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A preliminary study on fish food organisms in Thongjaorok river at Bishnupur district, Manipur, north east India

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Abstract : The importance of zooplankton in fish culture is not to be ignored as zooplankton assist in recycle of natural resources and degrade the waste materials for fish culture. The present paper reports on a collection of freshwater live fish-food organisms from the Thongjaorok River, a partially subterranean stream located in the Bishnupur District of Manipur, North East India during 2012-2013. The river lies in the intersection of 24o 30?N-24o 45?N and 93o 45?E- 93o 47?E. A total of 18 species belonging to three classes viz., Rotifera, Cladocera and Copepoda were identified. Phylum Rotifera was the most populous group represent by 6 genera viz Brachionus, Lecane, Mytilina, Keratella, Plationus and Euchlanis reported. Class Copepoda was represented by 3 genera viz Neodiaptomus, Eucyclops and Mesocyclops and Class Cladocera represent by one genera viz Moina.

Keywords: Fish food organism, partially subterranean river, Thongjaorok, Manipur, North-East India.

INTRODUCTION

The Thongjaorok river, located in the Bishnupur District of Manipur, North East India, is a freshwater hill stream originating from the western hill ranges and falling into the Loktak Lake. The river lies in the intersection of 24o 30?N-24o 45?N and 93o 45?E- 93o 47?E. During the rainy season, the current is torrential. During lean months, the river exists as an underground current beneath the rocky as well as sandy riverbed. The underground river also serves a very important source of potable water for the local people.

Zooplanktons are natural fish food organisms. They are considered as one of the most important linkage in aquatic food chain and so the importance of zooplankton in fish culture is not to be ignored . They assist in recycle of natural resources, to degrade the waste materials for fish culture, to decompose toxic substances such as ammonia, nitrate pesticides and herbicides , to established biogeochemical cycle, to establish food chain and food web are some of the significant importance of micro-invertebrates. Different types of natural food forms a definite relationship among themselves in an aquatic ecosystem. This relationship describes how energy and nutrients pass from organism to organism. Energy is locked into food by plants (mainly phytoplankton) and then transferred to primary consumers (mainly zooplankton and bottom fauna) and ultimately consumed by fish (secondary consumer). No work has been reported on the zooplankton fauna from this water body. So the main objective of this study is to determine the diversity of fish food organisms particularly zooplankton from Thongjaorok river.

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MATERIALAND METHODS

Materials for the present study were collected during 2012 to 2013 from Thongjaorok river maril, of Bishnupur district, Manipur Northeast India. The rotifer collection was done at monthly intervals. Plankton samples were collected following the methods described by Edmondson

(1959), Michael (1964), Michael (1984) and APHA (1991). Identification of rotiter specimens were done following Edmondson (1959), Patil and Gouder (1989), APHA (1991), BATTISH (1992), Nogradyet al (1993), Segers (1995), Sharma (1999), and Khan (2003). Segers (2002) was followed regarding classification and nomenclature of Phylum Rotifera.

Microscope observations of preserved samples were done using Fisher-Scientific Micromaster Stereo zoom microscope with computerized inbuilt CCD camera and image capture software.

RESULT AND DISCUSSION

Systematic list of the identified species from Thongjaorok river: Eighteen different species of zooplankton belonging to three classes Rotifera, Cladocera and copepod were identified.

Rotifera

Order: Ploima

Family: Brachionidae

1. ***Brachionus angularis*** (Gosse, 1851)
2. ***Brachionus urceolaris*** (O.F. Muller, 1773)
3. ***Brachionus calyciflorus*** (Pallas, 1766)
4. ***Brachionus falcatus*** (Zacharias, 1898)
5. ***Brachionus quadridentatus*** (Hermann, 1783)
6. ***Brachionus ruben*** (Ehrenberg, 1838)
7. ***Keratella tropica*** (Apstein, 1907)
8. ***Plationus patalus*** (Muller, 1786)

Family: Euchlanidae

9. ***Euchlanis dilatata*** (Ehrenberg,1832)

Family: Lecanidae

10. ***Lecane papuana*** (Murray, 1913)
11. ***Lecane (Monostyla)*** bula (Gosse 1851)
12. ***Lecane (Monostyla) quadridentata*** (Ehrenberg, 1830)

Family: Mytilinidae

13. ***Mytilina ventralis ventralis*** (Ehrenbergh, 1832)
14. ***Mytilina mucronata*** (O.F. Muller, 1773)

Cladocera

Family: Moinidae

15. ***Moina sp.***

Copepoda

Family; Diaptomidae

16. ***Neodiaptomus schmackeri*** (Poppe & Richard, 1892)

Family: Cyclopoidae

17. ***Eucyclops agilis*** (Koch, 1838

18. ***Mesocyclops leukarti*** (Claus, 1893)

Systematic account

1. ***Brachionus angularies*** (Gosse, 1851)

Brachionus angularies Gosse, 1851, p. 203; Ahlstorm, 1940, p. 154, Pl. 5, figs. 10 19.

Material examined : 2 exs., 8-6-12, Coll. Bimola M.

Description : Lorica slightly stippled with a pattern of cuticular plates on the dorsum. Anterior dorsal margin with two short median spines. Foot opening with U shaped aperture. Posterior spine absent.

Measurement : Total length 99.3-110.1 µm, width 70-98 µm.

Distribution : West Bangle, Assam, Orissa, Andhra Pradesh, Madhya Pradesh, Delhi, Kashmir, Maharashtra, Punjab, Haryana, Chandigarh and Manipur. Elsewhere: Pantropical and subtropical.

2. ***Brachionus urceolaris*** (O.F. Muller, 1773)

Brachionus urceolaris O.F. Muller, 1773, p.131: Ahlstrom, 1940, p. 171. Pl. 16, figs. 1-11.

Material Examined : 1 ex., 6-2-13, Coll. Bimola M.

Description : Lorica oval moderately compressed dorso- vevtrally and rounded posteriorly. Anterior dorsal margin with six acute spines. Median spine longest, lateral and intermediate are almost equal in length. Four inner occipital spines with strengthening ridges.Posterior spines absent. Foot opening almost rectangular dorsally but semi circular ventrally.

Measurement : Total length 66.1 um-70 um; maximum width 73.1-79.2 um.

Distribution : Manipur, Madhya Pradesh and Punjab. Elsewhere: Cosmopolllitan.

3. ***Brachionus calyciforus*** (Pallas, 1766)

Brachionus calyciforus Pallas,1766, Hagae Comitum., p. 93.

Material Examined : 2 exs, 24-6-12, Coll. Bimola M.

Description : Lorica is globular in outline and not flexible,not separated into dorsal and ventral plates. Anterior occipital margin with four braod- based spines of variable length.Median spines are longer than the laterals. Ventral margins are flexible with a V-shaped notch. Posterior spines present or absent and usually of variable length. Postero-lateral spines present or absent.

Measurement : Total length 180-183 um, maximum width 160-162 um.

Distribution : India: West Bangle, Orissa, Andhra Pradesh, Punjab, Manipur. Elsewhere: Cosmopolitan.

4. ***Brachionus falcatus*** (Zacharias, 1898)

Brachionus falcatus Zacharias, 1898, p.45, taf. IV, fig.4; Ahlstrom 1940, p. 164, pl. 10, figs. 1-3.

Material Examined : 1 ex., 24-8-12, Coll. Bimola M.

Description : Lorical rigid, dorso-ventrally compressed. Occipital margin with six spines. The lateral and median spines are shorter than the intermediate, which is longest and curved inwardly and widely separated basally.

Measurement : Total length 250-260 um; maximum width 104-112um

Distribution : West Bangle, Assam, Orissa, Bihar, Andhra Pradesh, Madhya Pradesh, Gujarat,Kerala, Rajasthan, Punjab, Haryana and Manipur. Elsewhere: Pantropical and subtropical.

5. ***Brachionus quadridentatus*** (Hermann, 1783)

Brachionus quadridentatus Hermann, 1783 p.47, pl.II, fig.9; Ahlstrom,1940, p.165, pl.10, fig.9.

Material Examined : 1 ex., 28-8-12, Coll. Bimola M.

Description : Lorical rigid, stippled and moderately compressed. Anterior dorsal margin with six occipital spines, unequal in length. Median longest with V-shape notch at the base and outwardly curved, lateral longer than intermediates. Ventro-posterior spine prolonged to fotm a foot sheath around the foot, (Foot sheath not prolong into long spines.

Measurement : Total length 221.8-225.9 um; maximum width 139.3-142.5 um.

Distribution : West Bangle, Assam, Orissa, Andhra Pradesh, Madhya Pradesh, Kerala, Rajasthan, Punjab, Kashmir, Ladak, Manipur. Elsewhere: Cosmopolitan.

6. ***Brachionus ruben*** (Ehrenberg, 1838)

Brachionus ruben Ehrenberg, 1838 p.513, pl. LXIII, fig.4; Ahlstrom, 1940, p.170, pl.15, figs. 1-9;

Material Examined : 2 exs., 4-9-12, Coll. Bimola M.

Description : Lorica oval, firm and compressed dorsoventrally. Anterior margin with six occipital spines (with saw toothed). Median occipital spine longest; median and intermediate occipital spines with peculiar unsymmetrical shape- each spine showing a narrow anterior part, then surrounding outwards and forming a broad base. Four inner occipital spines with short strengthening ridges.

Measurement : Total length 157.5-160.5 um; maximum width 136.8-139.9 um.

Distribution : India- West Bangle, Assam, Orissa, Rajasthan, Manipur. Elsewhere: Cosmopolitan.

7. ***Keratella tropica*** (Apstein, 1907)

Aurea valga f. tropica Apstein, 1907 p. 210, fig. F.

Keratella tropica (Apstein): Berzins, 1955 p. 554.

Material Examined : 1 ex., 5-4-13, Coll. Bimola M.

Description : Lorica elongated-oval and devided into adorsal and ventral plate; six anterior occipital spines; median occipitals longest, pointed and outwardly curved. Dorsal plate with three median hexagonal plaques and a small squarish area between the last and median plaque and posterior margin of the lorica. Posterior spines distinctly unequal in length, the right spine generally longer than the left.

Measurement : Total length 168.5 um-173.4 um, maximum width 61 um-64.7 um.

Distribution : India- West Bangle, Assam, Bihar, Orissa, Andhra Pradesh, Madhya Pradesh, Kerala, Gujarat, Rajasthan, Punjab, Haryana, Kashmir, Ladak, Manipur. Elsewhere: Tropic and subtropic.

8. ***Plationus patulus*** (Muller, 1786)

Brachionus patulus Muller,1786, p.361,Taf. XL VII, figs. 14, 15; Koste, 1978, p. 69, T.8:1, 2a, 3,6.

Material Examined : 1 ex., 5-6-13, Coll. Bimola M.

Description : Lorica sub-rectangular and firm, compress dorsoventrally. Occipital spines with 10 pronounce spines- four projected dorsally, another four from ventral and two from lateral side. Median spine longer than other.Posterior spine short, stout and unequal in size.Foot opening flank by two short spines different in shape and position.

Measurement : Total length 142 um-150.2 um; maximum width 102.8-106.2 um.

Distribution : India- Orissa, Andhra Pradesh, Gujarat, Tamil Nadu, Kerala, Rajasthan, Punjab, Kashmir and Manipur. Elsewhere: Cosmopolitan.

9. ***Euchlanis dilatata*** (Ehrenberg,1832)

Euchlanis dilatata Ehrenberg, 1832, p.131, pl.4, fig;Voigt, 1957, p. 172, Taf. 28: fig.2, 7, Abb. 16,g.

Material Examined : 2 exs., 28-6-13, Coll. Bimola M

Description : Lorica oval and flexible. Dorsal plate usually arched and wider than the ventral plate. Toes sword shaped parallel-sided and with pointed tip.

Measurement : Total length 214-219.5um maximum width 175 um-185.2 um

Distribution: India- West Bangle, Assam, Meghalaya, Orissa, Gujarat, Punjab, Ladak, Kashmir and Manipur. Elsewhere: Cosmopolitan.

10. Lecane papuana (Murray, 1913)

Material Examined: 3 exs. 26-2-13, Coll. Bimola M.

Description: Lorica broadly oval, antero-dorsal margin straight, median sinus flanked by undulating sides. Ventral plate slightly narrower than the dorsal plate. Toes moderately long, parallel sided and terminating into small claws.

Measurement: Total length 61 um- 67.2 um; maximum width 63.1 µm-69 µm.

Distribution: India- Assam, Tripura, Nagaland, West Bengal, Orissa, Tamil Nadu, Kashmir, Bihar, Ladakh and Manipur.

Elsewhere: Tropicopolitan.

11. *Lecane (Monostyla) bulla* (Gosse1851) .

Monostyla bulla Gosse1851, p. 200. .

Material Examined: 1 ex., 27-10-12, Coll. Bimola M.

Description: Lorica firm, elongated and ovate; anterior dorsal margin with a shallow sinus, anterior ventral margin with a deep U- shaped notch. Ventral plate equally broad or slightly narrower than dorsal. Toe long with a pointed claw which bear distinct median line but not divided.

Measurement: Total length 134-150.2 µm-120-135 µm

Distribution: India- West Bengal, All state of North-East India, Orissa, Andhra Pradesh, Tamil Nadu, Rajasthan, Gujarat, Punjab and Kashmir. Elsewhere: Cosmopolitan.

12. *Lecane* (Monostyla) ***quadridentatus*** (Ehrenbergh, 1832)

Material Examined: 1 ex., 27-10-12, Coll. Bimola M.

Description: Lorica ovate to pyriform, anterior dorsal margin with two out-curved spines. Ventral margin with a V-shaped sinus and its external angles produce into minute spines. Toe long and parallel-sided. Claw pointed with two distinct basal spicules.

Measurement: Total length 138-151.2 µm-121-133 µm.

Distribution: India- All state of North-East India, Orissa, Bihar, Andhra Pradesh, Madhya Pradesh, Rajasthan, Punjab, Haryana and Kashmir.

Elsewhere: Cosmopolitan.

13. Mytilina ventralis ventralis (Ehrenbergh, 1832)

Salpina ventralis Ehrenbergh, 1832 p.133, pl. 4, fig.7.

Mytilina ventralis Ehrenbergh: 1913 Harring b, p. 75.

Material Examined: 1 ex. 7-11-12, Coll. Bimola M.

Description: Body cylindrical, heavily loricate and laterally flattened, antero-ventral corners with a spine on each side. Postero-ventral and Postero dorsal short and variable; toes two and moderately long.

Measurement: Total length 186.7 um-196 um; maximum width 84.7 um-91 um.

Distribution: West Bangle, Assam, Orissa, Andhra Pradesh, Madhya Pradesh, Gujarat, Kerala, Rajasthan, Punjab, Kashmir, Ladak, Manipur. Elsewhere: Cosmopolitan.

14. *Mytilina mucronata* (O.F. Muller, 1773)

Mytilina mucronata (O.F. Muller, 1773); De Ridder; XI (4): 1-191, 1981.

Material Examined: 1 ex., 10-11-12, Coll. Bimola M.

Description: Body cylindrical and heavily loricate. Lorica with double dorsal keel and with spine in all four corner; spine at times completely or partially reduce; toes thin and slender.

Measurement: Total length 164 um-175.1 um; maximum width 76 um-82 um.

Distribution: India- Manipur.

15. *Moina sp.*

Material Examined: 2 exs., 28-6-12, Coll. Bimola M.

Description: Head depressed, antennules attached to ventral convex part of head. Supra ocular depression well defined; valves more o less oblong, ending bluntly posteriorly, slightly flattened laterally and faintly marked. Shell with bristles confined to anterior part of ventral edge.

Measurement: Body length 1.2-1.12 mm.

Distribution: Rajasthan, Punjab and North-East India.

16. ***Neodiaptomus schmackeri*** (Poppe & Richard, 1892)

Neodiaptomus schmackeri Poppe & Richard. 1892, Bull. Soc. Zool., Fr. 17: 149.

Material Examined: 2 exs., 12-3-13, Coll. Bimola M.

Description: Body robust with anterior proximity rounded off at its tips. Urosome three segmented. Genital segment largest and second segment smallest of all.Caudal remi symmetrical. First antennules consist of twenty five segments. Margin of claws are highly chitinised.

Measurement: Body length 0.55-0.75 mm.

Distribution: West Bengal, Manipur, Tamil Nadu. Elsewhere: China.

17. ***Eucyclops agilis*** (Koch, 1838)

Cyclops agilis Koch, 1838.

Material Examined: 3 exs., 28-8-12, Coll. Bimola M.

Description: Antennules reach beyond the posterior margin of the cephalothorax. Fifth leg bears three terminal spines. Denticles on the outer margin of the caudal ramus. The first antennule has 12 segments.

Measurement: 0.63-0.72mm.

Distribution: Manipur, Elsewhere: Cosmopolitan.

18. ***Mesocyclops sp.***

Material examined: 2 exs., 28-8-12, Coll. Bimola M.

Description: Body cyclopiform with podoplean division into prosome and urosome. Antenna with single outer seta on basis, representing exopod. Mandible with palp reduced to three setae on small papilla. Maxilluli with large and well developed arthrite, palp small. Legs 1-4 biramous, with three segmented rami; third ex-opodal segments of legs with only two outer spines.

Measurement: Total length 0.80-0.93mm.

Distribution: West Bangle, All state of North-East India, Orissa, Tamil Nadu, Mysore, Maharastra, Punjab Jammu and Kashmir.

Elsewhere: Africa and South America

1. *Brachionus angularis* (Gosse,1851)

2. *Brachionus urceolaris* (Muller,1773)

3. *Brachionus calyciflorus* (Pallas, 1766)

4. *Brachionus falcatus* (Zacharias, 1898)

5. *Brachionus quadridentatus* (Hermann, 1783)

6. *Brachionus ruben* (Ehrenberg 1838)

7. *Keratilla tropica*
(Apstein, 1907)

8. *Plationus patulus*
(Muller,1786)

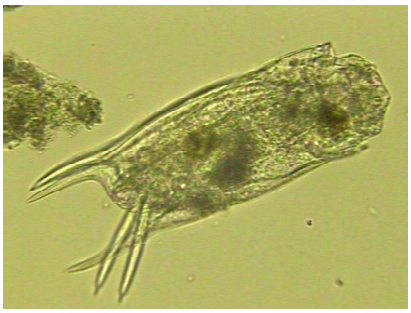
9. *Euchlanis dilatata*
(Ehrenberg 1832)

10. *Lecane papuana*
(Murray, 1913)

11. *Lecane bulla*
(Gosse, 1851)

12. *Lecane quadridentata*
(Ehrenberg, 1832)

Mytilina ventralis
(Ehrenberg, 1832)



Mytilina mucronata
(O.F. Muller, 1773)

Neodiaptomus schmackeri
(Poppe & Richard, 1892)

21.Eucyclops agilis
(Straus, 1820)

Mesocyclops sp

Moina sp.

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