The Occurrence of Marine Plankton Organisms in Lake Quarun (Egypt)

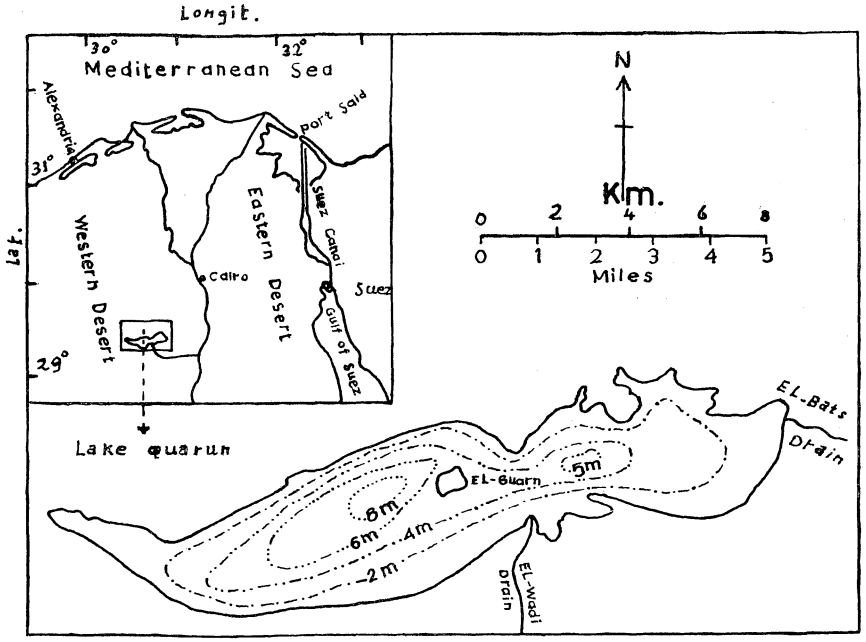
by

A.M. EL-MAGHRABY and N.M. DOWIDAR

Oceanography Department, Alexandria University (Egypt)

The Lake

Lake Quarun, the only inland Lake in Egypt, is situated in the Western Desert 83 km. SSW of Cairo. It covers an area of about 226 km^2 in the deepest part of Fayoum depression at 44 metres below sea level. The maximum water depth in the Lake is 8 metres and the average is 4 metres but the water level in the Lake is subjected to changes within ± 50 cm. (see chart figure).



In historical times, the Lake (known as Lake Moeris) was in direct connection with the Nile forming a natural reservoir for the flood water. There is no doubt that the Lake was inhabited during that time by a fresh water flora and fauna derived from the Nile.

Lake Quarun has now no direct connection with the Nile; it is used as a drain reservoir for the cultivated land of Fayoum province. The Lake receives a continuous supply of the slightly brackish drain water (salinity about 1.25 ‰) estimated to be annually as much as 350 million cubic metres. Nearly all the water drained to the Lake is lost through excessive evaporation due to the high air temperature in this low lying arid region. GORGY [1959] estimated the total annual evaporation from the Lake to be 1 837.3 mm.

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As a result of the accumulation of salts contained in the drain water reaching the Lake, the salinity is progressively rising. Its average increased from 11.6 ‰ in 1920 to 17.0 ‰ in 1928 and to 23.4 ‰ in 1934. At present the salinity varies according to water level between 25 ‰ to 29 ‰. NAGUIB [1958] gave a detailed account of the chemistry of Lake water.

The maximum surface water temperature of the Lake is about 28 ° C attained in August, the minimum is about 13° C in January. The values of the maximum and minimum surface water temperatures are nearly similar to those recorded for the surface water of Alexandria region.

The steady increase in Lake Quarun salinity has affected greatly its fauna and flora. For instance, most of the Nile fishes formerly known to support its fisheries have disappeared from the Lake proper, except the euryhaline cichlid species *Tilapia zillii* (Gerv.).

Improvement of the Lake fisheries was achieved by a continuous restocking process (started in 1928) with the fry of grey mullets (*Mugil cephalus* Risso, *Mugil capito* Blanchard and *Mugil saliens* Risso). Young individuals of the sole (*Solea vulgaris* Linn.) were also carried four times between 1938-1948 to the Lake. The latter species is now successfully breeding in the Lake; its planktonic eggs characterize the winter and spring plankton. EL-ZARKA [1963] estimated its catch to exceed 1/3 of the total fish yield from the Lake.

The Plankton

WIMPENNY [1936] showed that zooplankton samples collected monthly from Lake Quarun during 1931 was dominated by the fresh water copepod *Diaptomus salinus* Daday, besides the cladoceran *Moina salinarum* (Gurney) and the juvenile stages of *Leander squilla* var. *elegans* Rathke. Since that time there was no record on the plankton composition of the Lake until few plankton samples collected in 1949 and 1950 were examined. In these samples, both *Diaptomus salinus* and *Moina salinarum* were absent, while the marine neritic copepod *Acartia latisetosa* Kriczaguin was extremely abundant. This copepod species is an important organism in the inshore water of Alexandria [EL-MAGHRABY & HALIM 1965; DOWIDAR, 1965]; it even thrives in the backish water Delta Lakes (connected with the Mediterranean) dominating their plankton community in some months [EL- MAGHRABY *et al.* 1963].

The presence of this marine neritic copepod in Lake Quarun may indicate the possible presence of other marine plankton species in the environment of the Lake. In order to investigate this, plankton samples were collected at monthly intervals throughout 1965 by the use of fine meshed plankton net. Examination of these samples has revealed that beside *Acartia latisetosa*, 36 planktonic species of marine origin, mainly of diatoms, tintinnids and dinoflagellates, are now present some are even dominating the biota of the Lake. The fresh water forms associated with the recorded marine species belong mainly to rotifers and benthic diatoms.

Almost all the identified species are known from the Mediterranean waters at Alexandria [EL-MAGHRABY & HALIM, 1965; DOWIDAR, 1965]. They could be sorted, as regards their duration and frequency in the plankton into three main categories :

1. Extremely common species with long duration and sometimes forming blooms. These are :

DIATOMS : *Chaetoceros affinis* Lauder, *Chaetoceros compressus* Lauder, *Thalassionema nitzschioides* Grun., *Grammatophora marina* (Lyngb.) Kutz., *Licmophora lyngbyei* (Kutz.) Grun.

DINOFLAGELLATES : *Prorocentrum micans* Ehr., *Exuviaella compressa* (Bail.) Ost.

TINTINNIDS : *Tintinnopsis subacuta* Jorg., *Tintinnopsis beroidea* Entz., *Tintinnopsis bermudiensis* Bdt.

COPEPODA : *Acartia latisetosa* Kriczaguin.

LARVAE : Veligers of *Cardium edule* Linn.

2. Species of common presence but with short duration and irregular periodicity. These are :

DIATOMS : *Chaetoceros decipiens* Cleve., *Chaetoceros lauderi* Ralfs, *Coscinodiscus excentricus* Ehr., *Coscinodiscus gigas* Ehr., *Biddulphia laevis* Ehr., *Gyrosigma balticum* (Ehr.) Cleve.

DINOFLAGELLATES : *Goniaulax digitale* Kof., *Goniaulax monacantha* Pavill.

IBRIIDEAE : *Hermesinum adriaticum* Zach.

TINTINNIDS : *Tintinnopsis campanula* (Ehr.) Dad., *Tintinnopsis cyathus* Dad., *Tintinnopsis turgida* Kof.

3. Extremely rare species. These are :

DIATOMS : *Biddulphia aurita* Bréb. & God., *Biddulphia pulchella* Gray, *Triceratium antidiluvianum* (Ehr.)

Grun., *Plagiogramma vanheurckii* Grun., *Achnanthes longipes* Agardh, *Rhisosolenia hebetata* f. *semispina* (Hensen) Gran.

DINOFLAGELLATES : *Exuviaella baltica* Lohm., *Goniaulax dicantha* (Meun.) Schill., *Peridinium* sp.

TINTINNIDS : *Salpingella acuminata* Clap. & Lachm., *Tintinnopsis lindeni* Dad., *Tintinnopsis rosmaeri* Dad.

LARVAE : Nauplius larvae of *Balanus* (probably *B. perforatus* Brug.).

Most of the forms mentioned are known to thrive in water of low salinity and they are now undoubtedly self maintained in the Lake. This is clearly demonstrated with *Acartia latisetosa* whose developmental stages dominate the plankton population particularly during winter and spring months. Similarly, the lamellibranch *Cardium edule*, which lives in large numbers along the shallow sandy shores of the Lake breeds nearly all the year round as judged from the permanent presence of its larvae in the plankton. The occurrence of some species of tintinnids in extremely large numbers is also an indication of their successful propagation in the Lake. Moreover, the blooms exerted by some of the diatoms recorded prove that the environment of the Lake is suitable for them to multiply vigorously. Resting spores of *Chaetoceros affinis* were frequently met with during its bloom. It is also worth to note that the blooms recorded for some marine species introduced to the lake generally coincide in time with their corresponding blooms in the neretic water of Alexandria.

Concerning the introduction of these marine plankton species into the Lake, it is most likely that they have been carried through the process of fish restocking. The sea or brackish water tanks, used for transporting the living fry of grey mullet or the young sole from the vicinity of Alexandria, may have included several neritic species. Those recorded in this report, finding the new environment suitable for them, have established themselves in the Lake.

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