Diversity of Cultivable Bacteria and Their Extracellular Enzymes in the Water Column of the New Britain Trench

QIANFENG LIU[1], JIASONG FANG[2]

1State Key Laboratory of Marine Geology, Tongji University, Shanghai 200092, China 2013qfl@tongji.edu.cn

2The Hadal Science and Technology Research Center and College of Marine Science, Shanghai Ocean University, Shanghai 201306, China jfang@hpu.edu

Most of the organic matter produced in the photic zone is recycled in the upper layer of the ocean, however, an estimated 0.1 % of the production is exported downwards through the water column and ultimately buried in sediments. Recent investigations show that marine bacteria play an important role in biogeochemical cycle in the mesopelagic and bathypelagic waters. However, the diversity of the bacteria in the deep ocean and their extracellular enzymes are largely unknown. In this work, we investigated the diversity of cultivable bacteria and their extracellular enzyme in seawater from eight different depths of the New Britain Trench. The 16S rRNA sequence analysis revealed that the cultivable bacteria were affiliated with the phyla Proteobacteria and Actinobacteria, and the predominant genera were *Pseudoalteromonas* (62.7%) and *Halomonas* (17.3%). Moreover, 78.7% of the cultivable bacteria could produce extracellular enzymes to hydrolyze casein, gelatin, starch or triacetin. Among these strains, 78% were found to produce hydrolytic zone on casein-gelatin plates, in which *Pseudoalteromonas* species show relatively high protease production. Inhibitor analysis showed that nearly all the extracellular proteases from the bacteria are serine protease or metalloproteases. These results show that there is a great diversity of cultivable bacteria in the water column of the New Britain Trench, which produce diverse extracellular enzymes.