

Ancestral or not? Phylogenetic position of *Noctiluca scintillans* within dinoflagellates inferred from morphological and molecular analyses

Yasuhiro FUKUDA (Div. of Life Sci., Grad. Sch. of Natural Sci. and Technol, Kanazawa Univ.)

Noctilucid protozoans are among the dinoflagellates that cause red tides. In this study, we have succeeded in observing new details of the complete life cycle of *Noctiluca scintillans*. Gametes of *Noctiluca* with a semi-spindle body shape retain not only two flagella that differ in length and motion, but also longitudinal and transverse grooves, as is typical of dinoflagellates, indicating that dinoflagellate-like characteristics are conserved in the gametes, although they are not present in the specialized trophonts. Although gametes retain two slightly differentiated flagella, they do not have the transverse flagellum with a highly specialized wavy ribbon and other accessories. In addition, noctilucae do not possess thecal plates, as with the ancient *Oxyrrhis* that also lacks them, although lacking thecal plates is a synapomorphic character of the Gymnodiniales. The primitive nature of these characteristics in noctilucae can be regarded as the ancestral characters of dinoflagellates. This view is supported by our phylogenetic analyses of a few protein-coding genes (such as β -tubulin or Hsp90), in which *Noctiluca* is placed in the most ancestral position after *Oxyrrhis* branching out. Based on this information, we presently conclude that after *Oxyrrhis* and *Noctiluca* diverged from the main line of dinoflagellates, a common ancestor of the more recent species of dinoflagellates might acquire their typical dinokaryotic characteristics.