International Journal of Global Science Research
Vol. 11, Issue. 1, April 2024, pp. 2251-2260
Available Online at www.ijgsr.com

ISSN: 2348-8344 (Online)
DOI: 10.26540/ijgsr.v11.i1.2024.261

Research paper

Diversity of Zooplankton (Rotifera, Cladocera & Ostracoda) from Chembarampakkam Lake, Chennai, Tamil Nadu.

Jaysree Thilak and Neethu K. P.
Southern Regional Centre, 130 Santhome High Road, Chennai, Tamil Nadu, India
Corresponding author Email: jayasreethilak@yahoo.com

Received: 28/12/2023
Revised: 04/01/2024
Accepted: 12/01/2024

Abstract: The freshwater lakes form an important dynamic and productive ecosystem which supports various ecological functions and services. In lakes and ponds the most common groups of zooplanktons include Rhizopoda, Rotifera, Cladocera, Copepoda, Ostracoda, fish eggs, fish larvae and insects' larvae. The present study was conducted to acess the abundance and diversity of occurance of Rotifers, Cladocerans and Ostracoda in the Chembarampakkam lake.10 species of Rotifers belonging to 1 Order, 5 genera under 6 families and 10 species of Cladocera belonging to 8 genera, 2 orders under 6 families and one species of Ostracoda were identified from the Chembarampakkam lake.

Keywords: Chembarampakkam, Rotifera, Cladocera, Ostracoda, Ecological functions.

Introduction:

Freshwater forms only 3% of the global water. Freshwater's habitats for many species of plants and animal groups. In freshwaters the planktonic animals are dominated by Rotifers and crustaceans. Zooplanktons are minute aquatic free floating or swimming organisms that drift with mercy of water currents. They are present in the pelagic zone where food sources are abundant. Some zooplanktonic crustaceans are benthic too. Due to their small size, sensitive body and shorter life span they respond quickly to the changes in the aquatic environment. Zooplanktons play an important role in the nutrient cycle and energy transfer within their unseen environment. The present study was conducted to assess the diversity and occurrence of the zooplanktonic organisms such as Rotifers, Cladocerans and Ostracods from the Chembarampakkam lake of Chennai district of Tamil Nadu.

Materials and Methods:

Study Area

The Chembarampakkam lake is a large reservoir build across the Adyar River at about 25 Kms South West of Chennai and Kanchipuram district of Tamil Nadu. The GPS co-ordinates of the lake is N-13.0116 & E- 80.0606. and an altitude of 135ft. Three field visits were done and samples from three localities viz... Site.No-1. Kanadapalayam (N-13.01246 E-80.03904); Site No-2. Chembarampakkam view Point (N- 13.01037, E-80.07450);

International Journal of Global Science Research
Vol. 11, Issue. 1, April 2024, pp. 2251-2260
Available Online at www.ijgsr.com

ISSN: 2348-8344 (Online)
DOI: 10.26540/ijgsr.v11.i1.2024.261

Site. No-3. Malayampakkam (N-12.98474, E-80.04338) were collected for the study.

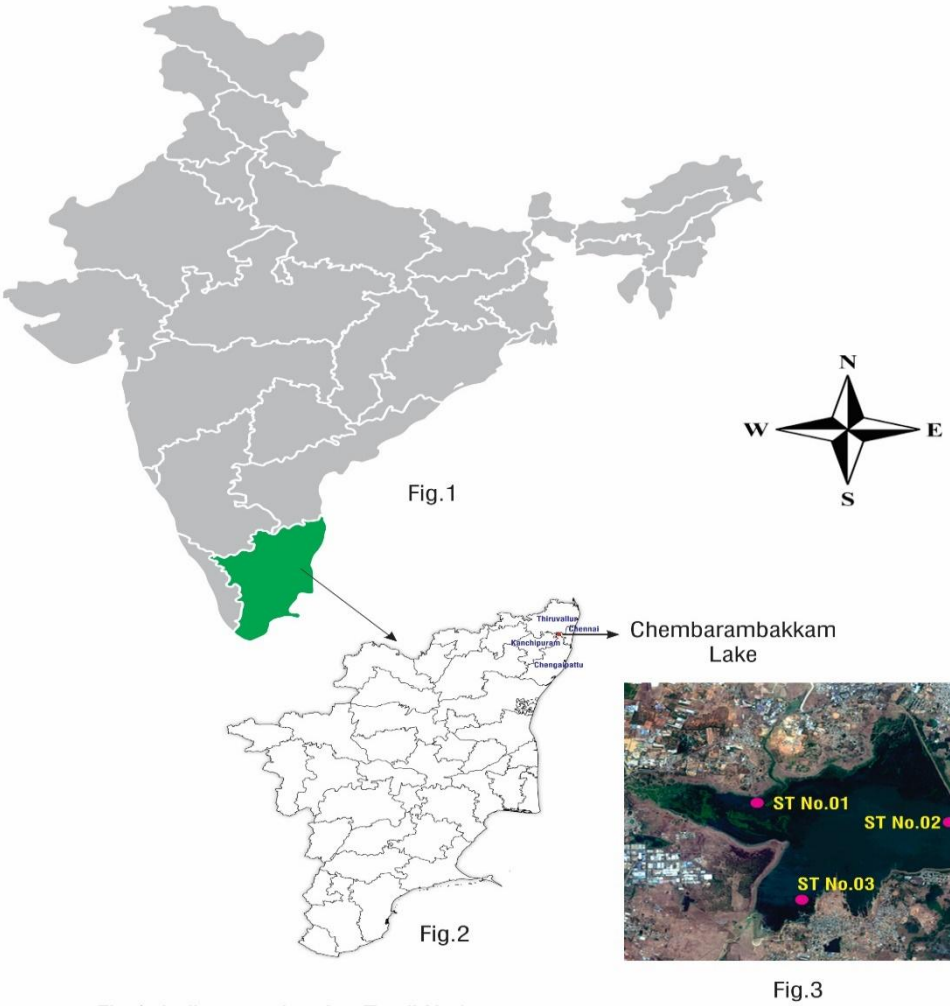


Fig.1

Fig.2

Fig.3

Fig.1: India map showing Tamil Nadu

Fig.2: Tamil Nadu map showing the location of Chembrampakkam Lake

Fig.3: Satellite map showing the collection sites

Methodology:

The zooplankton samples were collected by sweeping standard plankton net made up of bolting silk of mesh size 123µm among weeds in water and also by filtering 50 liters of water through the net. The samples were preserved in 5% formalin and later sorted out under dissection microscope and subjected to taxonomic studies by observing under high power magnification of compound microscope and by referring standard references viz., Edmondson (1959), Pennak, (1978), Segers, (2007, 2008) Michael & Sharma (1988), Sharma and Sharma (2008) Chatterjee et. al, (2013), Victor & Fernando (1989).

Historical Resume:

The studies on Rotifers from Tamil Nadu are very limited when compared to the other parts of India (Raghunathan & Suresh Kumar, 2006). Several workers viz. Edmondson and Hutchinson (1934), Hauer

International Journal of Global Science Research
Vol. 11, Issue. 1, April 2024, pp. 2251-2260
Available Online at www.ijgsr.com

ISSN: 2348-8344 (Online)
DOI: 10.26540/ijgsr.v11.i1.2024.261

(1937), Ahlstrom (1943), Nayar (1965), Brehm (1951), Chacko (1952), Pasha (1961), Rajendran (1971), Michael (1973), Sampath et. al. (1974), Patil (2000), Daisy (2001), Sivakumar & Altaff (2001), Raghunathan & Kumar (2006), Sharma & Sharma (2009), Sharma & Sharma (2014) paid some contributions to the Rotifers of Tamil Nadu.

Some contributions to Indian Cladocera were made by Venkataraman, 1982,1991,1992,1993, 2000. Later Sharma & Sharma (2017) recorded 131 species of Cladocera belonging to 48 genera, 3 orders under 12 families from India. Raghunathan & Kumar, 2003 reported 81 species of Cladocera with major representation from family Chydoridae and Daphnidae from Tamil Nadu.

Taxonomic studies on Indian Ostracoda were initiated by Klie (1927), Baird (1959), Arora (1931), Hartmann (1964), Deb (1972, 1973, 1978), Victor & Michael (1975) and Battish (1978, 1981), Victor & Fernando (1979), Thilak (1992), Thilak et al., (1994), Venkataraman (1998), Venkataraman (1999), Harshey & Thilak (2011), Karuthapandi et al., (2014), Thilak & Sakthivel (2020) from various parts of India. From Tamil Nadu Victor & Fernando (1979) recorded 29 species belonging to 16 genera under 4 families belonging to the superfamily Cypridoidea and are mostly from the Madurai district of Tamil Nadu. Venkataraman (1999) reported 3 species of Ostracoda from the Chennai district of Tamil Nadu. Thilak & Sakthivel (2020) recorded 23 species from various geographic zones of Tamil Nadu. From the different waterbodies of Tamil Nadu Thilak (2019) reported 14 species of Ostracoda. Similar observations were made by Arunachalam et.al., (2023) recorded 8 species belonging to, 7 genera, 1 order under 2 families and 5 subfamilies from the Puzhal lake.

GLOBAL & INDIAN STATUS OF THE RECORDED ZOOPLANKTON GROUPS

No	Group	World	India
1	ROTIFERA	2030	419
2	CLADOCERA	700	137
3	OSTRACODA	2330	154

(Source: **Chandra et. al., 2017.)**

SYSTEMATIC LIST OF ZOOPLANKTON ROTIFERS AND CLADOCERA RECORDED FROM CHEMBARAMBAKKAM LAKE.

ROTIFERA

Phylum ROTIFERA Cuvier, 1798
Class EUROTATORIA De Ridder, 1957
Subclass MONOGONONTA Wesenberg-Lund, 1889
Order PLOIMA Hudson and Gosse, 1886
Family BRACHIONIDAE Wesenberg-Lund, 1889
Genus ***Brachionus*** Pallas, 1766

1. *Brachionus diversicornis* (Daday, 1883)
2. *Brachionus quadridentatus* Hermann, 1783
3. *Brachionus patulus* (O.F. Muller, 1786)
   Genus ***Keratella*** Bory de St.Vincent, 1822
4. *Keratella tropica* (Apstein, 1907)
   Family **MYTILINIDAE**Bartos, 1959
   Genus ***Mytilina*** Bory de St.Vincent, 1826
5. *Mytilina ventralis* (Ehrenberg, 1830)
   Family **LEPADELLIDAE**
   Genus ***Lepadella*** Bory de St. Vincent, 1826
6. *Lepadella ovalis* (O.F. Muller, 1786)
   Family **LECANIDAE** Bartos, 1959
   Genus ***Lecane*** Nitzsch, 1827
7. *Lecane (M) bulla* (Gosse, 1851)

International Journal of Global Science Research **ISSN: 2348-8344 (Online)**
Vol. 11, Issue. 1, April 2024, pp. 2251-2260 **DOI: 10.26540/ijgsr.v11.i1.2024.261**
***Available Online* at www.ijgsr.com**

8. *Lecane (M) closterocerca* (Schmarda, 1898)
9. *Lecane luna* (O.F. Muller, 1776)

Family **ASPLANCHINIIDAE**
Genus ***Asplanchna*** Gosse, 1850

10. *Asplanchna brightwelli* Gosse, 1850

Superclass CRUSTACEA Pennant, 1777
Class BRANCHIOPODA Latreille, 1817
Superorder CLADOCERA Latreille, 1829
Order CTENOPODA Sars, 1865
Family SIDIDAE Baird, 1850
Genus ***Diaphanosoma*** Fischer, 1850

11. *Diaphanosoma excisum* Sars,1885
12. *Diaphanosoma sarsi* Richard,1895

Order **ANOMOPODA** Sars, 1865
Family **DAPHNIDAE** Straus, 1865
Genus ***Ceriodaphnia*** Dana 1853

13. *Ceriodaphnia cf. cornuta* Sars, 1885
14. *Ceridaphnia quadrangula* (O.F. Muller ,1779)

Family **BOSMINIDAE** Sars, 1865
Genus ***Bosmina*** Baird, 1845

15. *Bosmina longirostris* (O.F. Muller ,1776)

Family **MOINIDAE** Goulden, 1968
Genus ***Moina*** Baird, 1850

16. *Moina micrura* Kurz ,1874

Genus ***Moinodaphnia*** Herrick, 1887

17. *Moinodaphnia macleayi* (King, 1853)

Family **MACROTHRICIDAE** Norman and Brady, 1867
Genus ***Macrothrix*** Baird, 1843

18. *Macrothrix spinosa* King, 1853

Family **CHYDORIDAE** Stebbing, 1902
Genus ***Chydorus*** Leach 1816

19. *Chydorus sphaericus* (O.F. Muller, 1776) s.lat

Genus ***Coronatella*** Dybowski & Grochowski, 1894

20. *Coronatella rectangula rectangula* (Sars, 1862) s.lat.

Phylum ARTHROPODA
Class CRUSTACEA Pennant, 1777
Subclass OSTRACODA Latrielle, 1806
Order PODOCOPIDA Muller, 1894
Suborder PODOCOPA Sars, 1886
Family CYPRIDIDAE Baird, 1845
Subfamily CYPRIDINAE Baird, 1845
Genus ***Strandesia***, Stuhlmann, 1888

21. *Strandesia elongata* Hartmann, 1964

Results and Discussion:

Of the 10 species of Rotifers reported 9 species are cosmopolitan. Among these the species viz. *Brachionus diversicornis*, *Brachionus quadridentatus* are the species preferring temperate waters, *Keratella tropica* is also a warm stenothermal species. The species viz. *Keratella tropica*, *Lecane (M) bulla* and *Mytilina ventralis* are eutrophic species and *Asplachna brightwelli* is an alkaline species.

Table 2. Showing the familywise representation of the Rotifers recorded from Chembarambakkam lake.

No	Family	No of species	% Composition
1	Brachionidae	4	36.360
2	Mytilinidae	1	9.09
3	Lepadellidae	1	9.09
4	Lecanidae	4	36.36
5	Asplanchnidae	1	9.09

International Journal of Global Science Research
Vol. 11, Issue. 1, April 2024, pp. 2251-2260
Available Online at www.ijgsr.com

ISSN: 2348-8344 (Online)
DOI: 10.26540/ijgsr.v11.i1.2024.261

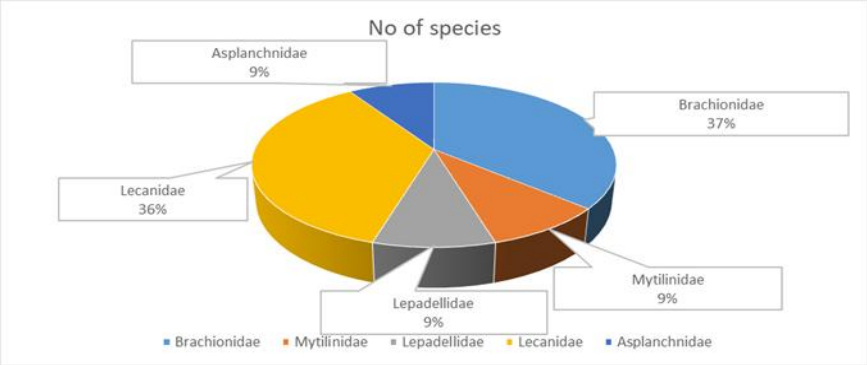


Figure 3. Showing the familywise representation of the Rotifers recorded from Chembarambakkam lake.

While considering the Cladoceran species recorded five species are high altitude elements, *Diaphanosoma excisum* is common in tropics and subtropics, *Diaphanosoma sarsi* is pantropical, *Ceriodaphnia cornuta* is cosmotropical, *Bosmina longirostris* is Holarctic and also truly cosmopolitan and *Moinodaphnia macleyi* is widely distributed in tropics, *Macrothrix spinosa* is also circumtropical species, cosmopolitan and also found in high altitudes. *Coronotella rectangula rectangula* is a palaerctic species.

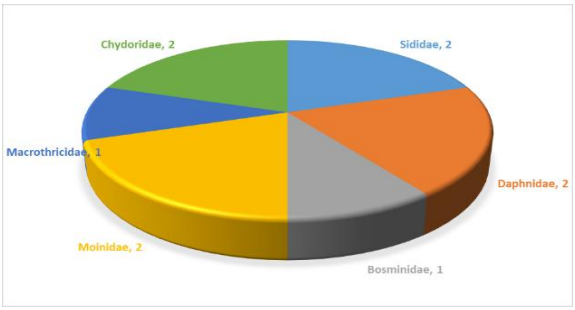


Figure 4. Showing the familywise representation of the Cladocerans recorded from Chembarambakkam lake.

Only one species of Ostracoda was recorded. This may be due to collection error. Mostly Ostracods are benthic organisms. More studies will reveal a greater number of Ostracoda species from this lake.

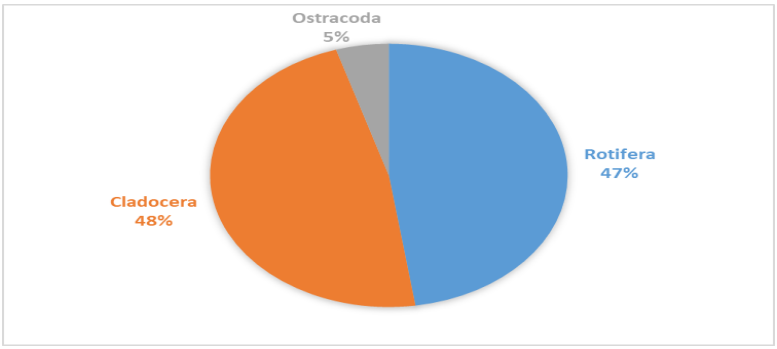


Figure 5. Showing the groupwise % composition of the Zooplankton recorded from Chembarambakkam lake.

ISSN: 2348-8344 (Online)
DOI: 10.26540/ijgsr.v11.i1.2024.261

Conclusion:
The stress caused by the anthropogenic activities, urbanization, pollution and colonization of alien fish species are major threats to diversity of zooplankton. Further exploratory studies on the various zooplankton groups were suggested in this lake which will reveal more species.

Acknowledgements:
The authors are thankful to the Director, Zoological Survey of India and to the Officer-in-Charge, Southern Regional Centre, Chennai for providing necessary facilities.

References:
Edmondson, W. T. (1959) Freshwater Biology (Ed. Ward & Wipple) 2nd ed. John Wiley and Sons, Inc., New York: 420-494.
Pennak, R. W. (1978) Freshwater Invertibrates of the United States. The Ronald Press.Co., New York: 769 pp.
Segers, H. (2007) Annotated checklist of the rotifers (Phylum: Rotifera) with notes on nomenclature, taxonomy and distribution. Zootaxa, 1564, 1-104.
Segers, H. (2008) Global diversity of rotifers (Rotifera) in freshwater. Hydrobiologia. 595, 49-59.
Michael, R. G and Sharma, B. K. (1988) Fauna of India and Adjacent countries, Indian Cladocera, (Crustacea: Branchiopoda: Cladocera). Ed. Director, Zoological Survey of India, Calcutta, pp.262.
Sharma, S and Sharma, B.K. (2008) Zooplankton Diversity in Floodplain Lakes of Assam. *Rec. zool. Surv. India*, Occ. Paper No., 290, 1-307.
Chatterjee Tapas, Alexey A. Kotov, Kay Van Damme, S. V. A. Chandrasekhar and Sameer Padhye. (2013) An annotated checklist of the Cladocera (Crustacea: Branchiopoda) from India. *Zootaxa,* 3667 (1), 1-89.
Victor, R. & C. H. Fernando. (1979) The freshwater Ostracods. (Crustacea: Ostracoda). Rec. Zool. Surv. India. 74(2), 147-242.
Edmondson, W. T and Hutchinson, G.E. (1934) Report of Rotatoria. Article IX. Yale North Indian Expedition. *Mem. Conn. Acad. Arts. Sci*., 10, p.153-186.
Hauer, J. (1953) Zur Rotatorien fauna von Nordostbrasilien. Arch. Hydrobiol., 48: 154-172.
Ahstom, E. H. (1940) A revision of the Rotatorian genus Brachionus & Platiyas with descriptions of one new species and two new varieties. Bull. Amer. Mus. Nat. Hist., 77: 148- 184.
Nayar, C. K. G. (1965) Taxonomic notes on Indian species of Keratella (Rotifera) Hydrobiologia, 26: 457-562.
Brehm, V. (1951) Ein neure Brachionus aus Indian (Brachionus donneri), Zool. Anz. 146, p. 54-55.
Chacko, P.I.S. (1952) Development of fisheries of Kodaikanal Lake, Madurai district. Ind. Com. Journal. Madras. 8(4): 372-374.
Pasha, S. M. K. (1961) On a collection of freshwater rotifers from Madras. J. Zool. Soc. of India. 13: 52-55.
Rajendran. M. (1971) On a species of Conochilus from Madurai. Proc. Ind. Acad. Sci., 73: 8-14.
Michel, R. G. (1973) A guide to the study of freshwater organisms. 2. Rotatoria. J. Madurai Univ. Suppl., 1: 23-36.
Sampath. V, Srinivasan. A, and Ananthanarayanan, R (1974) Rotifers as biological indication of water quality in Cauvery River. Proc. Symp. Environ. Biol. P. 441- 452.
Patil, S. G. (2001) Rotifers. In: Editor-Director, 2001. Fauna of Nilgiri Biosphere Reserve, Fauna of Conservation Area Series, 11: 1-330 (Published_Director, ZSI, Kolkata): p. 25-30.
Daisy, R.R. (2001) Taxonomy and resting egg morphology of Freshwater rotifers. Ph.D. Thesis. Manonmaniam Sundaranar University, Tirunelveli. 140 pp.

ISSN: 2348-8344 (Online)
DOI: 10.26540/ijgsr.v11.i1.2024.261

Sivakumar, K and Altaff, K. (2001) Diversity of freshwater rotifers of Dharmapuri district, Tamil Nadu. Convergence, 3: 25-30.

Raghunathan, M.B. and R. Suresh Kumar. (2006) Diversity of Rotifers of Tamil Nadu. Rec. zool. Surv. India: 106 (Part-2): 67-78.

Sharma, B. K and Sharma, Sumita. (2014) Biodiversity of freshwater rotifers (Rotifera: Eurotatoria) of Mizoram, Northeast India: composition, new records and interesting features. International Journal of Aquatic Biology. 3(5): 301-313.

Venkataraman, K. (1982) Taxonomy and Ecology of Cladocera of southern Tamil Nadu, Ph.D thesis. Madurai Kamaraj University, India. pp.1-190.

Venkataraman, K. (1991). Freshwater Cladocera of Little Andaman. *Andaman. Sci. Assoc.*, 7 (2): 43 - 49.

Venkataraman, K. (1992). I. Cladocera of Keoladeo National park, Bharatpur and its environs. J. Bombay. Nat. Hist. Soc., 89: 79 – 26.

Venkataraman, K. (1993). Cladocera of Port Blair, Andaman. J. Andaman. Sci. Assoc., 8 (2): 133 – 137.

Venkataraman, K. and Das, S. R. (2000) Cladocera fauna of Tripura. State Fauna Series, 7 (4): 277 – 316, Zoological Survey of India.

Sharma, B. K and Sharma, S. (2017) Crustacea: Branchiopoda (Cladocera). In current status of freshwater faunal diversity in India. (Eds. Kailash Chandra, Gopi K. C, Rao. D.V, Valarmathi, K and Alfred J.R.B). P. 199-223.

Raghunathan and R. Suresh Kumar 2003 Cladocera (Crustacea) of Tamil Nadu - Checklist and Bibliography. Zoos Print Journal. 7(12): 959-961.

Klie. W. (1927) Zur Kenntnis der Mikrofauna von British Indien. Rec. Indian Mus. 1: 157-165.

Baird, W. (1859) Description of some new Entomostraca from Nagpur, collected by Rev, S. Hislop. Proc. zool. Soc. Lond. 389: 231-234.

Arora, G. L (1931). Fauna of Lahore 2 Entomostraca (Water fleas) of Lahore. Bull. Dep Zool. Punjab University. 1: 62-100.

Hartmann, G. (1964) Asiatische Ostracoden Systamatische und Zoogeographische untersuchungen.*Internationalae Revue der Gesamten Hydrobiologie und Systematische Beihefte* 3: 1-155.

Deb, M. (1972) Two new species of Stenocypris Sars, 1889, J. zool. Soc. India.1: 91-95.

Deb, M. (1973) First record of the genus *Sclerocypris*, Sars 1924(Crustacea: Ostracoda) from India with description of two new species.J. zool. Soc. India.25: 47-52.

Deb, M. (1978) Note on the collection of Ostracods from Delhi. Rec. zool. Soc. Surv. India. 67: 309-313.

Victor, R & R.G. Michael. (1975) Nine new species of freshwater Ostracods from Madurai area in southern India. J. Nat. Hist. 9: 361-376.

Battish, S. K. (1978) A new genus and new species of *Cypridid* Ostracod from India, with notes on its biology. Zoological J. Linn. Soc., 64: 283-292.

Battish, S. K. (1981) Freshwater Ostracods of the subfamily Cyprinotinae from Punjab, India with description of eight new species. Jour. Nat. Hist. Soc. 15: 645-669.

Thilak Jayasree (1992) Systematics and population studies on Ostracoda (Arthropoda: Crustacea) of the Western Zone of River Narmada. M. Phil thesis. Vikram University, Ujjain. (M.P).

Thilak Jayasree., K. S. Rao., K. A. Singh & K. Sunil (1994) Observations on the Ostracoda fauna of central India with special reference to the Western Narmada basin. Journal of Aquatic Biology and Fisheries. 1(2), 41-50.

Venkataraman, K. (1999) Three species of freshwater Ostracoda (Crustacea) from

ISSN: 2348-8344 (Online)
DOI: 10.26540/ijgsr.v11.i1.2024.261

Tamil Nadu. Rec. Zool. Surv. India. 97(3), 91-96.

Harshey, D. K. and Thilak, J. (2011) Freshwater Ostracods (Arthropoda: Crustacea). In: *Fauna of Madhya Pradesh (including Chhattisgarh), State Fauna Series,* 15 (Part -3): 31- 44, Zoological Survey of India, Kolkata.

Karuthapandi, M., Rao, D. V., & Xavier innocent, B. (2014) Freshwater Ostracoda (Crustacea) of India- A checklist. Journal of Threatened Taxa. 6(12): 6576-6581.

J. Thilak and R. Sakthivel. (2020) Studies on the fresh water Ostracoda from Villupuram, Trichy, Thiruvannamalai, Nilgiri and Chennai Districts of Tamil Nadu, India. International Journal of Global Science & Research. V.7(2): 1353-1375.

Chandra Kailash., Gopi, K. C., Rao, D. V. and Valarmathi Kandasamy. (2017) Current Status of Freshwater Faunal Diversity in India. Published by Director, Zoological Survey of India, M-Block, New Alipore, Kolkata-700053.

Thilak. J. (2019) A report on the diversity of Zooplankton recorded from Chennai district of Tamil Nadu. International Journal of Global Science Research. V.6, Issue.1. Pp. 916-929.

Arunachalam, G., Mohan Raj, P., Hemanth Raj., Jayasree Thilak., Sakthivel, R. and Neethu, K. P. (2023) A report on Zooplankton (Rotifera, Cladocera and Ostracoda) based on a collection from Puzhal lake of Thiruvallur district of Tamil Nadu, India. International Journal of Global Science Research. V. 10, Issue. 2, pp. 2164 -2175.

International Journal of Global Science Research
Vol. 11, Issue. 1, April 2024, pp. 2251-2260
Available Online at www.ijgsr.com

ISSN: 2348-8344 (Online)
DOI: 10.26540/ijgsr.v11.i1.2024.261

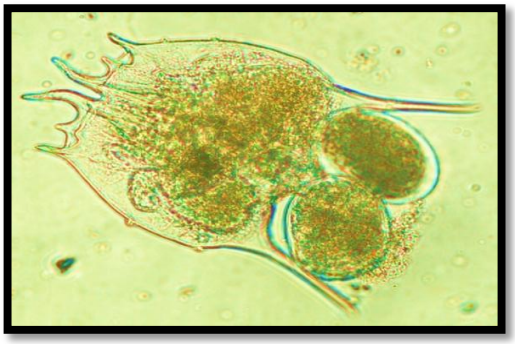
PLATE-1
SOME PHOTOGRAPHS OF ZOOPLANKTON (ROTIFERS, CLADOCERA &OSTRACODA)

Brachionus diversicornis (Daday, 1883)

Mytilina ventralis (Ehrenberg, 1830)

Keratella tropica (Apstein, 1907)

Lepadella ovalis (O.F. Muller, 1786)

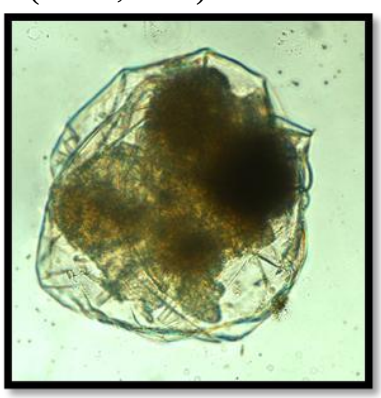


Brachionus quadridentatus Hermann, 1783

Lecane (M) bulla (Gosse, 1851)

Lecane (M) closterocerca (Schmarda, 1898)

Lecane luna (O.F. Muller, 1776)



Asplanchna brightwelli Gosse, 1850

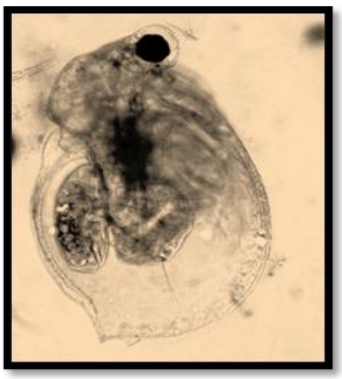
International Journal of Global Science Research
Vol. 11, Issue. 1, April 2024, pp. 2251-2260
Available Online at www.ijgsr.com

ISSN: 2348-8344 (Online)
DOI: 10.26540/ijgsr.v11.i1.2024.261

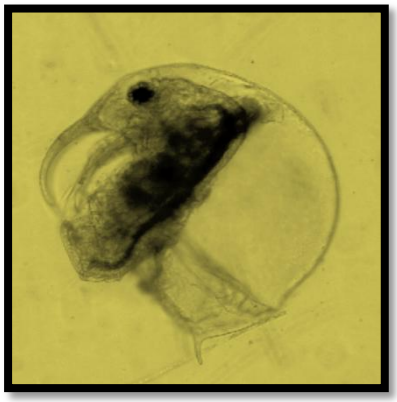
PLATE- 2

Diaphanosoma sarsi Richard,1895

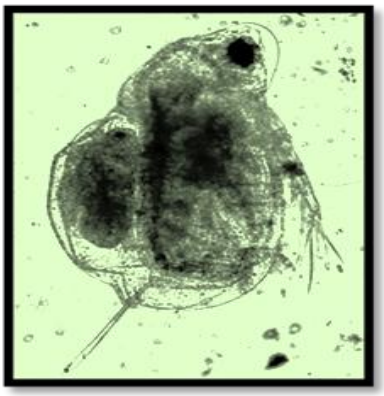
Ceridaphnia quadrangula (O.F. Muller ,1779)



Ceriodaphnia cf. cornuta Sars, 1885

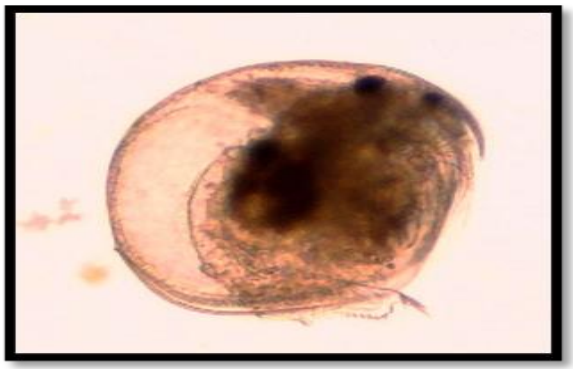


Bosmina longirostris (O.F. Muller ,1776)



Moinodaphnia macleayi (King, 1853)

Macrothrix spinosa King, 1853



Chydorus sphaericus (O.F. Muller, 1776) s.lat

Coronatella rectangula rectangula (Sars, 1862) s.lat

Moina micrura Kurz ,1874

Strandesia elongata Hartmann, 1964