

Space Bioastronautics, Space Medicine, Life Support Systems (5)
Space Bioastronautics, Space Medicine, Life Support Systems - IP Session (IP)

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A DETRIMENTAL RELATIONSHIP OF SILICON BIOMINERALIZATION ON CALCIUM BIOMINERALIZATION: A VITAL ISSUE IN FUTURE TERRAFORMING

Abstract

Silicon biomineralization occurs mainly as biologically controlled biomineralization and biologically induced biomineralization. In the calcium biomineralizing system, vesicular solid phase calcium is mostly translocated out of the cell for mineralization. Organisms with silicon biomineralization systems survived excellently in the mass extinction periods and their population may act as an environmental bellwether and are recognized as candidate organisms in terraforming. In this study, we observed the interaction between silicon-utilizing microorganisms and carbonate shell animals in a controlled sea-like condition in the laboratory. A supplement of sodium metasilicate showed excessive growth of silicon utilizing microbes with gradual thinning of the carbonate shells of the animals in the six-month study period as observed by X'ray. In contrast, an addition of calcium carbonate could not prevent this change in the carbonate shells. Thus, this may indicate a detrimental effect of silicon biomineralization over calcium biomineralization in nature. During terraforming with organisms this important issue should be carefully considered.