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Life-detection simulation and viability assessment studies with haloarchaea as possible models of recognition of past or present life on Mars.

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Viable strains of extremely halophilic archaea were isolated from rock salt of Permo-Triassic age (4), suggesting their possible long term preservation in extreme conditions (3). The identification of halite in meteorites of Martian origin (2) was a reason to study the survivability of these microorganisms. The cells of the strains *Halobacterium salinarum* strain NRC-1 and *Halococcus dombrowskii* H4 were collected and embedded in laboratory made crystals, and resuspended in 4M salt buffer after storage of 30 days at different temperatures. The assessment of their viability was performed by the classical determination of colony forming units (that showed a 0.5 to 4% survival of the cells) and by staining of the cells with the BacLight LIVE DEAD Kit (Molecular Probes) and observing them with a fluorescence microscope (green color indicated viable cells and red color dead ones). The detection of haloarchaeal strains embedded in salt crystals (from a pellet obtained of 1000 ul of a culture with an OD_{600}= 1.0, mixed with 100 μl of a solution containing 4M sodium chloride and dried overnight on glass slides) was perfomed by Raman spectroscopy, which is considered to be an important method for life detection on Mars (1). We obtained spectra with peaks characteristic of the carotenoids contained by these haloarchaea at 1150 cm-1 and 1525 cm-1, suggesting that the method was of high sensitivity and capable of detecting cells while embedded in fluid inclusions.

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