

## Compositional and functional shift in epibiotic bacterial community of hydrothermal vent crustacean during methane-fed rearing

Kaori Motoki<sup>1, 2, \*</sup>, Tomo-o Watsuji<sup>2</sup>, Emi Hada<sup>2</sup>, Yukiko Nagai<sup>2, 3</sup>, Yoshihiro Takaki<sup>2</sup>, Asami Yamamoto<sup>1, 3</sup>, Kenji Ueda<sup>1</sup>, Takashi Toyofuku<sup>2</sup>, Hiroyuki Yamamoto<sup>2</sup>, Ken Takai<sup>2</sup>

<sup>1</sup>Nihon University, Kanagawa, Japan; kaori@bs.s.u-tokyo.ac.jp

<sup>2</sup>Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Kanagawa, Japan

<sup>3</sup>Yokohama National University, Kanagawa, Japan

\*Present Affiliation: Graduate School of Science, The University of Tokyo, Tokyo, Japan

The squat lobster *Shinkaia crosnieri* inhabiting deep-sea hydrothermal vent fields and cold seeps in the Okinawa Trough are known to harbor bacteria (epibionts) that adhere to the surface of setae on the ventral side of the body. The epibiotic communities associated with *S. crosnieri* are dominated by actual or potential thioautotrophic and methanotrophic epibionts belonging to three families within the class  $\epsilon$ - and  $\gamma$ -Proteobacteria. These are the genus *Sulfurovum* and the family Thiotrichaceae and Methylococcaceae. It seems very likely that the dominance of such groups in the epibiotic bacterial community would be sustained by the supply of the energy and carbon sources from the hydrothermal fluid discharge. However the hypothesis has not yet been demonstrated.

To test the hypothesis, we designed the rearing experiment and assessed the compositional and functional shift in the epibiotic bacterial community by using microscopic observations, culture-dependent and -independent techniques and functional measurements.

We succeeded to rear *S. crosnieri*, which is proven to utilize epibiotic bacteria as the primary nutrient source, in a tank fed with methane for one year. After rearing, the overall phylogenetic composition of epibiotic community was drastically changed from the chemolithotrophs-dominating one. The predominant thioautotrophic populations such as *Sulfurovum* and Thiotrichaceae disappeared probably due to the lack of energy sources. On the other hands, the indigenous Methylococcaceae and the  $\beta$ -Proteobacterial methylotrophic members adapted the rearing tank supplied with the methane. This adaptation may have a potential of cross-feeding of the methanotrophs and methylotrophs. These results suggest that the composition and function of *S. crosnieri* epibiotic bacterial community is significantly affected by the mass balance that the supply of energy and carbon sources, production and consumption of organic compounds. (1800字)