



Microbial interactions with limestone treated with water-repellent protective agents

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The aim of the work was to investigate the waterproofing agents effects on durability to microbial stone decay. Different hydrophobing chemicals are generally used to preserve stone from degradation. It is common knowledge that increased humidity is responsible for all weathering processes particularly involving the salt attack and the freeze-thawing processes. Further it is expected that hydrophobization must be kept free from microbial contamination. The latter application, however, is based on visualization of biofilm development on the surface of treated material, while the estimation of the minerals dissolution by microorganisms in stone subsurface layers is critical importance. With this purpose in the course of a laboratory simulation the isolated from weathered stone bacteria (*bacilli*, *actinobacteria*, *mycobacteria*) and microalgae were inoculated with limestone cubes treated by protective agents of the different-structural compositions. The experiments were carried out in liquid nutrient media. The biodestruction of limestone treated by water-repellents was evaluated by the release of calcium and silicon ions into solution. As the result of microbial action in/on stone samples the changes of physical and physico- mechanical properties of limestone were detected. The processes of tiff dissolving-deposition were controlled by the bacterial metabolism. The protective compounds, including the colloidal dispersions of silica particles in water, perfluorinated polyether, inorganic agents in a silicate and alkaline metal based, as well as acrylic copolymer with capillary-active fluorine, microemulsion of silane alkoxysiloxane. The results have shown that only one protective agent of inorganic nature raised the biostability of limestone whereas stone samples to be treated by analyzable organic protective compounds were subjected to damage.