Observations on the Neritic zooplankton Community in Abu Qir Bay during the flood season

by

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A regular and periodic phenomenon, before the complete construction of the High Aswan Dam, was the discharge of huge amounts of the Nile flood water to the Mediterranean sea, (through Rosetta & Damietta mouths) from late summer through autumn. During the flood period, the Nile water extends as a mixed dilute surface layer (hardly exceeding 10 meter depth) all over the entire neritic region off the Nile Delta; affecting the hydrographic and biological conditions of the whole south eastern Levantine Sea as far as Lebanon [ROUCH, 1940; OREN, 1952; EMERY *et al*, 1962 & 1966; HALIM *et al.* 1967].

It is aimed in this paper to study the zooplankton community in an area greatly affected by the Nile water, since all previous zooplankton studies were carried out in Alexandria area which is moderately affected by the Nile flood [EL-MAGHRABY & HALIM 1965, DOWIDAR 1965], throughout September 1967, for certain technical reasons, large amounts of Nile water were allowed to flow into the Mediterranean sea through Rosetta Nile mouth. As a result, the neritic region infront of this mouth, including Abu Qir Bay which is the site of observations, was greatly affected.

Abu Qir Bay, is a shallow water area (maximum water depth about 10 fathoms) bordered easterly by Rosetta Nile mouth and westerly by the tip of Abu Qir peninsula. Zooplankton samples from several stations covering the Bay were collected on September 12th by horizontal hauls (10 minutes duration) and vertical hauls (from the bottom to the surface). Both fine (silk No. 25) and coarse (silk No. 10) meshed nets were used; the diameter of each net was 30 cm. The salinity and temperature at 0, 5, 10 and 15 meter depth at each station was also determined. The area of the Bay and stations sampled are shown in chart figure 1.

A - Condition Prior to the Flood Period

At the beginning of August, about 3 weeks before the outflow of the flood water, both temperature and salinity of the surface water reach their maxima in the neritic area off the Nile Delta. In table (1) are given the temperature and salinity at the surface and 3 depths at station I. These values could be taken as representing the condition in the upper 15 meters along the whole stretch of the Bay during this period.

Table (1): Vertical distribution of temperarure and salinity at station I on 4/8/1967.

Depth (m)	Temp. (° C)	Salinity (‰)
0	27.9	38.94
5	27.3	.88
10	26.8	.84
15	26.5	.78

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The Zooplankton

During this period, the Bay is populated by a summer zooplankton community which is relatively nomogenous, as regards its main constituents, in the entire neritic zone off the Delta coast. This population consists of the following elements :

1 — Common (species represented by > 1000 individuals per haul)

Paracalanus parvus, *Clausocalanus arcuicornis*, *Centropages kroyeri*, *Isias clavipes*, *Oithona nana*, *Euterpina acutifrons*, Appendicularians (*Oikopleura* spp.) *Favella markusovszkyi* and *Eutintinnus fraknoii*

2 — Frequent (400-1 000 individuals per haul)

Evadne tergestina, *E. nordmanni*, *E. spinifera*, *Temora stylifera Oithona plumifera*, *Acartia negligens*, *Corycaeus clausi*, *C. speciosus. Sagitta* spp. (including *S. friderici* & *S. macrocephala)*, *Pyrocystis*, Echinopluteus and ophiopluteus larvae, mysis of *Lucifera*, veligers of Mollusca and *Eutintinnus lusus-undae.*

3 — Rare (< 400 individuals per haul)

Engraulis eggs, protozoea of prawn, *Labidocera brunescens*, *Centropages violaceus* and *Rhabdonella spiralis.*

B - Condition during the Nile Flood Period

In September the water temperature is still around its maximum varying between 28. 3° C at the surface and 27° C at 15 meter depth. The fresh water flowing out through the Rosetta Nile mouth has significantly diluted the surface water of the area. The dilution could be easily detected at Alexandria about 30 miles west of Rosetta mouth. Table (2) shows the distribution of salinity at the stations sampled in the Bay and at Alexandria on September 12th 1967.

Table (2) :

The distribution of salinity (‰) in Abu Qir Bay and at Alexandria on 12/9/1967.

Depth	Alexandria	Abu Qir Bay					
		St. I	II	III	IV	V	VI
0	35.95	29.78	25.07	23.06	19.09	14.60	8.04
5	36.45	37.75	37.99	38.08	37.99	37.41	36.35
10	39.03	39.22	39.18	38.86	39.14	—	—
15	39.20	39.29	39.25	—	—	—	—

It is obvious from this table that the surface water of the Bay is greatly affected; the dilution is most pronounced at station VI, 600 meter from the Nile mouth, where the salinity of the surface water is 8.04 ‰. There is also a gradient of salinity increase by passing northerly and westerly. It is also evident from the high salinity values, at 5 meter depth, in all stations that the pronounced dilution is mostly confined to the upper 2 or 3 meters.

The zooplankton

The population surviving in this environment, so drastically diluted, was found to consist of the following forms :

1 — Common (> 1000 individuals per haul)

Paracalanus parvus, *Centropages kroyeri*, *Oithona nana*, *Euterpina acutifrons*, Copepod nauplii, *Evadne tergestina*, *Tintinnopsis cylindrica* and *Tintinnopsis radix.*

2 — Frequent (from 400-1000 individuals per haul)

Sagitta spp., Appendicularians, *Engraulis* eggs, *Noctiluca Scintillans*, Protozoa of prawns, *Tintinnopsis buetschelli, T. beroidea, Codonellopsis morchella, C. schabi, Eutintinnus latus, E. fraknoii, Rhobdonella spiralis, Epiplocylis undella*, veligers of Mollusca and Spionid larvae of Polychaeta.

3 — Rare (< 400 individuals per haul)

Acartia negligens, Temora stylifera, Oithona plumifera, Fish larvae mysis larvae, *Corycaeus, speciosus, Corycaeus clausi*, Echinopluteus larvae, *Evadne spinifera*, Bipinnaria larvae, Crab-zoea and *Tintinnopsis lobiancoi.*

By comparing the relative abundance of the common and frequent species prior to and during the flood period, it appears that some completely disappeared or became extremely rare during the flood season, These species are : *Clausocalanus arcuicornis, Isias clavipes, Acartia negligens; Oithona plumifera, Oncaea* spp., *Crycella* spp., *Temora stylifera, Evadne nordmanni* and *Evadne spinifera.* Such species being rather stenohaline are not able to whithstand the large dilution of the Bay, they either perish or avoid the diluted area. These species thus behave as some open sea plankton forms stated by STEUER [1935] to avoid the coastal waters near Alexandria during the flood season. On the other hand, several other common or frequent elements prior to the flood continued their existence or even becoming extremely common during the flood season such as *Centropages kroyeri, Evadne tergestina, Paracalanus parvus, Euterpina acutifrons, Oithona nana*, Appendicularians, *Sagitta* spp., *Engraulis* eggs, Zoea of prawn and *Noctiluca scintillans.*

Other forms, not recorded in the area in summer, were frequent or some times common in the Bay during the flood season, these such as : *Tintinnopsis cylindrica, T. radix, Codonellopsis morchella, C. schabi* and *Epiplocylis undella.*

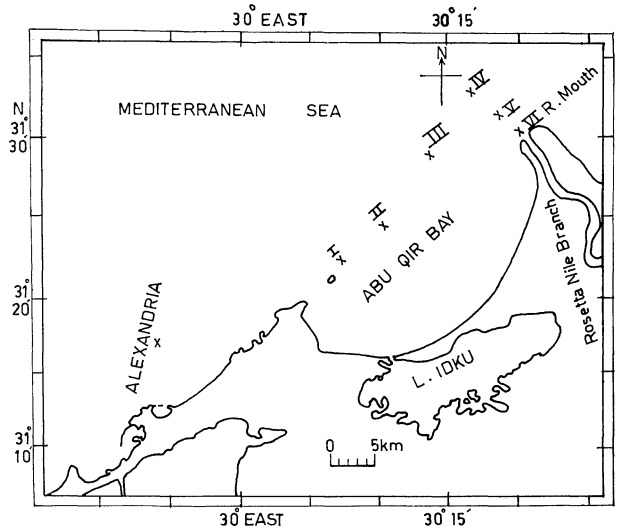

FIG. 1 — Showing stations sampled in Abu Qir Bay.

Genuine fresh water forms that may possibly be carried out into the sea by the out flowing Nile water were not recorded except at station (VI) where *Diaphonosoma (cladocera)* was recorded but in very few unhealthy specimens.

The Distribution of the important forms in the Bay during the flood :

The distribution of the larger forms in the upper surface water is traced from their occurrence in the coarse net hauls. The distribution of the smaller forms on the other hand, is traced from the vertical fine not catches in which they were better represented. Horizontal hauls taken by the fine net were not representable due to the heavy clogging of the net by the dense phytoplankton bloom which is mostly confined to the upper dilute layer. The total number of organisms and the numbers of the important constituents of the population are given in table (3) from which the following could be concluded :

1. On the whole the entire area of the Bay (compared with Alexandria region) maintained a rich zooplankton population during the flood period. Indeed, several species seem to favour the low salinity of the Bay during this season. The numerical variations of the total population and of the separate elements, from one station to the other are mostly due to local patchness.
2. The great abundance of the small copepods viz : *Paracalanus parvus*, *Oithona nana* and *Euterpina acutifrons* in the shallow station (V) (surface salinity 14.6 ‰) suggest that they also exist in large numbers in the upper dilute water layer.
3. The abundance of *Centropages kroyeri* and *Evadne tergestina* in the surface catches indicates their extreme euryhalinity, persisting in (St. V, salinity down to 8.04 ‰).

Table (3)

The total number of zooplankton organisms and the numbers of important forms in thousands per haul at Alexandria and at 6 stations in Abu Qir Bay on September 12th 1967, numbers less than 400 are indicated as rare, (r).
A. Horizontal haul catches of course net, 10 minutes duration;
B. Vertical haul catches of fine net. The surface salinity and the depth of each station is also given. Station V not sampled horizontally Station VI not sampled vertically.

	Alexan.	Abu Qir Bay					
		St. I	St. II	St. III	St. IV	St. V	St. VI
A. Surface salinity (‰)	35.95	29.78	25.07	23.06	10.09	14.6	8.04
Depth of water (m)	40	18	17	13	12	10	5
Total number	4.0	30.80	11.10	13.30	3.30	—	6.60
Evadne tergestina	1.24	26.50	8.70	12.00	22.70	—	4.00
Centropages kroyeri	1.6	3.10	1.40	8.50	r	—	2.10
Sagitta spp.	1.4	0.55	0.57	r	r	—	r
Appendicularians	r	0.55	r	r	r	—	—
Protozoea of prawn	—	r	r	r	r	—	r
Engraulis eggs	r	0.6	r	r	r	—	r
B. Total numbers	25.5	26.5	26.3	20.00	27.7	37.5	
Paracalanus parvus	14.5	7.85	5.76	5.10	8.10	7.25	
Oithona nana	1.60	5.60	0.70	0.92	3.50	3.92	
Euterpina acutifrons	1.60	3.92	2.16	2.30	3.50	6.70	
Centropages kroyeri	0.4	r	r	r	r	r	
Copepod nauplii	4.40	2.80	7.20	8.90	4.10	10.10	
Evadne tergestina	0.40	r	0.50	r	r	—	
Sagitta spp.	0.40	r	1.45	r	r	0.56	
Appendicularians	1.2	1.10	1.45	0.92	r	0.56	
Noctiluca	r	1.68	0.90	0.75	0.50	0.50	
Veligers of Mullusca	1.2	1.60	0.68	1.40	1.00	1.40	
Zoea of prawn	—	r	0.50	r	r	r	
Tintinnopsis cylindrica	0.60	r	0.48	0.46	0.40	0.56	
T. radix	—	r	0.96	0.56	0.40	0.56	
Codonellopsis schabi	—	r	0.96	0.80	1.20	2.80	

4. All the recorded copepod species were in a healthy and good condition even from areas most affected by dilution (St. V & VI). Bearing in mind that the Bay was subjected to dilution two weeks before sampling and judging from the extreme abundance of copepod nauplii, it may be concluded that these copepods not only tolerate such drop of salinity but they can also breed successfully in this environment. This also holds true for *Evadne tergestina*. On the whole, the lower salinity limit of the above mentioned species could be safely taken as 8 ‰.

5. The estuarine tendency of the 4 tintinnid species namely *Tintinnopsis radix*, *T. cylindrica*, *Codonellopsis morchella* and *Condonellopsis schabi* is clearly demonstrated in our samples.

6. The greater abundance of appendicularians, *Sagitta* spp. and *Noctiluca* in the vertical haul catches (inspite of the small depth sampled) than in the horizontal catches indicates that they may seek the subsurface more saline water not sampled horizontally.

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