

# Observations on the Zooplankton Community in the Egyptian Mediterranean Waters

by

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During 1966 zooplankton samples were collected from the Mediterranean fisheries grounds of Egypt by the Russian Research Vessel *Ichthyolog*. The area sampled lies between longitudes 29° 00' E and 33° 40' E and from near the coast to latitude 32° 40' N; it thus covered the inshore and offshore water from off El-Arish to the east to the Gulf of Arab to the west. The depth of the stations sampled ranged from about 6 m to more than 1000 m. Thirty stations arranged in 6 sections more or less perpendicular to the coast line were sampled in each of the four seasons of the year (i.e February, April, August and November). In the stations lying over depths not exceeding 100 m. the samples were collected by vertical hauling from near the bottom to the surface, while in greater depths the water column sampled did not exceed the upper 110 meters layer.

Altogether 120 samples were examined and counted by the authors and the numbers of each organism as well as the total counts were converted to express the numbers per cubic meter of the water column sampled. For convenience in the presentation of the data, the area sampled is divided into 3 depth zones, viz :

- coastal neritic zone comprising stations lying over depths < 50 m
- offshore neritic zone comprising stations lying over depths  $\geq$  50-200 m
- oceanic zone comprising stations lying over depths > 200 m

The results of the total counts (numbers/m<sup>3</sup>) at each depth zone are shown in table 1, that of the percentage composition of the important groups are shown in table 3.

A brief discussion of the results of the numerical distribution and percentage composition of the total zooplankton community in the area is given in this paper.

The present data represent the zooplankton production in the area investigated when the Nile flood water has, for the first time, since time immemorial ceased to flow into the Mediterranean, due to the construction of the Aswan High Dam.

Previous works in the area [HALIM, 1960; EL-MAGHRABY & HALIM, 1965; DOWIDAR, 1965; ALEEM & DOWIDAR, 1967] have shown that, as a result of the nutrient enrichment caused by the annual discharge of the flood water into the sea, a luxuriant plankton production took place in the whole area off the Nile Delta in autumn. As much as  $10 \times 10^6$  phytoplankton cells per litre were recorded in the neritic waters of Alexandria region during the climax of the flood of 1961; this dense phytoplankton bloom was associated with a high zooplankton production [DOWIDAR & EL-MAGHRABY, 1970]. Table 2 shows a comparison between the zooplankton production in the neritic waters of the area before and after the cessation of the flow of the Nile flood water into the Mediterranean. Although the sampling method was different in both years (i.e 1962 and 1966) yet, the values demonstrate clearly the large drop in the population of 1966. The annual average off Abu Qir in 1966 is less than half that of 1962 and that of the whole area is even much lower.

Apart from this obvious quantitative decrease, the general pattern in the zooplankton community in 1966, matched that had been recorded in Alexandria waters in 1961. As evident from table 1, the zooplankton crop showed two annual peaks in 1966, one in spring and the second in autumn, i.e. reflecting the same conditions previously recorded in Alexandria region and in various Mediterranean regions [DOWIDAR & EL-MAGHRABY, 1970].

TABLE 1. — The average No/m<sup>3</sup> ( $\times 10^2$ ) of the total zooplankton community at each zone of the six stations sampled and the mean seasonal and annual counts of the whole area sampled.

Season	Depth zone m	El-Arish	Tina Bay	Dami-etta	Brul-los	Abu Qir	Arab's Gulf	Mean of zone	Mean of Season
Winter	< 50	17	58	104	34	46	12	45	24.7
	50-200	17	—	21	9	—	—	16	
	> 200	5	5	3	12	18	11	9	
Mean of section		13	31	43	18	32	11		
Spring	< 50	103	107	70	114	125	31	92	43.7
	50-200	6	—	9	29	44	11	20	
	> 200	14	9	9	13	13	—	12	
Mean of section		41	58	29	52	61	21		
Summer	< 50	124	53	28	18	135	18	63	31.5
	50-200	—	8	17	10	12	17	13	
	> 200	9	9	10	17	8	11	11	
Mean of section		66	23	18	15	52	15		
Autumn	> 50	95	157	107	35	89	104	98	49.8
	50-200	28	52	17	15	—	—	28	
	> 200	23	15	14	4	19	13	15	
Mean of section		49	75	46	18	54	59		
Annual mean of section		42	47	34	26	50	26		

TABLE 2. — Zooplankton production (organism/m<sup>3</sup>) in the neritic zone (< 50 m depth) off the Nile Delta in 1962 and 1966.

	Off Alexandria 1962	Off Abu Qir 1962	Off Abu Qir 1966	Whole Neritic Zone 1966
Annual average	22200	22400	9900	7400

It is worth to mention that, coinciding with the period of the flood season in previous years, the autumn population was the highest of all seasons in the 3 depth zones sampled in the area. The average numbers/m<sup>3</sup> for these depth zones from the inshore to the oceanic zone was 9800 : 2800 : 1500 respectively.

The absolute maximum of the whole year viz; 15700/m<sup>3</sup> was recorded in the coastal waters of Tina Bay in that season. The condition so described in November 1966 represents, for the first time, the autumn increase when the area is not influenced by the Nile discharge. HALIM *et al.* [1967], gave some observations on the total zooplankton in the upper 10 meters in the area investigated during the flood season (October 1964). The relative poverty of the zooplankton crop in the neritic coastal waters (1000-3000/m<sup>3</sup>) referred to by HALIM *et al.* (*loc. cit.*) did not represent the actual condition. Their estimation is probably misleading since it was based on a very small number of scattered samples. Moreover, their reasoning that this drop is due to the repulsion of several zooplankters (other than Copepoda) from the dilute coastal waters of high phytoplankton content is not convincing. The analysis of the present samples have revealed that the numbers of the oceanic zooplankton forms in the coastal waters are by no means of importance and their contribution to the total zooplankton did not exceed 3-5 % in any season. Moreover, DOWIDAR & EL-MAGHRABY, [1970] found that the dilution of coastal waters associated with the dense phytoplankton bloom occurring in the flood season, induce several of the true neritic forms to reproduce and increase considerably in numbers; as much as 241000 organisms/m<sup>3</sup>, mostly of neritic copepods, were estimated by the authors in the neritic waters of Alexandria during the flood seasons of 1961 & 1962. (Salinity, 20 ‰ - 36 ‰).

As shown in table 1 the neritic coastal zone has maintained a rich zooplankton crop in all seasons, though subjected to seasonal and spatial variations. This is natural since such waters are favoured by numerous neritic zooplankton elements whether holoplanktonic or meroplanktonic, due to the large amount of available food (phytoplankton and detritus) as well as the suitable bottom which is favoured by several bottom invertebrates. The annual average of this depth zone in the whole area was 7400/m<sup>3</sup>. The ratio of the average total numbers in the three depth zones from inshore to offshore was found to be 6.3 : 1.7 : 1. The influence of the rich coastal population on the enrichment of the oceanic waters is of secondary importance. Since the latter maintains a fairly constant population (average 1180/m<sup>3</sup>) in all seasons. However, the distribution of the zooplankton elements seems to be affected to a certain extent by the wind regime in the area. In winter, under the effect of the prevailing North westerly winds several oceanic zooplankters are carried out into the coastal neritic waters. On the other hand, the spring and autumn increase in the total population of the oceanic waters may be due (at least partly) to an inshore enrichment governed by the southerly winds of usual prevalence at that time, beside the periodic flourishing which takes place in both seasons. As regards the regional numerical distribution, it was found that the sections off Abu Qir, Tina and El-Arish generally maintained the highest population in all seasons (average 5000, 4700, 4200 respectively). The richness of Abu Qir area is obviously due to higher basic production caused by land drainage and a rich population of meroplanktonic elements; the latter cause may, at least partly, account for the rich population of El-Arish and Tina regions. The richness in the latter two regions could also be attributed to the accumulation of organisms caused by the piling up of the water of the eastward current flowing along the south eastern Mediterranean. Direct current measurements (in summer and autumn) have shown that this current forms local vortices off Sinai Peninsula [GORGY, 1966; HASSAN, 1969].

TABLE 3. — The percentage composition of the zooplankton community based on :  
A - the average Nc. in each season; B - the annual average at each depth zone.

	A - seasons				B - depth zones			
	Winter	Spring	Summer	Autumn	< 50 m	50-200	>200	AbuQir < 50 m 1962
Copepods	81,8	79.6	69.8	76.3	78.7	73.1	77.2	76,3
Larval forms	7.9	12.0	13.4	9.5	11.5	5.8	3.8	8.4
Appendiculates	3.7	2.2	5.0	4,7	4,0	3.4	3.1	2.2
Pyrocysts	1.9	1.5	3.6	4.9	1.7	10.0	6.1	1
Sagitta	0.9	1.9	2.2	1.7	1.9	1.1	0.6	1
Coelentrates	2.2	1.2	0.5	0.8	1.1	1.2	1.7	1
Radiolarians	0.8	0.5	1.7	1.3	0.2	1.1	4.6	—

The percentage composition of the zooplankton community in the area (Table 3) shows that, regarding the qualitative aspects of the population, the general pattern is nearly the same in the three depth zones sampled. Thus, as in 1962, the copepods dominate the population at all depth zones and in all seasons (average 77.0 %). Planktonic larvae (average 10.8 %) follows in abundance. The warm seasons (i.e late spring, summer & autumn) are the seasons of high larval production; the low winter temperature seems to be not favourable for the breeding of several bottom invertebrate animals in the area. The barnacles (*Balanus* spp.) are the important winter breeding animals; Cirripede nauplii formed 3.6 % of the total winter population; they were exceptionally abundant in the coastal waters of Abu Qir where they constituted 24.0 % of the winter population in that region. Appendiculates, Pyrocysts and Radiolarians were particularly numerous in summer and autumn; the oceanic affinities of the latter 2 groups are confirmed in our samples. *Sagitta* spp. were rather frequent (as juveniles) in spring and autumn particularly in the neritic zone. Siphonophores were more frequent in the offshore and oceanic waters of the winter and spring seasons.

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