



## Research paper

### A Report of Zooplankton (Rotifera, Cladocera and Ostracoda) based on a collection from Puzhal Lake of Thiruvallur district of Tamil Nadu, India.

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**Abstract:** The diversity of zooplankton reflects the water quality of an aquatic environment. The zooplankton is cosmopolitan in all aquatic habitat. They respond quickly to any changes in water quality because they are strongly affected by environmental conditions. They are considered as good bio indicators and are also helpful for monitoring polluted waters. This investigation revealed 17 species of Rotifers belonging to 1 order 8 genera under 8 families; Cladocera belonging to 12 species, 11 genera, 2 orders under 6 families and Ostracoda belonging to 8 species belonging to, 7 genera, 1 order under 2 families and 5 subfamilies from the Puzhal lake .

**Keywords:** Zooplankton, Cosmopolitan, Water quality, Polluted waters, Bio indicators.

#### Introduction:

The zooplankton community constitutes both primary consumers (which eat

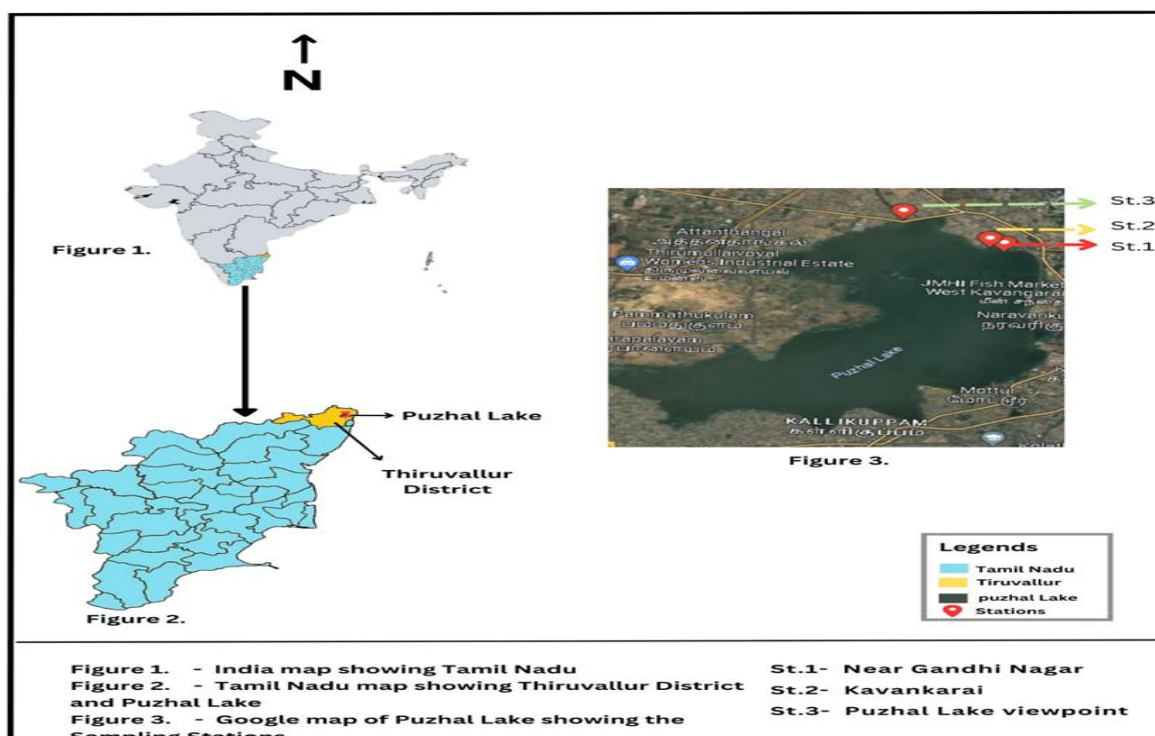
phytoplankton) and secondary consumers (which feed on the other zooplankton) and thus they provide a direct link between primary producers and higher trophic levels such as fish (Madin et al., 2001). A direct method for the evaluation of the potentiality of an aquatic biotope is the estimation of the rate of its primary production, where it begins the primary fixation of energy and its subsequent transfer to higher trophic levels (Wetzel, 1983). Zooplankton acts as a major link in the energy transfer at secondary level in aquatic food webs between autotrophs and heterotrophs (Deivanai et al., 2004). As these communities are very sensitive to the anthropogenic impacts causing environmental fluctuations, the zooplankton studies can be used to predict the long term changes in the aquatic ecosystems (Ferrara et al., 2002; Jeppesen et al., 2011; Kehayias et al., 2014; Preston and Rusak, 2010). Several studies reported that zooplankton can serve as an indicator of changes in trophic dynamics and the ecological state of

lakes related to changes in nutrient loading and climate (Caroni and Irvine, 2010; Kehayias et al., 2014). Earlier reports were not available on the zooplankton composition of Puzhal lake of Thiruvallur district of Tamil Nadu. Hence the present study was undertaken which resulted in 17 species of Rotifers belonging to 1 order 8 genera under 8 families; Cladocera belonging to 12 species, 11 genera, 2 orders under 6 families and Ostracoda belonging to 8 species belonging to, 7 genera, 1 order under 2 families and 5 subfamilies from the Puzhal lake.

### Materials and Methods:

The Puzhal lake in Redhills, Thiruvallur district of Tamil Nadu is selected for the present study as it is one of the city's largest lakes. Three areas from different parts of Puzhal lake was selected as the sampling locations. The co-ordinates of the locations

are 1. Near Gandhinagar ( $13^{\circ}11'15''\text{N}, 80^{\circ}11'5''\text{E}$ ) 2. Kavankari ( $13^{\circ}11'39''\text{N}, 80^{\circ}10'25''\text{E}$ ) 3. Puzhal lake view point. ( $13^{\circ}11'8''\text{N}, 80^{\circ}11'13''\text{E}$ ). The zooplankton samples were collected by sweeping standard plankton net made up of bolting silk of mesh size  $123\mu\text{m}$  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 detailed taxonomic studies by observing under high power magnification of stereoscopic microscope and by referring standard references viz., Edmondson (1959), Pennak, (1978), Segers, (2007, 2008) Sharma (1998), Sharma and Sharma (2008), Michael and Sharma, (1988), Chatterjee et. al, (2013), Victor and Fernando (1979), Karanovic (2012), Martens and Savatentalinton (2011),



**Fig-1. Showing the location map of 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



**Fig-2. A view of Puzhal lake.**



**Fig- 3. Collection of zooplankton samples.**



**Fig-4. Collection of zooplankton by sweeping by towing among aquatic weeds.**



**Fig- 5. Collection of zooplankton method.**

**SYSTEMATIC LIST OF  
 ZOOPLANKTON (ROTIFERA,  
 CLADOCERA AND OSTRACODA)  
 RECORDED FROM PUZHAL LAKE.**

Phylum **ROTIFERA**

Class **EUROTATORIA** Bartos, 1959

Subclass **MONOGONONTA** Wesenberg-  
 Lund, 1889

Order **PLOIMA** Delage, 1897

Family **BRACHIONIDAE** Wesenberg –  
 Lund, 1899

Genus **Brachionus** Pallas, 1766

1. *Brachionus calyciflorus* Pallas, 1766
2. *Brachionus caudatus personatus* (Ahlstrom, 1940)
3. *Brachionus falcatus* Zacharias, 1898
4. *Brachions quadridentatus* Hermann, 1783
5. *Brachionus patulus* (O.F. Muller, 1786)  
 Genus **Keratella** Bory de St. Vincent, 1822
6. *Keratella tropica* (Apstein, 1907)  
 Genus **Platylas** Harring, 1913
7. *Platylas quadricornis* (Ehrenberg, 1832)  
 Family **MYTILINIDAE** Bartos, 1959  
 Genus **Mytilina** Bory de St. Vincent, 1826
8. *Mytilina ventralis* (Ehrenberg, 1830)  
 Family **LEPADELLIDAE** Harring, 1913  
 Genus **Lepadella** Bory de St. Vincent, 1826
9. *Lepadella patella* (O.F. Muller, 1773)  
 Family **LECANIDAE** Bartos, 1959  
 Genus **Lecane** Nitzsch, 1827
10. *Lecane luna* (O.F. Muller, 1776)
11. *Lecane unguolata* (Gosse, 1887)
12. *Lecane (Hemimonostyla) inopinata* Harring  
 & Myers, 1926
13. *Lecane (Monostyla) bulla* (Gosse, 1851)  
 Family **NOTOMATIDAE** Remane, 1933  
 (partim)  
 Genus **Cephalodella** (Bory de St. Vincent,  
 1826)
14. *Cephalodella forficula* (Ehrenberg, 1830)  
 Family **ASPLANCHNIDAE** Harring &  
 Myers, 1926  
 Genus **Asplanchna** Gosse, 1850
15. *Asplanchna brightwelli* Gosse, 1850

Family **TESTUDINELLIDAE** Bartos,  
 1959

Genus **Testudinella** Bory de St. Vincent,  
 1826

16. *Testudinella patina* (Hermann, 1783)

Family **FILINIIDAE** Bartos, 1959

Genus **Filinia** Bory de St. Vincent, 1824

17. *Filinia longiseta* (Ehrenberg, 1834)

Class **BRANCHIOPODA**

Superorder **CLADOCERA**

Order **CTENOPODA** Sars, 1865

Family **SIDIDAE** Baird, 1850

Genus **Diaphanosoma** Fischer, 1850

18. *Diaphanosoma sarsi* Richard, 1894

Order **ANOMOPODA** Sars, 1865

Family **DAPHNIIDAE** Straus, 1820

Genus **Ceriodaphnia** Dana, 1853

19. *Ceriodaphnia cornuta* Sars, 1885

Genus **Simocephalus** Schoedler, 1858

20. *Simocephalus (Echinocaudus) acutirostratus*  
 (King, 1853)

Family **MOINIDAE** Goulden, 1968

Genus **Moina** Baird, 1850

21. *Moina micrura* Kurz, 1874

Genus **Moinodaphnia** Herrick, 1887

22. *Moinodaphnia macleayi* (King, 1853)

Family **MACRITHRICIDAE** Norman and  
 Brady, 1867

Genus **Macrothrix** Baird, 1843

23. *Macrothrix spinosa* King, 1853

Family **ILYOCRYPTIDAE** Norman and  
 Brady, 1867

Genus **Ilyocryptus** Sars, 1862

24. *Ilyocryptus spinifer* Herrick, 1882

Family **CHYDORIDAE** Dybowski &  
 Grochowski, 1894

Subfamily **ALONINAE** Dybowski &  
 Grochowski, 1894

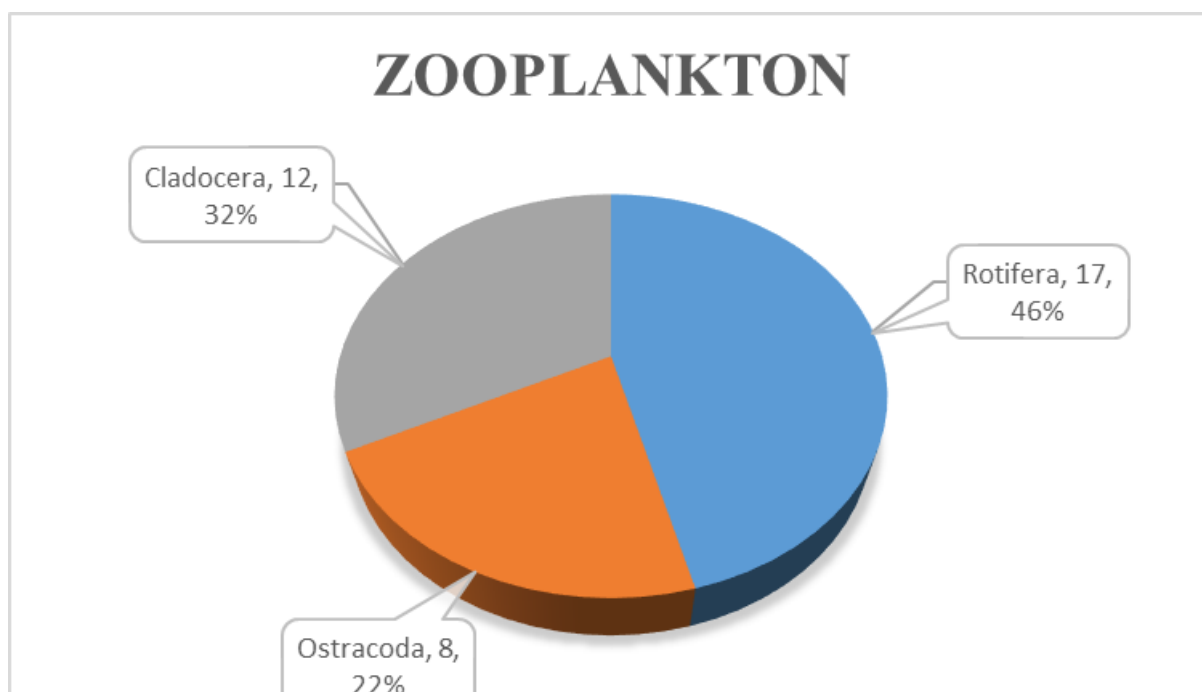
Genus **Alona** Baird, 1843 emend. Smirnov,  
 1971

25. *Alona costata* Sars, 1862 s.lat.

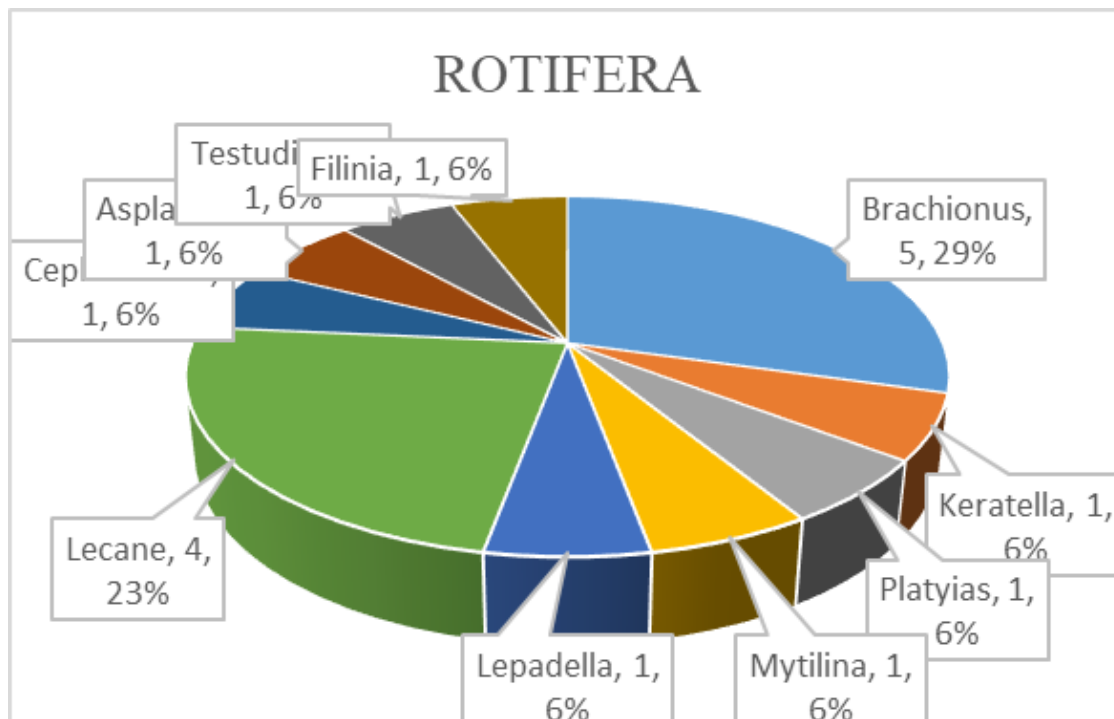
26. *Alona quadrangularis* (O.F. Muller, 1776) s.  
 lat

Genus **Coronatella** Dybowski &  
 Grochowski, 1894

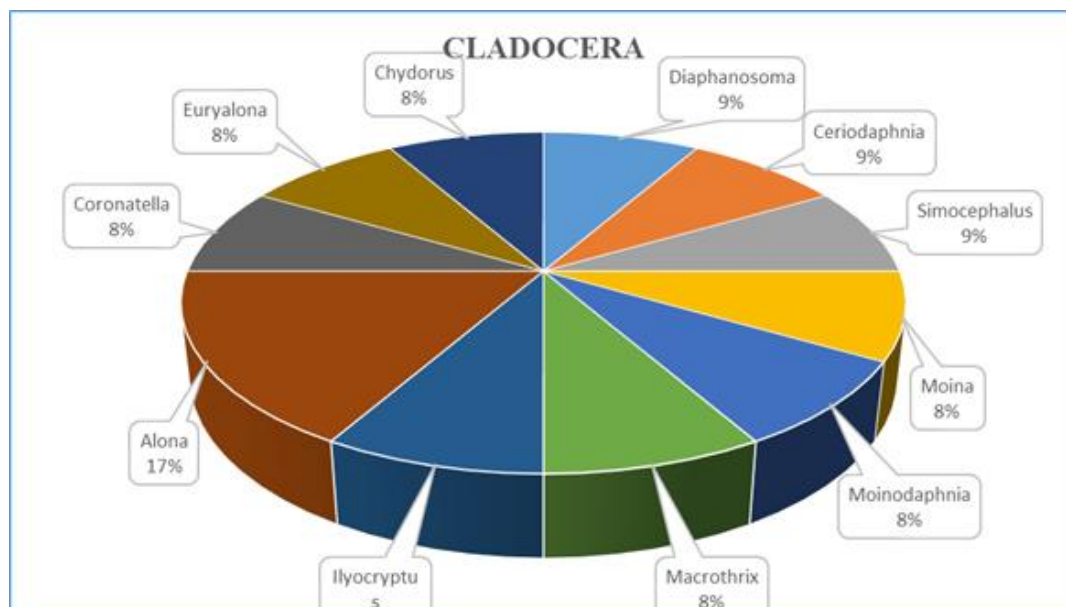
27. *Coronatella monacantha tridentata* (Stingelin, 1905)  
 Genus **Euryalona** G. O. Sars, 1901
28. *Euryalona orientalis* (Daday, 1898)  
 Genus **Chydorus** Leach, 1816
29. *Chydorus sphaericus* (O.F. Muller, 1776) s.lat.  
 Class **OSTRACODA** Latreille, 1802  
 Subclass **PODOCOPA** G.W. Muller, 1894  
 Order **PODOCOPIDA** Sars, 1866  
 Suborder **CYPRIDOCOPINA** Jones, 1901  
 Superfamily **CYPRIDOIDEA** Baird, 1845  
 Family **CYPRIDIDEA** Baird, 1845  
 Subfamily **CYPRICERCINAE** McKenzie, 1971  
 Genus **Bradleystrandesia** Broodbakker, 1983
30. *Bradleystrandesia parva* (Hartmann, 1964)  
 Genus **Bradleytriebella** Savatnalinton and Martens, 2009
31. *Bradleytriebella tuberculata* (Hartmann, 1964)  
 Genus **Strandesia** Stuhlmann, 1888
32. *Strandesia saetosa* (Hartmann, 1964)  
 Subfamily **CYPRIDOPSINAE** Kaufmann, 1900  
 Genus **Plesiocypridopsis** Rome, 1965
33. *Plesiocypridopsis dispar* (Hartmann, 1964)  
 Subfamily **CYPRINOTINAE** Bronstein, 1947  
 Genus **Hemicypris** Sars, 1903
34. *Hemicypris anomala* (Klie, 1964)
35. *Hemicypris dentatmarginata* (Baird, 1859)  
 Subfamily **HERPETOCYPRIDINAE** Kaufmann, A. 1900.  
 Genus **Chrissia** Hartmann, 1957
36. *Chrissia halyi* (Ferguson, 1969)  
 Family **ILYOCYPRIDIDAE** Kaufmann, A. 1900  
 Subfamily **ILYOCYPRIDINAE** Kaufmann, 1900  
 Genus **Ilyocypris** Brady and Norman, 1889
37. *Ilyocypris sp.*



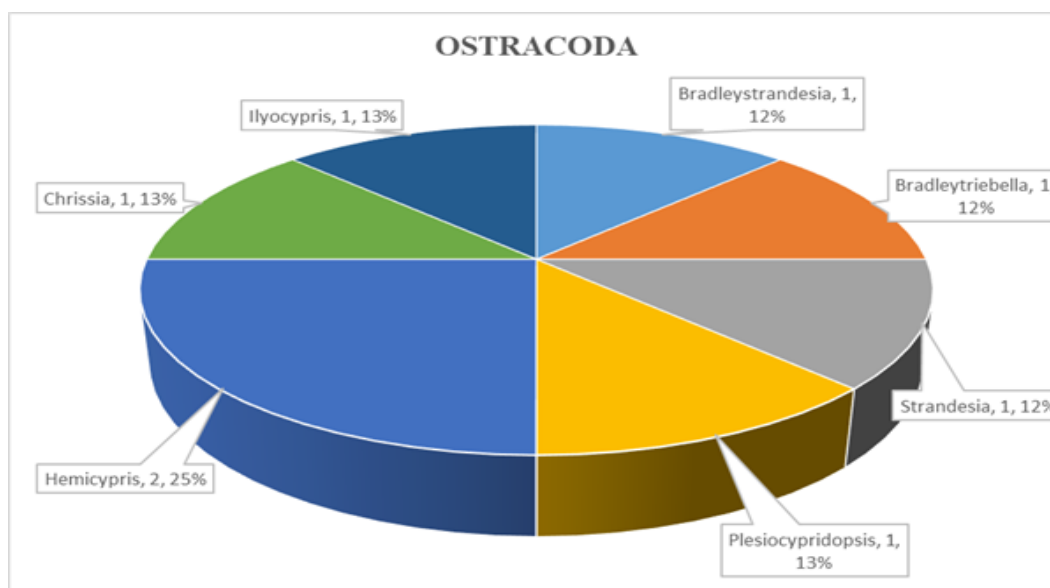
**Fig- 6. Showing the Percentage composition of Rotifers, Cladocerans and Ostracods recorded from Puzhal lake.**



**Fig- 7. Showing the genera wise Percentage composition of Rotifers recorded from Puzhal lake.**



**Fig- 8. Showing the genera wise Percentage composition of Cladocerans recorded from Puzhal lake.**



**Fig- 9. Showing the genera wise Percentage composition of Ostracods recorded from Puzhal lake.**

#### Discussion:

In the present study among the three different groups of Zooplankton recorded, Rotifers represented the most dominant group with a percentage composition of 46% followed by Cladocera 32% and Ostracoda 22% (Fig. 6). The genera wise percentage composition of each group was represented in Figs. 7, 8 & 9 respectively. Several workers such as Pace and Orcutt, 1981; Gilbert and Bogdan, 1984; Sivakami, 1996; Ezhili et al., 2013; Sivakami et al., 2014; Basawarajeshwari Indur et al., 2015 reported rotifers to be the dominant group of zooplankton in freshwater systems. Gannan and Stemberger (1978) stated that the Rotifers respond more quickly to the changes in the environment. They can be considered as bioindicators of water quality (Sladeczek, 1983). High rotifer density is a characteristic of eutrophic lakes (Sendacz, 1984). From an ecological point of view Cladocerans are considered to be an important component of zooplankton. As the Cladocerans attain a maximum population within a short period of time besides being an important food source for many of the

cultured fishes both juveniles as well as adults they occupy a prime place in pisciculture (Verma and Shukla, 1968; Jhingran, 1982).

#### Summary:

The present study is based on a small collection of zooplankton sample which revealed 37 species of zooplankton comprising different faunal groups such as 17 species of Rotifers belonging to 1 order 9 genera under 8 families; Cladocera belonging to 12 species, 11 genera, 2 orders under 6 families and Ostracodas of 8 species belonging to 7 genera, 1 order under 2 families and 5 subfamilies from the Zooplankton collections of Puzhal lake of Thiruvallur district. The eutrophic species of Rotifers viz.. *Brachionus calyciflorus*, *Brachionus falcatus*, *Keratella tropica*, *Lecane bulla*, *Mytilina ventralis*, *Filinia longiseta* are reported during the present study. Chydoridae represented the most dominant family of Cladocerans with a representation of five species. The cosmopolitan species of Cladocerans such as *Moina micrura*, *Alona quadrangularis*,

*Chydorus sphaericus*, *Diaphanosoma sarsi*, *Ceriodaphnia cornuta* are recorded. One of commonest cladoceran species found even in high altitude systems of India such as the *Moina micrura* is also reported during the present study.

### Conclusion:

The number of zooplankton species present in an aquatic ecosystem and their distribution pattern is the result of both their phylogeny and present-day environmental circumstances. The information on environmental conditions and on the structure and functioning of plankton communities will help in minimizing adverse effects of unsustainable development and pollution. Because of the much greater degree of interconnectedness and lack of clear boundaries, conservation on aquatic ecosystem is fundamentally more difficult than on land. So, this type of work will help to regularize the management plans.

### Acknowledgements:

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

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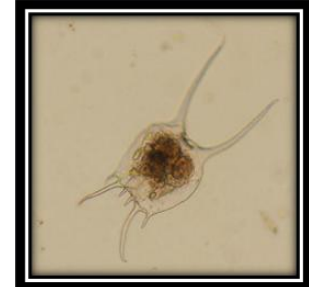
**PLATE-1**



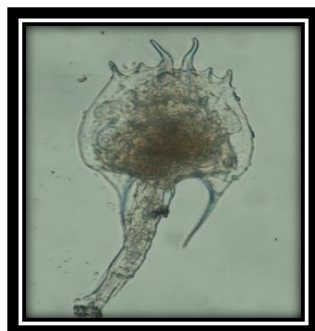
*Brachionus calyciflorus* Pallas, 1766



*Brachionus caudatus personatus* (Ahlstrom, 1940)



*Brachionus falcatus* Zacharias, 1898



*Brachionus quadridentatus* Hermann, 1783



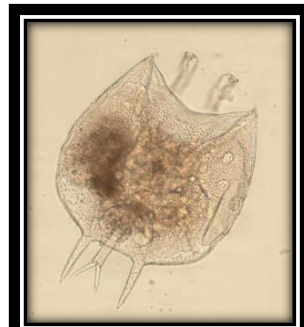
*Brachionus patulus* (O.F. Muller, 1786)



*Keratella tropica* (Apstein, 1907)



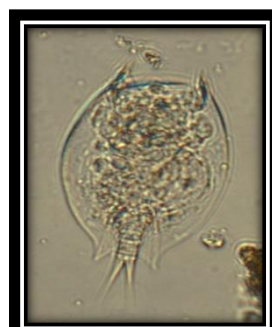
*Filinia longiseta* (Ehrenberg, 1834)



*Platyas quadricornis* (Ehrenberg, 1832)



*Mytilina ventralis* (Ehrenberg, 1830)



*Lepadella patella* (O.F. Muller, 1773)



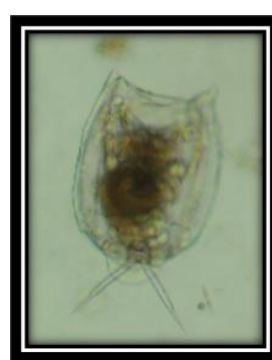
*Lecane (Monostyla) bulla* (Gosse, 1851)



*Lecane luna* (O.F. Muller, 1776)



*Cephalodella forficula* (Ehrenberg, 1830)



*Lecane unguolata* (Gosse, 1887)

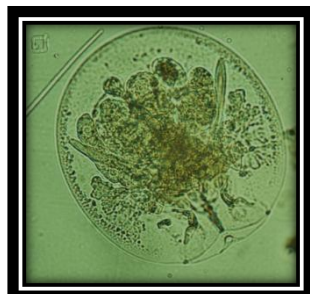


*Lecane (Hemimonostyla) inopinata* Harring & Myers, 1926

## PLATE-2



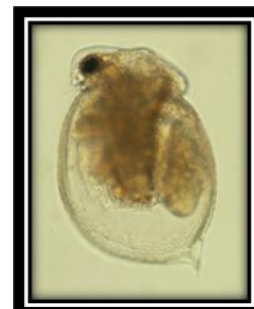
*Asplanchna brightwellii* Gosse, 1850



*Testudinella patina* (Hermann, 1783)



*Diaphanosoma sarsi* Richard, 1894



*Ceriodaphnia cornuta* Sars,



*Moina micrura* Kurz, 1874



*Moinodaphnia macleayi* (King, 1853)



*Moinodaphnia macleayi* (King, 1853)



*Macrothrix spinosa* King, 1853



*Ilyocryptus spinifer* Herrick, 1882



*Alona costata* Sars, 1862 s.lat



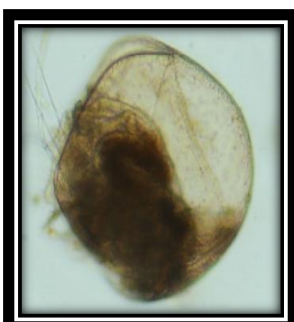
*Alona quadrangularis*  
(O.F. Muller, 1776) s. lat



*Coronatella monacantha tridentata*  
(Stingelin, 1905)



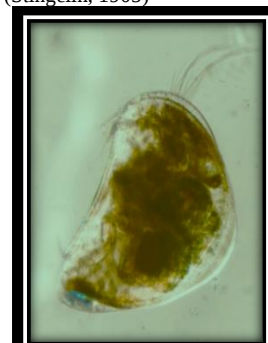
*Euryalona orientalis* (Daday, 1898)



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

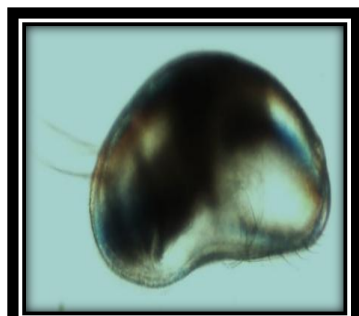


*Bradleystrandesia parva* (Hartmann, 1964)



*Bradleytribella tuberculata*  
(Hartmann, 1964)

PLATE-3



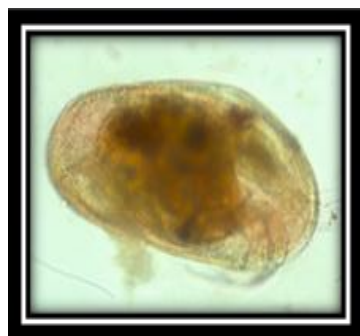
*Strandesia saetosa* (Hartmann, 1964)



*Plesiocypridopsis dispar* (Hartmann, 1964)



*Hemicypris anomala* (Klie, 1964)



*Hemicypris dentatomarginatus* (Baird, 1859)



*Chrissia halyi* (Ferguson, 1969)



*Ilyocypris* sp