BIOSIGNATURES IN VESCICULAR BASALTS. B. Cavalazzi[1], F. Westall[2], S.L. Cady[3], R. Barbieri[4], F. Foucher[2], N.J. Beuckes[1], Department of Geology, University of Johannesburg, Johannesburg, South Africa (cavalazzib@uj.ac.za; nbeukes@uj.ac.za), [2]CNRS-Centre de Biophysique Moléculaire, Orléans, France (frances.westall@cnrs-orleans.fr; frederic.foucher@cnrs-orleans.fr), [3]Department of Geology, Portland State University, Portland, Oregon, US (cadys@pdx.edu), [4]Dipartimento di Scienze della Terra e Geologico-Ambientali, Università di Bologna, Bologna, Italy

Introduction: The search for traces of life on Mars is concentrated on sediments and alteration products that have been formed in the presence of water but volcanic rocks, in particular basalts, are the most common rock type on Mars. Basalts extruded under water or covered by water should not be ignored because it has recently been recognized that the glassy rinds of pillow basalts and vesicles and fractures in basaltic rocks represent ideal habitats for chemotrophic microorganisms [1-5]. They host a wide variety of euendoliths, chasmoliths, epiliths, and cryptoendoliths [e.g. 1, 3-5]. Importantly, such microorganisms can leave traces in the geological record [1-6].

In this presentation we describe microbial fossils in vesicular basalts [4].

Fossil Life in vesicular pillow basalt: A vesicular pillow basalt from the Ampére-Coral Patch Seamounts in the eastern North Atlantic was studied as a potential habitat of microbial life (Fig. 1) [4]. A variety of putative biogenic structures, such as filamentous and spherical microfossil-like structures, were detected in K-phillipsite–filled amygdules within the vesicles in chilled pillow basalt rinds. Several lines of evidence indicate that the microfossil-like structures in the pillow basalt are the fossilized remains of microorganisms. Possible biosignatures were investigated using a multianalytical approach (e.g. Raman microscopy, ESEM-EDX, CLSM).

Astrobiological relevance of vesicular basalts: This study documents a variety of evidence for past microbial life in a hitherto poorly investigated and underestimated microenvironment of significant relevance to Mars. Basaltic rocks that have been in prolonged contact with water should not be ignored as potential habitats and preservers of life. Although previous identifications of traces of life in the martian meteorite ALH84001 [7] are still debated, it is clear that such materials are excellent habitats for chemolithotrophic life forms.

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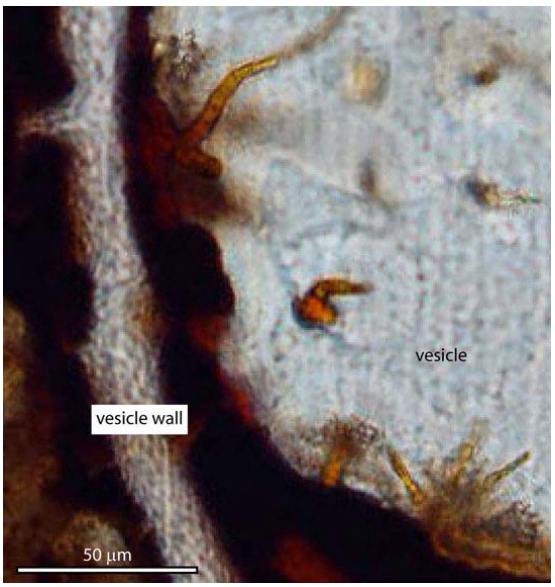

Figure 1. *Transmitted-light photomicrograph of a petrographic thin section showing a phillipsite-filed vesicle in a pillow basalt from Ampère-Coral Patch Ridge Seamounts, North Atlantic. Note on the vesicle walls the presence of microfossils.*

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