

Microbial Diversity of Terrestrial and Maritime ecosystems in Antarctic Peninsula

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Polar environments are colonized by microorganisms that have evolved a series of adaptations to survive in these cold ecosystems. Psychrophilic and cold-tolerant microorganisms contribute essentially to the processes of nutrient turnover, biomass production and litter decomposition and consequently are strictly connected with climatic change. Moreover, these microorganisms and their cellular constituents or products provide a large biotechnological potential. The objective of this proposal is to bring together the database generated by scientists of Latin America working in Antarctic Peninsula and to exchange ideas and experiences on an international scale. With this purpose the data generated will cover the biodiversity and biogeography of terrestrial and aquatic ecosystems of the Antarctic Peninsula, including soils, permafrost, ice, lakes, marine waters and sediments. This study will consider broad range group of microorganisms as bacteria, archaea, virus, yeast and filamentous fungi. Microbial community structure analysis based in molecular tools as denaturing gradient gel electrophoresis (DGGE), terminal restriction fragment length (TRFLP) and clone library of 16S rDNA, rpoB and functional genes will be done to give us an understanding of functional and biogeographic relationships. These data are vital for an improved understanding of ecosystems process and the role of microorganisms play in Antarctic environment. Information obtained from soil and permafrost will be compared with data from Arctic region in collaboration with the Canadian activities. Despite these culturable-independent studies, efforts will be done mainly to cultivate not yet culturable microorganisms and physiological, taxonomic studies and exploitation of bacteria and fungi will be developed. In the Uruguayan project the objective is to study the microbial N cycle in the Antarctic ecosystem. In particular the genes involved in each process will be studied (nitrogen-fixation, nifH/vnfH/anfH, ammonia oxidation, amoA and nitrite reduction (denitrification) (nirS/nirK)), as well as 16S rRNA ribotypes. Morphological characterization of the cyanobacteria will be done and attempts will be made to culture these as well as prokaryotes capable of nitrogen-fixation, ammonia oxidation or denitrification. The results obtained from the genomic and the isolated strains will contribute to the database for the present project. The occurrence of virus in birds and mammals of Peninsula will be covered as part of the epidemiological studies of viral diseases spread over a wide geographical range. Programs as Brazilian Antarctic Program have been developed for 24 years in Antarctic Peninsula, but to date relatively few studies has been addressed to improve the knowledge of microbial ecology in Antarctic Peninsula. However the data generated in the region are not organized and accessible. The creation of a database to display the activities, strains isolated and location of culture collections, publications and gene sequences generated from Brazil and Uruguay will be developed to compare the biodiversity and biogeography of Antarctic Peninsula. The integration of this data with the Arctic will be useful to understand the microbial biodiversity in Polar regions.