

Amphipod biodiversity of shallow water *Posidonia oceanica* (L.) DELILE, 1813 meadows in the Aegean coasts of Turkey

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This study focused on Amphipod assemblages in the shallow-water Posidonia oceanica beds from the Aegean coast of Turkey. Investigations were carried out at eight stations along a depth gradient (2 to 5 m) in June and July 1995.

A total of 40 species were identified, of which Ampithoe ramondi was the highest dominance value with up to 34 %, followed by Dexamene spinosa with 7.71 %. Among the species identified, Ampelisca unidentata, Caprella grandimana, Photis longipes and Elasmopus affinis were new records for the Turkish seas.

Key words: Amphipoda, biodiversity, *Posidonia oceanica*, Aegean Sea, Turkey

INTRODUCTION

Posidonia oceanica is a phanerogam endemic to the Mediterranean Sea. It distributes at the entire Mediterranean, excluding the Black Sea, Istanbul Strait, Sea of Marmara, Israeli coasts and Gibraltar Strait. The meadows formed by this phanerogam play an important role in the context of primary production, biological diversity and equilibrium (PNUE/IUCN/GIS, 1990).

The vagil fauna within the *Posidonia oceanica* canopy constitutes one of the most important components of the ecosystem formed by this phanerogam (KIKUCHI and PÉRÈS, 1997). Amphipods are also highly dominant in coastal waters and have long been known as sensitive to environmental perturbation (THOMAS, 1993). Moreover, amphipods exhibit a relatively rich diversity in *Posidonia oceani-*

ca meadows (LEDOYER, 1966; SCIPIONE and FRESI, 1984; SCIPIONE *et al.*, 1996; SCIPIONE, 1999). Although several studies (DEMİR, 1952-1954; STOCK, 1967, 1968; CASPERS, 1968; GELDİAY *et al.*, 1971; KOCATAŞ, 1978; KOCATAŞ and KATAĞAN, 1977 a,b; KOCATAŞ and KATAĞAN, 1980; KRAPP-SCHICKEL *et al.*, 1994; SEZGİN *et al.*, 2000; KOCATAŞ *et al.*, 2000) exist concerning the benthic amphipods of Turkish coasts nevertheless, a single study deals with the amphipods occurred in *Posidonia oceanica* meadows (ERGEN *et al.*, 1988). This study in which species list was not included was mainly concentrated on the polychaeta and crustacea fauna associated with *Posidonia oceanica* meadows in the vicinity of Izmir Bay.

The present study aims to examine the amphipod diversity of the *Posidonia oceanica* meadows comparatively among the various localities in the Aegean coasts of Turkey.

MATERIAL AND METHODS

In the present study, amphipods were collected from the *Posidonia oceanica* beds distributed along the Aegean coasts of Turkey during the summer (June and July 1995). For this purpose, eight shallow stations (2-5 m depths) were chosen (Fig.1). In the field, the temperature (C) and salinity (psu) values of the surface waters of each sampling station were measured (Table 1).

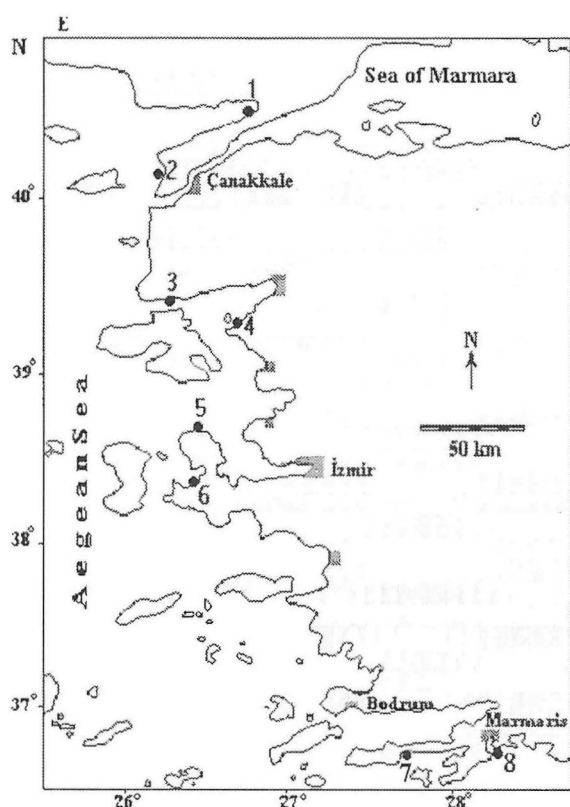


Fig. 1. Map of the investigated area with location of sampling sites (Sta.1: Güneyli-Saroz, Sta.2: Near victory monument- Çanakkale, Sta.3: Behramkale, Sta.4: Cunda Island- Ayvalık, Sta.5: Karaburun, Sta.6: Ildır-Çeşme, Sta.7: Körmen Port-Datça, Sta.8: Turunç- Marmaris

A surface of 400 cm² in the *Posidonia oceanica* beds which was sampled by a frame, 20 x 20 cm in dimensions, with a net of 500 µm mesh size was considered at each station by snorkeling. The samples taken in each station were placed into separate jars and fixed with a 5% formaldehyde solution. In the laboratory the samples were sieved through 0.5 mm mesh and the retained fauna was preserved in 70 % ethanol. The extracted fauna was separated into taxonomic groups, identified and counted under a stereomicroscope. Amphipods were identified and listed in alphabetical order of families according to the recent revision by BELLAN-SANTINI *et al.*, 1998. In order to elucidate the community structure, quantitative Dominance (% DI), SHANNON-WIENER's (1949) Diversity index (H') and PIELOU's (1975) Evenness index were calculated.

RESULTS

As a result of the study conducted at 8 stations in the Aegean Sea, a total of 476 amphipod individuals belonging to 40 species and 19 families were determined (Table 2) of which four species (*Ampelisca unidentata*, *Caprella grandimana*, *Photis longipes*, *Elasmopus affinis*) were new for the Turkish fauna. The number of individuals in the stations were ranged from 28 (Sta.3) and 98 (Sta.6). Among the species, 9 (*Eusiroides dellavallei*, *Leptocheirus sp.*, *Hyale stebbingi*, *Leucothoe richiardi*, *Lysianassa caesarea*, *Elasmopus affinis*, *Pontocrates arena-rius*, *Pereinotus testudo*, *Podocerus variegatus*) were represented by only one individual. *Dexamine spinosa* was present in all stations, four species such as *Ampithoe ramondi*, *Caprella acanthifera*, *Ericthonius brasiliensis* and *Stenothoe monoculoides* in more than four

Table 1. The temperature (C) and salinity (psu) values of the stations

Stations	1	2	3	4	5	6	7	8
Temperature (°C)	26.0	27.0	27.0	28.5	26.0	27.5	26.5	25.5
Salinity (psu)	33.9	25.7	39.1	38.9	37.1	39.5	37.2	37.4

stations. The greatest number of species (15) was encountered at Sta. 2 and the lowest number of species (9) at the stations 3 and 4 (Fig.2; Table 1). SHANNON-WIENER Diversity index values which ranged from 1.80 (Sta.6) to 3.60

(Sta.7) were fairly constant among the stations (Fig.2c). Similarly the Evenness values showed the same trend, with lowest value (0.50) at Sta.6 and value 0.92 at Sta.7 (Fig. 2d).

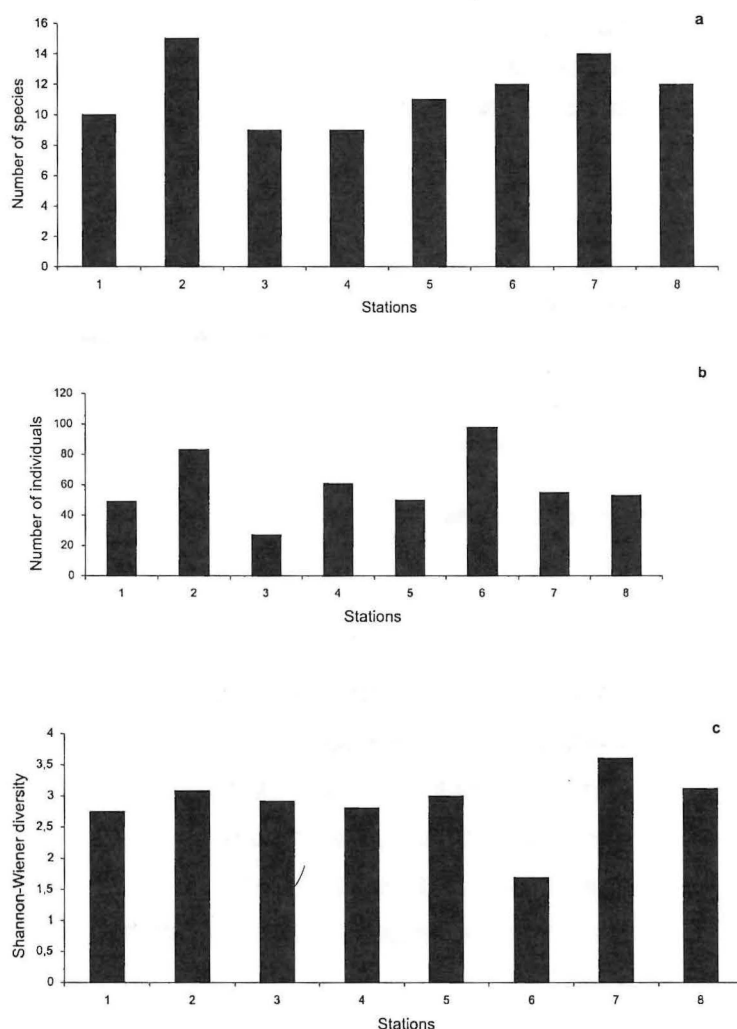


Fig. 2. Number of species (a), Number of individuals (b) and SHANNON-WIENER Diversity index (c) in each station

As for the DI, the following eleven species which accounted up to 76.5 % of the total fauna, possessed the highest dominance values: *Ampithoe ramondi* (34.45 %), *Dexamine spinosa* (7.77 %), *Caprella acanthifera* (5.67 %), *Elasmopus pocillimanus* (5.46 %), *Gammaropsis maculata* (5.25 %), *Erichthonius brasiliensis* (5.04 %), *Stenothoe monoculoides* (4.20 %), *Maera inaequipes* (3.36 %), *Lysianassa costae* (3.15 %), *Erichthonius difformis* (2.52 %) and

Caprella grandimana (2.31 %) (Table 2). The stations composed of various dominant species. For instance *Ampithoe ramondi* at Sta.6 (72.4%), Sta.4 (37.7 %), Sta.2 (37.3%), Sta.5 (26.0%), *Gammaropsis maculata* at Sta.1 (34.6%), *Elasmopus pocillimanus* at Sta.8 (26.4%), *Caprella acanthifera* at Sta.3 (22.2 %) and *Erichthonius brasiliensis* at Sta.7 (14.5 %) (Fig.3, Annex).

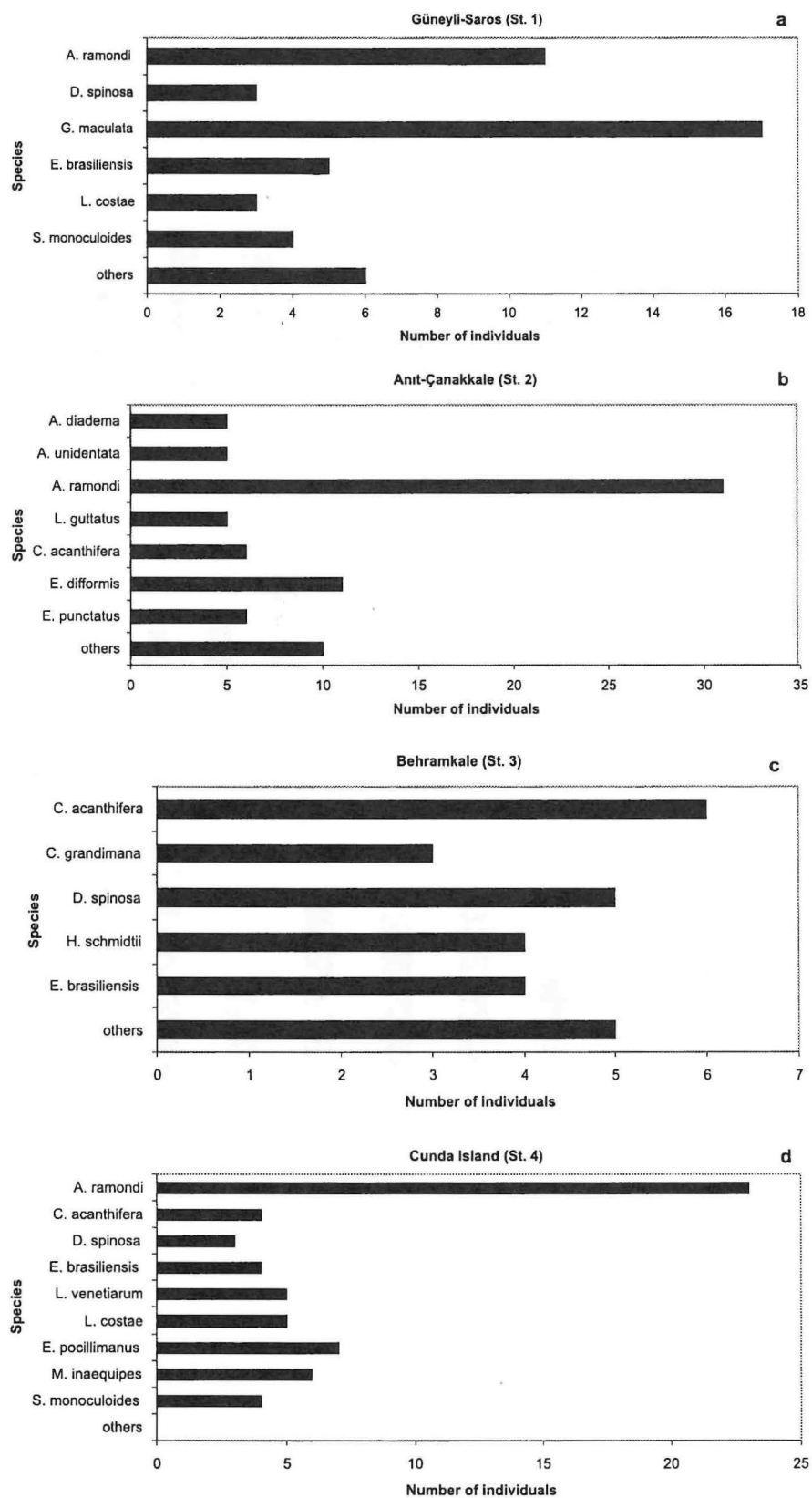


Fig 3. Abundance of the most dominant species in the stations

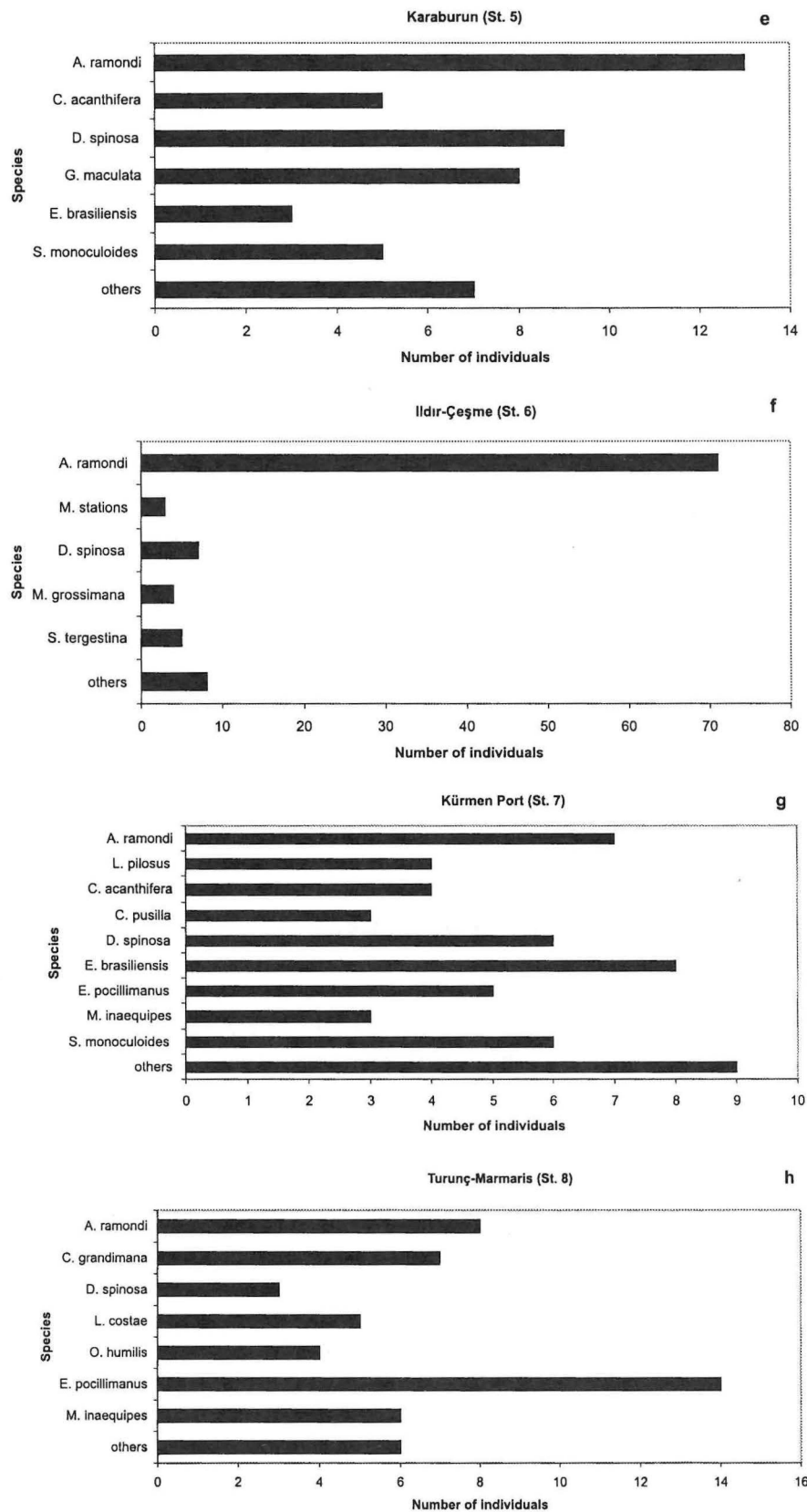


Fig 3. cont'd

DISCUSSION

Posidonia oceanica meadows are known to constitute one of the most important biotope which increases the coastal benthic biodiversity. The studies concerning *Posidonia oceanica* meadows distributed at various localities revealed that amphipod communities exhibit similar and high species diversity, regardless of differences in number of species and individuals (SCIPIONE, 1999).

The dominant species encountered in the *Posidonia oceanica* meadows (e.g. *Dexamine spinosa*, *Apherusa chierighinii*, *Ampithoe helleri*, *Aora spinicornis* and *Caprella acanthifera*) were mentioned to be closely associated with the entire marine meadows (SCIPIONE and FRESI, 1984; LORENTI and SCIPIONE, 1990; GAMBI *et al.*, 1992).

Results from the present study carried out in the Aegean Sea are in good accordance with the findings of the above mentioned studies. In the study conducted by ERGEN *et al.* (1988) at the same region in three different localities, a total of 35 crustacean species were reported from *Posidonia oceanica* meadows. However,

40 species belonging to the order Amphipoda were determined in our study. *Dexamine spinosa* and *Caprella acanthifera*, dominant species associated with the Aegean Sea *Posidonia oceanica* meadows were also previously reported to be main constituents of the *Posidonia oceanica* beds also in the Mediterranean Sea (SCIPIONE, 1990). Differences in the species list between present study and the others seem to be complex, but some authors such as ATTA and HALIM (1990) and VIRNSTEIN *et al.* (1984) summarized that the morphology and proximity of the coast, hydrodynamics, sedimentation regime and geographic latitude might play important roles for such contradictions.

The lowest of the Diversity and Evenness indices on the station Sta.6 was mainly due to the dominance level (72.44 %) of *Ampithoe ramondi*.

As a conclusion, further studies covering more sampling stations on the Aegean and the Mediterranean coast of Turkey will lead to a better understanding of the structure of the benthic Amphipod communities and their functional adaptations in the *Posidonia oceanica* ecosystem.

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Biodiverzitet amfipoda u plitkovodnim naseljima cvjetnice *Posidonia oceanica* (L.) DELILE, 1813 turske obale Egejskog mora

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SAŽETAK

Ova studija se odnosi na zajednice amfipoda u plitkom moru u naseljima cvjetnice *Posidonia oceanica* turske obale Egejskog mora. Istraživalo se na 8 postaja na dubinama od 2 do 5 m (lipanj - srpanj 1995. godine).

Ukupno je identificirano 40 vrsta od kojih je najzastupljenija *Ampithoe ramondi* (34 %), a slijedi je *Dexamine spinosa* (7.71 %). Među pronađenim vrstama *Ampelisca unidentata*, *Caprella grandimana*, *Photis longipes* i *Elasmopus affinis* nove su za turske vode.

ANNEX

List of Amphipod species and their presence, abundance and dominance at each station

* New species for the Turkish fauna

SPECIES	STATIONS								Tot.	DI%
	1	2	3	4	5	6	7	8		
Ampeliscidae										
<i>Ampelisca diadema</i> (A.Costa, 1853)		5				1			6	1.26
<i>Ampelisca rubella</i> A.Costa, 1864		2					2		4	0.84
* <i>Ampelisca unidentata</i> Schellenberg,1936		5					2		7	1.47
Ampithoidae										
<i>Ampithoe ramondi</i> Audouin, 1826	11	31		23	13	71	7	8	164	34.45
Aoridae										
<i>Leptocheirus guttatus</i> (Grube, 1864)		5							5	1.05
<i>Leptocheirus pilosus</i> Zaddach, 1844							4		4	0.84
<i>Leptocheirus</i> sp.						1			1	0.21
<i>Microdeutopus stationis</i> Della Valle,1893						3			3	0.63
Biancolinidae										
<i>Biancolina algicola</i> Della Valle, 1893			2				1		3	0.63
Caprellidae										
<i>Caprella acanthifera</i> Leach, 1814		8	6	4	5		4		27	5.67
* <i>Caprella grandimana</i> Mayer, 1882			3			1		7	11	2.31
<i>Phtisica marina</i> Slabber, 1769						2			2	0.42
Colomastigidae										
<i>Colomastix pusilla</i> Grube, 1861		1					3	1	5	1.05
Dexaminidae										
<i>Atylus</i> sp.		2							2	0.42
<i>Dexamine spinosa</i> (Montagu, 1813)	3	1	5	3	9	7	6	3	37	7.77
Eusiridae										
<i>Apherusa</i> sp.	2							2	4	0.84
<i>Eusiroides dellavallei</i> Chevreux, 1899			1						1	0.21
Hyalidae										
<i>Hyale schmidtii</i> (Heller, 1866)			4						4	0.84
<i>Hyale stebbingi</i> Chevreux, 1888					1				1	0.21
Isaeidae										
<i>Gammaropsis maculata</i> (Johnston, 1827)	17				8				25	5.25
* <i>Photis longipes</i> (Della-Valle, 1893)	1		1						2	0.42
Ischyroceridae										
<i>Erichthonius brasiliensis</i> (Dana, 1855)	5		4	4	3		8		24	5.04
<i>Erichthonius difformis</i> Milne-Edwards, 1830		11				1			12	2.52
<i>Erichthonius punctatus</i> (Bate, 1857)		6							6	1.26
Leucothoidae										
<i>Leucothoe richiardi</i> Lessona, 1865			1						1	0.21
<i>Leucothoe spinicarpa</i> (Abildgaard, 1789)	2	1			2		2		7	1.47
<i>Leucothoe venetiarum</i> Giordani-Soika, 1950				5		1	2		8	1.68
Liljeborgidae										
<i>Liljeborgia dellavallei</i> Stebbing, 1906		2							2	0.42
Lysianassidae										
<i>Lysianassa caesarea</i> Ruffo, 1987		1							1	0.21
<i>Lysianassa costae</i> Milne-Edwards, 1830	3			5	2			5	15	3.15
<i>Orchomene humilis</i> (A.Costa, 1853)		2						4	6	1.26
Melitidae										
* <i>Elasmopus affinis</i> Della Valle, 1893	1								1	0.21
<i>Elasmopus pocillimanus</i> (Bate, 1862)				7			5	14	26	5.46

ANNEX *cont'd*

<i>Maera grossimana</i> (Montagu, 1808)						4			4	0.84	
<i>Maera inaequipes</i> (Costa, 1857)				6	1			3	6	16	3.36
Oedicerotidae											
<i>Pontocrates arenarius</i> (Bate,1858)						1				1	0.21
Philiantidae											
<i>Pereionotus testudo</i> (Montagu, 1808)					1					1	0.21
Podoceridae											
<i>Podocerus variegatus</i> Leach, 1814									1	1	0.21
Stenethoidae											
<i>Stenothoe monoculoides</i> (Montagu, 1813)	4			4	5		6	1	20		4.20
<i>Stenothoe tergestina</i> Nebesski, 1880						5		1	6		1.26
Total number of individuals	49	83	27	61	50	98	55	53	476		
Total number of species	10	15	9	9	11	12	14	12	40		