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New Records of the *Dictyocha antarctica* Lohmann, *Dictyocha crux* Ehrenberg and *Nitzschia rectilonga* Takano Species from the Sea of Marmara

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Abstract: The silicoflagellate species *Dictyocha antarctica* Lohmann, *Dictyocha crux* Ehrenb. and the diatom species *Nitzschia rectilonga* Takano are reported for the first time from the coastal waters of the north-eastern Sea of Marmara (lat. 40° 45.80' N - 40° 58.00' N, long. 28° 36.00' E - 29° 13.60' E) and also from the coastal waters of Turkey. Descriptions of these species are given in this paper.

Key Words: *Dictyocha antarctica*, *Dictyocha crux*, *Nitzschia rectilonga*, phytoplankton, Sea of Marmara

Marmara Denizi'nde *Dictyocha antarctica* Lohmann, *Dictyocha crux* Ehrenb. ve *Nitzschia rectilonga* Takano Türleri Üzerine Yeni Kayıtlar

Özet: Bu çalışmada silikoflagellatlara ait *Dictyocha antarctica* Lohmann, *Dictyocha crux* Ehrenb. ve diatomlara ait *Nitzschia rectilonga* Takano türleri Kuzeydoğu Marmara Denizi'nden (enlem: K 40° 45.80' - K 40° 58.00', boylam: D 28° 36.00' - D 29° 13.60') ve Türkiye Denizleri kıyıl sularından ilk kez rapor edilmiştir. Bu yayında bu türlerin özellikleri verilmiştir.

Anahtar Sözcükler: *Dictyocha antarctica*, *Dictyocha crux*, *Nitzschia rectilonga*, fitoplankton, Marmara Denizi

Introduction

Dictyocha antarctica Lohmann and *Dictyocha crux* Ehrenb. are members of the class Dictyochophyceae. The members of this class generally have a silicated skeleton and their shape is extremely variable. Three species and 3 varieties from the genus *Dictyocha* Ehrenb. have been recorded from the Sea of Marmara. *Nitzschia rectilonga* Takano is a member of the class Bacillariophyceae in Round et al. (1990). Five species from the genus *Nitzschia* Hassall have been recorded from Turkish coastal waters (Koray, 2001). Two species from the genus *Dictyocha* Ehrenb. and 1 species from the genus *Nitzschia* have been recorded from the Sea of Marmara (Balkis, 2004).

This study adds these 3 species to the regional checklist of the microplankton species of Turkish seas.

Materials and Methods

The samples were collected from the north-eastern Sea of Marmara (lat. 40° 45.80' N - 40° 58.00' N, long. 28° 36.00' E - 29° 13.60' E). The study area and the locations of the sampling points are shown in Figure 1. The phytoplankton samples were collected from different depths (0.5, 5 and 10 m) with a Niskin bottle and with a 55 µm mesh standard plankton net from 15 m to the surface, and the samples were preserved in 4% formaldehyde (Thronsen, 1978). A light microscope was used for identification of the species and a Nikon Diaphot 300 light microscope and a video camera was used to photograph them. For identification and taxonomy Bernhard (1980), Cupp (1943), Drebes (1974), Hendey (1964), Tomas (1997), Priddle and Fryxell (1985), Rehakova (1974), Ricard and Dorst (1987), Trégouboff and Rose (1957) were used.

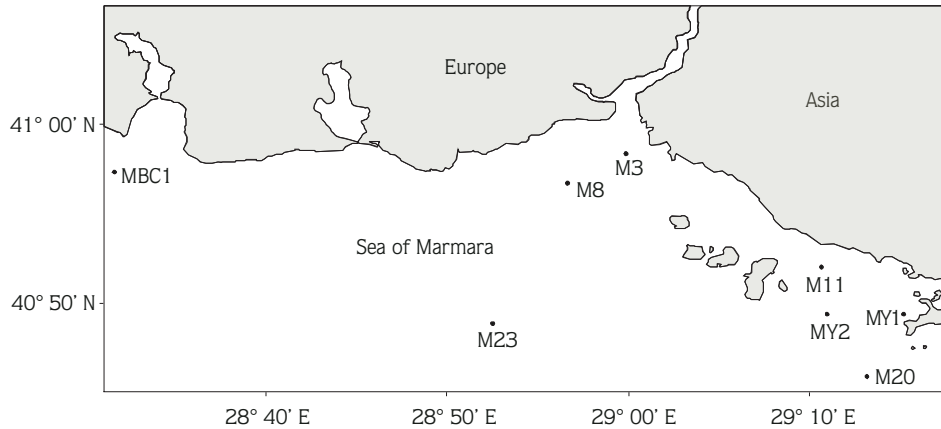


Figure 1. The study area and the location of sampling points.

Result and Discussion

The 3 species identified were very rarely sampled. The locations, depths and dates are given in Table. During the study period salinity was between 22-28 psu and temperature was between 14-23 °C (Sur et al., 2000).

The taxonomy of these species is given as follows (Tomas, 1997):

- Class: Dictyochophyceae Silva 1980
- Order: Dictyochales Haeckel 1894
- Family: Dictyochaceae Lemmermann 1901
- Genus: *Dictyocha* Ehrenb. 1837

Dictyocha antarctica Lohmann 1919

Dictyocha crux Ehrenb. 1840

Class: Bacillariophyceae Haeckel 1878 *emend* Mann in Round et al. 1990

Subclass: Bacillariophycidae Mann in Round et al. 1990.

Order: Bacillariales Hendey 1937 *sensu emend*

Family: Bacillariaceae Ehrenb. 1831.

Genus: *Nitzschia* Hassall 1845

Nitzschia rectilonga Takano 1983

Table. The date, station name, depth, and concentration information of the identified species.

Species name	Date	Station name	Depth (m)	Concentration (cells/l)
<i>Dictyocha antarctica</i>	10.08.2000	M20	5	250
	10.08.2000	M20	10	500
	10.08.2000	MY2	5	250
	15.11.2000	M3	15 0	Plankton net*
<i>Dictyocha crux</i>	10.08.2000	M20	15 0	Plankton net*
	26.10.2000	MBC	15 0	Plankton net*
	26.10.2000	MY1	15 0	Plankton net*
	26.10.2000	MY1	0.5	250
	16.11.2000	MY1	15 0	Plankton net*
	16.11.2000	M11	15 0	Plankton net*
	16.11.2000	M8	15 0	Plankton net*
	16.11.2000	M23	15 0	Plankton net*
<i>Nitzschia rectilonga</i>	16.11.2000	MY2	15 0	Plankton net*

* The concentration of the mesh standard plankton samples was not counted.

The identification of the *Dictyocha* species is based on the external SiO_2 skeleton. The cells have one flagellum (+ one very short in naked phase) and many chloroplasts. The morphology of the *Nitzschia* species is poorly known and, as a consequence, so is their taxonomy.

Dictyocha antarctica Lohmann 1919

Their silicated skeleton size is 45-51 μm ; they have many yellowish chloroplasts. The skeleton is simple,

circular to quadrangular with short spines. The distribution is oceanic, cold waters; South Atlantic (Tomas, 1997). A microscopic photo of it is given in Figure 2a.

Dictyocha crux Ehrenb. 1840

The silicated skeleton size is 20-40 μm and it has long spines, 15 μm . The skeleton has 4 protruding spines and 5 "windows". The distribution is oceanic; Mediterranean,

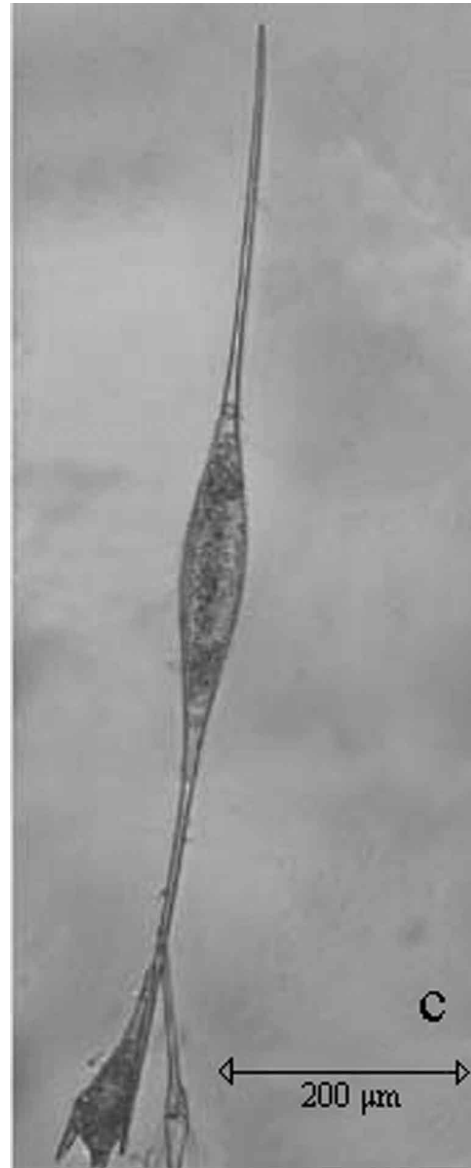
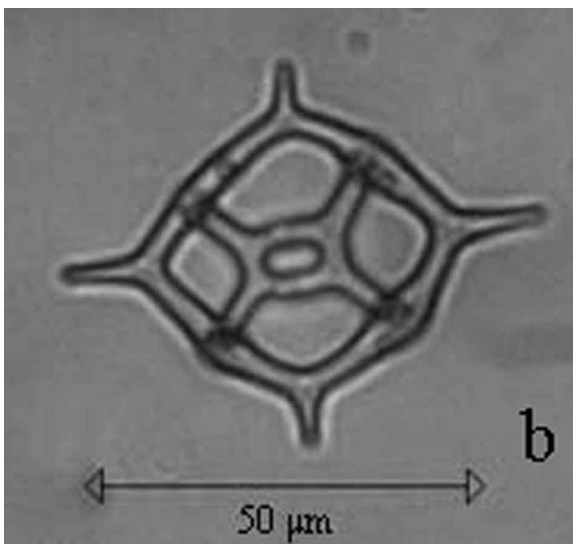
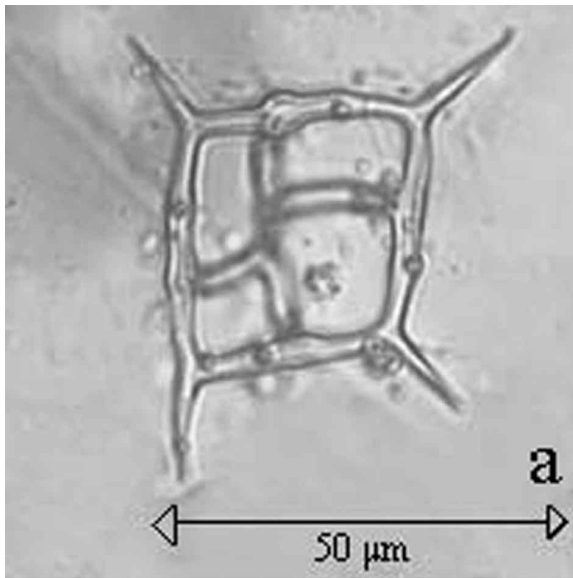


Figure 2. Microscopic photographs of species. a. *Dictyocha antarctica*, b. *Dictyocha crux*, c. *Nitzschia rectilonga*.

Atlantic and Pacific (Tomas, 1997). A microscopic photo of it is given in Figure 2b.

Nitzschia rectilonga Takano 1983

The cell size is huge, the individual (Figure 2c) is 894 µm in length and 55 µm in width.

These 3 species are not small for a phytoplankton study; however, because of their rare occurrence, these species were not recorded or they may have been

neglected in previous studies carried out in the north-eastern Sea of Marmara. On the other hand, the recording of these species for the first time in this study may be related to the lack of adequate studies in this area. Another possibility is that they may have recently been transported to the studied area by ballast waters, especially *D. antarctica*, because its distribution does not include the Mediterranean or Aegean seas. Moreover, in the study area, there is a dry dock for the loading and unloading of international ships.

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