Potential diesel and phenol biodegradation by the Antarctic bacterium *Rhodococcus* sp. strain AQ5-07

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The potential study of Antarctic microorganisms in bioremediation has been of increasing interest, due to their adaptations to harsh conditions and their metabolic potential in removing a wide variety of organic pollutants at low temperature. However, there is currently inadequate information available about indigenous Antarctic diesel and phenol degraders. Environmental variables such as temperature, pH and salinity are important factors affecting the efficiency of diesel and phenol degradation (Ruberto et al., 2005; Habib et al., 2018). In this study, a psychrophilic bacterium from King George Island, Antarctica (Figure 1) was isolated and identified as *Rhodococcus* sp. strain AQ5-07 by 16S rRNA analysis (Figure 2) (Lee et al., 2018). The optimum conditions of strain AQ5-07 for diesel and phenol degradation were optimized (Table 1). For diesel degradation, strain AQ5–07 displayed optimal cell growth and biodegradation activity at 1% (v/v) of initial diesel concentration, 15-20°C, pH 7 and 0.1 g/L NaCl. While, it optimal phenol degradation occurred at 0.5 g/L phenol, 10-15°C, pH 7.0 and 0.15 g/L NaCl. Based on the results obtained, strain AQ5-07 show good potential as a candidate for biodegradation operations on diesel and phenol contaminated sites in polar region, especially in Antarctica.

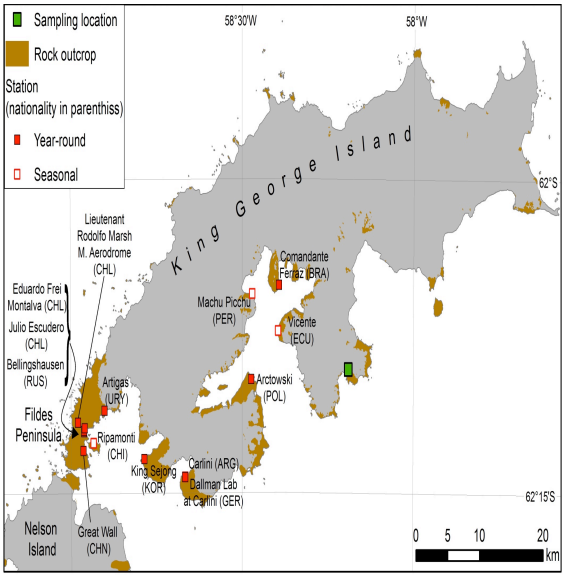

Figure 1. Map of sampling location, King George Island, Antractica.

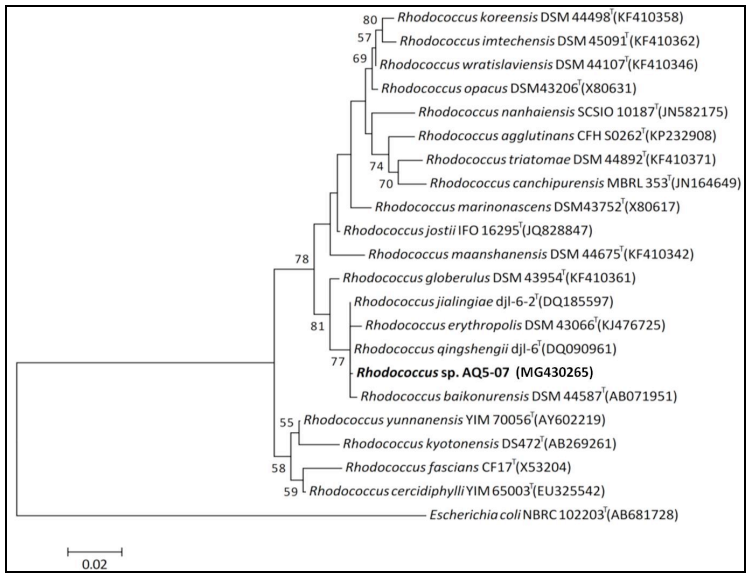

Figure 2. Maximum likelihood phylogenetic tree of strain AQ5-07 with 20 related type strains of *Rhodococcus* spp. based on 16S rRNA sequences. *Escherichia coli* was used as an outgroup.

Table 1. Comparison of result from OFAT on diesel and phenol degradation.

Parameter	Optimization	
	Diesel degradation (1%)	Phenol degradation (0.5 g/L)
Temperature (°C)	15-20	10-15
pH	7	7
Salinity (NaCl concentration mg/L)	0.1	0.15

References

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