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| **National Report to SCAR for year 2024** | | | | | | |
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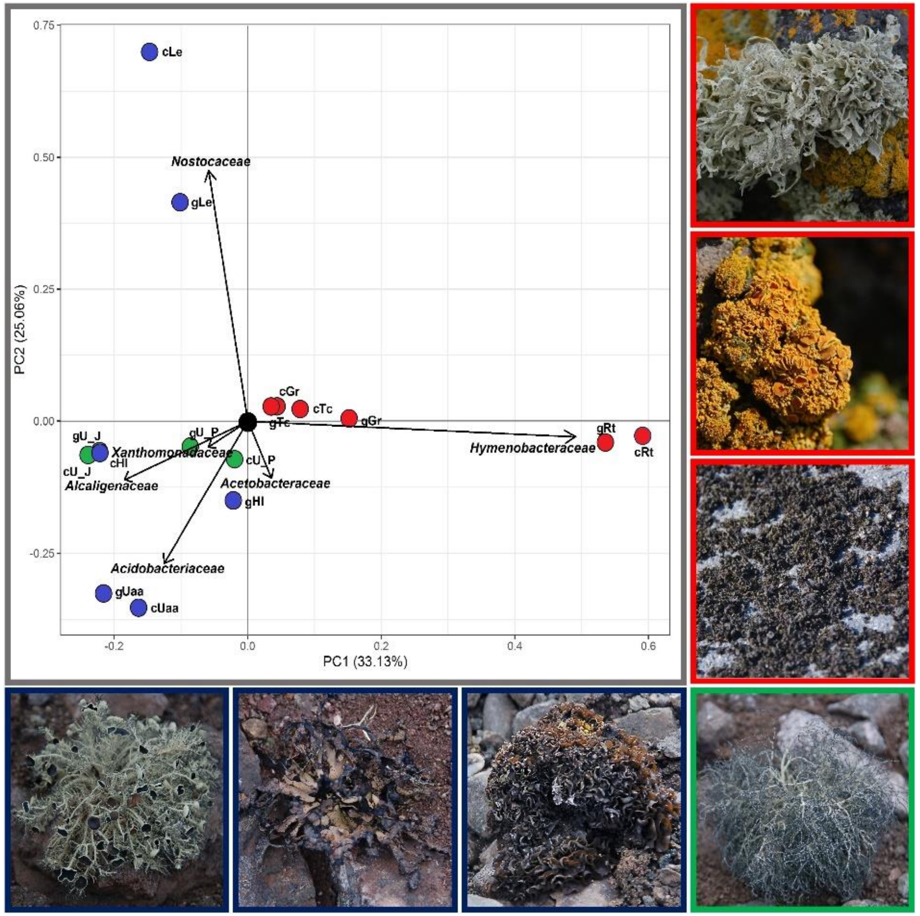
| **A BRIEF SUMMARY OF SCIENTIFIC HIGHLIGHTS:** | | | | | | |
| *See the following pages* | | | | | | |

**Woltyńska A., Gawor J., Olech M. A., Górniak D., Grzesiak J. 2023. Bacterial communities of Antarctic lichens explored by gDNA and cDNA 16S rRNA gene amplicon sequencing. *FEMS Microbiology Ecology* 99: 3.**

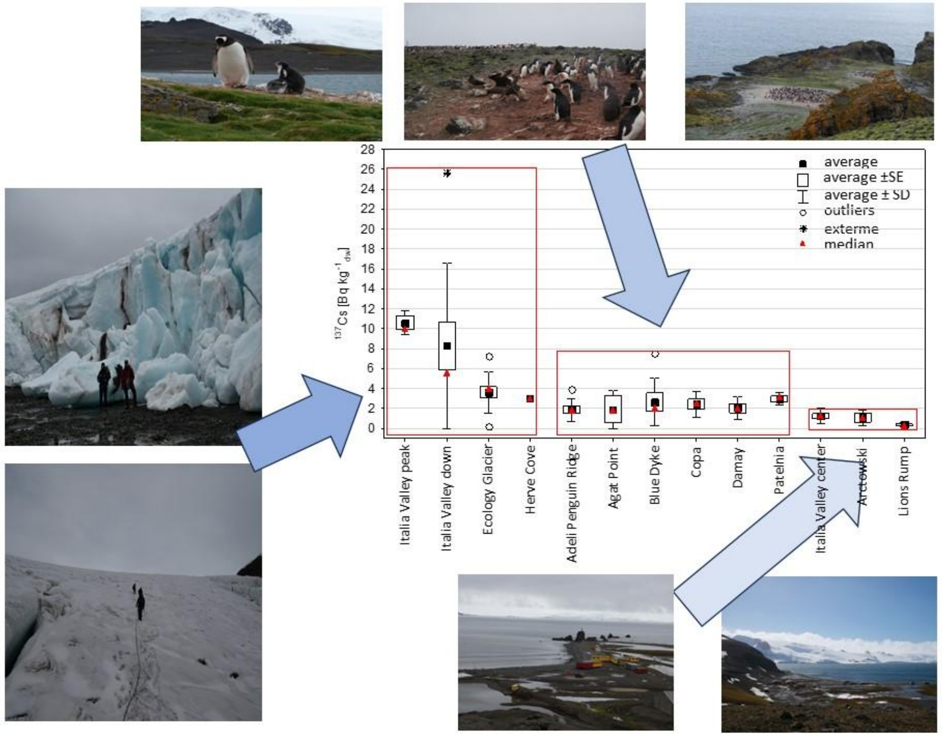
Recently, lichens came once more into the scientific spotlight due to their unique relations with Prokaryotes. Lichen species in several temperate regions have been thoroughly explored in this regard yet, the information on Antarctic lichens and their associated bacteriobiomes is lacking. In this paper, we assessed the phylogenetic structure of the whole and active fractions of bacterial communities housed by Antarctic lichens growing in different environmental conditions by targeted 16S rRNA gene amplicon sequencing. Bacterial communities associated with lichens procured from a nitrogen enriched site were very distinct from the communities isolated from lichens of a nitrogen depleted site. The former were characterized by substantial contributions of Bacteroidetes phylum members and the elusive Armatimonadetes. At the nutrient-poor site the lichen-associated bacteriobiome structure was unique for each lichen species, with chlorolichens being occupied largely by Proteobacteria. Lichen species with a pronounced discrepancy in diversity between the whole and active fractions of their bacterial communities had the widest ecological amplitude, hinting that the non-active part of the community is a reservoir of latent stress coping mechanisms. This is the first investigation to make use of targeted metatranscriptomics to infer the bacterial biodiversity in Antarctic lichens.




Principal Component Analysis of lichen-associated bacterial communities based on family-rank group abundances with photographs of lichen hosts (from top right to bottom left): *Ramalina terebrata*; *Gondwania regalis*; *Turgidosculum complicatulum*; *Usnea antarctica*; *Leptogium puberulum*; *Himantormia lugubris*; *Usnea aurantiaco-atra*.

**Saniewski M., Wietrzyk-Pełka P., Węgrzyn M.H., Saniewska D., Bałazy P., Zalewska T. 2023. Distribution of $^{90}$Sr and $^{137}$Cs in biotic and abiotic elements of the coastal zone of the King George Island (South Shetland Archipelago, Antarctic Peninsula).** ***Chemosphere*** **322: 138218.**

Antarctica, often considered a pristine and unpolluted area, has been found to contain radioactive pollution from anthropogenic sources. The primary contaminants are the radioisotopes $^{90}$Sr (Strontium-90) and $^{137}$Cs (Cesium-137), which are remnants from nuclear weapon tests conducted in the mid-20$^{th}$ century. The study showed that these radioisotopes were present in green algae, bryophytes (mosses), lichens, vascular plants, soil, and guano. The highest concentrations of $^{137}$Cs were found in soil samples near glaciers and penguin colonies. As glaciers melt, they release trapped radioisotopes into the surrounding environment. Bird guano, especially from penguin colonies, also contributes to redistributing these isotopes. Additionally, the ratio $^{137}$Cs/$^{90}$Sr in vascular plants collected in the vicinity of glaciers was at a similar level compared to the integrated deposition ratio of $^{137}$Cs/$^{90}$Sr to the Southern Hemisphere after fallout. Despite being over 60 years since the primary contamination events, these radioisotopes remain measurable in the Antarctic environment and have remained in similar activities for more than 20 years, indicating their ongoing redistribution. The study emphasizes the far-reaching effects of human activities, even in remote and seemingly untouched environments like Antarctica. The presence of $^{90}$Sr and $^{137}$Cs highlights the importance of continuous monitoring and research to understand the long-term environmental impact of anthropogenic pollutants.




Spatial variability of $^{137}$Cs activity from King George Island in different biota samples.

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24. Wójcik-Długoborska K.A. 2023. The Glacial Meltwater Turbidity Algorithm (GaMTA): Adaptation of single-band algorithm retrieving turbidity to satellite and UAV dataset from highly glaciated Antarctic region. *Regional Studies in Marine Science* 58: 102798.