Phylotype-specific Productivity of Marine Bacteria in the Western North Pacific, Measured by Bromodeoxyuridine Immunocytochemistry and Fluorescence in Situ Hybridization

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The fundamental questions in marine microbial ecology are “which taxa or phylogenetic groups account for total bacterial productivity?” and “what is the relative contribution of each?” Answers to these are substantially important to our understanding of the food web dynamics and biogeochemical cycles in the ocean. We have developed a novel technique, named bromodeoxyuridine immunocytochemistry–fluorescence *in situ* hybridization (BIC–FISH) and, successfully compared phylotype–specific productivity in the western North Pacific (WNP). Monitoring by BIC–FISH in the WNP revealed the importance of the Bacteroidetes and *Roseobacter/Rhodobacter* groups as a constantly proliferating basic population (33% and 10% of all BrdU–positive cells, respectively), although their contribution was not significantly correlated with water temperature or with chlorophyll *a* or organic matter concentration. However, *Alteromonas* group, known as numerically minor group in the open ocean, were abundant and were actively proliferating in the high chlorophyll *a* stations (up to 18% of all BrdU–positive cells). Their abundance and activity correlated strongly with chlorophyll *a* and organic matter concentrations. It implies that this group should play an important role in secondary production and nutrient regeneration as a specialist to consume organic matter derived from phytoplankton bloom in the WNP. The BrdU approach would be one of the reliable, powerful tools for a better understanding of the linkage between organic matter and bacterial communities.

Keywords: Bacterial community composition; Bacterial productivity; Bromodeoxyuridine; Fluorescence *in situ* hybidization.

References

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