



NOTES ON SOME PROTOZOA AND ZOOPLANKTON OF SEWAGE SYSTEMS IN KOLKATA

****L. BINDU, *J. CHITHRA AND *A.K. SANYAL**

***Zoological Survey of India, Marine Biology Regional Centre, Chennai-600028*

**Zoological Survey of India, M.Block, New Alipore, Kolkata*

INTRODUCTION

Sewage is water carried wastes, in either solution or suspension, that is intended to flow away from a community. It is more than 99.9% pure water and is characterized by its volume or rate of flow, its physical condition, its chemical constituents and the bacterial organisms that it contains. Sewage water is a complex matrix with many distinctive chemical characteristics. These include high concentrations of ammonium, nitrate, phosphorus, high conductivity (due to high dissolved solids), high alkalinity, with pH typically ranging between 7 & 8.

Several major taxonomic groups of protozoa *viz.*, flagellates, naked and tested amoebae, actinopods and ciliates occur in biological sewage treatment plants. Amongst these, ciliated protozoa are the most significant component. They are numerically dominant and occupy different trophic levels by being detritivorous, carnivorous and occasionally herbivorous. It has been shown experimentally that ciliates actively contribute to the regulation of entire complex of purification plants by regulating bacterial population and controlling BOD level (Curds, 1973). Thus ciliates are useful bioindicators for determining water quality and also for quick monitoring of water purification plants. Like protozoa different plankton species are also indicators of water bodies. Das *et al.*, (1993) reported only few species from sewage systems of West Bengal. On considering their immense role in self purification process, present study was undertaken to provide background data of the

abundance and distribution of some of the protozoa and plankton fauna in sewage systems of Kolkata *viz.*, East Kolkata wetlands, Bagjola and Tollynala.

MATERIALS AND METHODS

Water samples were collected during 2009-10 from the above mentioned three sewage systems and triplicate samples were collected from each canal. Those samples were then thoroughly examined under the microscope from time to time. The free living rhizopods and ciliates occurring in them were isolated and examined for more than 15 days in living condition by keeping them in a drop of natural medium. Free-living ciliates occurring in them were isolated, processed and stained following standard fixation and preservation methods (Mandal *et al.*, 1990; Das *et al.*, 1993). Rhizopods and Planktons were also isolated and identified.

RESULTS AND DISCUSSION

The presence of considerable amount of dissolved organic matter provided suitable environment for the growth of varieties of microorganisms. In the present study three species of rhizopods under two genera, 10 species of ciliates coming under 10 genera and 10 families and 5 species of zooplankton were observed. These 13 species of protozoa belong to 7 orders and 13 families. All the 3 rhizopods are coming under the order Arcellinida. Prostomatid ciliates represent 3 species followed by 2 species each of nassulids and hymenostomatids and one species each of pleurostomatid, colpodid and synhymenid

Table-1: Systematic list of free-living protozoa and zooplankton species recorded from Kolkata sewage systems (classification according to Levine *et al.*, 1980)

Systematic list of species	Occurrence in Kolkata sewage systems	Earlier records in India (Ref.)
A. Protozoa Phylum Sarcomastigophora Class Lobosea Order Arcellinida Family Arcellidae		
1. <i>Arcella discoides</i> Ehrenberg 1843 Family Diffugiidae	Bg, EK W	AP, Arp, Man, Meg, Miz, Nag, HP, Skm, Tp, WB (Das <i>et al.</i> , 1993, 1995, 2000, 2004)
2. <i>Diiflugia corona</i> Wallich 1864	Bg, TN	AP, Man, Tp, WB (Das <i>et al.</i> , 1995, 2000)
3. <i>Diiflugia lobostoma</i> Leidy 1879 Phylum Ciliophora Class Kinetofragminophorea Order Prostomatida Family Colepidae	EKW, TN	AP, Arp, Man, Meg, Miz, Nag, HP, Raj, Skm, Tp, WB (Das <i>et al.</i> , 1993, 1995; 2000, 2004; Mahajan, 1971)
4. <i>Coleps hirtus</i> (Muller) 1786 Family Tracheliidae	Bg, EK W	Raj, WB (Mahajan, 1971; Das <i>et al.</i> , 1995)
5. <i>Trachelius gutta</i> (Cohn) 1866 Family Didiniidae	EKW	WB (Das <i>et al.</i> , 1995)
6. <i>Didinium nasutum</i> (Muller) 1773 Order Pleurostomatida Family Amphileptidae	TN	Raj, WB (Mahajan, 1971; Das <i>et al.</i> , 1995)
7. <i>Litonotus fasciola</i> (Ehrenberg) 1838 Order Colpodida Family Colpodidae	Bg, EK W	Mah, Raj, WB (Mahajan, 1971; Das <i>et al.</i> , 1995, Bindu & Saha, 2012)
8. <i>Colpoda cucullus</i> Muller 1773 Order Synhymeniida Family Scaphidiodontidae	TN	AP, Mah, WB (Das <i>et al.</i> , 1995, 2004; Bindu & Saha, 2012)
9. <i>Chilodontopsis bengalensis</i> (Ghosh) 1921 Order Nassulida Family Nassulidae	Bg, EK W, TN	WB (Das <i>et al.</i> , 1995)
10. <i>Nassula ornata</i> Ehrenberg 1833 Family Microthoracidae	Bg	Raj, WB (Mahajan, 1971; Das <i>et al.</i> , 1995)
11. <i>Microthorax pusillus</i> Engelman 1862 Class Oligohymenophorea Order Hymenostomatida Family Tetrahymenidae	TN	WB (Das <i>et al.</i> , 1995)
12. <i>Tetrahymena pyriformis</i> (Ehrenberg) 1866 Family Frontoniidae	Bg	WB (Das <i>et al.</i> , 1995)
13. <i>Frontonia leucas</i> (Ehrenberg) 1838 B. Zooplankton Class Rotifera Order Ploimida Family Lecanidae	Bg, TN	Raj, Mah, WB (Mahajan, 1971; Das <i>et al.</i> , 1995, Bindu & Saha, 2012)
1. <i>Lecane leontina</i> (Turner, 1892) Class Crustacea Order Cladocera Family Sididae	EKW	AP, MP, Osa, WB (Sharma, B. K., 1998; Sumita Sharma & Sharma, B.K., 2008)
2. <i>Pseudosida bidentata</i> Herrick 1884 Family Moinidae	EKW	Raj, Meg, WB (George Michael & Sharma, B. K. 1998; Sumita Sharma & Sharma, B.K., 2008)
3. <i>Moina micrura</i> Kurz 1874 Order Cyclopoida Family Cyclopidae	Bg, EK W,	Raj, WB, Bhr (Sharma, B.K., 1998)
4. <i>Mesocyclops leuckarti</i> (Claus) 1857 Order Podocopa Family Cyprididae	EKW	AP, Mah, TN, UP, WB (Sumita Sharma & Sharma, B.K., 2008; Sharma, B.K., 1998)
5. <i>Cypris subglobosa</i> Sowerby 1840	Bg	Mah, MP, AP, Tamil Nadu (Reginald Victor & Fernando, C. H., 1979)

(Table-1). All the species are reported earlier from different states of India. (Das *et al.*, 1993, 1995, 2000, 2004; Mahajan, 1971; Bindu and Saha, 2012). All the 5 species of zooplankters reported herewith belong to 4 different orders *viz.*, plomida, cladocera, cyclopoida and podocopa.

(Bg- Bagjola, EKW - East Kolkata wetland, TN-Tollynalla, AP-Andhra Pradesh, Arp-Arunachal Pradesh, Bhr-Bihar, Mah-Maharashtra, Man-Manipal, Meg-Meghalaya, Miz-Mizoram, Nag-Nagaland, HP-Himachal

Pradesh, Osa-Orissa, Raj-Rajasthan, Skm-Sikkim, Tp-Tripura, TN, Tamil Nadu, WB-West Bengal)

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