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Naphthalene and pyrene degradation by novel bacterial strains isolated from an oil-polluted site in the Arabian Gulf

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Brevibacillus brevis (T2C2008), Proteus mirabilis (T2A12001) and Rhodococcus qinshengii (TA13008) were tested to unravel their degrading efficiency for low molecular weight (LMW) and high molecular weight (HMW) polycyclic aromatic hydrocarbons (PAHs). The strains were isolated in previous research that focused on the microbial community structure and potential degraders of hydrocarbons in oil-contaminated sites in the Arabian Gulf. The bacterial isolates PAHs degrading efficiency was trialed at temperatures 25 °C and 37 °C and pH values 5.0 and 9.0. Each media was spiked with 100 mg/L naphthalene and pyrene and followed by incubation at the chosen temperatures and pH. Rhodococcus qinshengii metabolized close to 56% pyrene at 37 °C. Naphthalene was completely mineralized in R. qinshengii inoculated media at 37 °C. At room temperature (25 °C), Brevibacillus brevis metabolized over 80% naphthalene. Approximately, 94% naphthalene biodegradation was observed in P. mirabilis and R. qinshengii incubated media. Rhodococcus qinshengii showed unique degradation potentials under varying pH conditions as the strain's mineralization was above 50% pyrene across the pH values investigated. Given that Proteus mirabilis and Brevibacillus brevis actively mediated the degradation naphthalene, the strains could be suitable for decontamination of environments polluted with LMW PAHs. Rhodococcus qinshengii biodegradation overall, exceeded half the concentration of the spiked naphthalene and pyrene, at varying temperatures and pH, implying that the strain could be suitable for degrading PAHs in suboptimal environments contaminated with hydrocarbons.