Rec. zool. Surv. India : **108**(Part–3) : 55-58, 2008

ROTATORIAN FAUNA AS INDICATOR OF TROPHY IN ADRA LAKE, PURULIA DISTRICT, WEST BENGAL, INDIA

S. V. A. CHANDRASEKHAR AND S. Z. SIDDIQI*

Freshwater Biological Station, Zoological Survey of India, Plot 366/1, Attapur (V), Ring Road, Hyderguda P.O., Hyderabad-500 020

INTRODUCTION

Adra lake (also known as Saheb Bandh), is a relatively small, oligotrophic raw water reservoir (*Ca.* 2.5 ha.) located at about 5 km north of Adra, a railway town in Purulia district, West Bengal [latitude 23°42'N and longitude 87°01'E]. Detailed limnological investigations were initiated covering three main seasons between October, 1995–April, 1996, to assess/evaluate its raw water characteristics and *trophic* status. Pending in depth analysis of the physico-chemical *milieu* and inorganic plant nutrients [various forms of Phosphorus (P) and Nitrogen (N)] in lake's ecology, the rotifer component of the net zooplankton in the lake were identified, for possible biological evaluation of its ecological status. In past, occurrence/abundance of rotifer population and their distribution have been successfully used as indicator of lake's trophy (Sladecek, 1983 and Kuezensky 1987). Nearer home, Arora, 1966, Chaurasia and Adoni, 1987 and Sharma and Dudani, 1992 have used presence of these organisms as ecological indicators.

Further to listing the overall species composition of rotifer community in the lake, observations have been made on ecological indicator values of the respective taxa as indicator of environment. Of the ten species reported hereunder, genus *Keratella* predominates the rotifer population though its two species *viz.*, *K. quadrata* (Muller, 1788) and *K. cochlearis* (Gosse, 1851) and the species rich genus *Lecane* represented by three species.

Rotifer fauna of West Bengal, save for some pioneering studies by Anderson, 1989 and later exhaustive studies by Sharma, 1998, have otherwise failed to attract much scientific attention as ecological indicators of lakes environment. Therefore this humble attempt to document rotifer fauna in the oligotrophic lake as an indicator of ecological status. Present study records ten species

**Estuarine Biological Station, Zoological Survey of India, Gopalpur-on-Sea-761 002, (Ganjam, Orissa).*

under six genera, quite a few of which serve as good biological indicator of lakes oligotrophic status, including few transitional forms (Table-I).

MATERIAL AND METHODS

The relatively small raw water reservoir (*Ca.* 2.0 ha.) caters to the potable water needs of the railway township, Headquarters of Adra Railway Division on the South-Eastern Railways. A masonary wall bandh with a pucca road on it separates the reservoir upstream from the filter beds and pump house below. An irregular shaped lake and its water spread area is otherwise surrounded by fields and small forest on western, northern and north-western edges/sides. Over five limnologically sampling sites where selected for random sampling of plankton/other wetland fauna.

Plankton samples were collected in addition to subsurface samples of lakes waters using plankton net (No. 25) with a 50 ml capacity plastic container tied at its end, on the sub-surface waters during the course of limnological studies in October, 1995 and April, 1996. Samples were preserved in 4% formaldehyde solution, were deposited in the National Zoological Collections of Freshwater Biological Station, Zoological Survey of India, Hyderabad after registration (Nos. FBS/ZSI/4417 to 4440, 4443 to 4461 and 4491 to 4504). The rotifer fauna was identified using standard taxonomic manual (Smith, 2001) and other Indian literature (Battish, 1992 and Dhanapathi, 2000).

DISCUSSION

The plankton community in relatively small oligotrophic, Adra lake plays host to a wide array of zooplankton communities *viz.*, Cladocera, Rotifera, Copepoda and Ostracoda *etc.* of which cladocera predominates, both in terms species and numbers, followed by rotifera, in the stated order of abundance. Of the Rotifers, the ubiquitous Lecanid genera is represented by three species while the other equally cosmopolitan Brachionid genera is represented by a single species—*B. patulus*, and *Keratella* by two species *viz., K. quadrata* and *K. cochlearis,* the former predominating the later in terms of species number and abundance. A brief taxonomic account of the ten rotifer species encountered, with ecological notes is furnished in tabulated form (Table 1). A categorical number of the taxa, over two three species, inhabit oligotrophic, often acidic waters (acidophilic).

In view of established ecological criterion of the ubiquitous genus *Brachionus* and its few cosmopolitan species as eutrophic forms and that of the genus, *Trchocerca* as indicator of purely oligotrophic waters, an interesting ratio of the two genera *viz., Brachionus, Trichocerca* quotient or Q = *Brachionus* spp. / *Trichocerca* spp. (Sladecek, 1983) has been used for biological evaluation of lakes trophic status. Sladecek's quotient revealed a value of 0.5 and corroborates the oligotrophic status of Adra raw water reservoir.

Table 1. Listing over all species composition of rotifers in the zooplankton community in Adra lake. Sladecek, 1983 quantitative quotient Q = B/T using the presence of number of species of *Brachionus* to number of species of *Trichocerca* indicates oligotrophic status.

ROTIFERA / EUROTATORIA / MONOGONONTA / PLOIMIDA
Brachionidae Wisenberg-Lund 1851. 1. *Brachionus* Pallas 1766 *Brachionus patulus* (Muller, 1776). Lorica length 0.135-0.15; maximum width 0.11-0.13; antero-lateral spine 0.03-0.04; antero-median spine 0.029-0.04; postero-lateral spine; 0.05-0.06; postero-median spine 0.015-0.016; postero-intermediate spine 0.01-0.015 mm. Commonly occurring, ubiquitous, transitional species. Invariably inhabits acidic waters (acidophilus).
Keratella Bory de Vincent, 1822 (a) *Keratella cochlearis* (Gosse, 1851) Lorica length 0.1-0.13; Maximum width 0.66-0.7; anterior spine 0.012-0.014; posterior spine 0.055-0.06 mm. Commonly observed in eutrophic, soft and often acidic waters or waters with neutral pH (< > 7). (b) *K. quadrata* (Muller, 1786) Lorica length 0.18-0.2; maximum width : 0.085-0.09; Posterior spine 0.057-0.06 mm.
Mytilinidae Bortos, 1969. 3. *Mytilina* Bory de., Vincent, 1826 *Mytilina ventralis ventralis* (Ehrenberg, 1832), Lorica length 0.38-0.4; maximum width 0.22-0.25; toes 0.084-0.088 mm. Relatively uncommon, but widely, distributed in oligo-meso-eutrophic lake series. A transitional form, restricted to clean, clear waters.
Lecanidae Bartos 1959 4. *Lecane* Nitzsch, 1827 (a) *Lecane bulla* (Gosse, 1851), Lorica length 0.16-0.18; maximum width 0.075-0.085, toe 0.04-0.048 mm. Cosmopolitan, ubiquitous in all types of waters but less abundant, (b) *L. hamata* (Stokes, 1896), Lorica length 0.12-0.145; maximum width 0.057-0.07; toe length 0.05-0.06 mm. Commonly observed, transitional form, occurring in both nutrient poor to nutrient rich or polluted waters. © *L. lunaris* (Ehrenberg, 1832), Lorica length 0.065-0.075; maximum width 0.045-0.06; toe length 0.04-0.05 mm. Ubiquitous, most commonly occurring, littoral species, inhabits both oligo-and eutrophic waters.
Trichocercidae Remane, 1933, *Trichocerca* (Lamarck, 1801). Sub-genus : *Trichocerca (Diurella)* Bory de St. Vincent, 1824 *(a) Trichocerca (Diurella) similes* (Wierzejski, 1893), Lorica length 0.15-0.2, right toe 0.065-0.075; left toe 0.046-0.055 mm. Cosmopolitan but less commonly occurring, prefers purely oligotrophic, clean, clear waters. Sub-genus *Trichocerca (Trichocerca)* Lamarck, 1801. (b) *Trichocerca (Trichocerca) pusilla* (Lauterborn, 1898), Lorica length 0.2-0.25, body width : 0.1-0.15, left toe 0.15-0.16, right toe 0.075-0.08 mm., Less commonly observed/distributed, prefers clear, clean oligotrophic, nutrient poor waters.
Gastropidae Remane, 1933. *Ascomorpha* Perty, 1850. *A. ovalis* (Bergendal, 1892), Lorica length : 0.57-0.6 mm., Less commonly observed, rather rare in nutrient rich meso-trophic waters, inhabits oligotrophic waters.

SUMMARY

Limnologic investigations, including range of pH values (6.8-7.0), high Sacchi disc transparency, extremely low turbidity and nutrients various forms-Phosphates and Nitrates, initiated on a relatively small raw water reservoir *ca* 2.5 *ha.*, as also associated lacustrine fauna-littroral, planktonic, neuston and nekton, predominantly fishes and crustacean decapods (prawns) revealed oligotrophic nature of the lake. Of the various zooplankton groups, rotifers in view of their ubiquitous nature, and wide use as indicator of environment were taken up for identification. 10 species, including a few transitional forms, serve as categorical indicator of oligotrophic environment.

ACKNOWLEDGEMENTS

The authors are thankful to Dr. A.K. Ghosh, ex-Director, Dr. Ramakrishna, Director, Zoological Survey of India for initiation and encouragement and to the previous and present Officers-in-Charge, Freshwater Biological Station, Zoological Survey of India, Hyderabad for extending field/laboratory facilities and encouragement.

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