Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

MIS27-04 Room:101B Time:May 19 15:00-15:15

Fine-structure and molecular analyses of symbiotic algae in Radiolaria

Tomoko Yuasa[1*]

[1]Tokyo Gakugei University

Marine, holoplanktonic protist radiolarians retain the algal symbionts within the cytoplasmic bodies. The majority of modern symbionts-bearing radiolarians appear to depend on their symbionts to provide photosynthetically fixed carbon and to maintain the radiolarians in low nutrient environments (e.g., Anderson 1978). Therefore, acquisitions of the photo-symbionts have may have had their survival under low nutrient condition in the geologic time. During symbiotic state, algal symbiont within radiolarians generally appear as yellow-brown minute spheres, several micrometers in diameter. Cyanobacteria, dinoflagellates, prasinophytes, and haptophytes have all been identified as symbionts of radiolarians (e.g. Anderson 1983; Foster et al. 2006; Yuasa et al. 2012). However, the accurate taxonomic affiliation of these symbionts has not been clarified by the lack of diagnostic morphological features, such as theca or flagella, during the symbiotic state. Among them, I was able to establish cultures of the symbiotic dinoflagellate and compared the motile cell morphology and the molecular phylogeny of the SSU rDNA sequences with those of related species. The features of the thecal plate pattern and the molecular phylogenetic analysis indicate that the symbiotic dinoflagellate belongs to the peridinioid genus and species. In addition, based on the ultrastructural features by scanning electron and transmission electron microscopy and the molecular phylogenetic analyses of non-motile cells of other symbiotic algae, I found that radiolarian species contained some other partners; *Synechococcus* sp. (Cyanobacteria), *Chrysochromulina* sp. (Haptophyte) and Chlorophyta gen. sp. This symbiont diversity is in contrast to many corals, which host only dinoflagellates (*Symbiodinium* spp. and others). On the other hand, the symbionts have never co-occurred in a single host radiolarians, so the notion of only one kind of symbiotic algae per individual host has been maintained. A hypothesis would be that radiolarian symbionts originated from some free-living algae. This hypothesis is in agreement with the concept that radiolarians can easily acquire cyanobacteria symbionts *Synechococcus* sp. and *Prochlorococcus* sp. from environmental pools (Foster et al. 2006; Yuasa et al. 2012). Very little is known, however, about the distribution of free-living dinoflagellate, and, as far as we know, there is no evidence for the presence of radiolarian specific dinoflagellate symbionts in the natural environment.

Keywords: Radiolaria, Symbiosis, algae, ultrastructure, molecular phylogeny