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Morphometric and Qualitative Analysis of Cladocera (Zooplankton) Communities in Upper Morna Reservoir, Medshi, District – Washim, Maharashtra

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Abstract: ***In present investigation was taken from the Upper Mona Reservoir located at Medshi, at Malegaon taluka, District - Washim in Maharashtra. From this reservoir study of different zooplankton were studied. Total 53 species and 29 genera of zooplankton that are encountered during the study year 2012 and 2013 in which total 9 species of Cladocera were found in 7 genera and 5 families. Cladocera were found more in summer than monsoon and winter. In Cladocera Chydorus species, Alona species, Daphnia and Moina species were recorded, among them Alona sp. Daphnia sp. and Moina sp. were most abundant.***

Keywords: Cladocera, Medshi, Upper Morna Reservoir, Washim, Zooplankton

1.Introduction

The Upper Morna Reservoir is located in a small village called Medshi, until now the study on that reservoir is not done, which is use mainly for irrigation purpose, fishery purposes and some people use that reservoir for drinking and domestic use, therefore zooplankton are use as pollution indicator and indicating food chain therefore it is necessary to study them.

Cladocera found in all sorts of fresh water. The limonitic region of the inland lakes shows large number of Cladocera species but do not show richness in species. The order Cladocera belongs to sub-class Brachiopoda and includes micro zooplankton ranging from 0.2 to 3 mm in size. They are commonly known as 'water fleas' because most of them move through water with series of hops and jumps. They characterized by presence of large compound eyes and smaller acellus. Head are also the brain**,** optic ganglion with numerous nerves to eye, and some shows digestive tract, legs, abdominal spines, setae and antennal parts are used to differentiate them.

Morphology:

A typical cladoceran body is divided into distinct head, thorax, abdomen and post-abdomen and is covered by a bivalve cuticular carapace. The outline of carapace may look either oblong or oval or quadrangular, that is it shows different carapace in different species. Cladoceran shows a unique morphological feature i.e. carapace is ventral surface architecture; some has poly or hexagonal markings on the body. The shells are marked with district pattern of penta or polygon and in some species dorsal surface is covered with soft stiff setules forming velvet like coating.

Compound eye and Ocellus:

The light sensitive organ in Cladocera consists of a large compound eye and a small ocellus. The presence of ocellus, its size and shape and location with reference to the eye and rostram are of taxonomical value. Ocellus is also different in different species, For example, in Simocephalus acutirostatus the ocellus is small and punctiform. Large and elongated ocellus is present in S. ventilus. In Alona rectangular the ocellus is as large as the eye.

Antennule (First Antenna):

In all cladocerans head bears antennules and antenna. The antennules are a simple structure bearing olfactory or sensory setae laterally or terminally. Different families of Cladocera are shows different types of antennules.

Antenna:

In cladocerans the biramus second antenna is the largest and functions as the primary locomotary appendage. The number of segments in each ramus, arrangement and the number of setae are of taxonomic importance.

Mouth appendages:

In cladocera the mouth parts consisting of a median labrum are well developed in Macrothricidae and Chydoridae and are taxonomically important. There is pair of hard and stout teethed mandibles and maxillae.

Rostrum:

In cladocera rostrum which is situated between antennules, it is the structure where mouth is elongated into beak like structure. Their sizes are also taxonomically important.

Conspicuous absence of rostrum is characteristic of the some genera. The rostrum is long in Pleuroxus and short and blunt in Alonella.

Fornix and Vertex:

There is a ridge above the point of insertion of antenna strengthening both antenna and head. The anterior most part of head in front of the eye is called Vertex. Both fornix and vertex are important in taxonomical studies. Some species shows supraocular depression just above the eye. This depression is caused by the attachment of bundle of muscles to the inner surface of the flexible exoskeleton. At the junction of head and body a depression called cervical depression is noticed in some members of Cladocera.

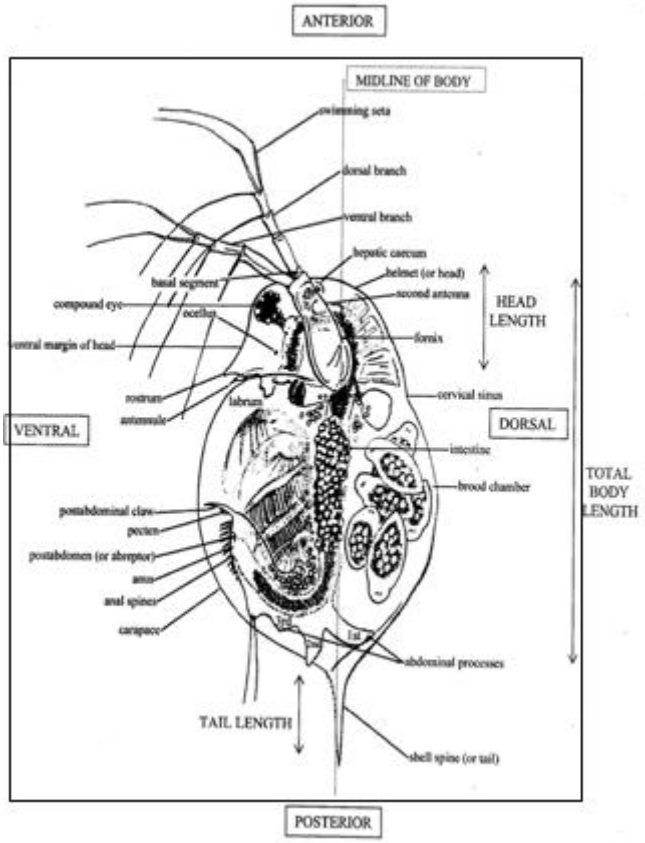


Figure 1: General anatomy of a Cladocera (modified from Dalton and Frey, 1991)

2.Review of Literature

Padate et al., (2014) studied seasonal variations in density of total microcrustacean for two years of investigation and reported 15 species of microcrustaceans belonging 30 genera which include Cladocera (9 species) and Copepoda (6 species) in high altitude, Lotus lake. Gadekar et al., (2014) investigated 25 genera belonging to five major groups Protozoa (6 genera), Rotifera (5 Genera), Copepoda (6 genera) and cladocera (5 genera) and Ostracoda (3 genera) in Pangdi lake, Gondia, District Gondia, Maharashtra. Chavan and Dhamani (2011) Studied Biodiversity of zooplankton community in Wainganga River Bramhapuri, District Chandrapur (MS), India, they recorded 41 species, consisting of Rotifera (15), Cladocera (21), Copepoda (4) and Ostracoda (1). Pradhan (2014) reported Zooplankton populations which are Rotifera, Cladocera and Copepoda in Wunna Lake. Kolhe and Shinde (2014) studied monthly variation in distribution and diversity of Cladocera population in Godavari river water; they reported 6 species of Cladocera belonging to 6 different families and genera.

3.Materials and Method

The Cladocera are large species than that of rotifer species therefore live animal observed with help of dissecting microscope. The characteristics jerky movement was observed with the motion showing locomotary appendages or Oars. The movement of second Antenna, which are the locomotary appendages were observed.

The individual Cladocera was captured by large Bore plastic pipette due its rapid action .A wet mount of a single specimen using a cover slip with wax feet were prepared, due its large size they required thick feet to support the cover slip. The slide was observed on compound microscope and setae were examined with 40x and 100x as per requirement.

For the identification of daphnids, the setae formula is used as the number of setae at the end of the articles of two rami of the antenna. The formula gives the upper ramus first then the lower. For each ramus the proximal article are given first i.e. an animal with the setal formula 1,1,4,5/0, 1,3 has the upper ramus, 1setea at end of first article , 1 seta at end of second article and 4 for the third article and fifth for fourth article. The lower ramus is read in the same manner.

Samples collected monthly from four different sites of reservoir during two yeas study 2012 and 2013 by towing Nylon plankton Net of mesh size 25u. This net used repeatedly operated to get concentrated samples. Large common organisms like aquatic insects, crustacean larva and tadpole larva were removed by forceps. Concentration of samples was done by using a bore cut wide syringe with fine mesh size netting fitted on mouth. The water sieved inside the tube of syringe without piston is dipped in the inserting the piston in the tube of syringe is poured away so as to prepare a data searching was done for identification of new species. These concentrated samples were collected in sampling bottles indicating name of the sampling site i.e. S1, S2, S3, S4 date and time of sampling. Identification was carried out by standard literature of Edmonson (1959).

4.Result and discussion

Total 9 species of Cladocera was found in 7 genera and 5 families. Cladocera were found more in summer than monsoon and winter. Numbers of cladocera were more in April and May, minimum in the month of July in 2012 and 2013. In Cladocera Chydorus species, Alona species, Daphnia and Moina species are recorded, among them cladocera Alona sp. Daphnia sp. and Moina sp. were most abundant.

Abundance and dominancy of Cladocera shown in **Graphplate I (figure no.2).** Seasonal fluctuation in number of species of Cladocera shown in **Graphplate II (fig no. 3**). Total nine Cladocera species shown in **Photoplate of Cladocera.** Total nine species of Cladocera with their five families are shown in following table asgiven below.

CLADOCERA
FAMILY- I: CHYDORIDAE,
Dunhevedia crassa
Chydorus ovalis.
Chydrous cf.hermanni.
FAMILY-II: ALONIAE
Alona affinis
Alona karua
FAMILY-III:DAPHNIIDAE
Daphnia schodleri
Ceriodaphnia species
FAMILY- IV: MOINIDEA
Moina micrura
FAMILY-V- MACROTHRICIDAE
Macrothris goeldil

In present study due to favorable temperature and availability of food like suspended detritus, bacteria and nanoplakton the abundancy of Cladocera increases. Similar result recorded by Raut et al., (2012) they found Cladocera dominated in summer season over other zooplankton. Gadekar et al., (2014) also found that Cladocera were minimum in Monsoon but they recorded that maximum cladocera found in winter. In monsoon season the physico-chemical factor like dissolved oxygen, temperature, turbidity, transparency also play an important role to controlling the density and diversity of Cladocera (Edmonson, 1965). The Cladoceranes are primary consumers which feed on algae and fine particulates thus it influence the energy of food chain and cycling matter in the detritus by Sitare, (2013). In Cladocera Alona karua, Alona affinis Moina micrura, and Daphnia species shows dominancy and abundance. The abundance of Cladocera among zooplankton shows increases in summer season and minimum in monsoon this variation in population was due to favorable conditions like temperature, can be correlate with water level, and density and biomass of Cladocera is primarily determined by food supply and favorable/unfavorable environmental condition. (Kolhe and Shinde, 2014).In summer season occurrence of fewer predators may be the reason for higher density of Cladocera (Shivashankar and Venkataramana, 2013).

Graphplate-I

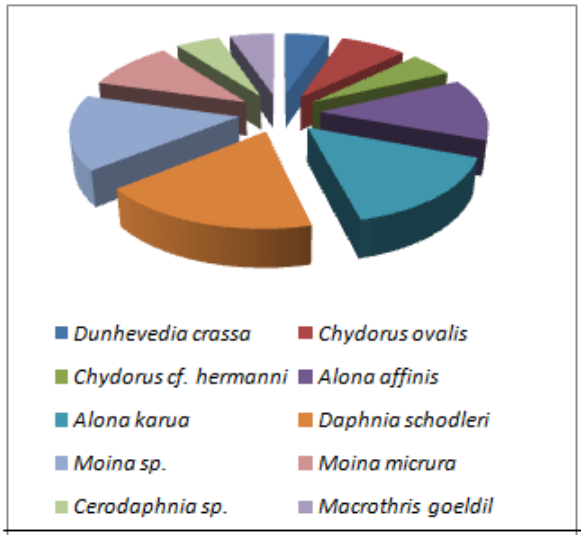


Figure 2: Pie diagram Shows dominancy and abundance of Cladocera Species.

Graphplate-II

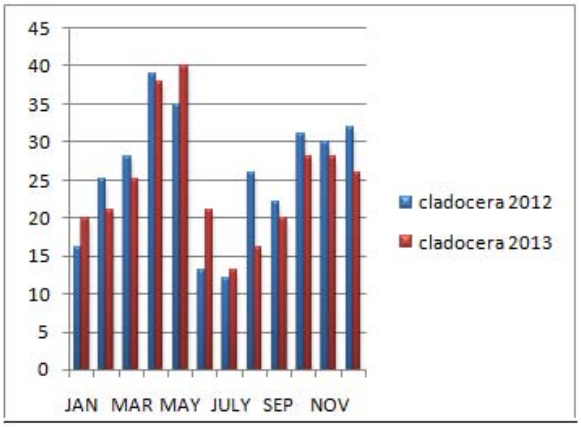


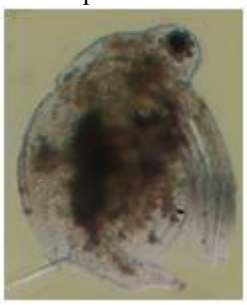
Figure 3: Seasonal variation in number of species of Cladocera in 2012-2013

Cladocera Photoplate

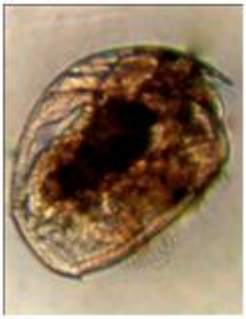
Dunhevedia crossa

Alona karua

Ceriodaphnia reticulate



Chydorus ovalis

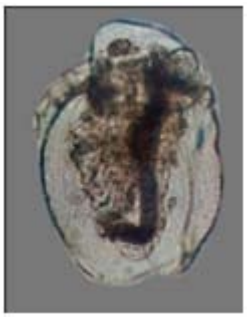


Moina micrura

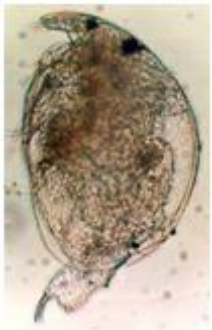
Daphnia Catawba

Macrothris goeldil

Chydrous cf.hermanni.



Alona affinis



5.Conclusion

The abundance of Cladocera among zooplankton shows increases in summer season and minimum in monsoon and winter. Among Cladocera, Alona sp. Daphnia sp. and Moina species were most abundant species recoded during this study. It is most important to study that for food chain reaction in zooplankton study.

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