The bottom of Lake Edku, Egypt

by

MASSOUD A.H. SAAD and ALTAF EZZAT
Department of oceanography, Faculty of science,
University of Alexandria, Moharem Bey Alexandria (U.A.R.)

Introduction

Lake Edku is shallow brackish water lake, lying at a distance of about 30 km to the N.E. of Alexandria. The lake area reaches about 30000 feddans (one feddan is equivalent to 4200 m^2). Its water depht varies between 50 and 150 cm. The eastern part of the lake was dried for agriculture (fig. 1). This lake is considered as a highly productive one regarding its fish yields. Its bottom is sandy with plant detritus in the region of its connection to the sea, while the rest of the lake is muddy mixed with brocken shells of molluscs.

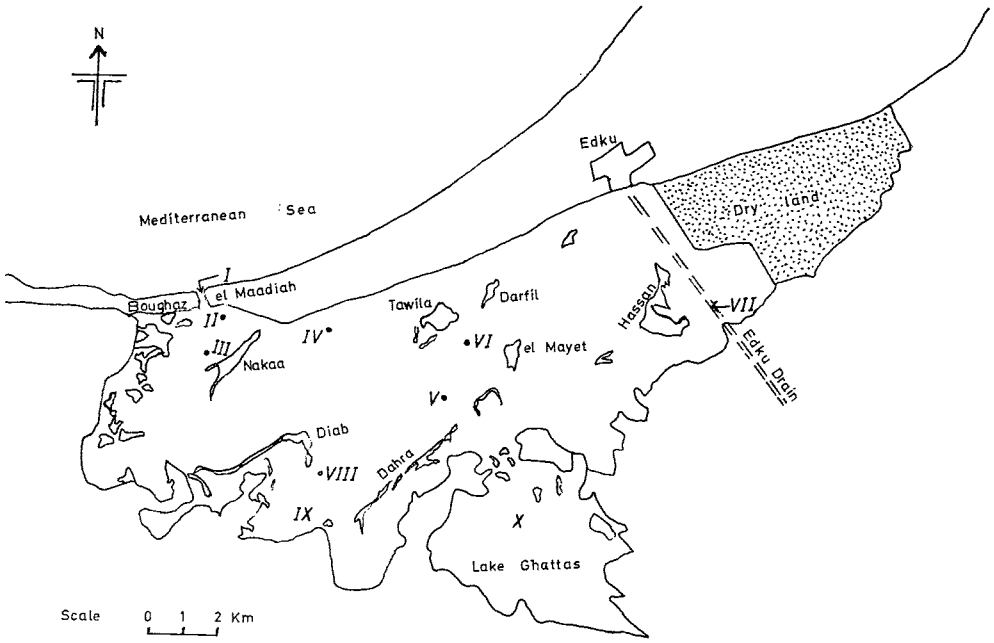

FIG. 1. — Lake Edku.
Position of station.

Exchange of water between the lake and Mediterranean sea occurs through a narrow slit called Boughaz el Maddiah. Both sea and lake levels do not vary owing to their permanent connection together. A lake-sea current or sea-lake current result from any considerable rise in the lake level or the level of the sea. Drainage water discharged into the lake causes a rise of its level up to about 0.6 m A.S.L. Winds

Rapp. Comm. int. Mer Médit., **21**, 3, pp. 129-132, 1 fig. (1972).

are mainly reponsible for the rise in the sea level. Sea water affects principally the Maddiah region, and an exceptional days especially in winter, may reach a great distances inside the lake, thus increasing the salinity of its water. Considerable variations of salinity were observed in different localities and seasons. It fluctuates from less than 0.5 ‰ in the Eastern part of the lake to about 18 ‰ in the Maddiah region inside the Boughaz [NASR *et al.*, 1963].

Material and Methods

Bottom deposits were collected in 1958, by means of a modified EKMAN - bottom sampler, which cuts out 200 square centimeters of the sediments. Ten stations were selected representing different parts of the lake in order to study the distribution of its bottom fauna. Field and laboratory treatments of samples were described by EZZAT [1959]. Bottom animals were identified and counted in one square meter.

In 1969, stations II, III, IV, V, VI and VIII were sampled again in order to find any change in the distribution of bottom fauna after that period of time. Samples from these stations were treated in the same manner. These new samples were subjected also to some chemical investigations, using the methods described by SAAD [1970].

Résults and Discussion

1. *Bottom fauna from 1958*

The qualitative and quantitative distributions of bottom animals in lake Edku vary greatly in the different stations (tab. 1). The maximum number of *Chironomid larvae* is found in station VI, which was taken from the plant belt of the lake. RAWSON [1930], found an increase in the number of *Chironomid*

Table 1. Number of bottom animals per m²

Stations	Chironomid larvae	Corophium	Gammarus	Nereis	Donax	Cardium
I	1989	122	87	82	42	13
II	255	280	187	34	-ve	-ve
III	755	265	1224	-ve	N	N
IV	1594	211	-ve	184	-ve	-ve
V	-ve	168	-ve	51	-ve	16
VI	2769	144	-ve	-ve	-ve	-ve
VII	-ve	71	-ve	422	-ve	-ve
VIII	-ve	10	102	-ve	N	N
IX	488	-ve	561	-ve	-ve	-ve
X	-ve	-ve	64	134	-ve	-ve

N = present but not counted

larvae with the increase in depth in lake Simcoe in U.S.A. The abundance of these larvae in lake Edku is not attributed to water depth, since this lake is a shallow one. *Chironomid larvae* are known to be a characteristic member of the littoral zone of both oligotrophic and eutrophic lakes [MUNDIE, 1955] *Gammarus*, *Corophium* and *Nereis* follow chironomid larvae in their numerical abundance. *Donax* and *Cardium* are present in stations III and VIII but they were not counted.

In addition to animals mentioned in table 1, many empty shells of *Bullinus* and *Planorbis* were recorded in station IV. *Corbicula* and *Snails* are found also in this station but in low amounts (83 and 32 individuals/m^2). In station VII (Edku drain) which represents a fresh water habitat, *Mussels* and *Snails* are found in high amounts, which reach 197 and 124 individuals/m^2. Dead shells of *Cardium*, *Donax* and *Barnacle* are present in good amounts in station VIII. Snails are most abundant in the Ghattas area (St. X). They reach 1849 individuals/m^2.

2. *Bottom fauna from 1969*

It is interesting to observe no insignificant variations in the distribution of bottom animals obtained in 1958 and 1969, except at the lake area of the plant belt (St. VI). This area was covered by large masses of plants mainly *Eichornia*, making a sort of a blanket. The destruction of *Eichornia* after 1960 had an effect on the bottom animals, resulting in the appearence of *Molluscs* together with *Amphipods*. The high amount of Chironomidae, which was observed in 1958 was disappeared. The new animal community is represented by : *Nassarius*, *Ballinus*, *Planorbis* and *Corophium*. These animals are found in variable amounts which are; 717, 357, 71 and 71 individuals/m^2, respectively.

3. *Some chemical investigation of bottom deposits from 1969*

Sediments samples obtained in 1969 were subjected also to some chemical investigations (tab. 2.)

Table 2. Density of wet mud, as well as content of some constituents (k.g./m^2 wet mud).

Stations		2/cm^3	k.g./m^2 wet mud				
	Water depth cm	Density wet mud	Water	Dry matter	Org. matter	Calc. matter	Alloch. matter
II	50	1.99	5.6	14.3	0.3	2.4	11.6
III	80	1.54	6.9	8.5	0.6	2.2	5.7
IV	90	1.67	6.1	10.6	0.5	3.5	6.6
V	120	1.17	9.7	2.0	0.4	1.0	0.6
VI	120	1.22	9.3	2.9	0.5	1.3	1.1
VIII	105	1.58	8.4	7.4	0.6	2.8	4.0

The quantity and quality of any material precipitated down in a unit area of the sediments may be determined by both internal and external events. Samples were analysed into two main fractions; 1. ignitable substance (equal approximation to organic matter; 2. unignitable residue, which is further differentiated into calcareous and allochthonous materials plus diatom shells.

The maximum density of wet mud (1.99 g/cm^3), which is found in station II, is mainly attributed to the maximum value of the dry matter (14.3 k.g./m^2) and the minimum amount of water content (5.6 k.g./m^2). The great increase in the weight of dry matter is mainly due to the high amount of mineral substances which reach their maximum value (11.6 k.g./m^2). The calcareous substance is found also in a relatively

high amount (2.4 k.g./m^2). The organic matter in this sample is found in its minimum value (0.3 k.g./m^2). The lake bottom at this station, which is near the lake-sea connection consists mainly of sand and mineral matters.

The minimum density of wet mud (1.17 g/cm^3) which is found in station V is mainly due to the maximum water content (9.7 k.g./m^2), and minimum dry matter (2.0 k.g./m^2). This low value of dry matter results from the great decrease in the weight of both allochthonous and calcareous materials, which reach their minimum values of 0.6 and 1.0 k.g./m^2, respectively. The organic matter in this sample is found also in a low amount (0.4 k.g./m^2). The position of this station in the middle of the lake can explain such type of sediment.

References

EZZAT (A.), 1959. — Ecological studies of bottom living Amphipods in the Nozha Hydrodrome — *Notes and Memoirs*, Alexandria Institute of Hydrobiology, **47**, pp. 1-16.

MUNDIE (J.H.), 1955. — On the distribution of Chironomidae in a storage reservoir - *Int. Ass. Theorie and Appl. Limnol.*, **12**, pp. 577.

NASR (A.B.), HASHIM (M.A.) & ALEEM (A.A.), 1963. — The flora of lake Edku, with particular reference to benthic diatoms. *Bull. Fac. Sci., Alex. Univ.*, **5** (1961-63), pp. 219-235.

RAWSON (D.S.), 1930. — The bottom fauna of lake Simcoe and its role in the ecology of the lake. Univ. of Toronto Studies. *Publ. Ont. Fish Res. Lab.*, **40**.

SAAD (M.A.H.), 1970. — Entwicklungsgeschichte des Schöhsees aufgrund mikroskopischer und chemischer Untersuchungen. *Arch. Hydrobiol.*, **67**, 1, pp. 32-77.