IJVAR *International Journal of Veterinary and Animal Research*
*Uluslararası Veteriner ve Hayvan Araştırmaları Dergisi*
*E-ISSN:2651-3609 1(3): 54-57, 2018*

# Identification of Some Rotifer Species in Hazar Lake (Elazığ-Turkey) with Electron Microscope

Hilal Bulut[1*] Serap Saler[1]
[1]Department of Fisheries Faculty, Firat University, Elazıg, Turkey

*Corresponding Author
E-mail: hilalhaykir@gmail.com

**Abstract**

This study was conducted between March 2017 and February 2018 to determine the rotifer fauna of Hazar Lake provide clear diagnosis of suspected rotifers in electron microscopy. Totaly 24 species from Rotifera, were identified in our this study. In this study, scanning electron microscope photographs of some Rotifera species were taken. Scanning electron microscopy (SEM) of the trophi structure (SEM), which is an important part of the species identification of monogonont rotifers, has also been performed in this study.

## INTRODUCTION

The phylum Rotifera is a group of microscopic animals, usually much shorter than 1 mm, living in any habitat where water is available: rotifers can be found in permanent water bodies such as lakes, ponds, and rivers, but also in the water layer between soil particles, mosses and lichens, and in the meltwater of glaciers [1]. Rotifers are very diverse, and occupy different dietary niches, with species that are filter-feeders, predators, browsers, piercers, parasites, etc. Such diversity in the feeding strategies is revealed in the wide variety of shape of the hard pieces that form the masticatory apparatus, the trophi reflect taxonomic differences (so that detailed differences are used for species identification), evolutionary relationships (trophi are used in the morphological classification of most taxonomic ranks), and ecological adaptations (trophi reflect different feeding adaptations).

The identification of Rotifera is difficult for many reasons; most species were described before 1950, and original descriptions do not report important taxonomical details that can be observed only with modern technological equipment such as scanning electron microscopy (SEM) and high-quality light microscopes. The scanning electron microscopy SEM has helped in the recognition of surfaces of cells, tissues, and structures, developing a new way of more detailed study.

In the case of limnology, the use of SEM has been of great importance for taxonomists as a tool that allows for a more detailed study of the different planktonic organisms that are mainly microscopic, and thus optical microscopy might not allow for a clear distinction of structures of taxonomical importance

One of the main problems faced by rotifer taxonomists is the insufficiency of useful morphological characteristics for classification. Initial examination of the external features of the body usually relies on the distinct shapes of the lorica, appendages or corona. However, structures of the internal trophi have also been used successfully for identification. In particular, for the identification of species of Filinia, Hexarthra and Synchaeta, it is not sufficient to use only the external features; ecological requirements and also trophal structures must be analysed. Trophi appear to be species-specific and therefore are a valuable taxonomic discriminator [2]. One of the most important features of trophi is the number of uncal teeth, but these structures are difficult to count using a compound light microscope, even at magnifications up to 1000 x. Scanning electron microscopy (SEM) permits finer resolution of structures and, as a consequence, has the potential to clarify much of the present systematic confusion within the Rotifera. Initial SEM studies involved examining large trophi of large rotifers e.g. Asplanchna [3,4] which are reasonably easily prepared. Trophi of smaller specimens need more refined techniques.

Purpose of this study is current rotifer fauna of Hazar Lake and make definite identify of rotifer species similar to each other.

## MATERIALS AND METHODS

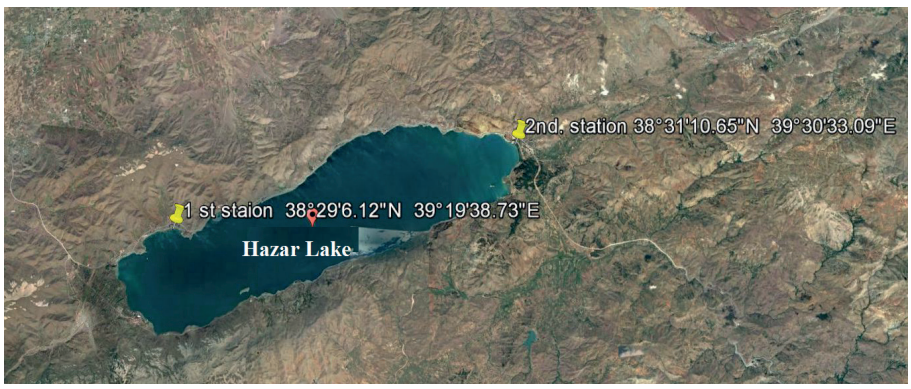



**Figure 1**. View of Hazar Lake

In this research rotifer distribution of Hazar lake were determined between March 2017 - February 2018. The samples were taken from 2 stations of lake. The rotifer samples were collected with a standard plankton net (Hydrobios Kiel, 25 cm diameter 55 µm mesh size) horizontal hauls and the specimens were preserved in 4% formaldehyde solution in 250 ml plastic bottles. The species were identified according to Kolisko [5], Koste [6], Segers [7].

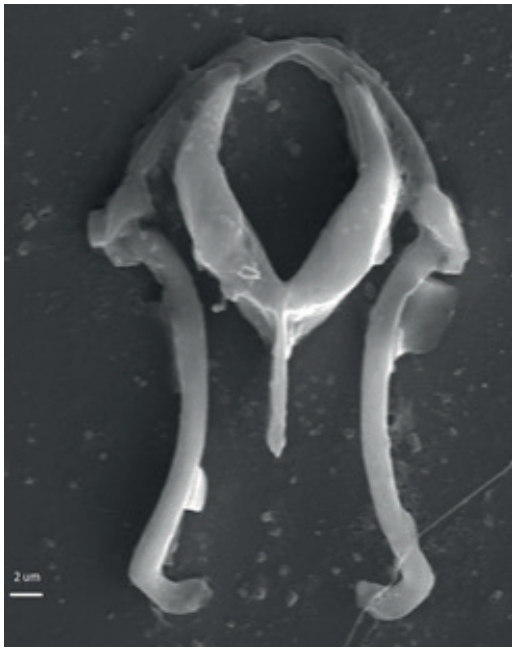
**Preparation of the lorica of rotifers for the scanning electron microscopy (SEM)**:

1. Samples collected from the field and contained in 4% formaldehyde taking a designated individual on the glass slide,
2. General photos of the individual on the slide have been taken, diagnostic features of the species have been noted.
3. The sample washed about 10 times with distilled water (1 dropping the water and re-draining the water),
4. 18x18 mm glass coverslip divided into 4 equal parts,
5. The sample transferred on one of piece of coverslip.
6. The sample has been observed under microscope and the place of it marked with a red glass pen.
7. The coverslip placed the on the staple and sputtered and coated with gold.
8. After the gold covering, the photos have been taken with convenient magnification
9. Printing photos were taken on a CD.

**The trophi structure's of Semi loricate or illoricate rotifers preparation for S.E.M**

The procedure is same to number 5.

1. One drop of glycerin is added between slide and cover slide.
2. The washed sample transferred to cover slide.
3. 1 drop of NaOCl poured on the sample for removing of trophi from the body.
4. The separated trophi washed with distilled water several times.
5. The procedure is the same after this step with above procedure (6,7,8,9)



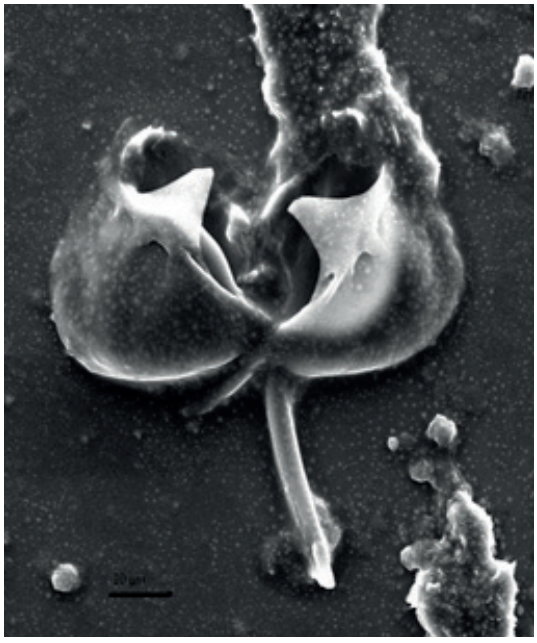

*Encentrum saundersiae*

## RESULT AND DISCUSSION

In Hazar Lake 24 species from Rotifera were identified. The distributions of the species are given in Table 1.

**Table 1**. Distributions of rotifers according to stations in Hazar Lake

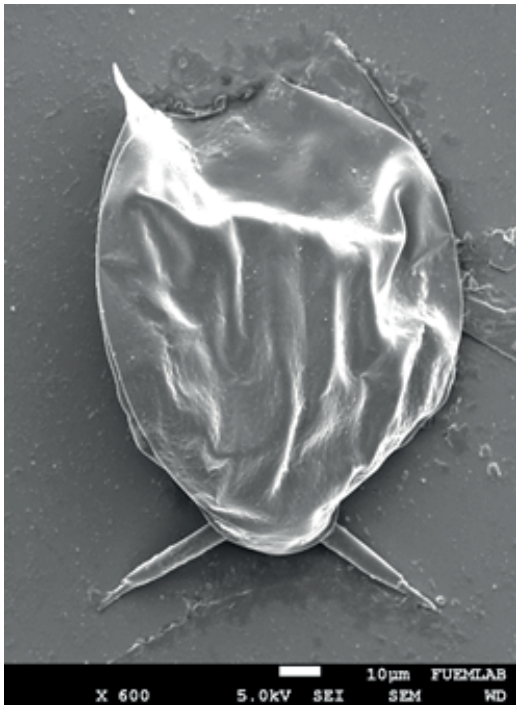
| Stations | 1 | 2 |
|---|---|---|
| **Rotifera species** | | |
| *Ascomorpha saltans Bartsch,1870* | + | - |
| *Asplanchna priodonta* Gosse, 1850 | + | + |
| *Asplanchna sieboldi* (Leydig, 1854) | + | - |
| *Brachionus angularis Gosse, 1851* | + | + |
| *Brachionus urceolaris* Müller, 1773 | - | + |
| *Encentrum saundersiae* (Hudson, 1885) | + | - |
| *Epiphanes senta* (Müller, 1773) | + | - |
| *Euchlanis dilatata* Ehrenberg, 1832 | + | + |
| *Filinia terminalis* (Plate, 1886) | - | + |
| *Hexarthra fennica* (Levander, 1892) | + | + |
| *Hexarthra mira* (Hudson, 1871) | + | + |
| *Keratella cochlearis* (Gosse, 1851) | + | + |
| *Keratella tecta* (Gosse, 1851) | + | + |
| *Keratella quadrata* (Müller, 1786) | + | + |
| *Lecane luna* (Müller, 1776) | + | - |
| *Lepadella ovalis* (Müller, 1786) | - | + |
| *Lepadella patella* (Müller, 1773) | - | + |
| *Notholca squamula* (Müller, 1786) | + | - |
| *Polyarthra dolichoptera* Idelson,1925 | + | + |
| *Synchaeta oblonga* Ehrenberg, 1832 | + | + |
| *Synchaeta pectinata* Ehrenberg, 1832 | + | + |
| *Trichocerca similis* (Wierzeski, 1893) | - | + |
| *Trichotria tetractis* (Ehrenberg, 1830) | + | - |



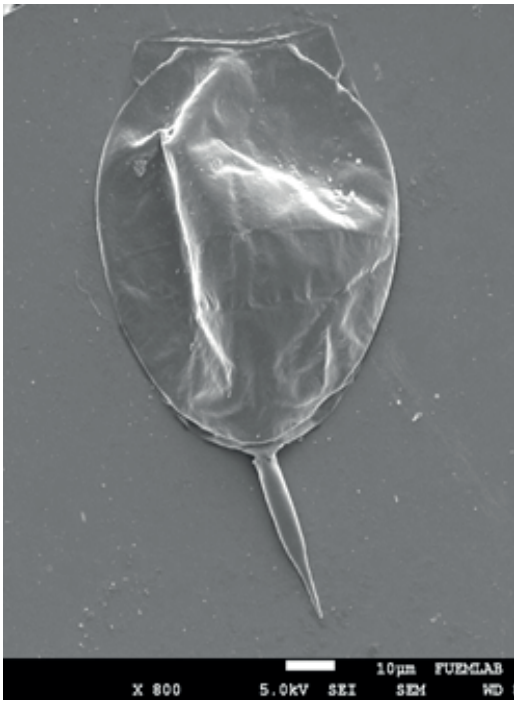
*Sychaeta pectinata*

The dominance of Brachionus and Keratella are common in freshwater bodies in Turkey [8]. In this study two species of Brachionus (*B. angularis* and *B.urceolaris*) and three species of Keratella (*K. cochlearis, K. quadrata, K. tecta*) have been identified. Ustaoğlu et al. [8] reported

*Epiphanes senta*




*Lecane luna*




*Lecane closterocerca*

15 Brachionus species and 6 Keratella species from Turkey. According to Radwan [9] and Sladecek [10], Branchionus species indicate eutrophic habitats. They also suggested the Brachionidae family and Brachionus species as indicators of highly trophic habitats. In the current study 8 species


*Keratella cochlearis*

(*Brachionus angularis, B. urceolaris, Euclanis dilatata, Keratella cochlearis, K. quadrata, K. tecta* and *Notholca squamula*) from Brachionidae have been identified.

The genera Keratella Bory de St. Vincent, 1822 was found to be the most dominant group (with 3 species), followed by the genus Asplanchna Gosse, 1850 (with 2 species), Brachionus Pallas, 1766 (with 2 species), Hexarthra Schmarda, 1854 (with 2 species), Lepadella Bory de St. Vin-

cent, 1826 (with 2 species) and Synchaeta Ehrenberg, 1832 (with 2 species).

Although many studies on rotifer fauna of Turkish inland waters have been conducted, in the most of these studies for identification of the species, light or inverted microscopes have been used. But the details of some diagnostic features of the species could not be observed under these kind of microscope. In recent years some researchers have been used electron microscopy for rotifer species identification. Altındağ et al., [11], identified *A.silvestrii, A.brightwellii, A.priodonta, A.girodi, Cephalodella segersi, Hexarthra polyodonta*; Kaya *et al.,* [12] *Sinantherina semibullata*; Kaya and Altındağ, [13], *C. forceps, C. misgurnus, Encentrum limicolo, E. mustela*; Bulut and Saler [14], *L. steenroosi*, *L.closterocerca, Platiyas quadricornis, Scaridium longicaudum, Squatinella rostrum, Proales fallaciosa* by using scanning electron microscopy. In this study different from above species *K.cochlearis, Encentrum saunsarsiae, Epiphanes senta* SEM photos have been taken.

## REFERENCES

1. D. Fontaneto, W.H. De Smet and C. Ricci, Rotifers in saltwater environments, re-evaluation of an inconspicuous taxon. *J. Mar. Biol. Ass. UK*. 86 (2006), pp. 623-656.

2. J.K. Koehler, and T.L. Hayes, The rotifer jaw:A scanning and transmission electron microscope study. I The trophi of Philodina acuticornis odiosa. *J. Ultrastruct. Res.* 27 (1969), pp. 402-418.

3. G.W. Salt, G.F. Sabbadini and M. Commins, 1978. Trophi morphology relative to food habits in six species of rotifers (Asplanchnidae). *Trans. Amer. Micros. Soc*. 97 (1978), pp. 469-485.

4. W. Koste, and R.J. Shiel, 1989. Classical taxonomy and modern methodology. In C.Ricci, T.W. Snell and C.E. King (eds), Rotifer Symposium V.Developments in Hydrobiology 52. Kluwer Academic Publishers, Dordrecht: 279-284. Reprinted from Hydrobiologia pp. 186-187

5. A. Altındağ, H. Segers and M. Kaya, M. Some Turkish rotifer species studied using light and scanning electron microscopy. *Turkish Journal of Zoology*, 33(2009), pp. 73-81.

6. H. Bulut and S. Saler, Monthly Variations of Zooplankton In A Freshwater Body (Maryap Pond, Turkey). *Academic Journal of Science*, 6 1 (2016), pp. 39-52.

7. V. Sladecek, "Rotifers as indicators of water quality", *Hydrobiol*., (1983)100, pp. 169-201.

8. M. Kaya, A. Altındağ and G. Sezen, A new Genus (Sinantherina Bory de St. Vincent, 1826) for Turkish Rotifer Fauna, *Tr. Journal of Zoology*, 32 (2008), pp. 71-74.

9. M. Kaya and A. Altındağ, Ten additions to the rotifer fauna of Turkey. *Turk J. Zool*. 34 (2010), 195-202.

10. W. R. Kolisko,. Planktonic Rotifers Biologyand Taxonomy Biological Station, *Lunz of The Austrian Academy of Science*, Stuttgart, (1974), pp. 974.

11. W. Koste,. Die Radertiere Mitteleuropas I. Textband, Berlin, (1978a), pp. 673.

12. W. Koste,. Die Radertiere Mitteleuropas II. Tofelband, Berlin, (1978b), pp. 235.

13. M. R. Ustaoğlu, A. Altındağ, M. Kaya, N. Akbulut, A. Bozkurt, D. Ö. Mis, S. Atasagun, S. Erdoğan, A. Bekleyen, S. Saler and H. C. Okgerman, "A checklist of Turkish Rotifers". *Turk. J. Zool*., (2012), 36, pp. 607-622.

14. H. Segers, 1995. The Lecanidae (Monogononta). In: Nogrady T. (ed) Rotifera 2. In: Dumont HJ (ed) Guides to the Identification of the Continental Waters of the World 6. SPB Academic, The Hague, The Netherlands,(1995), pp. 226.

15. S. Radwan, The influence of some abiotic factors on the occurrence of rotifers of Leczna and Wladowa Lake District. *Hydrobiol*.,112 (1984), pp. 117-124.