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Taxonomy and toxicity of Prorocentrum from Perhentian Islands (Malaysia), with a description of a non-toxigenic species Prorocentrum malayense sp. nov. (Dinophyceae)

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Abstract :

Thirteen isolates of Prorocentrum species were established from the coral reefs of Perhentian Islands Marine Park, Malaysia and underwent morphological observations and molecular characterization. Six species were found: P. caipirignum, P. concavum, P. cf. emarginatum, P. lima, P. mexicanum and a new morphotype, herein designated as P. malayense sp. nov. Prorocentrum malayense, a species closely related to P. leve, P. cf. foraminosum, P. sp. aff. foraminossum, and P. concavum (Clade A sensu Chomérat et al. 2018), is distinguished from its congeners as having larger thecal pore size and a more deeply excavated V-shaped periflagellar area. Platelet arrangement in the periflagellar area of P. malayense is unique, with the presence of platelet 1a and 1b, platelet 2 being the most anterior platelet, and a broad calabash-shaped platelet 3. The species exhibits consistent genetic sequence divergences for the nuclear-encoded large subunit ribosomal RNA gene (LSU rDNA) and the second internal transcribed spacer (ITS2). The phylogenetic inferences further confirmed that it represents an independent lineage, closely related to species in Clade A sensu Chomérat et al. Pairwise comparison of ITS2 transcripts with its closest relatives revealed the presence of compensatory base changes (CBCs). Toxicity analysis showed detectable levels of okadaic acid in P. lima (1.0–1.6 pg cell-1) and P. caipirignum (3.1 pg cell-1); this is the first report of toxigenic P. caipirignum in the Southeast Asian region. Other Prorocentrum species tested, including the new species, however, were below the detection limit.

Highlights

► A new non toxigenic species *Prorocentrum* malayense sp. nov. is described herein based on morphological and molecular data. ► Other five benthic epiphytic *Prorocentrum* species were reported from Perhentian Islands Marine Park, Malaysia. ► Okadaic acid production of *P*. *lima* and *P. caipirignum* was confirmed by LC–MS/MS.

Keywords : Diarrhetic shellfish poisoning, ITS2 secondary structure, Morphology, Periflagellar area, Phylogeny