Pseudo-nitzschia simulans sp. nov. (Bacillariophyceae), the first domoic acid producer from Chinese waters

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\textbf{Article info}

Article history:
Received 20 January 2017
Received in revised form 29 June 2017
Accepted 29 June 2017
Available online 12 July 2017

\textbf{Keywords:}
Domoic acid
China
Pseudo-nitzschia
P. simulans

\textbf{Abstract}

The genus Pseudo-nitzschia has attracted attention because of production of the toxin, domoic acid (DA), causing Amnesic Shellfish Poisoning (ASP). Pseudo-nitzschia blooms occur frequently in Chinese coastal waters, and DA has been detected in several marine organisms, but so far no Pseudo-nitzschia strains from Chinese waters have been shown to produce DA. In this study, monocolonial Pseudo-nitzschia strains were established from Chinese coastal waters and examined using light microscopy, electron microscopy and molecular markers. Five strains, sharing distinct morphological and molecular features differentiating them from other Pseudo-nitzschia species, present a new species, Pseudo-nitzschia simulans sp. nov. Morphologically, the taxon belongs to the P. pseudodelicatissima group, cells possessing a central nodule and each stria comprising one row of poroids. The new species is characterized by the poroid structure, which typically comprises two sectors, each sector located near opposite margins of the poroid. The production of DA was examined by liquid chromatography tandem mass spectrometry (LC−MS/MS) analyses of cells in stationary growth phase. Domoic acid was detected in one of the five strains, with concentrations around 1.05−1.54 fg cell\textsuperscript{−1}. This is the first toxicogenic diatom species reported from Chinese waters.

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1. Introduction

The genus Pseudo-nitzschia H. Peragallo is a group of pennate chain-forming diatom species globally distributed in marine waters, and known to produce the toxin domoic acid (DA) (Hasle, 2002). Following an intoxication incident in Canada in 1987, which was found to be caused by \textit{P. multiseries} (Hasle) Hasle, species of Pseudo-nitzschia attracted attention and considerable progress has been made since then in our understanding of species diversity and toxicity. The number of described species in the genus has increased during the past two decades, and currently comprises 48, of which 24 are known to produce DA (Teng et al., 2016; Lundholm, 2017).

Identification of Pseudo-nitzschia often requires a combination of different methods, including colony traits and cell shape by light microscopy, frustule ultrastructure by electron microscopy, phylogenetic analyses based on molecular markers, ITS2 secondary structure comparison, sexual mating experiments and physiological traits (reviewed in Lelong et al., 2012; Trainer et al., 2012). Molecular tools have proved the presence of cryptic and pseudo-cryptic species in the genus (e.g. Amato et al., 2007; Lim et al., 2012; Lundholm et al., 2012; Orive et al., 2013; Percopo et al., 2016; Teng et al., 2016). Most recently described species of Pseudo-

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http://dx.doi.org/10.1016/j.hal.2017.06.008
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