www.trjfas.org
ISSN 1303-2712
Turkish Journal of Fisheries and Aquatic Sciences 12: 165-169 (2012) DOI: 10.4194/1303-2712-v12_1_19

Four New Rotifera Species of Turkish Fauna

Sevil Erdoğan[1,*], Hüseyin Güher[2]

[1] Trakya University, Keşan Vocational College, Fisheries Programme, 22800, Keşan, Edirne/ Turkey.
[2] Trakya University, Science Faculty, Department of Biology, 22030, Edirne/ Turkey..

* Corresponding Author: Tel.: ; Fax: ;
E-mail: serdogantrakya@gmail.com

Received 8 April 2011
Accepted 6 January 2012

Abstract

Four rotifer species were recorded from 3 freshwater bodies (Pedina and Hamam Lakes, İğneada-Kırklareli and Ömerbey Stream, Uzunköprü- Edirne) in Turkish Thrace. These species, *Trichocerca bicristata* (Gosse, 1887), *Gastropus minor* (Rousselet, 1892) , *Erignatha clastopis* (Gosse, 1886) and *Encentrum kulmatyckii* Wiszniewski, 1953, are new records for the Turkish fauna. Besides, the recorded species are illustrated and aspects of their distribution are represented.

Keywords: Rotifera, taxonomy, new record species, Turkey.

Türkiye Rotifera Faunası İçin Dört Yeni Tür

Özet

Trakya bölgesindeki 3 tatlı sudan (Pedina ve Hamam Gölleri, İğneada-Kırklareli ve Ömerbey Deresi, Uzunköprü-Edirne) 4 rotifer türü tespit edilmiştir. Bu türler, *Trichocerca bicristata* (Gosse, 1887), *Gastropus minor* (Rousselet, 1892), *Erignatha clastopis* (Gosse, 1886) ve *Encentrum kulmatyckii* Wiszniewski, 1953, Türkiye Rotifera faunası için yeni kayıttırlar. Ayrıca, kaydedilen türlerin çizimleri ve dağılımları da verilmektedir.

Anahtar Kelimeler: Rotifera, Taksonomi, Yeni kayıt türler, Türkiye.

Introduction

There are a lot of studies on Rotifera, because it forms the first ring of the food chain in aquatic ecosystems and is used as a pollution indicator. As a result of these studies, 2030 Rotifera species have been identified in the world up to now. (Segers, 2007).

Studies performed to determine the Rotifera fauna of Turkey have also continued over the years without stopping. Some of these studies focuses on Rotifera taxonomy. The first checklist was published by Emir (1996) in a book chapter and in this checklist, 167 taxa were listed. The second checklist was published by Ustaoğlu (2004) with the title 'a check list for zooplankton of Turkish inland waters'. Ustaoğlu (2004) listed 229 rotifer species found out in former studies. In the following years, a number of investigations were carried out (Akbulut and Yıldız, 2005; Akbulut and Kaya, 2007; Altındağ and Yiğit, 2004; Altındağ *et al*., 2005; Altındağ *et al*., 2009a; Altındağ *et al*., 2009b; Aygen *et al*., 2009; Balık *et al*., 2006; Bekleyen and Taş, 2008; Bekleyen and İpek, 2010; Bozkurt, 2004a; Bozkurt, 2004b; Bozkurt, 2006; Buyurgan *et al*., 2010; Emir, 1996; Erdoğan and Güher, 2005; Kaya and Altındağ, 2007a; Kaya and Altındağ, 2007b; Kaya *et al*., 2007c; Kaya *et al*., 2008; Kaya and Altındağ, 2009; Kaya *et al*., 2009a; Kaya *et al*., 2009b; Kaya and Altındağ, 2010; Ölmez Aydın and Altındağ, 2004; Özdemir Mis and Ustaoğlu, 2009; Özdemir Mis *et al*., 2009; Saygı (Başbuğ) and Yiğit, 2005; Saler, 2009; Saler and Şen, 2010; Saler *et al*., 2010a; Saler *et al*., 2010b; Saler, 2011; Saler and Haykır, 2011; Tellioğlu and Akman, 2007; Türkmen *et al*., 2006; Ustaoğlu, 2004; Ustaoğlu *et al*., 2004; Ustaoğlu *et al*., 2005; Ustaoğlu *et al*., 2008; Yalım, 2006; Yıldız *et al*., 2010; Yiğit and Altındağ, 2005) and 341 rotifer species were recorded from Turkey. However, almost all of these studies are interested in Monogononta. Only one of them

presents a detailed research on bdelloidea (Kaya *et al* ., 2009b). In this study, 36 new bdelloid species were recorded for the Turkish fauna and thus, species number of bdelloid rotifers increased to 41.

This study presents four new rotifer species of Turkish fauna. Due to this study, the species number of Turkish Rotifera fauna increased to 345.

Materials and Methods

The samples were collected by using a plankton net (55µm mesh size) from 3 different water bodies in Thrace in 2008-2009. Samples were fixed in 4% formalin. Rotifera species were examined under the inverted microscope of Olympus mark. Species were drawn using a camera lucida and some were photographed. Trophi were extracted from some specimens using diluted sodium hypochlorite, and prepared for ligth microscope. Identification of rotifer species was made by using Kolisko (1974), Koste (1978), Pontin (1978) and Jersabek vd. (2003).

At each locality, air temperature, water temperature, pH, electrical conductivity and dissolved oxygen were measured during the field.

Results and Discussion

In this study, it was found 4 new record rotifers for Turkey. These species are *Trichocerca bicristata* (Gosse, 1887) belonging to Trichocercidae, *Gastropus minor* (Rousselet, 1892) belonging to Gastropodidae, *Erignatha clastopis* (Gosse, 1886) and *Encentrum kulmatyckii* Wiszniewski, 1953 belonging to Dicranophoridae. Although, *Trichocerca bicristata* and *Gastropus minor* are widely distributed in the world, the others have limited distribution (Segers, 2007).

Family: Dicranophoridae Harring, 1913

Encentrum kulmatyckii Wiszniewski, 1953

This species was collected from Ömerbey stream (Uzunköprü, Edirne), situated at 41°16' K - 26°50' D, on 26.01.2008 and is new record for the Turkish Rotifera fauna (Figure 1).

Description: Eye spots are observed. Retrocerebral sack and subcerebral glands are lack. Foot glands are long, discrete and completely fills the last segment of the foot. Toes are relatively short and conical. Stomach is typically with bright granules. Trophy is big and has strong components. It acts by crawling like a leech.

Length: 200-450 µm, Toe: 15-22 µm, Trophy: 45-56 µm, Manubrium: 42 µm, Fulcrum: 14 µm.

Ecology: It is found in temporary waters, pools and ponds. It is an ecto-parasite on Crustacea. Carnivore. It feeds on sessile ciliates and small rotifers (Koste and Terlutter, 2001).

In this study, pH: 9,5; Water temperature: 7 ºC; Air temperature: 10 ºC; Dissolved oxygen: 8,5 mg L^{-1}.

Distribution: Palearctic (Koste, 1978; Segers, 2007).

Erignatha clastopis (Gosse, 1886)

This species was collected from lakes Hamam and Pedina (Kırklareli-İğneada), situated at 41º49' K, 27º57' D and 41º50' K, 27º55' D on 01.02.2009 and 25.04.2009, 12.10. 2008, respectively and is new record for the Turkish Rotifera fauna (Figure 2).

Description: It has bright red frontal eye spots. Rostrum with 2 palps. Gastric glands contain spherical pedicles. Toes are long, sharp and bent into ventral. Stomach is without zoochlorella. Trophy carries a pair of symmetrical, slightly curved intramallei. Vitellarium has 4 nuclei.

Length: 145-210 µm, Toe: 24-36 µm, Trophy: 30-35 µm.

Ecology: It is found in the periphyton of lakes, temporary waters, pools and ponds (Koste, 1978).

In this study, pH: 7,2-7,5; Water temperature: 15-16,2 ºC; Air temperature: 15-18 ºC; Dissolved oxygen: 6,6 mg L^{-1}; Electrical conductivity: 146-206 µS cm^{-1}.

Distribution**:** Australia, Nearctic, Neotropical and Palearctic (Koste, 1978; Segers, 2007).

Family: Gastropodidae Remane, 1933

Gastropus minor (Rousselet, 1892)

This species was found in Lake Pedina and in Lake Hamam (İğneada-Kırklareli), situated at 41º50' K, 27º 55' D and 41º 49' K, 27º 57' D, on 25.04.2009

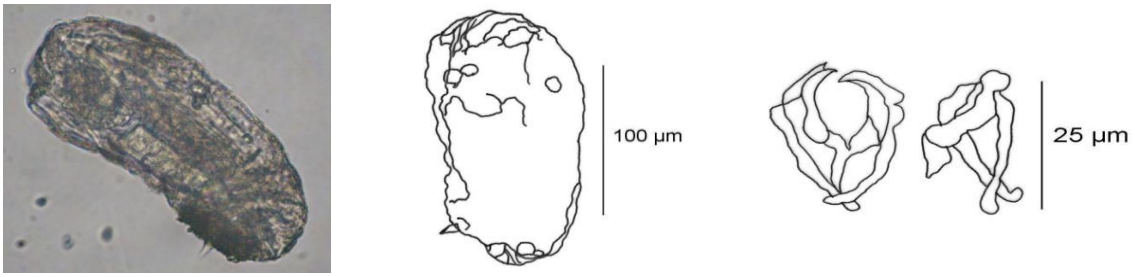

Figure 1. *Encentrum kulmatyckii*'s general view and trophy.

and 01.02.2009, respectively and is new for Turkish Rotifera fauna (Figure 3)

Description: Anterior end narrowed, foot is slightly wrinkled, toes are long and pointed. Trophy is pointed like the tip of a needle because the opening of the mouth manages ramus. Ramus has a long alula at the base. Unci simple, manubria is lamellar structer on both sides. Fulcrum is rod-shaped and medium length. The animal is colorless, only its stomach brown because it contains fat droplets. Vitellarium with 4 nuclei.

Length: 82-140 µm, Foot: 35 µm, Toe: 20-23 µm, Trophy: 24-30 µm (Koste, 1978).

Ecology: It is found in lakes, temporary waters, pools and ponds. Especially, in plankton in winter (Kolisko, 1974; Koste, 1978).

In this study, pH: 6,8-7,8; Water temperature: 16-25 ºC; Air temperature: 15-18 ºC; Dissolved oxygen: 8,6-10 mg L^{-1}; Electrical conductivity: 97-146 µS cm^{-1}.

Distribution: Australian, Nearctic, Neotropical, Oriental, Palearctic (Segers, 2007)

Family: Trichocercidae Harring, 1913

***Trichocerca bicristata* (Gosse, 1887)**

Only one specimen was found in Lake Pedina (İğneada-Kırklareli) situated at 41°50' K, 27°55' D on 25.04.2009 and is new for Turkish Rotifera fauna (Figure 4).

Description: Anterior border of lorica is without processes. Lorica is usually with 2 high crest with broad furrow. Corona with 2 thin palps. Lorica finally stippled; sometimes red brown coloured. Both manubria terminally crooked, one side curved, suprarami large, left ramus occasionally with two pointed alula.

Total length: 294-660 µm, Left Toe: 200-320 µm, Right Toe: 25-36 µm, Trophy 65-79µm.

Ecology: It usually occurs among plants and moss in littoral in detritus occasionally in

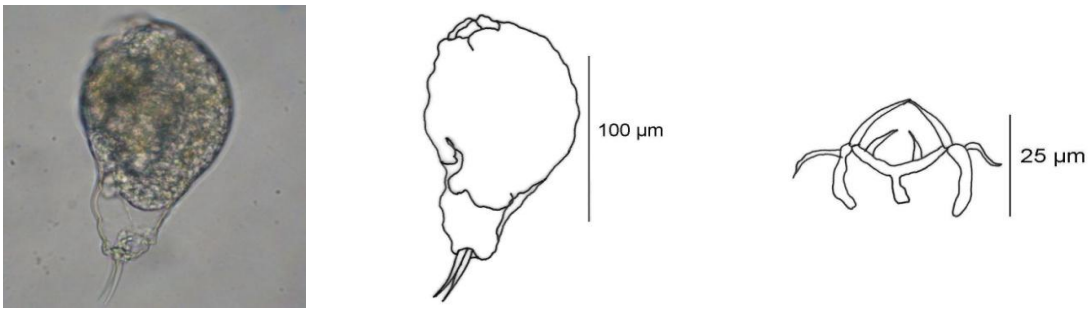

Figure 2. *Erignatha clastopis*'s general view and trophy.

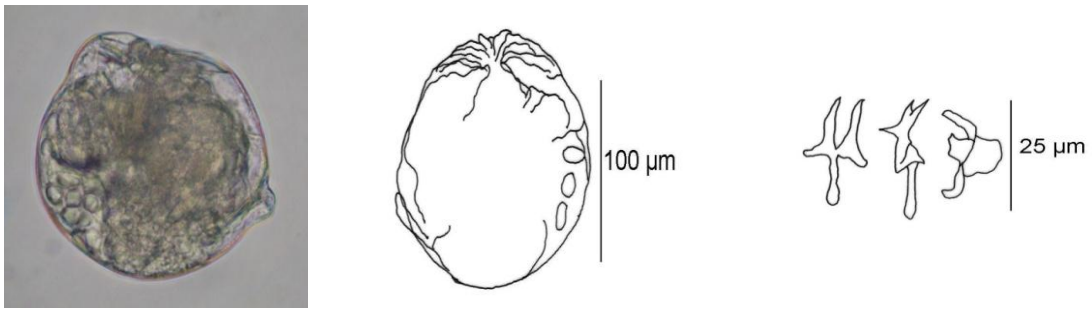

Figure 3. *Gastropus minor*'s general view and trophy.

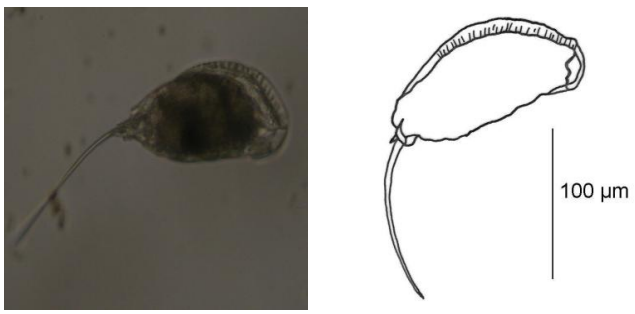

Figure 4. *Trichocerca bicristata*'s general view.

tychoplankton. Indicator of oligosaprobic waters (Koste, 1978). Temperature: 8-24,5 ºC, pH 6,3-8,4, Dissolved oxygen: 5,3-13 mgl^{-1}, 59-575 µS cm^{-1}. (Shiel and Koste, 1992).

In this study, pH: 7,5; Water temperature: 16 ºC; Air temperature: 18 ºC; Dissolved oxygen: 8,6 mg L^{-1}; Electrical conductivity: 146 µS cm^{-1}.

Distribution: Australian, Nearctic, Neotropical, Oriental, Pacific, Palearctic (Segers, 2007).

Turkey is rich in freshwater ecosystems which show different physical and chemical characteristics. But most of the investigations that have been done in Turkey up to now, were performed in stagnant waters like ponds and lakes. Streams were ignored. However, streams and natural lakes are far from the antropological effect that provides different types of habitat for the rotifer species and support higher species diversity. As long as intensive investigation continues in these different habitats, it will be possible to find new species of Turkish fauna.

Besides, it needs to be perform new studies on bdelloid rotifers because there was only one detailed study done in Turkey up to now. Bdelloid rotifers live in many kinds of aquatic and terrestrial habitats such as mosses, soil, and streams. Kaya *et al*. (2009b) stated that specific sampling strategies would greatly be effective to sampling bdelloid rotifers thus we can learn much about bdelloids.

This study suggests more extensive investigations are needed to understand the diversity of rotifers in freshwater, brackish, marine and terrestrial ecosystems in Turkey. The present study, adds four species (*Trichocerca bicristata* (Gosse, 1887), *Gastropus minor* (Rousselet, 1892), *Erignatha clastopis* (Gosse, 1886) ve *Encentrum kulmatyckii* Wiszniewski, 1953) to the rotifer fauna of Turkey. This study increased the species number of Turkish Rotifera fauna to 345.

Acknowledgements

This paper is a part of the Ph.D. thesis of S.Erdoğan which was financially supported by the Scientific Research Fund of the Trakya University.

References

Akbulut, N. and Yıldız, K. 2005. The Rotifera fauna of Euphrates River Basin (Turkey). Hacettepe Journal of Biology and Chemistry, 34: 93-105.

Akbulut, N. and Kaya, M. 2007. Records of species of Lecane Nitzsch, 1827 new for the Turkish rotifer fauna (Ploima, Lecanidae). Zoology in the Middle East, 41: 119-120.

Altındağ, A. and Yiğit, S. 2004. Beyşehir Gölü Zooplankton Faunası ve Mevsimsel Değişimi. G.Ü. Gazi Eğitim Fakültesi Dergisi, 24(3): 217-225.

Altındağ, A., Kaya, M., Ergonul, 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. 2009a. A Survey on Some Physico-Chemical Parameters and Zooplankton Structure in Karaman Stream, Antalya, Turkey, Journal of Animal and Veterinary Advances, 8(9): 1710-1716.

Altındağ, A., Segers, H. and Kaya, M. 2009b. Some Turkish Rotifer Species Studied Using Light and Scanning Electron Microscopy. Turk. J. Zool., 33: 73-81.

Aygen, C., Özdemir Mis, D., Ustaoğlu, M.R. and Balık, S. 2009. Zooplankton Composition and Abundance in Lake Eğrigöl, a High Mountain Lake (Gündoğmuş, Antalya). Turk. J. Zool., 33: 83-88.

Balık, S., Ustaoğlu, M.R., Sarı, H.M., Özdemir Mis, D., Aygen, C., Taşdemir, A., Yıldız, S., Topkara, E.T., Sömek, H., Özbek, M. and İlhan, A. 2006. Bozalan Gölü'nün (Menemen-İzmir) Biyolojik Çeşitliliği Hakkında Bir Ön Araştırma. E.Ü. Su Ürünleri Dergisi ,23(3-4): 291-294.

Bekleyen, A. and Taş, B. 2008. Çernek Gölünün (Samsun) Zooplankton Faunası. Ekoloji, 17(67): 24-30.

Bekleyen, A. and İpek, E. 2010. Composition and Abundance of Zooplankton in a Natural Aquarium, Lake Balıklıgol (Şanlıurfa, Turkey) and New Records. Journal of Animal and Veterinary Advances, 9(4): 681-687.

Bozkurt, A. 2004a. Akdeniz Bölgesindeki Bazı Akarsuların Zooplankton (Rotifer, Kladoser ve Kopepod) Faunası Üzerine İlk Gözlemler. Türk Sucul Yaşam Dergisi ,2(3): 65-70.

Bozkurt, A. 2004b. Doğu Akdeniz Bölgesindeki Bazı Baraj ve Göletlerin Zooplankton Faunası Üzerine İlk Gözlemler. Türk Sucul Yaşam Dergisi, 2 (3): 71-76.

Bozkurt, A. 2006. Yenişehir Gölü (Reyhanlı, Hatay) Zooplanktonu. E.Ü. Su Ürünleri Dergisi, 23(1/1): 39-43.

Buyurgan, Ö., Altındağ, A. and Kaya, M. 2010. Zooplankton Community Structure of Asartepe Dam Lake (Ankara, Turkey). Turkish Journal of Fisheries and Aquatic Sciences, 10: 135-138. doi: 10.4194/trjfas.2010.0119

Emir, N. 1996. Türkiye zooplankton (Rotifera, Cladocera tür listesi ve yayılışları. 20.1: Rotifera, In: Genel ve Türkiye Zoocoğrafyası (Hayvan Coğrafyası) (ed. A. Demirsoy), Meteksan yayınları, 465-479.

Erdoğan, S. and Güher, H. 2005. The Rotifera fauna of Gala Lake(Edirne-Turkey). Pakistan Journal of Biologial Sciences. 8(11): 1579-1583. doi: 10.3923/pjbs.2005.1579.1583

Jersabek, C.D., Segers, H. and Morris, P.J. 2003. An illustrated online catalog of the Rotifera in the Academy of Naturel Sciences of Philadelphia http://rotifer.acnatsci.org/rotifer.php.

Kaya, M. and Altındağ, A. 2007a. Brachionidae (Rotifera: Monogononta) species from Turkey. Asian Journal of Animal Sciences, 1: 40-47. doi: 10.3923/ajas.2007.40.47

Kaya, M. and Altındağ, A. 2007b. A taxonomic study on the families Lepadellidae and Trichocercidae (Rotifera: Monogononta) of Turkey. Chinese Journal of Oceanology and Limnology, 25: 423-426. doi: 10.1007/s00343-007-0423-z

Kaya, M., Yiğit, S. and Altındağ, A. 2007c. Rotifers in Turkish inland waters. Zoology in the Middle East, 40: 71-76.

Kaya, M., Altındağ, A. and Sezen, G. 2008. The genus Sinantherina Bory de St. Vincent, 1826, a new record for the Turkish rotifer fauna. Turkish Journal of

Zoology. 32: 71-74.

Kaya, M. and Altındağ, A. 2009. New Record Rotifer Species for the Turkish Fauna. Turkish Journal of Zoology. 33: 7-12.

Kaya, M., Duman, F. and Altındağ, A. 2009a. Kayseri İli Bazı Sulak Alanlarından (Şeker Göleti, Reşadiye Göleti, Zincirdere Göleti, Mimarsinan Parkı Havuzu, Hisarcık Çayı, Kumalı Parkı Havuzu) Kaydedilen Rotifer Türleri. SDÜ Fen E- Dergisi, 4(1): 54-58.

Kaya, M., Herniou, E.A., Barraclough, T.G. and Fontaneto, D. 2009b. A faunistic survey of bdelloid rotifers in Turkey. Zoology in the Middle East, 48: 114-116.

Kaya, M. and Altındağ, A. 2010. Ten additions to the rotifer fauna of Turkey. Turkish Journal of Zoology. 34: 195-202.

Kolisko, A. 1974. Plankton Rotifers, Biology and Taxonomy. Die Binnengenwasser, 26(1), 144 pp.

Koste, W. 1978. Die Radertiere Mitteleuropas II. Tafelband, Berlin, Stutgart, 670.

Koste, W. and Terlutter, H. 2001. Die Rotatorienfauna einiger Gewasser des Naturschutzgebietes "Heiliges Meer" im Kreis Steinfurt, Osnabrücker Naturwissenschaftliche Mitteilungen Band 27:113-117.

Ölmez Aydın, D. and Altındağ, A. 2004. Sarmısaklı Baraj Gölünün (Kayseri-Türkiye) Rotifera Faunası Üzerine Taksonomik Bir çalışma. Türk Sucul Yaşam Dergisi 2(3): 27-34.

Özdemir, Mis, D. and Ustaoğlu, M.R. 2009. Gölcük Gölü'nün (Ödemiş, İzmir) Zooplanktonu Üzerine Araştırmalar. E.Ü.Su Ürünleri Dergisi 26(1): 19-27.

Özdemir Mis, D., Aygen, C., Ustaoğlu, M.R. and Balık, S. 2009. Tahtalı Baraj Gölü (İzmir)'nün Zooplankton Kompozisyonu. E.Ü.Su Ürünleri Dergisi 26(2): 129-134.

Pontin, M.R. 1978. A Key to the freshwater Planktonic and Semi-Planktonic Rotifera of the British Isles. No: 38.178.

Saler, S. 2009. Rotifers of Kepektaş Dam Lake (Elazığ-Turkey). Iranian Journal of Science & Technology, Transaction A, 33, A1: 121-126.

Saler, S. and Şen, B. 2010. Long Term Changes in Rotifera fauna of Guluskur Bay (Keban Dam Lake, Elazıg, Turkey). Journal of Animal and Veterinary Advances 9 (14): 1909-1912.

Saler, S., Eroğlu, M. and Haykır, H. 2010a. Peri Çayı (Tunceli-Türkiye) Zooplanktonu. E-Journal of New World Sciences Academy, Ecological Life Sciences 6(2):14-20.

Saler, S., İpek, N. and Eroğlu, M. 2010b. Karakaya Baraj Gölü Battalgazi Bölgesi (Malatya) Rotifer Türleri. e-Journal of New World Sciences Academy, Ecological Life Sciences 5(3): 216-221.

Saler, S. 2011. Zooplankton of Munzur River (Tunceli-Turkey). Journal of Animal and Veterinary Advances 10(2): 192-194. doi: 10.3923/javaa.2011.192.194

Saler, S. and Haykır, H. 2011. Zooplankton Composition of Pülümür Stream (Tunceli- Turkey). Journal of Animal and Veterinary Advances 10(11): 1401-1403. doi: 10.3923/javaa.2011.1401.1403

Saygı, Başbuğ, Y. and Yiğit, S. 2005. Rotifera Community Structure of Yeniçağa Lake, Turkey. Journal of Freshwater Ecology, 20(1): 197-199.

Segers, H. 2007. Annotated checklist of the rotifers (Phylum Rotifera), with notes on nomenclature, taxonomy and distribution, Zootaxa. 1564: 1–104. Magnolia Press ISSN 1175-5334 (online edition).

Shiel, R.J. and Koste, W. 1992. Rotifera from Australian inland waters VIII. Trichocercidae (Monogononta). Trans. R. Soc. S. Aust. 116(1):1-27.

Tellioğlu, A. and Akman, F. 2007. A Taxonomical Study of the Rotifera Fauna in Pertek Region of Keban Dam Lake. E.Ü. Journal of Fisheries & Aquatic Sciences 24(1-2): 135-136.

Türkmen, M., Naz, M. and Dinler, Z.M. 2006. Gölbaşı Gölü'nün Zooplankton Tür Kompozisyonu ve Biyoması (Hatay, Türkiye). E.Ü. Su Ürünleri Dergisi 23(1/1): 163-167.

Ustaoğlu, M.R. 2004. A Check-list for Zooplankton of Turkish Inland Waters, E.U. Journal of Fisheries & Aquatic Sciences. 21 (3-4) : 191-199.

Ustaoğlu, M.R., Balık, S. and Özdemir, M.S. 2004. The rotifer fauna of Lake Sazlıgol (Menemen-İzmir). Turk. J. Zool. 28: 267-272.

Ustaoğlu, M.R., Balık, S., Ozdemir, M.S. and Aygen, C. 2005. The zooplankton of some mountain lakes in the Taurus Range (Turkey). Zoology in the Middle East. 34: 101-108.

Ustaoğlu,M.R., Balık, S., Sarı, H.M., Özdemir Mis, D., Aygen, C., Özbek, M., İlhan, A., Taşdemir, A., Yıldız, S. and Topkara, E.T. 2008. Uludağ (Bursa)'daki Buzul Gölleri ve Akarsularında Faunal Bir Çalışma. E. Ü. Su Ürünleri Dergisi, 24(4): 295-299.

Yalım, B. 2006. Rotifera Fauna of Yamansaz Lake (Antalya) in South-west of Turkey. E.U.Journal of Fisheries & Aquatic Sciences 23(3-4): 395-397.

Yıldız, Ş., Özgökçe, M.S., Özgökçe, F., Karaca, İ. and Polat, E. 2010. Zooplankton composition of Van Lake Coastline in Turkey. African Journal of Biotechnology, 9(48): 8248-8252.

Yiğit, S. and Altındağ, A. 2005. A Taxonomical Study on the Zooplankton Fauna of Hirfanlı Dam Lake (Kırşehir). Turkey. G.Ü.Fen Bilimleri Dergisi 18(4): 563-567.