ion	Evenness J'
5	0.56
9	0.68
0	0.48
5	0.54
5	0.52
6	0.53
1	0.53
5	0.57
1	0.55
5	0.59
5	0.56
6	0.55

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Meroplankton and pelagic polychaetes of the Northern Levantine Basin shelf waters

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Abstract- Taxonomic composition of the meroplankton and holoplankton of the northern Levantine basin shelf waters has been investigated for the first time. Qualitative and quantitative analysis of total 12 samples taken in monthly intervals from a fixed station have shown that meroplankton of the region is represented under 5 phyla, 9 classes and 28 families. Pelagic nectochaete larvae of the Spionidae family (Polychaeta) and zoeas of Grapsidae family (Decapoda) were the dominating meroplanktonic groups throughout the year. Total 12 pelagic Polychaete larvae, 3 Gastropod larvae, 5 Decapod species and 6 adult pelagic Polychaete species were identified during the study period. There is considerable seasonal difference in the taxonomic composition and quantitative distribution of meroplankton and pelagic polychaetes. Presence of trochophora, metatrochophora, nectochaeta, rostraria larvae of Polychaeta; ophiopluteus, echinopluteus, auricularia, doliolaria, pentactula, bipinnaria, brachiolaria larvae of Echinodermata; zoea, mysis, megalopa larvae of Decapoda; nauplius, cypris larvae of Cirripedia; tornaria of Enteropneusta; actinotrocha larvae of Phoronidea make the region remarkably species diverse. Typical stenohaline taxa formed by classes of Enteropneusta, Ophiuroidea, Asteroidea, Echinoidea, Holothuroidea have been also revealed. Winter meroplankton taxa composed of 4 phyla, 4 classes and 17 families. Highest meroplankton diversity was observed in January with 15 families. The predominance of the decapod larvae was a distinguishing feature of the winter. Maximal meroplankton abundance totalling 176 specimens within the 0-100 m layer was recorded during the February. Holoplanktonic polychaete species identified in winter are *Tomopteris elegans*, *Vanadis studeri*, *Travisiopsis lobifera*, *Pelagobia serrata* and *Maupasia caeca*. Highly diverse meroplankton composition including 5 phyla, 9 classes and 19 families is observed during spring. During this period holoplanktonic polychaetes also composed of 4 families, 5 genera and 3 species. Overall, meroplankton and holoplankton diversity was highest during the spring (Margalef's Index **d** = 4.3, 5.4 and 5.6 for March, April and May, respectively) and lowest during August (**d** = 1.9) and November (**d** = 2.3). Predominance of the polychaete larvae in April and May was a distinguishing feature. A remarkable increase in numbers (60 specimens) of nectochaetes of family Spionidae (especially of genus *Prionospis*) was observed in May. Holoplanktonic polychaetes identified during spring were *Travisiopsis lobifera*, *Pelagobia serrata* and *Maupasia caeca*. Summer meroplankton composed of 4

phyla, 6 classes and 14 families. Holoplanktonic polychaetes were represented by 4 families, 5 genera and 4 species. Decapod larvae contributed much to the total biomass during July and zoeas only composed 45% of the total number of meroplankton in June and 70% in July, and finally vanished totally in August. The dominant holoplanktonic polychaete species were *Tomopteris elegans, Travisiopsis lobifera*, and *Typhloscolex grandis*. In comparison to winter and spring the density of Ostracoda and Pteropoda was less. Results of multivariate analysis (Multi-Dimensional Scaling) have shown that the late summer mero-holoplankton composition varied much from the rest of the periods. Taxonomic composition of the autumn meroplankton contained 5 phyla, 5 classes and 10 families. The dominating groups were nectochaetes of genus *Prionospio* and zoea of family Grapsidae. In September, almost half of the pelagic larvae were composed of polychaetes and decapods. Holoplanktonic polychaete *Pelagobia serrata* was most abundant in October and November. The abundance of Ostracoda was insignificant.

Keywords- meroplankton, pelagic polychaetes, diversity, Levantine basin.

Introduction

Planktonic larvae are composed of two groups, one being the larvae of various holoplankton, the other the larvae of benthic animals. Due to its great abundance and diversity, these two groups of plankton occupies an important place in the marine coastal plankton communities. During breeding seasons, the importance of meroplankton becomes even more evident. Since they appear periodically at definite seasons (spring, summer or autumn), they are called seasonal plankton. Except Protozoa, almost all the marine invertebrates undergo a planktonic larval stage during development. The presence of larvae in the plankton is controlled by a number of factors: spawning time, water temperature, duration of pelagic stage, food availability and abundance (phytoplankton, zooplankton) as well as the hydrodynamic regime (prevailing currents, upwelling and downwelling). The meroplankton composition of the Mediterranean Sea was studied in detail by British scientists R. Southern, 1909; E. W. Knight-Jones, 1954; French scientists M. Bhaude, 1967; C. Cazauax, 1972; J. P. Guerin, 1970; Spanish scientist F. Vives, 1966, 1967; Russian scientists S.A. Mileikovsky, 1973, 1974 ; V. V. Murina, 1995, 1997a,b, 1999. For the taxonomic identification of meroplankton of the northern Levantine basin we referred to the important work of M. Rose (1957) titled "Manuel de Planctologie Mediterranean" and very useful monograph of Dr. M. Bhaud, C. Cazaux, 1982 "Les Larves de Polychetes des Cotes de France". Also we referred to the Brasil Catalogue of Marine larvae of M. Vannucci, 1959-1961. The holoplankton polychaetes were identified according to C. Stop-Bowitz 1948, 1977 and 1984.

Material and Methods

Zooplankton samples for this study were collected from a single station, about 10 km offshore of the Institute of Marine Sciences of Middle East Technical University, located in the northeastern coast of the Mediterranean Sea (Fig.1.coordinates are 34°22'E, 36°30'N). This station, with a total depth of 150m, was visited at weekly intervals with R/V Erdemli starting from January 1998. The zooplankton samples were hauled from 100m to the surface using a Nansen net with a mouth opening of 0.385 m^2 and 112 micron mesh size. On board, the samples were preserved in a 4% borax buffered formaldehyde solution in seawater. Qualitative and quantitative analysis of the larval meroplankton were conducted under a binocular microscope using Bogorov's camera.

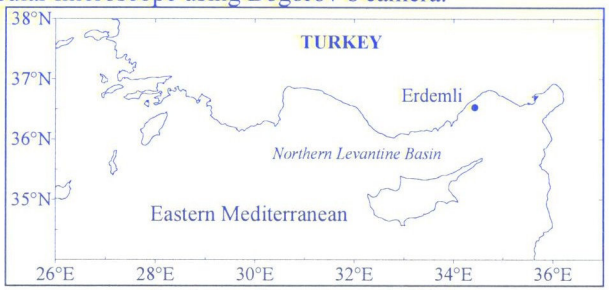


Fig. 1 Sampling station in the NLB.

Results and Discussion

Abundance is expressed as number of individuals for the layer 0-100 m. Dominant individuals that were frequently observed in the samples are shown in Fig.s 2 & 3. Taxonomic composition of the meroplankton and holoplankton of the northern Levantine basin shelf waters changed considerably in monthly intervals throughout the year. Such changes are well illustrated on the similarity dendogram given in Fig. 4. Similarly, results of multivariate analysis (Multi-Dimensional Scaling) have shown that the late summer mero-holoplankton composition varied much from the rest of the periods (Fig. 5). Total number of only 8 species were identified during August. Temperature rather than salinity was found to be more effective in controlling the abundance and diversity in the region (Fig.s 6a,b). Meroplankton and holoplankton abundance was highest during the winter period where the water column was thoroughly mixed way down to the bottom. Maximal meroplankton abundance totalling 176 specimens in a single tow within the 0-100 m layer was recorded in February. Highest meroplankton and holoplankton diversity was recorded in spring (Margalef's Index **d** = 4.3, 5.4 and 5.6 for March, April and May, respectively) and lowest during August (**d** = 1.9) and November (**d** = 2.3) (Table 1).

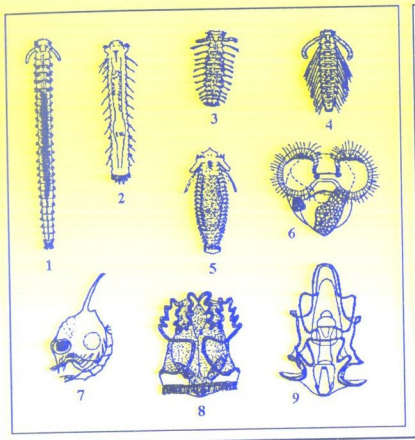


Fig. 2. Pelagic larvae of the bentic invertebrates. The nectochaetes of class Polychaeta: 1- *Prionospio malmgreni*, 2- *P. caspersi*. 3- *Scolelepis fuliginosa*, 4- *Microspio mecznikowianus*, 5- *Nerine cirratulus* , 6- veliger of *Limopontia capitata (class Gastropoda)*, 9-zoea of family Grapsidae (Decapoda), 8-tornaria of class Enteropneusta, 9- bipinnaria of class Asteroidea (Bhaud and Cazaux, 1982; 2- from Guerin, 19).

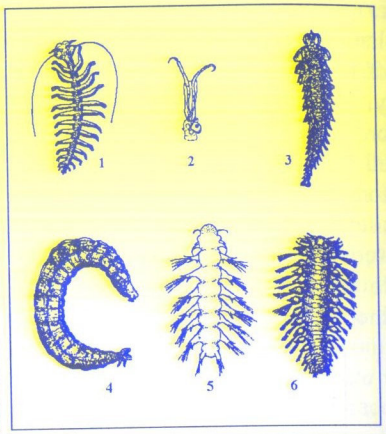
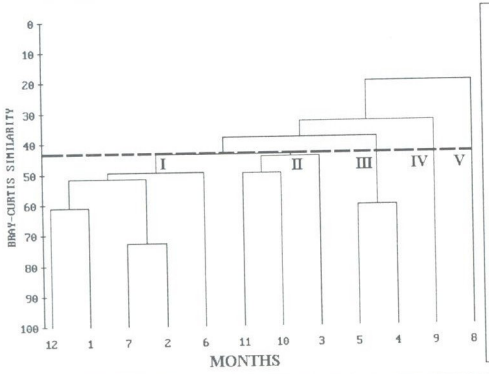
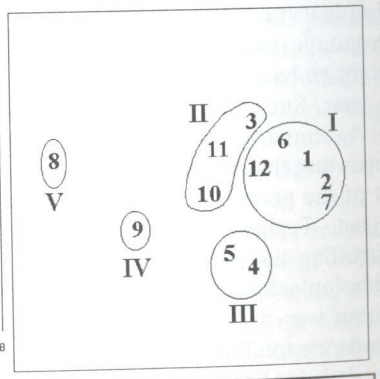


Fig. 3. Holoplanktonic polychaetes: 1- *Tomopteris elegans* 2- *Vanadis studeri* 3- *Travisiopsis lobifera* 4- *Typhloscolex grandis* 5- *Pelagobia serrata* 6- *Maupasia caeca* (1, 3, 4, 6 from Stop-Bowitz, 1977; 2 and 5 original.)





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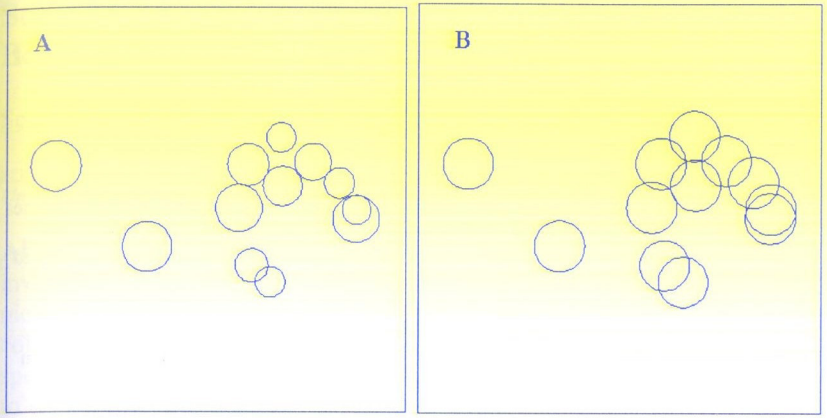

Fig. 6. MDS plots of superimposed values of surface temperature (a) and surface salinity (b).

Table 1. Monthly changes in meroplankton community diversity indices in the region.

Month	Total individual abundance/tow	Total # species	Richness d	Shannon H`	Evenness J`
January	211	24	4.3	1.8	0.58
February	240	22	3.8	2.3	0.75
March	206	24	4.3	2.0	0.62
April	182	29	5.4	2.6	0.78
May	218	31	5.6	2.8	0.82
June	119	18	3.5	2.4	0.84
July	126	19	3.7	2.0	0.66
August	37	8	1.9	1.6	0.78
September	123	17	3.3	2.1	0.76
October	102	21	4.3	2.3	0.76
November	85	11	2.3	1.6	0.66
December	178	14	2.5	2.1	0.80

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