Experimental evidence of bacterially-induced iron oxyhydroxides and gypsum deposits in Naica caves

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The Naica Mine in Northern Mexico displays the largest natural gypsum crystals in the world, growing from conspicuous iron oxyhydroxide deposits. By studying this materials and hot-spring waters collected at different levels in the mine, through a suite of spectroscopic, spectrometric, microbiological and experimental techniques, we can decipher a possible bacterially-mediated mechanism for the formation of the gypsum crystals.

We propose that EPS produced by *Bacillus* species could play a fundamental role in the formation of the iron oxyhydroxides that cover the walls of the caves, and the presence of *Pseudoxanthomonas taiwanensis* presumably can promote the calcium sulfate nucleation under $CaCO_3$ supersaturation aqueous solution. The characteristics of these two species allow us to suggest that they are microorganisms which could be involved in geomicrobiological processes. This represents the first evidence of biological activity as a biogeochemical agent for conspicuous mineral deposits found in the giant crystal caves of the Naica Mine.