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FEEDING ECOLOGY OF *CHIRONOMUS* LARVAE (INSECTA: DIPTERA) COLLECTED FROM DIFFERENT HABITAT OF DHAKA, BANGLADESH

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Abstract: Chironomid larvae are frequently available in the muddy habitats of Curzon Hall campus of University of Dhaka. The larvae of single species of *Chironomus* (Insecta: Diptera) were collected from the drains and pond of the campus. Algae, fungi, diatoms, protozoan's, rotifers, animal parts (crustacean appendages, ostracodan shell, insect appendages), and detritus were found as the main food items of the larvae. Gut content analysis showed a change in their feeding habits with seasons. The feeding intensity was maximum in spring just after winter. The feeding activity was lowest in winter. The variation in the diet may suggest that these groups showed a low degree of selectivity, having more generalist food selection habit.

Key words: Chironomid larvae, food habits, gut contents, ecology, Dhaka, Bangladesh

INTRODUCTION

A good number of insect's larva and pupa inhabitant of the ponds and wetlands of Dhaka city (Ameen and Nessa 1985). Aquatic insects can be easily recognized by their chitinous body with joint appendages and various growth stages. The midges (Diptera : Chironomidae) account for most common macro invertebrates in freshwater environment (Khan *et al*. 1997). Chironomid larvae are one of the most ubiquitous and usually the most common insect found in all types of freshwater, often attaining densities of many thousands per square meter (Pinder 1983). In four derelict ponds of Mymensingh this group constitutes of four species with an abundance of 340 to 1980 individual/sq meter and *Chironomous* sp. represented more than a quarter of the total number present (Sujjat-Al-Azad *et al*. 1982). They form a major constituent of benthic macro invertebrates (Hobbi 1973), play an important role in nutrient recycling of aquatic ecosystem, and are important as fish food (Bryce and Hobart 1972, Roback 1978).

Chironomids play an important role in the food webs of aquatic communities, representing a major link between producers and secondary consumers (Tokeshi 1995). Chironomid larvae are opportunistic omnivorous, ingesting a wide variety of food items (Cummins and Klug 1979). Rathore and Rama (1979) reported 27 species of algae from the gut of *Chironomous* from a river Kshipra of India. However the food and feeding ecology of *Chironomus* larvae is not known from Bangladesh.

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In this paper the natural food habits of Chironomid larvae from two different habitat in Dhaka, Bangladesh have been reported.

MATERIAL AND METHOD

The chironomid larvae were collected from two sites - one from the pond in front of the Department of Zoology at Curzon-Hall campus and another from the drainage system of Shahaidullah Hall, University of Dhaka. An Ekman Bottom dredger sampler was used to collect the bottom mud.

Chironomid larvae were sieved by means of Surber net (900 cm^2 area and 35 mm mesh size) during the month of February(summer), May (autumn), August (winter), and November (spring) of 2008. The sampled larvae were preserved in 70% alcohol. The identification was made up to generic level after Khan *et al*. (1997).

Gut content analysis was based on the observations of the gut contents of previously slide mounted specimens. The stomachs of Chironomid larvae were dissected and the contents of each gut were observed under a compound microscope (Olympus, Japan, 400x). All food items were identified following Ward and Whipple (1959). Upon dissecting each gut, the following methods were followed according to Hynes (1951) and Hyslop (1980).

Point method: An index of fullness of the gut was recorded by the point method. Irrespective of the size of gut of *Chironomus* , point was given score 0 for empty, 1 for ¼ full, 2 for ½ full, 3 for ¾ full, 4 for full gut.

Number method: The total number of individuals of each food items found in the gut of *Chironomus* was counted and expressed as the percentage of the total number of organisms found in all Chironomid larvae gut examined.

RESULTS AND DISCUSSION

In total eight species of green algae (*Chlorella, Ulothrix, Microcystis, Botryococcus, Crucigenia, Cloeastrum, Chaetophora* and *Protococcus)*, five species of diatoms (*Navicula, Bacillaria, Diatoma, Asterionella* and *Amphora*), three species of protozoans (*Clamydomonas, Euglena* and *Volvox*), one species of rotifer (*Brachionus*) and three types of animals parts (Crustacean appendages, Ostracodan shells and Insect appendages) and debris were observed in the gut of *Chironomus* sp. larvae.

By using point method the average index of fullness condition of the gut in given in Table 1. The feeding intensity was maximum in November (spring) followed by February (summer), May (autumn) and lowest in August (winter). Thus the feeding intensity was maximum in spring just after winter when the feeding activity was the lowest.

Table 1. Average index of the fullness condition of the gut of *Chironomus* during the study period.

Items	Months			
	February	May	August	November
Number of gut examined (total 40)	11	7	12	10
Empty	1	1	2	0
¼ of full gut	6	4	5	5
½ of full gut	2	1	3	2
¾ of fullgut	2	1	2	1
Full gut	0	0	0	2
Average index of fullness	1.45	1.28	1.08	2.00

Following the number method (Table 2) the food items found in the guts of *Chironomus* sp. larvae were: **Green algae** (Chlorophyceae) - The percentage composition of this food items was variable from larva to larva and between days. The highest percentage of green algae recorded on 2nd and 4th day (7.23%) followed by 1st day (6.33%) and minimum on 3rd day (5.11%). **Diatoms** (Bacillariophyceae) - The highest percentage of diatoms recorded on 2nd day (5.63%) and minimum on 3rd day (3.11%); **Protozoan** - The percentage composition of this food items was abundant than other food items. The highest percentage of protozoan's recorded at 1st day (3.25%) and minimum on 3rd day (2.21%); **Rotifers -** The highest percentage of rotifers recorded on 2nd day (3.73%) and minimum on 3rd day (1.41%); **Animal parts -** The highest percentage of crustacean appendages recorded on 2nd day (5.23%), while the lowest percentage of crustacean appendages was recorded on 5th day (4.87%). The highest percentage of ostracodan shell recorded on 1st and 2nd day (4.13%), and minimum on 3rd day (2.11%). Only on 2nd day insect appendages were recorded (2.25%); **Detritus -** Detritus was main food items of larvae gut. The average percentage of this food items found in gut content was 50-55%.

Table 2. Different food items found in the gut of *Chironomus* sp. by following number method.

Food items	1st day (%)	2nd day (%)	3rd day (%)	4th day (%)	5th day (%)	6th day (%)
Green algae (Chlorophyceae)	6.33	7.23	5.11	7.23	7.21	7.21
Diatoms (Bacillariphyceae)	5.20	5.63	3.11	5.53	5.61	5.55
Protozoans	3.25	3.23	2.21	3.15	3.18	3.21
Rotifers	3.55	3.73	1.41	3.59	3.71	3.65
Crustacean appendages	5.15	5.23	5.11	4.95	4.87	4.75
Ostracodan shell	4.13	4.13	2.11	4.09	4.07	4.05
Insect appendages	–	2.25	–	–	–	–
Detritus	55	55	54	54.51	54	54.5
Unidentified matter	17.4	13.57	26.75	16.95	17.35	17.05

Gut content analysis showed a change in their feeding habits with seasons. The variation in the diet may suggest that these groups showed low degree of selectivity, having more generalist food selection habits. According to Berg (1995), there are few chironomid species that shows nutritional selectivity, the great majority being generalists and opportunistic. However, generally these larvae ingest five kinds of food items: algae, detritus and associated microorganisms, macrophytes, debris and invertebrates. Our results support the findings of Berg (1995) from Europe and Rathore and Rama (1979) from India.

Concluding remarks: From the above study it was found that most species had generalist and opportunistic feeding habit, i.e. feeding on what was available at that moment. Studying the diet of chironomid larvae in these habitats indicated that the composition of gut contents changed according to the type of microhabitat where the larvae were found. The occurrence of some genera in the gut contents of these chironomids was due to their availability in the habitat and can also be related to prey size and the predator's development stage.

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