

## Research Paper

# Iron-Magnesium Silicate Bioweathering on Earth (and Mars?)

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### ABSTRACT

We examined the common, iron-magnesium silicate minerals olivine and pyroxene in basalt and in mantle rocks to determine if they exhibit textures similar to bioweathering textures found in glass. Our results show that weathering in olivine may occur as long, narrow tunnels (1–3  $\mu$ m in diameter and up to 100  $\mu$ m long) and as larger irregular galleries, both of which have distinctive characteristics consistent with biological activity. These weathering textures are associated with clay mineral by-products and nucleic acids. We also examined olivine and pyroxene in martian meteorites, some of which experienced preterrestrial aqueous alteration. Some olivines and pyroxenes in the martian meteorite Nakhla were found to contain tunnels that are similar in size and shape to tunnels in terrestrial iron-magnesium silicates that contain nucleic acids. Though the tunnels found in Nakhla are similar to the biosignatures found in terrestrial minerals, their presence cannot be used to prove that the martian alteration features had a biogenic origin. The abundance and wide distribution of olivine and pyroxene on Earth and in the Solar System make bioweathering features in these minerals potentially important new biosignatures that may play a significant role in evaluating whether life ever existed on Mars.

**Key Words:** Bioweathering—Biosignature—Olivine—Pyroxene—Dunite—Nakhlite.

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#### Related references:

Fisk, M.R., Popa, R., Storrie-Lombardi, M.C., and Vicenzi, E.P. (2004) Olivine alteration on Earth and Mars. *LPSC XXXV* Abstract 1746

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