies were a small part of the specific aims of the grant “*Global Regulation of the Methane-Producing Archaeon Methanococcus maripaludis*” (P.I. John Leigh, University of Washington). We proposed to determine the correlation of the levels of aminoacyl-tRNA and free amino acids under different growth conditions (varying phosphate, amino acid, or hydrogen concentrations). We did determine the levels of several aminoacyl-tRNAs under the growth conditions used by our collaborators in their experiments (J. Leigh and W. Whitman, University of Georgia). These data will be incorporated into a publication currently being prepared by John Leigh.

In order to really understand aminoacyl-tRNA formation in *Methanococcus maripaludis*, this grant also supported—in part—the following publications:

Tumbula-Hansen, D., Feng, L., Toogood, H., Stetter, K.O. and Söll, D. (2002) Evolutionary divergence of the archaeal aspartyl-RNA synthetases into discriminating and non-discriminating forms. *J. Biol. Chem.* **277**, 37184-37190.

Kamtekar, S., Kennedy, W. D., Wang, J., Stathopoulos, C., Söll, D. and Steitz, T. A. (2003) The structural basis of cysteine aminoacylation of tRNA<sup>Pro</sup> by prolyl-tRNA synthetases. *Proc. Natl. Acad. Sci. USA* **100**, 1673-1678.

Feng, L., Tumbula-Hansen, D., Toogood, H. and Söll, D. (2003) Expanding tRNA recognition of a tRNA synthetase by a single amino acid change. *Proc. Natl. Acad. Sci. USA* **100**, 5676-5681.

Korencic, D., Ahel, I., Schelert, J., Sacher, M., Ruan, B., Stathopoulos, C., Blum, P., Ibba, M. and Söll (2004) A freestanding proofreading domain is required for protein synthesis quality control in archaea. *Proc. Natl. Acad. Sci. USA* **101**, 10260–10265.

Korencic, D., Polycarpo, C., Weygand-Durasevic, I. and Söll (2004) Differential modes of tRNA<sup>Ser</sup> recognition in *Methanosarcina barkeri*. *J. Biol. Chem.* **279**, 48780-48786.

Sauerwald, A., Zhu, W., Major, T.A., Roy, H., Palioura, S., Jahn, D., Whitman, W., Yates, J.R., 3<sup>rd</sup>, Ibba, M. and Söll, D. (2005) RNA-dependent cysteine biosynthesis in archaea. *Science* **307**, 1969-1972.