

A Taxonomical Study on the Zooplankton of Göksu Dam Lake (Diyarbakır)

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Abstract: The zooplanktonic fauna of Göksu dam lake was taxonomically investigated between April 1995 and December 1996. As a result, 16 species of cladocerans, three species of copepods and 28 species of rotifers, a total of 47 species, were identified in the lake. Of these, *Monommata arndti* (Rotifera) is a new record for Turkey's inland waters.

Key Words: Cladocera, Copepoda, Rotifera, Zooplankton, Taxonomy, Göksu dam lake

Göksu Baraj Gölünün (Diyarbakır) Zooplanktonu Üzerine Taksonomik Bir Çalışma

Özet: Göksu baraj gölünün zooplankton faunası, Nisan 1995-Aralık 1996 tarihleri arasında taksonomik açıdan incelenmiştir. Gölde; Cladocera' dan 16, Copepoda' dan 3 ve Rotifera' dan 28 tür olmak üzere toplam 47 tür tespit edilmiş olup bu türlerden *Monommata arndti* (Rotifera), Türkiye içsuları için yeni kayıttır.

Anahtar Sözcükler: Cladocera, Copepoda, Rotifera, Zooplankton, Taksonomi, Göksu baraj gölü

Introduction

Zooplankton constitute the food source of organisms at higher trophic levels, and some are of high economic value in lake ecosystems. Since the majority are filter feeders, this serves to cleanse the water column of suspended matter and hence contributes significantly to the improvement of water quality (1). Additionally, some studies show that certain species of zooplankton are usually considered to be useful indicators of water quality, trophic status and pollution (2,3).

Cladocerans, copepods and rotifers are the main groups of zooplankton. In Turkish inland waters, these groups were partly reported in numerous publications by Geldiay (4), Tokat (5), Ongan et al. (6), Demirhindi (7), Ustaoglu (8,9), Ustaoglu and Balık (10-12), Ustaoglu et al. (13), Gunduz (14-16), Guher and Kirciz (17), Guher (18), Emir (19,20), Altındağ and Özkurt (21), Altındağ (22,23), and Ustaoglu and Akyurek (24), but information on the zooplanktonic fauna of the south-east of Turkey is scarce (25-27).

The aim of this paper was to determine the zooplankton fauna of Göksu dam lake and hence contribute to the knowledge of the zooplankton fauna of south-east Anatolia.

Description of the Lake

Göksu dam lake is used for irrigation and is located 30 km south-east of Diyarbakır city centre (lat 37°55' N/long 40°12' E). The dam was built on the Göksu stream in the 1980s by the state Hydraulic Works (DSİ). The lake, with an elevation of 682 m, is fed by Zügar, Karaçay, Pepeya, Çay, Kırmızımezar and Hüllo streams (Figure). The surface area and maximum depth of the lake are 3.5 km² and 52 m, respectively. The lake's maximum volume reaches 62 hm³. The main rainfall area is 672 km². Its catchment area is used for agriculture. Mean water levels of dry and rainy months in the lake differ by more than 5 m. Göksu dam lake contains economically important fish species, namely *Leuciscus cephalus orientalis*, *Chondrostoma regium*, *Chalchalburnus mossulensis*, *Capoeta c. umbla*, *Barbus plebejus lacerta*, *Acantobrama marmid* and *Mastacembelus simack* (28).

The yearly temperature variation was established to be 5-27°C, pH variation 7.56-8.65, dissolved oxygen 6-13 mg/l⁻¹, temporary hardness 8-16 °d and turbidity 2-22 NTU. Additionally, the yearly variations in nutrient levels were established to be as follows: nitrite 0-8 mg/l⁻¹, nitrate 1-4.5 mg/l-1 and orto-phosphate 0.1-1.1 mg/l⁻¹ (29).

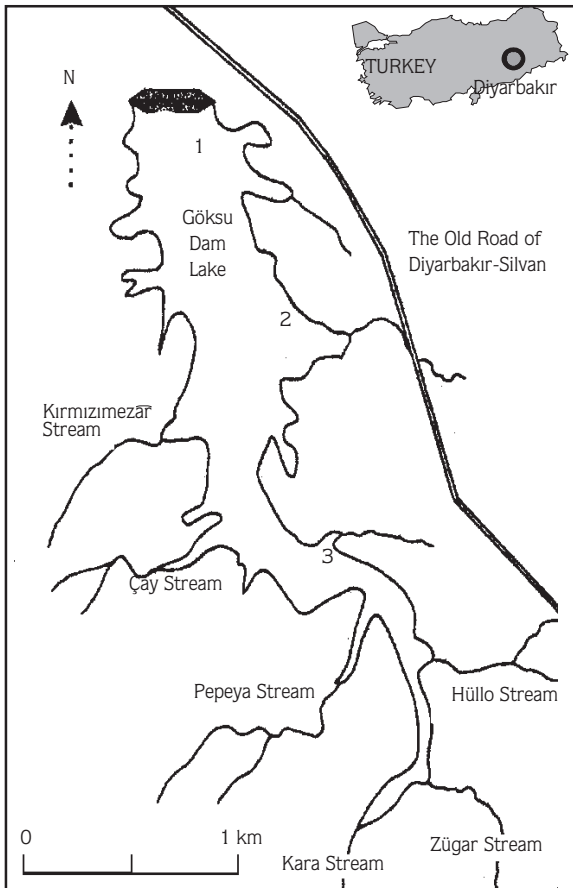


Figure. Göksu dam lake and sampling stations.

Materials and Methods

Figure. Göksu dam lake and sampling stations.

Zooplankton was sampled monthly at three different stations between April 1995 and December 1996 (Figure). Samples were collected with a 55 μ pore sized Hydro-Bios plankton net by horizontal hauls and the specimens were preserved in 4% formaldehyde solution. In January, February and May (1996), samples could not be collected due to unfavourable weather conditions. The zooplanktonic species were identified according to Edmondson (30), Kolisko (31), Koste (32, 33), Harding and Smith (34), Scourfield-Harding (35), Negrea (36), Flössner (37), Rylov (38), Smirnov (39) and Kiefer (40).

Results and Discussion

The zooplankton species living in Göksu dam lake are as follows:

Order: Cladocera

Family: Sididae

1. *Diaphanosoma orghidani* Negrea, 1982
2. *Diaphanosoma lacustris* Korinek, 1981

Family: Daphniidae

3. *Daphnia cucullata* Sars, 1862

Phylum: Rotifera

Family: Brachionidae

4. *Simocephalus vetulus* (O.F. Müller, 1776)
5. *Ceriodaphnia reticulata* (Jurine, 1820)
6. *Ceriodaphnia megops* Sars, 1862
7. *Ceriodaphnia dubia* Richard, 1894

Family: Moinidae

8. *Moina micrura* Kurz, 1874

Family: Macrothricidae

9. *Macrothrix laticornis* (Fischer, 1848)

Family: Bosminidae

10. *Bosmina longirostris* (O.F. Müller, 1785)

Family: Chydoridae

11. *Disparalona rostrata* (Koch, 1841)
12. *Chydorus sphaericus* (O.F. Müller, 1785)
13. *Alona rectangula* Sars, 1862
14. *Leydigia leydigi* (Schoedler, 1863)
15. *Biapertura affinis* (Leydig, 1860)

Family: Leptodoridae

16. *Leptodora kindtii* (Focke, 1844)

Subclass: Copepoda

Family: Cyclopidae

17. *Cyclops vicinus* Ujjanin, 1875
18. *Thermocyclops dybowskii* (Lande, 1890)
19. *Eucyclops serrulatus* (Fischer, 1851)
20. *Brachionus falcatus* Zacharias, 1898
21. *Brachionus caudatus* (Barrois-Daday, 1894)
22. *Keratella quadrata* (O.F. Müller, 1786)
23. *Keratella tropica* (Apstein, 1907)
24. *Keratella cochlearis* (Gosse, 1851)

25. *Notholca squamula* (O.F.Müller, 1786)
Family: Euchlanidae
26. *Euchlanis dilatata* Ehrenberg, 1832
Family: Colurellidae
27. *Lepadella acuminata* (Ehrenberg, 1834)
Family: Lecanidae
28. *Lecane luna* (O.F. Müller, 1776)
29. *Lecane (M.) scutata* (Harring-Myers, 1926)
30. *Lecane (M.) stenroosi* (Meissner, 1908)
Family: Notommatidae
31. *Monommata arndti* Remane, 1933
32. *Cephalodella gibba* (Ehrenberg, 1838)
Family: Trichocercidae
33. *Trichocerca cylindrica* (Imhof, 1891)
34. *Trichocerca similis* (Wierzejski, 1893)
Family: Gastropodidae
35. *Ascomorpha ovalis* (Bergendahl, 1892)
Family: Synchaetidae
36. *Synchaeta oblonga* Ehrenberg, 1831
37. *Polyarthra vulgaris* Carlin, 1943
38. *Polyarthra dolichoptera* Idelson, 1925
Family: Asplanchnidae
39. *Asplanchna priodonta* Gosse, 1850
40. *Asplanchna sieboldi* (Leydig, 1854)
Family: Testudinellidae
41. *Testudinella truncata* (Gosse, 1886)
42. *Testudinella mucronata* (Gosse, 1886)
43. *Pompholyx complanata* Gosse, 1851
Family: Conochilidae
44. *Conochilus dossuarius* (Hudson, 1914)
Family: Filiniidae
45. *Filinia longiseta* (Ehrenberg, 1834)
Family: Collethecidae
46. *Colletheca mutabilis* (Hudson, 1885)
47. *Colletheca ornata* (Ehrenberg, 1832)

The zooplankton of Göksu consist mainly of Cladocera, Copepoda and Rotifera groups. A total of 47 species composed of 16 cladocerans, three copepods and 28 rotifers were identified. All of these are recorded for the first time in Göksu lake and one, the rotifer *Monommata arndti* Remane, 1933, is new record for Turkey's inland waters. Additionally, *Brachionus caudatus*, *Lecane scutata* and *Testudinella truncata* are recorded for the second time after being recorded previously from Devegeçidi dam lake (27). Ceriodaphnia megops was previously only recorded from Turkish Thrace (18) and *Lecane stenroosi* from Gümüldür stream (13).

In terms of species composition, rotifers have a high species number in the lake. The most numerous species were representatives (six species) of the family Brachionidae, with 12.7% of the species listed, followed by species of the families Daphniidae and Chydoridae with 10.6% during the sampling period.

The monthly distributions of the species are given in the Table . Among the species identified, *Diaphanosoma lacustris*, *Ceriodaphnia dubia*, *Bosmina longirostris*, *Cyclops vicinus*, *Polyarthra vulgaris* and *Polyarthra dolichoptera* were recorded in the zooplankton virtually throughout the sampling period. In contrast, *Simocephalus vetulus*, *Moina micrura*, *Leydigia leydigi*, *Biapertura affinis*, *Eucyclops serrulatus*, *Brachionus falcatus*, *Brachionus caudatus*, *Keratella tropica*, *Euchlanis dilatata*, *Lepadella acuminata*, *Lecane stenroosi*, *Monommata arndti*, *Trichocerca cylindrica*, *Synchaeta oblonga*, *Testudinella truncata*, *Testudinella mucronata* and *Colletheca ornata* were rarely found in the lake. The composition of zooplankton fauna was similar at three stations at Göksu lake.

The ecological features of the recorded species show that most of them are cosmopolitan and littoral inhabiting aquatic macro-vegetation (31,32). Additionally, among the recorded species, *Bosmina longirostris*, *Chydorus sphaericus*, *Daphnia cucullata*, *Cyclops vicinus*, *Keratella cochlearis*, *Polyarthra dolichoptera*, *Filinia longiseta* and *Trichocerca* species are well-known indicators of eutrophy (1,38). However, Göksu dam lake also includes distinctive species of oligotrophic and mesotrophic lakes. According to Kolisko (31), the predominant representatives of oligotrophic lakes in temperate climatic regions are *Synchaeta oblonga*, *Polyarthra vulgaris*, *Polyarthra dolichoptera*, *Keratella cochlearis* and

Table. Monthly distribution of zooplanktonic organisms in Göksu dam lake.

Species MONTHS	1995									1996											
	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Cladocera																					
<i>Leptodora kindtii</i>	-	+	-	+	+	-	-	-	-	X	X	-	-	X	-	-	-	-	-	-	-
<i>Diaphanosoma orghidani</i>	-	-	+	+	-	+	-	+	+	X	X	-	-	X	+	+	+	-	+	-	-
<i>Diaphanosoma lacustris</i>	+	+	+	+	+	+	+	+	+	X	X	+	+	X	+	+	+	+	+	+	+
<i>Daphnia cucullata</i>	+	+	+	+	-	-	-	-	+	X	X	+	+	X	+	-	-	+	+	+	+
<i>Simocephalus vetulus</i>	-	+	+	-	-	-	-	-	-	X	X	-	-	X	-	-	-	-	-	-	-
<i>Ceriodaphnia reticulata</i>	-	-	+	-	+	+	+	+	-	X	X	-	+	X	+	+	+	+	+	+	+
<i>Ceriodaphnia megops</i>	-	-	-	-	-	-	-	+	-	X	X	-	+	X	+	-	-	-	-	-	+
<i>Ceriodaphnia dubia</i>	+	+	-	+	+	+	+	+	+	X	X	+	+	X	+	+	+	+	+	+	+
<i>Moina micrura</i>	-	-	-	-	+	-	-	-	-	X	X	-	-	X	-	-	-	-	-	-	-
<i>Macrothrix laticornis</i>	-	-	-	-	+	-	-	-	-	X	X	-	-	X	-	+	+	+	-	-	-
<i>Bosmina longirostris</i>	+	+	+	+	+	+	+	+	+	X	X	+	+	X	+	+	+	+	-	-	+
<i>Disparalona rostrata</i>	-	-	-	+	-	-	-	-	+	X	X	-	+	X	+	-	+	+	-	-	-
<i>Chydorus sphaericus</i>	+	+	-	-	-	-	-	-	-	X	X	-	-	X	+	-	-	-	+	+	-
<i>Alona rectangula</i>	+	+	-	-	-	-	-	+	-	X	X	+	-	X	-	-	+	-	-	-	-
<i>Leydigia leydigi</i>	-	-	-	-	-	-	-	-	-	X	X	+	-	X	-	-	-	-	-	-	-
<i>Biapertura affinis</i>	-	-	-	-	-	-	-	-	+	X	X	-	+	X	-	-	-	-	-	-	-
Copepoda																					
<i>Cyclops vicinus</i>	+	+	+	-	+	+	+	+	+	X	X	+	+	X	+	+	-	-	+	+	+
<i>Thermocyclops dybowskii</i>	+	-	-	-	-	+	-	-	+	X	X	-	-	X	-	-	-	+	-	-	-
<i>Eucyclops serrulatus</i>	-	-	-	-	-	+	+	-	-	X	X	-	-	X	-	-	-	-	-	-	-
Rotifera																					
<i>Brachionus falcatus</i>	-	-	+	-	+	-	-	-	-	X	X	-	-	X	-	-	-	-	-	-	-
<i>Brachionus caudatus</i>	-	-	+	-	-	-	-	-	-	X	X	+	-	X	-	-	-	-	-	-	-
<i>Keratella quadrata</i>	-	-	-	-	-	-	-	-	+	X	X	+	-	X	-	-	-	-	-	-	+
<i>Keratella tropica</i>	-	-	-	-	-	-	-	-	-	X	X	-	-	X	-	+	-	-	+	-	-
<i>Keratella cochlearis</i>	-	-	+	-	-	-	-	-	+	X	X	+	-	X	-	-	-	-	-	-	-
<i>Notholca squamula</i>	-	-	-	-	+	-	-	-	-	X	X	+	+	X	-	-	-	-	-	-	+
<i>Euchlanis dilatata</i>	-	-	-	-	+	-	-	-	-	X	X	-	-	X	-	+	-	-	-	-	-
<i>Lepadella acuminata</i>	-	-	-	-	-	-	-	-	-	X	X	-	+	X	-	-	-	-	-	-	-
<i>Lecane luna</i>	-	-	-	-	+	+	-	-	+	X	X	+	-	X	-	-	-	-	-	-	+
<i>Lecane (M.) scutata</i>	+	-	-	-	+	+	-	+	+	X	X	+	-	X	-	-	+	+	+	-	+
<i>Lecane (M.) stenroosi</i>	-	-	-	-	-	-	-	-	-	X	X	-	-	X	+	-	-	-	-	-	-
<i>Monommata arndti</i>	-	-	-	-	-	-	-	-	-	X	X	-	+	X	-	-	-	-	-	-	-
<i>Cephalodella gibba</i>	+	-	-	-	+	-	-	-	-	X	X	+	-	X	-	-	+	-	+	-	+
<i>Trichocerca cylindrica</i>	-	-	-	-	+	-	-	-	-	X	X	-	-	X	-	-	-	-	-	-	-
<i>Trichocerca similis</i>	+	+	+	-	+	+	-	-	-	X	X	-	-	X	-	-	-	-	-	-	-
<i>Ascomorpha ovalis</i>	-	+	+	+	+	+	-	+	-	X	X	-	-	X	-	-	+	+	+	+	+
<i>Synchaeta oblonga</i>	-	-	-	-	-	-	-	-	-	X	X	+	-	X	-	-	-	-	-	-	-
<i>Polyarthra vulgaris</i>	+	+	+	+	+	+	+	+	+	X	X	+	+	X	+	+	+	+	+	+	+
<i>Polyarthra dolichoptera</i>	+	+	+	+	+	+	+	+	+	X	X	+	+	X	+	+	+	+	+	+	+
<i>Asplanchna priodonta</i>	+	+	+	-	-	+	+	+	+	X	X	+	+	X	-	-	-	+	+	+	+
<i>Asplanchna sieboldi</i>	+	+	+	-	-	+	+	+	+	X	X	+	+	X	-	-	-	+	+	+	+
<i>Testudinella truncata</i>	-	-	-	-	-	-	-	-	+	X	X	-	-	X	-	-	-	-	-	-	-
<i>Testudinella mucronata</i>	-	-	-	-	-	-	-	-	-	X	X	-	+	X	-	-	-	-	-	-	-
<i>Pompholyx complanata</i>	-	-	-	-	-	-	-	-	+	X	X	+	-	X	-	-	-	-	+	-	-
<i>Conochilus dossuarius</i>	-	-	-	-	-	+	-	-	-	X	X	-	-	X	+	+	-	+	-	-	-
<i>Filinia longiseta</i>	-	-	+	-	-	+	+	+	-	X	X	+	-	X	-	-	-	+	+	-	-
<i>Colletheca mutabilis</i>	+	-	+	+	+	+	-	-	+	X	X	+	-	X	+	-	+	+	+	+	+
<i>Colletheca ornata</i>	-	-	-	-	-	-	-	-	-	X	X	-	+	X	-	-	-	-	-	-	-

ANNOTATION. Material could not be collected in months marked with an x.

Asplanchna priodonta. However, eutrophic lakes of the same regions contain some of the same species, along with *Euchlanis dilatata*, *Trichocerca species*, *Pompholyx species*, *Keratella quadrata* and *Filinia longiseta*.

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