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The crab species found in the Edremit Bay (NE Aegean Sea)

Edremit Körfezi'nde (KD Ege Denizi) bulunan yengeç türleri

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Abstract

This study was carried out to determine the crab species existing found in the Edremit Bay and some of their ecological properties. Samples were collected from 46 stations between the years 2001-2003, at 0.5-75 m depths, by using scoop net, dredge, beam-trawl and trammel net. A total of 40 crab species belonging to 16 families were identified during the course of this study. Primary hydrographic conditions, such as temperature (13-29 ˚C), salinity (35.3-38.9 ‰) and dissolved oxygen (2.76-9.82 mg l^{-1}) were recorded for each sampling.

Keywords: Brachyura, Edremit Bay, Aegean Sea.

Introduction

The Aegean Sea has a special place in the Mediterranean ecosystem in terms of its regional position, geomorphological structure, hydrographical and ecological features. The sea, which has a long and curved coastline, a complex bottom structure with terrestrial characteristic, and many islets and islands, can be examined hydrographically in three subcategories as

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Northern, Middle and Southern zone (Kocataş and Bilecik, 1992). The surface waters in the northern part are under the effect of the Black Sea waters with 26-35 ‰ salinity corresponding to which display the characteristics of brackish water. The waters coming through the Dardanelles flow towards the western part of the Aegean Sea and reach the Eastern Coasts of Greece. The middle layer waters with the highest salinity are not evident in shallow waters of the north of the Aegean Sea due to vertical mixture. The bottom waters extending down from about 300 meters have 38.8 ‰ salinity in this zone (Yüce, 1995).

Before this study, which was carried out in the littoral zone of the Edremit Bay, Forskal (1775) first reported the existence of two crab species (*Eriphia verrucosa, Pinnotheres pinnotheres*) around Izmir in the Aegean Sea. Later, Colombo (1885) reported the existence of two crab species (*Pilumnus hirtellus, Macropodia rostrata*) in the same region. Tortonese (1947) mentioned the existence of three crab species in the Aegean Sea (*Dromia personata, Calappa granulata, Maja squanido*) but he did not explain where and when these samples were collected.

According to the study carried out by Kocataş and Katağan (2003), 74 crab species were recorded in the Turkish coasts of the Aegean Sea. On the other hand, out of the Turkish coastal waters of the Aegean Sea, Guerin (1832) reported the existence of 22 crab species on the coasts of the Morea Peninsula, Lucas (1853), 16 species in Crete Island, Adensamer (1898), 11 species in various parts of the Aegean Sea, and Santucci (1928), 11 species in the Rhodes Island. Later, Holthuis (1961) recorded the existence of 11 crab species in the Greek coastal waters of the Aegean Sea, Georgiadis and Georgiadis (1974), 22 species around Salonika. Koukouras et al. (1992) reported the existence of 99 crab species in the Greek coastal waters of the Aegean Sea in the check-list they prepared.

The aim of this study is to determine the crab species living in the Edremit Bay, where no detailed study on the subject was carried out before.

Materials and Methods

This study was carried out in the Edremit Bay. The bottom samples were collected at 46 stations (Figure 1, Table 1) between the years 2001-2003 at 0.5-75 m depths by using scoop net, dredge, beam-trawl and trammel net. The bottom material was rinsed through sieves and crab specimens were

picked up. All specimens were preserved in 5 % formaldehyde prepared in seawater.

Species were identified using a range of references (Bouvier, 1940; Zariquiey-Alvarez, 1946, 1968; Demir, 1952; Monod ,1956; Bauchau, 1966; Ingle,1980, 1983; Holthuis, 1987). Nomenclature of the species follows Udekem D'Acoz (1999).

Some ecological parameters of the study area were determined. Temperature of the water sample was measured by thermometer, salinity by Mohr-Knudsen method (Ivanoff, 1972), and dissolved oxygen by the Winkler method (Winkler, 1888).

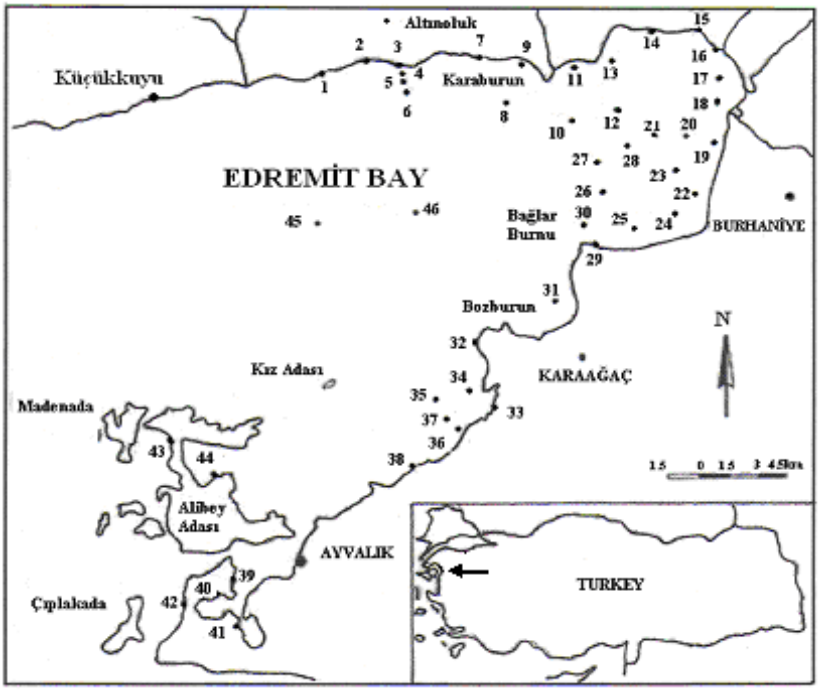

Figure 1. Map of the investigated area.

Table 1. Data from sampling stations. SN: Scoop Net; DR: Dredge; T: Trammel Net; BTR: Bottom Trawl; R: Rock; S: Stone; P: Posidonia meadow; SA: Sand; M: Mud.

Station Number	Date	Depth (m)	Tool	Temperature (˚C)	Salinity (‰)	Dissolved Oxygen (mg l^{-1})	Bottom Structure
1	31.07.01	0.5	SN	24.5	38.5	9.10	R+S
2	30.01.03	0.5	SN	13.0	36.9	8.46	R+S
3	30.01.03	0.5	SN	13.0	36.8	6.86	R+S
4	30.01.03	5	DR	13.0	37.8	8.12	SA
5	19.10.02	10	DR	21.4	38.9	3.29	SA
6	19.10.02	30	DR	21.2	38.0	5.61	M
7	29.04.03	5	DR	15.6	36.8	4.44	SA
8	30.07.02	50	BTR	17.0	38.4	7.27	M
9	29.04.03	5	DR	15.5	36.2	4.26	SA
10	30.07.02	50	BTR	17.1	38.4	7.17	M
11	29.04.03	20	BTR	15.1	36.2	4.67	M
12	30.07.02	40	T	17.3	38.1	7.13	M
13	31.07.01	25	T	18.5	38.2	9.82	M+P
14	27.10.01	5	DR	18.9	38.5	8.09	SA+P
15	26.10.01	1	DR	18.9	38.2	8.97	SA+P
16	27.10.01	1	DR	18.8	38.4	8.92	SA+P
17	28.10.01	10	DR	19.0	38.5	4.91	M
18	30.07.03	5	DR	26.0	37.8	7.02	SA+P
19	28.10.01	1	DR	19.9	38.6	6.00	SA+P
20	30.07.03	10	DR	26.0	37.8	6.80	M
21	30.07.03	20	DR	26.0	37.7	6.87	M
22	24.10.01	1	DR	19.9	38.6	6.00	SA
23	30.01.03	5	DR	13.0	37.4	8.37	SA
24	24.10.01	10	DR	19.5	38.4	6.73	M
25	29.04.03	10	DR	15.2	36.6	4.77	M
26	24.10.03	30	T	19.2	36.6	3.09	M
27	30.07.02	50	BTR	17.5	38.4	7.28	M
28	19.10.02	40	T	21.0	38.8	2.76	M
29	29.04.03	0.5	SN	15.6	35.9	5.68	R+S
30	30.01.03	30	T	13.0	36.9	6.77	M
31	30.01.03	20	DR	13.0	37.8	9.80	M

Table 1 continued.

32	30.01.03	0.5	SN	13.0	37.0	8.53	R+S
33	25.10.01	1	T	20.0	38.5	6.26	SA+R+S
34	29.04.03	20	DR	15.1	36.8	4.76	M
35	26.10.01	30	DR	19.9	35.3	4.98	M
36	25.10.01	5	DR	19.9	38.5	4.46	SA+P
37	25.10.01	10	DR	19.8	38.4	7.73	M
38	29.04.03	0.5	SN	15.8	36.1	5.49	R+S
39	28.07.01	0.5	SN	28.0	38.3	7.10	R+S
40	29.07.01	0.5	SN	28.0	38.4	7.34	R+S
41	29.07.01	0.5	SN	29.0	38.5	7.18	R+S
42	28.07.01	05	SN	27.0	38.4	7.03	R+S
43	29.07.01	0.5	SN	24.0	38.3	7.32	R+S
44	30.07.01	0.5	SN	24.0	38.5	7.53	R+S
45	30.07.02	75	BTR	17.0	38.2	8.45	M
46	30.07.02	60	BTR	17.0	38.4	7.10	M

Results and Discussion

In this study, a total of 40 crab species belonging to 16 families were identified. Two species are cosmopolitan (*Eurynome aspera, Carcinus aestuarii*), three species (*Maja squinado, Pisa corallina, Macropodia longirostris*) endemic to the Mediterranean and others Atlanto-Mediterranean originated (Stevcic, 1990; Udekem D'Acoz, 1999). The list of species and ecological properties in the sampling stations are provided in Table 2.

Although the coasts of the Edremit Bay at 0.5 m depth have sand bottoms in some parts, they consist mainly of rock and stone substrates. The samples were taken from a total of 12 stations at this depth, and 10 crab species were reported to be existent at these stations. *Pachygrapsus marmoratus*, obtained from all of the 12 stations, was observed to be the most common species at this depth.

The stations at 1, 5 and 10 m depths usually have sand bottoms and the great part of their bottoms is covered with *Posidonia oceanica* meadows**.** Eighteen stations were studied in this depth range. At this level which is the richest in terms of species number, 30 crab species were determined. *Carcinus aestuarii* was found at 5 stations but it is not possible to state that this is a common species at this cross section.

All of the 4 stations, where the samples were collected at 20 m depth**,** have mud bottoms. 18 crab species were collected at this depth. The most common species at this depth is *Pisa armata*, obtained from 3 out of the 4 stations.

The five stations located between the depths of 21 and 30 m have mud bottoms, and one of them (Station no 13) includes *Posidonia oceanica* meadows. 17 crab species were obtained from these depths and *Dromia personata*, available at 5 stations, was determined to be the most common species of the cross section.

The two stations, where the samples were collected at 40 m depth, have mud bottom. 12 crab species were obtained from this depth and *Dromia personata*, *Polybius (Necora) corrugatus*, *Polybius (Polybius) depurator* and *Goneplax rhomboides* were found at both stations.

Three stations were examined at 50 m depth and they were reported to have mud bottoms. Four crab species (*Maja crispata, Maja squanido, Medorippe lanata* and *Goneplax rhomboides*) out of 9 identified at this depth, were obtained from each of the 3 stations.

In this study, the deepest two stations were studied at 60 and 75 m depths and they were observed to have mud bottoms. Four crab species (*Maja crispata, Maja squanido, Medorippe lanata* and *Goneplax rhomboides*) out of 8 obtained from these depths were found at both stations.

To summarize, 40 out of 74 crab species obtained from the Turkish Coasts of the Aegean Sea were identified to be living in the Edremit Bay, and some data about their environment were provided by this study.

Table 2. List of species and ecological properties in the sampling stations.
T: Temperature, S: Salinity, DO: Dissolved Oxygen

Species	Stations	Ecological Properties				
		Depth m	T °C	S p.s.u.	DO mg l^{-1}	Bottom Structure
DROMIIDAE						
Dromia personata (Linnaeus, 1758)	6,12,13,17,26,28,30, 35,36.	5-40	13.0-21.2	35.3-38.8	2.76-9.82	Mud+Sand
MAJIDAE						
Eurynome aspera (Pennant,1777)	11,30.	20-30	13.0-15.1	36.2-36.9	4.67-6.77	Mud
Maja crispata Risso, 1827	5,6,8,9,10,11,12,23, 25,27,45,46.	5-75	13.0-21.4	36.2-38.9	3.29-8.45	Mud+Sand
M. squinado (Herbst, 1788)	5,6,8,9,10,12,21,23, 25,27,45,46.	5-75	13.0-26.0	36.2-38.9	3.29-8.45	Mud+Sand
Pisa armata (Latreille, 1803)	5,11,13,14,21,26,31, 35.	5-30	13.0-26.0	35.3-38.9	3.09-9.82	Mud+Sand
P.corallina (Risso,1816)	12	40	17.3	38.1	7.13	Mud
P. nodipes (Leach, 1815)	5,14,16,21,36.	1-20	18.8-26.0	37.7-38.9	3.29-8.92	Sand+Mud
P. tetraodon (Pennant, 1777)	1,33,39,42,43,44.	0.5-1	20.0-28.0	38.3-38.5	6.26-9.10	Rock+Stone
Acanthonyx lunulatus (Risso, 1816)	1,29,33,40,41.	0.5-1	15.6-29.0	35.9-38.5	5.68-9.10	Rock+Stone
Achaeus cranchii Leach,1817	5,14,36.	5-10	18.9-21.4	38.5-38.9	3.29-8.09	Sand
Inachus communissimus Risso, 1839	11,25,36.	5-20	15.1-19.9	36.2-38.5	4.46-4.77	Mud+Sand

Table 2 continued.

I. dorsettensis (Pennant, 1777)	6,7,9,11,13,26.	5-30	15.1-21.2	36.2-38.2	3.09-9.82	Mud+Sand
Macropodia linaresi Forest & Zariquiey Alvarez, 1964	5,34,36.	5-20	15.1-21.4	36.8-38.9	3.29-4.76	Sand+Mud
M.longirotris (J.C. Fabricius, 1775)	5,18,20,21,24.	5-20	19.5-26.0	37.7-38.9	3.29-7.02	Mud+Sand
M. rostrata (Linnaeus, 1761)	12,13,14,19,21,34, 35,37.	1-40	15.1-26.0	35.3-38.6	4.76-9.82	Mud+Sand
M. tenuirostris (Leach, 1814)	25,37.	10	15.2-19.8	36.6-38.4	4.77-7.73	Mud
DORIPPIDAE						
Medorippe lanata (Linnaeus, 1767)	8,10,12,13,17,21,27, 28,45,46.	10-75	17.0-26.0	37.7-38.8	2.76-9.82	Mud
Ethusa mascarone (Herbst, 1785)	8,21,22,28,35,36,46.	5-60	17.0-26.0	35.3-38.8	2.76-9.82	Mud+Sand
LEUCOSIIDAE						
Ilia nucleus (Linnaeus, 1758)	5,13.	10-25	18.5-21.4	38.2-38.9	3.29-9.82	Mud+Sand
CALAPPIDAE						
Calappa granulata (Linnaeus, 1767)	5,6,8,12,27,46.	10-60	17.0-21.4	38.0-38.9	3.29-7.28	Mud+Sand
ATELECYCLIDAE						
Atelecyclus rotundatus (Olivi, 1792)	8,12,45.	40-75	17.0-17.3	38.1-38.4	7.13-8.45	Mud
PIRIMELIDAE						
Pirimela denticulata (Montagu, 1808)	1,40.	0.5	24.5-28.0	38.4-38.5	7.34-9.10	Rock+Stone
Sirpus zariquieyi Gordon,1953	36.	5	19.9	38.5	4.46	Sand
PORTUNIDAE						
Carcinus aestuarii Nardo, 1847	4,5,9,17,33,39.	0.5-10	13.0-28.0	36.2-38.9	3.29-8.12	Various Type
Polybius arcuatus (Leach, 1814)	15,16,36.	1-5	18.8-19.9	38.2-38.5	4.46-8.97	Sand

Table 2 continued.

Polybius (Necora) corrugatus (Pennant, 1777)	6,12,28.	30-40	17.3-21.2	38.0-38.8	2.76-7.13	Mud
P. (Polybius) depurator (Linnaeus, 1758)	5,10,11,12,13,21,26, 27,28,30.	10-50	13.0-26.0	36.2-38.9	2.76-9.82	Mud+Sand
Polybius zariquieyi (Gordon,1968)	6,12.	20-40	17.3-21.2	38.0-38.1	5.61-7.13	Mud
PARTHENOPIDAE						
Parthenope angulifrons Latreille, 1825	7,17.	5-10	15.6-26.0	36.8-38.5	4.44-4.91	Sand+Mud
P. massena (P.Roux, 1830)	7,21.	5-20	15.6-26.0	36.8-37.7	4.44-6.87	Sand+Mud
XANTHIDAE						
Xantho incisus Leach, 1814	11,13.	0.5-25	15.1-24.5	36.2-38.5	4.67-9.82	Mud
X. pilipes A.Milne Edwards, 1867	11,17.	10-20	15.1-19.0	36.2-38.5	4.67-4.91	Mud
X. poressa (Olivi, 1792)	1,2,3,32,33,38,40,42, 44.	0.5-1	13.0-28.0	36.1-38.5	5.49-9.10	Rock+Stone
ERIPHIIDAE						
Eriphia verrucosa (Forskål, 1775)	1,40,41,42,43.	0.5	24.0-29.0	38.3-38.5	7.03-9.10	Rock+Stone
PILUMNIDAE						
Pilumnus hirtellus (Linnaeus, 1761)	33,41,43.	0.5-1	20.0-29.0	38.3-38.5	6.26-7.32	Rock+Stone
P. spinifer H.Milne- Edwards, 1834	8,11,12,13,26,46.	20-60	15.1-19.2	36.2-38.4	3.09-9.82	Mud
GONEPLACIDAE						
Goneplax rhomboides (Linnaeus, 1758)	8,10,11,12,13,26,27, 28,30,37,45,46.	10-75	13.0-21.0	36.2-38.8	2.76-9.82	Mud

PINNOTHERIDAE						
Nepinnotheres pinnotheres (Linnaeus, 1758)	17.	10	19.0	38.5	4.91	Mud
GRAPSIDAE						
Brachynotus sexdentatus (Risso, 1827)	1.	0.5	24.5	38.5	9.10	Rock+Stone
Pachygrapsus marmoratus (J.C.Fabricius, 1787)	1,2,3,29,32,33,38,39, 40,41,42,43,44.	0.5-1	13.0-29.0	35.9-38.5	5.49-9.10	Rock+Stone

Özet

Bu çalışma Edremit Körfezindeki yengeç türleri ve bazı ekolojik özelliklerini belirlemek amacıyla yapılmıştır. Çalışmaya ait örnekler 2001-2003 yıllarında Edremit Körfezi'nde bulunan ve derinlikleri 0.5-75 m arasında değişen 46 istasyondan el kepçesi, direç, bimtrol ve fanyalı ağ ile elde edilmiştir. Çalışma sonunda yengeç faunasından 16 familyaya ait 40 tür belirlenmiştir. Sıcaklık (13-29 ˚C), tuzluluk (35.3-38.9 ‰) ve çözünmüş oksijen (2.76-9.82 mg l^{-1}) gibi temel hidrografik şartlar her örnekleme döneminde kayıt edilmiştir.

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References

Adensamer, T. (1898). Zoologische ergebnisse. XI. Decapoden. Gesammelt auf S.M.Schiff Pola in den Jahren 1890-1894. Denkschr. Akad. Wiss. Wien., 65: 597-628.

Bauchau, A. (1966). La Vie des Crabes. Encyclopédie Biologique LXVI, Paul Lechevalier, Paris, pp.138.

Bouvier, E. L. (1940). Décapodes Marcheurs. Faune de France, Editions Paul Lechevalier et Fils, Paris, pp. 404.

Colombo, A. (1885). Raccolte zoologiche eseguite dal R. Piroscafo Washington nella Campagna abissale talassografica dell' anno 1885. Rivista Maritima, Roma, pp. 1-34.

Demir, M. (1952). Benthic invertebrates of the Bosporus and Prince Islands. Publications of Istanbul University, Faculty of Science, Department of Hydrobiology 3: 1-615.

Forskål, P. (1775). Descriptiones Animalium, Avium, Amphibiorum, Piscium. Insectorum, Vermium, Hafniae, Mölleri 19, pp. 1-164.

Georgiadis, C., Georgiadis, G. (1974). Zur kenntnis der Crustacea Decapoda des Golfes von Thessaloniki. *Crustaceana* 26: 239-248.

Guerin-Meneville, F. E. (1832). Classe Crustacea. In: A Brullé, Des animaux articulés. Expédition scientifique de Morée, Section de Sciences Physique, 3, *Zool*. 2: 30-50.

Holthuis, L.B. (1961). Report on a collection of Crustacea Decapoda and Stomatopoda from Turkey and the Balkans. *Zool.Verh*. 47: 1- 67.

Holthuis L.B. (1987). Vrais Crabes. Fiches FAO d'identification des espéces pour les besoins de la pêche. Mediterranée et Mer Noire. Zone de pêche 37, 1, Végétaux et invertébŕes FAO, Rome, pp. 321-367.

Ingle, R.W. (1980). British Crabs. Oxford University Press. British Museum (Natural History), London, pp. 222.

Ingle, R.W. (1983). Shallow-Water Crabs. Cambridge University Press, Cambridge,pp. 206.

Ivanoff, A. (1972). Introduction ă l'oceanographie. Tome I. Librairie Vuibert, Paris, pp. 208.

Kocataş, A., Bilecik, N. (1992). Aegean Sea and Its Living Resources. T.C. Tarım ve Köyişleri Bakanlığı, Su ürünleri Araştırma Enstitüsü Müdürlüğü Seri A., 7, Bodrum, pp.1-88.

Kocataş, A., Katağan, T. (2003). The Decapod Crustacean Fauna of the Turkish Seas. *Zoology in the Middle East* 29, 63-74.

Koukouras, A., Dounas, C., Türkay, M., Voultsiadou-Koukoura, E. (1992). Decapod Crustacean Fauna of the Aegean Sea: New Information, Check List, Affinities. Senckenbergiana marit, 22: 217-244.

Lucas, H. (1853). Crustacea. Essai sur les animaux articulés qui habitent I' ile de Crète. Rev. Mag. *Zool*. 2: 461- 468.

Monod, T. (1956). Hippidea et Brachyura Ouest-Africians. Mémoires de l'Institut Français D'Afrique Noire, 45, Ifan Dakar, pp. 1-674.

Santucci, R. (1928). Alcuni crostacei decapodi delle isole Egee. *Arch. Zool. Ital*. 12: 345-354.

Ševcıc, Z. (1990). Check-list of the Adriatic Decapod Crustacea. *Acta Adriatica* 31: 183-274.

Tortonese, E. (1947). Biological investigation in the Aegean Sea. *Nature* 159: 887-888.

Udekem d'Acoz, C. d' (1999). Inventaire et Distribution des Crustacés Décapodes de I'Atlantique Nord-Oriental, de la Méditerranée et des Eaux Continentales Adjancentes au Nord de 25 ºN. Patrimoines Naturels (Muséum National d'Histoire Naturelle Service du Patrimoine Naturel), Bruxelles, pp.

1-383.

Winkler, L. W. (1888). The Determination of Dissolved Oxygen in Water. *Berlin Deut. Chem. Ges*. 21: 2843-2855.

Yüce, H. (1995). Northern Aegean Water Masses. Estuarine, Coastal and Shelf Science, 41, United Kingdom, pp. 325-343.

Zariquiey Alvarez, R. (1946). Crustáceos Decápodos Mediterréneos. Instituto Español de Estudios Mediterráneos, Barcelona, pp. 181.

Zariquiey Alvarez, R. (1968). Crustáceos Decápodos Ibéricos. Investigación Pesquera, 32: Barcelona, pp.1-510.

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