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Spatio-temporal relationship between chlorophyll derivatives and eukaryotic microorganisms in a coastal water.

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Chlorophylls(Chls) are essential components of photosynthetic organism (algae), which include Chls-*a*, *b*, *c*, *d*, and *f*. The composition of the photosynthetic pigments including Chls as well as cartenoids and phycobiliproteins can be used as the taxonomic character or the biomarker to distinguish the dominant species in the aquatic ecosystems. While various Chl metabolites are known, their sources in the nature are not clear. Recently, ubiquitous occurrence of cyclopheophorbide *a* enol (cPPB-*a*E) is reported, and its producers, herbivorous protists, were elucidated. Therefore, we inspected that cPPB-*a*E can be able to be the biomarker to detect the feeding activity of protists. To understand the spacial-temporal relationships between the Chl derivatives and microorganisms, pigment analysis by HPLC, calculation of the cells and quantitative analysis using the environmental sequencing were performed.

The results demonstrated that quantity of the Chls and microorganisms were co-related. Chl-*a* was an extremely abundant pigment and much detected in shallow water. A quantitative trend of the cPPB-*a*E was similar to Chl-*a*, but the quantity in deep water in mid summer to early winter was much larger than shallow water. Even though a considerable amount of Chl-*a* was detected, cPPB-*a*E in winter was less abundant than in summer. Those trend shown in cPPB-*a*E was consistent with the abundances of the heterotrophic protists indicated by the environmental sequences.

Keywords: Chlorophyll derivatives, Cyclopheophorbide *a* enol, Protist, Algae