Ecology and diversity of phaeodarians (unicellular zooplankton) around Japan

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Phaeodarians are a group of unicellular zooplankton dwelling in pelagic ocean from the at least Triassic to the present. Phaeodaria have long treated as members of “Radiolaria”, however molecular studies revealed that the group in question belongs to Cercozoa. Phaeodarians occasionally become abundant in ocean, and they are thought to have important roles in the marine food web and the material cycles. We will present the results of our investigations concerning this group during the last five years and discuss about the importance of phaeodarians.
Plankton were sampled from several depths at ca. 40 stations around Japan during 2011–2015. The zooplankton in the samples were sorted and identified under a stereomicroscope in order to clarify the composition of each sample. The 18S rDNA sequences of phaeodarians were determined by single-cell PCR method. Some phaeodarians caught in the East China Sea were cultured to observe their behavior.
The microscopic and genetic analyses revealed that two undescribed phaeodarians live in the deep waters in the Sea of Japan, and they were described as *Aulographis japonica* and *Auloscena pleuroclada*. The former species was abundant through the year, occupying ca. 22% of the total zooplankton biomass on average. The abundance of phaeodarians was also seen in the Kuroshio region, where two species, Aulosphaeridae sp. 1 and Sagosphaeridae sp. 1, occupying 10.2–13.9% of the zooplankton biomass. Another unicellular zooplankton, *Thalassothamnus* sp. 1, was also found in this region. This genus is classified as Entactinaria (Radiolaria) in the current classification system. Our molecular and morphological analyses, however, revealed that the present species is a member of Phaeodaria. Thus, phaeodarians can occasionally become abundant around Japan, but their information is still limited. Further research on unicellular zooplankton near the Japanese Archipelago is necessary for considering the evolution of unicellular organisms in the pelagic ocean.

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