

THE BENTHIC FAUNA OF LAKE BUROLLUS
II - DISTRIBUTION AND PERIODICITY OF
DIFFERENT SPECIES

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ABSTRACT

The distribution and periodicity of the different species of benthic fauna in Lake Burollus were discussed. The oligochaete *Chaetogaster limnae* was numerically the most dominant bottom dweller particularly during Summer. The polychaete *Nereis limnicola* was confined to the eastern Lake with its maximum persistence in winter and Autumn. The amphipod *Corophium volutator* appeared more frequent in the middle sector in areas devoid of hydrophytes while *Gammarus lacustris* was dominant around the lake-sea connection. The maximum abundance of these two species was in Spring. The isopod *Mesanthura* sp. predominated the middle and western sectors particularly during summer. The mysidacean *Mysis relicta* was infrequently observed both in the plankton and bottom samples. The mollusc *Corbicula consobrina* contributed over 87% of the total benthos biomass. Its highest counts appeared in the western sector with no peculiar season for maximum abundance. The other molluscs namely; *Cerastoderma (Cardium) edule*, *Meritina nilotica* and *Melanoides tuberculata* were infrequent or scarcely met with. The chironomid larvae (*Tendipes tentans*) showed their maximum persistence in the eastern Lake particularly during winter.

INTRODUCTION

Lake Burollus is a shallow slightly brackish water lake situated along the Mediterranean coast, north of the Nile Delta (Egypt). It has a total area of about 50,000 hectares and an average depth of one meter. The Lake receives most of its water from five main drains Fig. 1. It is also connected to the Mediterranean Sea at its north eastern side through a small opening known as Boughaz El-Borg.

The distribution and seasonal variations of the total benthos were given in part 1 (Samaan et al., 1989). The present paper deals with the general ecology and periodicity of the different species recorded there.

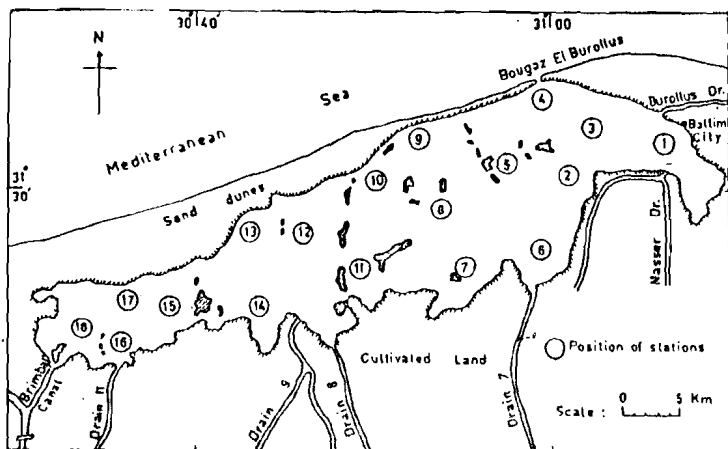


Fig. 1
Morphometry of Lake Burollus and position of stations.

MATERIAL AND METHODS

Quantitative sampling of benthic organisms was performed by using a modified Ekman bottom sampler. Two dredges were taken at each station representing an area equivalent to $0.06m^2$ of the upper layer of bottom sediments. The samples were washed thoroughly in a small hand net of bolting silk with 23 mesh/cm and preserved with neutral formalin solution. The bottom fauna was sorted into groups each group was counted and weighed separately after being left for five minutes on a filter paper to get rid of the external moisture.

Eighteen sampling stations were selected Fig. 1. These were further grouped into three main sectors namely; the eastern Lake (Stations 1-6) the middle Lake (Stations 7-12) and the western Lake (Stations 13-18). Sampling of the bottom fauna was carried out monthly at the different stations during the period from January, 1978 to December, 1979.

RESULTS AND DISCUSSION

ANNELIDA

1- *Chaetogaster limnae* K. Von Beer

The oligochaete *Chaetogaster limnaei* formed about 39% by number of the total benthos in the Lake (average annual 147 organisms/m²). However, being small size, their average annual biomass was only 0.07 gm fresh wt/m². As shown in fig. 2a the highest frequency of the species was in the western Lake (average 306 organisms/m²), decreasing gradually to 122 and 13 organisms/m² in the middle and eastern sectors, respectively. The species was more dominant during 1979 than in 1978.

C. limnaei appeared all the year round with no peculiar seasonal cycle. Thus, its highest density was recorded during the summer and early autumn of 1978 as well as in the winter and early spring of 1979 Fig. 3a.

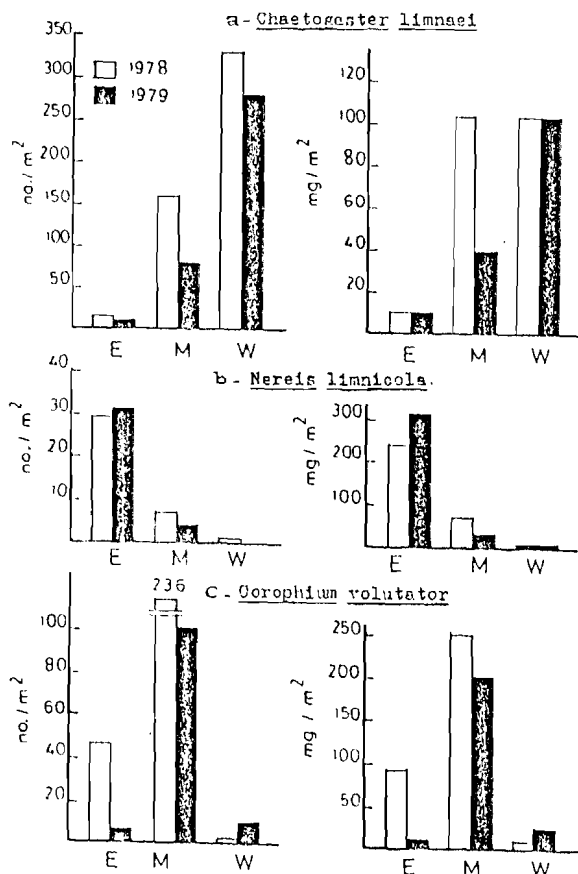


Fig. 2
Average annual values of the standing stocks of *C. limnaei*, *N. limnicola* and *C. volutator* (organisms/m² and mg fresh wt/m²) recorded in the three sectors of Lake Burollus during 1978 and 1979.

E: eastern Lake M: middle Lake W: western Lake

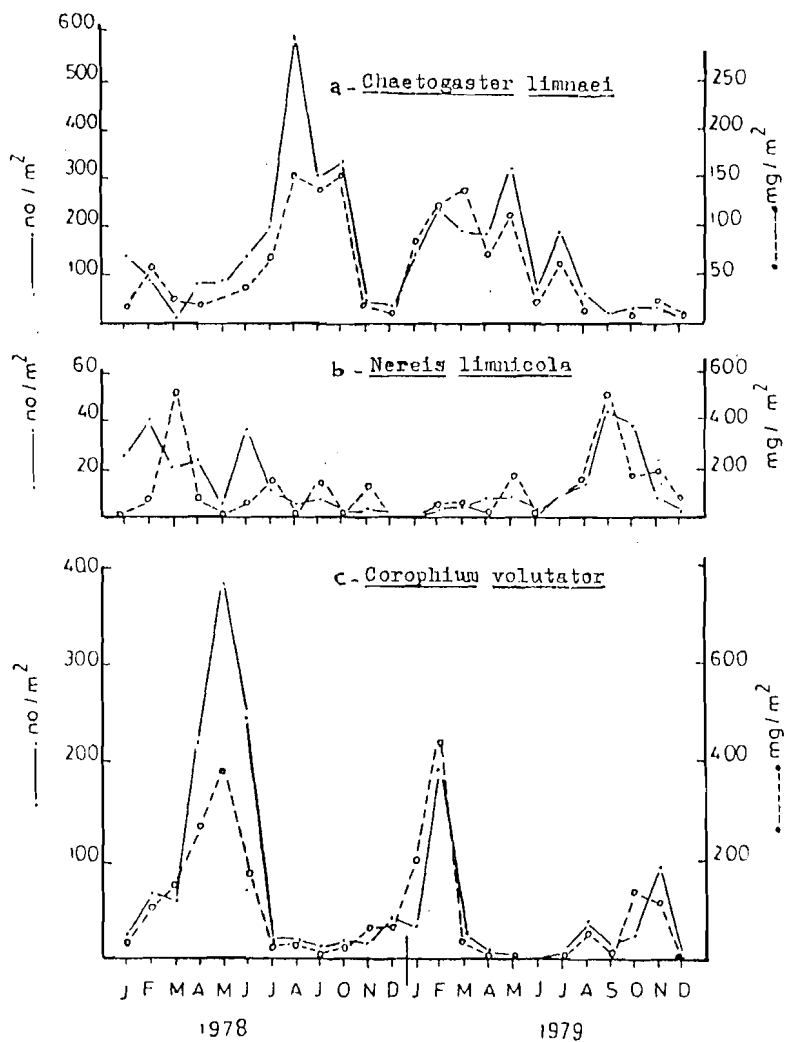


Fig. 3
 Seasonal variations of *C. limnaei*, *N. limnicola*
 and *C. volutator* recorded for the whole Lake in
 organisms/m² (solid line) and mg fresh wt/m²
 (dotted line) during 1978 and 1979.

The species is regarded as a fresh water organism (Hutchinson, 1967). It favours well oxygenated coarse sand bottom (Dumnicka, 1976 and Pfannkuche 1980). It was previously recorded in Lake Mariut (Samaan and Aleem, 1972).

2- *Nereis limnicola* Johnson

The polychaete *Nereis limnicola* appeared infrequently in the eastern Lake, while it persisted as a rare form in the other two sectors (Fig. 2b). It formed numerically about 3.2% of the total benthos with an average annual of 12 organisms/m² and 0.12 gm fresh wt/m².

N. limnicola was recorded all the year - round in the eastern Lake, showing relatively higher counts in February and June, 1978 as well as in early summer of 1979 (Fig. 3b).

Larvae of *Nereis* were observed in the plankton during spring (April-June) as was the case of *N. diversicolor* Mull. in Lake Mariut (Samaan and Aleem, 1972).

Nereis spp. are in general, important bottom dwellers in Egyptian Delta lakes. Thus, *N. diversicolor* Mull. contributed about 50% by weight of the total benthos in Lake Mariut. *N. Succinea* appeared also as a common bottom animal in Lake Menzalah (Guerguess, 1979).

ARTHROPODA

A- Crustacea

The amphipod *Corophium* formed numerically about 21.6% of the sampled benthos in 1978 (average 95 organisms/m²) but dropped to 12.2% in 1979 (average 38 organisms/m²). The maximum persistence of the species was in the middle Lake particularly during 1978 (Fig. 2c).

Its average annual biomass during the two successive years reached respectively 0.12 and 0.08 gm.fresh wt/m².

The numbers of *C. volutator* showed a pronounced increase between April and June, 1978 with a peak of 385 organisms/m² in May (Fig. 3c). A further increase was also recorded in February, 1979. Ezzat (1959) mentioned that temperature had no effect on the distribution of *Corophium* spp. in the Nouzha Hydrodrome (Egypt) since a succession of at least five broods occurred in the course of a year with a temperature range between 10 and 30°C.

C. volutator is well established in the Egyptian Delta lakes. It is regarded as the most important bottom dweller in areas devoid of hydrophytes in Lake Edku (Samaan, 1977), Lake Mariut (Samaan and Aleem, 1972), Nouzha Hydrodrome (Ezzat, 1959) and Lake Manzalah (Guerguess, 1979). Meadows and Ruagh (1981) mentioned the abundance of *C. volutator* in the intertidal mud or muddy sand estuaries with reduced salinity. The species is considered as eurythermic and euryhaline form.

Gammarus lacustris Fabricius

The amphipod *Gammarus lacustris* was collected from most stations, being more frequent in the eastern Lake particularly around the Boughaz area and the surrounding of the outlet of drain 7 (Fig. 4a). It contributed numerically about 14.2% of the total benthos in 1978 (average 62 organisms/m²), decreased to 13 organisms/m² in 1979 and forming only 4.2% of their total numbers. The average annual biomass of the species amounted respectively to 0.12 and 0.03 gm fresh wt/m² during the two successive years.

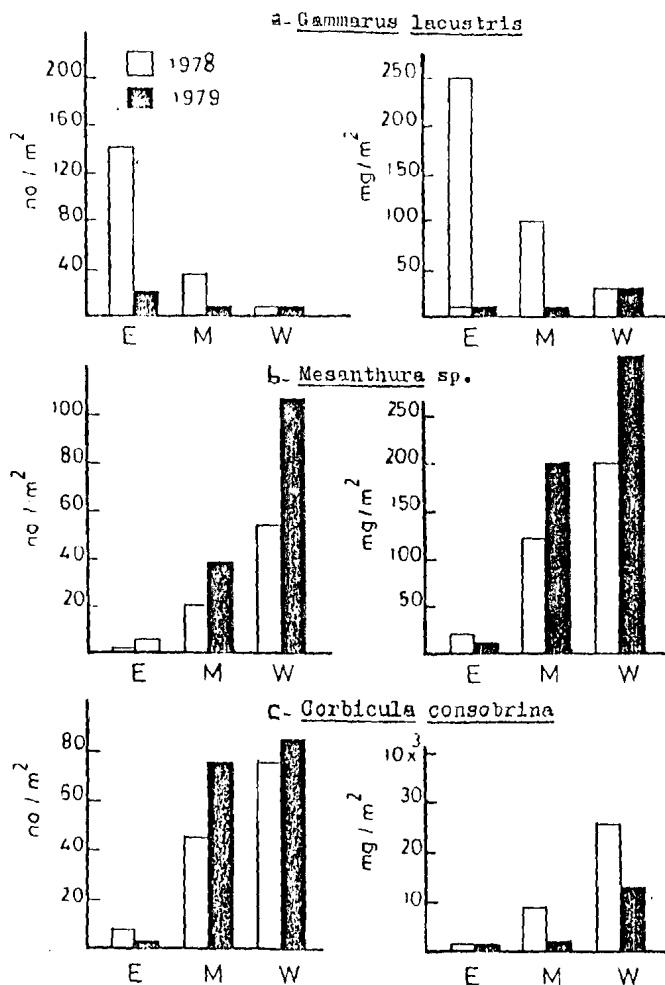


Fig. 4
Average annual values of the standing stocks of *G. lacustris*, *Mesanthura sp.* and *C. consobrina* (organisms/m² and mg fresh wt/m²) recorded in the three sectors of Lake Burullus during 1978 and 1979.
E: eastern Lake M: middle Lake W: western Lake

G. lacustris showed its maximum persistence in March and April, 1978. During 1979, the numbers of the species tended to increase slightly between January and April, otherwise it remained as a rare form through out the rest of the year (Fig. 5a). Similarly, its maximum occurrence in Lake Manzalah was in April (Guerguess, 1979) and in Lake Mariut during February and March (Samaan and Aleem, 1972). *G. lacustris* is a characteristic inhabitant of littoral areas containing rooted macrophytes and coarse bottom debris (Pennak and Rosine, 1976).

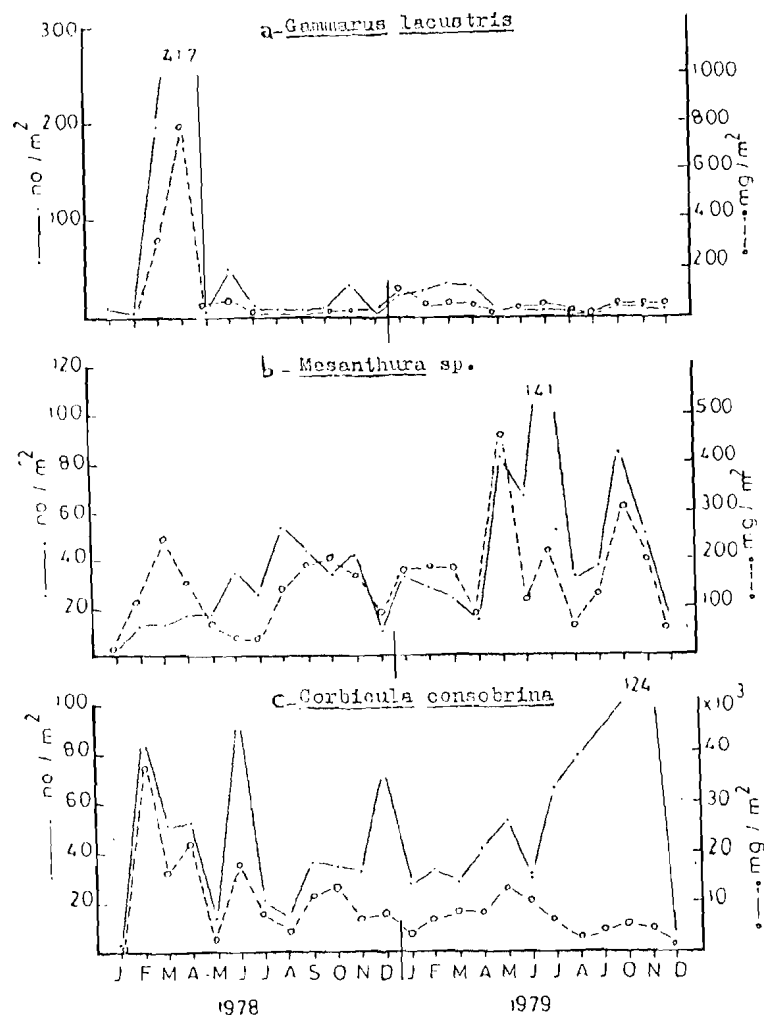


Fig. 5
Seasonal variations of *G. lacustris*, *Mesanthura* sp. and *C. consobrina* recorded for the whole Lake in organisms/m² (solid line) and mg fresh wt/m² (dotted line) during 1978 and 1979.

***Mysis relicta* Loven**

The Mysidacea *Mysis relicta* contributed numerically about 2.7% of the total benthos during the investigation period (average 11 organisms/m²). The species is considered a tychoplanktonic element (Beeton, 1960 and Watson, 1974). It appeared both in the plankton and benthos in Lake Burollus. Its numbers remained low at most stations during 1978 except at stations 6 and 9 which harboured respectively an average annual of 63 and 127 organisms/m², contributing more than 88% of the total benthos at station 9. Further reduction in their counts occurred in 1979.

The maximum frequency of *M. relicta* during 1978 was in May and August with averages of 48 and 88 organisms/m² respectively. In 1979, the higher counts of the species were confined to January in the eastern Lake (48 organisms/m²) and in May in the western sector (51 organisms/m²).

Carpenter et al. (1974) found one major period of recruitment of *M. relicta* in the Great Lakes (Canada) from February to July and the generation extended for two years. In Lake Ontario and Lake Huron, the recruitment was produced from February to August and the species appeared mature after 18 months. In Lake Burollus, a great portion of the population during 1979 was of small size indicating the propagation of a new generation.

M. relicta usually prefers shallow lakes with bottom predominated by sand-gravel and sparse aquatic vegetation (Sarkka, 1976 and Mcknight, 1976).

***Mesanthura* sp.**

The isopod *Mesanthura* sp. was frequently recorded in the middle and western sector while it persisted as a rare form in the eastern Lake (Fig. 4b). It formed about 5.7% by number of total benthos during 1978 (average 25 organisms/m²), increased to 16.0% in 1979 (average 50 organisms/m²). Being small in size, their weights averaged only 0.12 and 0.18 gm fresh wt/m² during the two successive years.

Mesanthura sp. appeared in the Lake all the year round, showing irregular monthly fluctuations. Its highest density was observed during the periods August-November, 1978 and May-October, 1979 (Fig. 5b). Plenty of small sized individuals appeared during these periods indicating production of new generations. Kensley (1978) recorded *Mesanthura* sp. from deep waters in south Africa and emphasized the lack of knowledge about this group.

B- Insecta (Hexapoda)

***Tendipes tentans* Meigen**

Chironomus larvae of *Tendipes tentans* (F. chironomidae) were infrequently observed in the eastern Lake particularly in areas covered with the hydrophyte *Potamogeton pectinatus*. Its average annual for the whole Lake was 5 larvae/m² with 0.01 gm fresh wt/m².

The maximum persistence of these larvae was in winter, while they remained very scarce in the other seasons. The same winter peaks were recorded for chironomus larvae in Lake Mariut (Samaan and Aleem, 1972) and Lake Edku (Samaan, 1977). Chironomus larvae are known to inhabit the littoral zone of both oligotrophic and eutrophic lakes (Mundie, 1955). They are good indicators of water pollution as they can thrive in water poor in dissolved oxygen (Rivosecchi et al., 1976; Wenstel et al., 1977).

Mollusca

A- Lamellibranchiata (Pelecypoda)

Corbicula consobrina Cailliaud

The pelecypod *Corbicula Consobrina* was the most important benthic mollusc in Lake Burollus. In spite of the fact that it formed numerically 10.3% of the total benthos (average 49 organisms/m²) yet its weight contributed about 87.5% of their total biomass with an average annual 8.7 gm fresh wt/m². As shown in Fig.4c, the maximum frequency of the species occurred at both the middle and western sectors, while it remained rare in the eastern Lake.

Regarding the seasonal variations, the highest counts of *C. consobrina* appeared in February, June and December, 1978. During 1979, the species showed as general gradual increase throughout the spring and summer to reach a peak of 124 organisms/m² in November. This was followed by a sharp drop in December (Fig. 5c).

The recruitment of small specimens of *C. consobrina* was relatively high during most of the year 1979 which revealed a continuous production of new generations. Leveque (1972) found that the reproduction of *Corbicula* spp. has one year life span.

Cerastoderma (Cardium) edule L.

Cerastoderma edule was infrequently sampled in the eastern Lake particularly around the Boughaz area. It appeared there between January and November, 1978 with a peak of 227 organisms/m² in November. The same distribution was recorded in 1979 but the highest frequencies were in September and October (averages 76 and 50 organisms/m² respectively). The species is mainly a marine form which tolerates a wide range of salinity (Hutchinson, 1967). Plenty of empty shells of *C. edule* is widely distributed on the bottom of the Egyptian Delta lakes indicating that the salinity in these lakes was much higher in the past than nowadays.

B- Gastropoda

Melanoides tuberculata Muller

The gastropod *Melanoides tuberculata* was infrequently observed in the middle and western sectors with relatively high counts at station 12. Its average annual number for the whole Lake was 5 gastropods/m². The species appeared throughout most of the year showing relatively higher counts in January and September, 1978 as well as in January and February, 1979.

M. tuberculata was previously recorded in the Egyptian Delta lakes particularly in Lake Mariut where it represented the second important bottom dweller there (Samaan and Aleem, 1972).

Neritina nilotica Reeve

The distribution of *N. nilotica* was confined to stations 12 and 13 during March, 1978 with an average of 151 gastropods/m² and at station 17 in April (17 gastropods/m²). It was missed from the collections of 1979. The species is a fresh-water form, previously recorded in the Nile River and Egyptian Delta lakes. It appeared as the most common gastropod in Lake Manzalah (Guerguess, 1979).

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