

Molecular phylogenetic relationships within the PSP producing marine dinoflagellate, genus *Alexandrium*

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The marine dinoflagellate genus *Alexandrium* has been recognized as the most representative toxic phytoplankton on account of production of paralytic shellfish poisoning (PSP) throughout the world. PSP producers, generally *A. tamarensis* and *A. catenella*, within the genus *Alexandrium* have caused high level intoxication of fisheries products and even death of human. In addition, more recent increasing of geographical range of this deleterious species has given rise to alarming tension.

The study presented here aimed construction of the molecular phylogenetic relationships through sequences-determination from 16 morphotypic species (containing newly sequenced 3 morphotypic species, *A. tamiyavanichii*, *A. fraterculus* and *A. pseudogonyaulax*) in LSU rDNA D1-D2 and 12 morphotypic species (containing newly sequenced 6 morphotypic species, *A. catenella*, *A. tamiyavanichii*, *A. fraterculus*, *A. affine*, *A. insuetum* and *A. pseudogonyaulax*) in SSU rDNA region, and the sequences were subjected to comparative-analysis in respect to regional population using functionally expressed rDNA genus and pseudogenes. And we discussed on genetic differentiation between *A. tamarensis* and *A. catenella* together with putative PSP divergence of the genus *Alexandrium*.

The results of phylogenetic analysis showed the robust monophyletic 14 distinct classes of *A. tamarensis*, *A. excavatum*, *A. catenella*, Tasmanian *A. tamarensis*, *A. affine* (and/or *A. concavum*), Thai *A. tamarensis*, *A. tamiyavanichii*, *A. fraterculus*, *A. margalefii*, *A. andersonii*, *A. ostenfeldii*, *A. minutum* (and/or *A. lusitanicum*), *A. insuetum*, and *A. pseudogonyaulax* clade. *A. fraterculus* and *A. tamiyavanichii* were sister relationship and they were

positioned independently between *A. affine* cluster and those of *A. margalefii*, *A. andersonii*, *A. ostefeldii*, *A. minutum* and *A. insuetum*. *A. pseudogonyaulax* appeared to be an ancestral taxon among *Alexandrium*.