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PRELIMINARY INVESTIGATIONS ON CRUSTACEANS ASSOCIATED WITH THE MEDITERRANEAN MUSSEL (*MYTILUS GALLOPROVINCIALIS* LAMARCK, 1819) BEDS IN THE UPPER INFRALITTORAL OF THE BOSPHORUS (TURKEY)

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ABSTRACT

*Twenty crustacean species associated with the Mediterranean mussel (*Mytilus galloprovincialis *Lamarck, 1819) beds were recorded in the upper infralittoral zone of the Bosphorus. Two species,* Microdeutopus algicola *Della Valle, 1893 and* Stenothoe tergestina *Nebeski, 1811, were recorded for the first time in this area.*

Key words: Crustacea, *Mytilus galloprovincialis*, Bosphorus

OSSERVAZIONI PRELIMINARI SU CROSTACEI ASSOCIATI A BANCHI DI MITILO COMUNE (*MYTILUS GALLOPROVINCIALIS* LAMARCK, 1819) NELL'INFRALITORALE SUPERIORE DEL BOSFORO (TURCHIA)

SINTESI

*Venti specie di crostacei associate a banchi del mitilo comune (*Mytilus galloprovincialis *Lamarck, 1819) sono state determinate nell'infralitorale superiore del Bosforo. Due specie,* Microdeutopus algicola *Della Valle, 1893 e* Stenothoe tergestina *Nebeski, 1811, vengono segnalate per la prima volta in quest'area.*

Parole chiave: Crustacea, *Mytilus galloprovincialis*, Bosforo

This article is dedicated to the memory of our professor Erdoğan Okuş.

INTRODUCTION

The Bosphorus is a passage between the Black Sea and the Sea of Marmara and is the northernmost part of the Turkish Straits System, which plays significant roles in the biology of the Mediterranean and the Black Sea basins. The Strait acts as a biological barrier between the Sea of Marmara and the Black Sea, limiting the penetration of given species between both seas. By means of two-layered current regime of the Bosphorus, a number of species penetrate the Black Sea from the Sea of Marmara and vice versa, thus the Strait serves as a biological corridor. The Bosphorus is also an acclimatization zone for the Mediterranean species (Öztürk & Öztürk, 1996).

Prior to this study, Heller (1863), Colombo (1885), Ostroumoff (1896), Marion (1898), Devedjian (1926), Demir (1952), Tortonese (1959), Caspers (1968), Topaloğlu & Kihara (1993), Balkıs & Albayrak (1994) and Uysal *et al.* (2002) recorded some benthic crustaceans from the Bosphorus. Among them, the work of Topaloğlu & Kihara (1993) also considered the crustacean species associated with the mussel beds in a small area of the Bosphorus.

The purpose of this study is to determine the crustaceans associated with the Mediterranean mussel beds and to contribute to the recognition of zoobenthic assemblages in the Bosphorus, where the waters of the Mediterranean and the Black Sea mix.

MATERIAL AND METHODS

Sampling of the crustaceans from mussel beds was carried out in January 2003 at 10 stations located at both coasts of the Bosphorus (Fig. 1). Samples were collected from the upper infralittoral zone at depth range of 0.5-1 m. All benthic organisms of the mussel community were removed from the hard substratum by a spatula and fixed in 4% neutral formalin solution. In addition, some environmental parameters such as salinity, temperature and dissolved oxygen were measured at each sampling station. In the laboratory, the samples were sifted in a 1 mm mesh sieve with fresh water and crustaceans separated from the retained material. Separated specimens were preserved in 70% ethanol. The crustaceans were identified to the species level using stereo and compound microscopes. The specimens were deposited in the first author's personal collection.

RESULTS AND DISCUSSION

Environmental parameters:

There was no significant difference in each variable of surface temperature, dissolved oxygen and salinity among the stations (Dispersion index and χ^2 test; $p < 0.05$). The mean salinity of the study area was 18.1±0.06 psu, the mean temperature was 6.7±0.19 °C, and the mean dissolved oxygen 7.44 ±0.09 mg l^{-1} with 95% confidence level.

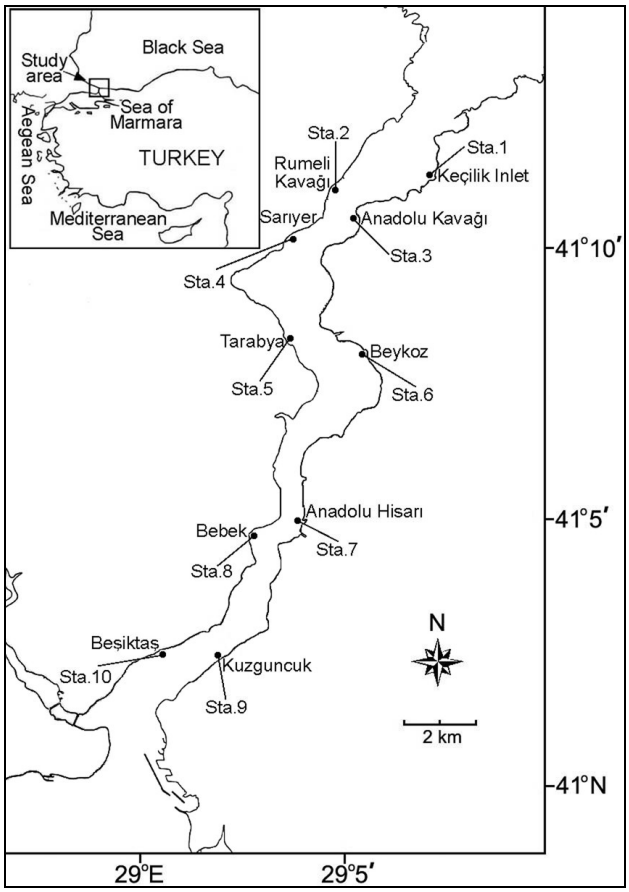

Fig. 1: Location of sampling stations in the Bosphorus.
Sl. 1: Lokacije vzorčišč v Bosporski ožini.

Fauna

A total of 20 species representing 19 genera and 5 orders were recorded in the area. The amphipods *Microdeutopus algicola* Della Valle, 1893 and *Stenothoe tergestina* Nebeski, 1811 are new records for the Bosphorus (Tab. 1).

Applying presence/absence data of the community to the McConnaughey similarity index, two different clusters of the stations were obtained at a truncation level of ≈ 60%. Group 1 embraced stations 1, 9, 10, whereas Group 2 included the remaining stations. However, the one-way ANOSIM test shows that there was not a significant dissimilarity between Groups 1 and 2 ($p < 99$). Moreover, the MDS plot confirmed insignificant representation of the stations (stress = 0.115).

Before the present study, the only research concerning the macrobenthos associated with the Mediterranean mussel beds in the Bosphorus has been carried out by

Tab. 1: List of species found at each station.
Tab. 1: Seznam vrst, ugotovljenih na posameznih vzorčiščih.

SPECIES	STATIONS									
	1	2	3	4	5	6	7	8	9	10
CIRRIPEDIA										
Balanus improvisus Darwin, 1854*	+	+	+	+	+	+	+	+	+	+
DECAPODA										
Pisidia longimana (Risso, 1816)*	-	+	+	+	+	+	-	-	-	+
Xantho poressa (Olivi, 1792)*	+	+	-	-	+	-	-	-	-	-
Pilumnus hirtellus (Linnaeus, 1761)	-	+	+	+	+	+	+	-	-	-
TANAIDACEA										
Tanais dulongii (Audouin, 1826)	+	-	-	+	-	-	-	-	+	-
ISOPODA										
Jaera nordmanni (Rathke, 1837)*	-	-	-	-	-	-	-	-	+	+
Dynamene bidentatus (Adams, 1800)*	-	+	-	+	+	-	+	+	+	-
Sphaeroma serratum (Fabricius, 1787)	+	+	+	+	+	+	+	+	+	+
Idotea balthica (Pallas, 1772)	+	-	+	-	+	-	+	-	+	+
Synisoma capito (Rathke, 1837)*	-	-	-	-	-	-	+	+	-	-
AMPHIPODA										
Caprella liparotensis Haller, 1879*	-	-	-	-	-	-	-	-	+	+
Ampithoe ramondi Audouin 1826	-	-	-	-	+	-	+	-	+	-
Microdeutopus algicola Della Valle, 1893*,†	-	-	-	-	-	+	-	-	-	-
Gammarellus angulosus (Rathke, 1843)*	-	-	-	-	+	-	-	+	-	-
Echinogammarus olivii (Milne-Edwards, 1830)*	+	-	-	+	+	-	-	-	+	+
Hyale perieri (Lucas, 1849)*	+	+	+	+	+	+	+	+	+	+
Jassa marmorata (Holmes, 1903)	-	+	+	+	+	+	+	+	+	+
Jassa ocia (Bate, 1862)*	-	+	-	+	-	-	-	+	+	-
Melita palmata (Montagu, 1804)	-	+	+	-	+	+	+	-	-	+
Stenothoe tergestina Nebeski, 1881*,†	-	-	-	-	+	-	-	-	+	+

* New record for the mussel associated crustacean fauna of the Bosphorus.
† New record for the Bosphorus.

Topaloğlu & Kihara (1993). According to these authors, Crustacea is the dominant taxon in the area investigated, where a total of 22 crustacean species have been recorded.

The present study has contributed 13 new records (Tab. 1) to the mussel associated crustacean fauna previously examined by Topaloğlu & Kihara (1993), and two of them (*M. algicola* and *S. tergestina*) are new records for the Bosphorus. As a result, the number of the crustacean species has now been increased to 35. The number of crustacean species associated with the mussel assemblages varies from 8 (Sicily, Italy: D'Anna *et al.*, 1985) to 32 (Izmir Bay, Turkey: Kocataş, 1978) at various sites in the Mediterranean infralittoral (Chintiroglou *et al.*, 2004). The number of species seems to depend on the specific features of each study area (polluted/non-polluted, midlittoral/infralittoral) (Thiel & Ullrich, 2002; Chintiroglou *et al.*, 2004). The present study can be accepted as an example for a moderately polluted infralittoral area located between the Mediterranean and the Black Seas.

In conclusion, the current status of the species composition of benthic communities existing in the Bosphorus is far from complete and it is obvious that further research will increase this number.

PREDHODNE RAZISKAVE RAKOV V HABITATIH UŽITNE KLAPAVICE (*MYTILUS GALLOPROVINCIALIS* LAMARCK, 1819) V GORNJEM INFRALITORALU BOSPORSKE OŽINE (TURČIJA)

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POVZETEK

*V gornjem infralitoralnem pasu Bosporske ožine je bilo zabeleženih 20 vrst rakov, živečih v habitatih užitne klapavice (*Mytilus galloprovincialis *Lamarck, 1819). Dve izmed vrst,* Microdeutopus algicola *Della Valle, 1893 in* Stenothoe tergestina *Nebeski, 1811 sta bili v tem območju ugotovljeni prvič.*

Ključne besede: Crustacea, *Mytilus galloprovincialis*, Bospor

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