Iron scavengers - β-hydroxy aspartate containing siderophores of Cyanobacteria

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Iron is an essential element for both photosynthesis and respiration. Where scarce it can limit the growth and survival of microorganisms. Facing this challenge for long enough organisms have evolved strategies how to cope with it. One such strategy is production of compounds that can chelate iron - siderophores - and their excretion to the environment. Siderophores make iron more accessible either to the whole community or specifically to their producer. They could become a common good or a tool of competitive exclusion. The biosynthesis of these compounds is at least as interesting as their possible role in shaping microbial communities. There are various types of siderophores, yet the ones we are interested in are synthetized by non-ribosomal peptide synthetases associated with polyketide synthases and various tailoring enzymes. Recently we have identified several gene clusters composed of such enzymes that likely encode production of β-hydroxy aspartate containing siderophores in various strains of cyanobacteria across different evolutionary lineages. Selected compounds have been isolated, evaluated for their iron-chelating activity and tested for additional bioactivity.