

Microbial diversity in hematitic bearing rock from tropical Sri Lanka

S. WICKRAMARATHNA¹, R. CHANDRAJITH², A. SENARATNE², S. WICKRAMASHINGHE³, V. PAUL¹ AND P. DASH¹

¹Department of Geosciences, Mississippi State University, MS, USA (*correspondence: sg1985@msstate.edu, pd175@msstate.edu, vgp25@msstate.edu)

²Department of Geology, University of Peradeniya, Sri Lanka (rohanac@pdn.ac.lk, atulas@pdn.ac.lk)

³Department of Basic Veterinary Sciences, University of Peradeniya, Sri Lanka (saumyawicks@gmail.com)

In nature, iron-reducing and oxidizing bacteria play a major role in sediment iron cycling. However, a thorough understanding of the exact physical, geochemical, and biological processes for explaining weathering and re-precipitation of iron-bearing minerals by these bacteria is lacking. A band of hematite bearing rocks found near Kandy in central Sri Lanka was investigated for its microbial weathering mechanisms. Rock samples and weathered soil materials were collected to investigate the textural and biogeochemical characteristics. X-ray fluorescence (XRF) analysis of the soil samples revealed that the upper layers (1-2 ft) are enriched with Fe₂O₃, which suggests dissolution of hematite through the weathering process. Scanning Electron Microscope (SEM) observations showed botryoidal-like growth layers that potentially nucleated from bacteria and biofilms. SEM analysis also indicated that these growth layers contained iron, oxygen, aluminium, carbon, and silicon with traces of niobium. Microbial diversity analysis using 16S rRNA gene sequencing revealed that the sample was dominated by Actinobacteria (~40%), specifically members of the iron-metabolizing bacteria, Acidimicrobiales. Majority of the identified taxa were common soil microorganisms, such as Chloroflexi and Rhizobiales. This research provides a window for further research and interpretations of the microbial role in iron metabolism in tropical environments and possibly on early Mars.