Abstract for a poster presentation (unpublished) at the 10th International Small Genomes Meeting, Lake Arrowhead, CA, 8-12 September 2002.

TonB-dependent Iron Siderophore Receptors in Proteobacteria and Cyanobacteria

Loren J. Hauser1, Heather M. Connelly1, Miriam Land2, Frank W. Larimer2
1UT-ORNL Graduate School of Genome Science and Technology, Joint Institute of Biological Sciences, Oak Ridge, TN 37831, 2Oak Ridge National Laboratory, Oak Ridge TN, 37831

In many environments iron is a limiting nutrient. Bacteria have developed elaborate mechanisms to ensure sufficient iron for their growth and survival. Numerous Bacteria secrete iron siderophores, of a variety of types, into the environment in order to chelate Fe+3, which is otherwise virtually insoluble. Proteobacteria and Cyanobacteria use tonB-dependent iron siderophore receptors as the first stage in iron uptake. Autotrophic growth requires that ATP and reducing power be used efficiently. The sequence of the obligate NH3 oxidizing autotroph, Nitrosomonas europaea, has recently been completed. The genome contains 28 functional and 12 non-functional iron siderophore receptor genes, as well as, 20 functional and 2 non-functional FecI-FecR 2 component regulatory systems, but no siderophore synthesizing capability. This set of receptors is capable of binding to a wide variety of different types of siderophores. This gives Nitrosomonas a unique and efficient system for scavenging iron by synthesizing only those receptors for which the siderophore is present in the local environment, but not having to synthesize the siderophores. Investigations into the iron uptake systems of related species and other autotrophs will be compared to that of Nitrosomonas.

Prepared by the Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831. Managed by UT-BATTELLE for the U.S. DEPARTMENT OF ENERGY under contract DE-AC05-00OR22725