

Nineteen New Records From Sarıyar Dam Reservoir Phytoplankton for Turkish Freshwater Algae

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Abstract: Nineteen new records of Turkish freshwater algae were determined in a study of the phytoplankton from Sarıyar dam reservoir. One of these species was from the *Cyanobacteria*, 14 were from the *Chlorophyta*, three were from the *Euglenophyta* and one was from the *Heterokontophyta*.

Key Words: Sarıyar dam reservoir, New record, *Cyanobacteria*, *Chlorophyta*, *Euglenophyta*, *Heterokontophyta*.

Sarıyar Barajı Fitoplanktonundan Türkiye Tatlı Su Algleri İçin Ondokuz Yeni Kayıt

Özet: Sarıyar barajı fitoplanktonunda Türkiye tatlı su algleri için 19 yeni kayıt belirlenmiştir. Teşhis edilen alglerden 1 tanesi *Cyanobacteria*, 14 tanesi *Chlorophyta*, 3 tanesi *Euglenophyta* ve 1 tanesi de *Heterokontophyta* bölümüne ait türlerdir.

Anahtar Sözcükler: Sarıyar Barajı, Yeni kayıt, *Cyanobacteria*, *Chlorophyta*, *Euglenophyta*, *Heterokontophyta*.

Introduction

This study was carried out to contribute to the knowledge of freshwater algae of Turkey. To benefit from the algae in lakes, ponds, dam reservoirs and rivers, it is necessary to study the taxonomy of freshwater systems. Algae are the source of oxygen in aquatic systems, are the main autochthonous primary producers and are used in determining water pollution levels.

The Sarıyar dam reservoir (SDR) is on the border of the provinces of Ankara and Eskişehir, two of the large cities in Turkey. The SDR is between the longitudes of 30° 45' 36" E and 31° 45' 36" E and at a latitude of 40° 03' 00" N, in central Turkey (Figure 1).

The total length of the SDR is 63 km. The maximum water depth of the reservoir at the high supply level is 90 m. The water volume is $1.900 \times 10^6 \text{ m}^3$ and the surface area is 84 km² (Anonymous, 1992).

The SDR is supplied by the Sakarya River, the Aladağ Stream, the Kirmir Stream and the Gürleyik

Stream. Of these, the Sakarya River is industrially polluted (Atıcı, 1997) while both the Aladağ and Gürleyik streams are unpolluted. The SDR was constructed mainly for hydroelectric power generation.

Material and Methods

Seven stations were chosen in different areas of the reservoir. The samples were taken from these seven stations between March 1996 and June 1997. Phytoplankton samples were taken horizontally both from the surface and from 10 m, 20 m and 50 m depths by plankton net with a pore diameter of 55 µm.

These samples were brought to the laboratory and 100 ml was mixed with 4 ml of a solution prepared by mixing 1 l alcohol, 1 l glycerine and 1 l formaldehyde (36%) (Hecky & Kiling, 1987), and examined microscopically. Identification of algae samples was carried out by examination under a research microscope; they were then photographed.

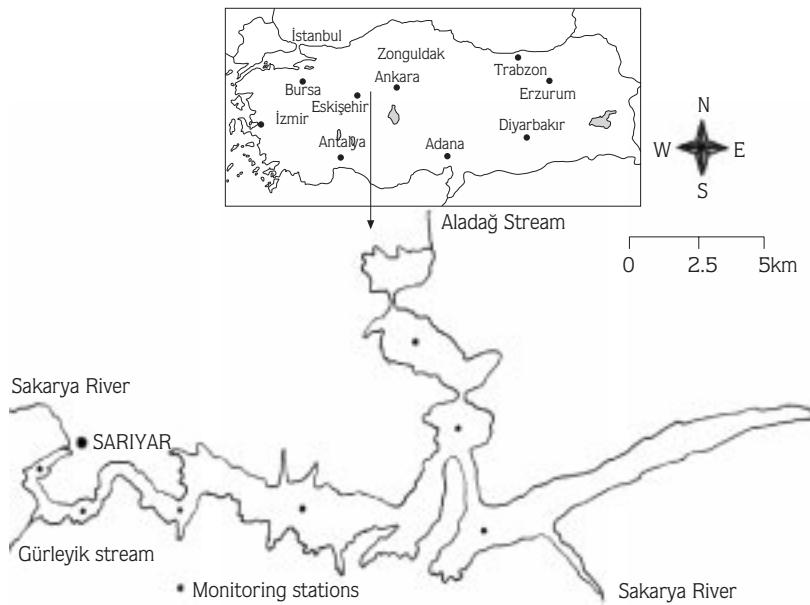


Figure 1. Sarıyar dam reservoir and sampling stations.

Results

The total number of algal species of the SDR is 195 “Cyanobacteria: 35, Chlorophyta: 74, Bacillariophyta: 70, Rhodophyta: two, Pyrrophyta: four, Heterokontophyta: four, Euglenophyta: six”. Only new records are listed in this paper.

Divisio: Cyanobacteria

Classis: Cyanophyceae

Ordo: Nostocales

Familia: Nostocaceae

Genus: Anabaena Bory 1822

A. circinealis Rabenh. var. *macrospora* (Wittr.) De Toni (Figure 2-a.) (Prescott, 1975).

Cells 6-8 μm in diameter, heterocysts 7.8-10 μm in diameter, occur in a long chain.

Divisio: Chlorophyta

Classis: Chlorophyceae

Ordo: Tetrasporales

Familia: Tetrasporaceae

Genus: Schizochlamys A.Braun 1849.

S. gelatinosa A.Braun (Figure 2-b.) (Parra & Gonzales, 1978).

Cells 10 μm in diameter; sometimes cells rounded, in a group of two or four. Colonies usually have long pseudoflagella and float at the surface.

Ordo: Oedogoniales

Familia: Oedogoniaceae

Genus: Oedogonium Link 1820.

O. inclusum Hirn. (Figure 2-c.) (Prescott, 1975).

Vegetative cells cylindrical or somewhat capitellate 10-12 μm in diameter, 33-62 μm long. Antheridia not observed. Oospores ellipsoid; filling the oogonia laterally. Attached to overhang on macrophytes.

Ordo: Chlorococcales

Familia: Chlorellaceae

Genus: Dictyosphaerium Naegeli 1849.

D. pulchellum Wood. var. *ovatum* Korshikov (Figure 2-d.) (Korshikov, 1987).

Basic form in the oval or slightly ovoid cells attached to the stalks by a narrow end. Colony 70 μm in diameter, cells 8 μm in diameter.

Genus: Treubaria Bernard 1908.

T. setigerum (Archer) G.M.Sm. (Figure 2-e.) (Prescott, 1975).

Cells triangular and flattened in surface view, the angles broadly rounded and then produced to form a long

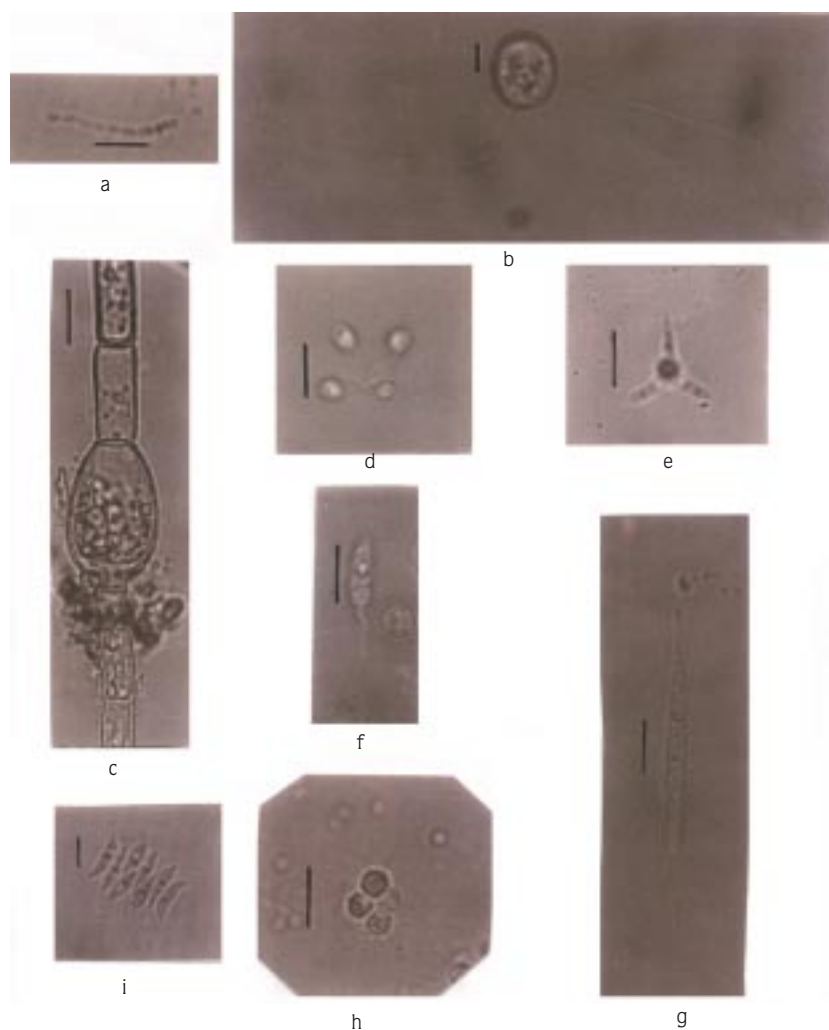


Figure 2. a) *Anabaena circinealis* Rabenh. var. *macrospora* (Wittr.) De Toni b) *Schizochlamys gelatinosa* A.Braun c) *Oedogonium inclusum* Hirn. d) *Dictyosphaerium pulchellum* Wood. var. *ovatum* Korsh e) *Treubaria setigerum* (Archer) G.M.Sm. f) *Lambertia ocellata* Korsh. g) *Ankistrodesmus longissimus* (Lemm.) Wille. var. *acicularis* (Chod) Brunth. h) *Tetrastrum triacanthum* Korsh. i) *Scenedesmus acuminatus* (Lagerh.) Chod. var. *biseriatus* Reinsch
Scale 10 μ

tapering spine, cells 7-9 μ m in diameter, spines 12-15 μ m long.

Genus: *Lambertia* Korshikov 1982.

L. ocellata Korshikov (Syn: *Characium ocellum* Korsh.) (Figure 2-f.) (Korshikov, 1987).

Cells narrow fusiform, straight, posteriorly with a thin spine appendage, the lobes of which separate in different directions. Cells up to 45 μ m long and 5 μ m wide.

Genus: *Ankistrodesmus* Corda 1838.

A. longissimus (Lemm.) Wille. var. *acicularis* (Chod) Brunth. (Figure 2-g.) (Korshikov, 1987).

Cells shorter than 210 μ m, usually 60-180 μ m long, young cells from 10 μ m, with one to several pyrenoids. Cells 2.5-6.5 μ m in diameter.

Familia: Scenedesmaceae

Genus: *Tetrastrum* Chodat 1895.

T. triacanthum Korshikov (Figure 2-h.) (Korshikov, 1987).

Coenobia rhomboid, 16 μ m long. Cells with three massive spines, the middle one long, up to twice the length of the cell and two short lateral ones. Chromatophore with a pyrenoid.

Genus: *Scenedesmus* Meyen 1828.

S. acuminatus (Lagerh.) Chod. var. *biseriatus* Reinsch (Figure 2-i.) (Korshikov, 1987).

Cells arranged alternately, dimensions within the limits of the basic form, apical cells are concave, cells 3-6 μ m in diameter, 15-35 μ m long.

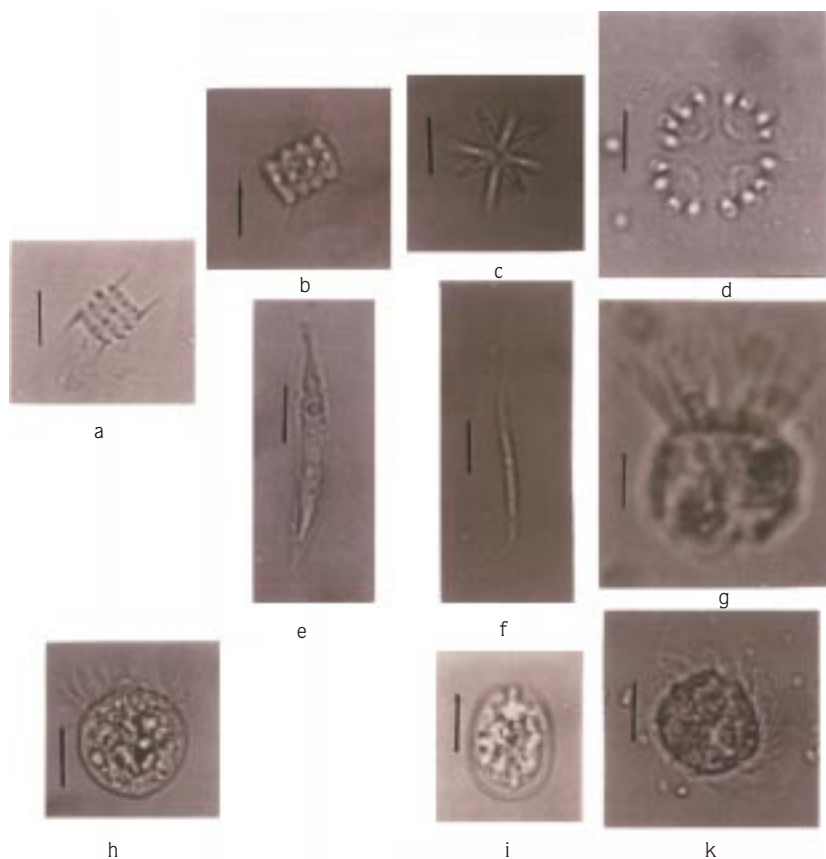


Figure 3. a) *Scenedesmus opoliensis* Richter var. *abundans* Printz b) *Scenedesmus opoliensis* Richter var. *contacta* Prescott c) *Actinastrum gracillum* G.M.Sm. d) *Dimorphococcus lunatus* A.Br. e) *Closterium ralfsii* Breb. var. *hybridum* Rabenh. f) *Closterium setaceum* Ehr. g) *Trachelomonas armata* (Ehr.) Stein h) *Trachelomonas armata* (Ehr.) Stein var. *longispina* (Playf.) Deflandre i) *Trachelomonas lacustris* Drezepolski k) *Paraphysomonas vestita* (Stokes). De Saedelecer

Scale 10 μ

S. opoliensis Richter var. **abundans** Printz. (Figure 3-a.) (Korshikov, 1987).

Coenobium of four cells arranged linearly, cells 10-13 μ long, marginal cells straight or slightly concave, other sides convex with one additional spine arising from the centre.

S. opoliensis Richter var. **contacta** Prescott (Figure 3-b.) (Prescott, 1975).

Coenobium consisting of four naviculoid cells arranged in a single series adjoined along 3/4 of the length of their lateral walls, 6-8 μ in diameter, 20-24 μ long. Spine on terminal cells, either one or two at each pole.

Genus: Actinastrum Lagerh. 1882.

Ac. gracillum G.M.Sm. (Figure 3-c.) (Prescott, 1975).

Cells cylindrical, with very slightly narrowed to abruptly truncate poles, 1.7-3 μ in diameter, 14-21 μ long, colonies 30-45 μ in diameter, forming colonies of individuals with the long axes of the cells radiating in all

planes from a common centre.

Genus: Dimorphococcus A.Braun 1849.

D. lunatus A.Braun (Figure 3-d.) (Korshikov, 1987).

Cells elongate oval, slightly cylindrical cell ends broadly rounded, Chromatophore with one pyrenoid. Cells up to 8 by 14 μ long.

Ordo: Desmidiaceae

Familia: Closteriaceae

Genus: Closterium Nitzsch ex. Ralfs. 1848

Cl. ralfsii Breb. var. **hybridum** Rabenh. (Figure 3-e.) (Lind & Brook, 1980).

Cells narrow and long, 25-40 μ in diameter and 300-450 μ long, much less convex cell wall is yellowish to dark brownish, cell appearing somewhat fusiform.

Cl. setaceum Ehr. (Figure 3-f.) (Dillard, 1990).

Cells 0.7-2.5 μ in diameter, 150-600 μ long almost straight, fusiform at the midregion, rather abruptly attenuated to form rostrate extensions to the

incurved, truncate apices, cell wall is colourless or brownish, chloroplast with 2-3 pyrenoids.

Divisio: Euglenophyta

Classis: Euglenophyceae

Ordo: Euglenales

Familia: Euglenaceae

Genus: *Trachelomonas* Ehrenberg 1835.

T. armata (Ehr.) Stein (Figure 3-g.) (Pestalozzi, 1955).

Cells broadly ovate, 22-25 µm in diameter, 38-40 µm long, including spines, two chromatophores with one pyrenoid. Flagellar opening with or without a collar.

T. armata (Ehr.) Stein var. *longispina* (Playf.) Deflandre (Figure 3-h.) (Prescott, 1975).

Cells broadly ovate, 30-31 µm in diameter, 41-48 µm long, flagellum aperture without a collar, but with a circle of erect spines at margin.

T. lacustris Drezepolski var. *lacustris* Yamagishi & Akijama (Figure 3-i.) (Yamagishi, 1987).

Cells cylindrical, golden yellow-brown, cells 12-16.5 µm diameter, 26-30 µm long. The lateral margins almost parallel, broadly rounded both posteriorly and anteriorly.

Divisio: Heterokontophyta

Classis: Chrysophyceae

Ordo: Ochromonadales

Familia: Lepochromanodoideae

Genus: *Paraphysomonas* De Saedelecer 1930.

P. vestita (Stokes) De Saedelecer (Figure 3-k.) (Oguni et al., 1987).

Cells non-photosynthetic and spherical, 7.7-11.5 µm in diameter, spines very thin and colourless, 5-10 µm long, all over the cell surface.

Discussion

The species listed in the Results from the SDR phytoplankton have not been recorded so far in Turkey (Gönüloğlu & Öztürk, 1996). The division Chlorophyta contains the most (14) species. The Chlorophyta were reported to be widespread in the lakes of America and Britain (Dillard, 1990; Verch & Blinn, 1971; Sommerfeld, 1975; Moss, 1995). The division Cyanobacteria was represented by one species, which was reported to be located in the mesotrophic lakes of Europe (Lund & Lund, 1995). Three *Trachelomonas* species belonging to the division Euglenophyta were found in the SDR. They are generally found in aquatic areas rich in nutrients (Yamagishi, 1987; Desikachary, 1959). *Paraphysomonas vestita* of the division Heterokontophyta (Hoek van den et al., 1995, 1997) are also found to be widespread in the inland waters of the Ongul Islands and in the vicinity of Antarctica (Oguni et al., 1987).

In terms of species diversity, Cyanophyta, Chlorophyta, Euglenophyta and Heterokontophyta were most common in the Manisa-Marmara Lake (Cirik, 1982, 1983, 1984), Hazar Lake (Elazığ) (Şen, 1988) and Hafik Lake (Sivas) (Kılınç & Dere, 1988). They were widespread in lakes around Ankara (Aykulu et al., 1983; Gönüloğlu & Aykulu, 1984; Aykulu & Obalı, 1981) and also in Mogan Lake (Obalı, 1984).

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