

深海に棲息する巨大ウイルスの生態
Ecology of giant virus in deep ocean

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研究成果概要

Giant viruses (GVs) are large double-stranded DNA viruses that infect a variety of eukaryotic microorganisms. According to the large-scale metagenomic data analyses, GV are proved to be broadly distributed at a high density and exhibit infectious activity in the ocean, potentially play critical roles in the ecological and evolutionary dynamics of eukaryotic communities.

In the marine system, knowledge about GV is so far mainly focused on the photic zone. The investigations of GV in the aphotic layer (at depths below 200 m) are limited because of the lower organism density and the high difficulty to conduct a large volume of sampling for extracting high-quality of DNA and RNA from eukaryotic microorganisms and viruses. So far only few studies reported focusing on conserved marker genes with low phylogenetic resolution.

In this research, metagenome, metabarcoding and metatranscriptome sequencing results were obtained by sampling at both surface and mesopelagic layer (320 m) seasonally in muroto. GV bins were assembled and analyzed by megahit, trinity, blast and so on through supercomputer. Based on the previous genome assemble pipeline, 4 GV bins were assembled in mesopelagic layer from 5 samples, and 17 bins were assembled in surface layer from 2 samples. The result showed that GV are less diversity in mesopelagic layer than in the surface. The GV bins abundance results showed that in the mesopelagic layer, GV were persistent during the whole year, whereas GV bins showed seasonally changing. Community composition of eukaryotic microorganisms, which served as host of GV, also showed the same trend between surface deep sea. That indicate that GV communities may also evolve a correspond strategy to adapt to such change of their host and a rush environment condition in deep sea layer. Further research will focus on the genetic composition and infectious activity of the GV and probe the interactions between the GV and eukaryotic microbes in the aphotic layer.