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Biological soil crusts from arctic environments: characterization of the prokaryotic community and exopolysaccharidic matrix analysis.

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Biological soil crusts (BSCs) are highly specialized topsoil microbial communities widespread in many ecosystems, from deserts to polar regions. BSCs play an active role in promoting soil fertility and plant growth. In Arctic environments BSCs are involved in promoting primary succession after deglaciation, increasing moisture availability and nutrient immission at the topsoil. The organisms residing on BSCs produce extracellular polymeric substances (EPS) in response to the environmental characteristics, thus contributing to the increase of constraint tolerance.
The aim of this study was to investigate the taxonomic diversity of microbial communities, together with the analysis of the chemical features of EPS, from BSC samples collected in several sites near Ny-Ålesund, Norway.
The phylogenetic composition of the prokaryotic community was assessed through a metagenomic approach.
Exopolysaccharidic fractions were quantified using ion-exchange chromatography to determine the monosaccharidic composition. Size exclusion chromatography was used to determine the distribution of the EPS fractions.
Abundance of phototrophic microorganisms, which are known to contribute to EPS excretion, was also evaluated.
Results underlined the complexity of the microbial communities, showing a high level of diversity within the BSC sampled analyzed. The analysis of the polysaccharide composition displayed a high number of constituent sugars; the matrix was found to be constituted by two main fractions, a higher molecular weight (2 10 exp(6) Da) and a lower molecular weight fraction (< 100 10 exp(3) Da).
This study presents novel data concerning EPS of BSCs matrix in relationship with the microbial communities in cold environments.