

First Report of *Pseudo-nitzschia calliantha* Lundholm, Moestrup & Hasle 2003, a New Potentially Toxic Species from Turkish Coasts

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Özet: Türkiye kıyılarından potansiyel olarak toksik, yeni bir tür kaydı, *Pseudo-nitzschia calliantha* Lundholm, Moestrup & Hasle 2003. Diatomlardan *Pseudo-nitzschia*'nın bazı türlerinin dünyanın bir çok bölgesinde insanlar da dahil yüksek organizasyonlu organizmaların ölümlerinden sorumlu olduğu ve bir nörotoksik aminoasit olan domoik asit'i ürettiği bilinmektedir. Bu çalışmada, elektron mikroskobu kullanılarak, potansiyel olarak toksik olabilecek bir *Pseudo-nitzschia* türü olan *P. calliantha*, Türkiye'nin Karadeniz kıyıları için ilk kez rapor edilmiştir. *P. calliantha*'nın tanımlanması morfolojik incelemelere dayanarak yapılmıştır.

Anahtar Kelimeler: *Pseudo-nitzschia calliantha*, Bacillariophyceae, Karadeniz, yeni kayıt.

Abstract: Several species of the diatom *Pseudo-nitzschia* H. Peragallo in H. & M. Peragallo, 1897-1908 are known to produce domoic acid (DA), a neurotoxic amino acid that has been shown to be responsible for deaths of higher trophic-level organisms, including humans, in many areas around the world. In this study, one of the potentially toxic *Pseudo-nitzschia* species, *P. calliantha*, is documented for the first time from the Turkish Part of the Black Sea using transmission and scanning electron microscopy. *P. calliantha* is described based on morphological data.

Key Words: *Pseudo-nitzschia calliantha*, Bacillariophyceae, Black Sea, new record.

Introduction

The global increase of phytoplankton blooms and their observed harmful effects on organisms through the food chain has sparked scientific attention around the world during the last decades. Recently, increasing attention has been focused on the toxicity of diatoms of the genus *Pseudo-nitzschia* because several species of the genus produce the neurotoxin domoic acid (DA), and are present globally in the marine plankton (Bates *et al.*, 2000). This phycotoxin was discovered as a problem when over 100 people suffered from gastro-intestinal

disorders and 4 people died, after having eaten cultured blue mussels from Prince Edward Island, Canada, in 1987 (Bates *et al.*, 1989).

Pseudo-nitzschia species have been found as common members of the phytoplankton community of Turkish waters (Koray *et al.*, 1996; Eker and Kideys, 2000; Polat *et al.*, 2000; Türkoglu and Koray, 2002). The aim of this study is to report the presence of *P. calliantha* for the first time for Turkish waters based on morphological data.

Materials and Methods

Horizontal net tows and water samples

were collected during bloom periods of 2000 from a neritic area of the Black Sea (41° 12' 30" N – 29° 31' 00" E and 41° 33' 00" N – 36° 00' 00" E) at 0.5 m, using 55-µm mesh plankton net. The plankton net samples were fixed with 4% (final concentration) of formaldehyde. Besides light microscopy using phase contrast optic, transmission (TEM) and scanning electron microscopy (SEM) were used to verify the species identity of the members of genus *Pseudo-nitzschia*. Water samples were concentrated onto 1.2 µm pore size isopore polycarbonate membrane filters (Millipore). Salt was removed from samples by rinsing with de-ionized water under low vacuum (150 mm Hg). To remove organic material, saturated KMnO₄ was added until the filters were covered and the samples were allowed to digest for 15 min. Twelve M HCl (3 ml) was then added to the samples and held for a total of 30 min to complete the oxidation process. Samples were then vacuumed gently and rinsed with de-ionized water. This process was repeated 2 times. Small drops were pipetted onto copper grids to be examined by TEM. For SEM observations, filters were removed from the filter tubes and fixed on aluminum stubs. Filters were air-dried in a desiccator for 24 h and then mounted onto SEM stubs with double-sided tape and sputter coated with gold palladium. All micrographs were taken with an ISI WB-6 electron microscope at 10 kV.

P. calliantha was identified based on morphological data using characters such as width and shape of the valve, density of fibulae and interstriae, and structural pattern of the poroid hymen.

Results

Pseudo-nitzschia calliantha was found as a new species in Turkey based on morphological data.

Class: Bacillariophyceae
Order: Bacillariales

Family: Bacillariaceae Ehrenberg 1831
Genus: *Pseudo-nitzschia* H. Peragallo
in H. & M. Peragallo, 1897-
1908

Pseudo-nitzschia calliantha

Lundholm, Moestrup et Hasle

Locality: Black Sea (41° 12' 30" N – 29° 31' 00" E and 41° 33' 00" N – 36° 00' 00" E)

The appearances of the cells are linear shape in valve view. The width of the valve is 1.3-1.4 µm and the length is 60-63 µm. The number of interstriae is 39-40 and the number of fibulae is 19-20 in 10 µm (Figure 1). Striae are uniseriate with 6 poroids in 1 µm (Figure 2A). Each poroid is divided into several sectors arranged in a circle, often with a sector in the middle (Figure 2B).

Discussion and Conclusion

Diatoms are common at the northern shelf of the Black Sea and half of the species are found all - year -round (Tunçer and Fevzioglu, 1989; Uysal and Sur, 1995; Manjos *et al.*, 1998; Eker *et al.*, 1999; Türkoğlu, 1999; Türkoğlu and Koray, 2002). *Pseudo-nitzschia pungens*, *P. pseudodelicatissima* and *P. delicatissima* have been found as members of the phytoplankton community in Turkish waters by previous studies (Koray *et al.*, 1996, Eker and Kideys, 2000; Polat *et al.*, 2000; Türkoğlu and Koray, 2002). All three species have been reported to produce domoic acid (DA) elsewhere (e.g. Rhodes *et al.*, 1998; Martin *et al.*, 1990; Lundholm *et al.*, 1997; Adams *et al.*, 2000; Pan *et al.*, 2001). *Pseudo-nitzschia calliantha* is now reported for the first time for Turkish waters. The species has previously also been reported in other world waters (Lundholm *et al.*, 2003). In addition, this study has contributed to the regional check-list of the microplankton species of Turkish seas (Koray, 2001).

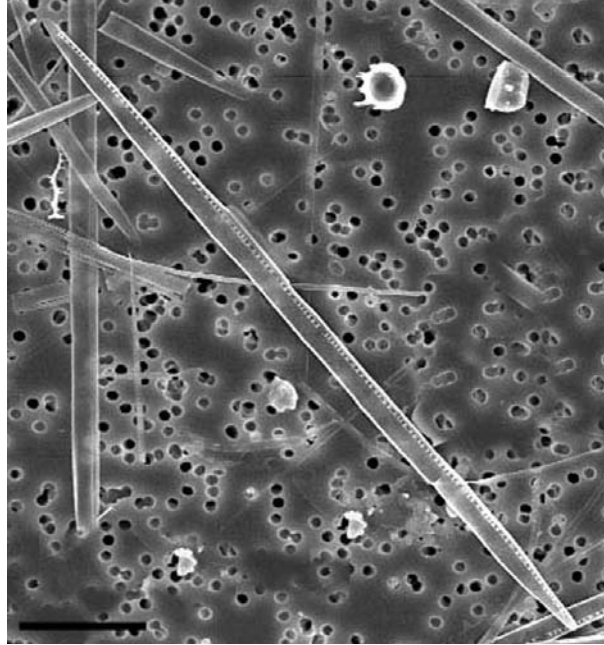


Figure 1. *Pseudo-nitzschia calliantha*, Black Sea, Turkey. SEM micrograph, showing the whole valve. Scale bar is 10 µm.

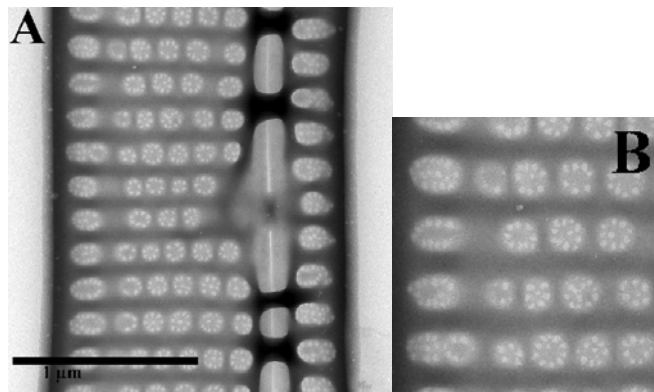


Figure 2. *Pseudo-nitzschia calliantha*, Black Sea, Turkey. TEM micrograph, showing A) part of valve with one row of poroids and central nodule, scale bar is 1 µm, B) poroid arrangements (closer look to Figure 2A).

Pseudo-nitzschia calliantha has previously been included in *P. pseudodelicatissima*. Lundholm *et al.* (2003) re-defined *P. pseudodelicatissima* and simultaneously described *P. calliantha* as a new species. The material

described as toxic in previous references (as *P. pseudodelicatissima*) (Martin *et al.*, 1990; Lundholm *et al.*, 1997) has been confirmed to belong to *P. calliantha*. Therefore, previously reported *P. pseudodelicatissima* species found in the

Black Sea needs to be re-examined and checked for their correct identity as *P. calliantha* or *P. pseudodelicatissima*.

Although most species of microalgae are harmless, a few can produce toxins that cause harm, and even death, to vertebrate consumers. In addition, the *Pseudo-nitzschia* species, which are known to produce toxin, seem to comprise both toxic and non-toxic strains (e.g. Bates, 2000). Current monitoring programs in Turkey, however, often does not include toxin determinations. Although seasonal patterns of different species of *Pseudo-nitzschia* are well known (Eker and Kideys 2000; Polat *et al.*, 2000; Türkoglu and Koray, 2002), it is clear that toxin monitoring, along with quantitative sampling, needs to be carried out in the future for the Turkish waters.

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