

BIODIVERSITY AND VERTICAL DISTRIBUTION OF POLYCHAETES ASSOCIATED WITH MUSSEL BEDS ON ARTIFICIAL HARD SUBSTRATES (ROMANIAN COAST, BLACK SEA)

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Abstract

Species composition, abundance and diversity of polychaetes associated with rocky mussel biocoenosis of Agigea dyke was analyzed seasonally at 9 different depths. A total of 13 polychaete species belonging to 5 families were identified, including *Eulalia viridis* (Linnaeus, 1767), a new record for the Romanian Black Sea coast. The most abundant polychaete in all seasons was the opportunistic species *Polydora cornuta*, which dominated at depths between 8 m and 16 m. At depths between 0 m and 6 m another species, *Salvatoria clavata*, dominated.

Keywords : Biodiversity, Polychaeta, Black Sea.

Introduction

On the Romanian coast of the Black Sea the hard substrate consists of Sarmatian organogenic limestone, covering an area of approximately 70 km². This substrate is of great ecological and economical importance, because it provides high habitat complexity and harbours a rich and diversified fauna [1]. In addition to this natural rocky facies, the hard substrate is also represented by man-made structures such as docks, piers, jetties, breakwaters and shipwrecks. The aim of this study is to assess polychaete species composition and diversity from artificial rocky substrates of the Romanian Black Sea coast and provide information on their seasonal and vertical distribution patterns within these habitats.

Material and methods

Seasonal samples (16th June 2004, 3rd October 2004 and 16th April 2005) were collected by SCUBA divers from the outer part of the southern dyke of Agigea seaport (Fig. 1). Sampling was conducted by scraping off quadrats (400 cm² each) along a transect perpendicular to the dyke at 9 different depths (0, 2, 4, 6, 8, 10, 12, 14, and 16 m). Samples were washed through a 0.5 mm sieve and the retained organisms were fixed in 10% formalin and then transferred to 70% ethanol. Polychaetes were separated from the other taxa, identified to species level and counted. The community structure of polychaete assemblages was assessed on the basis of Soyer's frequency index (F), Margalef's species richness index (d), Shannon-Wiener's diversity index (\log_2 base, H'), and Pielou's evenness index (J').

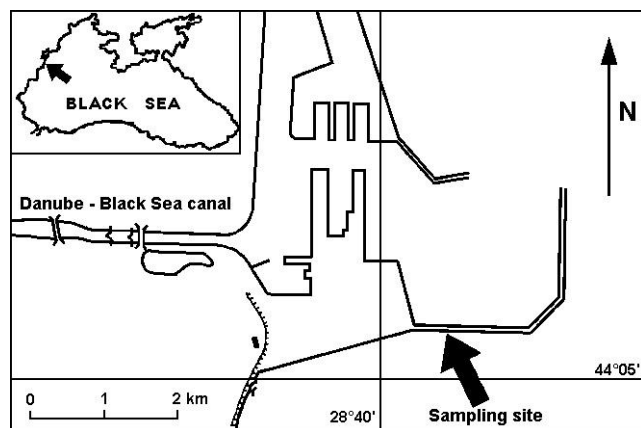


Fig. 1. Map of the Agigea seaport on the Romanian Black Sea coast. The Black arrow indicates the location of the study area.

Results and discussion

The identification of 8878 polychaete specimens collected provided 13 species belonging to 5 families (Table 1). *Eulalia viridis* (Linnaeus, 1767) is a new record for the Romanian Black Sea fauna. The most abundant species were *Polydora cornuta* (2741 individuals), *Salvatoria clavata* (1667 individuals), *Platynereis dumerilii* (1379 individuals), and *Neanthes succinea* (669 individuals) which accounted for up to 73% of the total number of individuals collected on artificial hard substrates. These four dominant species were also the most frequent species in the mussel beds, occurring in all seasons and at all depths investigated (frequency index $F=100\%$). Other recurrent species within artificial rocky sediments

($F \geq 50\%$) included *Harmothoe impar* (86%), *Prionospio cirrifera* (73%) and *Syllis gracilis* (59%). *Nereis zonata* (41%) and *Eteone picta* (32%) were classified as common ($25 \leq F < 50$), whereas *Nereiphylla rubiginosa* (23%), *Syllis hyalina* (14%), *Harmothoe imbricata* (13%) and *Eulalia viridis* (9%) were rare ($F < 25$).

The community structure of the polychaete assemblages varied among seasons and depths. Number of species tended to increase from spring to autumn and mean abundance was lowest during spring and highest during autumn. The maximum number of species occurred at a depth of 6 m (11 species), whereas the lowest number was found at 0 m (5 species). Total density of polychaetes was highest at 6 m depth (31,325 ind. m⁻²), gradually decreased toward shallower or deeper zones and reached a minimum at 14 m (2375 ind. m⁻²). Margalef's species richness index ranged between 0.90 (in summer at 2 m depth) and 1.76 (in spring at 12 m depth). Shannon diversity index ranged from 1.08 (in summer at 12 m depth) to 2.83 (in spring at 8 m depth) and Pielou's equitability ranged from 0.42 (in summer at 12 m depth) to 0.89 (in spring at 16 m depth).

Tab. 1. Average density of polychaete species (ind. m⁻²) across all seasons, for each of the 9 depths examined.

Species	Depth (m)								
	0	2	4	6	8	10	12	14	16
<i>Harmothoe cf. impar</i> (Johnston, 1839)	0	24	25	51	76	142	275	208	350
<i>Harmothoe imbricata</i> (Linnaeus, 1767)	0	0	0	0	0	0	0	8	9
<i>Nereiphylla rubiginosa</i> (de Saint Joseph, 1888)	0	0	0	0	12	8	0	25	18
<i>Eulalia viridis</i> (Linnaeus, 1767)*	0	0	23	27	0	0	0	0	0
<i>Eteone picta</i> Quatrefages, 1865	0	0	0	0	10	16	20	32	59
<i>Syllis gracilis</i> Grube, 1840	12	87	88	76	13	18	16	17	25
<i>Syllis hyalina</i> Grube, 1863	0	0	63	12	0	0	9	0	0
<i>Salvatoria clavata</i> (Claparède, 1863)	1063	3288	4052	5073	3500	717	650	667	542
Syllidae indet.	0	0	16	0	0	0	0	0	0
<i>Nereis zonata</i> Malmgren, 1867	11	225	300	50	150	9	7	0	0
<i>Neanthes succinea</i> (Frey & Leuckart, 1847)	350	987	800	1482	1494	792	300	558	516
<i>Platynereis dumerilii</i> (Aud. & M.-Edwards, 1833)	751	2074	6050	3052	3023	1125	209	134	57
Nereididae indet.	838	2326	2563	5575	5024	1942	1425	1458	1016
<i>Polydora cornuta</i> Bosc, 1802	22	638	2675	4887	5675	3358	2972	3559	3865
<i>Prionospio cirrifera</i> Wügan, 1883	0	0	12	50	26	67	133	1050	408

* new record for the Romanian Black Sea coast

The results of this study show that the polychaete fauna inhabiting the artificial rocky substrate from Agigea dyke is relatively scarce comparatively to the natural hard seabed from other areas [2, 3, 4]. This is essentially due to the strong influence of the severely polluted and eutrophicated waters of the nearby Agigea seaport and Danube - Black Sea canal.

References

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