

Desulfovibrio gigas neelaredoxin - A novel superoxide dismutase integrated in a putative oxygen sensory operon of an anaerobe



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Abstract: Neelaredoxin, a small non-heme blue iron protein from the sulfate-reducing bacterium *Desulfovibrio gigas* [Chen, L., Sharma, P., LeGall, J., Mariano, A.M., Teixeira M. and Xavier, A.V. (1994) Eur. J. Biochem. 226, 613-618] is shown to be encoded by a polycistronic unit which contains two additional open reading frames (ORF-1 and ORF-2) coding for chemotaxis-like proteins. ORF-1 has domains highly homologous with those structurally and functionally important in methyl-accepting chemotaxis proteins, including two putative transmembrane helices, potential methylation sites and the interaction domain with CheW proteins. Interestingly, ORF-2 encodes a protein having homologies with CheW proteins.

Neelaredoxin is also shown to have significant superoxide dismutase activity (1200 U.mg(-1)), making it a novel type of iron superoxide dismutase. Analysis of genomic data shows that neelaredoxin-like putative polypeptides are present in strict anaerobic archaea, suggesting that this is a primordial superoxide dismutase. The three proteins encoded in this operon may be involved in the oxygen-sensing mechanisms of this anaerobic bacterium, indicating a possible transcriptional mechanism to sense and respond to potential stress agents.

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