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A New Rotifer Species for Turkish Inland Waters

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ABSTRACT

The zooplankton fauna of Lake Sapanca (Turkey) was studied during January 2009-May 2010 of monthly intervals. One Rotifera species, *Ploesoma truncatum* (Levander, 1894) is a new record for the Turkish inland waters fauna.

Key words: Zooplankton, rotifera, *Ploesoma truncatum*, Turkey, Lake Sapanca

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Türkiye İçsuları için Yeni Bir Rotifer Türü

Öz: Sapanca Gölü (Türkiye)'nün zooplankton faunası Ocak 2009-Mayıs 2010 döneminde aylık aralıklarla incelenmiştir. Bir Rotifera türü, *Ploesoma truncatum* (Levander, 1894), Türkiye içsuları faunası için yeni kayıttır.

Anahtar kelimeler: Zooplankton, rotifera, *Ploesoma truncatum*, Türkiye, Sapanca Gölü

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Introduction

Studies about the Rotifera of Turkish inland waters began at the beginning of the 1900s with Daday (1903) and Vavra (1905). Then, a few works have been done up to the 1970's (Zederbauer and Brehm 1907; Mann 1940; Geldiay 1949; Hauer 1957). Since 1970's many studies have been carried out on Rotifera fauna of various localities of Turkey, (e.g., Margaritora and Cottorelli 1970; Geldiay and Tareen 1972; Tokat 1975; Tokat 1976; Margaritora et al. 1977; Ustaoğlu 2004).

In last decades, many new record of Rotifera species were added to Turkish fauna (Altındağ et al. 2005; Kaya et al. 2008; Altındağ et al. 2009; Kaya et al. 2009; Kaya and Altındağ 2009; Bekleyen et al. 2011). Finally, Ustaoğlu et al. (2012) collected all studies up to 2012 in a paper. However, the studies on zooplankton fauna of Lake Sapanca is limited. Tokat (1975) found only 5 taxa, Ongan (1982) recorded 9 taxa and Rahe and Worthmann (1985) reported only 8 taxa of Rotifera species, in Lake Sapanca (Table 1). On the other hand, Okgerman (2008) conducted a detailed study and identified 35 taxa of Rotifera in the Lake (Table 1). *Ploesoma* was detected in the lake only in genus level (Table 1). Also, another member of aforementioned genus, which named *Ploesoma hudsoni* (Imhof 1891), was recorded in Lake Gala, when lake was still under oligotrophic conditions (DSI 1986; Segers et al. 1992). However, there is not any record about the *Ploesoma truncatum* (Levander 1894) in Turkish lakes.

Materials and Methods

In this study, Rotifera fauna has been studied in oligomesotrophic Turkish lake, Lake Sapanca between January 2009 and May 2010. Samples couldn't be taken in April 2010. It is located in the

northeast of the Marmara region of Turkey (40°41'N to 40°44'N and 30°09'E to 30°20' E) (Figure 1). It is a tectonic lake with an area of 46.8 km^2, and 250 km^2 basin. Its maximum depth is 55 m, whereas mean depth is 26 m. Lake Sapanca is a warm monomictic. In general, thermal stratification occur between late April and mid November. Its primary water sources are small rivers and groundwater (DSI, 1998). Lake Sapanca is a source of drinking water of Adapazarı and Kocaeli cities (Albay et al. 2003; Akçaalan et al. 2007).

The samples were collected by using a plankton net with 55 µm mesh size from two stations vertically during January 2009-May 2010 of monthly intervals. The samples were transferred to the polyethylene bottles and fixed with 4% formaldehyde solution. Rotifera species examination and counting (%*N*) were done using Nikon ECLIPSE TS100 inverted microscope. Identifications of Rotifera species were performed under Nikon mark YS100 model stereomicroscope. The diluted sodium hypochlorite was used to extract the trophi of species. To identify the species of Rotifera following references were reviewed: Kolisko (1974), Koste (1978), Pontin (1978), and Hollowday (2002). Water temperature, pH, conductivity and Dissolved Oxygen were measured in situ by using YSI 650 MDS Multi-parameter instrument.

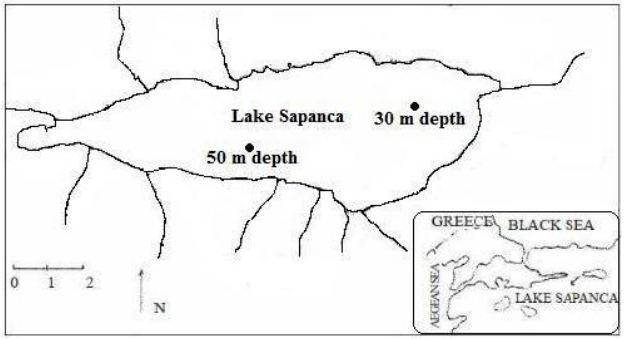

Figure 1. Location of the Lake Sapanca and sampling stations.

Results

P. truncatum is a loricate species (Figure 2). The head-plate of the specimen has small indentations dorsally, and it looks like almost straight. Also, this part seems a broad tongue if the caudal part is lifted. On the posterior of the dorsal antenna, crosswise ridges and borders are found. There are many longitudinal ridges on the surface of the shell, and they occurs a decisive triangle on the dorsal view of the specimen. The foot is partially annular in the upper reach. Its length of body, foot, and toe are 120-160; 70-80, and 25-32 µm, respectively (Hollowday 2002).

According to the data obtained over the entire study, *P. truncatum* was represented 1.83% of total zooplankton abundance, and 2.39% of total Rotifera abundance. High numbers of *P. truncatum* was determined in May 2010 (12.16% of total zooplankton abundance, and 12.37% of total Rotifera), whereas low abundance was established in cold months. Also, the assessment of the frequency of *P. truncatum* was done according to Koste and Terlutter (2001) (Table 2).

Discussion

Rotifera fauna will be given in another manuscript (Dorak et al. not publish yet). In the present study we present the first record of *P. truncatum* from Lake Sapanca (Turkey) (Figure 2). The taxonomical hierarchy of *P. truncatum* are given in below.

Phylum: Rotifera Cuvier, 1817
Class: Eurotatoria De Ridder, 1957
Subclass: Monogononta Plate, 1889
Superorder: Pseudotrocha Kutikova, 1970
Order: Ploima Hudson and Gosse, 1886
Family: Synchaetidae Hudson and Gosse, 1886
Genus: Ploesoma Herrick, 1885
Ploesoma truncatum (Levander, 1894)

This specimen is widely distributed Afrotropical, Australian, Nearctic, Neotropical and Palearctic regions around the world. *P. truncatum* is reported as thermophilic specimen (Koste 1978), and its embryonic development occurs at high temperatures, and this period continues for a long time (Edmondson 1960). *P. truncatum* was reported from various areas in the world including; Russia (Telesh 1995), Canada (Swadling et al. 2000), China (Lin et al. 2003; Zhaou et al. 2009), South America (Bonecker et al. 2005, 2009), Serbia (Cadjo et al. 2007), Greece (Doulka and Kehayias 2008; Kehayias et al. 2008), and North America (Barbiero and Warren 2011), except Turkey which is located in Palearctic region. Also, it has been a subject of several studies (e.g. Sudzuki et al. 1983; Molloy et al. 2014).

P. truncatum live in open waters of oligotrophic, ultraoligotrophic and mesotrophic lakes and ponds (Koste 1982). It was reported by Sládeček (1983) as an oligosaprobic specimen. Lake Sapanca is an oligomesotrophic lake with a clear water (Akçaalan et al. 2007). Some physicochemical characteristics of lake are given in Table 3. *P. truncatum* reached to high numbers in warm month (May 2010), when the water temperature was between 12.04-14.54 °C in Lake Sapanca (Table 2 and Table 3). Many authors were reported that the abundance of *P. truncatum*

positively correlated with water temperature (Swadling et al. 2000; Doulka and Kehayias 2008; Kehayias et al. 2008).

As a result, taxonomic studies are important to determine the biodiversity, and a new record for Turkish Rotifera fauna was added with this study.

Table 1. The Rotifera fauna of Lake Sapanca, according to the previous studies.

Taxon	Tokat (1975)	Ongan (1982)	Rahe and Worthmann (1985)	Okgerman (2008)
Anuraeopsis fissa Gosse, 1851				*
Ascomorpha ecaudis Petry, 1850				*
A. saltans Bartsch,1870				*
Asplanchna priodonta Gosse, 1850				*
A. sieboldi (Leydig, 1854)				*
Asplanchna sp.		*	*	
Brachionus angularis Gosse, 1851				*
B.calyciflorus Pallas, 1766				*
B. plicatilis O.F. Müller, 1786				*
Brachionus sp.		*	*	
Cephalodella catellina (O.F. Müller, 1786)				*
Colurella adriatica Ehrenberg, 1831				*
C.colurus (Ehrenberg, 1830)				*
C.uncinata (Müller, 1773)				*
Colurella sp.			*	
Conochilus sp.		*		
Euchlanis dilatata Ehrenberg, 1832				*
Filinia terminalis (Plate, 1886)				*
Gastrops sutylifer (Imhof, 1891)				*
Hexarthra mira (Hudson, 1871)	*			
Kellicotia sp.		*	*	
Keratella cochlearis	*	*		*
K. quadrata (Müller, 1786)	*	*		*
K. tropica (Apstein, 1907)				*
Keratella sp.			*	
Lecane luna (O.F. Müller, 1776)				*
L. lamellata (Daday, 1893)				*
Lepadella patella (O.F. Müller, 1773)				*
Lepadella sp.				*
Mytilina mucronata (O.F. Müller, 1773)				*
Notholca acuminata (Ehrenberg, 1832)				*
N. squamula (O.F. Müller, 1786)				*
N. labis (Gosse, 1887)				*
Pleosoma sp.	*	*		*
Polyarthra dolichoptera Idelson,1925	*			*
P. remata Skorikov, 1896				*
P.vulgaris (Carlin, 1943)				*
Polyarthra sp.		*	*	
Rotaria sp.			*	
Synchaeta oblonga Ehrenberg, 1832				*
S. pectinata (Ehrenberg, 1832)				*
Squatinella mutica (Ehrenberg, 1832)				*
Trichocerca cylindirica (Imhof, 1891)				*
Trichocerca sp.		*	*	
Trichotria pocillum (O.F. Müller, 1776)				*

Table 2. Monthly presence of *P. truncatum* in Lake Sapanca.

	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	May-10
P.truncatum	-	-	-	r	r	r	-	1	r	f	vo	vo	1	f	r	a

(1: for once; r =rare: 2–5 individuals; c = common : 6–10 individuals; f = frequent: 11–20 individuals; vo = very often: up to 50 individuals; a = abundant: over 50 individuals.)

Table 3. Some physicochemical characteristics of Lake Sapanca, and the preference of *P. truncatum* according to the literature.

Variable	Lake Sapanca		Jersabek and Leitner (2013)
	min-max	min-max	min-max
	Jan.2009-May.2010	May.2010*	
Water temperature (^{0}C)	7.91-18.01	12.04-14.54	5-10
Dissolved oxygen (mg L^{-1})	2.98-9.73	7.2-7.91	10.4-11.5
pH	7.22-8.94	8.35-8.5	6.4-8.3
Conductivity (µS cm^{-1})	226.57-265.57	264.8-265.57	250-340
TDS (mg L^{-1})	147.14-172.71	172-172.71	270-270

*: The sampling date with a high abundance of *P. truncatum* in the present study.

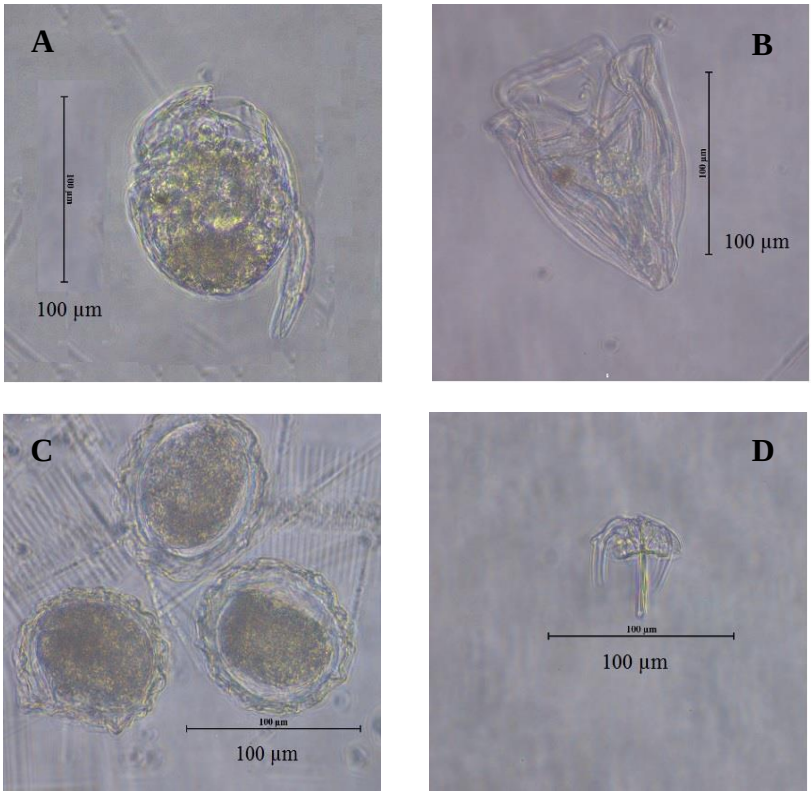

Figure 2. General view of *P. truncatum* (A and B). The eggs of *P. truncatum* (C) and Trophi of the species (D). (Photographs were taken at x40 magnification).

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