

1-1-2009

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ŞAHİN, BÜLENT (2009) "Contribution to the desmid flora of Turkey," *Turkish Journal of Botany*: Vol. 33:

No. 6, Article 8. <https://doi.org/10.3906/bot-0809-15>

Available at: <https://dctubitak.researchcommons.org/botany/vol33/iss6/8>

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Contribution to the desmid flora of Turkey

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Received: 25.09.2008

Accepted: 03.11.2009

Abstract: *Cosmarium botrytis* Menegh. ex Ralfs var. *tumidum* Wolle, *Cosmarium notabile* Bréb. var. *transiens* Insam et Krieger, *Cosmarium tetragonum* (Näg.) Arch. in Pritchard var. *tetragonum*, and *Cosmarium vogesiacum* Lemaire var. *alpinum* (Schmidle) Laporte are recorded for the first time for the desmid flora of Turkey. The desmids are recorded from Yedigöller Lakes in the Eastern Black Sea region of Turkey.

Key words: Desmids, new record, Turkey

Türkiye'nin desmid florasına katkılar

Özet: *Cosmarium botrytis* Menegh. ex Ralfs var. *tumidum* Wolle, *Cosmarium notabile* Bréb. var. *transiens* Insam et Krieger, *Cosmarium tetragonum* (Näg.) Arch. in Pritchard var. *tetragonum* ve *Cosmarium vogesiacum* Lemaire var. *alpinum* (Schmidle) Laporte Türkiye'nin desmid florası için ilk kez kaydedilmektedir. Desmidler Türkiye'nin Doğu Karadeniz Bölgesindeki Yedigöller'den kaydedilmiştir.

Anahtar sözcükler: Desmid, yeni kayıt, Türkiye

Introduction

The desmid flora in high mountain lakes of the Eastern Black Sea region of Turkey was investigated during 1996-2006. As suitable habitats for desmid species, oligotrophic lakes are very common in the high mountains of the Eastern Black Sea region. The desmid species are relatively poor in terms of diatom species in Turkey. Four genera (*Netrium*, *Micrasterias*, *Roya*, and *Spondylosium*) and 33 taxa have been added to the desmid flora of Turkey through studies in this region (Şahin, 1998, 2000, 2002, 2007a, 2007b).

The aim of the present study was to contribute to the desmid flora of Turkey.

Materials and methods

The Yedigöller lakes, located at latitude 40°52'32"N and longitude 40°37'30" E, consist of 7 large and small lakes ranging from 1 to 5 km² surface area on Mount Kızılkaya in Erzurum province (Figure 1). The altitude of the Yedigöller lakes is 3100-3142 m a.s.l. The average depths of the lakes vary from 0.2 to 3 m. The bottom of all lakes is a little muddy and composed of pebbles. The climate of the region is temperate, with cool summers and mild winters (seasonal average temperature 15.5 °C, precipitation 80.5 mm) (Trabzon İl Çevre Müdürlüğü, 1999).

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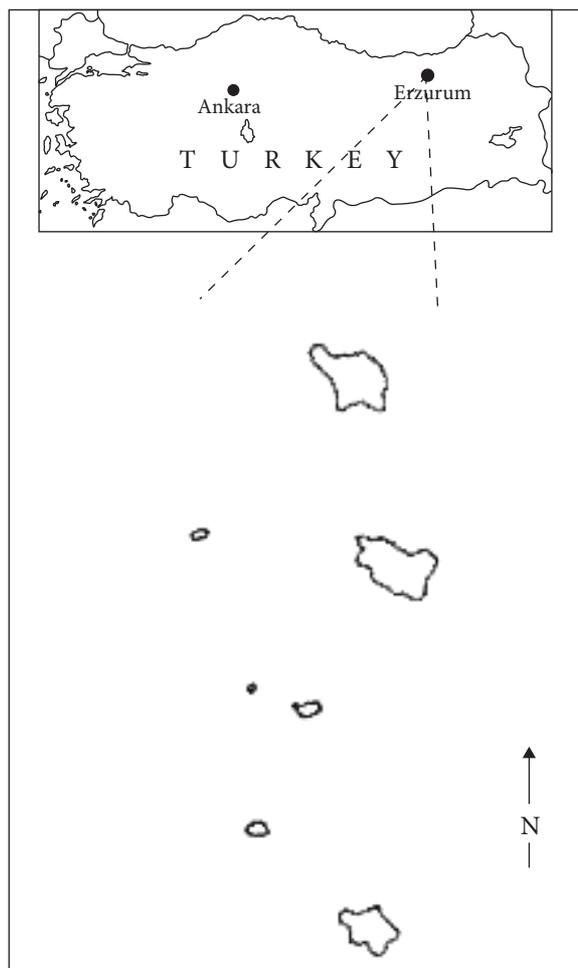


Figure 1. Map of the Yedigöller lakes.

In order to examine the epipellic algal flora of Yedigöller lakes, a station was chosen in each lake. Collections were made during snow-free periods from June to August in 2003. Samples were taken on a monthly basis and collected from stations of 20-30 cm depths near the surface and 50-100 cm offshore. Samples of epipellic algae were collected by drawing a glass tube across the surface of the sediment (Round, 1953). All samples were fixed in 4% formalin. Desmids were examined in temporary slides under a Nikon light microscope (magnification $\times 400$). Photographs were taken with an Olympus BH-2 microscope. Taxonomic identifications were made according to Coesel (1991), Förster (1982), Lenzenweger (1999), and West and West (1908, 1912). The systematic classification of desmids was made according to Christiansen (1994). All dimensions are

given in micrometers and the following abbreviations are used: L: cell length, W: cell width, I: breadth of isthmus.

Identified taxa were checked with the checklist published by Gönülol et al. (1996), Aysel (2005), Şahin (1998, 2000, 2002, 2005, 2007a, 2007b), and TÜBİTAK Türkiye Taksonomik Tür Veritabanı <http://bioces.tubitak.gov.tr> (2009) website. Samples were deposited at the Biology Laboratory of Fatih Faculty of Education, Karadeniz Technical University, Trabzon.

Results

Four taxa belonging to the genus *Cosmarium* (Desmidiaceae) were identified from epipellic samples. The genus *Cosmarium* belongs to placoderm desmids. The descriptions of the desmid taxa are given below.

Family Desmidiaceae

Genus *Cosmarium* Corda ex Ralfs 1848

Cosmarium botrytis Menegh. ex Ralfs var. *tumidum* Wolle (Figure 2)

West & G. S. West 1912, p. 5, pl. 97, figs. 2-3.

Förster 1982, p. 176, pl. 33, fig. 4.

Coesel 1991, p. 25, pl. 15, fig. 5.

Lenzenweger 1999, p. 111, pl. 56, fig. 2.

Cell $85 \mu\text{m}$ L, $63 \mu\text{m}$ W, $17 \mu\text{m}$ I, deeply constricted with a narrowly linear sinus; semicells subpyramidal with rounded basal angles, narrowing rather to a suddenly truncate apex. Wall is granulate and chloroplast is axial with 2 pyrenoids in each semicell.

Cosmarium notabile Bréb. var. *transiens* Insam et Krieger (Figure 2)

Coesel 1991, p. 41, pl. 9, figs 30-31.

Lenzenweger 1999, p. 106, pl. 54, fig. 19.

Cell $41.6 \mu\text{m}$ L, $26.6 \mu\text{m}$ W, $18.3 \mu\text{m}$ I. Cell 1.5 times longer than wide, moderately constricted, sinus narrow and open; semicells truncate-pyramidal, basal angles rectangular and slightly rounded, apical angles slightly rounded, lateral margins slightly convex with 5 undulations (including the basal and apical angles), apex truncate and 4 undulations (including the apical angles).

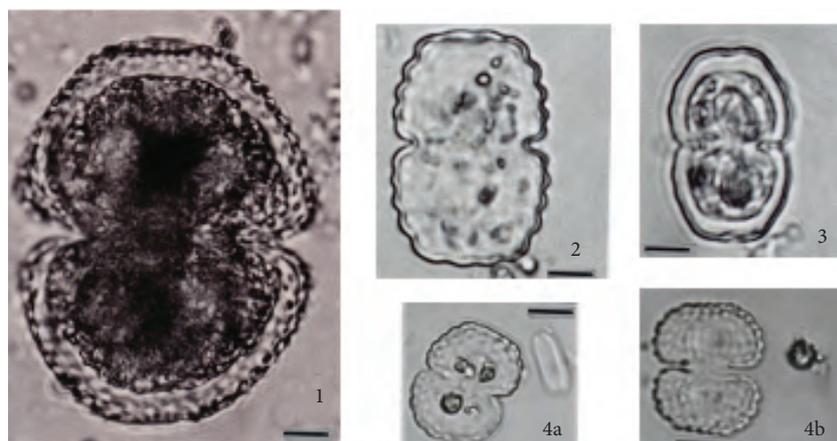


Figure 2. 1. *Cosmarium botrytis* var. *tumidum*, 2. *C. notabile* var. *transiens*, 3. *C. tetragonum* var. *tetragonum*, 4 a,b. *C. vogesiacum* var. *alpinum* (Scale bar: 10 μ m).

Cosmarium tetragonum (Näg.) Arch. in Pritchard var. *tetragonum* (Figure 2)

West & G. S. West 1908, p. 17, pl. 66, figs. 20-21.

Lenzenweger 1999, p. 99, pl. 54, fig. 3.

Cell 43.3 μ m L, 26.6 μ m W, 11.6 μ m I. Cell 1.6 times longer than wide, deeply constricted, sinus narrowly linear, with a slightly dilated apex; semicell subquadrate, slightly narrowed from base to apex, lateral margins (including the angles) 4 – undulate, apical and basal angles slightly rounded, apex with 2 undulations.

Cosmarium vogesiacum Lemaire var. *alpinum* (Schmidle) Laporte (Figure 2)

Lenzenweger 1999, p. 156, pl. 63, fig. 32.

Cell 26.6-28.3 μ m L, 21.6-23.3 μ m W, 8.3-11.6 μ m I. Cell 1.2 times longer than wide, deeply constricted, sinus linear; semicell circular- trapeziform, apical and basal angles slightly rounded, lateral margins convex, apex truncate; lateral margins with 5 crenulations, apical margin with 4 crenulations; face of semicell with concentric intramarginal rows of granules, the granules within the crenations paired.

Discussion

It has been suggested that the taxa of *Cosmarium* are the most significant desmids in the northern flora (Getzen, 1985). In addition, prevalence of *Cosmarium*

taxa is characteristic for the arctic flora (Medvedeva, 2001). Coesel (1996) pointed out that *Cosmarium tetragonum* was a characteristic taxon of the arctic-alpine regions. It is also stated that this taxon has been recorded from cold regions on other continents. The findings of this study supported these reports. *Cosmarium vogesiacum* var. *alpinum* was found at 2500 m in the Central Alps (Lenzenweger, 1999). This taxon was found at 3142 m in the Yedigöller lakes on Mount Kızılkaya in the Eastern Black Sea region.

In conclusion, the information concerning desmids in Turkey is still insufficient. During the 1996-2006 period, 4 desmid genera and 33 desmid taxa were registered for the first time in Turkey (Şahin, 1998, 2000, 2002, 2007a, 2007b). In this study, *Cosmarium botrytis* var. *tumidum*, *C. notabile* var. *transiens*, *C. tetragonum* var. *tetragonum*, and *C. vogesiacum* var. *alpinum* are recorded for the first time in Turkey and described. It can be assumed that by increasing the number of studies the number of desmids will rise.

Acknowledgement

The author wishes to thank Prof. Rupert LENZENWEGER for the identification of some taxa of desmids.

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