

Diversity and distribution of Archaea at hydrothermal vents and drilled boreholes in South Mariana

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To find new biological phenomena and invaluable bio/gene resources, many people are interested in marine extreme environments, such as deep-sea hydrothermal vent and sub-vent regions. However, the difficulty in approaching and collecting samples from such extreme environments prevents further progress in bio science and technology. Taking advantage of an opportunity of drilling in the vicinity of deep-sea hydrothermal vents in the Archaean Park Project, we developed some new instruments e.g., catheter-type in situ growth chamber for finding unexplored inside of the hydrothermal vents and sub-vent microbes and genes. In this study, using modified in situ growth chambers, we investigated microbial diversity and distribution in several hydrothermal vents and drilled boreholes in South Mariana.

After excavation trials to a hydrothermal subsurface biosphere of South Mariana, microbial diversity was examined using samples collected from drilled boreholes and natural vents with a catheter-type in situ microbial entrapment/incubator. This instrument consisted of a heat-tolerant cylindrical pipe with entrapment of a titanium-mesh capsule, containing sterilized inorganic porous grains, on the tip. After 1-3 day deployment in venting fluids with the maximum temperatures from 15 to 320degC, microbial DNA was extracted from the grains and a 16S rDNA region was amplified and sequenced.

Through the phylogenetic analysis of Archaea clones, hyperthermophilic lithoautotrophic Archaeon, *Ignicoccus* was only detected from the vent-catheter sample deployed in the hydrothermal vent at 80-100 degC, as same as the previous study in Suiyo Seamount. Moreover, a phylogenetically unique clone closely related to *Nanoarchaeum* was also detected in the same sample. These results suggest that 1) this in situ incubation method has advantage to get microbial samples from deep inside of the vent and 2) those obtained phylotypes are significant member of the sub-vent biosphere at least in the northwest Pacific Ocean. Further quantitative population analysis is now under going using these samples.