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Identification and analysis of the *Shewanella oneidensis* major oxygen-independent coproporphyrinogen III oxidase gene.

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Abstract: *Shewanella oneidensis* MR-1 is a facultative anaerobe that can use a large number of electron acceptors including metal oxides. During anaerobic respiration, *S. oneidensis* MR-1 synthesizes a large number of c cytochromes that give the organism its characteristic orange color. Using a modified mariner transposon, a number of *S. oneidensis* mutants deficient in anaerobic respiration were generated. One mutant, BG163, exhibited reduced pigmentation and was deficient in c cytochromes normally synthesized under anaerobic condition. The deficiencies in BG163 were due to insertional inactivation of hemN1, which exhibits a high degree of similarity to genes encoding anaerobic coproporphyrinogen III oxidases that are involved in heme biosynthesis. The ability of BG163 to synthesize c cytochromes under anaerobic conditions, and to grow anaerobically with different electron acceptors was restored by the introduction of hemN1 on a plasmid. Complementation of the mutant was also achieved by the addition of hemin to the growth medium. The genome sequence of *S. oneidensis* contains three putative anaerobic coproporphyrinogen III oxidase genes. The protein encoded by hemN1 appears to be the major enzyme that is involved in anaerobic heme synthesis of *S. oneidensis*. The other two putative anaerobic coproporphyrinogen III oxidase genes may play a minor role in this process