IMPORTANCE OF SHELL ATTACHED ORGANIC MATTER FOR OYSTER FOOD SOURCE IN HIROSHIMA BAY, SETO INLAND SEA

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An oyster (*Crassostrea gigas*) is cultured in the world coastal area, and the Hiroshima bay is one of the most important oyster culture fields in Japan. An oyster is a typical filter feeder and had been considered to be feeding on free-living phytoplankton in the water column. However, the carbon stable isotope ratios ($\delta^{13}C$ value) of oysters were from –16 to –15 ‰, very high compared with that of particulate organic matter (POM) reported by the preliminary experiments. The $\delta^{13}C$ value indicates that the oysters are not feeding only free-living phytoplankton. In this study, we focused on the oyster shell attached organic matter and cleared its importance as food source for oyster.

The experimental oyster culture were carried out in the inner part of the Hiroshima Bay from September 1999 to September 2000 in order to clear the seasonal variation of carbon and nitrogen stable isotope ratios ($\delta^{13}C$ and $\delta^{15}N$ value) in the oysters, shell attached organic matter of the oysters and particulate organic matter (POM). From the results of culture experiments, the $\delta^{13}C$ and $\delta^{15}N$ values of oyster fluctuated -16.3 ± 0.4 ‰, 12.2 ± 0.8 ‰ (n=72), respectively. The $\delta^{13}C$ and $\delta^{15}N$ values of oyster are near to those of the shell attached organic matter of the oysters ($\delta^{13}C = -18.2 \pm 1.3$ ‰, $\delta^{15}N = 12.2 \pm 1.5$ ‰, n=8) rather than those of POM($\delta^{13}C = -20.2 \pm 1.2$ ‰, $\delta^{15}N = 8.5 \pm 1.7$ ‰, n=24). These results indicated that more energy for oyster was derived from the shell attached organic matter rather than POM.

On October 2002, we collected soft shell attached organic matter (SAOM), hard shell attached organic matter (HAOM), gut contents of oyster and POM samples in the same station. We analyzed phytoplankton composition and $\delta^{13}C$ and $\delta^{15}N$ values of these samples. The $\delta^{13}C$ and $\delta^{15}N$ values of gut content of oyster were –16.9 ‰ and 10.5 ‰, respectively, which were similar to those of SAOM ($\delta^{13}C = -15.1$ ‰, $\delta^{15}N = 11.2$ ‰) and HAOM ($\delta^{13}C = -15.0$ ‰, $\delta^{15}N = 12.3$‰), rather than those of POM ($\delta^{13}C = -21.2$ ‰, $\delta^{15}N = 7.2$ ‰). Moreover, the relative abundance of *Navicula* spp., the attached diatom, is high (10.4 %) in gut content of oyster, compared with POM (2.8 %).

From these results, we concluded that oysters are feeding on the shell attached organic matter rather than POM. This conclusion gives very important knowledge for the management and development of oyster culture system in the world.