Biodegradation of phenol and diesel by cold-adapted *Arthrobacter* sp. strain AQ5-05 isolated from Antarctic soil

Siti Aqlima Ahmad[1,2*], Gillian Li Yin Lee[1], Azham Zulkharnain[3], Peter Convey[4], Siti Aisyah Alias[2] and Gerardo González-Rocha[5]

[1]*Department of Biochemistry, Faculty of Biotechnology and Biomolecular Sciences, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia.*
[2]*National Antarctic Research Centre, B303 Level 3, Block B, IPS Building, Universiti Malaya, 50603 Kuala Lumpur, Malaysia.*
[3]*Department of Bioscience and Engineering, College of Systems Engineering and Science, Shibaura Institute of Technology, 307 Fukasaku, Minuma-ku, Saitama, 337-8570, Japan.*
[4]*British Antarctic Survey, NERC, High Cross, Madingley Road, Cambridge CB3 0ET, UK*
[5]*Laboratorio de Investigacion en Agentes Antibacterianos, Facultad de Ciencias Biologicas, Universidad de Concepcion, Concepcion 4070386, Chile.*

**Corresponding author: aqlima@upm.edu.my*

Antarctica can no longer be considered as the last pristine continent, as pollution has locally affected terrestrial and marine coastal ecosystems. Due to the continent's low temperatures, ecosystems in Antarctica are very sensitive to environmental changes, even those associated with minor incidents. Hydrocarbon pollution resulting from human activities such as transportation and power generation poses serious threats to the Antarctic environment. This study addresses the isolation of a phenol- and diesel-degrading bacterial strain from King George Island, Antarctica. Parameters including temperature, pH, salinity and nitrogen source were optimised in order to maximise phenol and diesel degradation using one-factor-at-a-time (OFAT) and response surface methodology (RSM). Statistical analysis of the results obtained from RSM confirmed improvement in phenol and diesel degradation compared to the conventional OFAT approach. *Arthrobacter* sp. strain AQ5-05, capable of degrading 0.5 g/L phenol (100%) and 3% of diesel (56.32%) at 10-15°C. In addition, enzyme activities were investigated and genes encoding phenol and diesel degradative enzymes identified using whole genome sequencing in order to determine the pathways of phenol and diesel degradation. This study suggests the potential use of cold-adapted bacterium, *Arthrobacter* sp. strain AQ5-05 in the bioremediation of phenol and diesel over a wide range of low temperatures.

References

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