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ZOOPLANKTONS OF THE LAKE OF MOSUL DAME AND THEIR SEASONAL VARIATIONS

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ABSTRACT
Four localities were selected in the lake of Mosul Dame for Zooplankton sampling and four samples were taken randomly from each location monthly starting from December 1986 to December 1987. Samples were taken by plankton net 25 cm in diameter. The net was pulled at medium speed in each sample at the volume of water which passed through the net was estimated to be 0.24 cubic meter. Duncan multiple range tests were used to test the differences among population means. The Planktons recovered are: one rotifer(*Synchaeta* sp.), five crustaceans: *Bosmina longirostris*, *Daphina pulex*, Leptodora sp., *Diaptomus* sp., *Cyclops* sp.

KEY WORDS: crustaceans, Lake, rotifer, zooplanktons

INTRODUCTION

The zooplanktons are one of the known important natural food sources of Fishes. These planktons may belong to rotifera, cladocerans, copepod, insecta and others. In any given area of water, planktons play an important role in the food chain which includes fishes as secondary consumers. In Iraqi waters some important studies have been carried out in different regions (Curney, 1921; Mohammad, 1965; Khalaf and Simrov, 1976; Al-Sabonchi *et al.* 1986; Mangalo and Akbar, 1986) but little was concerned with the water bodies in northern Iraq.. Recently Salih *et al. (*1986) studied the macrozoobenthos of river Tigris passing through Mosul city and gave a long list of different planktons recovered without giving a detailed account about their morphological features and seasonal variations during the period studied.
Due to the important role of the lake of Mosul Dam in irrigation, it may be planned also, secondarily to get benefit of such large body of water to use it as an organ of aquiculture. Therefore, the present preliminary investigation was undertaken to study the biodiversity of zooplanktons which might be thrived in such artificial lake. Furthermore, as the minimal facilities available samplings were carried out monthly, revealing the population densities of these planktons living in such lake during more than a year.

MATERIALS AND METHODS

Four localities were selected in the lake of Mosul Dam for plankton sampling and four samples were taken randomly from each location, monthly, starting from December 1986 to December 1987, samples were taken by plankton net, 25 cm in diameter. The plankton net was pulled at medium speed in net was estimated to be 0.24 m 3. The concentration of zooplanktons samples were preserved in 5% formaldehyde, along each sample water and air temperature was recorded. Samples were brought to laboratory, stained with acetocarmine or examined in glycerin, identified and described. The population densities were estimated and analyzed statistically. Duncans multiple range test was used to test the differences among population means.

RESULTS AND DISCUSSION

***Synchaeta* sp.**

Microscopic, broad anterior end and slender posterior body wall with lorica and two pairs of ciliated discs located anteriorly. Posterior end forked. Rotifers recovered from Iraq are: *Asplanchna* sp, *Keratella* sp., Lecane, Notholca, *Testudinella*, *Monomata*(Al-Sabonchi et al.1986; Al-Habbib et al.1986, but this species is the first to be reported from Iraq.

Bosmina longirostris : Body and feet covered by a bivalve shell, female length 0.5 –o.6 mm, male small 0.25 –o.58 mm. First and second antenna not united at base, female postabdominal claws with fine distal pectin, eye diameter 0.04mm, some female specimens with 2-3 winter eggs. This species has been reported from river Tigris in Iraq in several investigations (Gurney, 1921; Mohammad, 1965; Salih et al.1986).

Daphinia pulex:

Body and feet covered by bivalve shell, female 1.4- 1.6 mm, male smaller, rostrum present, first antenna small, second large, 5-6 pairs of foliaceous legs not segmented, eye large 0.09 mm in diameter and has more than 20 lenses, brood pouch with little Daphinians. According to description of Mellanby(1963) and key by Pennak(1978) it become evident that the species is D. pulex, this species previously reported by Mohammad(1965) but curiously not by Salih et al.1986.

Leptospora sp.
Body length 0.5-0.6 mm, six pairs of legs without branchial attachments, first antenna small or rudimentary, second pair long, 0.3-o.4 mm in length, the end of the last is biramus. The last posterior abdominal segment has two furca and posterior 2 spines. The present species is smaller than L. kindti described by Clegg, 1965 which reached 17 mm in length, Furthermore, abdomen shorter than that of L. kindti, and the thorax of the present species longer and legs attached separately. The rostrum is also longer in the present leptodorid compared to *L. kindti*. Therefore, the present species is likely to be a new species.

***Diaptomus* sp.**
Total length excluding cauda setae 2-3 mm, spindle-shaped, body consists of 5-segmented metasome and 3-segmented urostome, ending intwo broad, plate-like cauda rami bearing setae. The 1st metastomal segment is the longest, and the last has a posteriorly directed characteristic broad spine. The last postero-lateral margin of the last segment is expanded into asymmetrical "wings". The left wing ended in a pointed spine, while right wing is a bipartite structure, each of them ended into a pointed spine. The genital (first) segment of the urostome is long, its side are slightly asymmetrical, anal (third) segment forked posteriorly, and bears caudal rami , each ramus bears posteriorly 5 long caudal setae which are equal in length. The right and left antennules consists of 25 segments each segment bears spines and setae whereas number and arrangement of taxonomic value. The fifth pair of legs is symmetrical and stoutly built. The claws carry a short spine-like lateral setae at its base.

According to the key of Pennak(1978) the present calanoid does not appear to be similar in all characters to any of the American species. However, the male fifth leg may be similar to that of D. clavipes but the antennules setae on the segments 17, 19, 20 and 22 are hooked a phenomenon which is not reported in the present communication. Referring to the key of Lai et al.(1979) the present diaptomid does not coincide with the Philipine freshwater calanoid, for example the present calanoid does not have hyaline process like *Filipanodiaptomus birulai*. Comparing with Indian species redescribed by Rajendran(197), the present species is similar to *Neodiaptomus* schmacker in some of the characters but it has many other differences such pattern of antennules, the structure of the 5th female leg especially basipod. Salih et al.*1986) reported *Neodiaptomus* sp. From River Tigris but gave no description as such the present species may represent a new species of Diaptomus.

Cyclops
Total length 1.4-1.6 mm, body markedly flattened dorso-ventarally with constriction between the mesostome and urostome. The most posterior metasomal segment make a wing-like lateral protrusions, furcal rami 7-8 times longer than wide, first antenna of the female with 18 segments, the antenna extend posterior to the 2nd metasomal segment, but does not reach the urosome.the swimming legs with 3-segmente rami, the spine formula of the terminal exopod segments of legs 1-4 is 4,3,3,3. The seta formula of the same segment is 5,5,5,5 respectively. The spine formula of the terminal exopod teguments of legs 1-4 is 2, 2, 1, 1. The seta formula of the same segments is 4,4,5,3 .

The body shape of male similar to femal except slightly smaller (1.1- 1.4) and cephalothorax is more laterally compressed .the first antennae stout clasping type consisting of 10 segments. The spine formula of terminal exopod segments of legs 1-4 is 2,2,2,3, the seta formula of terminal endopod segments 4,4,4,5. The present Cyclops does not resemble any of the British species described by Harding and Smith (1974) or American species described by Pennak(1978), thus the species can be consider a new species because of the above characteristics.

Different developmental stages of Cyclops were recorded by this study. The most characteristic stage is naupilus(Fig 24) which has unsegmented body, simple median eye and 2 pairs of appendages as metanaupilus and Protozoea were observed in this study, but different intermediate stages of Cyclops also abundant.

Variation in population densities
Statistical analysis of the results indicated that there was a significant difference among the mean of the population densities of zooplanktons through the months of study (Table 1). It is evident from the results that the high population densities of zooplanktons were in June (5868 cyclop/ cubic meter of water; and 8538 intermediate stages of cyclop/ cubic m, 334 *B. longirostris* / cubic m and 5096 *D. pulex* / cubic m). On the other hand, the lowest population densities of the above species were in December (918/cubic m, 1230/ cubic m, 1051/ cubic m and 500/ cubic m respectively. It is clear from Fig (27) that the population densities of zooplankton decreased after the first month of study, then increased gradually and reached its maximum in June 1987, then fall through July and August, then increased slightly in September.

By comparing the population density of these zooplanktons between December 1986 and December 1987 it is obvious that the population density was lower in the latter. The reason for such fluctuation in the population densities of the

plankton studies seem to be correlated with the water temperature i.e. number of zooplanktons increased when temperature was low. It is known from similar examples that the water temperature has an effect on the reproduction of such aquatic animals(Mangalo and Akbar, 1986) in contrast, Al-Sabonchi et al.(1986) found the maximum of population densities of zooplanktons in Garma marshes was in the end of spring.

Moreover, Mangalo and Akbar(1986) when studied the zooplanktons of two stations of lower reaches of Diyala river found that the maximum population densities was in January and February respectively. Therefore, it is clear from the above, that the population densities of zooplanktons depends on different reasons such as temperature, dissolved oxygen, availability of food, pollution, storage of waters, predators, spawning of fishes, pH of water mineral ions in water etc. Further experimental studies is suggested to investigate factors that might affect the population densities of such crustaceans, in order to reach a clue about the optimumfactors which might affect them in such an artificial lake.

Table(1): Monthly Variations in Population Densities of Zooplanktons(mean numbers/ cubic meter).

Months	Cyclops	intermediate stages Of cyclops	*Bosmina longorostris*	*Daphnia pulex*
D.1986	1398	2101 opa	1710 rst	1210
J.1987	1109 u-y	1450 stu	1502 stu	940
F. =	2711 n	3198 i-L	1950 pqr	1290
M. =	2893 k-n	3141 j-m	2220 op	1390
A. =	3271 h-k	3858 fg	2080 pqr	2210
M. =	3541 ghi	4610 e	2880 lmn	4798
J. =	5868 b	8538 a	3341 hij	5098
J. =	4152 f	5150 c	2850 lmn	2898
A. =	1898 pqr	2610 n	1200 u-y	1800
S. =	5820 b	5241 c	3101 j-m	3020
O. =	2802 mn	4202 f	2520 no	2240
N. =	1498 stu	2180 opq	1198 u-y	1810
D. =	918 y	1230 u-y	1051 vxy	500

Each number is a mean of 16 values

** The differences are significant at 1 % probability level. Means which are followed by the same letter have no significant differences.

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