



Assessing the differences in microbial diversity between mineral phases forming Merzouga (Morocco) desert sand grains

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The sand of the arid dunes of Merzouga, Morocco, was investigated through crossed microbiological and mineralogical techniques. Bacterial abundance was estimated as a prerequisite. Bacteria were cultured after serial dilution of homogenized bulk sand and plating on nutritive agar medium, which yielded less than one CFU per grain. We subsequently plated sand grains individually on agar medium and incubated until colony formation, which lead to a fivefold increase in estimated culturability. Then the grains were retrieved, cleaned and characterized using Raman spectroscopy, defining six categories comprising a total of 66 grains (quartz-only, iron-III oxihydroxide-plated, carbonate plated-, compound, organic-matter coated-, or unclassified grains). A total of 79 16S-rDNA sequences from cultured bacteria were obtained and classified in 19 taxonomic groups. Contrasting to the very low biomass, all major bacterial phyla were represented.

Comparing the abundances of these groups among the mineralogical classes of sand grains was facilitated by principal component analysis. Compound grains made of quartz and Fe-II containing minerals show a bacterial diversity very different from that of the other mineralogical classes. The five other mineralogical classes show less obvious distinctive features.