

# **Enigmatic role of photolytic cyanobacterial siderophores in shaping of microbial consortia**

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## **Abstract:**

Iron is a part of enzymes performing respiration as well as photosynthesis and thus is required by all microorganisms. Iron, however, has also a complicated chemistry that often makes it not easily available. Microbes have evolved several strategies to ensure access to additional iron resources and one of them is production of siderophores - compounds able to efficiently scavenge residual iron from the environment and facilitate its uptake. Siderophores are believed to be produced by many bacteria, including cyanobacteria. In iron-limited microbial communities the excreted siderophores become the focal point of microbial interactions. Apart from competition between individual siderophore species produced by different microbes, the siderophores may mediate more complex interactions. Excreted siderophores dispersed throughout the microbial community become a common good that can eventually be accessed by the non-producers, cheaters or partner species alike. The siderophores produced by dominant species are likely to have a major influence on the structure of the community.

Previously we have identified a class of cyanobacterial siderophores that we named cyanochelins. In addition to iron chelation, the cyanochelins can also perform UV-dependent photolytic reduction of bound iron during which they are cleaved while they convert ferric iron to its more accessible and diffusible ferrous form. Cyanobacteria often dominate microbial communities and their siderophores are likely to be abundant. However, how would a photolytic siderophore produced by a phototrophic cyanobacterium grown on an irradiated spot influence the microbial community? Would it grant exclusive access through specific import of iron-siderophore complexes and favor partner species or would the siderophores work as an expensive common good that provides ferrous iron for everyone?