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Enduring the Antarctic Extremes: from humans inside Concordia Station to the microbes outside

Concordia Station in Antarctica is located on a 3200 meter-high plateau, harboring temperatures permanently below freezing (reaching to a staggering -80 °C), hypoxia, high fluence of solar UV radiation, desiccation and low nutrient availability in the surrounding snow. Indeed, these extremes make for hostile living situations for adventurous humans and extremotolerant microorganisms alike. As such, Concordia Station acts as a great analogue for space exploration, providing opportunities to study human adaptation in extreme environments as well as to monitor the microbial communities found in the surrounding surface snow.

This talk will begin with Dr. Adrianos Golemis sharing his year-long experience as the ESA research medical doctor at Concordia Station in 2014. As one of the most isolated permanently inhabited stations on Earth, Concordia is 600 km from the nearest human outpost and is only accessible during the summer months. Golemis will recount the wonders and challenges associated with living on a seemingly "white Mars" and his participation in one of the many ESA-funded projects, namely sample collection for the BacFinder project (ESA project No. AO-13-Concordia-23). The BacFinder project encompassed a two-year study (2015-2016), during which surface snow was sampled monthly at three areas varying in proximity (10 m, 500 m, and 1 km) to the Concordia Station and then phylogenetically profiled via sequencing of the 16S rRNA gene to identify microbial presence and abundance with respect to seasonal changes and human activity. In the second part of the talk, Nikea Ulrich will detail the study findings from her time spent as a Fulbright researcher in the Space Microbiology Research Group. While harboring low microbial diversity, the snow samples were characterized by heterogeneous microbiomes. Interestingly, snow samples were found to have a core microbiome consisting of the genera *Delftia*, *Acinetobacter*, *Micrococcus*, and *Pseudomonas*, which persisted regardless of the measured environmental factors and level of human activity. Ultimately, this study will further inform improvements or modifications to the existing techniques to interrogate the microbial ecology in extreme (sub-zero) environments as well as provide suggestions for future life-detection driven space missions.