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Decapod crustaceans on the Gökçeada (Imbros) island continental shelf (north-eastern Aegean Sea)

A.S. ATEŞ[1], T.KATAĞAN[2], A. KOCATAŞ[2] and M. SEZGİN[3]

[1.]Çanakkale Onsekiz Mart University,
Fisheries Faculty, 17100 Çanakkale, Turkey
[2.]Ege University, Fisheries Faculty 35100 Bornova - İzmir, Turkey
[3.]Ondokuz Mayıs University, Sinop Fisheries Faculty 57000 Sinop, Turkey

e-mail: asuatates@yahoo.com

Abstract

The present composition of decapod crustaceans found at the sublittoral depths (5-104 m) off the coast of the island of Gökçeada (north-eastern Aegean Sea) is presented. A total of 28 species (11 caridean shrimps, 1 thalassinid ghost crab, 7 anomurans and 9 brachyuran crabs) and 277 specimens were recorded. The caridean shrimp, Athanas nitescens had the highest abundance with a dominance value of 20.94% in samples. The dominant group is caridean, represented by a total of 11 species and an occurrence frequency of 39.29%.

Keywords: Decapoda Crustacea; Gökçeada (Imbroz) island; North-eastern Aegean Sea; Turkey.

Introduction

Faunistic and ecological studies on the decapod crustaceans of the sublittoral coast of Gökçeada (Imbroz) are quite scarce, and are reported in the study by BALKIS *et al.*, 2001. Lately, KOCATAŞ & KATAĞAN (2003) have published a checklist of decapods in Turkish Seas that included 220 species, among which 181 species were found in the Turkish Aegean Sea. Recently, ATEŞ *et al*. (2004) have increased to 186 the number of species known for the area with five new records i.e. the caridean shrimp, *Processa macrodactyla* Holthuis, 1952, the thalassinid, *Callianassa trryhena* (Petagna, 1792), the brachyurans, *Ebalia tumefacta* (Montagu, 1808), *Liocarcinus maculatus* (Risso, 1827), *Palicus caronii* (Roux, 1830). BALKIS *et al*. (2001) found 32 species of brachyuran crabs on the littoral bottoms of Gökçeada island. ATEŞ *et al*. (2005) reported *Munida rugosa* (J.C. Fabricius, 1775) as a new record for the Aegean coast of Turkey. Thus, the number of decapod species known for the Turkish Aegean Sea increased to 187. The present paper aims to describe the decapod fauna occurring on the continental shelf of Gökçeada Island.

Material and Methods

The study area is located on the coast of the Gökceada continental shelf (the north-eastern Aegean Sea) (Fig. 1). The bottoms surveyed are situated between 5 and 104 m depth. Samples were collected during daytime hours in August 2000 using either beam-trawl or dredge at 5 sampling sites. The bottom at the shallowest stations was

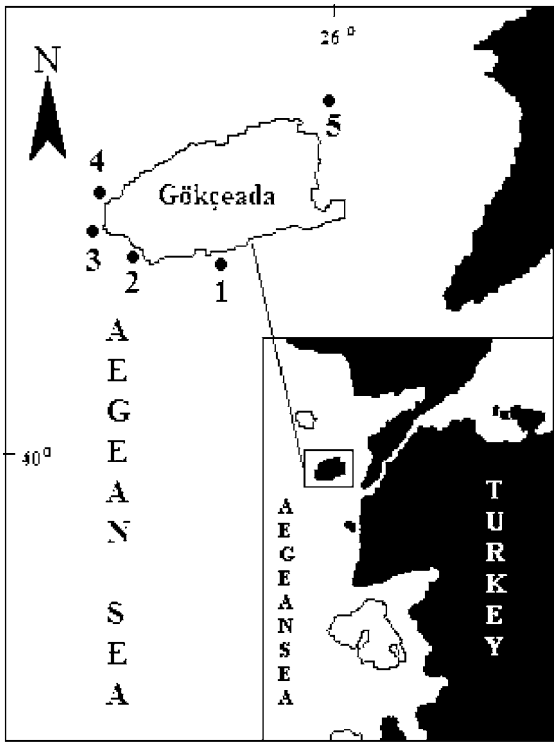

Fig. 1: Locations of the sampling stations off Gökçeada Island.

mostly covered with a *Posidonia oceanica* (L.) Delile meadow. The details on date, GPS coordinates, sampling gear, depth and substratum are presented in Table 1.

After collection, all decapods in the samples were preserved in 4 % formalin. In the laboratory, preserved samples were rinsed over a 0.5 mm sieve. Decapods were counted and identified to species level whenever possible, based on the work of ZARIQUIEY ALVAREZ (1968), INGLE (1993) and FALCIAI & MINERVINI (1996). The higher classification follows MARTIN & DAVIS (2001).

Dominance was calculated as Di = (*ni*/*N*) × 100, where Di is the mean dominance index for species *i*; *ni*, the number of individuals belonging to species *i*; *N*, the total number of individuals of all species (BELLAN-SANTINI, 1969). SOYER's (1970) frequency index was used to determine the frequency of spe-

Table 1
List of sampling stations. Substrates: P, *Posidonia oceanica* meadow; M, mud, sampling gears: D, dredge; B, beam-trawl.

Station	Date	Coordinates	Sampling gear	Depth (m)	Type of substratum
1	17.08.2000	40º05´45″ N 25º50´45″ E	D	27	P
2	13.08.2000	40º07´22″ N 25º39´50″ E	B	5	P
3	13.08.2000	40º07´30″ N 25º40´39″ E	D	10	P
4	13.08.2000	40º10´40″ N 25º40´50″ E	D	104	M
5	14.08.2000	40º13´20″ N 26º03´00″ E	D	96	M

cies at the stations, and in biotopes. The frq/x 100, where, m = number of stations where the species occurred and M = number of all stations.

Results

A total of 277 decapod specimens belonging to 28 species was captured (Table 2). Caridea was the most diversified group with 11 species followed by Brachyurans (9), Anomurans (7) and Thalassinideas (1). The decapod taxocoenosis is dominated by few species, *Athanas nitescens* being the most abundant (Di 20.94%), followed by *Lysmata seticaudata*, and *Pisidia longimana: d*ominance values of 19.86% and 15.16%, respectively. *Galathea squamifera*, *Macropodia rostrata*, and *Parthenope massena* have the lowest value of 0.36% (Table 2).

Total abundance of higher taxa was 39.29% for Caridea, 32.14% for Brachyura

Table 2
Species composition, , abundance of individuals at stations, values of frequency (f%) and dominance (Di%).

Species	**1**	**2**	**3**	**4**	**5**	
Total specimens	94	127	33	3	20	
Total species	18	9	9	3	7	
CARIDEA						**Di%**
Alpheus macrocheles (Hailstone, 1885)	0	0	21	0	0	7.58
Athanas nitescens (Leach, 1814)	16	42	0	0	0	20.94
Hippolyte inermis Leach, 1815	7	3	0	0	0	3.61
Lysmata seticaudata (Risso, 1816)	27	28	0	0	0	19.86
Palaemon elegans Rathke, 1837	3	0	0	0	0	1.08
Philocheras bispinosus (Hailstone, 1835)	1	0	0	0	2	1.08
Philocheras sculptus (Bell, 1847)	2	0	0	0	0	0.72
Processa macrodactyla Holthuis, 1952	3	0	0	0	5	2.89
Processa macrophthalma Nouvel & Holthuis, 1957	5	0	0	0	0	1.81
Processa modica Williamson & Rochanburanon, 1979	0	2	0	0	3	1.81
Processa nouveli Al-Adhub & Williamson, 1975	0	0	0	1	2	1.08
Upogebia pusilla (Petagna, 1792)	3	0	1	0	0	1.44
Pagurus anachoretus Risso, 1827	0	0	1	0	3	1.44
Pagurus cuanensis Bell, 1846	11	0	0	0	0	3.97
Pagurus forbesii Bell, 1845	3	1	0	0	0	1.44
Galathea bolivari Zariquiey Alvarez, 1950	5	0	2	0	0	2.53
Galathea intermedia Lilljeborg, 1851	0	5	0	0	2	2.53
Galathea squamifera Leach, 1814	0	0	1	0	0	0.36
Pisidia longimana (Risso, 1816)	0	42	0	0	0	15.16
Achaeus cranchii Leach, 1817	0	2	3	0	0	1.81
Achaeus gracilis O. G. Costa, 1839	0	2	0	0	0	0.72
Ethusa mascarone (Herbst, 1785)	1	0	1	0	0	0.72
Goneplax rhomboides (Linnaeus, 1758)	0	0	0	1	3	1.44
Inachus dorsettensis (Pennant, 1777)	1	0	1	0	0	0.72
Liocarcinus maculatus (Risso, 1827)	2	0	2	0	0	1.44
Macropodia rostrata (Linnaeus, 1761)	1	0	0	0	0	0.36
Parthenope massena (Roux, 1830)	1	0	0	0	0	0.36
Pilumnus hirtellus (Linnaeus, 1758)	2	0	0	1	0	1.08

Table 3
Dominance (Di%) values of species found on *Posidonia oceanica* beds and muddy bottoms.

Species	*Posidonia oceanica* beds	Muddy bottom
CARIDEA	**Dominance (Di%)**	**Dominance (Di%)**
Alpheus macrocheles	8.26	-
Athanas nitescens	22.83	-
Hippolyte inermis	3.93	-
Lysmata seticaudata	21.65	-
Palaemon elegans	1.18	-
Philocheras bispinosus	0.39	8.69
Philocheras sculptus	0.78	-
Processa macrodactyla	1.18	21.73
Processa macrophthalma	1.96	-
Processa modica	0.78	13.04
Processa nouveli	-	13.04
THALASSINIDEA		
Upogebia pusilla	1.57	-
ANOMURA		
Pagurus anachoretus	0.39	13.04
Pagurus cuanensis	4.33	-
Pagurus forbesii	1.57	-
Galathea bolivari	2.75	-
Galathea intermedia	1.96	8.69
Galathea squamifera	0.39	-
Pisidia longimana	16.53	-
BRACHYURA		
Achaeus cranchii	1.96	-
Achaeus gracilis	0.78	-
Ethusa mascarone	0.78	-
Goneplax rhomboides	-	17.39
Inachus dorsettensis	0.78	-
Liocarcinus maculatus	1.57	-
Macropodia rostrata	0.39	-
Parthenope massena	0.39	-
Pilumnus hirtellus	0.78	4.34

25% for Anomura and 3.5% for Thalassinidea. The number of species and specimens found at the sampling stations is presented in Table 2.

The *P. oceanica* stations had the richest decapoda fauna with 254 individuals (f%=92.86) and 26 species, followed by the mud, with 23 specimens (f%=28.57) and 8 species. The commonest decapod of the *P. oceanica* beds was *A. nitescens* with a dominance value of 22.83%, followed by *L. seticaudata* (Di=21.65%), and the *P. longimana* (Di=16.53%). *Processa macrodactyla* showed the highest abundance (Di=21.73%) in mud stations, followed by *Goneplax rhomboides* (Di=17.39%), *Processa modica*, *Processa nouveli* and *Pagurus anachoretus* (each with Di=13.04) (Table 3). As to the frequency of occurrence, only 2% of the species collected in *P. oceanica* meadows can

be considered as rare, and 98% are continuous. 28% of species recorded from mud sediments are common and 72% rare.

Discussion

P. oceanica meadows exhibit a complex biotic community (PÉRÈS & PICARD, 1964) and have a very high productivity and population density (GALLMETZER *et al*., 2005). Decapod crustaceans are one of the most remarkable taxa inhabiting these meadows. In recent years, many studies on decapods associated with *P. oceanica* beds have been published (SCIPIONE *et al*., 1983; MAZZELLA *et al*., 1989; GARCÍA RASO, 1990; ZUPO, 1990; BORG, 1991; GARCÍA RASO *et al*., 1996; BORG & SCHEMBRI, 2000). In our study, 26 decapod species were found on *P. oceanica* meadows and only 8 in muddy bottoms.

GARCÍA RASO (1990), stated that only 9 out of 50 decapod species captured in *P. oceanica* beds in southern Spain have a dominance value higher than 1%, and the commonest species were *Cestopagurus timidus* (31.6%), *Calcinus tubularis* (25.3%), and *A. nitescens* (13.6%). Recently, BORG & SCHEMBRI (2000) reported a total of 41 decapods from the same habitat along the Malta coasts, and the same authors indicated that *C. timidus* was the most abundant species with a dominance value of 51.2%, followed *A. nitescens* (Di=10.97%). According to GARCÍA RASO *et al*. (1996), the *P. oceanica* beds occurring in the Alboran Sea are characterized by two hermit crabs, *C. tubularis* and *C. timidus*. Overall GARCÍA RASO (1990), GARCÍA RASO *et al*. (1996) and BORG & SCHEMBRI (2000) exposed relatively similar results regarding the dominant decapod species of *P. oceanica* beds in the western and central Mediterranean. In addition, according to GALLMETZER *et al*. (2005), the most abundant decapods occurring in the *P. oceanica* meadows of Corsica were *A. nitescens*, *G. intemedia*, *L. navigator*, and *Pisa tetraodon* Nevertheless, *A. nitescens*, *L. seticaudata*, and *P. longimana* are commonest in the *P. oceanica* sites studied here.

The species such as *L. seticaudata*, *Palaemon elegans*, *Philocheras bispinosus*, *Philocheras sculptus*, *P. macrodactyla*, *P. macropthalma*, *P. modica*, *Upogebia pusilla* (Petagna, 1792), *Pagurus forbesii*, *G. intermedia*, *Inachus dorsettensis*, *Liocarcinus maculatus*, *Macropodia rostrata*, and *Parthenope massena* which are cited here in *Posidonia oceanica* meadows are not present in the study of BORG & SCHEMBRİ (2000).

Alpheus dentipes, *Thoralus cranchii*, *C. tubularis*, *C. timidus*, and *P. longicornis* which are noted as the most abundant species of *P. oceanica* beds in littoral zones off the coast of southern Spain by GARCÍA RASO, could not be found off the Gökçeada coast (1990). During our study, while *I. dorsettensis*, *M. rostrata, P. massena*, and *Pilumnus hirtellus* were observed in *P. oceanica* beds, on the contrary, BALKIS *et al*. (2001) previously recorded these species on the rocky, sandy and muddy bottoms of the Gökçeada coast.

Finally, the structure of the decapod community mainly depends on the physical characteristics of the biotopes. Differences in the species diversity obtained here may be related to different depth, biotope variations and hydrodynamic conditions. Further faunistic surveys which should be carried out in deeper zones, covering more sampling stations in the region will undoubtedly lead to better information regarding the decapod fauna.

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