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CRUSTACEANA

FIRST RECORDS OF SIX SPECIES OF CRUSTACEANS FOR THE EASTERN MEDITERRANEAN SEA

BY

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ABSTRACT

This paper deals with six crustacean species associated with *Posidonia oceanica* (Linnaeus) Delile, 1813 meadows along the Aegean coasts of Turkey: *Caprella tavolarensis*, *Eriopisella ruffoi*, *Iphimedia vicina*, *Astacilla mediterranea*, *Apseudopsis minimus* and *Macropodia deflexa*. *Apseudopsis minimus* is a new record for the Turkish coast of the Aegean Sea, the other five species are new records for the eastern Mediterranean. Brief descriptions of the species and their morphological and ecological characteristics are given.

RÉSUMÉ

Cet article traite de six espèces de crustacés associés aux prairies de *Posidonia oceanica* (Linnaeus) Delile, 1813 le long des côtes égéennes de la Turquie : *Caprella tavolarensis*, *Eriopisella ruffoi*, *Iphimedia vicina*, *Astacilla mediterranea*, *Apseudopsis minimus* et *Macropodia deflexa*. *Apseudopsis minimus* est un nouveau signalement pour la côte turque de la mer Égée, les autres cinq espèces sont nouvelles pour la Méditerranée Orientale. De brèves descriptions des espèces et leurs caractéristiques morphologiques et écologiques sont fournies.

INTRODUCTION

Posidonia oceanica (Linnaeus) Delile, 1813 is a seagrass endemic to the Mediterranean Sea, and is protected under national and international (e.g., Barcelona Convention) treaties and regulations. The habitat it forms is characterized by high biodiversity and production (Mazzella et al., 1992; Montefalcone, 2009). The complex rhizome networks and long leaves of this seagrass provide nursery grounds and food for many marine organisms (Van Montfrans et al., 1984; Bell & Pollard, 1989; Klumpp et al., 1989; Duffy et al., 2003).

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Along the Aegean coasts of Turkey, a few studies were carried out regarding the diversity of crustacean species inhabiting *P. oceanica* meadows. In a review study done by Katağan & Bakır (2013), it was shown that almost 270 crustacean species inhabit these meadows in the region.

During a project aimed at elucidating the benthic community structures in *P. oceanica* meadows along the Aegean coast of Turkey, many species of crustaceans were found in both the leaves and rhizome layers of the meadows. Among these, some species have not been reported from the eastern Mediterranean Sea before. This present paper aims to report these crustaceans and to elucidate their morphological and ecological features.

MATERIAL AND METHODS

Along the Aegean coast of Turkey, a total of 56 *Posidonia oceanica* samples (0-10 m depth) were randomly collected by scuba diving at 20 stations between June and August 2016 (fig. 1). Three replicate samples were taken at 5 and 10 m depth of each station by using a quadrate of 400 cm^2. In addition, some qualitative samples (not containing an area of specified size) were randomly taken at each station to assess the diversity of crustacean species. Samples were sieved through 0.5 mm mesh and the retained material was placed in separate jars containing 4% seawater-formalin solution. In the laboratory, *P. oceanica* samples were washed in fresh water on a sieve of 0.5 mm mesh size, and the material retained was sorted according to taxonomic groups under a stereomicroscope. The specimens were then preserved in 70% ethanol. Crustaceans were identified and counted using both stereo- and compound microscopes. Photographs were taken with a digital camera (Olympus OM-D E-M5) attached to a stereomicroscope. The specimens were deposited at the Institute of Marine Science and Technology, Dokuz Eylul University, Izmir.

RESULTS

Examination of 56 benthic samples taken from different depths (5-10 m) at 20 stations located along the Turkish Aegean coast revealed 6 crustacean species belonging to 4 orders, Amphipoda, Isopoda, Tanaidacea and Decapoda, which are new records for the eastern Mediterranean and the Aegean coast of Turkey.



Fig. 1. Map of the study area showing the sampling localities.

Order AMPHIPODA Latreille, 1816
Family CAPRELLIDAE Leach, 1814
Caprella tavolarensis Sturaro & Guerra-García, 2012
(fig. 2)

Material examined.— Kurucabük, 10 August 2016, 36°44′54″N 27°56′18″E, 10 m, 2 specimens.

Description.— Head with short rostrum. Eyes medium-sized. Body dorsally smooth, without tubercles or processes. Gills elongate, present on pereonites II and III. Pereonites II, III and IV with small spines on anterolateral projections.

Antenna I about half of body length; peduncle scarcely setose; flagellum of antenna I with 9 articles; antenna II flagellum two-articulate and shorter than

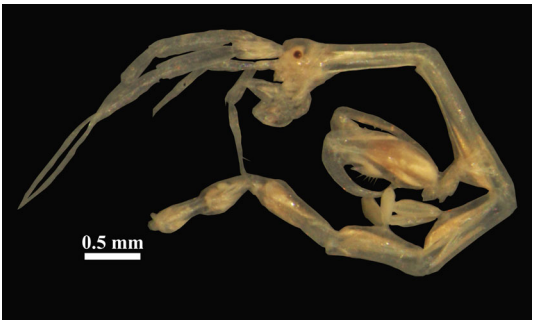


Fig. 2. External morphology of *Caprella tavolarensis* Sturaro & Guerra-García, 2012.

antenna I, with scarce setae. Basis of gnathopod I long, i.e., equal to sum of ischium, merus and carpus together. Propodus palm with 2 proximal spines, grasping margin smooth; dactylus elongate. Basis of gnathopod II short, about 0.17 times as long as pereonite III. Length of propodus about 3 times its width. Palm concave, with large tooth on outside, followed by several setae, one U-shaped carina and then again a tooth. Pereopods III and IV absent. Abdomen with pairs of two articulate appendages, a pair of lateral lobes and a single dorsal lobe (fig. 2).

Distribution.— This species was only known from Sardinia (Sturaro et al., 2011; Sturaro & Guerra-García, 2012). Herein it is now newly reported from the eastern Mediterranean.

Ecology.— This species was only found in *Posidonia oceanica* meadows at 0-15 m depth (Sturaro & Guerra-García, 2012; present study).

Family ERIOPISIDAE Lowry & Myers, 2013

Eriopisella ruffoi Marti & Villora-Moreno, 1996

(fig. 3)

Material examined.— Kurucabük, 10 August 2016, 36°44′54″N 27°56′18″E, 5-10 m, 5 specimens; Marmaris, 9 August 2016, 36°44′16″N 28°17′55″E, 10 m, 30 specimens.

Description.— Oval-shaped eyes small. Antenna I reaching 2/3 of body length, flagellum with about 20 articles, weakly setose; accessory flagellum with 2 articles. Antenna II short, flagellum with 8 or 9 articles, poorly setose. Basis of gnathopod I having 2 or 3 long setae on lateral side, merus setose posteriorly, propodus shorter than carpus. Palm oblique, armed with 4 marginal bifid spines. Gnathopod II hardly as long as gnathopod I, basis having 2 long setae on posterior margin. Propodus of gnathopod II shorter than carpus (fig. 3A). Uropods I and II with subequal rami having stout distal spines. One large spine on lateral side of uropod I peduncle. Uropod I ramus shorter than peduncle. Uropod III very long, exceeding end of uropod I, peduncle short, nearly one-third of outer ramus with distal and lateral



Fig. 3. External morphology of *Eriopisella ruffoi* Marti & Villora-Moreno, 1996: A, lateral view; B, lateral side of uropods.

spine. Outer ramus long, 2-articulate, article II very small. Outer and inner ramus with distal and lateral spines. Telson deeply cleft, telson lobes apically rounded with one lateral spine (fig. 3B).

Distribution.— Previously, this species was known only from the western part of the Mediterranean (Spain: Marti & Villora-Moreno, 1996). It is being newly reported from the eastern Mediterranean herein.

Ecology.— This species has been found in coarse sediment, both mineral and biodetritic, from shallow sublittoral pools and channels between *P. oceanica* meadows, and in "*Amphioxus*" gravel (Marti & Villora-Moreno, 1996; present study).

Family IPHIMEDIIDAE Boeck, 1871

Iphimedia vicina Ruffo & Schiecke, 1979

(fig. 4)

Material examined.— Sığacık, 23 June 2016, 38°11′44″N 26°46′70″E, 5 m, 2 specimens.

Description.— Body with dorsal processes on VII pereonite and pleonites I and II with relatively short backward directed dorsal teeth. Rostrum well developed. Antenna I without accessory flagellum. Gnathopods I and II minutely chelate. Pleonite III dorsally very convex with 2 curved terminal teeth. Coxae V, VI and VII posteriorly rounded without teeth. Pereipods V and VII basis expanded. Posterior margin of pereipod V basis rounded, finely crenulate. Posterior margin of pereipod VI basis crenulate, with weakly developed posterodistal tooth. Posterior margin of pereipod VII basis more strongly crenulate, with a large tooth distally (fig. 4A). Posterior part of epimeral plate III concave, upper teeth curved, separated by a narrow sinus. Telson entire and distal margin weakly excavate, distal angles weakly emarginate (fig. 4B).

Distribution.— This species occurs on the islands Sardinia and Malta (Ruffo & Schiecke, 1979), along Italy (Ruffo & Schiecke, 1979; Camisa et al., 2017), Spain (Conradi & Lopez-Gonzalez, 1999), and Algeria (Bakalem et al., 2014).

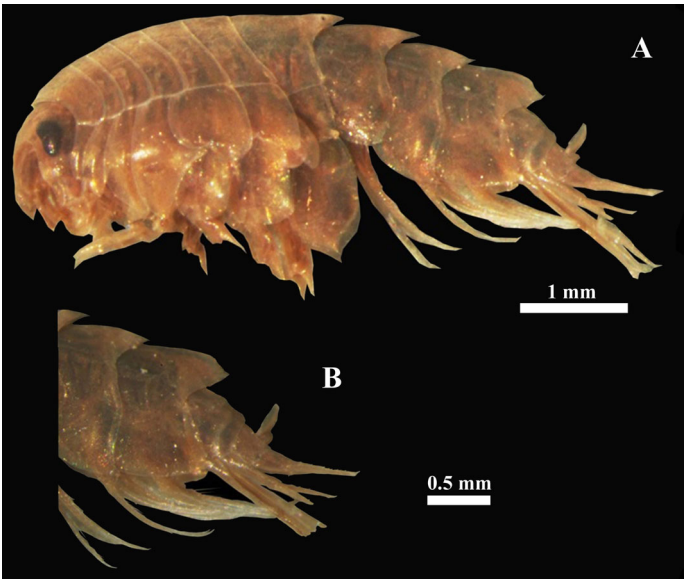


Fig. 4. External morphology of *Iphimeida vicina* Ruffo & Schiecke, 1979: A, lateral view; B, posterior part of epimeral plate III and uropods.

Ecology.— This species has been reported to occur in a number of biotopes; on sponges or hydroids (Ruffo & Schiecke, 1979), bryozoans (*Bugula neritina* (Linnaeus, 1758)) (cf. Conradi & Lopez-Gonzalez, 1999), among algae (*Halimeda* sp., *Vidalia* sp.), on hard bottoms, and in *Posidonia oceanica* meadows (Bakalem et al., 2014; Camisa et al., 2017; present study) at 0-45 m.

Order ISOPODA Latreille, 1817
Family ARCTURIDAE Dana, 1849
Astacilla mediterranea Koehler, 1911
(fig. 5)

Material examined.— Ayvalık, 25 July 2016, 39°20′11″N 26°33′36″E, 10 m, 1 specimen; Kuşadası, 17 August 2016, 37°51′35″N 27°14′36″E, 5-10 m, 6 specimens.

Description.— Body subcylindrical, elongate. Mandible without palp. Antenna reaching up to half length of body. Antennal flagella with 2 or 3 articles. Mandible without palp. First pereonite partially fused with cephalon. Pereonite IV considerably elongate, much longer and wider than other pereonites. Pereipods I, II, III and IV elongate, with long plumose setae, and directed forwards, pereipods V, VI and VII short, stout and directed backwards (fig. 5A). This species with various sharp tubercles on dorsal surface on pereonite IV and without waist or waist slightly developed. First tubercle on pereonite IV located at one third from

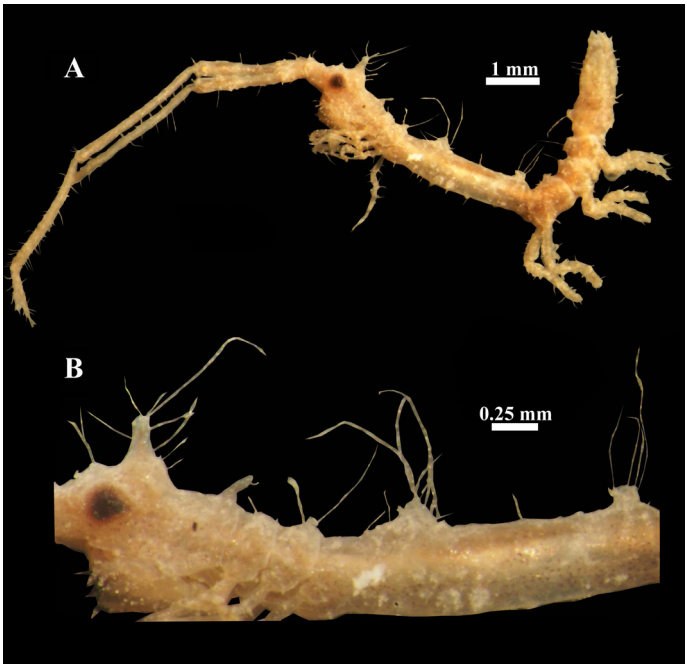


Fig. 5. External morphology of *Astacilla mediterranea* Koehler, 1911: A, lateral view; B, dorsal process.

anterior edge. Cephalon with two pairs of tubercles, first smaller than second (fig. 5B).

Distribution.— This species was previously reported from France (Koehler, 1911; Kensley, 1984; Castelló & Carbello, 2001), Italy (Lorenti & Fresi 1983) and Spain (Rincón et al., 2018) in the Mediterranean basin and in the North Atlantic Ocean (Van Der Land, 2001). Herein it is being newly reported from the eastern Mediterranean.

Ecology.— This species was collected at 1-92 m, on *Posidonia oceanica* meadows (Lorenti & Fresi, 1983; present study), on a gorgonacean (*Leptogorgia sarmentosa* (Esper, 1789)) (Kensley, 1984), among algae (*Padina*, *Sphaerococcus* and *Halopteris*) (Castello & Carbello, 2001) and on shell debris (Rincón et al., 2018).

Order TANAIDACEA Dana, 1849
Family APSEUDIDAE Leach, 1814
Apseudopsis minimus (Gutu, 2002)
(fig. 6)

Material examined.— İbrice Port, 20 July 2016, 40°36′06″N 26°32′29″E, 10 m, 1 specimen; Gökçeada, 22 July 2016, 40°14′13″N 25°56′26″E, 5-10 m, 69 specimens; Geyikli, 23 July 2016,

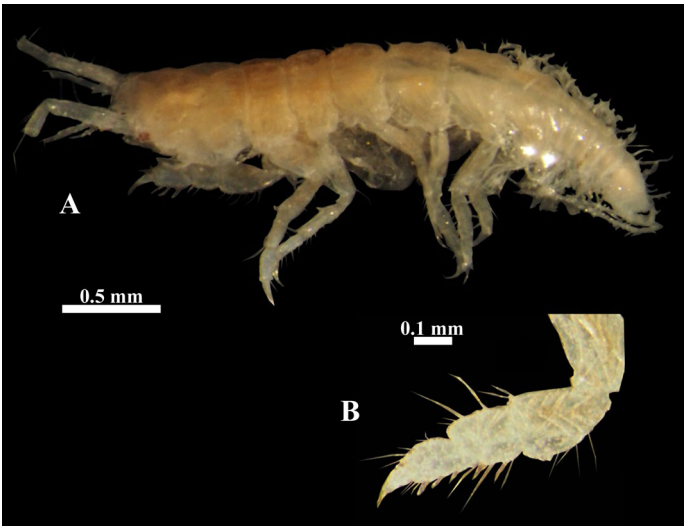


Fig. 6. External morphology of *Apseudopsis minimus* (Gutu, 2002): A, lateral view; B, pereiopod II coxa and propodus with spines.

39°47′06″N 26°09′25″E, 5 m, 1 specimen; Burhaniye, 24 July 2016, 39°28′35″N 26°53′54″E, 5 m, 4 specimens; Ayvalık, 28 July 2016, 39°20′11″N 26°33′36″E, 5-10 m, 2 specimens; Çandarlı, 27 July 2016, 39°03′28″N 26°51′42″E, 5-10 m, 4 specimens; Sazlıca, 24 July 2016, 38°44′28″N 26°46′49″E, 5 specimens; Urla, 20 June 2016, 38°27′27″N 26°45′33″E, 5-15 m, 47 specimens; Mordoğan, 21 June 2016, 38°32′17″N 26°35′59″E, 0-3 m, 2 specimens; Karaburun, 21 June 2016, 38°38′42″N 26°31′42″E, 5-10 m, 66 specimens; Ildır, 22 June 2016, 38°22′53″N 26°28′22″E, 5-10 m, 18 specimens; Sığacık, 23 June 2016, 38°11′44″N 26°46′70″E, 5-10 m, 13 specimens; Didim, 16 August 2016, 37°26′34″N 27°13′15″E, 0-1 m, 97 specimens; Kıyıkışlacık, 16 August 2016, 37°14′13″N 27°30′01″E, 5-10 m, 34 specimens; Bodrum, 15 August 2016, 36°57′39″N 27°29′15″E, 5-10 m, 10 specimens; Bördübet, 13 August 2016, 36°48′39″N 28°03′34″E, 5 m, 9 specimens; Marmaris, 9 August 2016, 36°44′16″N 28°17′55″E, 5 m, 1 specimen.

Description.— Body small. Carapace length shorter than its width. Rostrum acute and with large lobes at base. Antennule with about 6 or 7 setae on both margins of first peduncular article. Inner flagellum with 3 articles and outer flagellum with 6 articles Chelipeds and pereopod I with exopodite. Merus of cheliped with 5 setae, exopodite present. Pereonites I and II shorter than other pereonites. Each pereonite with posterolateral apophyses. Coxa and basis of pereopod III with 3 or 4 long setae each. Pereonites III and IV longer than other ones. Pleon with 5 very short pleonites and pleotelson. Pleopods, in five pairs, biramous and uni-articled, with long plumose setae around. Lateral sides of pleotelson with 3 setae. Exopodite of uropod with 3 articles (fig. 6A). Pereopod II with spiniform process; carpus with 2 and propodus with 3 ventral spines. Merus without distal spine (fig. 6B).

Distribution.— Previously, this species was known only from Haifa along the coasts of Israel (Gutu, 2002).

Ecology.— This species inhabits shallow waters. In this study, it has been found in *Posidonia oceanica* meadows at 0-10 m.

Order DECAPODA Latreille, 1802
Family INACHIDAE MacLeay, 1838
Macropodia deflexa Forest, 1978
(fig. 7)

Material examined.— Gökçeada, 22 July 2016, 40°14′13″N 25°56′26″E, 5-10 m, 9 specimens; Burhaniye, 24 July 2016, 39°28′35″N 26°53′54″E, 5 m, 1 specimen; Urla, 20 June 2016, 38°27′27″N 26°45′33″E, 15 m, 1 specimen; Ildır, 22 June 2016, 38°22′53″N 26°28′22″E, 10 m, 2 specimens.

Description.— Rostrum straight or curved downwards, long and splitting into two pieces. Length of rostrum reaching to either third, or fifth segment of antennal peduncle. Eyes without orbital spines. Carapace triangular and dorsal surface with numerous long spines. Anterior part of carapace narrow, becoming enlarged towards posterior. Lateral sides of carapace with long and sharp spines. Hepatic region of carapace with 2 pairs of tubercles. Metagastric region with very large spine (fig. 7A). Basal segments of antennal peduncle with 3-5 distinct spines. Antennal segments II and III longer and narrower than other segments (fig. 7B). Strong chelipeds in adult male; merus with very strong tooth. Pereiopods covered with long setae around. Inner face of dactylus of IV and V pereipods serrated.

Distribution.— This is an Atlanto-Mediterranean species occurring from the west of the British Isles to the western Mediterranean (Britain: Hayward & Ryland,

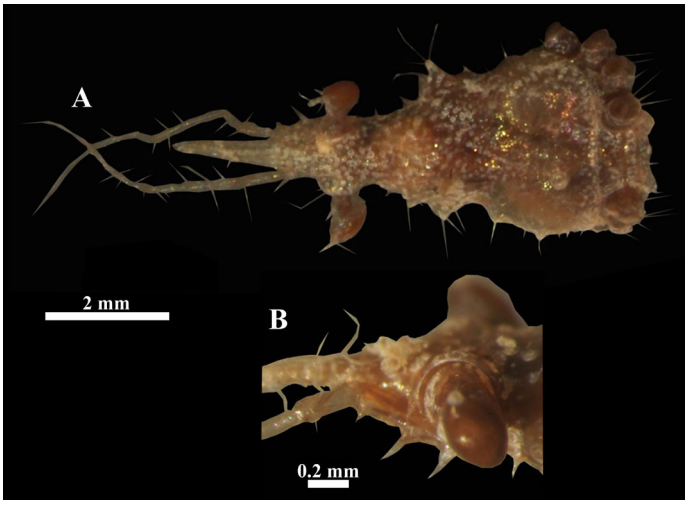


Fig. 7. External morphology of *Macropodia deflexa* Forest, 1978: A, dorsal view; B, basal segments of antennal peduncle with spines.

1995; Spain: Fernández Cordeiro et al., 2006; and Portugal: Marco-Herrero et al., 2015). It is being newly reported from the Aegean coasts of Turkey in the present paper.

Ecology.— This species is distributed from the intertidal up to 90 m depth, inhabiting different types of bottoms, but especially the rocky biotope with seaweed (Fernández Cordeiro et al., 2006). In the present study, this species has been found in *Posidonia oceanica* meadows.

SUMMARY CONCLUSION

This study sheds more light on the morphological and ecological features of crustaceans along the Turkish coast of the Aegean Sea. Extensive future sampling in the area, which is yet to be undertaken, would probably yield additional species to be added as elements in the known Turkish fauna.

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