

How resilient are Antarctic soil bacteria in a tropical climate?

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In recent decades, there has been a noticeable increase in the number of people travelling to and from Antarctica, especially to the South Shetland Islands, King George Island (KGI), and Deception Island (DCI). Therefore, unintentional soil transfer to other warmer regions, like tropical countries, may result from such movements. At the moment, it is unclear if the Antarctic soil bacteria can endure in a tropical climate and whether any of the surviving bacteria are harmful. Therefore, the objectives of this research were (i) to determine the baseline bacterial diversity of the soils at the study locations on the two islands and (ii) to determine whether simulating tropical-like climate growth conditions would affect overall diversity or increase the abundance of potentially harmful bacteria in the Antarctic soils. KGI and DCI soils were incubated for 12 months under simulated tropical conditions. Soil samples were taken in the sixth and twelfth months, and their bacterial population was analyzed through the metagenome 16S rDNA sequence analysis. By the 12th month, DNA fragment bacterial diversity fingerprint patterns on the denaturing gradient gel electrophoresis (DGGE) bacterial diversity had changed. A more detailed bacterial diversity analysis for KGI and DCI soils was then performed by using an Illumina MiSeq sequencer targeting the V3-V4 region of the 16S rDNA. The results showed that Actinobacteria, Proteobacteria, and Verrucomicrobia were the three main bacterial phyla found in KGI and DCI soils. The majority of phyla in both soils failed to acclimatize to simulated tropical conditions, except Proteobacteria in KGI soils and Acidobacteria and Chloroflexi in DCI soils. At the genus level, changes in diversity have been observed as well, with *Methylobacterium* spp. predominating in both soils following incubation under tropical conditions. Potentially pathogenic bacteria like *Mycobacterium*, *Massilia*, and *Williamsia* spp. became more prevalent after the 12th month of incubation, but whether there is any pathogenic species needs further confirmation. Overall, there was a decline in bacterial diversity in both Antarctic soils after a year, indicating that most bacteria from the sampling locations on both islands would not fare well if the soils were unintentionally brought to a warmer tropical environment.