

Characterizing a piezotolerant catalase-producing *Halomonas piezotolerans* bacterium isolated from the New Britain Trench

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Hydrogen peroxide (H₂O₂) is widely used in paper, food, textile, and wastewater treatment industries as a bleaching or microbicidal agent. Usually, H₂O₂ used in these industries should be removed by catalase before further treatment. In this study, a piezotolerant *Halomonas piezotolerans* (strain NBT06E8^T) was isolated from deep-sea sediment of New Britain Trench at depth of 8900 m. The strain was aerobic, motile, Gram-stain negative, rod-shaped, oxidase-positive and catalase-positive. Growth of the strain was observed at 4–45 °C (optimum, 30 °C), at pH 5–11 (optimum, pH 8–9) and in 0.5–21% (w/v) NaCl (optimum, 3–7%). The optimal pressure for growth was 0.1–30 MPa with tolerance up to 60 MPa. Under optimal growth conditions, the strain could tolerate 15 mM H₂O₂. The purified catalase (*KatE*) was obtained by heterologous expression in *Escherichia coli* and Ni-NTA agarose gel column method. The enzymatic characteristics showed that the optimal substrate concentration was 60 mM, the optimal enzymatic activity temperature and pH were 20 °C and 7, respectively. The optimal salinity was between 2–4%. New findings on oxidative stress mechanisms of this strain will broaden our knowledge of stress adaptation of deep-sea bacteria and potentiate the biotechnological application of *Halomonas* species in the future.