The cyanosphere: The portable microbiome of *Microcoleus* spp. A. Giraldo Siva[1,2], E. Couradeau[3], F. de Martini[1,2] and F. Garcia-Pichel[1,2]. [1] 427 E Tyler Mall, Arizona State University, School of Life Sciences, Tempe-85287 AZ, USA; amgirald@asu.edu, [2]Center for Fundamental and Applied Microbiomics, [3] Environmental Genomics and Systems Biology Division, Lawrence Berkeley National Laboratory, 1 Cyclotron Rd, Berkeley, California 94720, USA.

Introduction: Biological soil crust (biocrusts) communities provide important ecosystem services to arid lands regarding soil fertility and stability, and are arguably the most extensive biofilm on Earth. They constitute a carbon pool that exceeds 10^{14} g C, and are responsible for almost half of the nitrogen fixed on land. The cyanobacterium *Microcoleus vaginatus* is the pioneer of biocrust communities, but interestingly this architect of the early biocrust successional stage does not fix nitrogen. Where does the initial nitrogen pulse come from to support the establishment of *M. vaginatus* as it colonizes bare soil? To answer this question, we compared the bacterial community firmly attached to *M. vaginatus* bundles (the "cyanosphere") to that of the bulk biocrust soil, using high throughput 16S rDNA gene sequencing. We found a distinct bacterial community that is significantly enriched in the cyanosphere of *M. vaginatus*, one that contains several of the recently identified heterotrophic biocruts nitrogen fixers [Pepe-Ranney et al. (2015) ISME J., 2, 287-298]. We hypothesized that nitrogen fixing heterotrophs could be differentially abundant in this community. Using real-time PCR we demonstrated that the *nif*H genes were 100 fold more abundant in the cyanosphere than in the rest of the soil. In conjunction with recent metabolomics studies [Baran et al. (2016) Nat. Commun., 6, 1-9], this strongly suggests a symbiotic mechanism by which *M. vaginatus* provides carbon to the heterotrophic community in its cyanosphere and in exchange, this community provides *M. vaginatus* with fixed-nitrogen. This study reveals the existence of a differentiated microbial community associated with *M. vaginatus* and proposes a symbiosis with its cyanosphere that could be key to the early establishment of the biocrust.