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Annotated Checklist of Rotifers of Tehran Province, Iran, with Notes on New Records

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ABSTRACT

Despite rapid growth of our knowledge on the phylum Rotifera, only few studies on Iranian rotifers have been carried out. In this paper, we present a checklist of rotifers from the province of Tehran in Iran. In total, 45 species of rotifers (class Eurotatoria) are reported. Most of the recorded species are cosmopolitan in distribution. *Cephalodella ventripes, Dicranophorus forcipatus, D. luetkeni, Encentrum cf. putorius, Filinia terminalis, Notommata glyphura, Proales minima, Trichocerca tenuior* and *Trichotria pocillum* are new to Iran's fauna. Of the rotifer families found, Brachionidae, Lecanidae and Notommatidae were the most diverse. This study can be considered a starting point for rotifer biodiversity research in Iran. More comprehensive studies are required to achieve a reliable understanding of rotifer diversity patterns in the province of Tehran.

Keywords: biodiversity, rotifer, Tehran, Iran.

Introduction

The Phylum Rotifera includes a group of microscopic planktons, and is one of the most important elements of all freshwater ecosystems. The phylum is classically divided into three subclasses, Seisonidea, Bdelloidea, and Monogononta. A new classification, however, recognizes two classes, Eurotatoria and Pararotatoria (Wallace *et al.,* 2006). Although different aspects of rotifer biology including autecology (Berzin & Pejler 1989, May & Bass 1998, Arora & Mehra 2003) are and have been under intensive investigation worldwide, little research has been done in Iran. Even the most basic aspects of rotifer biology, such as their diversity, have not been extensively addressed in Iran. Löffler (1961) recorded eight species of rotifers from Iran and later on Brishtain *et al.* (1968) recorded 21 species from the Caspian Sea. Additionally, there are some reports from governmental organizations which have not published. Hakimzadeh (2007) was the first local researcher who studied rotifers of Iran, and he recorded 36 species from various freshwater aquatic systems in the province of Tehran. Shayestehfar *et al.* (2008) carried out an ecological study in the river Kor, Iran. Later, Kordbacheh (2010) reported 25 species from Karaj River and Karaj Dam Lake, again from the province of Tehran. Khaleqsefat *et al.* (2011) and Hakimzadeh *et al.* (2011) were among other researchers who studied Iran's fauna. The present article presents a checklist of the Rotifera of Tehran, with a focus on new records for Iran's fauna found in Karaj River and Karaj Dam Lake.

Materials and Methods

The checklist presented here is based on the species reported by Hakimzadeh *et al.*

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(2011) from the province of Tehran, and the study of Kordbacheh (2010) carried out at the University of Tehran. Sampling was carried out twice a month, from October 2008 to September 2009 in Karaj River and the lake behind the Karaj Dam, in the mountainous area of Alborz mountain chain, 60 km west of Tehran. To collect planktonic specimens, from surface waters a plankton net with 30 cm mouth diameter and 20 µm mesh size was used. Samples were collected from three sites, two in the Karaj River (sites I and IV) and one in Karaj Dam Lake (site II). Sampling sites from which the new records are collated are listed in Table 1.
A closing plankton net was applied to collect specimens from site III located at depth of 5-10 m of Karaj Dam Lake. Different species were identified and documented, using an Axioplan 2 imaging compound microscope. The specimens are deposited at the Zoological Museum of the University of Tehran (ZUTC) as whole mounts and trophis in perrmanent glycerine slides.

Results And Discussion

In total, 113 species of monogonont rotifers were found in Tehran province (Table 2), all belonging to the class Eurotatoria, orders Ploima, Flosculariaceae and Collothocacea. Of these, nine species were new to Iran's fauna. All newly recorded species exhibit cosmopolitan in distribution according to Segers (2007).

Order Ploima

Based on the number of families and species, the order Ploima had the highest diversity, Ploima contains 21 families (Wallace *et al.,* 2006), and 14 of these were found in Tehran province, including two genera and eight species not previously reported from Iran (Tables 2 & 3).

Family Dicranophoridae

Members of the family Dicranophor- idae are generally considered to be cosmopolitan, living in a diverse range of habitats, from freshwater to marine environments (De Smet, 1997). The family contains 17 genera, of which three were found in Tehran. Three species and two genera are new records for Iran's fauna.

Encentrum cf. putorius Wulfert, 1936

Specimens of *Encentrum cf. putorius* were found in benthic habitats in Karaj River. Trophi forcipate, uncus with trifid tip due to expanded shafts (Fig. 1 a). Measurements (µm): body length 430.7, toe length 38.25, ramus 13.4, manubrium 44.2, fulcurum 11. Despite being considered as a cold stenothermal species by De Smet (1997), we found *E. cf. putorius* even during summer when the water temperature was around 14 °C.

Dicranophorus forcipatus (Müller, 1786)

Specimens of *Dicranophorus forcip- atus* with fusiform body (Fig. 1 b), forcipate trophi, each ramus with five teeth (Fig. 1 c) were sampled from muddy and also sandy habitats of Karaj River, when the water temperature was between 7.2 and 9.1 °C. Measurements (µm): body length 347-351.25, ramus 40.28, manubrium 52.44 and fulcrum 16.72. *D. forcipatus* is a cosmopolitan species and is found in fresh and brackish waters worldwide (De Smet, 1997).

Dicranophorus luetkeni (Bergendal, 1892)

Specimens of *D. luetkeni* were sampled from muddy and sandy parts of Karaj River, with water temperature of 8.2 °C. Forcipate trophi, each ramus with two shearing teeth, and each uncus with one tooth (Fig. 1 d). Measurements (µm): body length 100, toe 20-22, ramus 15.96, manubrium 25.08,

uncus 7.6 and fulcrum 7.6. D. luetkeni is cosmopolitan in distribution, in muddy habitat of freshwater habitats (De Smet, 1997).

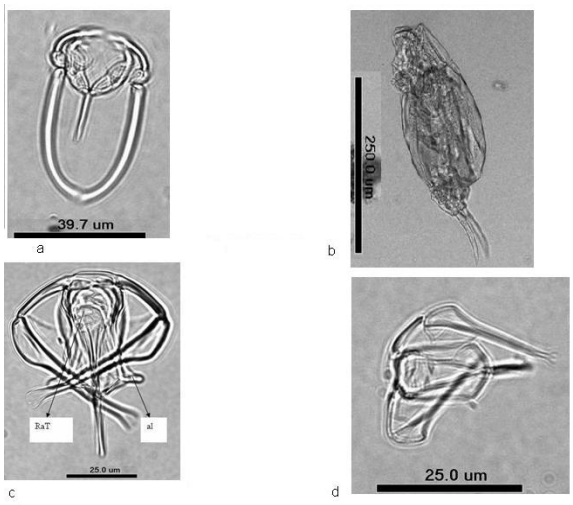

Figure 1. (a) *Encentrum cf. putorius* forcipate trophus. B-C) *Dicranophorus forcipatus*:b) lateral view c) forcipate trophus. al, alulae; RaT, ramus tooth. (d) *Dicranophorus luetkeni* forcipate trophus.

Family: Notommatidae

Notommatidae is the most difficult family for classification among monogononts. To avoid misidentification, it is necessary to observe the animals while still alive. In some cases, trophi examination is suffices for classification. In this study identifications are mostly based on trophi and also fixed specimens as it was impossible to transfer live animals to the laboratory. This family includes 21 genera, and four of these were recorded from Tehran (Table 2).

Cephalodella ventripes (Dixon-Nuttall, 1901)

Specimens of *C. ventripes* were found in Karaj River at water temperatures between 4.3 and 13.3 °C. Body short, oval dorsally (Fig. 2 a). Trophi virgate, type A (Fig. 2 b). Meaurements (µm): body length 80.75-96.52, width 71.44, toe 34-37.24. This species is cosmopolitan (Nogrady and Pourriot, 1995) and has previously been found at temperatures below 25 °C (Berzins and Pejler, 1989).

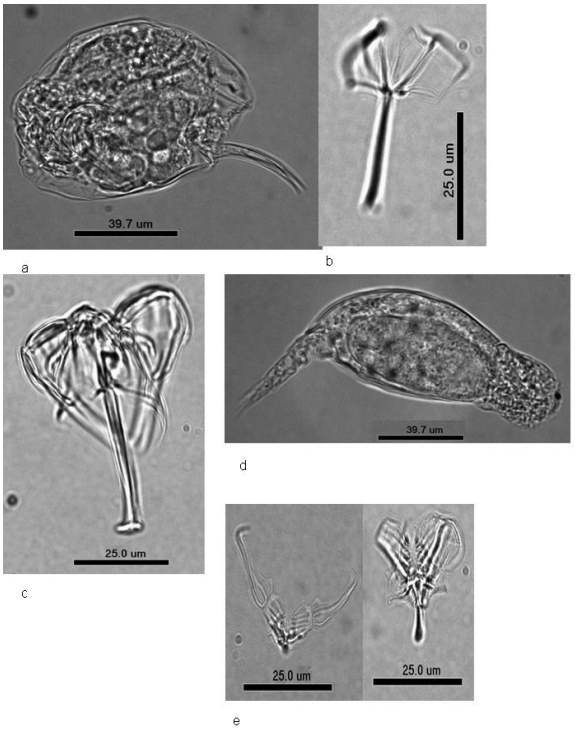

Figure 2. a-b *Cephalodella ventripes*: a) Lateral view b) virgate Trophus. c) *Notommata glyphura,* virg ate trophus. d-e *Proales minima*: d) lateral view e) Virgate trophus.

Notommata glyphura (Wulfert, 1935)

A specimen of *N. glyphura* was reported once from Karaj River, at a temperature of 4.7 °C, and was identified solely based on trophi as the specimen was contracted after fixation. Trophi virgate, asymmetrical (Fig. 2c). Measurements (µm): manubrium 38.76-41.8, ramus 29.64, fulcrum 35.72-37.24 and uncus 12.16-15.96.

Family: Proalidae

The Family Proalidae has a cosmopolitan distribution and exists in a diverse range of aquatic systems (De Smet 1996). It contains

four genera, one of which is reported from Tehran. This is a new record for Iran's fauna.

***Proales minima* (Montet, 1915)**

P. minima was observed in the muddy and sandy habitats of Karaj lake at temperatures between 10.2 and 16.5 °C. Body transparent (Fig. 2 d). Trophi between virgate and malleate, uncus with five teeth (Fig. 2 d, e).
Measurements (µm): body length 114.76-144.5, neck width 25.5-31.16, body width 34-44.84, toe 25.5-47.88, ramus 5.32, manubrium 15.96 and uncus 3.04.

Family: Notommatidae

Notommatidae is the most difficult family for classification among monogononts. To avoid misidentification, it is necessary to observe the animals while still alive. In some cases, trophi examination is suffices for classification. In this study identifications are mostly based on trophi and also fixed specimens as it was impossible to transfer live animals to the laboratory. This family includes 21 genera, and four of these were recorded from Tehran (Table 2).
This species is cosmopolitan (Nogrady and Pourriot, 1995) and has previously been found at temperatures below 25 °C (Berzins and Pejler, 1989).

Family: Trichotriidae
***Trichotria pocillum* (Müller, 1776)**

This species, with a spindle-shaped lorica (Fig. 3 c), one cerebral eyespot, and malleate trophi with round alulae (Fig. 3 d) was reported from muddy habitats of Karaj River.
Measurements (µm): body length 210, lorica length 102, foot spine 32, median spine 25 and foot 85. Berzin and Pejler (1989) reported this species at temperatures of 3-26 °C.

Order: Flosculariaceae

This order, characterized with malleoramate trophi, contains six families (Wallace *et al.,* 2006), five of which are being reported from Tehran. One species being reported is new for Iran's fauna (Table 2).

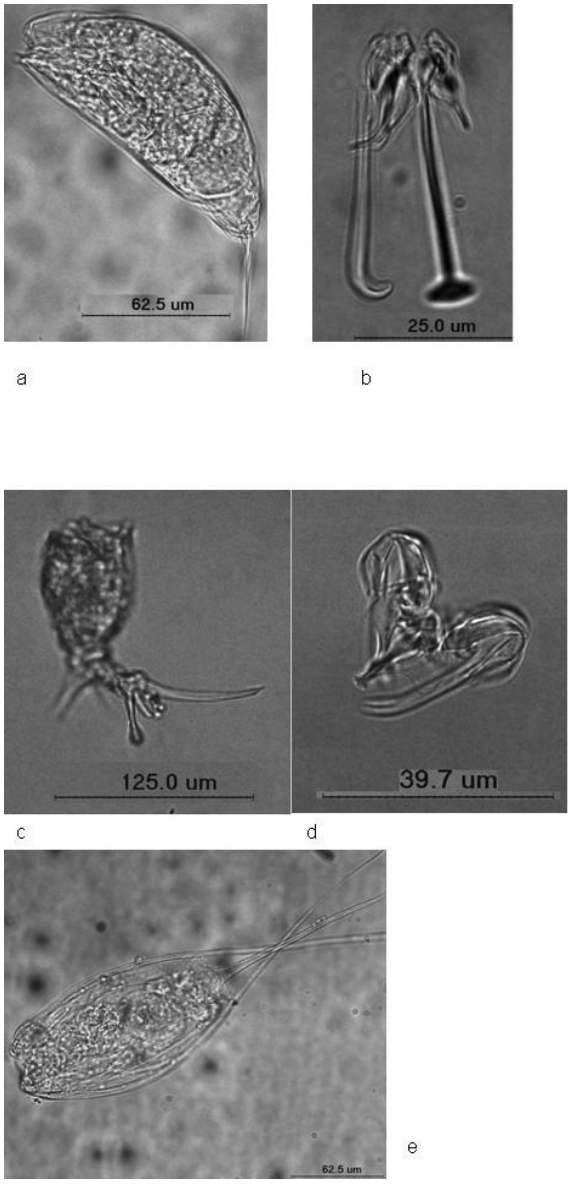

Figure 3. a-b) *Trichocera tenuior*: a) lateral view b) virgate Trophusi. c-d *Trichotria pocillum*: c) ventral view d) Malleate trophus. e) *Filinia terminalis* ventral view.

Family: Trochosphaeridae

This family contains three genera among which *filinia* is being reported from Tehran. It is a new record for Iran's fauna.

***Filinia terminalis* (Plate, 1886)**

F. terminalis was reported from both Karaj Dam Lake and Karaj River at temperatures of 6.1-12.7 °C. Bodysaccate, caudal seta inserted few microns from posterior end of body. (Fig. 3 e).

Measurements: body length 144.5 µm, caudal seta 142 µm, lateral seta 238 µm.

Filinia terminalis is considered a cold stenothermal species (Sanoamuang, 2002). Berzins and Pejler (1989) reported this species at temperatures of 8-14.5 °C.

Table 1. Coordinates of sampling sites with new records

Station Nam	Station coordinates		Altitude (m)	Habitat
Bilaghan	N 53° 49′ 5. 2″	E 51° 02′ 38. 1″	1364	Muddy
Karaj dam lake	N 53° 58′ 25. 4″	E 51° 05′ 58. 2″	1725	Surface water
Karaj dam lake,	N 53° 58′ 25. 4″	E 51° 05′ 58. 2″	1725	5-10 m depth
Lake entrance	N 36° 00′ 41. 4″	E 51° 08′ 24. 9″	1749	Sandy

Distributions

There are slight differences between the thermal range in which some of the rotifer species occurred in our study and temperature ranges that Berzins and Pejler (1989) had recorded for the same species. It seems that factors other than temperature might be more important in determining the geographical distribution of these species. Moreover, Berzins and Pejler (1989) presented thermal ranges for Swedish populations and the thermal ranges may be different for populations of the species in other areas of the world.

Families Brachionidae with 20 recorded species from Tehran represented 17.6% of total monogonont rotifers of Tehran. In terms of frequencies, it was followed by familiesLecanidae (13.27%) and Notommatidae (12.38%). In Southeast Asia, Lecanidae is the most diverse family followed by Brachionidae (Segers, 2001).

In studies carried out in Turkey (Altindag and Yigit, 1999; Altindag, 2000; Yigit 2002) with a climate similar to that of Karaj Dam Lake and river, Brachionidae represented the most diverse family. In our study, however, Brachionidae was the most diverse. Apparently, we do not yet have sufficient data to opine on rotifer diversity in Tehran province.

Among 113 species found in Tehran province, 103 were cosmopolitan. *Cephalodella stenroosi, Lecane elsa, Lecane lamellate* and *Synchaeta vorax* have been previously recorded from both Neotropic and Palearctic (Segers, 2007). *Lepadella (Lepadella) costata* has only been recorded from Palearctic. *Cephalodella maior* and *Lecane sympoda* have been recorded from Africa and Palearctic. *Lepadella (Lepadella) punctata* has been recorded from Orientalis and Palearctic.

The taxonomy of *Colurella obtusa* is uncertain (Segers, 2007), so its report from

Tehran needs confirmation. Also, the identity of *Lecane rugosa* needs confirmation.

The first survey of the rotifer fauna of Tehran province, covering different habitats, resulted in identification of 104 species, and the second survey, focusing on only Karaj Dam Lake and river, in the western part of the province, uncovered an additional 9 species (from the total of 25 species found), all new for Iran's fauna. These results indicate that Tehran's aquatic systems could be home to a considerable diversity of rotifers. Thus, great diversity is expected to be reported from Tehran if different habitats are sampled regularly in different seasons, as seen in Karaj River which was sampled every two weeks, for about one year.

Table 2. Check list of recorded species from the province of Tehran new records

Phylum: Rotifera
Class: Eurotatoria
Subclass: Monogononta

Order: Ploima

Family: Asplanchnidae
Asplanchna brightwellii Gosse, 1850
Asplanchna girodi de Guerne, 1888
Asplanchna priodonta Gosse, 1850

Family: Brachionidae
Brachionus angularis Gosse, 1851
Brachionus bidentatus Anderson, 1889
Brachionus calycifl orus Pallas, 1766
Brachionus diversicornis (Daday, 1883)
Brachionus leydigii Cohn, 1862
Brachionus plicatilis Müller, 1786
Brachionus quadridentatus Hermann, 1783
Brachionus rubens Ehrenberg, 1838
Brachionus urceolaris Müller, 1773
Brachionus variabilis Hempel, 1896
Kellicottia longispina (Kellicott, 1879)
Keratella cochlearis (Gosse, 1851)
Keratella quadrata (Müller, 1786)
Keratella tropica (Apstein, 1907)
Keratella valga (Ehrenberg, 1834)
Notholca acuminate (Ehrenberg, 1832)
Notholca labis Gosse, 1887
Notholca squamula (Müller, 1786)
Notholca striata (Müller, 1786)
Platyias quadricornis (Ehrenberg, 1832)

Family: Dicranophoridae
Encentrum cf. putorius Wulfert, 1936*
Dicranophoroides caudatus (Ehrenberg, 1834)
Dicranophorus forcipatus (Müller, 1786)*
Dicranophorus luetkeni (Bergendal, 1892)*

Family: Epiphanidae
Epiphanes senta (Müller, 1773)

Family: Euchlanidae
Euchlanis dilatata Ehrenberg, 1832
Euchlanis incisa Carlin, 1939
Beauchampiella eudactylota (Gosse, 1886)

Family: Lecanidae
Lecane bulla (Gosse, 1851)
Lecane closterocerca (Schmarda, 1859)
Lecane elsa Hauer, 1931
Lecane furcata (Murray, 1913)
Lecane grandis (Murray, 1913)
Lecane hamata (Stokes, 1896)
Lecane lamellata (Daday, 1893)
Lecane leontina (Turner, 1892)
Lecane luna (Müller, 1776)
Lecane lunaris (Ehrenberg, 1832)
Lecane nana (Murray, 1913)
Lecane obtusa (Murray, 1913)
Lecane opias (Harring & Myers, 1926)
Lecane scutata (Harring & Myers, 1926)
Lecane sympoda Hauer, 1929

Family: Lepadellidae
Colurella adriatica Ehrenberg, 1831
Colurella colurus (Ehrenberg, 1830)
Colurella obtusa (Gosse, 1886)
Colurella uncinata (Müller, 1773)
Lepadella (Lepadella) biloba Hauer, 1958
Lepadella (Lepadella) costata Wulfert, 1940
Lepadella (Lepadella) eurysterna Myers, 1942

Lepadella (Lepadella) ovalis (Müller, 1786)
Lepadella (Lepadella) patella (Müller, 1773)
Lepadella (Lepadella) punctata Wulfert, 1939
Lepadella (Lepadella) quadricarinata (Stenroos, 1898)
Lepadella (Lepadella) triptera (Ehrenberg, 1832)
Squatinella rostrum (Schmarda, 1846)

Family: Mytilinidae
Lophocharis salpina (Ehrenberg, 1834)

Family: Notommatidae
Cephalodella catellina (Müller, 1786)
Cephalodella forfi cula (Ehrenberg, 1830)
Cephalodella gibba (Ehrenberg, 1830)
Cephalodella maior (Zawadovsky, 1926)
Cephalodella misgurnus Wulfert, 1937
Cephalodella plicata Myers, 1924
Cephalodella stenroosi Wulfert, 1937
Cephalodella ventripes (Dixon-Nuttall, 1901)*
Monommata actices Myers, 1930
Monommata longiseta (Müller, 1786)
Notommata aurita (Müller, 1786)
Notommata copeus Ehrenberg, 1834
Notommata glyphura Wulfert, 1935*
Pleurotrocha petromyzon (Ehrenberg, 1830)

Family: Proalidae
Proales minima (Montet, 1915)*
Proales theodora (Gosse, 1887)

Family: Scaridiidae
Scaridium longicaudum (Müller, 1786)

Family: Synchaetidae
Polyarthra dolichoptera Idelson, 1925
Polyarthra remata Skorikov, 1896
Polyarthra vulgaris Carlin, 1943
Synchaeta oblonga Ehrenberg, 1832
Synchaeta pectinata Ehrenberg, 1832
Synchaeta stylata Wierzejski, 1893
Synchaeta vorax Rousselet, 1902

Family: Trichocercidae
Trichocerca cylindrica (Imhof, 1891)
Trichocerca elongata (Gosse, 1851)
Trichocerca longiseta (Schrank, 1802)
Trichocerca myersi (Hauer, 1931)
Trichocerca porcellus (Gosse, 1851)
Trichocerca pusilla (Jennings, 1903)
Trichocerca stylata (Gosse, 1851)
Trichocerca tenuior (Gosse, 1886)*

Family: Trichotriidae
Trichotria pocillum (Müller, 1776)*
Trichotria tetractis (Ehrenberg, 1830)

Order: Floscullariaceae

Family: Conochilidae
Conochilus (Conochiloides) dossuarius Hudson, 1885
Conochilus (Conochilus) hippocrepis (Schrank, 1803)

Family: Floscullariidae
Floscularia ringens (Linnaeus, 1758)
Ptygura furcillata (Kellicott, 1889)
Sinantherina semibullata (Th orpe, 1893)

Family: Hexarthridae
Hexarthra intermedia (Wiszniewski, 1929)
Hexarthra mira (Hudson, 1871)
Hexarthra oxyuris (Sernov, 1903)
Hexarthra polyodonta (Hauer, 1957)

Family: Testudinellidae
Testudinella incisa (Ternetz, 1892)
Testudinella mucronata (Gosse, 1886)
Testudinella parva (Ternetz, 1892)
Testudinella patina (Hermann, 1783)

Family:Trochosphaeridae
Filinia limnetica (Zacharias, 1893)
Filinia terminalis (Plate, 1886)*

Order: Collothocacea

Family: Collothecidae
Collotheca heptabrachiata (Schoch, 1869)
Collotheca ornata (Ehrenberg, 1832)
Collotheca pelagica (Rousselet, 1893)
Stephanoceros fimbriatus (Goldfusz, 1820)

Table 3. List of new records, sites and temperature in which they are found, and Repository and Catalog Numbers.

	Site I	Site II	Site III	Site IV	Temp	Catalog Numbers
Cephalodella ventripes	+			+	4. 3-13. 3	ZUTC Rot 1011
Dicranophorus forcipatus	+			+	7. 2-9. 1	ZUTC Rot 1023-1024
Dicranophorus. luetkeni	+				8. 2	ZUTC Rot 1025
Encentrum cf. putorius	+			+	7. 8-13. 9	ZUTC Rot 1026
Filinia terminalis	+	+	+	+	6. 1-12. 7	
Notommata glyphura	+			+	4. 7	ZUTC Rot 1012-1013
Proales minima	+			+	10. 2-16. 5	ZUTC Rot 1021-1022
Trichocerca tenuior	+				7. 8-14. 4	
Trichotria pocillum				+	8. 9	ZUTC Rot 1045

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References

1. Altindag A, Yigit S (1999) Aksehir Golu Rotifera FaunasÝ Uzerine Taksonomik Bir Arastirma. Turk J of Zool 23, 1-6.
2. Altindag A (2000) A Taxonomical Study on the Rotifer Fauna of Yedigöller (Bolu-Turkey). Turk J of Zool 24, 1-8.
3. Berzins B, Pejler B (1989) Rotifer occurrence in relation to temperature. Hydrobiologia 175, 223–231.
4. Birshtain JA, Vinogradov LT, Kondakov NN, Kun MS, Astakhova TV, Romanova NN, Translated by Dlinad L, Nazari F (1968) The atlas of Caspian Sea invertebrates. Translated by Dlinad L. and Nazari F (IFRO publications: Iran), p. 610.
5. De Smet WH (1996) Guides to the Identification of the Microinvertebrates of the Continental Waters of the World, Rotifera (The Proalidae, Monogononta). (SPB Academic Publishing: Amsterdam, Netherlands), p. 103.
6. De Smet WH (1997) Guides to the Identification of the Microinvertebrates of the Continental Waters of the World, Rotifera (The Dicranophoridae, Monogononta) (*SPB Academic Publishing*: Amsterdam, *Netherlands*), p. 344 .
7. Hakimzadeh Khoei M, Kaya M, Altindag A (2011) New records of Rotifers from Iran with biogeographic considerations. Turk J Zool 35, 395-402.
8. Khaleqsefat E, Pashaei Rad Sh, Malekzadeh Viayeh R (2011) Lecanid

rotifers (Rotifera: Monogononta: Lecanidae) from Iran. Turk J Zool 35, 49-55.

9. Kordbacheh A (2010), Master's Degree Thesis, Seasonal changes in rotifer species found and in their frequencies in Kraj Dam area in Tehran Province. Department of Animal biology, Faculty of Biology, College of Science, University of Tehran, Tehran, Iran.

10. Koste W, Shiel RJ (1989) Rotifera from Australian Inland Waters. IV. Colurellidae (Rotifera : Monogononta). T Roy Soc South Aust 113, 119-143.

11. Löffler, H (1961) Beitrage zur kenntnis der Iranischen Binnengewaser II. Regional-limnologische studie mit besonderer Berucksichtigung der crustaceenfauna. Int Revue Ges Hydrobiol 46, 309-406

12. May L, Bass JAB (1998) A study of rotifers in the River Thames, England, April–October, 1996. Hydrobiologia 387/388, 251–257.

13. Nogrady T, Pourriot R (1995) Guides to the Identification of the Microinvertebrates of the Continental Waters of the World, Rotifera (Notommatidae) (SPB Academic Publishers: Hague, Netherlands), p. 248.

14. Pejler B, Berzins B (1993) On the ecology of Trichocercidae (Rotifera). Hydrobiologia 263, 55-59.

15. Sanoamuang L (2002) Genus Filinia Bory de St Vincent, 1824. In: Guides to the Identification of the Microinvertebrates of the Continental Waters of the World, Rotifera (Asplanchnidae, Gastropodidae, Lindiidae, Microcodidae, Synchaetidae, Trochosphaeridae and Filinia), Nogrady T, Segers H eds. (Backhuys Publishers: Leiden, Netherlands), pp. 224-257.

16. Segers H (2001) Zoogeography of the Southeast Asian Rotifera. Hydrobiologia 446/447, 233–246.

17. Segers H (2003) A biogeographical analysis of rotifers of the genus Trichocerca Lamarck, 1801 (Trichocercidae, Monogononta, Rotifera), with notes on taxonomy. Hydrobiologia 500, 103–114.

18. Segers H (2007) Annotated checklist of the rotifers (Phylum Rotifera), with notes on nomenclature, taxonomy and distribution. Zootaxa 1564. (Magnolia Press: Auckland, New Zealand), p. 104 .

19. Shayestehfar A, Soleimani M, Mousavi SN, Shirazi F (2008) Ecological study of rotifers from Kor river, Fars, Iran. J Environ Biol 29, 715-720.

20. Wallace RL, Snell TW, Ricci C, Nogrady T (2006) Guides to the Identification of the Microinvertebrates of the Continental Waters of the World, Rotifera biology, ecology and systematics (Kenobi Production: Ghent, Belgium), p. 299.

21. Yigit S (2002) Seasonal fluctuation in the rotifer fauna of Kesikkopru Dam Lake. Turk J zool 26, 341-348.