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


BBG021-05 Room:301A Time:May 26 15:30-15:45

# Dynamics of algal evolution represented by micropaleontological research

Itsuki Suto[1*]

[1]Dpt. Earth & Planet. Sci., Nagoya Univ.

0) Fossil research to know evolution

There is no method to know actual biological evolution without researching fossils, alt-hough most investigation has been held by phylogenic methods. Concerning diatom, there are evolutional studies of fossil species by Yanagisawa & Akiba and report about its valve-size reduction by Finkel et al. (2005) as examples. However, there is hardly any fossil study directly connecting with modern species and its ecology. Therefore, the author will introduce a taxonomic study of fossil diatom genus Chaetoceros, its evolutional event affected by geological and oceanic changes, and the influence to other marine organisms in this presentation. For suchlike studies, it is important to combine ecological information of living species and detail geological one of fossil, cross-cutting collaboration will be needed.

1) Importance of Chaetoceros resting spore studies

The marine diatom genus Chaetoceros is one of the most important taxa in present oceans, especially coastal upwelling regions (Hasle & Syvertsen, 1996). Under nutri-ent-rich conditions, most species reproduce rapidly and form long chains of thin-walled cells, but their valves are not preserved as fossil due to dissolution (Itakura, 2000). On the other hand, as nutrient supplies are depleted, most of them form thick-walled resting spores which sink to the sea floor where they await the return of favorable conditions (McQuoid & Hobson, 1996). The heavily silicified resting spore valves are preserved in sediment as fossils and abundantly occurred from near-shore sediments in association with other fossil diatom valves, therefore, they can provide useful information for recon-structing paleoproductivity and paleoenvironmental changes.

2) Chaetoceros Explosion Event across the Eocene/Oligocene boundary

The taxonomy of resting spores is less well understood because its vegetative frustules are rarely preserved with the spores and their valve structures are simple. No attention, therefore, has been paid to the significance of resting spores from a geological point of view, which contrast well with that the taxonomy and biostratigraphy of fossil dia-toms from Cenozoic sediments have been studied intensively in several oceans by using marine sedimentary successions collected by the DSDP, ODP and IODP.

Recently, a firm taxonomic basis of fossil resting spores formed in biostratigraphic and paleoceanographic research, using Eocene through the Recent samples (e.g. Suto, 2006). As the result, distinct resting spore event (Chaetoceros Explosion Event, CEE), including abrupt increasing of species richness and abundance, and reducing valve sizes was documented from the sediments collected in Norwegian Sea within a ˜6 myr time interval across the Eocene/Oligocene boundary (Suto, 2006, Suto in prep.).

Based on evaluation of the ecologic differences between Chaetoceros and cyst-forming dinoflagellates, Suto (2006) indicated that i) the role of main primary producer might have switched from dinoflagellate in the Eocene to diatom, especially Chaetoceros, in the Oligocene; ii) the conditions in the Norwegian Sea changed from stable with a constant (annual) nutrient supply provided by upwelling in winter in the Eocene, to unstable with a sporadic supply of nutrients by increased vertical mixing in the Ocean after the development of Antarctic Circumpolar Current leading enhanced nutrient supply to the surface waters (Falkowski et al., 2004).

The CEE event was also recognized in the DSDP Holes 366 and 369A, eastern equa-torial Atlantic Ocean (Suto, in prep.), the event, therefore, might occur in all over the world oceans. Moreover, the evolution of the Mysticeti (baleen whales), which consumes a lot of copepods mainly eating diatoms, from the Archaeoceti (paleowhale) across the Eo-cene/Oligocene boundary, coincides with CEE. Consequently, CEE is likely to have en-hanced the evolution of whales (Chaetoceros-baleen whale co-evolution hypothe-sis)(Suto presented in AGU, 2007).

Keywords: diatoms, micropaleontology, paleoceanography, evolution, Eocene/Oligocene Boundary, algae