BIOLOGY OF CLADOCERA IN AN ALTITUDINAL LAKE AND THE PONDS OF SHILLONG AREA

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ABSTRACT

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As a group the Cladocera constitute one of the important biological components of the aquatic ecosystems, forming at times a major fraction of freshwater plankton. The cladocerans are important fish-food organisms that appear naturally in freshwater habitats.

Indian studies on Cladocera was initiated by Baird (1860) since when sporadic works dealing with faunistic records of different species appear in the literature. Studies on the biology of Cladocera have been indeed, fragmentory even till todate, and this is all the more true of the North Eastern Hill Regions of India. The only available report from this region is the recent faunal list by Patil (1976).

Shillong (Lat. 25°5' E, Long. 91°9'N), a small town of the North Eastern Hill Region of India is situated on a plateau at an altitude of 1600 m above the sea level. Further, its location being within about 50 Km from Maushinram - the highest rainfall area of the world - has a luxurient vegetation with humid climate which lends interesting scope for ecobiological studies. The present work is therefore, an attempt to investigate in as much detail as possible the biology of the available species in the Shillong area. Also emphasis have been given to relate the field information to laboratory findings in order to obtain a more comprehensive understanding of the basic life history patterns.

The present study comes under three major parts viz., (i) seasonal survey of the Cladocera and their environment, (ii) ecology and biology of the natural populations of Cladocera and (iii) laboratory life cycle studies of a few chosen cladoceran species. In addition to these, the present trends in cladoceran research have been outlined in the preface followed by a detailed review of available earlier literature.

In Part-I, results of a survey conducted through an entire annual cycle at two-month intervals have been furnished. The surveyed impoundments were of both temporary as well as permanent nature. Hydrographical features, associated vegetation and physicochemical properties of each impoundment have been studied with a view to relate these to the occurrence and diversity of the cladoceran species. A total of 23 species belonging to six cladoceran families was recorded which adds 9 more species to the earlier record of 14 species (Patil 1976). Chydoridae was the dominant group while Daphnidae formed the second highest group in terms of species number.

Dominance of littoral species has been noted and discussed. The faunal record has been compared with those from other parts of India. Species diversity appeared to be related to morphometry of the impoundment while physicochemical properties did not show any significant relationship.

Possibilities of accidental seeding of cladoceran species has been discussed.

In Part-II, the field populations of cladoceran species have been studied at weekly intervals in three selected habitats for a total duration of 18 months. Of these, one was a permanent recreational pond with good number of fish, another a comparatively big pond with aquatic birds kept under captivity, while the third, a small cemented nursery pond. Hydrographical features, vegetational association, physico-chemical properties as well as biological properties which included different groups of phytoplankton, zooplankton and associated organisms have been studied for the entire period of 18 months and the results discussed. A moderate level of organic pollution was observed in the recreational lake and in one pond and the causes were speculated.

The occurrence and seasonal distribution of the various cladoceran species encountered have been investigated and discussed in detail for each individual species. Maximum species diversity was recorded in the largest system. Numerical density of different species differed in the six sampling stations, though a certain degree of similarity existed among them. Causes for this variation have been discussed.

Size group analysis of selected species of Cladocera have been made. Distribution of different size classes during

the annual cycle did not exhibit any definite trend. However, appearence of more specimens with empty brood pouch generally coincided with period of low population density. Number of eggs/brood was more in daphnid species, while the bosminid contained much lower egg number which has been discussed. Occasional appearence of one egg in the chydorid species was noted and discussed. Gamogenetic females with ephippium were also recorded, though males were not encountered.

Part-III deals with the laboratory life cycle studies of two daphnid species, Daphnia lumholtzi and Simocephalus exspinosus, a moinid, Moina micrura and the chydorid, Alonella excisa . Also life cycle studies were conducted on the male of Daphnia lumholtzi. This study included the instar analysis, total life span, pattern of growth, egg/brood in different instars and the rate of egg production. Longest life span was recorded in the chydorid species which also produced the maximum number of broods. Simocephalus exspinosus produced the largest brood and also showed the second highest value for the rate of egg production so far recorded among Indian species of Cladocera. These findings have been compared with relevant reports from India and elsewhere. The studies on the life cycle of the chydorid Cladocera and the male of daphnid are the first Indian reports on the chydorid as well as male cladocerans in general. Lastly, comparisons have been made between field populations and laboratory data and a detailed discussion has been presented.