Characterization and regulation of weak and strong siderophores by soil nitrogen-fixing *Azotobacter sp.*

O. BAARS[1]*, S.H. KOPF[2], X. ZHANG[1], M.R. SEYEDSAYAMDOST[3], F.M.M. MOREL[1]

[1] Princeton University, Department of Geosciences, Princeton, NJ 08544, USA (*correspondence: obaars@princeton.edu) (xinningz@princeton.edu, morel@princeton.edu)
[2] University of Colorado Boulder, Boulder, CO 80309, USA (Sebastian.Kopf@colorado.edu)
[3] Princeton University, Department of Chemistry, Princeton, NJ 08544, USA (mrseyed@princeton.edu)

A. vinelandii and *A. chroococcum* are ubiquitous nitrogen-fixing soil bacteria with agricultural relevance. *Azotobacter sp.* use various extracellular iron chelators called siderophores to acquire this trace metal under conditions of Fe limitation. While the siderophore structures of *A. vinelandii* have been studied in detail, the siderophores from *A. chroococcum* remain still unknown. Using a new bioinformatics and high-resolution LC-MS driven workflow, we performed a comprehensive siderophore profiling study with *A. chroococcum*. The identified iron chelators fell into three structural families. *A. vinelandii* and *A. chroococcum* share a common weak siderophore called vibrioferrin. In contrast, stronger siderophores differ between both species. Among these high-affinity Fe chelators, we discovered chrochelins, a new class of siderophores with a novel iron binding motif produced only by *A. chroococcum*. We then studied the regulation of siderophore production by both species using chemostat and batch incubations with controlled metal availabilities. The results revealed a downregulation of the weak siderophore in a severe starvation response that was common to both species and gives conceptual insight into the role of bacterial weak siderophores.