Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

BBG021-03 Room:301A Time:May 26 15:00-15:15

Ongoing process of plastid acquisition in dinoflagellates

Haruyo Yamaguchi[1*], Isao Inouye[2]

[1]NIES, [2]University of Tsukuba

Dinoflagellates, comprising about 2,000 species, exhibit remarkable diversity in terms of morphological and ecological properties. It is known that the dinoflagellates acquired their plastid via secondary endosymbiosis so that they are called secondary plants. However, about a half of known species lost their photosynthetic ability secondarily, and turned back to heterotrophic life forms. In the present-day ocean, photosynthetic dinoflagellaltes are important as primary producers together with diatoms and coccolithophorids, while heterotrophic ones play a significant role as primary consumers in microbial loop (or microbial food web).

It is known that some heterotrophic dinoflagellates again turned back to photosynthetic by acquiring new plastids via ”tertiary endosymbioses”. The tertiary endosymbioses are endosymbiotic evolutionary events between the secondary plants and dinoflagellates. Two types of tertiary endosymbioses are known: one is that the plastid is of haptophyte origin (e.g. *Karenia*) and the other diatom origin (e.g. *Durinskia*). The tertiary plastids appropriately work in the dinoflagellate cell as integrated organelles, and they are equally inherited to daughter cells, as are conventional plastids.

The tertiary endosymbiosis should begin by predating a secondary plant. Possible intermediate states between a simple predation and an established tertiary plastid are known in the dinoflagellates. Studies on such dinoflagellates would improve our understanding on evolutionary process of plastid acquisition. I will introduce six dinoflagellate species that would exhibit different evolutionary states of plastid acquisition. These dinoflagellates engulf cryptophytes from outside the cell and temporarily retain their chloroplasts (sometimes with their other organelles) within the cell. Such temporary plastids (symbionts) are called as ”kleptochloroplasts (stolen chloroplasts)”. Specificity between the host and symbiont and residual components of the symbionts are different among species, probably reflecting different states of evolution from preys to integrated plastids. Comparisons of these possibly different states of evolution would provide insights to understand the process of plastid acquisition, and future genome analyses on these dinoflagellates would improve our understanding further.

Dinoflagellates are an algal group that has prospered at least since the Mesozoic era onward. The dramatic changes on manners of nutrition may involve their prosperity. Dinoflagellate cysts remain as microfossils in sediments and are common targets of stratigraphy of the Mesozoic and Cenozoic.

Keywords: algae, dinoflagellate, tertiary endosymbiosis, kleptochloroplast