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SHORT PAPER

Zooplankton Community Structure of Asartepe Dam Lake (Ankara, Turkey)

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Abstract

Zooplankton community structure of Asartepe Dam Lake was examined by collecting samples in three different seasons (Autumn 2007, Spring and Summer 2008). Rotifera was found the dominant group with 43 species, followed by Cladocera with 3 species and Copepoda with 2 taxa respectively. One of these rotifers, *Encentrum felis* is a new record for the Turkish fauna. Also some water parameters (pH, dissolved oxygen, electrical conductivity and water temperature) were measured during field trips.

Keywords: Asartepe Dam Lake, zooplankton, rotifera, new record.

Ankara Asartepe Baraj Gölü'nün Zooplankton Topluluğunun Yapısı

Özet

Asartepe Baraj Gölü'nün zooplankton topluluk yapısı, üç farklı mevsimde (Sonbahar 2007, Bahar ve Yaz 2008) örnekler toplanarak incelendi. Rotifera 43 türle baskın grup olarak tespit edildi, bunu sırasıyla 3 türle Cladocera ve 2 taksonla da Copepoda izledi. Tespit edilen rotiferlerden biri olan *Encentrum felis* Türkiye faunası için yeni tür olarak kaydedildi. Ayrıca bazı su parametreleri (pH, çözünmüş oksijen, elektriksel iletkenlik ve su sıcaklığı) arazi çalışmaları süresince ölçüldü.

Anahtar Kelimeler: Asartepe Baraj Gölü, zooplankton, rotifera, yeni kayıt.

Introduction

Since many studies around the country have been conducted, species composition of zooplanktonic organisms in Turkey is known very well (Dumont and De Ridder, 1987; Segers *et al*., 1992; Ustaoğlu *et al*., 2004). According to Ustaoğlu (2004), 229 taxa of Rotifera were recorded in Turkey. But recently, many studies have been focusing on rotifers, so the number of Turkish rotifers has increased to 285 (Altındağ *et al*., 2005; Kaya *et al.,* 2007a; Kaya and Altındağ, 2009; Altındağ *et al.,* 2009). Ninety-two taxa of Cladocera and 106 taxa of Copepoda were recorded in Turkey until 2004 (Ustaoğlu, 2004). A new species of Cladocera (*Alona mediterranea*) was found in Turkey, and Turkish cladoceran taxa increased to 93 (Yalım and Çıplak, 2005).

Phytoplankton flora of Asartepe Dam Lake was examined by Atıcı and Çalışkan (2007), and 94 taxa were recorded. These taxa belong to Chlorophyta, Cyanophyta, Euglenophyta, Pyrrophyta and Chrysophyta. The present study is the first survey of zooplankton in Asartepe Dam Lake.

As it is mentioned above, many studies were carried out on zooplanktonic organisms in Turkey. But many lotic and lentic waters in Turkey lack studies; so we carried out this study to explain of zooplankton fauna of Asartepe Dam Lake, and to discuss the species composition and species richness through the collected samples in three different seasons.

Materials and Methods

The samples were taken from five stations, which were defined to characterize whole Asartepe Dam Lake (Figure 1). Sampling lasted for three

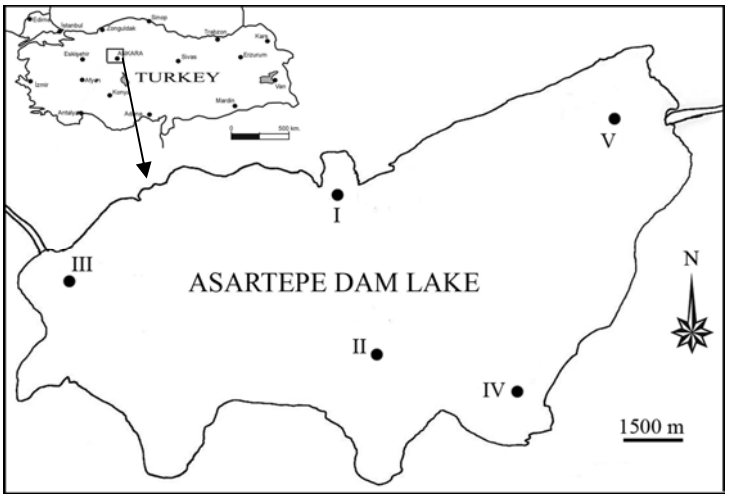

Figure 1. Map of Asartepe Dam Lake (Numbers show the stations).

months between November 2007- June 2008 in Autumn, Spring and Summer. There was no sampling in winter months as the lake froze.

A Hensen type Hydro- Bios Kiel plankton net (with a 20 cm edge diameter and 55 µm eye diameter) made from nylon screen cloth was used to gather Zooplankton samples. The samples were taken in two ways: vertically and horizontally. The vertical samples were taken by pulling the samples from the deep to the water surface. For the horizontal takings, the boat engine was started at idle speed and surface takings were completed in 5 minutes. The gathered zooplankton samples were put in 500 ml plastic bottles and formaldehyde (4%) was added.

The zooplankton species taken to the laboratory were first examined in general under an inverted microscope and then the species were diagnosed under a DM-LS Type 020–518–500 microscope. For diagnosis, Koste (1978), Nogrady and Pourriot (1995), Segers (1995), de Smet (1996), de Smet and Pourriot (1997), and Simirnov (1996) were referenced. Temperature was measured with a YSI 51 model oxygen meter; pH was measured with a WTW340-A/SET pH meter, dissolved oxygen with an SI 51 oxygen meter, and EC with a WTW LF 92 conductivity meter.

Asartepe Dam Lake is located in Central Anatolian Region, within the borders of Ankara-Ayaş, 47 km North West of Ankara (44°44'21″ N, 36°44'83″ E). It was started in 1980 for irrigation over the İlhan Stream. Lake size in normal water quote is 20 hm^3, and lake area in normal water quote is 1.8 km^2. The irrigation area of earth-filled Asartepe Dam Lake is 2,850 ha.

Results

Zooplankton fauna of Asartepe Dam Lake (Ankara, Turkey) was surveyed and forty-eight taxa were recorded by collecting samples in three different seasons (Autumn 2007, Spring and Summer 2008). Species richness of Rotifera was found high (43), while species richness of Cladocera (3) and Copepoda (2) was found low (Table 1). One of these rotifers, *Encentrum felis,* is a new record for Turkey. Twenty-eight taxa were observed in autumn and spring, but 34 taxa were observed in summer. Twelve taxa were seen together in three seasons, while twenty-two taxa were seen in only one season. Some water parameters (pH, dissolved oxygen, electrical conductivity and water temperature) were measured during field trips (Table 2).

Discussion

According to Segers (2007), all the recorded rotifer species in the present study are widely distributed around the world. Also many of the recorded species are common in Turkey (e.g. Kaya and Altındağ, 2007a; Kaya *et al*., 2007a; Kaya and Altındağ, 2009). *Encentrum felis* (O.F. Müller, 1773) is a new record for Turkey and it was found in summer. Only three species of Cladocera were observed. *Bosmina longirostris* and *Chydorus sphaericus* are cosmopolitan species. *Macrothrix laticornis* was recorded from holarctic and tropical region, but tropical species should be required reidentification (Smirnov, 1992). Only two taxa of Copepoda were seen during the study and they could not be identified in species level.

It is known that there is a positive correlation between temperature and species richness of zooplankton in aquatic environments (Matsubara, 1993; Castro *et al*., 2005; Hessen *et al*., 2007). In the present study, species richness of zooplankton is positively affected by increasing temperature, so our study supports the hypothesis that species richness of zooplankton is positively affected by increasing temperature.

Salinity is much important factor affecting species richness in continental water bodies (Lancaster and Scudder, 1987; Derry *et al*., 2003).

Table 1. List of zooplankton taxa recorded from Asartepe Dam Lake

Species	Seasons		
	Autumn	Summer	Spring
Rotifera			
Anuraeopsis fissa	+	+	-
Asplanchna priodonta	+	+	-
Brachionus angularis	+	+	-
Brachionus quadridentatus	-	+	-
Cephalodella catellina	+	-	-
Cephalodella gibba	-	-	+
Cephalodella gracilis	+	+	-
Cephalodella intuta	-	-	+
Cephalodella ventripes	+	+	+
Collotheca mutabilis	-	-	+
Collotheca ornata	-	-	+
Colurella adriatica	+	+	+
Colurella colurus	+	+	--
Dicranophorus grandis	-	-	+
**Encentrum felis*	-	-	+
Euchlanis dilatata	-	-	+
Euchlanis incisa	-	+	-
Filinia cornuta	+	-	-
Filinia limnetica	+	+	+
Filinia terminalis	+	+	+
Itura aurita	+	-	+
Keratella cochlearis	+	+	+
Keratella quadrata	+	+	+
Lecane bulla	-	-	+
Lecane closterocerca	+	+	+
Lecane luna	+	+	+
Lecane lunaris	+	+	+
Lepadella ovalis	-	-	+
Lepadella patella	+	+	+
Lepadella quadricarinata	+	+	+
Monommata arndti	+	-	-
Notholca squamula	-	+	-
Notommata cyrtopus	+	+	-
Philodina megalotrocha	-	-	+
Polyarthra vulgaris	+	+	+
Polyarthra remata	-	+	+
Rotaria rotatoria	-	-	+
Synchaeta oblonga	-	+	+
Synchaeta pectinata	+	+	-
Trichocerca pusilla	+	-	+
Trichocerca bidens	-	-	+
Trichocerca similis	-	-	+
Trichotria pocillum	+	+	-
Cladocera			
Bosmina longirostris	+	+	+
Chydorus sphaericus	-	-	+
Macrothrix laticornis	-	-	+
Copepoda			
Cyclops sp.	-	-	+
Arctodiaptomus sp.	+	+	+

* New record for the Turkish fauna.

Table 2. Measured water parameters during field surveys

Water parameters	Autumn	Spring	Summer
EC (µS/cm)	450	306	375
Temperature C^o	10.45	15.34	23.5
pH	8.6	9.16	8.5
Dissolved Oxygen mg/L	7.04	8.2	7.6
Secchi disc (cm)	178	85	122

Electrical conductivity was not changed so much during our measurements. According to Hammer (1986), Asartepe Dam Lake is considered as freshwater with salinity between 0 and 0.5 g/L of Total Dissolved Salts, TDS (less than 1000 µS/cm). The same species compositions were observed in other freshwater characteristic reservoirs in Central Anatolia (e.g. Saler and Şen, 2002; Kaya and Altındağ, 2007a; 2007b; Kaya and Altındağ, 2009). These cosmopolitan species in Central Anatolia are *Anuraeopsis fissa, Asplanchna priodonta, Brachionus angularis*, *Brachionus quadridentatus*, *Cephalodella gibba*, *Colurella adriatica*, *Colurella colurus, Euchlanis dilatata*, *Filinia limnetica, Filinia terminalis, Keratella cochlearis*, *Keratella quadrata, Lecane bulla*, *Lecane closterocerca, Lecane luna, Lecane lunaris, Lepadella patella*, *Notholca squamula, Polyarthra vulgaris*, *Synchaeta pectinata, Trichotria pocillum*, *Chydorus sphaericus*, *Bosmina longirostris.*

Species richness of Rotifera was found quite high, when compared to Cladocera and Copepoda in Turkish inland waters (Bekleyen, 2003; Altındağ and Yiğit, 2004; Yiğit and Altındağ, 2005; Bekleyen and Taş, 2006). The highest species richness was found in Rotifera with 43 species in the present study, as in other studies in Turkey.

References

Altındağ, A. and Yiğit, S. 2004. The zooplankton fauna and seasonal distribution Beyşehir Lake. Gazi Eğitim Fakültesi Dergisi, 24: 217-225.

Altındağ, A., Kaya, M., Ergönül, M.B. and Yiğit, S. 2005. Six rotifer species new for the Turkish fauna. Zoology in the Middle East, 36: 99-104.

Altındağ, A., Buyurgan, Ö., Kaya, M., Özdemir, E. and Dirican, S. 2009. A survey on some physico-chemical parameters and zooplankton structure in Karaman Stream, Antalya, Turkey. Journal of Animal and Veterinary Advances, 8(8): 1484-1490.

Atıcı, T. and Çalışkan, H. 2007. Effects of some Enviromental variables on the benthic shore algae (Excluding *Bacillariophyta*) of Asartepe Dam (Ankara). International Journal of Natural and Engineering Sciences, 1(2): 09-22.

Bekleyen, A. 2003. A taxonomical study on the zooplankton of Göksu Dam Lake (Diyarbakır). Turkish Journal of Zoology, 27: 95-100.

Bekleyen, A. and Taş, B. 2006. Çernek Gölü'nün zooplankton faunası. Ekoloji, 17: 24-30.

Castro, B.B., Antunes, S.C., Pereira, R., Soares, A.M.V.M. and Gonçalves, F. 2005. Rotifer community structure in three shallow lakes: seasonal fluctuations and explanatory factors. Hydrobiologia, 543: 221-232.

De Smet, W.H. 1996. The Prolidae (Monogononta). SPB Academic Publishing, Vol. 4. Amsterdam, 102 pp.

De Smet, W.H. and Pourriot, R. 1997. Rotifera 5: The Dicranophoridae (Monogononta) and Ituridae (Monogononta). In: H.J. Dumont, and T. Nogrady (Eds.), Guides to the Identification of the Microinvertebrates of the Continental Waters of the World 12. The Hague, 344 pp.

Derry, A.M., Prepas, E.E. and Hebert, P.D.N. 2003. A comparison of zooplankton communities insaline lake water with variable anion composition. Hydrobiologia, 505: 199-215.

Dumont, H.J. and De Ridder, M. 1987. Rotifers from Turkey. Hydrobiologia, 147: 65-74.

Hammer, U.T. 1986. Saline lake ecosystems of the world. Dordrecht, The Netherlands: Dr. W. Junk Publishers. 616 pp.

Hessen, D.O., Bakkestuen, V. and Walseng, B. 2007. Energy input and zooplankton species richness. Ecography, 30: 749-758.

Kaya, M. and Altındağ, A. 2007a. Zooplankton fauna and seasonal changes of Gelingüllü Dam Lake (Yozgat, Turkey). Turkish Journal of Zoology, 31: 347-351.

Kaya, M. and Altındağ, A. 2007b. Some Cladoceran species from Turkish inland waters. SDÜ., Fen Edebiyat Fakültesi Fen Dergisi, 2: 60-76.

Kaya, M. and Altındağ, A. 2009. New record Rotifer species for the Turkish fauna. Turkish Journal of Zoology, 33: 1-5.

Koste, W. 1978. Rotatoria Die Radertiere Mitteleuropas, Ein Bestimmungswerk, begrundet von Max Voigt, Uberordnung Monogononta, II. Tafelband, Gebruder Borntraeger, Berlin, 471 pp.

Lancaster, J. and Scudder, G.G.E. 1987. Aquatic Coleoptera and Hemiptera in some Canadian saline lakes: patterns in community structure. Canadian Journal of Zoology, 65: 1383–1390.

Matsubara, T. 1993. Rotifer community structure in the south basin of Lake Biwa. Hydrobiologia, 271: 1-10.

Nogrady, T. and Pourriot, R. 1995. The Notommatidae. Queen's Universty, Kingston, Ont. Canada and Université 6, Paris, 248 pp.

Saler, S. and Şen, D. 2002. Seasonal variation of Rotifera fauna of Çip Dam Lake (Elazığ-Turkey). Pakistan Journal of Biological Sciences, 5: 1274-1276.

Segers, H. 1995. The Lecanidae (Monogononta), Universty of Gent, Belgium, 226 pp.

Segers H. 2007. Annotated checklist of the rotifers (Phylum Rotifera) with notes on nomenclature, taxonomy and distribution, Zootaxa, 1564: 1-104.

Segers, H., Emir, N. and Mertens, J. 1992. Rotifera from North and North-east Anatolia (Turkey). Hydrobiologia. 245: 179-189.

Smirnov, N.N. 1992. The Macrothricidae of the world. Guides to the identification of the microinvertebrates of the continental waters of the world. SPB Academic Publishing, 143 pp.

Smirnov, N.N. 1996. The Chorinae and Sayciinae (Chydoridae) of the world, SPB Academic Publishing, Amsterdam, 197 pp.

Ustaoğlu, R. 2004. A Check-list for Zooplankton of Turkish inland waters. E.U. Journal of Fisheries and Aquatic Sciences, 21: 191-199.

Ustaoğlu, M.R., Balik, S. and Özdemir, M.S. 2004. The rotifer fauna of Lake Sazlıgöl (Menemen-İzmir). Turkish Journal of Zoology, 28: 267-272.

Yalim, F.B. and Çiplak, B. 2005. A representative of the pulchella group of Alona in Anatolia: *Alona camboui* Guerne and Richard, 1893 (Cladocera: Chydoridae), Turk. J. Zool., 29: 61-65.

Yiğit, S. and Altındağ, A. 2005. A taxonomical study on the zooplankton fauna of Hirfanlı Dam Lake (Kırşehir) Turkey. Gazi Eğitim Fakültesi Dergisi, 18: 563-567.

Williams, W.D., Boulton, A.J. and Taaffe, R.G. 1990. Salinity as a determinant of salt lake fauna: a question of scale. Hydrobiologia, 197: 257-266.