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BIOCHEMICAL COMPOSITION AND THE NUTRITIVE VALUE OF ZOOPLANKTER OF A FRESH WATER LAKE (VELACHERY)

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The biological analysis of three principal metabolites was carried out in the zooplankter collected from Velachery lake, Chennai. Protein contents remained high, when compared to carbohydrates and fatty acids. The organic matter formed by these plankter may be responsible for the viability of the above lake ecosystem.

Mostly prawn and fish species depend on zooplankter at some stage or other during their life-span. Some feed exclusively on zooplankter during their entire life cycle. They also constitute a source of protein, carbohydrates, aminoacids, lipids, fatty acids, minerals and enzymes. They could even represent an inexpensive ingredient to replace the expensive feed and an alternative to more expensive brine shrimp. In western countries, a number of chemical analysis have been made on the plankter to determine their actual nutritive value. Birge & Juday (1922) found that certain fresh water copepods varied considerably in their chemistry. Few studies have been carried out on the chemical composition of zooplankter to find their suitability as food in aquaculture. Kibria *et al.* (1997) clearly indicated the average protein content of copepods and cladocerans. In addition, seasonal studies on the biochemical composition of zooplankter with reference to protein, lipid and carbohydrates have also been made (Fisher, 1962; Curl, 1962a; Raymont et al., 1964). Studies on south Indian planktonic biochemical aspects are, however, very meagre. In the present study, total protein content, carbohydrates such as pentose, hexose and their protein-bound counterparts, fatty acid and water content were determined in the pelagic water planktonic organisms collected from a fresh water lake as a preliminary work.

Material for this investigation was mainly obtained from a fresh water lake situated near Velachery about 7 km from the laboratory (Chennai). They were collected by using plankton net. The collections were restricted to the early hours of the day. The stock specimens included such species as Mesocyclops, Daphnia and Moina. They were acclimated for a minimum period of 24 hrs prior to the analysis as suggested by Latimer *et al.* (1975). From the stock specimens 100 mg of plankter were weighed and ground well and centrifuged for the biochemical analysis. Total protein content was determined by Lowry *et al.* (1951) method. The total free carbohydrates present in the planktonic extract was estimated by phenol-sulphuric acid method of Dubois *et al.* (1951). For pentoses O.D. value was taken at 480 nm and for hexoses at 490 nm. Protein-bound sugar was also determined according to phenol-sulphuric acid method (Dubois *et al.*, 1951). Estimation of free fatty acids was made by Duncombe method (1963). Water content of the plankter was estimated by gravimetric method (Ramalingam *et al.*, 1980). The concentrations of metabolites aregiven in the Table I. The copepods are reported as the dominant and most abundant forms among marine and fresh water zooplankter. Hence, they are of major ecological significance in the dynamics of nutrient and energy fluxes in the aquatic food-webs (Hart, 1990). They also represent as an excellent food of high nutritional value for zoo planktivorous fishes and shrimps (Watanabe *et al.*, 1983; Bulkowski *et al.*, 1985; Kraul *et al.*, 1991). Indirectly the plankton is of very great value to man because of its basic place in general food cycle of aquatic environments. Man has seldom in the past, thought of using the plankton directly for his own nutrition. In the orient regions, Japan and China, people used to feed the planktonic organisms such as scyphozoa jelly fish, *Rhopilema esculenta* and *R. verrucosa*. They are eaten more as pickle or appetizer than

Table I : Biochemical composition of the freshwater zooplankter.

Parameters	Mean	SD
Total protein (µg/100mg wet tissue)	140.33	5.81
Total carbohydrate (µg/100mg wet tissue		
Pentose	0.093	0.02
Hexose	0.100	0.01
Ketose	0.013	0.01
Protein bound sugar (µg/100mg wet tissue)		
Pentose	0.103	0.01
Hexose	0.068	0.01
Free fatty acid (µg/100mg wet tissue)	0.015	0.01
Water content	93.5%	1.87

$p = 0.05$

as the primary basic food. In northern China, a shrimp-paste is being made from the plankter and used as a supplementary proteinaceous food. In addition to their use as a preferred live feed in aquaculture, copepods have enormous potential to be used by man in many ways. For instance they have already been used as a source of food by the shipwrecked persons (Dussart & Defaye, 1995). They are also employed as biocontrol agents in the eradication of mosquito larvae in the lentic habitats (Riviera *et al.*, 1987; Lardeux, 1992).

In the present study, results revealed higher protein content in the plankter among the metabolites analysed. The investigations of Juday (1943) also showed a high content of protein in the plankter of the lakes he studied. The present observations also show similarity to marine zoo plankter in which also higher protein value was reported. However, it is a matter of practical interest to inquire whether there is sufficient plankton in the water to provide an economical yield in any proposed commercial operations as has been suggested by Clarke (1939). The results of the present study in sum revealed that, the plankton may form as an alternate food material since it contains all the biochemical metabolites like protein, carbohydrate, protein-bound sugar and fatty acids which are essential for all the metabolic activities. It is also of interest to note that the summation of protein, lipid and carbohydrates of zoo plankter mass constitute the organic matter and organic carbon which have a direct bearing in aquaculture productivity, as most of these forms constitute the food for shrimps. The results also revealed that carbohydrate content of zoo plankter remained as different classes such as pentoses, hexoses, ketoses and their protein bound counterparts. As compared to proteins and carbohydrates, the value of total fatty acid seemed to be very low. Hence the suggestion that the zoo plankter could also be included in the food habit of human (Dussart & Defay, 1995) seems to be justifiable since the high caloric but risky animal fat content is very meagre in these zoo planketer. The same view holds good for aquaculture productivity also.

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