Rocky Bottom Crustacean Fauna of Sinop (Black Sea, Turkey) Coast

Fauna de crustáceos asociados a sustrato rocoso de la costa de Sinop (Mar Negro, Turquía)

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Palabras claves: Crustacea, sustrato rocoso, diversidad, taxonomía, Mar Negro.

SUMMARY

This study was carried out to determine crustacean fauna of rocky substrates along the Sinop Peninsula coast of Black Sea. As investigation zones for the samples 8 stations were chosen from the supra-, medio- and infralitoral. Samples were collected seasonally. As a result of qualitative analyses of the samples, a total of 66 species and 26777 specimens belonging to 40 genera, 30 families and 6 orders were found. The Isopods *Exosphaeroma pulchellum*, *Idotea pelagica, Armadilloniscus littoralis, Halophiloscia couchi, Ligia italica*, *Jaera hopeana* and *Jaera italica* represent new records for the crustacean fauna of the Turkish Black Sea coast. The most frequent species in all samples were the amphipods *Hyale crassipes* (%93), *Ericthonius brasiliensis* (%89), the tanaid *Tanais dulongii* (%82) and the isopod *Idotea baltica* (%82) are the species that have the highest frequency index values. There was included %82 of species have Mediterranean origin.

RESUMEN

Este estudio se llevó a cabo para determinar la fauna de crustáceos de sustratos rocosos a lo largo de la Península Sinop del Mar Negro. Se seleccion-

aron 8 estaciones del supra, medio e infralitoral. Las muestras se recolectaron estacionalmente. Como resultado del análisis de las muestras, se registraron 66 especies y 26777 ejemplares pertenecientes a 40 géneros, 30 familias y 6 órdenes. Los isópodos *Exosphaeroma pulchellum*, *Idotea pelagica, Armadilloniscus littoralis, Halophiloscia couchi, Ligia italica*, *Jaera hopeana* y *Jaera italica* representan nuevas citas para la fauna de crustáceos del Mar Negro de Turquía. Las especies más frecuentes en todas las muestras fueron los anfípodos *Hyale crassipes* (%93), *Ericthonius brasiliensis* (%89), y el tanaidáceo *Tanais dulongii* (%82) y el isópodo *Idotea baltica* (%82) fueron las especies con los valores más altos del índice de frecuencia. El 82% de las especies son de origen Mediterráneo.

INTRODUCTION

The Turkish coast is extremely interesting biogeographically, because it is situated on a board line among many sectors with different biogeographical characters. Along the Turkish coast and in the Black Sea in general, crustacean communities have received little attention (Gönlügür-Demirci, 2006; Sezgin & Katağan, 2007). The information concerning the crustacean fauna of the Black Sea is not satisfying. Studies on regional biodiversity studies are of great importance for the development of preservation policy, because these studies lead to the best comprehension of structure, functioning and variability of the ecology of the communities. The aim of the present study was to characterize the composition of crustaceans inhabiting the infralittoral rocky bottom of Sinop coast. This information will provide a basis for future comparative work and monitoring programs in the study region.

MATERIAL AND METHODS

Sinop peninsula is the northernmost part of Turkey. This peninsula has been affected by anthropogenic activities such tourism and fishery resources. The benthic material was collected from seven stations in various types of substrates on a seasonal basis (Fig. 1).

The crustaceans examined in this study were collected using hand scraper, forceps and hand net, from July 2004 to June 2005, at depths ranging from 0 to 1m. The samples taken in each station were placed in separate jars and fixed in a 5% formaldehyde solution. Specimens have been deposited in the Laboratory of Marine Biology, University of Sinop. Specimens were then classified into three different constancy categories: constant (C ≥50%), accessory (25% < C< 50%) and accidental (C≤ 25%).

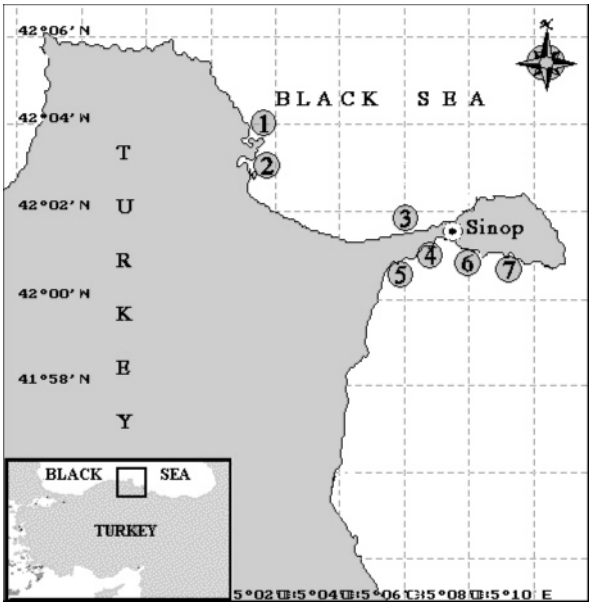

Fig. 1.—Study area and stations.
Fig. 1.—Área de estudio y estaciones.

RESULTS

During the 4-season sampling period, a total of 6 orders, 31 families, 40 genera and 69 species were recorded (Table I). Considering the number of species, the two most representative orders were the Amphipoda (45 species) and the Isopoda (11 species) (Fig. 2). Also with respect to number of individuals, the Amphipoda (19127 individuals) and Isopoda (6586 individuals) were the most important orders (Fig. 3).

According to the species' number in general, the dominant families in the study area are Gammaridae, Hyalidae, Ischyroceridae, Sphaeromatidae and Idoteidae (Fig. 4). With respect to number of individuals, Hyalidae (7886) and Gammaridae (5699) were the most important families in the region (Fig. 4).

Considering the species dominance, the seven most representative species were *Hyale crassipes, Echinogammarus olivii, Sphaeroma serratum, Idotea baltica, Hyale pontica, Gammarellus angulosus* and *Ericthonius brasiliensis* (Fig. 5). Regarding the pattern of temporal occurrence, 12 species were considered constants; 43 species that presented in Table I, were considered accidentals (Fig. 6).

Table I.—List of crustacean species and their presence, abundance and frequency (*f*) for each station
Tabla I.—Lista de las especies de crustáceos y su presencia, abundancia y frecuencia (*f*) por cada estación.

Species	Stations								
	1	2	3	4	5	6	7	% *f*	Total
Mysida									
Siriella jaltensis Czerniavsky, 1868		1						4	1
Cumacea									
Pseudocuma longicornis Bate, 1858		1						4	1
Cumella (Cumella) limicola Sars, 1879				3	1			11	4
Tanaidacea									
Tanais dulongii (Audouin, 1826)	26	14	56	114	358	30	46	82	644
Leptochelia savignyi Krøyer, 1842	2	190	2	97	68	12	14	75	385
Isopoda									
Exosphaeroma pulchellum (Colosi, 1921)			97	1	59			46	157
Sphaeroma serratum (Fabricius, 1787)	1	3	2	2	3345	13	3	21	3369
Dynamene torelliae (Holdich, 1968)	3	36		8	13	20	33	57	113
Idotea baltica (Pallas, 1772)	3	137	515	127	907	106	29	82	1824
Idotea pelagica Leach, 1815	8	17	106	23	89	141	55	50	439
Synisoma capito (Rathke, 1837)		4				3		14	7
Jaera italica Kesselyak, 1938					2			4	2
Jaera hopeana A. Costa, 1853					83			11	83
Ligia italica Fabricius, 1798					1	4		11	5
Armadilloniscus littoralis Budde-Lund, 1885					6	86		11	92
Halophiloscia couchi (Kinahan, 1858)		2			5	43	6	18	56
Amphipoda									
Ampithoe helleri Karaman, 1978			3		1	2		11	6
Ampithoe ramondi Audouin, 1826	39	432	5	65	153	102	10	79	806
Cymadusa crassicornis (A. Costa, 1857)					1	2		7	3
Biancolina algicola Della Valle, 1893	33	1			2	2		18	38
Ericthonius brasiliensis (Dana, 1855)	37	1064	5	55	316	190	39	89	1706
Ericthonius punctatus (Bate, 1857)		19						4	19
Jassa marmorata (Holmes, 1903)	17	4	3	9	18	5	8	43	64
Jassa ocia (Bate, 1862)		5	3	2	11	3		25	24
Atylus massilensis Bellan-Santini, 1975				1				4	1
Atylus guttatus (A. Costa, 1851)					18			4	18
Dexamine spinosa (Montagu, 1813)		43	2	50	20	67	19	46	201
Dexamine spiniventris (A. Costa, 1853)		2				2		7	4
Dexamine thea (Boeck, 1861)		2		2		1		25	5
Apherusa chiereghinii Giordani-Soika, 1950		11		1	6	10		14	28

Table I.—*Continued.*
Tabla I.—*Continuación.*

Species	Stations								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**% *f***	**Total**
Apherusa bispinosa (Bate,1857)	2		2		1	4	2	11	11
Echinogammarus olivii (Milne-Edwards, 1830)	2	3	26		3666	73	6	54	3776
Echinogammarus foxi (Schellenberg, 1928)					469			11	469
Gammarellus angulosus (Rathke, 1843)	347	79	201	151	170	182	124	43	1254
Gammarus aequicauda (Martyinov, 1931)					25			4	25
Gammarus crinicornis Stock, 1966			17		4			7	21
Gammarus insensibilis Stock, 1966		7	32	1	47	2		29	89
Gammarus subtypicus Stock, 1966				4	61			14	65
Melita palmata (Montagu, 1804)	3	1		3	3			14	10
Stenothoe monoculoides (Montagu, 1815)	36	102	12	40	140	124	6	57	460
Hyale pontica Rathke, 1837	624	105	27	242	117	535	239	61	1889
Hyale camptonyx Heller, 1866	509	23		1	4	62	251	46	850
Hyale crassipes (Heller, 1866)	893	41	434	211	892	653	912	93	4036
Hyale perieri (Lucas, 1849)	50	61	31		5	67	533	39	747
Micropythia carinata (Bate, 1862)	55	38	13	30	108	96	24	36	364
Orchestia gammarellus (Pallas, 1766)		3			1			7	4
Orchestia mediterranea A. Costa, 1853		8			1		2	11	11
Orchestia montaqui Audouin, 1826		6			34	14		11	54
Orchestia platensis Krøyer, 1845					4			4	4
Orchestia stephenseni Cecchini, 1928		2			34	2		14	38
Microdeutopus gryllotalpa A. Costa, 1853		8	11	9	25			14	53
Leptocheirus pilosus Zaddach, 1844				1				4	1
Monocorophium acherusicum A. Costa,1851	6	53	4	13	86	23		21	185
Monocorophium insidiosum Crowford, 1937	9	39	4	14	1089	8	2	57	1165
Medicorophium runcicorne Della Vella, 1893		13						4	13
Caprella acanthifera Leach, 1814	8	4						7	12
Caprella mitis Mayer,1890	1					3		14	4
Caprella danilevskii Czerniavski, 1868					10			11	10
Caprella equilibra Say,1818	2	41	1		2	91		4	137
Caprella rapax Mayer,1890	2	56	1	22	141	198	6	54	426
Pseudoprotella phasma (Montagu, 1804)		1				20		7	21
Decapoda									
Hippolyte leptocerus (Heller, 1863)		5						7	5
Pisidia longimana (Risso, 1816)		3		1				7	4
Pilumnus hirtellus (Linnaeus, 1761)			2					7	2
Xantho poressa (Olivi, 1792)		1				1		7	2
Pachygrapsus marmoratus (Fabricius, 1787)	7	5		1		1	2	29	16

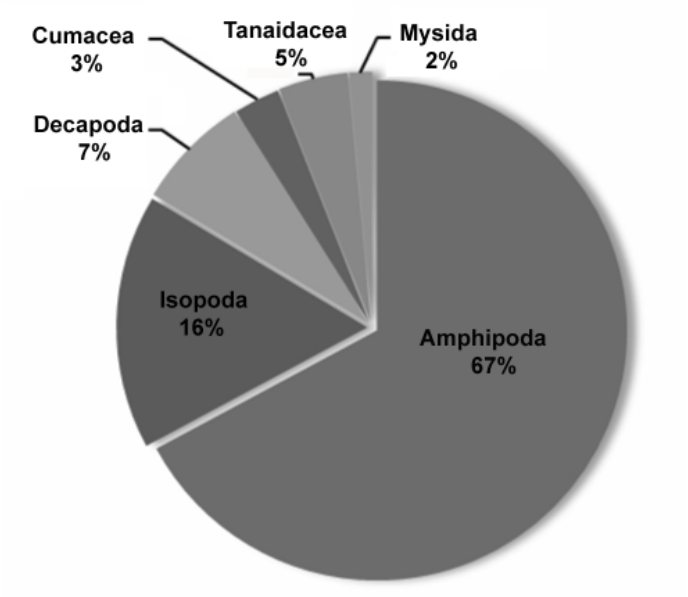

Fig. 2.—Qualitative dominance of orders.
Fig. 2.—Dominancia cualitativa de los diferentes órdenes.

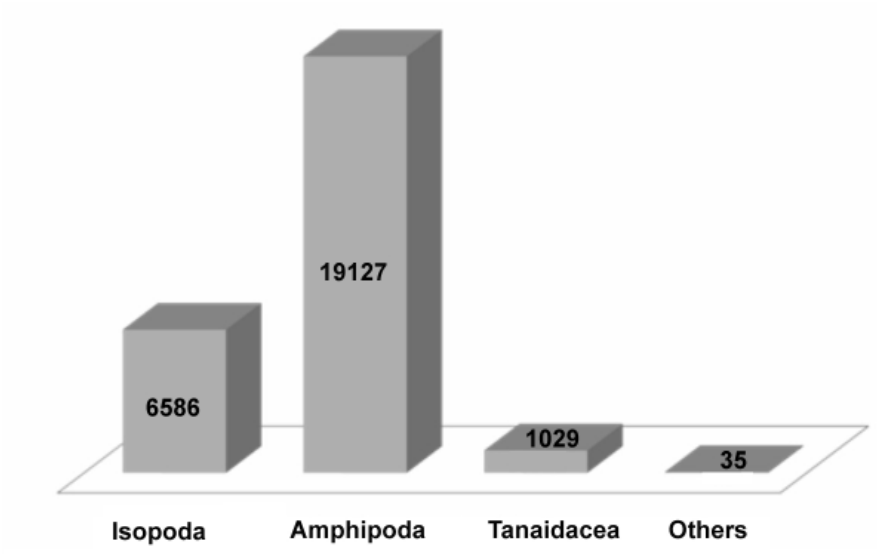

Fig. 3.—Numbers of individual of orders.
Fig. 3.—Número de individuos de los diferentes órdenes.

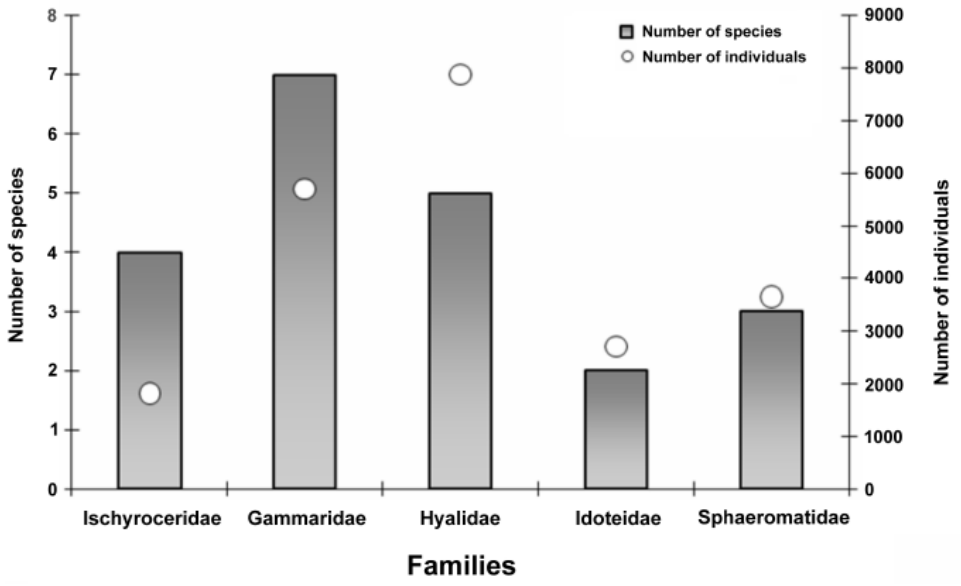

Fig. 4.—Numbers of species and individual of families.
Fig. 4.—Número de especies y familias.

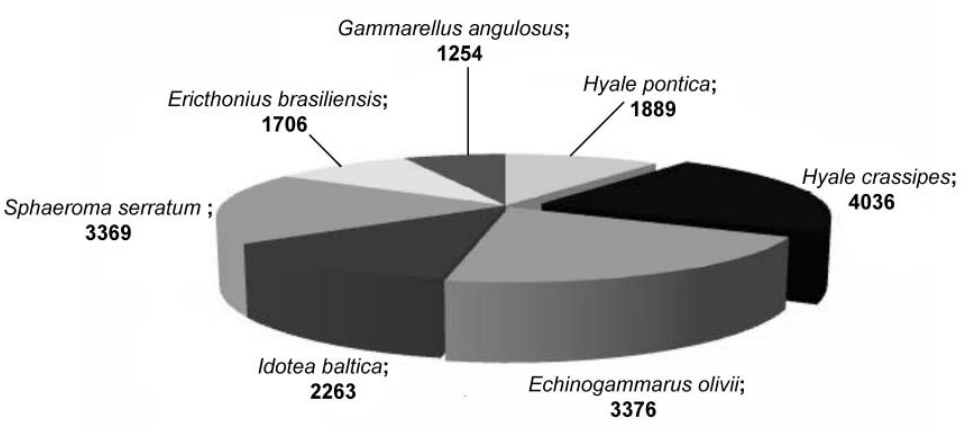

Fig. 5.—Dominance values of species.
Fig. 5.—Valores de dominancia de las especies.

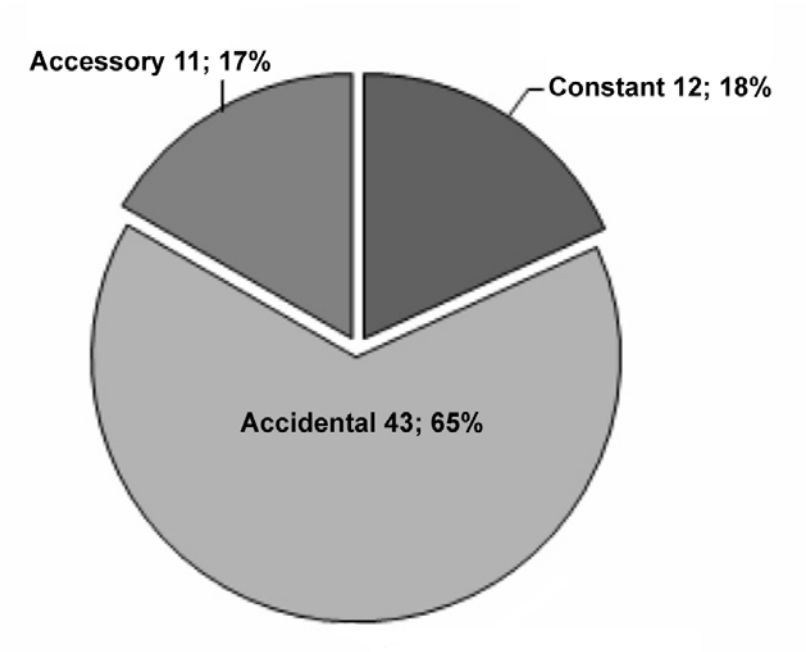

Fig. 6.—Distribution of species to three frequency index values groups.
Fig. 6.—Distribución de las especies en tres grupos según los valores del índice de frecuencia.

Regarding the species' richness at the study area examined, the highest number of species was obtained at station 5 (50), followed by station 6 (43) and station 4 (29). The lowest species' richness was recorded at station 1, with only 23 crustacean species. Overall numbers and species' presence are shown in Table I for each sampling station. The relative dominance of crustaceans showed partially fluctations within the different seasons of the same year. Crustaceans attained their highest number of species in spring (48 species) and number of individuals in autumn (9810 individuals) (Fig. 7).

When we considered the Black Sea as a marine basin, we can see it has no own native fauna in general. The big majority of the species in the Black Sea is originated from the Atlantic and Mediterranean. As a result of this study 6 cosmopolitan, 6 endemic and 54 Atlanto-Mediterranean originated species have been identified (Fig. 8)

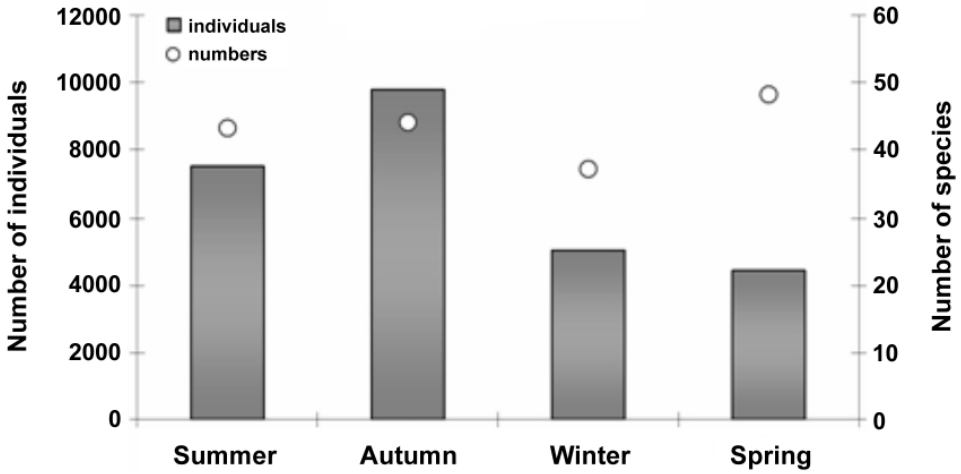

Fig. 7.—Seasonal changes of species and individuals.
Fig. 7.—Cambios estacionales de las especies y los individuos.

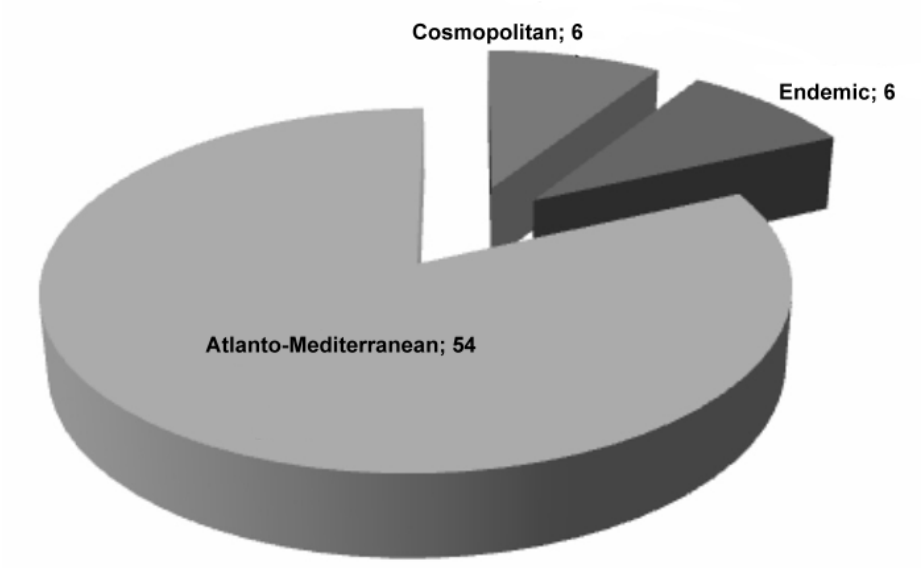

Fig. 8.—Zoogeographic patterns of species.
Fig. 8.—Patrones zoogeográficos de las especies.

DISCUSSION

Monitoring marine biodiversity is of most importance to determine the distrubiton of species, to detect local extinctions or invading species. Considering the relatively small area of Sinop Peninsula compared to the range of the Turkish Black Sea coast, we considered that the diversity of crustaceans was high. With this study the Isopods *Exosphaeroma pulchellum*, *Idotea pelagica*, *Armadilloniscus littoralis, Halophiloscia couchi, Ligia italica*, *Jaera hopeana* and *Jaera italica* represent new records for the crustacean fauna of the Turkish Black Sea coast. A high diversity was recorded for the amphipods in this area that could be related to the fact that Sinop coasts constituted a habitat with favorable conditions for set up and reproduction of these animals. Native populations of the Mediterranean and Atlantic Sea are sources of enrichment for the Black Sea fauna, and in this way the Black Sea is also enriched with warmwater species (Casper, 1957; Băcescu, 1977). Only qualitative samplings do not permit the presentation of a complete description of all rocky bottom crustaceans. Moreover, since our data is restricted to a small area within the Black Sea, future studies on a wider area are needed before we can summarize our findings.

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