Evaluations of Carrying Capacity and Lower Trophic Levels in Coastal Waters

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Summary

As a part of a research program on sustainable exploitation of biological productivity in coastal waters, destruction of chlorophylls and carotenoids by Japanese oyster *Crassostrea gigas* and scallop *Patinopecten yessoensis*, copepods *Neocalanus cristatus* (CV5), *Pseudocalanus* spp., *Acartia* sp., a salp *Cyclosalpa bakari* and a protozoan *Euplotes* sp. was assessed in Otsuchi Bay, a subarctic ria in the Pacific coast of the northern Honshu, Japan. A large scale commercial culture of scallop and oyster is conducted in the bay. Animals were starved for 24 h and then fed with various phytoplankton cultures over 24 hours in the dark. High pressure liquid chromatography was used to measure concentrations of chlorophylls, derived pheopigments, fucoxanthin and other carotenoids. Oysters and scalloped fed on diatoms produced pyropheophorbide *a* and fucoxanthinol-like pigment as major pigment derivatives in their fecal pellets. These derivatives were consistently dominant in sinking particles under mass culture raft in the bay during one month observation in May, suggesting that these bivalves fed on diatoms mainly. The ratio of Copepods consistently produced pyropheophorbide *a* as a major decomposed matter in their fecal pellets, occupying 79 to 93 % of total of chlorophyll *a*, pyropheophorbide *a*, pheophorbide *a*, chlorophyllide *a* and pheophytin *a*. In contrast, *C. bakari* produced various chlorophyll-*a* derivatives depending on food phytoplankton, but no pyropheophorbide *a* was detected in fecal matter. The degree of destruction of pigments in *Euplotes* sp. digestion was high to produce no pigment derivative. These observations indicate pyropheophorbide *a* is a good indicator of copepod grazing. Based on this, a quantitative approach to evaluate copepod grazing pressure on phytoplankton based on budget of pyropheophorbide *a* is being developed.