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The Rotifera Fauna of Gala Lake (Edirne-turkey)

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Abstract: This study was carried out to determine Rotifera fauna in the Lake Gala (Edirne). In this aim, the samplings were performed at monthly intervals between March 2004 and January 2005. The plankton specimens obtained from the samples Which were collected with horizontal and vertical samplings and then a total number of 69 species and 2 subspecies belonging to 17 different families were identified. Totally, 58 species were recorded for the first time in Turkish Thrace, including *Asplanchnopus hyalinus* (Harring, 1913), *Lecane donneri* (Chengalath and Mulamootil, 1974), *Dissotrocha aculeata* (Ehrenberg, 1832), *Proalides tentaculatus* (De Beuchamp, 1907), *Itura myersi* (Wulf, 1935) and *Paradicranophorus hudsoni* (Glascott, 1893) which is a new record for Turkish Rotifera fauna.

Key words: Rotifera, fauna, taxonomy, Gala lake

INTRODUCTION

Rotifera can be found in various aquatic habitats such as lakes, pools, streams and puddles and provide food for many vertebrate and invertebrate animals. In an aquatic habitat, abundance and composition of Rotifera species give clues in determining productivity of this aquatic habitat. Rotifera are also used as indicators for pollution and eutrophication for the habitat they are present since they are more sensitive to environmental changes than other zooplanktonic groups.

A number of investigations carried out for determination Rotifera fauna in Turkey^[1-15] and a total number of 174 species were recorded. However, most of these investigations were performed in Anatolia and thus investigations concerning on Turkish Thrace Rotifera fauna remained in limited numbers. Turkish Thrace is an aquatic ecosystem rich area harbouring Gala lake as well as Meriç, Tunca and Ergene rivers and a number of lakes and pools. In all these areas, 20 Rotifera species have been found.

Lake Gala is one of important wetlands in Turkey and was declared as a National Park on 28/02/2005. It is located on Meriç Delta surrounded by six freshwatered lakes and lagoons. The industrial and agricultural pollution through Thrace region also pollutes Gala lake and the wetlands around and thus the range of aquatic life here gets narrower day by day. This study was carried out in order to follow the likely alterations that might occur in the lake and to determine the Rotifera fauna and its annual variations patterns. This study will also form a base study for further investigations on Rotifera fauna of Turkish Thrace.

MATERIALS AND METHODS

Gala lake is an alluvial dam lake located in an area between Ipsala and Enez districts of Edirne where Meriç river falls into the Aegean Sea. It consist of two parts; Büyük Gala Lake and Küçük Gala Lake. Its covers an of 5,6 km² and it is 2 m. Above from the sea level (Fig. 1). Depth of the lake varies between 0,4 and 2,2 m. It is surrounded by wide reed (*Phragmites australis* and *Typha* sp.) areas. The lake is fed by IP-1 drainage canal (Basamaklar Stream), Kızıkan stream, other small streams and rainfalls.

Rice agriculture around the lake is rather dense and 24% of all Turkey's production of rice is met here. Water coming from these agricultural areas enters the lake and influences water quality negatively.

In the lake, 20 fish species of which most has economic importance^[16], 134 bird species^[17], 72 aquatic plant species^[18] were identified.

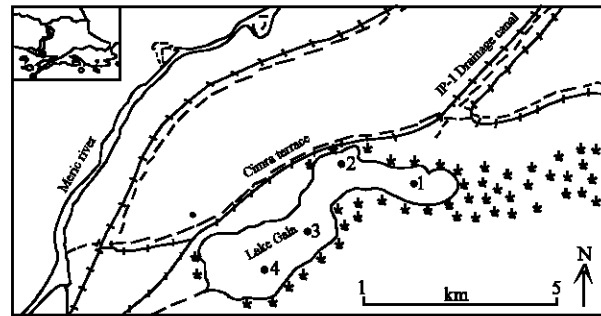


Fig. 1: Gala lake and sampling sites
(• ; shows the stations)

This study was carried out at monthly periods between March 2004-January 2005. Samples were collected with a Hensen type plankton net (mesh size 55 µ) vertically at four different stations representing the lake, with a the simple plankton net by horizontally at different zones of the lake and a small hand nets where the first two couldn't be used due to dense plantation. Collected samples were brought to the laboratory in 250 mL plastic bottles containing 4% formaldehyde. Identification and classification were done according to Kolisko^[19], Koste^[20], Ustaoglu ve Balık^[1], Emir^[2,3], Segers vd.^[4], Altındağ ve Sözen^[5], Altındağ ve Yiğit^[6] and Altındağ^[6,7].

RESULTS AND DISCUSSION

As a result of present study a total of 69 species and 2 subspecies belonging to 17 different families were identified. Of these, 6 species are new records for Turkey while 58 are new records for Turkish Thrace (Table 1).

When the species distribution according to the families are done it appears that Brachionidae (19 species) is the richest followed by Lecanidae (10 species) and Colurellidae (7 species). Member of these three families are commonly found in the plankton of shallow lakes and ponds are able to adapt to various physical and chemical environments^[21]. The shallow nature of Gala lake and the abundance of these families here supports the above conclusion.

We found the most abundant species in July (46 species). July is followed by 44 species in September, 38 species in June, 38 species in August, 27 species in May, 22 species in October, 21 species in November, 21 species in January, 20 species in December, 15 species in March and 14 species in April (Table 1).

According to this data, It is clear that species diversity of Rotifera increased gradually from spring to summer months. On the other hand when the weather began to get colder, that is the end of autumn, a decrease occurred. This diversity patterns greatly depend on the water temperature and the food supply provided within the water. In spring, when heat of water started to increase, It was observed an increase in the phytoplankton population which is food for Rotifera. Phytoplankton populations constituting the essential component of the Rotifera dietary spectrum increase with increasing water temperature in spring and this affects species diversity in the lake. While the most common species in the lake are *B. angularis*, *B. urceolaris* found during 11 months; *C. adriatica* found during 10 months; *B. calyciflorus*, *B. quadridentatus* and *L. closterocerca* found during 9 months; *D. aculeata*, *B. falcatus*, *B. patulus*, *N. acuminata*, *E. senta*, *M. mucronata*, *L. salpina*, *S. rostrum* and *L. rugosa* found during 1 month; *B. diversicornis*, *T. patina*, *N. squamula*, *L. triptera*, *L. furcata*, *L. nana*, *P. dolichoptera* and *Monommata* sp. found during 2 months are the rare ones (Table 1).

Table 1: Identified species in lake Gala and their distributions in months

Species/Months	M	A	M	J	J	A	S	O	N	D	J
Phylum: Rotifera											
Class: Diagononta											
Order: Bdelloidea											
Family: Philodinidae											
* <i>Philodina megalotrocha</i> (Ehrenberg, 1832)				+			+	+	+	+	+
* <i>Rotaria rotatoria</i> (Pallas, 1766)				+	+	+	+		+		
• <i>Dissotrocha aculeata</i> (Ehrenberg, 1832)										+	
* <i>Habrotrocha</i> sp.				+	+	+	+	+	+		
Class: Monogononta											
Order: Ploima											
Family: Brachionidae (W. and L., 1899)											
<i>Amuraopsis fissa</i> (Gosse, 1851)		+	+	+	+		+		+		
<i>Brachionus angularis</i> (Gosse, 1851)	+	+	+	+	+	+	+	+	+	+	+
* <i>Brachionus bidentata</i> (Andersen, 1889)				+	+	+	+			+	+
* <i>Brachionus budapestinensis</i> (Daday, 1885)					+	+	+				
* <i>Brachionus calyciflorus</i> (Pallas, 1766)	+	+	+	+		+	+		+	+	+
* <i>Brachionus diversicornis</i> (Daday, 1883)			+		+						
* <i>Brachionus falcatus</i> (Zacharias, 1898)				+							
* <i>Brachionus leydi</i> (Cohn, 1862)	+									+	+
* <i>Brachionus patulus</i> (O.F. Müller, 1786)					+						
* <i>Brachionus plicatilis</i> (O.F. Müller, 1786)			+	+	+		+				
* <i>Brachionus quadridentatus</i> (Hermann, 1783)		+	+	+	+	+	+	+		+	+
<i>Brachionus urceolaris</i> (O.F. Müller, 1773)	+	+	+	+	+	+	+	+	+	+	+
<i>Keratella quadrata</i> (O.F. Müller, 1786)	+	+	+	+						+	+
<i>K. cochlearis cochlearis</i> (Gosse, 1851)	+		+							+	+

•: First record for Turkey, *: First record for Turkish Trace

Table 1: Continue

Species/Months	M	A	M	J	J	A	S	O	N	D	J
* <i>K. cochlearis tecta</i> (Lauterborn, 1900)	+	+	+	+	+	+	+	+			
* <i>Keratella tropica</i> (Apstein, 1907)							+	+	+	+	
<i>Notholca acuminata</i> (Ehrenberg, 1832)											+
* <i>Notholca squamula</i> (O.F. Müller, 1786)										+	+
* <i>Platycs quadricornis</i> (Ehrenberg, 1832)				+	+	+	+				
Family: Epiphanidae (Bartos, 1959)											
* <i>Epiphaneis senta</i> (O.F. Müller, 1773)						+					
• <i>Proclides tentaculatus</i> (De Beauchamp, 1907)				+	+	+	+	+	+		
Family: Euchlanidae (Bartos, 1959)											
<i>Euchlanis dilatata</i> (Ehrenberg, 1832)		+	+	+	+	+	+	+			
Family: Mytilinidae (Bartos, 1959)											
* <i>Mytilina mucronata</i> (O.F. Müller, 1773)								+			
* <i>Mytilina ventralis</i> (Ehrenberg, 1832)						+	+	+			
* <i>Lopocharis salpina</i> (Ehrenberg, 1834)				+							
Family: Trichotriidae (Bartos, 1959)											
* <i>Trichotria pocillum</i> (O.F. Müller, 1776)			+	+	+	+	+	+		+	+
* <i>Trichotria tetractis</i> (Ehrenberg, 1830)			+		+	+	+				
Family: Colurellidae (Bartos, 1959)											
* <i>Cohurella adriatica</i> (Ehrenberg, 1831)	+		+	+	+	+	+	+	+	+	+
* <i>Cohurella colurus</i> (Ehrenberg, 1830)					+	+	+	+		+	
* <i>Cohurella uncinata</i> (O.F. Müller, 1773)				+	+	+					
* <i>Lepadella ovalis</i> (O.F. Müller, 1786)					+	+	+				
* <i>Lepadella patella</i> (O.F. Müller, 1786)			+		+	+	+				
* <i>Lepadella triptera</i> (Ehrenberg, 1830)					+	+					
* <i>Squatinella rostrum</i> (Schmarda, 1846)							+				
Family: Lecanidae (Bartos, 1959)											
* <i>Lecane bulla</i> (Gosse, 1886)	+			+	+	+	+				
* <i>Lecane closterocerca</i> (Schmarda, 1859)			+	+	+	+	+	+	+	+	+
• <i>Lecane donneri</i> (C. And M., 1974)					+	+	+				
* <i>Lecane furcata</i> (Murray, 1913)					+	+					
* <i>Lecane hamata</i> (Stokes, 1896)				+	+	+	+	+	+		
<i>Lecane luna</i> (O.F. Müller, 1776)			+	+	+	+	+	+			
<i>Lecane nana</i> (Murray, 1913)						+	+				
* <i>Lecane quadridentata</i> (Ehrenberg, 1832)				+	+	+	+				
* <i>Lecane rugosa</i> (Harring, 1914)						+					
* <i>Lecane stenwoosi</i> (Meissner, 1908)				+	+	+	+				
Family: Notommatidae (Remane, 1933)											
* <i>Cephalodella catellina</i> (O.F. Müller, 1786)	+	+	+								
<i>Cephalodella gibba</i> (Ehrenberg, 1838)	+	+	+	+							
• <i>Itura myersi</i> (Wulf, 1935)						+	+	+		+	
* <i>Monommata</i> sp.				+	+						
* <i>Scaridium longicaudum</i> (O.F. Müller, 1786)					+	+	+				
Family: Trichocercidae (Remane, 1933)											
* <i>Trichocerca elongata</i> (Gosse, 1886)				+			+	+	+		
* <i>Trichocerca rattus</i> (O.F. Müller, 1776)			+	+	+	+	+	+			
* <i>Trichocerca relictata</i> (Donner, 1950)			+	+	+	+	+	+			
Family: Synchaetidae (Remane, 1933)											
* <i>Synchaeta pectinata</i> (Ehrenberg, 1832)	+	+	+		+						
* <i>Synchaeta oblonga</i> (Ehrenberg, 1831)							+	+	+	+	+
* <i>Polyarthra dolichoptera</i> (Idelson, 1925)					+				+		
* <i>Polyarthra remata</i> (Skorikov, 1896)					+			+	+		+
<i>Polyarthra vulgaris</i> (Carlin, 1943)							+		+		+
Family: Asplanchnidae (H. and N., 1926)											
• <i>Asplanchnopus hyalinus</i> (Harring, 1913)					+	+	+				
<i>Asplanchna sieboldi</i> (Leydig, 1854)	+	+	+	+	+		+				
Family: Dicranophoridae (Remane, 1933)											
* <i>Dicranophorus grandis</i> (Ehrenberg, 1832)			+	+	+	+	+				
• <i>Paradicranophorus hudsoni</i> (Glascott, 1893)									+	+	+
* <i>Encentrum saundersiae</i> (Hudson, 1885)					+					+	+
Order: Flosculariaceae											
Family: Flosculariidae (Harring, 1913)											
* <i>Floscularia</i> sp.				+	+	+	+				
Family: Testudinellidae (Bartos, 1959)											
* <i>Testudinella patina</i> (Hermann, 1783)	+	+									
Family: Hexarthridae (Bartos, 1959)											
* <i>Hexarthra fennica</i> (Levander, 1892)			+	+	+						
Family: Filiniidae (Bartos, 1959)											
* <i>Filinia cornuta</i> (Weisse, 1847)			+		+	+			+		+
<i>Filinia longiseta</i> (Ehrenberg, 1834)	+	+	+	+			+		+	+	+

•: First record for Turkey, *: First record for Turkish Trace

Ploesoma hudsoni, *Asplanchna priodonta*, *Monostyla lunaris*, *Trichocerca pusilla* and *Rotaria citrina*^[4,22] were formerly recorded in previous studies performed in Gala lake and its surroundings, but couldn't be found in this study. *Ploesoma hudsoni* lives in oligotrophic lakes^[21]. The lake gained an eutrophic character since the DSI's studies. This trophic change is confirmed by some other eutrophy representative species. This is the reason why *P. hudsoni* couldn't be found. *Rotaria citrina* is a benthic species. This species as well as *A. priodonta*, *M. lunaris* and *T. pusilla* couldn't be found possibly because of the differences in methods used in sampling or physico-chemical features of the lake.

One hundred and seventy four species have been recorded so far with studies performed in Turkey. Rotifera fauna of Turkish Thrace region, covering 3% of Turkey's area, is represented by 78 species together with previous studies. So we can conclude that Turkish Thrace is a species rich area. This is because Turkish Thrace has many freshwater ecosystems. This region is neighbour to Balkan countries and especially Meriç and Tunca rivers from Bulgaria and Arda river from Greece pass enters Turkey here. Also, this region is located on the way of migration paths of birds which play an important role in carrying and distribution of Rotifer eggs. Almost all of the species identified in the lake Gala are also distributed in the Balkan countries^[23-25]. This shows that Rotifera fauna of the lake Gala resembles to those of Balkan countries and is under effect of them.

K. quadrata found in March, April, May, June, December and January during present study shows a distribution in eutrophic lakes^[21]. The presence of *Brachionus*, *Filinia* and *Polyarthra* in a lake indicates that this lake is eutrophic^[2]. In this study, while *Brachionus* is represented with the 11 species, *Filinia* and *Polyarthra* are represented with 2 and 3 species, respectively. The members of *Trichocerca* are also well-known as indicators of eutrophication^[12]. *H. fennica* and *B. plicatilis* which we found in Gala lake are widespread in salty inland water and are used as indicator of pollution and eutrophication^[5]. The presence of these species in the lake clearly demonstrates that sea water enters the lake when the water level in the lake decreases especially during summer time.

As a result, the following conclusions can be made for Gala lake. Rotifera fauna of the lake is represented by 71 species. Fifty eight of these species are new records for Turkish Thrace fauna whereas 6 species are new records for Turkey fauna. The lake can also be termed to be eutrophic regarding the Rotifera species identified.

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