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Research Article

Peracarid Crusteceans Species from Upper Infralittoral Rocky Shores of Gokceada Island (Aegean Sea)

Herdem ASLAN[1(*)], Pınar İŞMEN[2]

[1]Çanakkale Onsekiz Mart University, Faculty of Arts and Science, Department of Biology, Çanakkale,TURKEY
[2]Çanakkale Onsekiz Mart University, Faculty of Marine Sciences and Technology, Çanakkale , TURKEY
*Correspondent: asherdem@comu.edu.tr
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Herdem Aslan :Orcid 0000-0002-0872-2919, Pınar İŞMEN: Orcid 0000-0003-4662-5260

Abstract: The abundance of the peracarid crustacean fauna were studied on a spatial scale of Gokceada Island which is located Northern Aegean Sea. Samples were collected seasonally from 13 coastal stations at depth 0.1-0.5 m, during years of 2010 and 2011. The surface was scraped by means 20 x 20 cm quadrats and sieving 0.5 mm mesh size. Result of identified and counting all peracarid species, a total of 142,906 individuals/m^2 were obtained belonging to 88 species and 66 of them were new record for the island's fauna. Amphipods were the dominant group both in terms of species Margalef richness and abundance. *Ampithoe ramondi, Hyale schmidti* and *Elasmopus brasiliensis* were the most abundant species. Number of species, density, richness, evenness, diversity of stations and similarity are also discussed.

Keywords: Peracarida, Crustacea, Gokceada, Aegean Sea

Gökçeada (Ege Denizi)'nın Kayalık Üst Inftalittoral Kıyılarının Peracarid Crustacea Türleri

Özet: Peracarid crustacea faunanın bolluğu, Kuzey Ege Denizi'nde yer alan Gökçeada Ada'nın mekansal ölçeğinde incelenmiştir. Örnekler, 2010 ve 2011 yıllarında 0,1-0,5 m derinliğindeki 13 kıyı istasyonundan mevsimsel olarak toplanmıştır. Numuneler, 20 x 20 cm olan kuadrat aracılığıyla sert zeminden kazınmış ve 0,5 mm göz açıklığına sahip elekten geçirilmiştir. Tüm peracarid türlerin, tür teşhisi ve sayılmaları sonucunda, 88 türe ait toplam 142.906 birey/m^2 elde edilmiş ve bunların 66'sı adanın faunası için yeni kayıttır. Amphipodlar hem tür zenginliği hem de bolluk açısından baskın grup olduğu saptanmıştır. *Ampithoe ramondi, Hyale schmidti* ve *Elasmopus brasiliensis* en bol bulunan türlerdir. Çalışmada ayrıca tür sayısı, birey sayısı, zenginlik indeksi, düzenlilik indeksi, çeşitlilik indeksi ve istasyonların benzerlikleri de tartışılmıştır.

Anahtar Kelimeler: Peracarida, Crustacea, Gokceada, Ege Denizi

Introduction

The highest species richness is present in the coastal areas and decreases from the shallow toward to the deeper parts of the Mediterranean Sea (Coll *et al.*, 2010). Specially, rocky habitats are very productive ecosystems that support a variety of plants and animals. In spite of the importance of the coastal rocky habitats is known, they are under pressure due to various anthropogenic threats. Knowing species composition and their function is critical to understanding its sustainable use and safeguarding it for the benefit of future generations.

Islands and their surrounding near-shore marine areas constitute unique ecosystems often comprising many plant and animal species. The legacies of a unique evolutionary history, these ecosystems are irreplaceable treasures. They are also key to the livelihood, economy, well-being and cultural identity of 600 million islanders- one-tenth of world population (Convention on biological diversity, 2019). The Aegean Sea has got nearly 2.000 islands and Gokceada Island (Imbros), the biggest island of Turkey (289 km^2) which is located in the Northern Aegean Sea at the mouth of the Çanakkale Strait is situated nearly 25 km off the coast of mainland. The coastal line of island is 95 km and its surface is 289 km^2.

Peracarids (Amphipoda, Cumacea, Isopoda, Mysidacea and Tanaidacea) are a major constituent of the benthic fauna of many littoral environments and play an important role in the structuring, they are good indicators of water and sediment quality (Conlan, 1994, Gomez Gesteira & Dauvin 2000, Moreira *et al.*, 2008, Aslan-Cihangir & Pancucci-Papadopoulou, 2011).

Seasonal fluctuations of peracarid species are often the consequence of complex interactions between a number of factors.

Although to know importance of peracarid community, only 27 peracarid species had been known up to 2018 from Gokceada Island (Kocataş & Katağan 1977; Katağan, 1982; Çamur-Elipek & Aslan-Cihangir, 2007). In 2018, a total of 34 species have been reported, 18 of which are new recorded, from the south-east of island by Aslan *et al.,* (2018). None of these studies were focused spatial variations in community of peracarids from coastal rocky habitats.

The main aim of this study was to explore the spatial fluctuations in population density of peracarida on upper infralittoral rocky shores of Gokceada Island. The relationships between abundance cycles and population structure were also examined.

Material and Methods

The study was conducted during 2010 and 2011 at Gokceada Island. Sampling involved at depth 0.1-0.5 m, as seasonally from thirteen stations (Table1, Figure 1). The surface was scraped by means 20 x 20 cm quadrats which is covered mesh size 0,3 mm cloth pouch due to not missing vajil forms. All macroalgae and associated fauna were collected as three replicates from each station and were sieved through a 0.5 mm mesh size sieve and then all sampling were fixed with a 4 % formaldehyde-seawater solution. In the laboratory, the peracarids were separated from other animals under a stereomicroscope and put in glasses in 70 % ethanol. All peracarid species identified at the species level and counted.

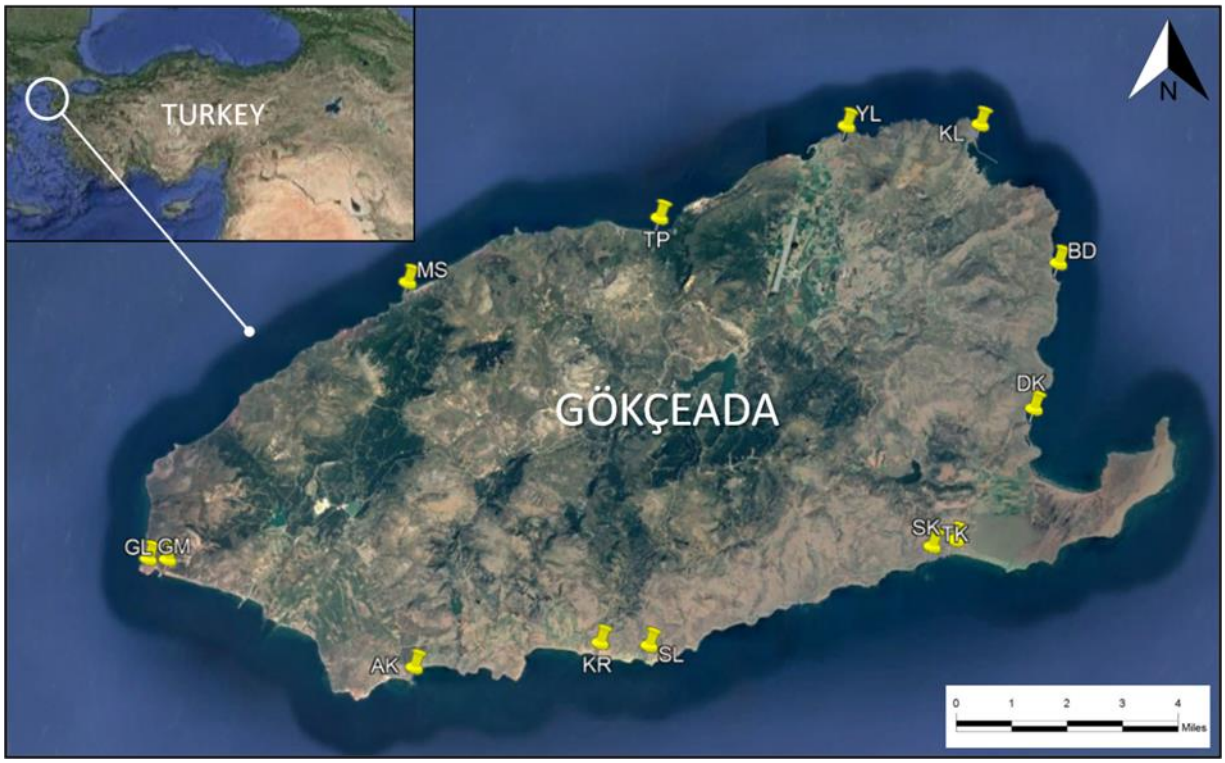

Figure 1. Map of the Gokceada Island showing sampling stations

Univariate analyses were applied to characterise the community in terms of relative abundance and diversity. The Margalef richness index (d), Pielou evenness index (J') and Shannon-Wiener diversity index (log_2 base) (H') were calculated at each station and season. The frequency of species occurrence (Ci) was calculated to identify the most representative species; accordingly, each species was evaluated either as constant ($1 \geq Ci \geq 0.5$), common ($0.5 > Ci \geq 0.25$) and rare ($Ci < 0.25$) (Soyer, 1970). Dominance index is relative total abundance in percentage.

The numerical abundance data were analyzed using cluster techniques, based on Bray Curtis similarity, using the PRIMER package ver. 6.0 (Clarke & Warwick, 2001). The cluster analysis was based on $log_{10}(n+1)$ transformation.

Results

A total of 142,906 specimens ($ind.m^{-2}$) were collected from Gokceada Island belonging to 88 Peracarid species (Table 2). Among of them total 66 species were new record for the Gokceada Island.

Table 1. Physical description of the sampling stations

Station Name	Station kode	Coordinates	Date	Fasiyes
Yıldız Koy	YL	40º 14′ 04.57 25º 54′ 11.16	05.04.2010 07.07.2010 10.10.2010 06.01.2011	Algae community
Tepeköy	TP	40º 12′ 40.39 25º 50′ 23.60	27.03.2010 07.07.2010 26.10.2010 23.12.2010	Algae community
Marmaros	MS	40º 11′ 41.99 25º 45′ 17.86	27.03.2010 20.06.2010 12.10.2010 24.12.2010	Algae community
Gizli Liman	GL	40º 07′ 26.02 25º 40′ 25.49	27.03.2010 07.07.2010 12.10.2010 06.01.2011	*M.galloprovincialis* community
Gizli Liman 2	GM	40º 07′ 26.80 25º 40′ 02.14	27.03.2010 07.07.2010 12.10.2010 06.01.2011	Algae community
Adalet Kampı	AK	40º 05′ 45.31 25º 45′ 23.71	27.03.2010 20.06.2010 12.10.2010 06.01.2011	Algae community
Karakol	KR	40º 06′ 07.44 25º 49′ 09.08	24.03.2010 16.06.2010 10.10.2010 06.01.2011	Algae community
Şapel	SL	40º 06′ 04.69 25º 50′ 8.46	24.03.2010 16.06.2010 10.10.2010 06.01.2011	Algae community
Sen Kamping	SK	40º 07′ 40.79 25º 56′ 20.28	24.03.2010 16.06.2010 10.10.2010 06.01.2011	Algae community
Kefaloz	TK	40º 07′ 34.94 25º 55′ 51.98	24.03.2010 16.06.2010 10.10.2010 06.01.2011	Algae community
Aydincik Koyu	DK	40º 09′ 41.85 25º 57′ 56.38	01.04.2010 16.06.2010 10.10.2010 24.12.2010	Algae community
Bozdere	BD	40º 11′ 56.48 25º 58′ 27.24	01.04.2010 16.06.2010 10.10.2010 24.12.2010	Algae community
Kuzu Limanı	KL	40º 14′ 05.27 25º 56′ 53.38	01.04.2010 17.06.2010 10.10.2010 24.12.2010	Algae community

Table 2. List of peracaridian crustaceans and their abundance (ind.m^{-2}) collected from Gokceada Island, *new record for Gokceada Island.

Species/stations	YL	TP	MS	GL	GM	AK	KR	SL	SK	TK	DK	BD	KL
Amphipoda													
Ampithoidae													
Ampithoe ramondi (Audouin, 1826)	2283	8392	1400	1508	2717	417	400	3325	558	4492	2550	4008	1546
Ampithoe ferox (Chevreux, 1901)*	250	142	367	1642	317	333	500	517	2467	1467	692	717	267
*Ampithoe spuria (*Krapp-Schickel, 1978)*	0	0	0	0	0	0	8	83	0	0	0	0	0
Pleonexes helleri (Karaman, 1975)*	0	0	0	0	0	217	0	0	0	0	0	0	0
Ampithoe riedli Krapp-Schickel, 1968 *	17	0	0	25	0	0	8	0	0	0	0	0	0
Sunamphitoe pelagica (H. Milne Edwards, 1830)*	0	258	0	0	0	0	0	0	0	0	0	0	0
Aoridae													
*Microdeutopus gryllotalpa (*Costa, 1853)*	0	0	0	0	0	0	0	0	42	17	0	0	0
Microdeutopus chelifer (Spence Bate, 1862)*	142	875	167	0	50	133	0	933	0	742	67	83	0
Microdeutopus stationis (Della Valle, 1893)*	8	0	8	0	0	0	17	0	0	33	0	0	0
Microdeutopus anomalus (Rathke, 1843)*	8	0	0	0	0	0	0	0	0	0	0	0	0
Microdeutopus obtusatus (Myers, 1973)*	58	1517	458	275	217	192	233	1742	842	200	367	217	0
Microdeutopus algicola Della Valle, 1893	0	100	0	0	0	0	83	0	25	0	0	0	0
Microdeutopus sp	25	83	0	0	0	50	25	0	25	33	58	17	25
Calliopiidae													
Apherusa mediterranea (Chevreux, 1911)*	0	0	0	0	42	308	217	175	600	133	0	8	0
Apherusa vexatrix (Krapp-Schickel, 1979)	0	0	0	0	0	0	17	0	0	0	0	0	0
Apherusa chiereghinii (Giordani- Soika, 1949)*	0	0	0	0	0	0	0	0	0	33	0	0	0
Corophiidae													
Apocorophium acutum (Chevreux, 1908)*	0	25	0	0	17	8	75	17	0	8	0	0	0
Leptocheirus pilosus (Zaddach, 1844)*	0	0	0	0	0	0	0	0	0	0	8	0	0
Dexaminidae													
Dexamine spiniventris (Costa, 1853)*	25	2308	383	0	317	375	492	867	17	1292	408	92	0
Dexamine thea (Boeck, 1861)*	0	0	0	0	0	17	0	0	0	0	0	8	0
Dexamine spinosa (Montagu, 1813)	8	58	0	0	0	17	92	58	333	133	8	0	0
Dexamine sp	0	0	0	0	0	0	8	0	0	0	0	0	0
Tritaeta gibbosa (Spence Bate, 1862)*	0	0	0	0	0	0	0	0	17	0	0	0	0
Guernea (Guernea) coalita (Norman, 1868)*	0	0	0	0	0	0	0	0	17	25	0	0	0
Gammaridae													
Gammarus insensibilis (Stock, 1966)*	0	0	0	0	0	0	0	0	67	0	0	0	0
Gammarus subtypicus (Stock, 1966)	0	0	0	0	0	0	0	0	33	0	0	0	0
Hyalidae													
Hyale schmidti (Heller, 1866)	1308	11350	1550	667	542	42	183	3425	233	1333	2942	2708	482
Hyale camptonyx (Heller, 1866)*	608	33	17	50	0	125	0	992	42	133	42	25	150
Hyale crassipes (Heller, 1866)*	0	0	0	25	0	0	8	17	0	275	0	0	0
Parhyale aquilina (Costa, 1857)*	0	0	0	0	0	0	8	0	0	0	0	0	0
Ischyroceridae													
Ericthonius punctatus (Spence Bate, 1857)*	0	2342	0	142	550	8	25	792	58	125	42	58	8
Jassa ocia (Spence Bate, 1862)*	0	0	0	0	0	0	8	17	8	0	0	0	0
Jassa marmorata (Holmes, 1905)*	0	0	0	200	133	0	0	150	0	0	0	0	0
Leucothoidae													
Leucothoe spinicarpa (Abildgaard, 1789)	0	8	0	0	8	0	0	0	0	0	0	0	0

Liljeborgiidae													
Liljeborgia dellavallei (Stebbing, 1906)*	0	0	0	0	0	0	0	0	0	17	0	0	0
Lysianassidae													
Lysianassa costae (H. Milne Edwards, 1830)	0	0	0	0	8	0	8	8	0	8	8	0	0
Lysianassa caesarea (Ruffo, 1987)*	0	0	0	0	0	8	0	0	0	0	0	0	0
Maeridae													
Elasmopus brasiliensis (Dana, 1855)*	2125	7983	742	1600	442	850	550	858	683	1408	1083	2025	1120
Elasmopus pocillimanus (Spence Bate, 1862)*	433	1217	125	308	125	33	108	33	42	125	308	942	882
Elasmopus rapax (Costa, 1853)*	0	383	83	17	8	0	8	0	0	0	0	233	33
Quadrimaera inaequipes (A. Costa in Hope, 1851)*	142	50	0	8	0	8	0	8	0	0	0	108	0
Melitidae													
Melita palmata (Montagu, 1804)*	0	325	0	0	0	8	0	8	0	0	0	0	0
Nuuanuidae													
Gammarella fucicola (Leach, 1814)	0	208	0	0	0	0	0	17	0	0	0	0	0
Photidae													
Gammaropsis crenulata (Krapp-Schickel & Myers, 1979)*	0	0	0	0	0	0	0	0	0	233	0	33	25
Gammaropsis palmata (Stebbing & Robertson, 1891)*	25	0	0	0	25	0	0	0	0	0	0	0	0
Phliantidae													
Pereionotus testudo (Montagu, 1808)*	17	33	50	0	0	0	8	8	0	8	17	8	0
Podoceridae													
Podocerus variegatus (Leach, 1814)*	17	0	0	0	0	8	0	8	0	0	0	8	0
Stenothoidae													
Stenothoe tergestina (Nebeski, 1881)*	0	0	0	0	0	0	0	0	0	0	0	0	8
Stenothoe monoculoides (Montagu, 1813)*	0	150	8	0	575	0	8	25	75	33	25	0	0
Stenothoe cavimana (Chevreux, 1908) *	0	0	0	0	0	0	0	0	17	0	17	0	0
Stenothoe elachista (Krapp-Schickel, 1975)*	0	0	0	0	0	0	0	17	0	0	0	0	0
Caprellidae													
Caprella rapax Mayer, 1890*	58	0	1350	892	50	92	108	1442	25	242	650	142	1
Caprella grandimana (Mayer, 1882)*	0	0	0	267	0	17	58	400	0	275	0	0	0
Caprella acanthifera (Leach, 1814)*	17	0	17	0	0	8	0	0	0	0	17	0	0
Caprella sp.	0	0	0	0	0	8	0	0	0	0	0	0	0
Caprella mitis (Mayer, 1890)*	0	0	0	0	0	0	0	0	0	33	0	8	0
Isopoda													
Sphaeromatidae													
Cymodoce truncata (Leach, 1814)*	0	8	0	0	8	0	0	0	8	0	0	0	25
Cymodoce spinosa (Risso, 1816)*	0	25	0	0	0	25	0	142	17	108	17	8	0
Cymodoce emarginata (Leach, 1818)*	0	0	0	0	0	0	8	0	0	0	0	0	0
Cymodoce tuberculata (Costa in Hope, 1851)*	8	67	0	0	0	0	0	42	0	8	0	0	0
Cymodoce sp.	17	92	17	0	0	0	8	158	0	0	58	0	8
Dynamene magnitorata (Holdich, 1968)*	8	17	58	0	0	150	33	0	25	8	0	17	0
Dynamene bicolor (Rathke, 1837)*	8	283	108	0	0	33	83	50	133	25	100	92	8
Dynamene edwardsi (Lucas, 1849)*	17	0	167	0	0	67	0	0	8	8	0	58	0
Dynamene bifida (Torelli, 1930)*	0	0	0	0	0	0	8	0	0	0	17	8	0
Dynamene bidentata (Adams, 1800)*	0	0	0	0	0	0	0	0	0	0	92	0	0
Dynamene sp	0	17	0	8	0	0	0	0	0	0	0	0	0
Sphaeroma serratum (Fabricius, 1787)	0	0	0	0	0	0	0	0	0	0	0	67	0
Sphaeroma sp.	0	0	0	0	0	0	0	0	0	8	0	0	0
Janiridae													
*Janira sp.**	17	8	0	0	0	0	0	0	8	0	0	0	0
Janira maculosa (Leach, 1814)*	67	50	17	0	0	0	0	0	0	0	0	0	0

Limnoriidae													
Limnoria tripunctata (Menzies, 1951)*	8	0	0	0	0	0	0	0	0	0	0	0	0
Paranthuridae													
Paranthura costana (Bate & Westwood, 1866)	25	83	50	17	0	33	25	50	8	17	33	25	0
Paranthura nigropunctata (Lucas, 1846)*	0	0	17	0	0	0	0	0	17	0	0	8	0
Gnathiidae													
Paragnathia formica (Hesse, 1864)	8	0	0	0	0	0	0	0	0	0	0	0	0
Idoteidae													
Idotea cf. metalica (Bosc, 1802)*	0	0	0	0	0	0	0	8	0	0	0	0	0
Idotea baltica basteri (Pallas, 1772)	0	0	0	0	0	0	0	0	58	17	0	0	0
Idotea sp.	0	0	0	0	0	0	0	0	0	17	0	0	0
Stenosoma capito (Rathke, 1837)	0	0	0	0	0	0	0	0	117	0	0	0	0
Anthuridae													
Apanthura corsica (Amar, 1953)*	17	8	0	0	25	0	0	0	0	0	0	0	0
Holognathidae													
Cleantis prismatica (Risso, 1826)*	0	0	0	0	0	0	0	0	0	8	0	0	0
Tanaidacea													
Tanaididae													
Tanais dulongii (Audouin, 1826)*	67	33	0	417	42	167	0	0	67	0	0	75	358
Leptocheliidae													
Chondrochelia savignyi (Kroyer, 1842)*	58	1750	142	317	67	383	483	383	392	242	433	392	100
*Pseudoleptochelia sp.**	0	0	0	0	0	0	17	0	0	0	0	0	0
Apseudidae													
Apseudopsis latreillii (Milne Edwards, 1828)*	0	8	0	0	8	0	0	0	0	0	0	0	0
Cumacea													
Nannastacidae													
Cumella (Cumella) limicola (Sars, 1879)*	0	92	0	0	0	8	0	0	50	8	0	0	0
Cumella (Cumella) pygmaea (G.O. Sars, 1865)	0	0	0	0	0	0	0	8	0	0	0	0	0
Mysidacea													
Mysidae													
Siriella clausii (G.O. Sars, 1877)*	0	0	0	0	0	0	0	8	0	0	0	0	0
Species number	**33**	**37**	**23**	**19**	**23**	**32**	**35**	**36**	**35**	**39**	**26**	**30**	**19**
Specimens number.m^{-2}	**7900**	**40383**	**7300**	**8383**	**6292**	**4150**	**3933**	**16792**	**7133**	**13333**	**10058**	**12200**	**5048**

While the highest species number was obtained at station of TK with 39 species; the lowest species number was obtained at the stations GL and KL (19 species) (Fig 3, Table 2). By the way, the highest abundance (40.383 ind/m^2) was obtained station TP which has second highest species number (37 species), a sharp decrease was observed the rest of the stations (Fig 4, Table 2).

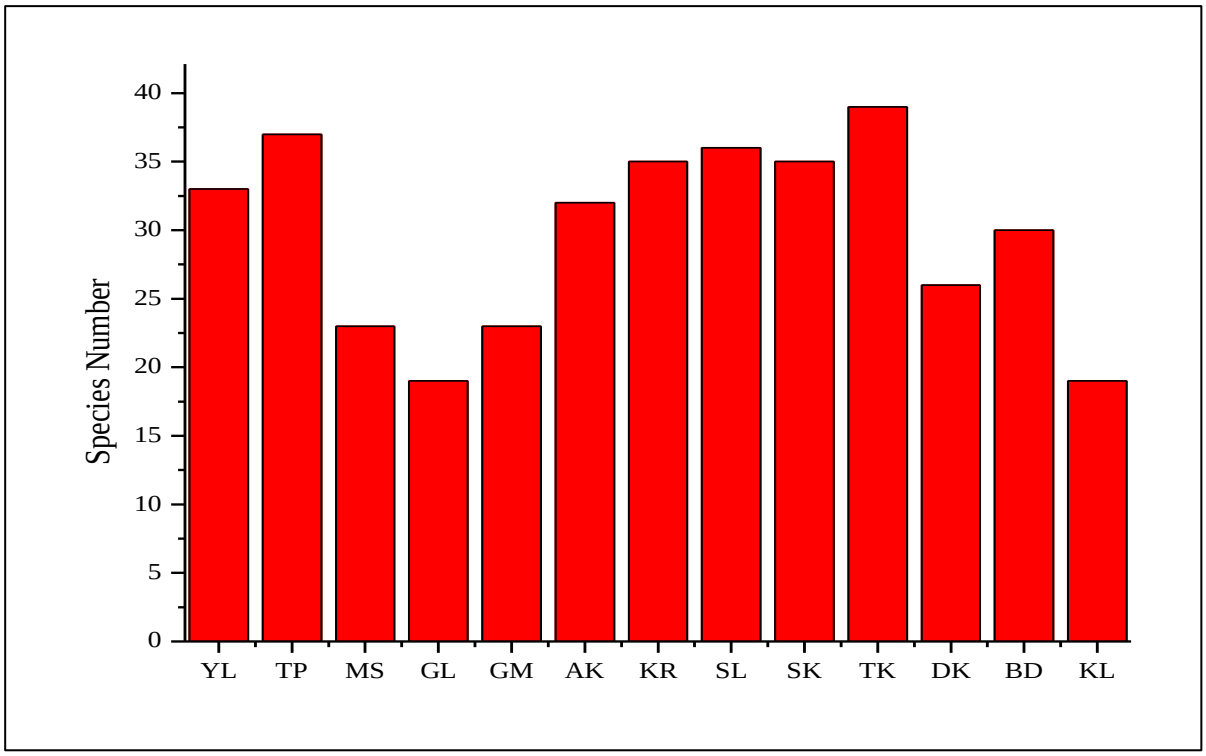

Figure 3. Total number of species at sampling sites.

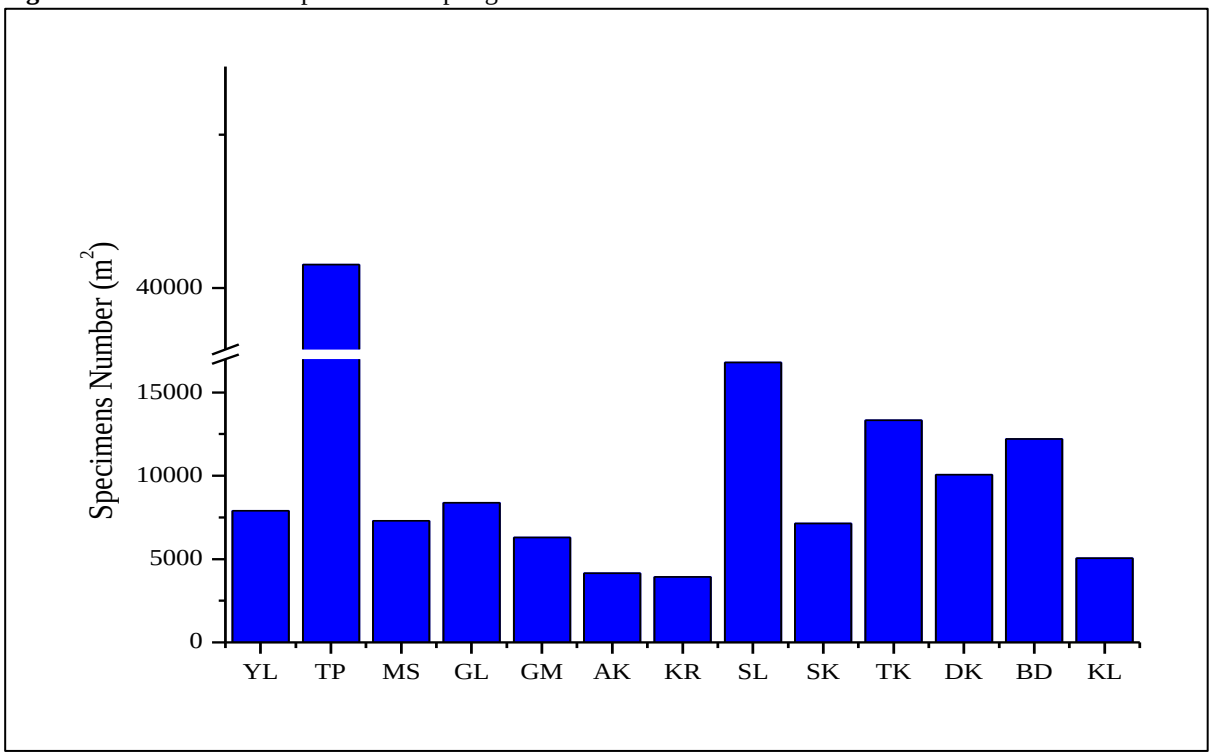

Figure 4. Total abundance at sampling sites.

Amphipods were the dominant group in terms of species richness (56 species) and abundance (132789 ind.m^{-2}). Although isopods are second highest species number with 25 species, their abundance (3425 ind.m^{-2}) is lower than tanaids with 6517 ind.m^{-2} belong to only 4 species. Cumacea has two species with 167 individuals and mysida has one species with eight specimens (Fig 5, Fig 6).

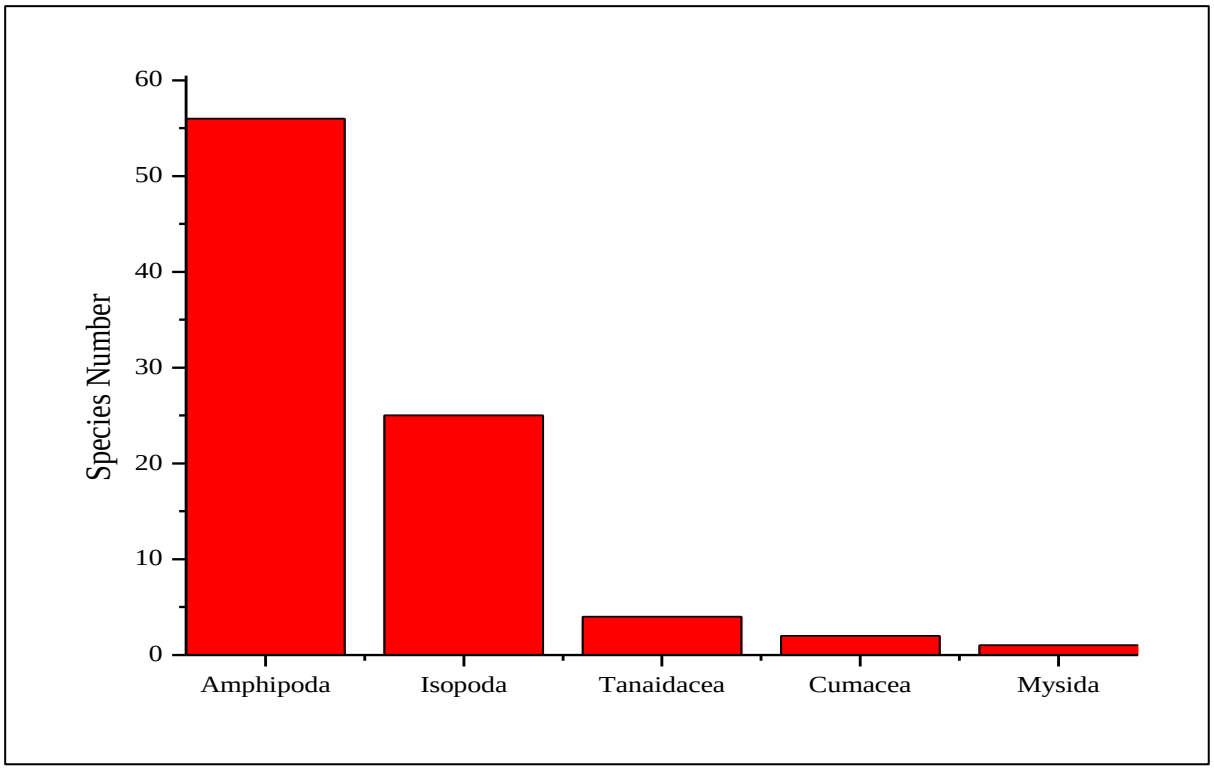

Figure 5. Species number according to the peracarid orders

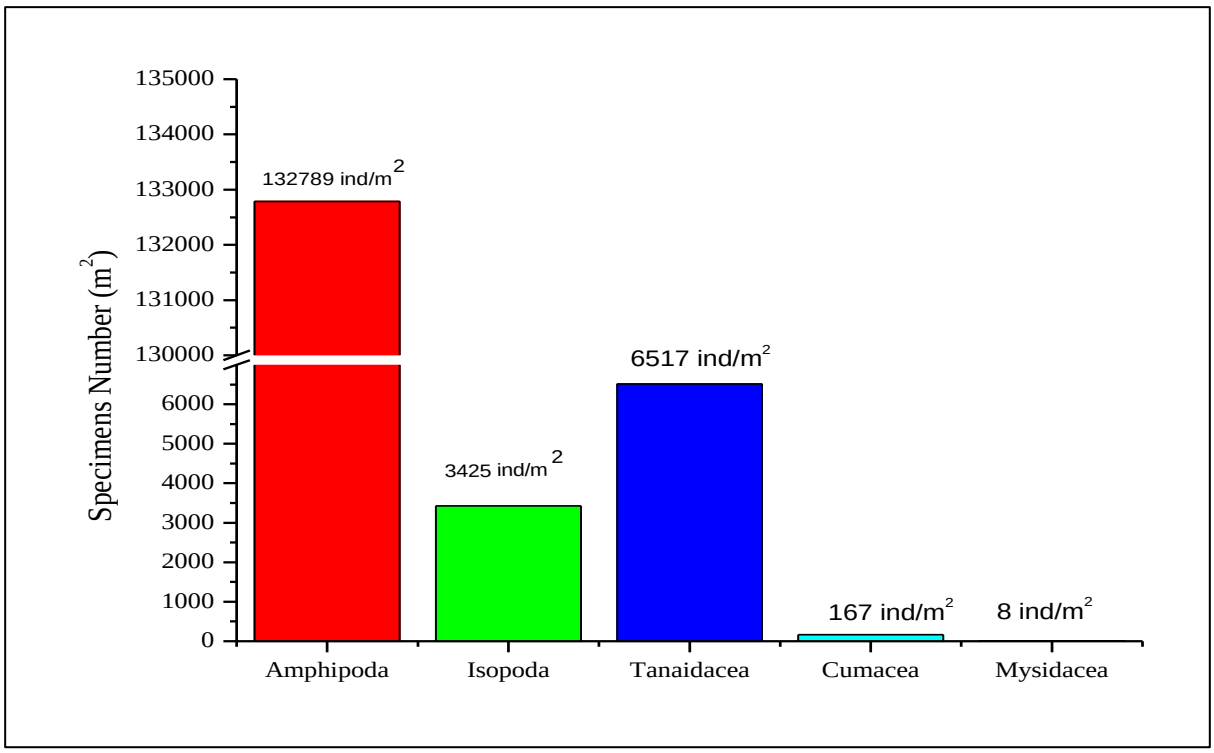

Figure 6. Individual number/m^2 according to the peracarid orders

The frequency of occurrence, four amphipod species (*Ampithoe ramondi*, *Ampithoe ferox*, *Elasmopus brasiliensis*, *Elasmopus pocillimanus*) and one tanaid species (*Chondrochelia savignyi*) were obtained from every month (F=100), also other 13 amphipods (*Microdeutopus chelifer*, *Microdeutopus obtusatus*, *Microdeutopus sp.*, *Apherusa mediterranea*, *Dexamine spiniventris*, *Dexamine spinosa*, *Hyale schmidti*, *Hyale camptonyx*, *Ericthonius punctatus*, *Elasmopus rapax*, *Pereionotus testudo*, *Stenothoe monoculoides*, *Caprella rapax*) four isopod (*Cymodoce* sp., *Dynamene magnitorata*, *Dynamene bicolor*,

Paranthura costana) and one Tanaids (*Tanais dulongii*) species were constant. Total of eight amphipod species (*Microdeutopus stationis, Apocorophium acutum, Hyale crassipes, Lysianassa costae, Quadrimaera inaequipes, Podocerus variegatus, Caprella grandimana, Caprella acanthifera*), four isopod species (*Cymodoce truncate, Cymodoce tuberculate, Dynamene edwardsi, Paranthura nigropunctata*) and one Cumacea (*Cumella limicola*) species were designed as common and rest of 52 species as rare.

As for the dominancy, only three amphipod species were consist of 58 % of whole specimens. *Ampithoe ramondi* (33,596 ind.m^{-2}) with a dominance value of 24 %, followed by *Hyale schmidti* (26766 ind.m^{-2}, 19 %) and *Elasmopus brasiliensis* (21470 ind.m^{-2}, 15 %).

Spatial variations in richness (d), evenness (J') and diversity (H') values at all stations are presented in Table 3. According to the Table 3, while the richness (d) values was changed between 2.0 and 4.1, the evenness (J') values was changed between 0.6 and 0.8. The highest diversity (H') values were observed station AK and KR which had also highest evenness Indeks.

Table 3. Richness Index (d), evenness (J') and diversity Index (H') for each stations

Stations	YL	TP	MS	GL	GM	AK	KR	SL	SK	TK	DK	BD	KL
d	3.6	3.4	2.5	2.0	2.5	3.7	4.1	3.6	3.8	4.0	2.7	3.1	2.1
J'	0.6	0.6	0.7	0.8	0.7	0.8	0.8	0.7	0.7	0.6	0.7	0.6	0.6
H'	2.9	3.1	3.3	3.3	3.0	3.9	3.9	3.6	3.4	3.4	3.1	2.9	2.8

When considering the total species abundance for each stations (Fig.7), cluster analysis based on the $\log_{10}$ (n+1) revealed that all stations have a similarity than 53 %. Stations MS and DK where were located opposite side of the island, has highest similarity level (73 %). Stations BD, YL and AK are joined to them at similarity levels of 70 %, 66% and 64 % respectively. Similar similarity values were 63 % between station KR, SL and TK. Stations SK and TP are joined to these stations similarity level of average 57 %. The rest of stations GM, GL and KL has also similarity levels of 57 % and this group are joined to all other stations level of 53%.

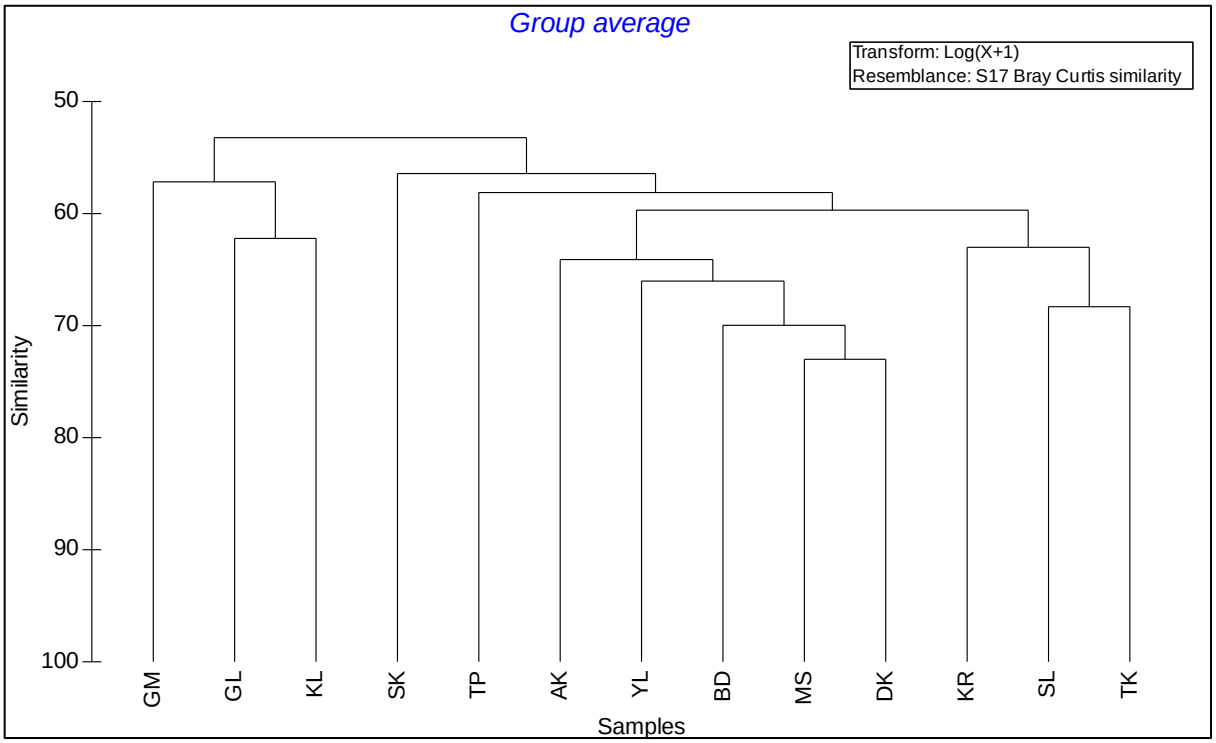

Figure 7. Cluster analysis applied to total abundance of peracarids

Discussion

Faunistic analyses of the shallow hard bottom peracarid community of Gokceada Island revealed a rich species composition (88 species) and high abundance (142,906 ind.m^{-2}). Although to know the importance of the peracarids, the knowledge about the peracarid fauna of Gokceada which is the biggest island

in Turkish coast, had limited. Kocataş & Katağan (1978) and Katağan (1982) reported 24 amphipod (*Ampelisca* spp., *Amphitoe ramondi, Leptochelius pectinatus, Apherusa cf. vetatrix, Colomastix pusilla, Corophium spp., Erichthinous brasiliensis, Unicola sp., Atylus guttatus, A. swammerdani, A. vedlomensis, Dexamine spinosa, Gammarella fucicola, Bathyporeira, guilliamsonia, Leucothia spinicarpa, Acidostima laticorne, Orchomene humilis, Paracentromedon crenulatus, Monoculodes sp., Perioculodes longimanus, Scychelidium cf. maculatum, Westwoodila rectirostris, Harpinia dellavallai, Metaphoxus fultoni*) and one cumacea (*Diastylis rugose*) species as a first time from Gokceada between depth 10-90 m. Then Çamur-Elipek & Aslan-Cihangir (2007) reported *Talitrus saltator* and *Orchestia gammarellus* and Aslan *et.al.*, (2018) reported 34 peracarid species from the same area. Before this study, only 45 peracarid species were known from the island. With 66 new record peracarid species, the number of peracarid species were increased to 101.

As an expected, amphipods were dominant group both in diversity and abundance, three amphipod species *Ampithoe ramondi*, *Hyale schmidti* and *Elasmopus brasiliensis* were consist of 58% of whole specimens and except of tanaid species *Chondrochelia savignyi*, four amphipod species (*Ampithoe ramondi, Ampithoe ferox, Elasmopus brasiliensis, Elasmopus pocillimanus*) had highest frequency.

Since most environments on the planet are being threatened by antropogenic activities, the species diversity and monitoring of the areas becomes urgent. The impact is of course more intense and "detectable" in shallow waters which are generally characterized by a very high level of biodiversity. The shallow subtidal zone of the Aegean Sea which has a lot of islands, is considered as a fragile ecosystem able to express the anthropogenic stress. Gokceada is one of island which is acceptable irreplaceable treasures. As a result of analysing the peracarid species community which were belong to upper infralittoral hard substratum, it has been determined that the species numbers of stations vary between 19 and 39 and the number of individuals varies between 3933 and 40383. This big variation may be explained specially structure of algal community. It is well known that on a spatial and temporal scale, differences between littoral rocky shore assemblages are a result of such factors as exposure to wave action, the nature of the substratum, influence of sunlight and shade, climatic conditions, biological interactions, salinity and the concentration of nutrient salts. To understand spatial and temporal distribution and abundance patterns of peracarid species need to revealed to driven ecological properties associated to macroalgae.

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References

Aslan H., Gönülal O., Can Yilmaz E., Çamur Elipek B., Baytut Ö., Tosunoğlu M., Karabacak, E. & Kurt, Y. (2018). Species diversity in lentic, lotic, marine and terrestrial biotopes of Gökçeada Salt Lake Wetland (Çanakkale, Turkey). *Fresenius Envıronmental Bulletin,* 27:2853-2867.

Aslan-Cihangir, H. & Pancucci-Papadopoulou, M.A. (2011). Spatial and temporal variation of soft-bottom peracarid (Crustacea-Peracarida) infauna in the Canakkale Strait (Turkey). *Mediterranean Marine Science*, 12 (1): 153-182.

Camur-Elipek, B. & Aslan-Cihangir, H. (2007). First observations of two Talitrid Crustaceans (Amphipoda: Talitridae) from Gokceada (Imbroz) Island (NE Aegean Sea) with a key to Turkish Talitridae family. *Journal of Mediterranean Marine Science*, 81, 8/2:83-86.

Clarke, K.R. & Warwick, R.M. (2001). *Change in Marine Communities: An Approach to Statistical Analysis and Interpretation*. 2nd Edition, Primer-E, Ltd., Plymouth Marine Laboratory, Plymouth.

Coll M, Piroddi C, Steenbeek J, Kaschner K, Ben Rais Lasram F, Aguzzi J, et al. (2010). The Biodiversity of the Mediterranean Sea: Estimates, Patterns, and Threats. *PLoS ONE* 5(8): e11842. https://doi.org/10.1371/journal.pone.0011842

Conlan, K.E. (1994). Amphipod crustaceans and environmental disturbance: a review. Journal of Natural History, 28 (3): 519-554.

Convention on biological diversity, http://www.cbd.int/island / Accessed 15 April 2019.

Gómez Gesteira, J.L. & Dauvin, J.C. (2000). Amphipods are good bioindicators of the impact of oil-spills on soft-bottom macrobenthic communities. *Mar. Pollut. Bull*., 40 (11): 1017-1027.

Guerra-García, J. M., Baeza-Rojano, E., Cabezas, P. & García-Gómez, J. C. (2011). Vertical distribution and seasonality of peracarid crustaceans associated with intertidal macroalgae. *Journal of Sea Research*, 65: 256-264.

Moreıra, J., Gestso, L. & Troncoso, J.S. (2008). Diversity and temporal variation of peracarid fauna (Crustacea: Peracarida) in the shallow

subtidal of a sandy beach: Playa America (Galicia, NW Spain). *Marine Ecology*, 29 (1): 12-18.

Katağan, T. (1982). Cumaces Nouveaux pour la Mediterranee orientale. *Crustaceana*, 43 (3): 313-315.

Kocatas, A. & Katagan., T. (1978). *Türkiye Denizleri littoral bentik ampfipodları ve yayılışları*, Proje No: TBAG, 223, Ankara, pp 1-63.