

**Assessment of spore UV and impact resistance of *Bacillus pumilus* strains isolated from extreme environments**

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Because of their high resistance to harsh physical conditions, bacterial spores have been considered ideal candidates for interplanetary transport by natural processes such as asteroidal or cometary impacts (i.e., lithopanspermia). In addition, recent evidence has accumulated indicating that spores are the major type of bacterial contaminants found in spacecraft assembly facilities, and thus can also be accidental passengers into space on man-made satellites.

Microbial populations were examined from two extreme environments: (i) the ultra-clean Spacecraft Assembly Facility at NASA-JPL and (ii) the interior of near-subsurface basalt rocks collected in the Sonoran desert near Tucson, AZ. The phylogenetic affiliation of the spore-forming bacteria isolated from these environments was determined and the resistance properties of their spores were characterized. We identified strains of *Bacillus pumilus* as being common to both extreme environments. Populations of purified spores of the isolated strains were prepared in the laboratory and were subjected to 254-nm UV and ballistics tests in order to assess their resistance to UV radiation and to extreme acceleration shock, two lethal factors for spores during interplanetary transfer. Specific natural isolates of *B. pumilus* were found to be substantially more resistant to UV and extreme acceleration than were reference laboratory strains of *Bacillus subtilis*, the benchmark organism, suggesting that spores of environmental *B. pumilus* isolates would be more likely to survive the rigors of interplanetary transfer.