

Effects of Salt Concentration on the Growth of Halophiles from Mariana Trench under High Pressures

Hideyuki Tamegai

College of Humanities and Sciences, Nihon University

Summary

Oceans occupy about 70% of the earth. Recently, some bacteria were isolated from the deep sea, and it has been found that they represent a relatively unexplored viable environment. Deep sea is the environment of high pressure and high salinity. The organisms living there should be adapted with such extreme environment. Recently, we used *Escherichia coli* as a model organism for the investigation of relationship between salt concentration on growth and piezotolerance. As a result, relatively high salt concentrations improved the growth of *E. coli* under high hydrostatic pressures. However, *E. coli* is not deep-sea organism. The relationship between salt concentration on growth and piezotolerance of the deep-sea bacteria is still unclear. In this study, I carried out the taxonomic study of halophilic bacterium isolated from the mud of Mariana Trench, one of the deepest areas on the Earth. Further, I investigated the relationship between salt concentration on growth and piezotolerance using *Pseudomonas* sp. MT-1, also isolated from the mud of Mariana Trench.

At first, moderately halophilic strain DT-C was isolated from the mud of the Mariana Trench. Cells of the organism were rod-shaped (3 μm x 1.5 μm) with polar flagella. Growth occurred in a NaCl concentration of about 0.1-15% (optimal: 1-5%), at pH of 5-10, and at temperatures ranging from 4-48 $^{\circ}\text{C}$ (optimal: 35 $^{\circ}\text{C}$). The results of 16S rDNA analysis and DNA-DNA hybridization analyses showed that DT-C was closely related to *Idiomarina zobellii* which is also isolated from the deep sea.

Further, I found that relatively high salt concentrations improved the growth of MT-1 under high hydrostatic pressures. This phenomenon cannot be observed in the case of related bacterial strains, and it can be said that this is one of the mechanisms for the adaptation of MT-1 for the environment of deep sea. I can show the novel character of salts in this study.