Bioweathering in natural rocks and heritage stones

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In order to investigate aspects of weathering that transforms rocks into soil, it is necessary to study the bioweathering at the interface between living organisms and minerals. In the case of granite colonized by lichen thalli, depletion of potassium from mica was observed [1]. In addition to potassium, other elements can be removed up to nearly 10% of the mineral material [2]. The physical exfoliation of the biotite and the interlayer ionic exchange of K and subsequent vermiculite formation were also observed [3]. While many of these processes occur in the presence of water in temperate habitats, we have also studied endolithic colonization inducing bioweathering in the hyper-arid Atacama Desert. These bioweathering processes have also been described in cultural heritage stones. For example, lichen biomobilization of magnesium in dolostone from city churches [4]. The Bioweathering phenomena is so important in monumental stones that it continually launches new protocols for stone conservation and restoration. A recent investigation has determined the effect of laser irradiation. A comparative study was carried out by applying infrared (1064 nm) and ultraviolet (355 nm) nanosecond and sequential pulses of the two wavelengths using a Q-switched Nd:YAG system. The study showed that optimal conditions for removal of the colonization crust, while ensuring no weathering of the lithic substrate, were obtained for dual infrared-ultraviolet sequential irradiation.

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[1] Ascaso *et al*. (1995) *Bot. Acta* **108**, 474-481. [2] Wierzchos & Ascaso (1996) *Clays and Clays Minerals* **44**, 652-657. [3] Wierzchos & Ascaso (1998) *Clays and Clay Minerals* **46**, 446-452. [4] de los Ríos *et al*. (2004) *IBB* **54**, 113-120.