

Food web analysis using stable carbon and nitrogen isotopic ratios: from the shallow to deep water in Toyama Bay

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The isotopic ratios of stable carbon and nitrogen are useful to clarify the influence that the environmental changes (e.g. climate changes) on marine food web. The main aim of this study was to explore the food web in Toyama Bay, which has different water mass structure in the water shallower than approximately 200m and the water deeper than that. The aquatic sample of fishes and zooplankton inhabiting in the water shallower than 200m and in the water deeper than 200m, sinking particles, sedimentary organic matter and POM (particulate organic matter) were collected in Toyama Bay. We also collected sample of zooplankton and POM in Yamato basin, Central Japan Sea, and analyzed the stable carbon and nitrogen isotopic ratios of these sample. From the analysis results, we reached following findings. Aquatic creatures of both the shallow water and the deep water in Toyama Bay are located on a food web starting from POM and it is considered that phytoplankton produced near the sea surface is the primary producer. The $\delta^{13}\text{C}$ values of zooplankton collected in Toyama Bay were higher than those from Yamato basin. It is inferred that the growth rate of the phytoplankton in Toyama Bay is faster. The $\delta^{15}\text{N}$ values of the fish inhabiting in the deep water are higher than the fish inhabiting in the shallow water. In the deep water, there were scavengers and zooplankton whose $\delta^{15}\text{N}$ values are higher than those in the shallow water suggesting that they raised the trophic level. Furthermore, the $\delta^{15}\text{N}$ level of POM collected in Toyama Bay and Yamato basin were low with the average of 3.3 ‰, it is suggested that the $\delta^{15}\text{N}$ value of primary producers is low.

Keywords: Stable isotope, carbon and nitrogen, Food web