

*Robert*  
**R.C. Fahey: DISTRIBUTION AND ABUNDANCE OF ORGANIC  
 THIOLS**

The role of glutathione (GSH) in protecting against the toxicity of oxygen and oxygen byproducts is well established for all eukaryotes studied except *Entamoeba histolytica* which lacks mitochondria, chloroplasts, and microtubules. GSH is not universal among prokaryotes. *Entamoeba histolytica* does not produce GSH or key enzymes of GSH metabolism (Fahey, 1984). A general method of thiol analysis based upon fluorescent labeling with monobromobimane and HPLC separation of the resulting thiol derivatives was developed in order to determine the occurrence of GSH and other low molecular weight thiols in bacteria. Glutathione is the major thiol in cyanobacteria and in most bacteria closely related to the purple photosynthetic bacteria, but GSH was not found in archaeobacteria, green bacteria, or Gram positive bacteria. This suggests that glutathione metabolism may have been incorporated into eukaryotes at the time that mitochondria and chloroplasts were acquired by endosymbiosis. In Gram positive aerobes, bacteria not thought to be ancestral to eukaryotic organelles, coenzyme A occurs at millimolar levels and CoA disulfide reductases have been identified. CoA, rather than glutathione, may function in the oxygen detoxification processes of these organisms.

Fahey, R.C., Brown, W.C., Adams, W.B., and Worsham, M.B., 1978. Occurrence of glutathione in bacteria. *J. Bacteriol.*, 133:1126-1129.

Fahey, R.C., Dorian, R., Newton, G.L., and Utley, J., 1983. Determination of intracellular thiol levels using bromobimane fluorescent labeling: Applications involving radioprotective drugs. In *Radioprotectors and Anticarcinogens*, (D.F. Nygaard and M.G. Simic, eds.), Academic Press, New York, pp. 103-120.

Fahey, R.C., and Newton, G.L., 1983. Occurrence of low molecular weight thiols in biological systems. In *Functions of Glutathione: Biochemical, Physiological, Toxicological, and Clinical Aspects* (A. Larsson et al, eds.), Raven Press, New York, pp. 251-260.

Fahey, R.C., Newton, G.L., Arrick, B., Overdank-Bogart, T., and Aley, S.B., 1984. *Entamoeba histolytica*: A eukaryote without glutathione metabolism, *Science*, 224:70-72.

Meister, A., and Anderson, M.E., 1983. Glutathione. *Ann. Rev. Biochem.*, 52:711-760.

Newton, G.L., and Javor, B., 1985. Glutamylcysteine and thiosulfate are the major low molecular weight thiols in halobacteria. *J. Bacteriol.*, (in press).