

# PHYLOGENETIC STUDY OF ANTARCTIC CYANOBACTERIAL STRAINS

**Theme:** Biodiversity conservation indicators

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Cyanobacteria are an important group of bacteria with ability to realize oxygenic photosynthesis and nitrogen fixation. This group is considered the major component of Antarctic ecosystems and classical taxonomic studies have described Antarctic species compositions based mainly on morphological and ecological features. Molecular studies investigating cyanobacteria diversity on Antarctic are in the beginning and only few cultured strains exist. The aims of this study were to isolate cyanobacterial strains from Antarctic continent, identify the isolates using morphological features and investigate the phylogeny of these strains by sequencing of 16S rRNA gene. Field samples from terrestrial environments collected in South Shetlands Archipelago, Antarctic Continent were used for cyanobacteria isolation. Four different culture media (BG-11, BG<sub>0</sub>-11, 3NP and 3) specific for cyanobacteria were used to enhance the number of isolates. Thirty-one cyanobacterial strains were isolated by repeated streaking onto fresh solid media. Morphological evaluation using optical light microscope and specific literature revealed that these strains belong to the Chroococcales (2 strains) Oscillatoriales (16 strains) and Nostocales (13 strains) orders. Ten cyanobacterial strains have their genomic DNA extracted using a modified cetyl-trimethyl-ammonium bromide (CTAB) method. To investigate the phylogeny of each cyanobacteria strain total DNA was used as template for 16S rRNA gene amplification by PCR with the 27F1 and 1494Rc oligonucleotide primer set. The PCR products were cloned and sequenced. BLAST analyses among the almost complete 16S rRNA gene sequences of *Nodularia* sp. ANT3, *Phormidium* sp. 13, *Pseudophormidium* sp. 30.3, *Phormidium* sp. 10C, *Leptolyngbya* sp. 24, *Leptolyngbya* sp. 41C, *Phormidium* sp. 21, *Nostoc* sp. 41D, *Phormidium* sp. 28D and *Chroococcidiopsis* sp. 1 showed similarities ranging from 96 to 99% with other cyanobacterial sequences available in public database. The sequences obtained from *Nodularia* sp. ANT3 isolated from sediment of a geothermal lake in Deception Island, *Nostoc* sp. 41D isolated from a microbial mat in Keller Peninsula, *Phormidium* sp. 13 and *Chroococcidiopsis* sp. 1 isolated from rock in Baranowski glacier had the highest similarities with sequences of strains found outside Antarctic, whilst the sequences of the remaining isolates had the highest similarities to members originated from several Antarctic areas. The relationship among these strains was tested using Neighbor-Joining analysis, which showed coherent positions of the isolates on the phylogenetic tree according to genera level.

**Keywords:** cyanobacterial isolation, 16S rRNA gene, sequencing, phylogenetic analysis

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