**Introduction**

Extreme environmental conditions, such as Antarctica or the Arctic, are thought to test the limits of life. The extremely low temperatures, dry atmospheres, strong UV-radiation isolation, low nutrient availability or long periods without sunlight have not been obstacles in the adaptation and proliferation of several different types of microorganisms. Microorganisms living in these environments often seek protection from environmental stresses, with one sheltered habitat found within rocks. The microbial colonization in rock was influenced by the physical and chemical properties of rock substrates, such as pore structure, mineral composition, and permeability, as well as environmental factors, such as climatic exposure, nutrient sources, and water availability. In this study, we examined the bacterial and fungal endolithic community structure of different rock samples collected from four sites in Svalbard (Fig. 1). The main objectives of this work were (1) to investigate major members of bacteria and fungi colonizing the endolithic environment of Svalbard in the Arctic, and (2) to compare the endolithic microbes living other habitats.

**Materials and Methods**

Rock samples were collected in August 2014 at four sites in Svalbard, Norway. Samples were collected with hardened steel chisels that were flame sterilized in the field with 100% ethanol. Rock samples at each site were collected into sterile, plastic tubes and bags, and transported to the laboratory in icebox keeping under ~4ºC. For scanning electron microscopy (SEM), the rock samples were lyophilized and a two-step gold coating process was performed using the micoater machine. Statistical analyses were performed using the vegan R package.

**Results**

In field fracturing of rock samples revealed possibility of the presence of endolithic communities in several points. Scanning electron microscopy (SEM) analysis of the rock samples clearly revealed a diversity of microbiological structures, including both bacteria and fungi (Fig. 3). Hyphal structures were clearly visible on surfaces of all rock types, as well as microbacterial (data not shown). The fungi are characterized by spindle-shaped swellings along the hyphae, and by spherical swellings inter-connected with the hyphae. Both bacterial and fungal communities showed slight variation between different rock types.

**Conclusions and Implications**

Although harsh conditions of Arctic have been thought to limit microbial diversity and richness within endolithic communities, we present data of Arctic endolithic community that is diverse and abundant. Our results show that various rocks in Svalbard are capable of harboring diverse microbial communities, despite the inhospitable habitats. Our study also provide insight into geological processes that shape the biosphere and help us understand the cold and dry environments possibly elsewhere in the Solar System.

**References**


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