

W0228

**Identification of a Novel *Escherichia coli* O157:H7 Heme Oxygenase ChuS and its Structural Similarity to ChuX.** M.D.L. Suits, G.P. Pal, Z. Jia, Dept. of Biochemistry, Queen's Univ., Kingston, Ontario, K7L 3N6 Canada.

Heme oxygenases (HOs) catalyze the oxidation of heme to biliverdin, carbon monoxide (CO), and free iron. For pathogenic microorganisms, heme uptake and degradation is one of the critical mechanisms for iron acquisition that enables multiplication and survival within hosts they invade. Here we report the functional identification of a novel heme oxygenase ChuS from the *Escherichia coli* O157:H7, along with its apo and heme complex structures. ChuS is structurally unique compared to other HOs with respect to overall architecture and heme coordination. Spectral analysis and CO detection by gas chromatography confirm that ChuS is capable of using either ascorbic acid or cytochrome P450 reductase-NADPH as sources of electrons for heme oxygenation. As such, ChuS is the first HO to be identified in any strain of *E. coli*. Sequence analysis suggests that homologues of ChuS are present in many other pathogenic bacteria. Furthermore, we present the structure of another member of the heme utilization operon, ChuX, which superimposes with the structural repeats of ChuS. This structural conservation suggests a similar method of heme coordination. The functional implication of this new structural information is discussed in the context of enteric iron acquisition.

