IronT – an iron exporter from a thermophile

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Iron homeostasis in bacteria is tightly controlled by iron importers, gene regulation according to iron levels, intracellular storage systems for excess iron and iron exporters. Iron is essential for nitrogen fixation, respiration, oxygen transport and many other biological processes. Many pathogenic bacteria thrive due to high affinity iron scavengers that enable to source iron even from low iron host environments. Excess cytoplasmic iron, however, can be detrimental due to formation of reactive oxygen species via Fenton-like chemistry.

The bacterial iron transporter IronT belongs to the VIT1/CCC1 family of iron transporters found across all organisms except for animals. These transporters form a dimer with 5 transmembrane helices per monomer and an intracellular iron binding domain. The bacterial sub group of VIT1 transporters have an additional cytoplasmic N-terminal ferritin-like erythrin domain. The structure of a plant VIT1 from Eucalyptus grandis has been solved by crystallography, however, no examples of the bacterial homologues have been solved.

The poster focuses on the purification and early cryoEM studies of IronT from a thermophilic bacterium. While this homologue is straightforward to express and purify by membrane protein standards, the analysis of cryoEM data for this small dimer has proven tricky.