Geo-Eco-Trop, 1979, 3 (4) 267-271

ZOOPLANKTON OF THE RIVER BETWA (INDIA)

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RESUME

Le zooplancton de la rivière Betwa à Ganj Basoda (Inde) montre en ce qui concerne les populations de Cladocères et de Rotifères une dominance d'espèces de la zone tempérée, les espèces tropicales étant peu nombreuses. Ce zooplancton est vraisemblablement originaire d'eaux calmes présentes dans les biefs supérieurs, plus froids, de la rivière Betwa. E u r y c e r c u s l a m e l l a t u s, une espèce boréale est rapportée d'Inde pour la première fois.

ABSTRACT

The zooplancton of the river Betwa at Ganj Basoda (India) shows a predominantly temperate zone species composition of Cladocera and Rotifera with only a few tropical species. The zooplankton probably originates in standing waters in the cooler upper reaches of the river. E u r y c e r c u s l a m e l l a t u s, a distinctly boreal species is recorded from India for the first time.

INTRODUCTION

Many fishes depend upon plankton directly or indirectly for their food. Also most juvenile fishes feed on zooplankton. Many workers have contributed to the plankton study of lakes, ponds and pools in India but only the Ganga, Jamuna and Jhelum (CHAKRABARTY *et al.*, 1959; PAHWA & MEHROTRA, 1966; RAY *et al.*, 1966 and VASS *et al.*, 1977) have been explored as far as such studies of Indian rivers are concerned.

The present communication deals with the qualitative study of zooplankton of the river Betwa at Ganj Basoda. The Betwa, which is an important river of Madhya Pradesh and Uttar Pradesh, originates near Jhiribarod

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village of Raisen district in Madhya Pradesh at an elevation of 472 m above MSL and latitude 23.2° N, and longitude 77.24° E, and after traversing 564 km joins the river Jamuna in Hamirpur district of Uttar Pradesh at an elevation of 85.5 m above MSL and latitude 25.55° N, and longitude 80.13° E showing a drop of 386.5 m from its origin.

Water depth of the river varies in various seasons form 1.0 to 15.0 m and water current from 5.0 to 9.0 m/min. Minimum and maximum atmospheric temperature varied from 11.5 to 40.5° C. Average water temperature fluctuated from 19.5 to 31.0° C and pH ranged from 6.4 to 8.5. Though the river is rich in dissolved oxygen, water pollution is recorded for about 2 km near Puttha Mill, Vidisha in Madhya Pradesh (ADHOLIA, 1977).

MATERIAL AND METHOD

The collection of plankton was done fortnightly during 1976 according to the methods suggested by PAHWA and MEHROTRA (1966) using a 25 ## (65 µm) plankton net.

RESULTS

The zooplankton recorded during the course of investigation were :

PROTOZOA

Arcella dentata Ehrenberg, *A. discoides* Ehrenberg, *A. vulgaris* Ehrenberg, *Amoeba proteus* Pallas, *Euglena* sp., *Paramaecium caudatum* Ehrenberg, *Eudorina elegans* Ehrenberg, *Volvox* sp., and *Centropyxis aculeata* Stein.

ROTIFERA

Brachionus angularis Gosse, *Polyarthra dolichoptera* Idelson, *P. vulgaris* Anctt., *P. major* (Burckhardt), *P. euryptera* (Wierzejski), *P. remota* (Skorikow), *Notholca acuminata* (Ehrenberg), *N. caudata* Carlin, *N. carnuta* Carlin, *N. squamula* (O.F. Mullar), *N. foliacea* (Ehrenberg), *N. striata* (Ehrenberg), *Keratella cochlearis* (Gosse), *K. vulga* (Ehrenberg), *K. tropica* (Apstein), *K. procurva* (Thorpe), *K. quadrata* Carlin, *Distimus* sp., *Mytilina ventralis* Gosse, *Chromogaster ovalis* Bergendal, *Distomus* sp., *Cynchaeta* sp., *Kellicottia longispina* (Kellicott), *Dicranophorus* sp., *Colurus* sp., *Rattulus* sp., *Limnias* sp., *Dinocharius* sp., *Trichocerca porcellus* (Gosse), *T. rousseletei* (Voigt), *T. birostris* (Minkiwicz), *Pompholyx complanata* Gosse, *P. sulcata* Hudson, and *Furcularia* sp.

ANOSTRACA

Eubranchipus vernalis (Verrill).

CLADOCERA

Bosmina longirostris (O.F. Mullar), *Chydorus eurynotus* Sars, *C. sphaericus* O.F. Mullar, *Diphanosoma brachyurum* (Lievin), *Daphnia* sp., *Simocephalus expinosus* (Koch), *S. vetulus* Schaller, *Moina micrura* Kurz, *M. affinis* Birge, *M. brachiata* (Jurine), *Indialona ganapati* Petkovski, *Eurycercus lamellatus* (O.F. Mullar), and *Acroperus harpae* Baird.

OSTRACODA

Cypridopsis sp.

COPEPODA

Diaptomus sp., *Cyclops* sp., *Microcyclops varians* (G.O. SARS), *Nauplii* sp., *Tropocyclops prasinus* (Fischer), and *Canthocamptus* sp.

INSECTA

Peltodytes sp., *Styalis* sp., *Amphynema* sp., *Micronecta* sp., *Psectrocladius* sp., *Caenis* sp., *Chaborus flavicans* (Meigen), and *C. crystallinus* (De Geer).

ARACHNIDA

Hydracarina sp.

DISCUSSION

The (potamo-) zooplankton of the river Betwa at Ganj Basoda consisted of 10 Protozoa, about 40 Rotifera, a single Anostracan, 13 Cladocera and about 6 Copepoda. GREEN (1960, 1962) recorded 41 species of Rotifera, 30 Cladocera and 13 Copepoda in the river Sokota in Nothern Nigeria. BROOK & RZOSKA (1956) recorded 18 Cladocera and 9 Copepoda in the subtropical Nile. CHAKRABARTY *et al.* (1959) recorded 7 Protozoa, 20 Rotifera, 4 copepoda, 7 Cladocera and one Ostracoda in the river Jamuna at Allahabad. PAHWA & MEHROTRA (1966) have recorded 4 Protozoa, 16 Rotifera, 2 Copepoda and 8 Cladocera in the river Ganga. RAY *et al.* (1966) recorded 6 Protozoa, 18 Rotifera, about 7 Copepoda, 7 Cladocera and one Ostracoda in the river Ganga and Jamuna at Allahabad in 1958-1959 and VASS *et al.* (1977) recorded 5 Protozoa, 9 Rotifera, 4 Copepoda and 6 Cladocera in the river Jhelum. In the present study the fewer species are probably due to the effects of pollution. Also the variation in temperature

is quite marked and would eleminate both tropical and temperate species depending on the prevailing water temperature. HYNES (1970) has reviewed the literature on Potamoplankton. He concluded that much of the plankton of rivers actually originate in quiet bays as is probably the case in the river Betwa. The temperate composition of the zooplankton indicates that the plankton originates in cooler waters. Larger rivers have some plankton always present. LAKSHMINARAYANA (1965) found that the turbidity of the flood waters of the Ganges reduced phytoplankton density.

The zooplankton recorded in the present study consist of some cosmopolitan and widely distributed species. like *Bosmina longirostris*, *Simocephalus vetulus*, *Chydorus sphaericus*, *Chydorus eurynotus* and *Moina micrura* (Cladocera), *Polyarthra dolicoptera*, *P. vulgaris*, *Pompholyx complanata*, *Keratella tropica*, *K. quadrata* and *K. cohlearis* (Rotifera) and *Microcyclops varicans* and *Tropocyclops pracinus* (Copepoda). However, there is a distinct temperate region element in the Rotifera and Cladocera. *Eurycercus lamellatus* and *Diaphonosoma brachyurum* are certainly boreal species. In fact *Eurycercus lamellatus* has not been recorded in India before although it is known for Tibet (FREY, 1971) and Nepal (DUMONT & VAN DE VELDE, 1977). FERNANDO (personal communication) found it at Srinagar, Kashmir. The Rotifera are dominated by temperate region species of the genus *Keratella* and the genus *Notholca* which are absent or rare in tropical waters (GREEN, 1971; PEJLER, 1977). However, there are some typically tropical species like *Keratella tropica*, *Chydorus eurynotus* and *Moina micrura*. This mixture of species can be accounted for by the fact that the potamoplankton originates in calm waters throughout the river course from situations with temperatures varying from temperate to tropical conditions. The widely distributed eurytropic tropical Cladocerans, *Ceriodaphna cornuta* and *Diaphanosoma excisum* Sars; Rotifers, *Brachinous caudatus* Hauer, and *B. calyciflorus* Pallas and the Copepods, *Mesocyclops leuckarti* (Claus) and *Thermocyclops crassus* (Fischer) are all absent.

ACKNOWLEDGEMENTS

The author is indebted to Dr. H. SWARUP, Vice Chancellor, Jiwaji University, Gwalior (India) for guidance and Prof. C.H. FERNANDO, University of Waterloo, Waterloo, Ontario (Canada) for identification of some zooplankton and critically reviewing the manuscript and to University Grants Commission India for financial assistance.

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