

First record of a Polychaete species, *Leonnates persica*, and its seasonal distribution in Turkish coasts of the Mediterranean

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Abstracts- Seasonal distribution of an exotic species recently found in the Turkish coast of Mediterranean, *Leonnates persica*, was studied on three transects with depths of 5 m to 200 m. The species was observed in all sampling months and was found on the bottoms with water depth between 10 m and 150 meters. No individual of the species was found at depths shallower than 10 m and deeper than 150 m. the stations with a water depth of 200 meters. Species were observed between 40 and 150 m in February and May when Sea Surface Temperatures were below 21 °C, and was found at shallower waters (10-80 m) during warmer season (SST>29 °C in August), and started to move to deeper water in November. Abundance varied between 10 and 130 ind. m⁻² and peaked at 25-30 m in August. The species was found in the sediment composed mainly of CaCO₃ less than 35%, gravel <12%, sand >65%, silt <55%, and clay <21%. Abundance of *L. persica* peaked in sediment of shallow water where the sediment was characterized with CaCO₃ less than 28%, gravel <2%, sand >90%, silt <5%, and clay <3%.

Keywords- benthic, polychaete, new record, Turkish coast, Mediterranean

Introduction

The opening of the Suez Canal put into motion what has been called "a mammoth ecological experiment" (Por, 1978). Although the Canal was opened in 1869, the first migrant invertebrate was not observed in the Levant until 1924 (Ben-Tuvia, 1966). *Leonnates persica* Wesenberg-Lund 1949, is an endemic species of Persian Gulf and occurrence of the species in the Mediterranean Sea was reported first in the coast off Haifa by Ben-Eliahu (1998). Ben-Eliahu (1991) presented data on Nereididae of the Suez Canal. Of the 20 nereidid species reported from the Canal, 16 have Red Sea distributions, 4 have Mediterranean and Red Sea records. A previously reported *Leonnates* sp. fragment is tentatively attributed to the Lessepsian migrant species, *L. persica* that was reported in south of Haifa (Ben-Eliahu, 1991). Ben-Eliahu (1998) showed that the deep limit for *L. persica* was extended (range 13-153 m). A population of *Prionospio saccifera*, a new record for the Mediterranean Sea, was investigated in the Manavgat River Delta (Antalya Bay, Turkey, Cinar and Ergen, 1999). Simboursa et al (2000) studied polychaete communities of Greece and found a total of 398 species in soft bottoms

with depths ranging from 3 to 380 m. Ergen et al (2000) studied Nereididae fauna of the Bay of Izmir and found 7 genera and 15 species; of these *Micronereis variegata* was recorded for the first time in Turkish waters. Ergen and Cinar (1997) identified 129 polychaete taxa belonging to 30 families, of which 120 were new records for the Turkish region of the Levant Basin. Kocak et al (1999) studied fouling organisms and their developments in a polluted and an unpolluted marina in the Aegean Sea (Turkey) and identified 25 Polychaete species. The present study reported second occurrence of the species in the different location of the Mediterranean Sea and its first occurrence along the Turkish coasts. The study sowed also their spatio-temporal seasonal distribution in association with surface and deep-water temperatures and sediment structure (Gravel, sand, silt and clay compositions) and total carbonate of the sediment in a year.

Material and Methods

Benthic infaunal samples were collected with a standard Van-Veen Grab (0.10 m² surface area) at seven standard depths of three transects in February, May, August, and November 2000 (Fig. 1). The depths were 10, 25, 50, 75, 100, 150 and 200 m. Three replications for samples collections were made at each station. A bulk of sediment was taken apart from one of grab samples for the geological analyses.

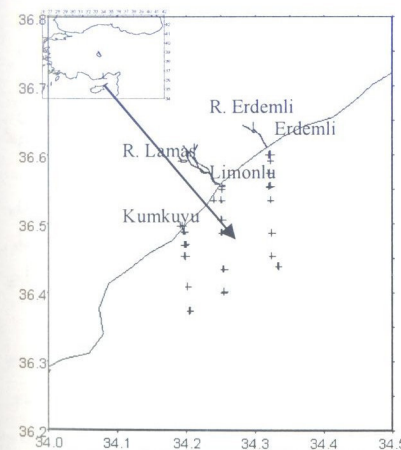


Fig. 1. Study area and station locations sampled for benthos.

Physical parameters of stations were measured by means of SeaBird Conductivity, Temperature and Depth (CTD) probe. Positions of the stations were fixed with Global Positioning System (GPS) on board of R/V "Erdemli". Onboard, the sediments were sifted with a sieve set of 0.5, 1 and 2 mm. In the laboratory, organisms were sorted out from the residuals and were preserved in 70% alcohol.

A polychaete species, *Leonnates persica*, was identified and found as new record for the Turkish coasts. Gravel (> 2mm) and sand (2.0-0.063 mm) size fractions of the surface sediment samples were separated using standard dry sieving. The silt (0.063-0.0039 mm) and (<0.0039 mm) fractions were determined standard pipette technique (Folk, 1974). The CaCO_3 content of sediment was determined by measuring volume of CO_2 produced on treating a known weight of sediment with excess HCl (Muller, 1967).

Results

A Polychaete species, *Leonnates persica*, new to the Turkish coasts of the Mediterranean Sea were found in the cruises of the present study. The species was observed in all sampling months and was found on the bottoms with water depth between 9 m and 146 meters. No individual of the species was found at the stations with water depths of 200 and 5 m. Specimens were observed on transect Limonlu while they occurred seasonally on other transects. Overall, spatial occurrence of the species was high off Erdemli in year 2000. The occurrence decreased from east to west in the sampling. There was also difference in temporal occurrence of the species. The species was observed only at 50 m, at 150 m, between 10 and 45 m and between 15 and 100 m off Erdemli, off Limonlu between 60 and 90 m, at 60 m, between 20 and 90 m, and at 20 and 100 m, and at 40 and 150 m, none, at 50 m, and at 75 and 150 m off Kumkuyu in February, May, August, and November, respectively. The species displayed significant difference in spatio-temporal distribution in the study area, resulting in that the species was observed 10 and 150 m depth off Erdemli, 20 and 100 m off Limonlu whereas no individual was observed on bottom shallower than 40 m off Kumkuyu (Fig. 2). At stations where the species was observed, abundance of the species ranged from 10 to 130 individuals m^{-2} in the year. The number of individuals remained at 10 in February and May whereas it varied between 10 and 130 in August and 10 and 50 individuals per square meter in November. Abundance of the species varied between 10 and 130 individuals m^{-2} off Erdemli, between 10 and 30 off Limonlu, and 10 and 20 individuals m^{-2} off Kumkuyu in the year (Fig. 2).

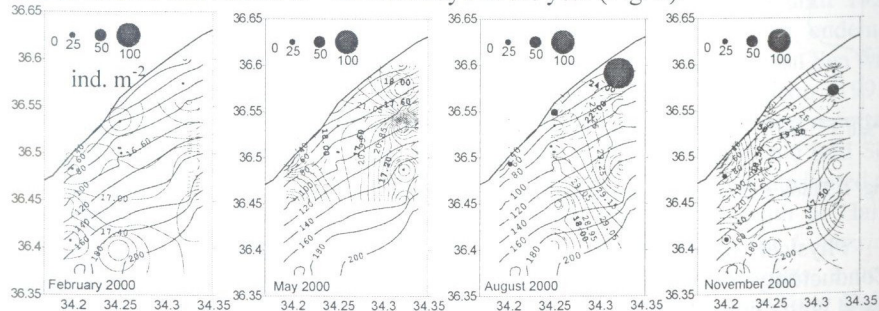


Fig. 2. Spatio-temporal abundance (ind. m^{-2}) distributions of *Leonnates persica* in association with Seas Surface Temperatures (SST; solid line), Deep Sea Temperatures (DST; dashed line and labels in bold) at the stations, and bathymetry (tick solid line) of the study

Sea Surface Temperature (SST) and Deep Sea Temperature (DST) increased from inshore to offshore (15.5 and 18.0 °C, and from 16 to 16.5 °C) in February, respectively. The temperatures decreased from inshore to offshore (from 21.3 to 20.5 °C, and from 19.2 to 17 °C) in May, (from 29.3 to 28.7 °C, and from 29 to 16 °C) in August. The SST increased from inshore (21.8 °C) to offshore (22.7 °C) whereas DST decreased from inshore (23 °C) to offshore (16.5 °C) in November. With increasing SST in August, *L. persica* moved to coastal water with depth less than 80 m and peaked in abundance in shallow water with depth about 25-30 m where SST was over 29.2 °C and DST was over 24 °C (Fig. 2). With SST dropping down to 22 °C at the depth, the species started to move the deeper zone. The species generally occurred in water with Sea Surface Salinity (SSS) higher than 39.2 ppt and Deep Sea Salinity (DSS) > 38.80 ppt.

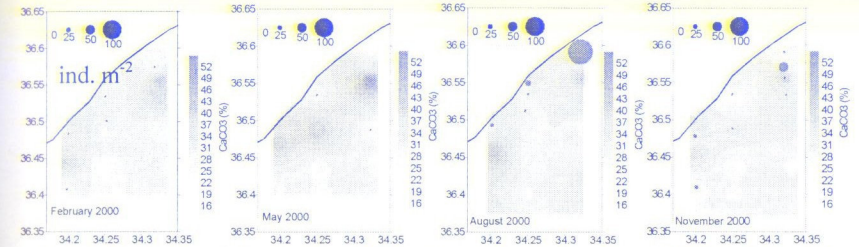


Fig. 3. Distribution of the species with regard to total carbonate content (%) of surficial sediment.

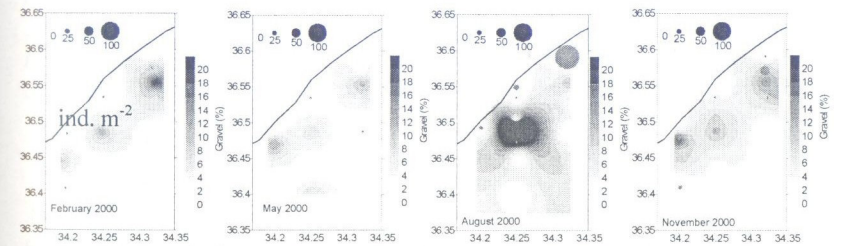


Fig. 4. Distribution of the species with regard to Gravel (%) of surficial sediment.

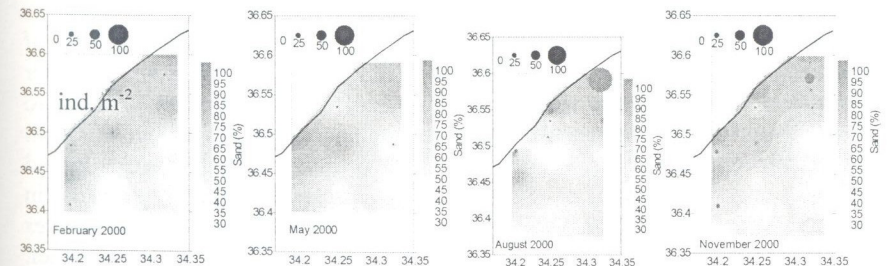


Fig. 5. Distribution of the species with regard to Sand (%) of surficial sediment.

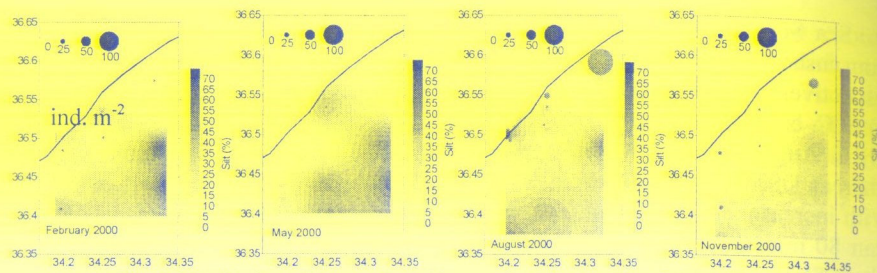


Fig. 6. Distribution of the species with regard to silt (%) of surficial sediment.

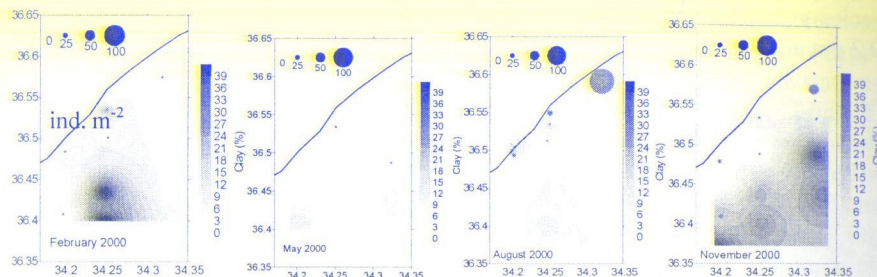


Fig. 7. Distribution of the species with regard to clay (%) of surficial sediment.

Horizontal distribution of the species was associated with geological parameters such as grain size and total carbonate (CaCO_3) as well. The species was found in the sediment composed mainly of CaCO_3 less than 35%, gravel <12%, sand >65%, silt <55%, and clay <21%. Abundance of *L. persica* peaked in sediment of shallow water where the sediment was characterized with CaCO_3 less than 28%, gravel <2%, sand >90%, silt <5%, and clay <3% (Figs. 3, 4, 5, 6 and 7).

Discussions

Leonnates persica occurred for the first time along the Turkish coasts. Occurrence of the species was reported in Red Sea that could be considered a region close to Mediterranean Sea (Ben-Eliahu, 1991). Earlier Mediterranean record (El Arish) was reported by Ben-Eliahu (1989). Ben-Eliahu (1991) made its farthest record at 10-15 m depths in the South of Haifa. Horizontal distribution of the species was restricted to a depth range of 9 to 146 m in variation of water temperature. During the warm water season (August), the species approach close to shallower water with depth less than 80 m and abundance peaked around 23-30 m depths. As the temperatures decreased, abundance decreased and the species spread over deeper bottom where the deep-sea temperature relatively warmer than that in the coastal water. Ben-Eliahu (1998) reported that the deep limit for *Leonnates persica* (a Lessepsian migrant) was extended in a range of 13 to 153 m off Israel. The present study showed also that no individuals of the species were occasionally observed on some deep bottoms even in a range of 10 to 150 m depths. Apart from SST and DST, another factor controlling its spatial distribution was sediment

textures (grain size). There was a carbonate zone characterized with high contents of CaCO_3 and gravel between 60 and 100 m depths in the study area. The gravel was composed mainly of molluscan shell fragments as referred to in Ediger et al (1997). The species was generally found in the sediment composed mainly of CaCO_3 less than 35%, gravel <12%. Sediment with high carbonate content, hence, high shelly gravel materials could prevent the specimens from surviving on the bottom.

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