

## 6.0 CONCLUSION

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Actinobacteria, formerly known as actinomycetes, is known as the most common high G+C, Gram-positive bacteria found in soils. Actinobacteria produce a vast array of secondary metabolites which contribute to the agricultural, medicinal and pharmaceutical fields.

In this study, ninety five actinobacterial strains were isolated from different locations in Signy Island namely Elephant Flats, Three Lakes Valley, Backslope, Spindrift-Col and Gourlay Peninsular by using various isolation media. All actinobacterial strains isolated were divided into fifteen colour groups based on combinations of aerial mycelia and substrate mycelia colour.

DNA extracted from all the soil samples and the ninety five isolated actinobacterial strains were used as nested PCR with actinobacterial specific primers and all samples showed a 640 bp length of 16S rRNA gene. Thus this supports the presence of actinobacterial strains in Antarctic soil samples. Various characterization methods such as morphological examination, Gram stain examination, cover slip examination, analysis of DAP isomers, ARDRA methods and nucleotide sequencing were employed to characterize all the ninety five actinobacterial strains and group them up to a genus level (Table 5.1).

ARDRA technique was employed to differentiate the strains up to genus level. The ninety five isolates were divided into sixteen groups respectively according to their restriction patterns by using two restriction enzymes, *BssMI* and *HhaI*. Representatives of each group sent for sequencing showed high similarity to *Actinobacterium* P23, *Actinobacterium* kmd\_307, *Demetria terrigena*, *Glaciibacter superstes*, *Humicoccus* sp., *Kocuria* sp., *Marmoricola aequoreus*, *Microbacterium* sp., *Micrococcus luteus*,

*Mycobacterium* sp., *Nocardia ninae*, *Rhodococcus* sp., *Rhodococcus corynebacterioides*, *Streptomyces argenteolus*, *Streptomyces beijiagensis* and *Tsukamurella* sp. This shows that identification of actinobacteria was successfully done by using ARDRA method and nucleotide sequencing.

All actinobacterial isolates were tested for antimicrobial activity and a total of forty six isolates showed positive results for antimicrobial activity against *Staphylococcus aureus*, *Staphylococcus epidermidis* and *Proteus vulgaris*. Screening of NRPS systems was employed because NRPS are largely involved in the synthesis of secondary metabolites which can contribute to the medical field. NRPS systems were detected in seventy nine actinobacterial strains. Detection of NRPS systems in majority of the strains revealed that they might possess potential antimicrobial activity.

This study shows that a large number of actinobacterial strains could be isolated from maritime Antarctic soils. Many of the isolates produced antibacterial activity against three test organisms. Therefore, Antarctica soils may harbour novel actinobacteria which may produce new antimicrobial compounds.