

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/263814523>

Marine Interstitial and Phytal Miraciidae Dana, 1846 (Crustacea: Copepoda: Harpacticoida) Inhabiting along the Mediolittoral Zone of Turkish Coasts

Article · January 2014

CITATIONS

15

READS

1,136

3 authors:



[Serdar Sönmez](#)

Adiyaman University

41 PUBLICATIONS 116 CITATIONS

[SEE PROFILE](#)



[Serdar Sak](#)

Balikesir University

50 PUBLICATIONS 291 CITATIONS

[SEE PROFILE](#)



[Süphan Karaytuğ](#)

Mersin University

78 PUBLICATIONS 497 CITATIONS

[SEE PROFILE](#)

Marine Interstitial and Phytal Miraciidae Dana, 1846 (Crustacea: Copepoda: Harpacticoida) Inhabiting along the Mediolittoral Zone of Turkish Coasts

Serdar SÖNMEZ^{1*}, Serdar SAK¹, Süphan KARAYTUĞ²

1. Balıkesir University, Faculty of Science and Literature, Department of Biology, Çağış Campus, 10145, Balıkesir / Turkey.

2. Mersin University, Faculty of Art and Science, Department of Biology, Çiftlikköy Campus, 33343, Mersin/TURKEY.

*sonmezserdar@gmail.com

Abstract: Phytal and interstitial miraciids inhabiting along the Turkish coasts were determined based on the previous collections as well as the newly collected materials, in order to determine the distribution and species diversity of the family. For this purpose miraciid samples collected from a total of 265 stations along the beaches of Black Sea (66 stations), Aegean Sea (110 stations) and Mediterranean Sea (89 stations) were morphologically examined in detail. As a result 17 species and 1 subspecies belonging to 14 genera were determined. The examination of the previous literature revealed that eight of the identified species (*Diosaccus tenuicornis*, *Schizopera pratensis*, *Psammotopa vulgaris*, *Amonardia phyllopus*, *Metamphiascopsis hirsutus bermudae*, *Robertgurneya smithi*, *Paramphiascella robinsoni* and *Sarsamphiascus kawamurai*) are new records for Turkish waters. On the other hand *Sch. pratensis*, *R. smithi*, *M. hirsutus bermudae* and *S. kawamurai* are reported for the first time from Mediterranean Sea.

Key Words: Intertidal, fauna, Turkey, taxonomy, Harpacticoida.

Türkiye Kıyılarında Mediolittoral Alanda Denizel Kumiçi ve Fital Olarak Yaşayan Miraciidae Dana, 1846 (Crustacea: Copepoda: Harpacticoida) Türleri

Özet: Türkiye sahilleri boyunca yaşayan interstitial ve fital miraciidler, yayılış ve tür çeşitliliklerinin ortaya çıkarılması amacı ile, önceden toplanmış olan örnekler ve yeni toplanan örnekler kullanılarak belirlendi. Bu amaçla Karadeniz sahilleri (66 istasyon), Ege Denizi sahilleri (110 istasyon) ve Akdeniz sahillerinden (89 istasyon) toplam 265 istasyondan toplanan örneklerin detaylı morfolojik incelemeleri gerçekleştirildi. Sonuç olarak 14 cins dahil 17 tür ve 1 alttür teşhis edildi. Yapılan literatür incelemesine göre, teşhis edilen türlerden sekizi (*Diosaccus tenuicornis*, *Schizopera pratensis*, *Psammotopa vulgaris*, *Amonardia phyllopus*, *Metamphiascopsis hirsutus bermudae*, *Robertgurneya smithi*, *Paramphiascella robinsoni* and *Sarsamphiascus kawamurai*) Türkiye sahillerinden ilk kez kaydedilmiştir. Bunun yanı sıra *Sch. pratensis*, *R. smithi*, *M. hirsutus bermudae* ve *S. kawamurai* tüm Akdeniz'den ilk kez rapor edilmiştir.

Anahtar Kelimeler: Intertidal, fauna, Türkiye, taksonomi, Harpacticoida.

Introduction

High energy sandy beaches and rocky shorelines are the most dynamic habitats harbouring diverse and abundant macrofauna and meiofauna. Meiofaunal organisms especially play an important ecological role in the aquatic ecosystem and are well suited for environmental impact assessment studies (Giere, 2009). Therefore, there is currently increasing interest in the study of interstitial fauna in order to propose sustainable management policies for these ecosystems. However, in spite of increasing interest in the role of biodiversity in the functioning of marine ecosystems, taxonomic studies of meiofauna are still unsatisfactory in many parts of the world such as Turkey. The order Harpacticoida of the subclass Copepoda are mostly free living benthic organisms and in marine sediments they are usually the second most abundant meiofaunal taxon after nematodes, but they are often the dominant taxon in marine algae (Hicks ve Coull, 1983; Huys ve ark., 1996). Despite the fact that Turkey has a very

long coastline consisting of many sandy and rocky shores, only limited faunistic information on harpacticoid copepods exists. On the basis of published data, only 132 harpacticoid species have been recorded from Turkish marine waters so far (Sönmez ve ark., 2012).

The family Miraciidae of order Harpacticoida consists of 426 species/subspecies which are classified into 50 valid genera (Song ve ark., 2007; Wells, 2007; Karanovic ve Cooper, 2012; Huys ve Mu 2008; Chullarson, 2011) most of which transferred from the former family Diosaccidae by Willen (2002). The members of the family are mostly inhabitants of the marine benthos, although a few species occur in fresh water (Boxshall ve Halsey, 2004). A total of 25 miraciid species that belong to 14 genera have been recorded from Turkey so far. The first marine miraciid report from Turkish waters was given by Noodt (1955) who determined 17 miraciid species. Then Karaytuğ and Sak (2006) reported 6 miraciids from Edremit Bay and Kapıdağ Peninsula. Finally Alper ve ark. (2010) reported 8 miraciid species from the coasts of Datça-Bozburun Peninsulas. However there is no published record of miraciids from the Black Sea, Mediterranean Sea and Aegean Sea coasts (except Datça-Bozburun Peninsulas and Edremit Bay) of Turkey. The main aim of this study is to determine the distribution and species diversity of the phytal and interstitial miraciids inhabiting along the Turkish coasts.

Material and Methods

Samples were collected from a total of 265 stations (Figure 1) along the beaches of the Black Sea (66 stations) between April 2001 and September 2002 (Table 1), the Mediterranean Sea (89 stations) between April 2007 and September 2009 (Table 2) and the Aegean Sea (110 stations) on July 2011 (Table 3). Interstitial samples were collected using Karaman-Chappius method (Delamare-Deboutteville, 1953) from intertidal zone and phytal samples were taken from supralittoral rocks by hand. All samples were immediately preserved with 4% formalin solution. Copepods were extracted from detritus under an OLYMPUS SZX-12 or SZX-16 stereomicroscopes and stored in 70% ethanol. Observations were made from whole or dissected specimens that were mounted in lactophenol mounting medium. Broken cover glass pieces were added between cover glass and slide to prevent the animal and appendages from being compressed by the cover slip and to facilitate rotation and manipulation, allowing observation from all angles. Preparations were subsequently sealed with Entellan® (Merck). Identification of the specimens were made under a DIC attached Olympus BX-50 light microscope following the taxonomic keys of Lang (1948; 1965) and Wells (2007), as well as the relevant literature. Photographs were taken with Olympus E-330 Digital Camera. Focus stacking method was used to obtain final images. For this purpose a series of images were captured at different focal depths and blended together using Zerene Stacker Software to get the final image with a greater depth of field. The descriptive terminology is adopted from Huys ve ark. (1996). Abbreviations used in the text are: A1 for Antennule, A2 for Antenna, P1–P6, for swimming legs 1–6; exp (enp)-1 (-2, -3) to denote the proximal (middle, distal) segment of a ramus. Material was deposited in the Balıkesir University Zoology Museum (BUZM), Turkey.

Table 2. Sampling localities that miraciids were found along the Mediterranean Sea coasts of Turkey.

Code	Sampling Dates				Locality	Coordinates
	1.	2.	3.	4.		
M1	07.04.07	25.07.07	24.11.07		Samandağ beach, Mağaracık / Hatay	N 36° 05.783'; E 35° 56.182'
M4	07.04.07	25.07.07	24.11.07		Arsuz beach / Hatay	N 36° 24.808'; E 35° 53.202'
M5	07.04.07	25.07.07	24.11.07		Gözcüler beach / Hatay	N 36° 25.656'; E 35° 54.033'
M10	08.04.07	24.07.07	25.11.07	13.09.08	Yumurtalık / Adana	N 36° 45.180'; E 35° 47.515'
M12	08.04.07	24.07.07	25.11.07	13.09.08	Haylazlı village, Sarıgöl / Adana	N 36° 45.684'; E 35° 39.444'
M13	08.04.07	24.07.07	25.11.07	13.09.08	Deveciüşiği village / Adana	N 36° 44.809'; E 35° 37.699'
M14	08.04.07	-	-		Asu beach, Karataş / Adana	N 36° 35.448'; E 35° 25.450'
M16	09.04.07	26.07.07	26.11.07		Kazanlı beach / Mersin	N 36° 48.617'; E 34° 45.442'
M18	09.04.07	26.07.07	-		Alata beach / Mersin	N 36° 37.766'; E 34° 20.917'
M23	10.04.07	27.07.07	27.11.07	14.09.08	Arkum beach / Mersin	N 36° 21.519'; E 34° 04.762'
M24	10.04.07	-	-		Akgöl beach / Mersin	N 36° 18.005'; E 34° 01.177'
M25	10.04.07	27.07.07	27.11.07	14.09.08	East of Kum district, Taşucu / Mersin	N 36° 17.829'; E 33° 50.863'
M28	10.04.07	27.07.07	27.11.07		Boğsak beach / Mersin	N 36° 16.264'; E 33° 48.842'
M34	11.04.07	28.07.07	28.11.07	-	Ağaçlı beach / Mersin	N 36° 09.382'; E 33° 28.917'
M36	11.04.07	28.07.07	28.11.07	-	Aydıncık beach / Mersin	N 36° 09.248'; E 33° 21.204'
M38	11.04.07	28.07.07	28.11.07	15.09.08	Tekeli beach / Mersin	N 36° 08.281'; E 33° 09.728'
M40	11.04.07	28.07.07	28.11.07	-	Bozyazı beach / Mersin	N 36° 06.023'; E 32° 58.201'
M42	12.04.07	29.07.07	29.11.07	-	Anamur beach / Mersin	N 36° 04.319'; E 32° 52.271'
M43	12.04.07	29.07.07	29.11.07	-	2 km east of Anamuryum / Mersin	N 36° 01.959'; E 32° 48.749'
M44	12.04.07	29.07.07	29.11.07	-	Melleç beach / Mersin	N 36° 02.582'; E 32° 41.029'
M45	12.04.07	29.07.07	29.11.07	-	Kaledran beach / Mersin	N 36° 05.932'; E 32° 34.066'
M46	12.04.07	29.07.07	29.11.07	-	Gazipaşa marina / Antalya	N 36° 16.137'; E 32° 16.783'
M47	12.04.07	29.07.07	29.11.07	-	East of Demirtaş / Antalya	N 36° 22.930'; E 32° 11.374'
M50	12.04.07	29.07.07	29.11.07	-	Payallar beach / Antalya	N 36° 35.549'; E 31° 50.348'
M51	12.04.07	29.07.07	29.11.07	-	İncekum beach / Antalya	N 36° 38.250'; E 31° 44.794'
M52	12.04.07	29.07.07	29.11.07	-	10 km east of İncekum / Antalya	N 36° 40.720'; E 31° 37.163'
M53	12.04.07	30.07.07	30.11.07	-	Side / Antalya	N 36° 46.757'; E 31° 23.268'
M54	12.04.07	30.07.07	30.11.07	-	Kumköy Diamond hotel beach / Antalya	N 36° 47.977'; E 31° 21.400'
M55	13.04.07	30.07.07	30.11.07	15.09.08	Belek beach / Antalya	N 36° 50.473'; E 31° 04.793'
M56	13.04.07	30.07.07	30.11.07	-	Kumköy beach / Antalya	N 36° 51.256'; E 30° 55.846'
M57	13.04.07	30.07.07	30.11.07	-	Lara beach / Antalya	N 36° 51.031'; E 30° 50.966'
M58	13.04.07	30.07.07	30.11.07	16.09.08	Konyaaltı beach / Antalya	N 36° 52.172'; E 30° 39.122'
M59	13.04.07	30.07.07	01.12.07	-	Küçükaltıncak beach, Kemer / Antalya	N 36° 47.710'; E 30° 34.490'
M60	13.04.07	30.07.07	01.12.07	-	Mirage hotel beach, Göynük / Antalya	N 36° 39.667'; E 30° 33.670'
M61	13.04.07	31.07.07	01.12.07	-	East of Kemer / Antalya	N 36° 37.291'; E 30° 33.399'
M63	13.04.07	31.07.07	01.12.07	16.09.08	Çıralı beach / Antalya	N 36° 24.320'; E 30° 28.747'
M64	13.04.07	31.07.07	01.12.07	-	Çavuşköy (Adrasan) beach / Antalya	N 36° 17.948'; E 30° 28.131'
M66	13.04.07	31.07.07	01.12.07	-	Mavikent beach / Antalya	N 36° 17.269'; E 30° 20.491'
M67	14.04.07	31.07.07	01.12.07	16.09.08	Hasyurt intersection / Antalya	N 36° 18.913'; E 30° 11.915'
M68	14.04.07	31.07.07	-	-	3 km east of Finike, Sahilkent / Antalya	N 36° 18.491'; E 30° 09.857'
M70	14.04.07	31.07.07	01.12.07	-	Beymelek / Antalya	N 36° 15.200'; E 30° 02.938'
M73	14.04.07	01.08.07	01.12.07	-	Kalkan road, Mavımağara / Antalya	N 36° 13.722'; E 29° 26.955'
M74	14.04.07	01.08.07	01.12.07	-	Patara beach / Antalya	N 36° 15.162'; E 29° 18.720'
M75	14.04.07	01.08.07	01.12.07	-	Patara beach, Eşen river estuary / Antalya	N 36° 17.569'; E 29° 15.733'
MY1	-	25.07.07	24.11.07	-	100 m south of Asi River / Hatay	N 36° 02.774'; E 35° 57.753'
MY4	-	25.07.07	24.11.07	-	Kale Village / Hatay	N 36° 17.439'; E 35° 47.087'
MY6	-	25.07.07	24.11.07	-	İkem Collage beach, İskenderun / Hatay	N 36° 34.965'; E 36° 08.316'
MY7	-	24.07.07	25.11.07	-	Zeytinbeli beach / Adana	N 36° 45.997'; E 35° 44.163'
MY8	-	24.07.07	25.11.07	-	Bahçe beach / Adana	N 36° 35.501'; E 35° 26.163'
MY10	-	26.07.07	26.11.07	-	Karaduvar / Mersin	N 36° 48.494'; E 34° 41.242'
MY12	-	29.07.07	29.11.07	-	Dragon camping beach, Mamure / Mersin	N 36° 04.806'; E 32° 53.480'
MY13	-	30.07.07	30.11.07	-	Boğazkent beach / Antalya	N 36° 49.866'; E 31° 09.394'
MY14	-	31.07.07	01.12.07	-	Papaz bay beach, Mavikent / Antalya	N 36° 16.742'; E 30° 23.577'
MY15	-	13.07.07			Yapraklı Bay / Taşucu / Mersin	-----

Table 3. Sampling localities that miraciids were found along the Aegean Sea coasts of Turkey.

Code	Sampling Date	Locality	Coordinates
G2	13.07.2011	Suncity Beach/ Ölüdeniz	36° 33' 19,9" N 29° 06' 26,3" E
G3	13.07.2011	Gemiler Bay	36° 33' 30,9" N 29° 03' 37,1" E
G4	13.07.2011	Letoonia Beach	36° 38' 25,9" N 29° 05' 39,5" E
G6	13.07.2011	Kuleli beach	36° 38' 34,8" N 29° 04' 35,9" E
G7	13.07.2011	Büyükboncuklu Bay	36° 38' 39,9" N 29° 04' 39,7" E
G10	13.07.2011	Katrançı Bay	36° 42' 30,0" N 29° 01' 58,8" E
G11	13.07.2011	Günlüklü Bay	36° 42' 53,5" N 29° 01' 16,7" E
G13	13.07.2011	Kayacık Beach(near Dalaman Airport.)	36° 41' 10,2" N 28° 47' 15,1" E
G14	13.07.2011	Sarıgerme Ortaca Beach	36° 42' 17,5" N 28° 42' 39,6" E
G15	14.07.2011	Aşı Beach	36° 43' 21,7" N 28° 38' 57,1" E
G16	14.07.2011	İztuzu Beach (South part)	36° 42' 34,5" N 28° 37' 49,5" E
G19	14.07.2011	Turuñ Beach / Marmaris	36° 46' 22,7" N 28° 14' 55,4" E
G23	15.07.2011	Adatepe	36° 49' 03,6" N 28° 18' 02,4" E
G24	15.07.2011	Buzağı Otu	36° 55' 15,7" N 28° 10' 22,8" E
G26	15.07.2011	Kleopatra Island	36° 59' 22,0" N 28° 15' 02,9" E
G27	15.07.2011	Beach near İncekum	36° 59' 00,4" N 28° 12' 20,8" E
G29	15.07.2011	West of Hayıtlı	37° 02' 52,0" N 28° 16' 15,3" E
G33	15.07.2011	Çökertme	37° 00' 19,9" N 27° 47' 30,6" E
G34	16.07.2011	Pitos Hotel Beach	37° 07' 50,1" N 27° 34' 28,9" E
G35	16.07.2011	Gölköy	37° 07' 09,8" N 27° 23' 44,6" E
G36	16.07.2011	Küçükbüük	37° 08' 27,0" N 27° 21' 26,2" E
G37	16.07.2011	Gündoğan	37° 07' 50,4" N 27° 20' 52,9" E
G46	17.07.2011	Güllük beach.	37° 14' 39,7" N 27° 36' 03,6" E
G47	17.07.2011	Zeytinlik	37° 15' 29,6" N 27° 31' 29,8" E
G48	17.07.2011	Corendan Hotel Beach	37° 15' 45,5" N 27° 32' 37,1" E
G49	17.07.2011	Bozkum	37° 19' 52,0" N 27° 23' 18,5" E
G51	17.07.2011	Uslu site	37° 23' 58,9" N 27° 22' 09,5" E
G52	17.07.2011	Didim Altinkum Beach	37° 21' 21,9" N 27° 17' 16,6" E
G56	18.07.2011	Venüs Beach/ Güzelçamlı	37° 43' 34,7" N 27° 14' 09,6" E
G57	18.07.2011	Dilek Peninsula, İcmeler Beach	37° 42' 28,8" N 27° 12' 18,3" E
G58	18.07.2011	Dilek Peninsula, Aydınlik Beach	37° 42' 00,9" N 27° 10' 34,0" E
G59	18.07.2011	Dilek Peninsula, Karasu Beach	37° 41' 23,0" N 27° 07' 43,8" E
G61	18.07.2011	Dilek Peninsula, Military zone	37° 39' 48,0" N 27° 00' 32,5" E
G62	18.07.2011	Kuşadası Long Beach	37° 48' 40,2" N 27° 16' 10,9" E
G64	18.07.2011	Pamucak Beach	37° 56' 42,5" N 27° 16' 23,6" E
G68	19.07.2011	West of Doğanbey	33° 03' 47,5" N 26° 54' 10,9" E
G69	19.07.2011	Doğanbey Cape Orşal Site	38° 08' 20,4" N 26° 49' 49,3" E
G76	19.07.2011	6 km south of Mordoğan - İmren Sit.	38° 28' 20,6" N 26° 36' 48,3" E
G79	20.07.2011	Yeniliman / Karaburun	38° 40' 19,6" N 26° 26' 07,4" E
G80	20.07.2011	Bademlibük	38° 37' 14,2" N 26° 21' 26,2" E
G81	20.07.2011	Küçükbahçe	38° 33' 27,4" N 26° 22' 13,6" E
G84	20.07.2011	Alaçatı (west coast)	38° 18' 31,3" N 26° 22' 28,5" E
G85	20.07.2011	Pırlanta beach / Çeşme	38° 17' 07,1" N 26° 15' 12,8" E
G87	21.07.2011	Ferah camp&beach / Foça	38° 41' 30,7" N 26° 43' 54,3" E
G93	21.07.2011	Deniz camp&beach. / Bademli	39° 02' 19,8" N 26° 47' 31,2" E
G94	21.07.2011	Dikili beach	39° 05' 14,2" N 26° 52' 58,5" E
K12	02.08.2011	Baklaburnu beach	40° 32' 51,6" N 26° 44' 50,1" E
K13	03.08.2011	Altinkum beach / Enez	40° 39' 14,5" N 26° 03' 55,6" E
K14	03.08.2011	Sultaniça beach	40° 35' 37,7" N 26° 07' 48,8" E
K16	03.08.2011	İbrice harbour / Mecidiye	40° 36' 06,2" N 26° 32' 29,7" E

Results

A total of 17 species and 1 subspecies belonging to 14 genera have been identified. The identified species, their localities, number of individuals and distribution along the coasts of Turkey are given below:

Family: Miraciidae Dana, 1846

Subfamily: Diosaccinae Sars, 1906

Genus: *Diosaccus* Boeck, 1873

Diosaccus tenuicornis (Claus, 1863)

Material examined: Interstitial: M7(I): 2♀ (dissected); M73(I): 1♀ (dissected), 1♀; phytal: M4(I): 1♀.

Distribution in Turkey: New Record.

Short Description: *Female*. Body robust, prosome distinctly wider than urosome. Rostrum well developed, blunt at tip. Caudal rami about 1.2 times as long as broad, inner and outer margin naked, bears 6 setae, seta I absent; seta II short, unipinnate, spiniform; seta III long, thin and naked; seta IV long and naked; seta V longest, about 3 times longer than seta IV; seta VI short and naked; seta IV located on dorsal surface and tri-articulated at base. A1 (Figure 2A) long and slender, slightly tapering to the tip, 8 segmented. Segment two longest, segment four bears a long aesthetasc fused basally to a seta, segment eight bears an apical acrothek consisting of a short aesthetasc and two setae. A2 with allobasis, bears one segmented exopod (Figure 2B) armatured with 1 long, broad and spinulose seta medially, 2 short and 1 long, broad and spinulose setae apically.

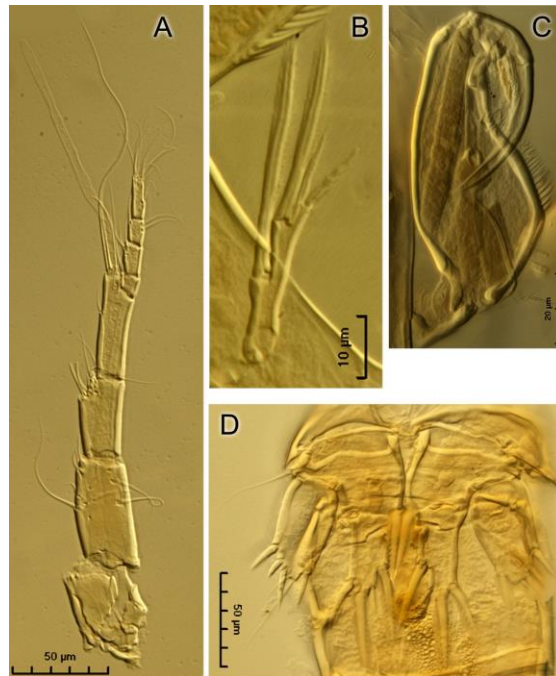


Figure 2. *Diosaccus tenuicornis*, ♀. A. A1; B. A2; C. Maxiliped; D. P5.

P1 (Figure 3A) coxa well developed about 2 times as long as basis. Basis bears 1 short spinulose spine at inner margin. Endopod and exopod 3-segmented. Enp-1 elongated, about 8 times as long as wide, inner margin with spinules, bears 1 short plumose seta at inner distal corner; enp-2 very short, inner margin naked, ornamented with short and broad spinules at outer margin; enp-3 short, armatured with 1 naked minute seta at inner distal corner and 2 well developed claw like seta at terminal. Exopod reaches beyond the half of enp-1, inner margin naked, bears a spinular row along outer margin and 1 short, broad and naked spine at outer distal corner; enp-2 longest, about 4 times as long as broad, bears 1 thin, plumose seta at inner distal corner, outer margin ornamented with a spinular row and bears 1 short, broad and naked spine at outer distal corner; enp-3 inner margin naked, armatured with 2 long naked setae at terminal and 2 short, broad, naked seta at outer margin.

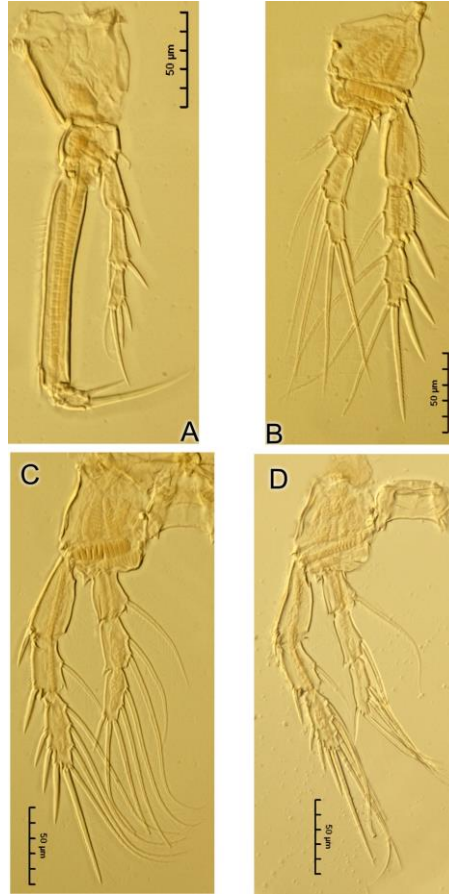


Figure 3. *Diosaccus tenuicornis*, ♀. A. P1; B. P2; C.P3; D.P4.

P2-P4 (Figure 3B-D) with 3 segmented rami. Endopod shorter than exopod. Enp-1 bears 1 long plumose seta at inner margin, ornamented with fine spinules along outer margin; enp-2 with 2 well developed plumose setae (P2, P3) or 1 long plumose seta (P4) at inner margin, ornamented with fine spinules along outer margin; enp-3 armatured with 1 (P2) or 2 (P3, P4) plumose seta at inner margin, 2 long plumose seta at terminal and 1 short, broad and naked seta at outer distal corner. Exp-1 inner margin naked, outer margin ornamented with a row of spinules and bears 1 long bipinnate spine at outer distal corner; exp-2 with 1 long, plumose seta at inner margin, outer margin ornamented with a row of spinules and bears 1 long bipinnate spine at outer distal corner; exp-3 armatured with 2 (P2) or 3 (P3,P4) long plumose seta at inner margin, 1 long plumose and 1 relatively short and broad unipinnate setae at terminal, 2 (P2) or 3 (P3,P4) bipinnate spines at distal part of outer margin. Setal formula of the swimming legs:

	Endopod			Exopod		
P1	1	0	120	0	1	022
P2	1	2	121	0	1	222
P3	1	2	221	0	1	323
P4	1	1	221	0	1	323

P5 (Figure 2D) baseoendopod and exopod distinct, outer basal seta long, thin and naked. Endopodal lobe of baseoendopod elongated, about 3.2 times as long as broad at anterior surface, bears 4 well developed bipinnate spines and 1 relatively short and naked spine. Exopod about 1.6 times as long as broad, armatured with 2

bipinnate spines, 2 naked spines, 1 very minute and naked seta and 1 relatively long, thin and naked seta.

Male. (Figure 4A) P1 basis, P2 endopod, P5 and P6 sexually dimorphic. P1 basis with a teeth like chitinous projection located near the base of inner spine (arrowed in Figure 4D). P2 enp-2 and enp-3 modified to a single segment (Figure 4C) with 1 short bipinnate spine near inner proximal corner, 1 very long plumose seta at inner distal corner, 1 thick and 1 thin undulated spine at terminal; inner margin ornamented with fine spinules. P5 (Figure 4B) baseoendopod and exopod fused. Endopodal lobe short and squarish bears 2 short, thick, bipinnate spines. Exopod short and squarish with 3 bipinnate spines and 1 short, naked seta. P6 (Figure 4B) baseoendopod and exopod modified into a single plate, bears 1 long bipinnate spine and 2 short, naked setae.

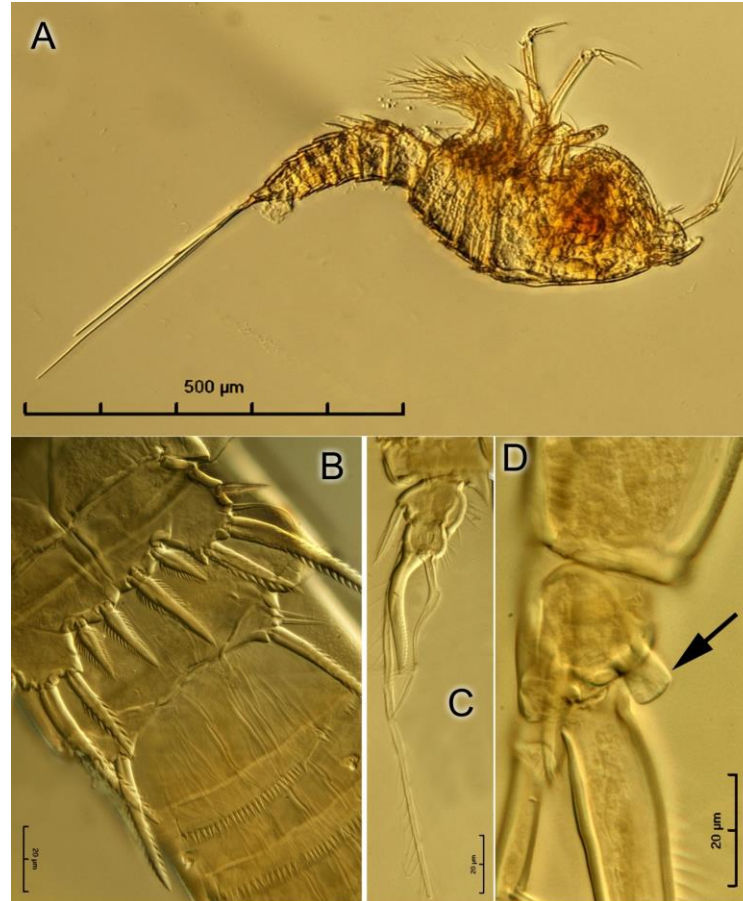


Figure 4. *Diosaccus tenuicornis*, ♂. A. Habitus, lateral; B. P5, P6; C. P2 endopod; D. P1 basis.

Genus: *Robertsonia* Brady, 1880

Robertsonia knoxi (Thompson & A. Scott, 1903)

Material examined: Phytal; G51: 1 ♀, 1 ♂, M10 (IV): 1 ♂ (dissected), 1 ♀ (dissected), 7 ♂♂, 1 ♀.

Distribution in Turkey: Sea of Marmara (Noodt, 1955).

Genus: *Schizopera* Sars, 1905

Schizopera brusinae Petkovski, 1954

Material examined: Interstitial; st3:1♀ (dissected); M12(I): 1♀ (dissected); M31(III): 8♀♀, 8♂♂; M32(III): 1♀ (dissected), 5♀♀, 2♂♂; M38(III): 13♀♀, 8♂♂; M41(III): 1♀ (dissected); M43(I): 1♀, 3♂♂; M44(I): 14♀♀, 15♂♂; M44(II): 6♀♀, 4♂♂; M44(III): 10♀♀, 3♂♂; M45(I):1♂; M59(III): 4♀♀, 2♂♂; M60(III): 1♀; M63(I): 5♀♀, 2♂♂; M66(I): 8♀♀, 2♂♂; M72(III): >50♀♀, >50♂♂; M75(III): 2♀♀, 5♂♂; st4: 1♀ (dissected), 7♀♀, 2♂♂; st5: 1♀.

Distribution in Turkey: Edremit Bay (Karaytuğ and Sak, 2006), Datça (Alper ve ark., 2010).

Schizopera gligici Petkovski, 1957

Material examined: Interstitial: G16: 1♀(dissected), 1♂; G26: 1♀, 1♂; G27: 1♂; G35: 1♀, 1♂ ; G42:1♀, 2♂♂; K12: 1♀, 1♂; K13: 1♀, 3♂♂; K14: 1♀, 1♂; M72(I): 1♂; st24: 1♀; st40: 1♀ (dissected); st49: 1♀ (dissected), 2♀♀, 3♂♂; st57: 1♀ (dissected); st60:1♂ (dissected); epibenthic: st40: 1♀ (dissected); st49: 1♀ (dissected); st57: 1♀ (dissected); st60: 1♂ (dissected).

Distribution in Turkey: Edremit Bay (Karaytuğ and Sak, 2006).

Schizopera pratensis Noodt, 1958b

Material examined G4: 1♀ (dissected), 1♂; G29: 2♀♀.

Distribution in Turkey: New Record.

Short Description: *Female*. Body cylindrical, slightly tapering posteriorly. Rostrum (Figure 5A) triangular and elongate, reaching the half of the second antennular segment, with two minute sensillae, defined at base. Caudal rami (Figure 5C) about 1.2 times as long as wide in dorsal view; ornamented with well developed spinules along the distal part of the inner and posterior margin, with 6 setae: seta I absent; seta II modified to a naked spine, seta III thin and naked; seta IV and V well developed, with a fracture plane at base; seta VI thin, short and naked; seta VII located on dorsal surface, plumose and triarticulated at base. A1 (Figure 5A) 8-segmented; all setae naked except the one plumose seta in segment two; segment two longest about 1.75 times longer than wide; segment four bears a long aesthetasc fused basally to a seta; segment eight bears an apical acrothek consisting of a short aesthetasc and two setae. A2 (Figure 5B) allobasis long with 2-segmented exopod; segment one longer than wide, with a unipinnate seta at distal corner; segment two longer than wide, inner and outer margins naked, with one naked and one plumose seta terminally and a spinule row at terminal margin.

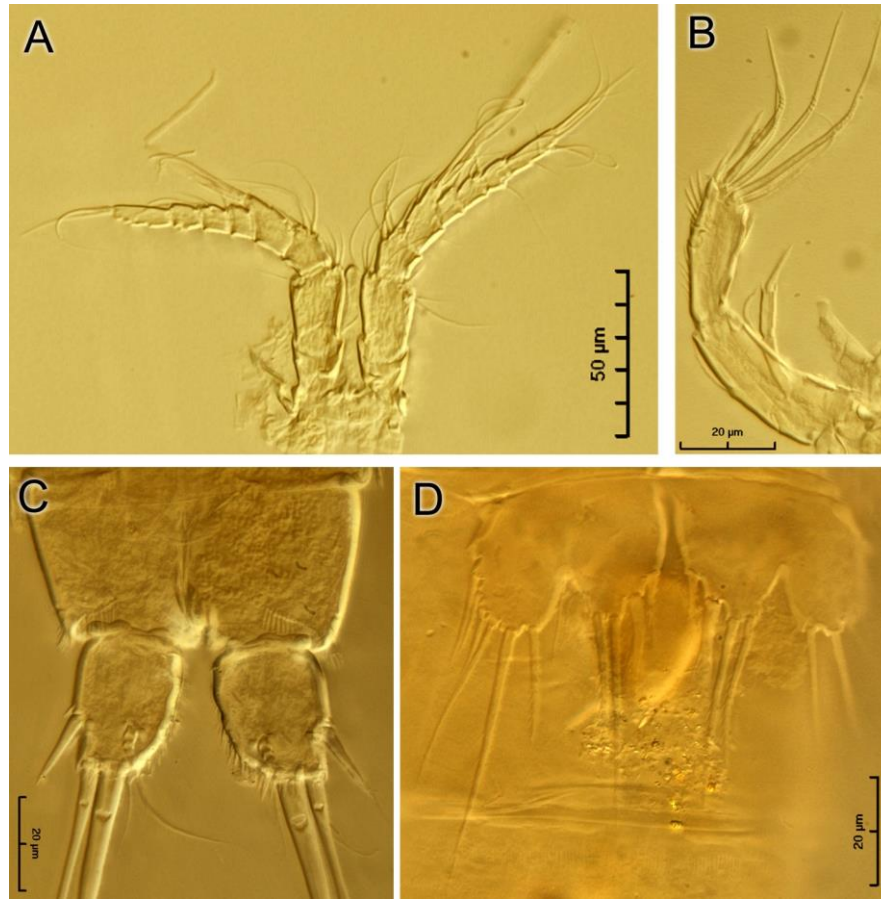


Figure 5. *Schizopera pratensis*, ♀; A. A1; B. A2; C. Caudal rami, dorsal; D. P5.

P1 (Figure 6A) with 2-segmented endopod and 3-segmented exopod. Endopod longer than exopod; enp-1 reaches to the proximal half of exp-3, bears a plumose seta near outer distal corner; outer margin ornamented with fine spinules; enp-2 long and narrow, about half as long as enp-1, armatured with 1 minute seta at inner distal corner, one strong geniculate seta and one well developed naked seta at terminal, ornamented with a fine row of spinule at outer margin. Exp-1 ornamented with a course row of spinules at outer margin and bears a well developed bipinnate spine at outer distal corner, inner margin naked; exp-2 ornamented with a course row of spinules at outer margin and bears a well developed bipinnate spine at outer distal corner, inner margin with fine spinules; exp-3 with a course row of spinules at outer margin, bears 2 geniculate setae at terminal and 2 short unipinnate spines at outer distal corner, inner margin naked.

P2-P4 (Figures 6B-D) with 3-segmented endopod and exopod. Exopod and endopod segments with coarse spinules at outer margin. Endopod about as long as exopod (P2,P3) or slightly shorter than exopod (P4). Enp-1 without inner seta (P2) or bears a long plumose seta (P3,P4) at inner margin; enp-2 bears one long seta at inner margin; enp-3 inner margin with 1 long plumose seta (P2,P3) or naked (P4), bears 1 long plumose and 1 long unipinnate seta at terminal and 1 short and strong, unipinnate seta at outer distal corner. Exp-1 inner margin naked; exp-2 with one naked (P2) or plumose seta (P3,P4) at inner margin; exp-3 inner margin naked, bears 1 long plumose and 1 long unipinnate seta terminally, 1 strong bipinnate seta and 1 short bipinnate spine at outer distal corner. Setal formula of the swimming legs;

		Endopod			Exopod	
P1	1	120		0	0	022
P2	0	1	121	0	1	022
P3	1	1	121	0	1	022
P4	1	1	021	0	1	022

P5 (Figure 5D) baseoendopod and exopod fused. Endopodal lobe bears 1 short bipinnate spine, 1 strong spine forked at tip and 2 bipinnate setae. Exopod bears 1 short bipinnate seta, 1 very long bipinnate seta, 1 long and 3 short naked setae. P6 baseoendopod and exopod reduced to a short and wide plate, without any armature.

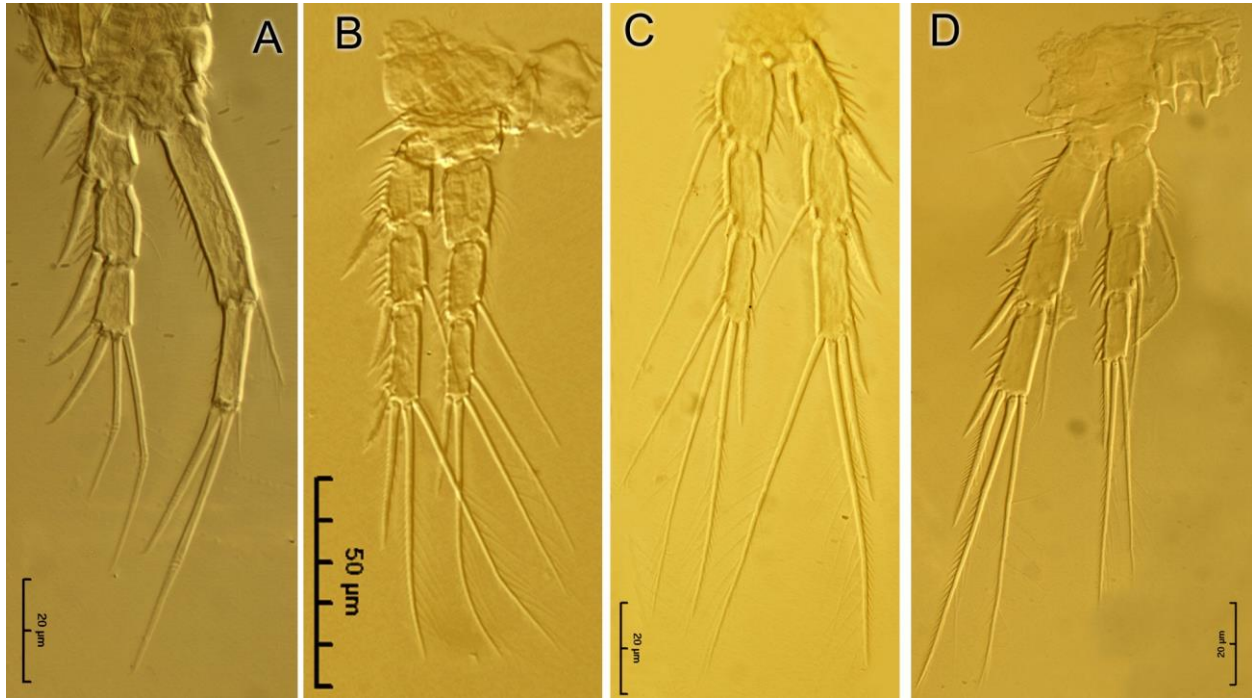


Figure 6. *Schizopera pratensis*, ♀; A. P1; B. P2; C. P3; D. P4.

Male. Sexual dimorphism in A1, P1 basis, P2 endopod, P3 exopod distal segment and P5. A1 (Figure 7A) haplocer and 9 segmented, all setae naked. Segment 4 very small; segment 5 with a lobate expansion anteriorly; bears a large aesthetasc arising from pedestal and fused basally to a long seta. Segment 9 with acrothek consisting of short aesthetasc fused basally to 2 short setae. P1 basis bears a teeth like chitinous projection located near inner spine (arrowed in Figure 7B) P2 endopod (Figure 7C) segment two derived from second and third endopodal segments of female; with 1 minute seta at inner margin, 1 naked seta near distal margin on anterior surface, inner distal corner with 1 plumose seta and two sword like long and broad spines distally. P3 exopod distal segment bears a hyaline spine on anterior surface in addition to female. P5 (Figure 7D) pairs medially fused; baseoendopod and exopod distinction not clear. Endopodal lobe with 1 long, strong bipinnate seta and 1 well developed short spine with forked tip; exopod with 1 short spine with forked tip, 1 long well developed bipinnate spine, 2 long and 1 short naked setae.

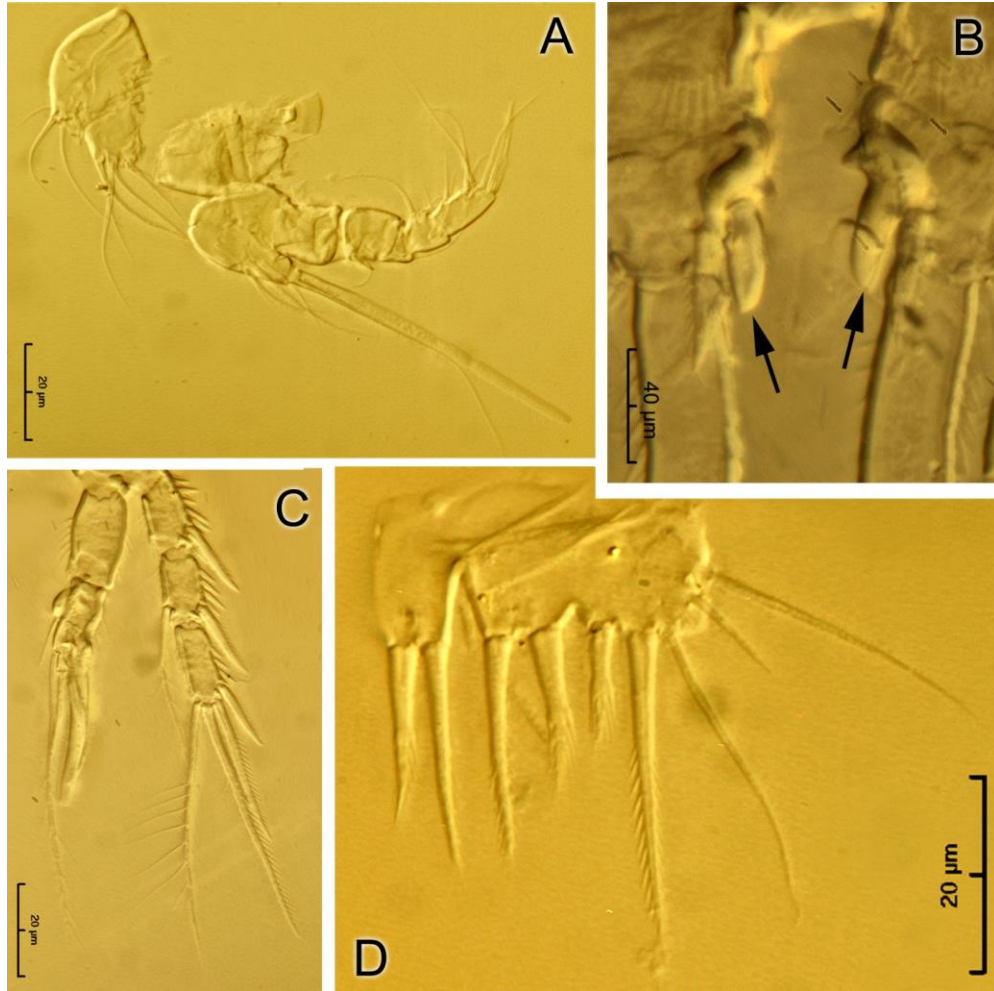


Figure 7. *Schizopera pratensis*, ♂; A. A1; B. P1 basis; C. P2; D. P5

Genus: *Amphiascopsis* Gurney, 1927

Amphiascopsis cinctus (Claus, 1866)

Material examined: Phytal: G25: 1♀ (dissected); G35: 1♀; G46: 1♀; G47: 1♂; G52: 1♀; G61: 2♂♂; G76: 1♀; G80: 1♀ (dissected); G93: 1♂; MY11(II): 2 ♀♀, 1♂; M30(III): 1♂; M49(III): 1♂; M(II): 1♂; M18 (29.09.07): 5♀♀, 7♂♂; (30.10.07); 1♀ (dissected), 7♀♀, 2♂♂; st32: 1♂; st60: 3♀♀, 4♂♂.

Distribution in Turkey: Sea of Marmara (Karaytuğ and Sak, 2006), Datça (Alper ve ark., 2010).

Genus: *Amphiascoides* Nicholls, 1941c

Amphiascoides brevifurca (Czerniavski, 1868)

Material examined: Phytal: st7; 1 ♀ (dissected), 5♀♀.

Distribution in Turkey: Sea of Marmara (Noodt 1955).

Genus: *Psammotopa* Pennak, 1942

Psammotopa vulgaris Pennak, 1942

Material examined: Interstitial: G14: 1♀; G56: 2♂♂; G62: 1♂, G68: 1♀, 1♂; G84: 2 ♀♀, 2♂♂; M1(II): 12♀♀, 17 ♂♂, 1♂(dissected); M2(II): 2♀♀, 4♂♂; M2(III): 9♀♀, 13♂♂; M4(II): 1♀; M34(II): 1♀; M51(II): 1♀, 2♂♂; M74(III): 36♀♀, 44♂♂; M75 (III): 2♀♀; MY2 (II): 1♂. M18 (26.07.07): 1♀ (dissected).

Distribution in Turkey: New Record.

Short Description: *Female.* Body cylindrical without clear distinction between urosome and prosome. Rostrum (Figure 8A) narrow and short extends slightly beyond the first antennular segment, defined at base. Caudal rami (Figure 8B) elongated, about twice as long as wide, bears 6 setae; seta I absent; seta II located at outer distal corner, very thick and long; seta III long and naked, seta IV and V located at the terminal, long, naked and with a fracture plane near base, seta VI very thin and naked; seta VII located at the dorsal surface near median of inner margin, naked and tri-articulated at base. A1 (Figure 8A) 8-segmented, long and cylindrical, tapering slightly to the tip, segment two longest, about twice as long as wide; segment three, four and eight bears an aesthetasc. A2 (Figure 8D) with 1-segmented exopod, about 5 times longer than wide, bears 2 short, thick and bipinnate setae at terminal.

P1 (Figure 9A). with 2-segmented endopod and 3-segmented exopod. Enp-1 elongated, about 7 times as long as wide, ornamented with fine spinules along inner and outer margin, enp-2 about half as long as enp-1, bears 1 naked minute seta at inner distal corner and 2 long bipinnate setae terminally. Exopod extends slightly beyond the half of enp-2; exp-1 and exp-2 inner margin naked, bears coarse spinules along outer margin and 1 strong, naked spine at outer distal corner; exp-3 inner margin naked, armatured with 1 long geniculate seta and 1 short naked spine terminally and 1 very short spine at outer distal corner.

P2-P4 (Figures 9B-D) with 3-segmented rami. Endopod shorter (P2,P3) or about as long as exopod (P4). Enp-1 inner and outer margin naked (P2) or with a long and naked inner seta (P3,P4); enp-2 outer margin ornamented with long spinules, bears 1 long and naked inner seta; enp-3 inner margin naked (P2) or bears 1 bipinnate seta (P3,P4), 1 short and 1 long bipinnate setae terminally and 1 very short and naked seta at outer distal corner. Exp-1 and exp-2 without inner seta, outer margin ornamented with coarse spinules and bears 1 outer spine; exp-3 inner margin naked, bears 2 bipinnate setae terminally, 1 naked spine at inner distal corner, 1 short and naked spine at outer margin; proximal part of outer margin ornamented with spinules. Setal formula of the swimming legs.

	Endopod			Exopod		
P1	0	021		0	0	021
P2	0	1	021	0	0	022
P3	1	1	121	0	0	022
P4	1	1	121	0	0	022

P5 (Figure 8C) baseoendopod and exopod distinction clear. Endopodal lobe elongated, about 3 times as long as broad on anterior surface, proximal half of inner margin and outer margin naked, bears 1 long and 1 short bipinnate setae and 1 short and naked seta. Exopod about 1,6 times as long as broad, bears 5 naked setae.

Male A1, P5 and P6 sexually dimorphic. A1 (Figure 9A) 9-segmented, segment three four and nine bears an aesthetasc. P5 (Figure 9B) baseoendopod and exopod distinction clear, outer basal seta very long, dense and naked. Endopodal lobe elongated, about 2,7 times as long as wide at anterior surface, bears two short spines with forked tip. Exopod bears 4 naked setae. P6 (Figure 9B) pairs asymmetric, bears 2 long and 1 short naked setae.

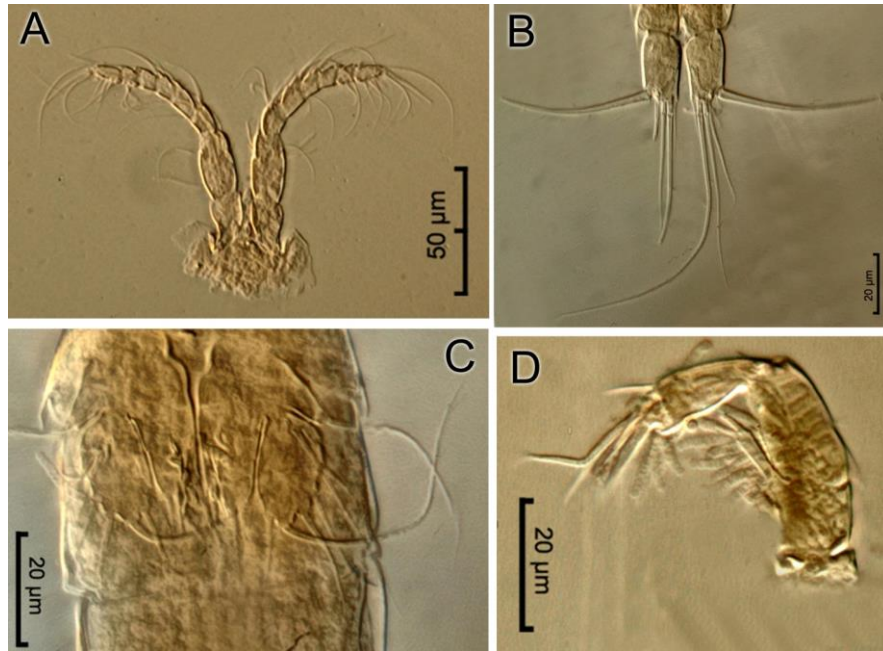


Figure 8. *Psammotopa vulgaris*, ♀; A. A1; B. Caudal rami, dorsal; C. P5, D. A2.

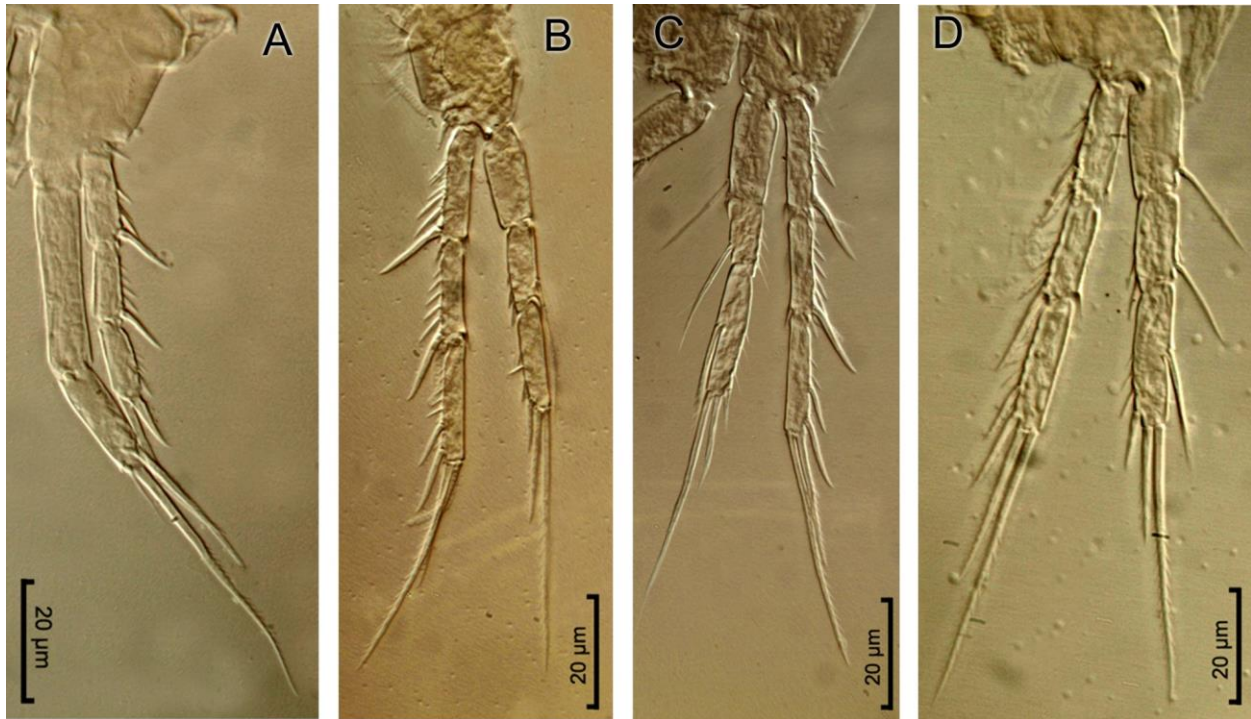


Figure 9. *Psammotopa vulgaris*, ♀; A. P1; B. P2; C. P3; D. P4.

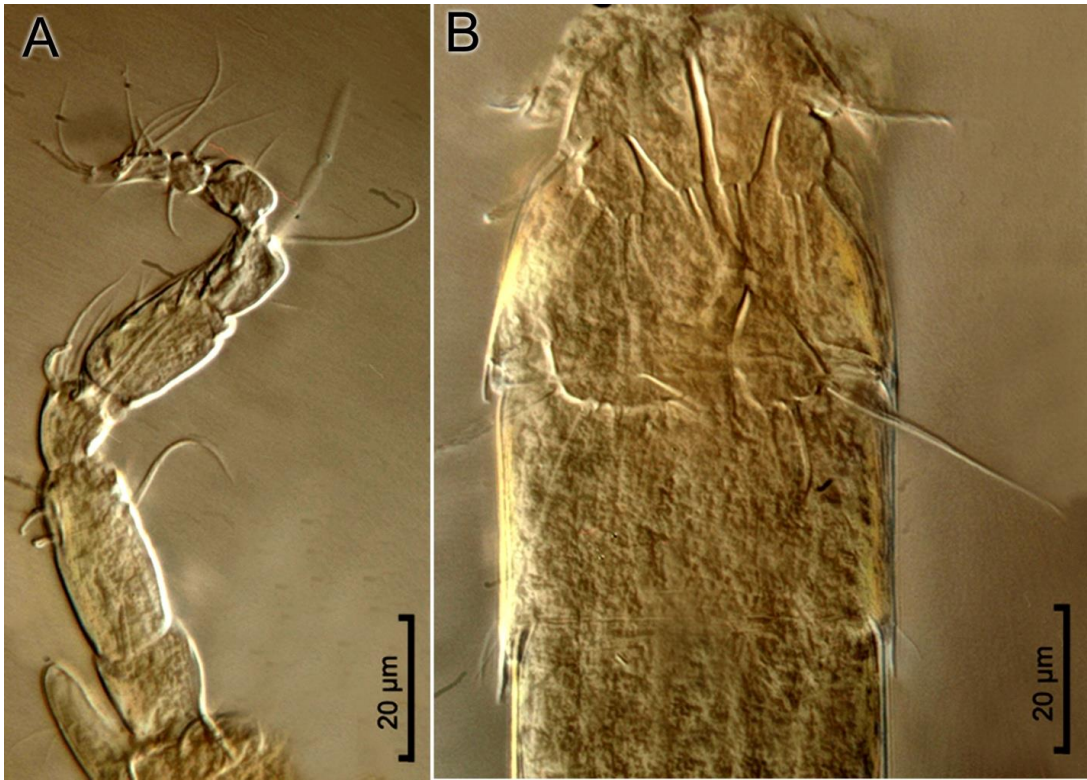


Figure 10. *Psammotopa vulgaris*, ♂; A. A1; B. P5 and P6.

Genus: *Amonardia* Lang, 1944

Amonardia phyllopus (Sars, 1906)

Material examined Phytal: G35: 2♂♂; st46: 1♀, 1♂; G48: 1♂; G51: 1♂; G52 1♀ (dissected), 3♀♀, 1♂; G59: 2♂♂ (dissected), 3♀♀, 1♂; G69:1♀, 1♂:K16:1♀ (dissected), 5♀♀. M3(I): 1♂, 1♀; M8(I): 2♀♀; st9(I): 1♀; M9(III): 1♂; M12(I): 2♀♀, 1♂; M27(II): 2♀♀; M48(II): 1♂; M72(III): 1♀ (dissected), 5♀♀.

Distribution in Turkey: New Record.

Short Description: *Female*. Body well developed, urosome and prosome distinction clear, tapering to the posterior. Rostrum (Figure 11A) well developed, reaches slightly beyond the second antennular segment, narrow at tip and defined at base. Caudal rami (Figure 11C) short and squarish, posterior margin ornamented with a transverse spinular row on dorsal and ventral surface, bears coarse spinules at inner distal corner, armed with 7 setae; seta I located at outer distal corner, naked; seta II originates near the base of seta I, minute and naked; seta III located at outer distal corner, long, slender and naked; seta IV and V located at the terminal, well developed with a fracture plane near base; seta VI located at inner distal corner, well developed, long and naked; seta VII located at inner distal corner of dorsal surface, slender, naked and tri-articulated at base. A1 (Figure 11A) 8-segmented, long, tapering to the tip. All setae naked, segment four and eight with an aesthetasc. A2 (Figure 11D) with 3 segmented exopod; segment one elongated, about twice as long as wide, bears 1 strong bipinnate seta at distal corner; segment two very short and narrow, without any armature, segment three elongated, about 3 times as long as wide, ornamented with fine spinules at margins and posterior part of anterior surface, bears 1 strong bipinnate seta near proximal corner and 2 short and naked setae terminally.

P1 (Figure 12A) basis with a bipinnate spine. Endopod and exopod 3-segmented. Enp-1 elongated, about 4 times as long as wide, bears a short bipinnate seta at inner distal corner; ornamented with very minute spinules along outer margin, enp-2 very short, bears 1 minute and naked seta at inner distal corner and course spinules at outer margin; enp-3 very short, bears 1 minute seta at outer distal corner and 2 claw like spines at terminal. Exopod shorter than endopod, extends beyond the half of enp-1, exp-1 squarish, inner margin naked, outer margin ornamented with minute spinules and bears 1 naked spine at outer distal corner; exp-2 slightly elongated, about 2.3 times as long as broad, bears 1 short, slender and plumose seta at inner distal corner, fine spinules along outer margin and 1 naked spin at outer distal corner; exp-3 inner margin naked, bears 1 long geniculate seta and 1 long spine with a curved tip at terminal, 3 naked spines with curved tip at outer margin.

P2-P4 (Figures 12B-D) with 3-segmented rami. Endopod and exopod segments ornamented with fine spinules along outer margins. Enp-1 with 1 long plumose seta; enp-2 with 1 short and 1 long plumose setae (P2,P3) or 1 long plumose seta (P4); enp-3 bears 1 (P2), 3 (P3) or 2 (P4) plumose seta at inner margin, 2 long plumose setae terminally and 1 short unipinnate spine at outer distal corner. Exp-1 and exp-2 with 1 long, plumose inner seta and 1 short, naked outer spine; exp-3 bears 2 (P2, P4) or 3 (P3) long and plumose setae at inner margin, 1 long plumose seta and 1 long, thick seta with a plumose inside and pinnate outer side, 3 short and naked spines at outer margin. Setal formula of the swimming legs:

	Endopod			Exopod		
P1	1	1	120	0	1	023
P2	1	2	121	1	1	223
P3	1	2	321	1	1	323
P4	1	1	221	1	1	223

P5 (Figure 11B) well developed, baseoendopod and exopod distinct. Endopodal lobe ovoid, proximal parts of inner and outer margin naked, ornamented with fine spinules between setae, armatured with 5 setae, all naked and slender. Exopod rounded, ornamented with course spinules along outer margin and scattered fine spinules at inner margin, bears 6 naked setae.

Male. Posterior margins of urosomites ornamented with rows of spinules on dorsal, lateral and ventral surfaces (Figures 13D-F). A1 (Figure 13A) 8-segmented, segment three and four with 1 long aesthetasc, segment eight with 1 short aesthetasc. P2 enp-2 and enp-3 (Figure 13B) fused and modified into a single segment with 2 plumose setae at inner margin, 1 long and plumose seta at inner distal corner, 1 naked seta at inner terminal, 1 sword like chitinous projection at outer terminal and 1 short spine at outer margin. P5 (Figure 13C) Baseoendopod and exopod distinction clear. Endopodal lobe very short, bears two naked setae. Exopod squarish, bears 2 long and 2 short naked setae. P6 (Figure 13E) baseoendopod and exopod fused and reduced to a narrow plate, armatured with 1 short naked spine and 2 long and naked setae.

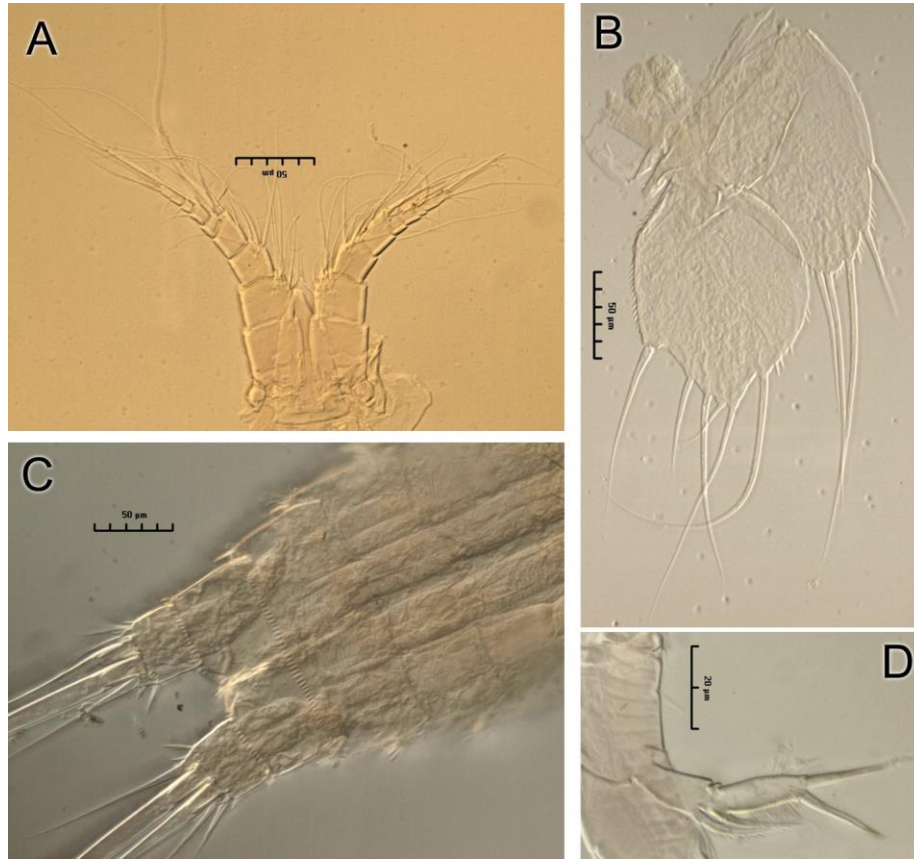


Figure 11. *Amonardia phyllopus*, ♀; A. A1; B. P5; C. Caudal rami, ventral; D. A2 exopod.

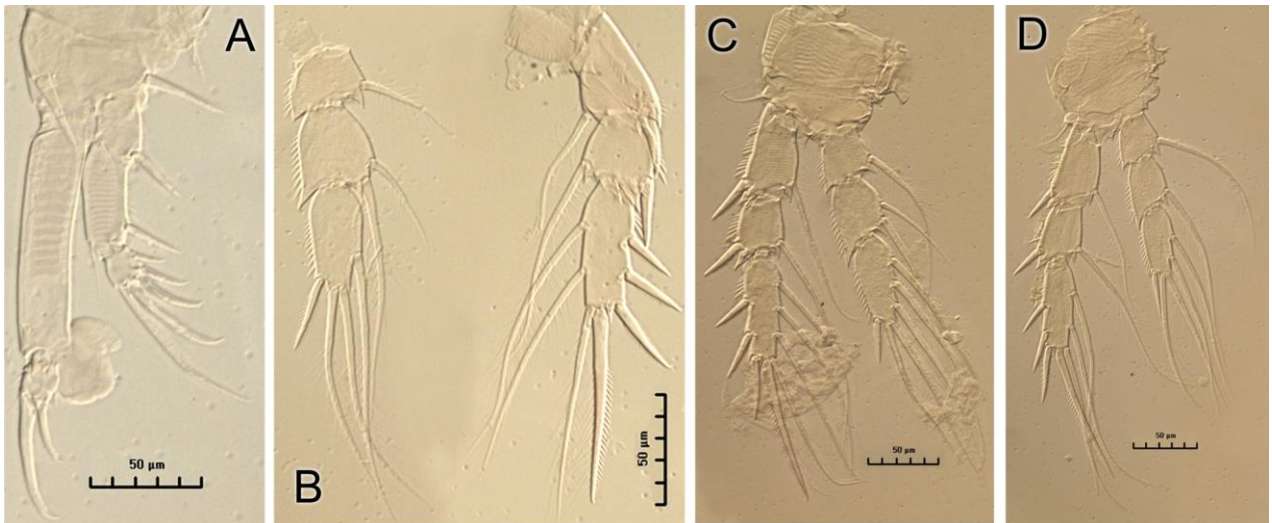


Figure 12. *Amonardia phyllopus*, ♀; A. P1; B. P2 endopod and exopod; C. P3; D. P4.

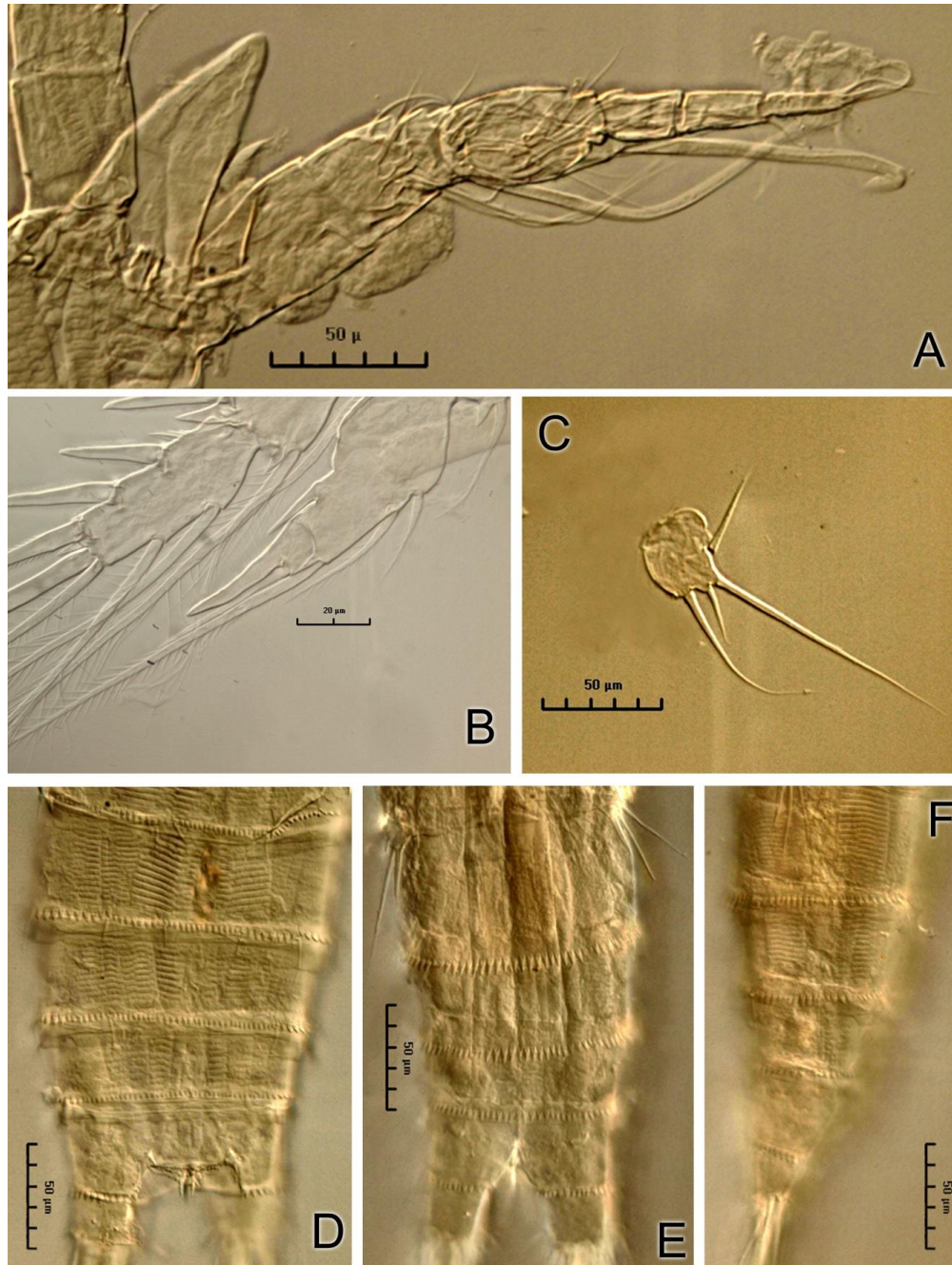


Figure 13. *Amonardia phyllopus*, ♂; A. A1; B. P2 endopod; C. P5 exopod; D. Urosome, dorsal, E. Urosome ventral; F. Urosome, lateral.

Genus: *Metamphiascopsis* Lang, 1944

Metamphiascopsis hirsutus bermudae Willey, 1930

Material examined: Phytoplankton: M20 (III): 1♀ (dissected), 1♀, 2♂♂; M27 (II): 4♀♀, 5♂♂, 14 copepodit V; M30(III): 3♀♀; M65(II): 1♀, 2♂♂; M72(III): 1♂; MY11(II): 2♀♀, 1♂. M26 (4-6 meter, sediment; 21.06.07): 1♀.

Distribution in Turkey: New Record.

Short Description: *Female*. Body well-developed, urosome and prosome distinction clear, tapering to the posterior, urosomites with numerous rows of setules and spinules on all surfaces. Rostrum well-developed, long, extends to the posterior margin of the second antennule segment, defined at base. Caudal rami (Figure 14B) very short, about 2.7 times as wide as long, armatured with 7 setae; seta I, II and III located very close to each other at outer distal corner, seta I spiniform, short and naked; seta II long, slender and naked; seta III relatively short and naked; seta IV and V located at the terminal, well developed with a fracture plane near base; seta VI located at the inner distal corner, long and naked; seta VII originates from dorsal surface near inner distal corner, slender, naked and tri-articulated at base. A1 (Figure 14A) long and 9-segmented, all setae naked. Segment one longest, segment four and nine with a long aesthetasc. A2 (Figure 14C) with 3-segmented exopod. Segment one about 5 times as long as wide with a well developed bipinnate seta at distal corner; segment two very short and naked; segment three about 4 times as long as wide, inner and outer margins ornamented with well developed spinules, armatured with 1 long bipinnate seta at proximal corner, 2 long and 1 short bipinnate setae at terminal.

P1 (Figure 15A) with long and naked inner spine. Endopod and exopod 3-segmented. Enp-1 elongated, about 5 times as long as broad, bears long spinules along inner margin and a naked seta at inner distal corner, outer margin ornamented with fine spinules; enp-2 very short, with 1 minute seta at inner distal corner, bears coarse spinules at outer margin; enp-3 about as long as enp-2, bears 1 minute seta at inner distal corner and 2 claw like spines at terminal. Exopod shorter than enp-1; exp-1 inner margin naked, bears 1 well developed and naked spine at outer distal corner and ornamented with long and fine spinules along outer margin; exp-2 slightly elongated, about 2.7 times as long as broad, bears 1 slender and naked seta at inner distal corner, 1 well developed, naked spine at outer distal corner, inner and outer margin ornamented with fine spinules; exp-3 inner margin naked, armatured with 1 long and geniculate seta and 4 naked spines.

P2-P4 (Figures 15B -D) with 3-segmented rami. Endopod shorter than exopod. Enp-1 with 1 short and plumose seta, outer margin ornamented with short spinules; enp-2 with 1 long plumose inner seta (P4) or 1 long and 1 short (P2,P3) plumose inner setae, outer margin ornamented with short spinules, bears a mucriniform projection at outer distal corner; enp-3 inner margin with 1 (P2) or 3 (P3) or 2 (P4) long and plumose inner seta, 2 long and plumose terminal setae and 1 short and naked seta at outer distal corner, outer margin ornamented with short spinules. Exp-1 and exp-2 with 1 long and plumose inner seta, ornamented with coarse spinules along outer margin and bears 1 naked outer spine; exp-3 elongated, bears 2 (P2) or 3 (P3,P4) long plumose seta at inner margin; 1 long plumose and 1 long unipinnate seta at terminal and 3 short, naked spines at outer margin. Setal formula of the swimming legs:

	Endopod				Exopod	
P1	1	1	120	0	1	023
P2	1	2	121	1	1	223
P3	1	2	321	1	1	323
P4	1	1	221	1	1	323

P5 (Figure 14D) well developed, baseoendopod and exopod distinct. Endopodal lobe slightly elongated, about 1.7 times as long as wide at anterior surface, proximal part of inner margin naked, ornamented with fine spinules along outer margin, armatured with 1 very short and naked, 3 short, bipinnate and 1 long and bipinnate setae. Exopod about 1.5 times as long as wide at anterior surface, ornamented with a short spinule row near inner distal corner, armatured with 6 naked and slender setae.

Male. A1, P1 basis, P2 endopod, P5 and P6 sexually dimorphic. A1 (Figure 16A) 8-segmented, segment four longest, bears a long aesthetasc at distal corner, segment eight slightly elongated about 3 times as long as wide, bears a short aesthetasc. P1 basis (Figure 16B) bears 1 short tooth like projection and 1 minute seta at inner distal corner (arrowed in Figure 16B). P2 endopod (Figure 16C) second and third segment fused, about 1.5 times as long as wide, bears 1 long and plumose inner seta with a mucriniform projection near the base; 1 long and plumose seta at inner distal corner, 1 bipinnate modified seta at terminal, 2 thick sword like modified spines with a spatula like tip at outer distal corner; outer margin ornamented with fine spinules. P5 (Figure 16D) pairs fused together from baseoendopod proximal margins. Baseoendopod and exopod distinction clear. Endopodal lobe short, inner and outer margin ornamented with fine spinules, armatured with 1 short naked and 1 relatively long bipinnate spine. Exopod short and squarish, ornamented with spinules at inner and outer margin, armatured with 1 long and 3 short bipinnate spines and 2 long, slender, naked setae. P6 (Figure 16D) fused and reduced to a single plate with 1 long spiniform seta and 2 slender setae.

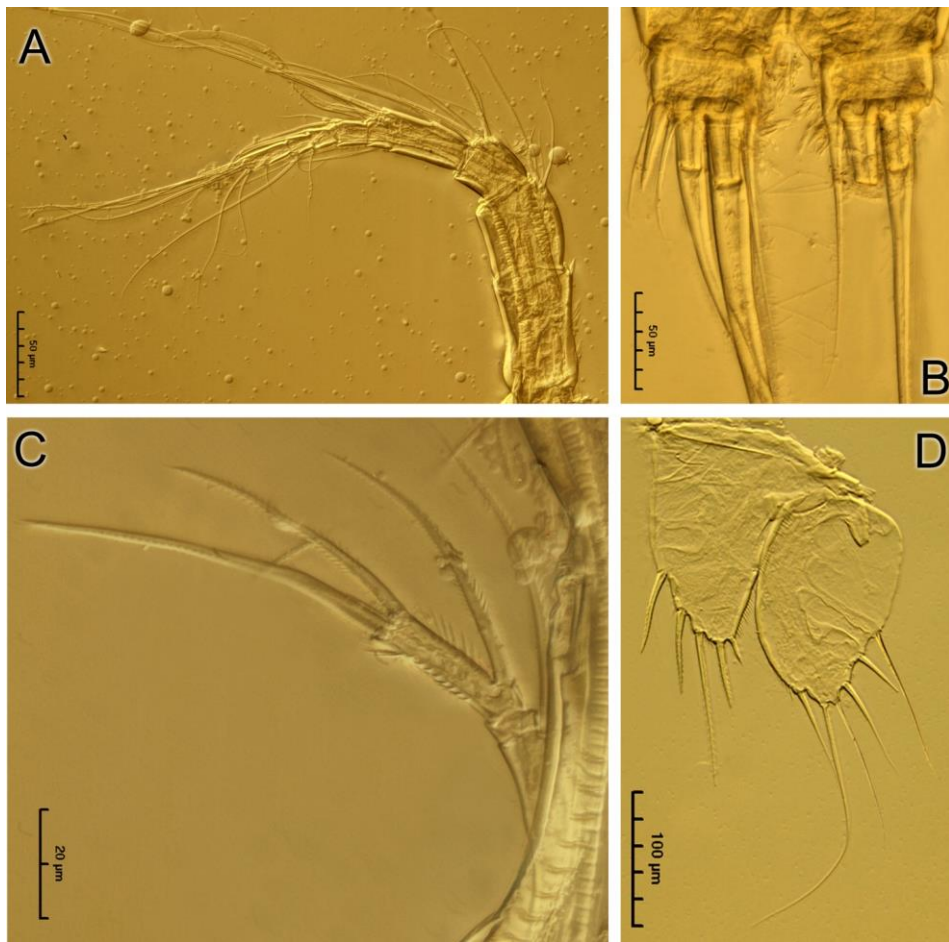


Figure 14. *Metamphiasopsis hirsutus bermudae* ♀; A. A1; B. Caudal rami, dorsal; C. A2 exopod; D. P5.

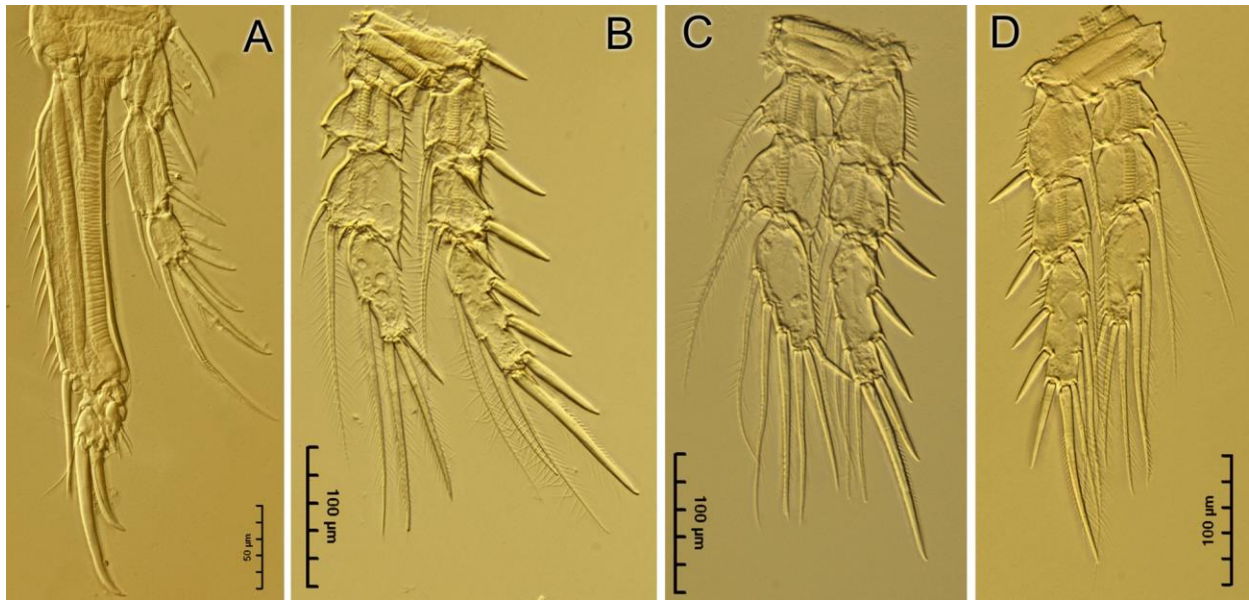


Figure 15. *Metamphiascopsis hirsutus bermudae* ♀; A. P1; B. P2; C. P3; D. P4.

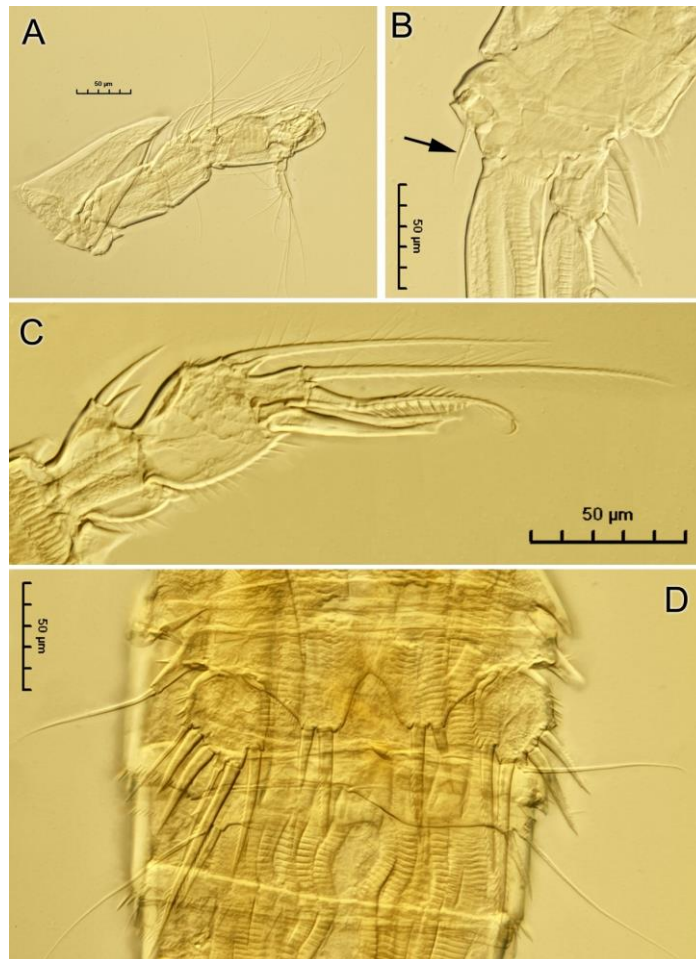


Figure 16. *Metamphiascopsis hirsutus bermudae*, ♂; A. A1; B. P1 basis; C. P2 endopod; D. P5 and P6.

Genus: *Bulbamphiascus* Lang, 1944

Bulbamphiascus imus (Brady, 1872)

Material examined: Interstitial; M39 (I): 1♂; MY15(I): 4♀♀.

Distribution in Turkey: Sea of Marmara (Karaytuğ and Sak, 2006).

Genus: *Robertgurneya* Lang, 1944

Robertgurneya smithi Hamond, 1973

Material examined: Phytoplankton: G27 1♀ (dissected), 1♀, 3♂♂; M3(I): 1♀; M33(II):1♂; M72 (III) 1♂.

Distribution in Turkey: New Record.

Short Description: *Female*. Body (Figure 17A) well developed, urosome and prosome distinction clear, tapering slightly to posterior. Rostrum long and broad, blunt at tip. Caudal rami (Figure 17D) very short and broad, about 1.5 times wider than long, bears 6 setae; seta I absent, seta II located at outer distal corner, naked; seta III located on ventral surface near inner distal corner, short, naked and slender; seta IV and V well developed, located at terminal with a fracture plane near base; seta VI located at inner distal corner, minute; seta VII located on dorsal surface, near midline of inner margin, short and naked. A1 (Figure 17B) 8-segmented, all setae naked. Segment two longest, segment four and eight with an aesthetasc. A2 (Figure 17C) with 3-segmented exopod. Segment one elongated, bears 1 long, thick and bipinnate seta at distal corner; segment two very short and naked; segment three about as long as segment one, armatured with 1 long, thick, bipinnate seta near proximal corner and 2 long setae at terminal.

P1 (Figure 18A) basis with 1 long bipinnate inner spine. Endopod and exopod 3-segmented. Enp-1 elongated, about 5 times as long as broad, bears 1 long plumose seta at inner distal corner; enp-2 short, bears 1 minute seta at inner distal corner and ornamented with fine spinules along outer margin; enp-3 elongated, about half as long as enp-1, armatured with 1 minute seta at inner distal corner, 1 long geniculate seta at inner terminal and 1 relatively thick and short seta at outer terminal, outer margin ornamented with long spinules. Exopod slightly shorter than enp-1; exp-1 and exp-2 ornamented with long and fine spinules along inner margin and outer margin and bear 1 long outer spine; exp-3 inner margin naked, bears 2 long geniculate setae at terminal and 2 short spines at outer distal corner, outer margin ornamented with fine spinules.

P2-P4 (Figures 18B-D) with 3-segmented rami, enp-3 and exp-3 elongated. Endopod about as long as exopod (P2, P3) or shorter than exopod (P4). Enp-1 with 1 short (P2) or 1 long (P3,P4) plumose seta, inner and outer margin ornamented with long and fine spinules; enp-2 bears 1 short and 1 long plumose setae (P2) or 1 long plumose seta (P3,P4), bears long spinules along outer margin; enp-3 bears 1 (P2,P4) or 2 (P3) long plumose inner seta, 1 long plumose and 1 unipinnate setae at terminal and 1 unipinnate spine at outer distal corner, outer margin ornamented with long spinules. Exp-1 inner margin naked, with a spinular row along anterior surface of posterior margin, ornamented with coarse spinules along outer margin and bears 1 unipinnate outer spine; exp-2 with 1 long, slender and plumose inner seta, outer margin ornamented with coarse spinules and bears 1 unipinnate outer spine; exp-3 bears 1 (P2,P3) or 2 (P4) long, plumose seta at inner margin, 1 long, slender, plumose seta and 1 unipinnate, long, thick seta at terminal and 3 unipinnate spines at outer margin, proximal half of outer margin ornamented with long spinules. Setal formula of the swimming legs:

	Endopod			Exopod		
P1	1	1	120	0	0	022
P2	1	2	121	0	1	123
P3	1	1	221	0	1	123
P4	1	1	121	0	1	223

P5 (Figure 17E) baseoendopod and exopod distinction clear. Endopodal lobe slightly elongated, ornamented with fine spinules at inner and outer margin, bears 2 tube pores on anterior surface near terminal, armatured with 2 thick and relatively short setae with forked tip, 1 short and 2 long naked setae. Exopod slightly elongated, about 2.3 times as long as broad at anterior surface, ornamented with fine spinules along inner and outer margin armatured with 1 bipinnate and 4 naked, slender setae.

Male. A1, P1 basis, P2 endopod, P5 and P6 sexually dimorphic. A1 (Figure 19A) 8-segmented, segment four and eight bears an aesthetasc. P1 basis (Figure 19B) inner spine modified, very long, extends to the half of enp-1 (arrowed in Figure 19B) P2 endopod (Figure 19C) segment two and three fused into a single segment, bears 2 short, naked and slender setae at inner margin, 1 long plumose seta at outer distal corner, 1 short, naked seta with blunt tip located on the posterior surface of inner distal corner, 2 modified chitinous projections as in Figure. P5 (Figure 19D) Baseoendopod and exopod distinct. Endopodal lobe with coarse spinules along outer margin, inner margin naked, armatured with 2 short spines with forked tip at terminal, bears 2 tube pores on anterior surface. Exopod very short and squarish, ornamented with coarse spinules on anterior surface near inner distal corner, bears 1 tube pore close to the spinules, armatured with 1 short spine with forked tip, 1 relatively long and bipinnate spine, 1 long, slender and naked seta and 2 short, naked spines. P6 (Figure 19E) baseoendopod and exopod reduced to a single plate with 3 naked setae.

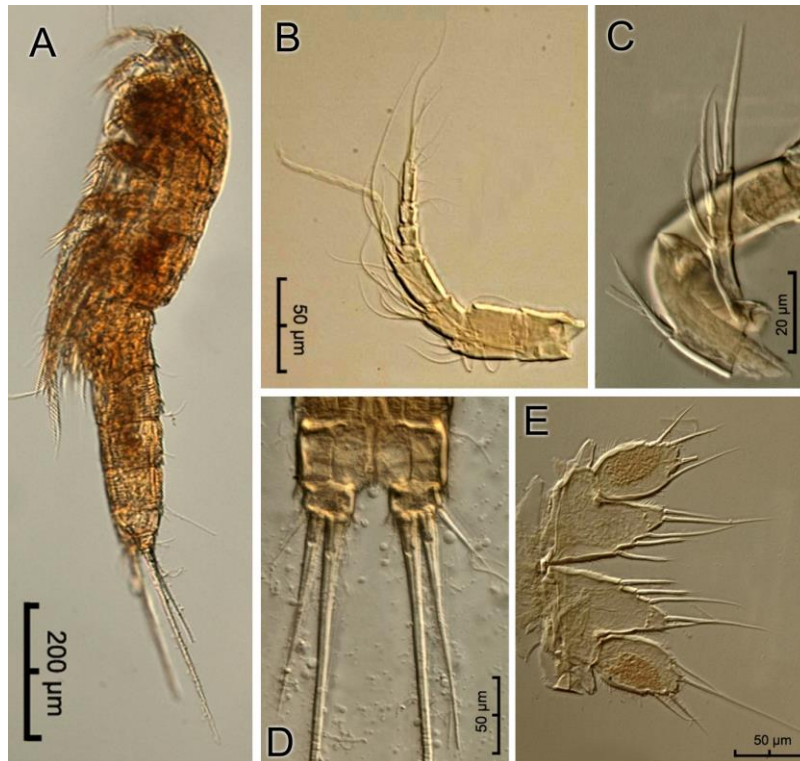


Figure 17. *Robertgurneya smithi*, ♀; A. Habitus dorsal; B. A1; C. A2 exopod; D. Caudal rami, ventral; E. P5.

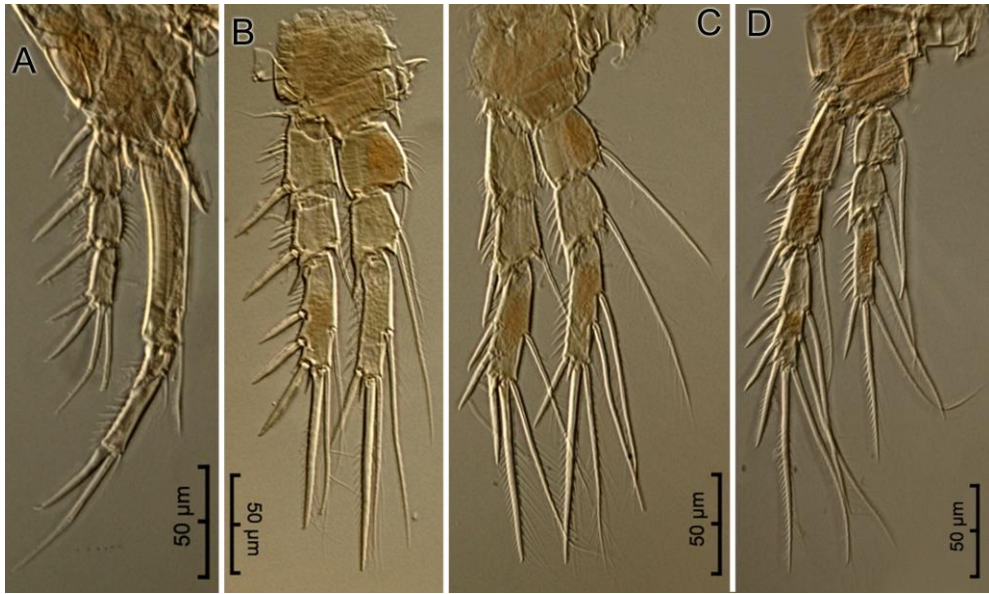


Figure 18. *Robertgurneya smithi*, ♀; A. P1; B. P2; C. P3; D. P4.

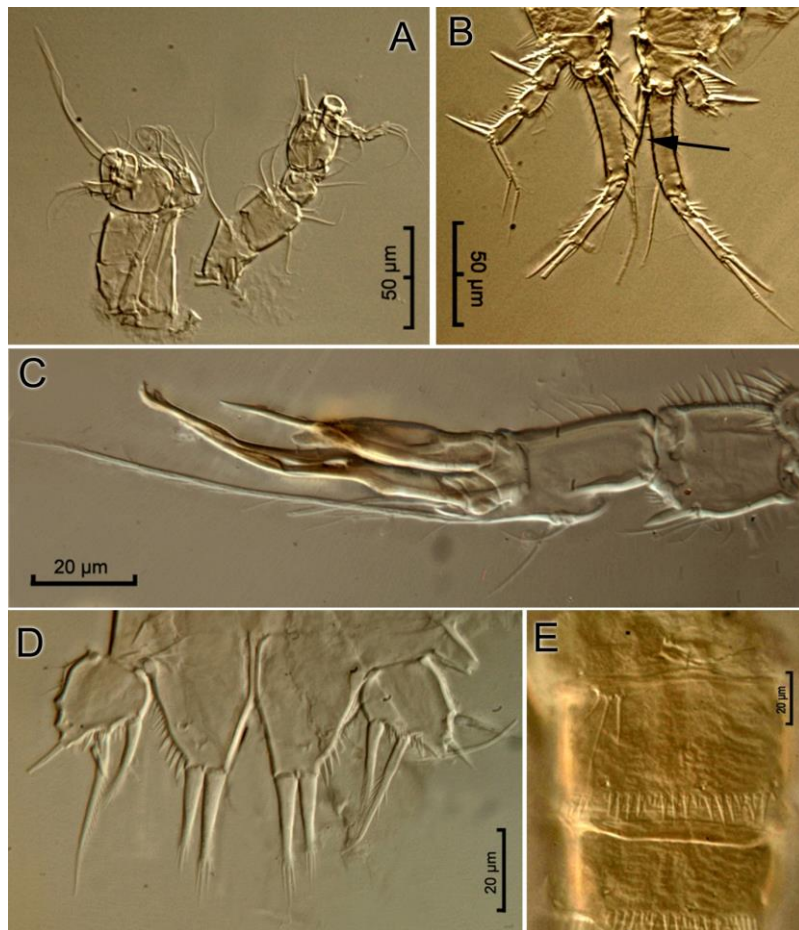


Figure 19. *Robertgurneya smithi*, ♂; A. A1; B. P1; C. P2 endopod; D. P5; E. P6.

Genus: *Paramphiascella* Lang, 1944

Paramphiascella robinsoni (A. Scott, 1902)

Material examined: Phytal: G81: 1♀; MY10 (III): 1♀; M65 (III): 1♀; M15 (III): 1♂ (dissected); M18 (27.05.07); 1♀.

Distribution in Turkey: New Record.

Short Description: *Female*. Body tapering posteriorly, with a clear distinction between prosome and urosome (Figure 20A). Rostrum well developed with blunt tip. Caudal rami (Figure 21D) very short and broad, about 2.5 times as long as wide, bears 6 setae; seta I absent; seta II located at outer distal corner, naked and spiniform; seta III located near outer distal corner, long and naked; seta IV well developed, located at outer terminal, bipinnate, bears a fracture plane near base; seta V well developed, located at inner terminal, with a fracture plane near base; seta VI located at inner distal corner, long, slender and naked; seta VII located on dorsal surface near outer proximal corner, long, slender, naked and triarticulated at base. A1 (Figure 21A) long, 8-segmented, tapers gradually to the posterior after segment two, segment four and eight bear an aesthetasc. A2 with allobasis and 3-segmented exopod (Figure 21B), segment one longest, about 3 times as long as wide, bears 1 long, thick and bipinnate seta at distal corner; segment two very short and naked; segment three about half as long as segment one, bears 1 long, bipinnate seta and 2 short naked setae.

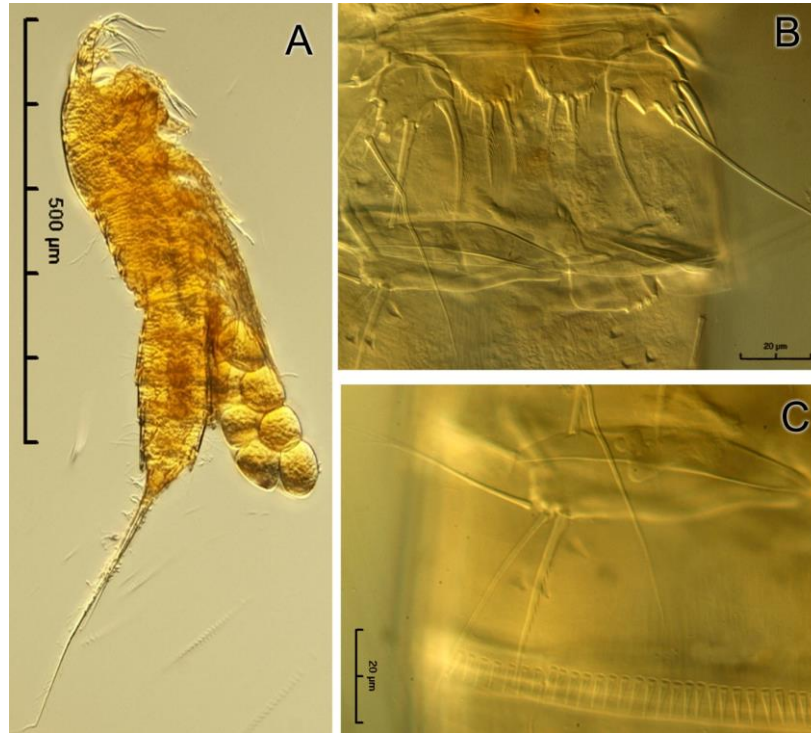


Figure 20. *Paramphiascella robinsoni*; A. ♀, habitus, lateral; B. ♂ P5, C. P6.

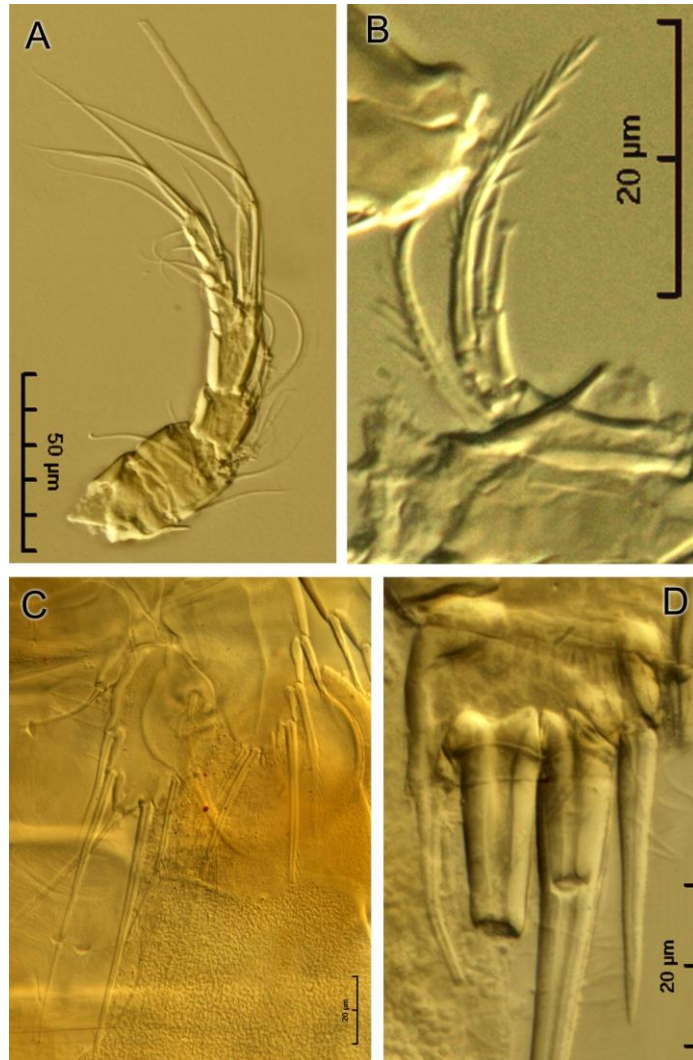


Figure 21. *Paramphiascella robinsoni*, ♀; A. A1; B. A2; C. P5; D. Caudal rami, ventral.

P1 (Figure 22A) basis with a short bipinnate inner spine. Endopod and exopod 3-segmented. Enp-1 elongated, about 3 times longer than wide, ornamented with long spinules at inner and short spinules at outer margin, bears 1 long and plumose inner seta; enp-2 shortest, bears 1 minute seta at inner distal corner and a few coarse spinules along outer margin; enp-3 slightly longer than enp-2, armatured with 1 minute seta at inner distal corner, 1 long geniculate seta at inner terminal and 1 long and spiniform seta with a claw like tip at outer terminal, ornamented with coarse spinules along outer margin. Exopod slightly longer than enp-1, exp-1 and exp-2 ornamented with fine spinules at inner margin and coarse spinules at outer margin, bear 1 long, naked outer spine; exp-3 armatured with 2 long geniculate setae at terminal, 1 naked spine with claw like tip at outer distal corner and 1 short, naked spine near outer distal corner, outer margin ornamented with coarse spinules.

P2-P4 (Figures 22B-D) with 3-segmented rami. Endopod shorter than exopod. Enp-1 with 1 short (P2) or 1 long (P3,P4) plumose inner seta, outer margin ornamented with short spinules; enp-2 with 1 long plumose seta, outer margin ornamented with coarse spinules, bears a mucriniform projection near outer distal corner; enp-3 with 1 (P2,P4) or 2 (P3) long plumose inner setae, bears 1 long plumose and 1 long seta with plumose inside and pinnate outer side at terminal and 1 relatively short unipinnate spine at outer distal corner, outer margin ornamented with spinules. Exp-1 inner margin naked, bears coarse spinules along outer margin and 1 unipinnate spine at outer distal

corner; exp-2 with 1 long plumose inner seta, inner margin naked (P2) or with 1 (P3) or 2 (P4) plumose setae, bears 1 long plumose and 1 long seta with plumose inside and pinnate outer side at terminal, 1 short, unipinnate seta at outer distal corner and 2 short spine near outer distal corner, proximal half of outer margin ornamented with coarse spinules. Setal formula of the swimming legs:

	Endopod			Exopod		
P1	1	1	120	0	0	022
P2	1	1	121	0	1	023
P3	1	1	221	0	1	123
P4	1	1	121	0	1	223

P5 (Figure 21C) baseoendopod and exopod distinct, outer basal seta long, slender and naked. Endopodal lobe ornamented with a short spinular row at terminal margin, inner and outer margins naked, armed with 4 bipinnate and 1 naked setae. Exopod about 2 times as long as wide, ornamented with short spinules at inner and outer margin, armed with 4 bipinnate and 1 naked slender setae.

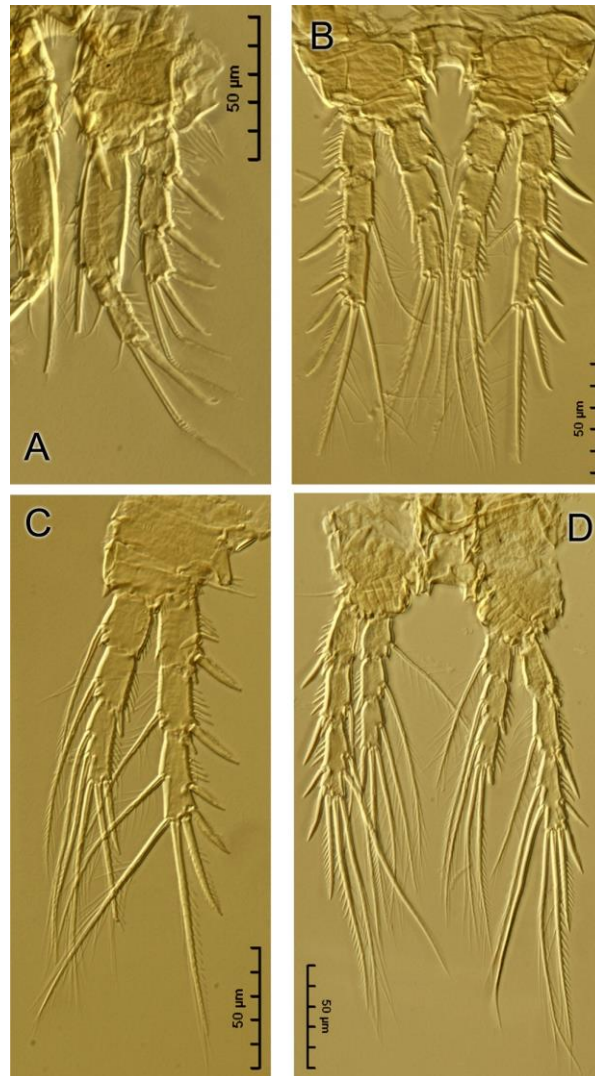


Figure 22. *Paramphiascella robinsoni*, ♀; A. P1; B. P2; C. P3; D. P4.

Male. A1, P1 basis, P2 endopod, P5 and P6 sexually dimorphic. A1 (Figure 23A) 8-segmented, tapers gradually to posterior, segment four longest with an aesthetasc, segment eight bears a short aesthetasc at terminal. P1 basis (Figure 23B) with a short broad tooth like projection near inner spine (arrowed in Figure 23B). P2 endopod (Figure 23C) second and third segment fused; bears 1 teeth like projection at inner proximal corner, 2 setae at inner margin, 1 long modified spine with serrate tip at inner terminal and 1 long sword like chitinous projection with narrow tip at outer terminal.

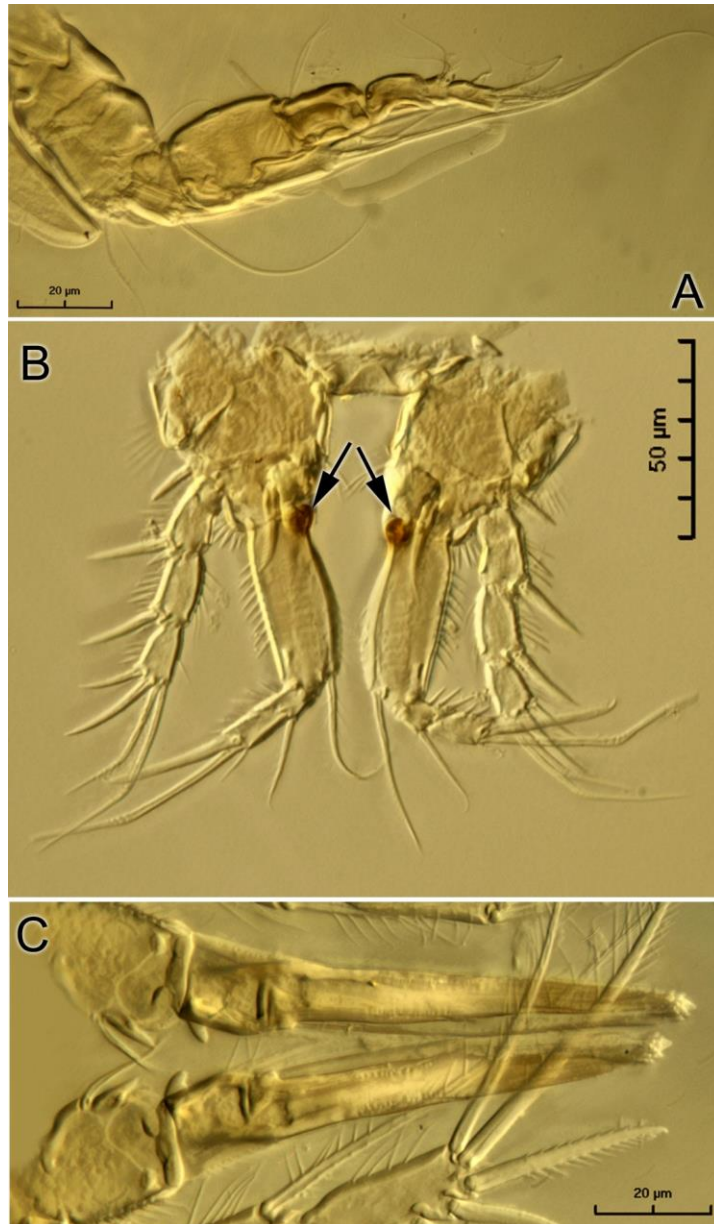


Figure 23. *Paramphiascella robinsoni*, ♂; A. A1; B. P1; C. P2 endopod.

Genus: *Haloschizopera* Lang, 1944

Haloschizopera marmarae, Noodt, 1955c

Material examined: Interstitial: M75: 1♀; M26 (4-6 meter, sediment; 21.06.07): 1♀.

Distribution in Turkey: Sea of Marmara (Noodt, 1955).

Genus: *Sarsamphiascus* Huys, 2009

Sarsamphiascus minutus (Claus, 1863)

Material examined: Phytaal: G3: 2 ♂♂; G13: 1♀; G24: 2♀♀(dissected), 1♂ (dissected), 1♀, 2♂♂; G29: 1♀, 1♂; G34: 1♀ (dissected), G46: 1♀ (dissected), 1♀; G49: 1♀; G52: 1♀; G61: 2♀♀, 1♂; G71: 1♂; G80:1♀; G81:3♀♀, 1♂; G93: 2♀♀; M2(III): 1♀, 2♂♂; M3(I): 1♀, 1♂; M3 (II): 1♀; M3(III): 2♀♀, 3♂♂; M15(III): 3♀♀, 1♂; M17(II): 2♀♀, 1♂; M19(II): 1♀; M20(III): 1♀, 2♂♂; M26(III): 2♀♀; M41(III): 1♀; M65(II): 1♀; M65(III): 2♀♀, 2♂♂; M72 (II): 1♀, 2♂♂; M72(III): 1♀; MY3(III): 2♂♂. M18 (23.07.07); 1♀ (dissected), 5♀♀, 1♂; st52 2♂♂.

Distribution in Turkey: Sea of Marmara (Noodt, 1955; Karaytuğ and Sak, 2006), Datça (Alper ve ark. 2010).

Sarsamphiascus angustipes (Gurney, 1927)

Material examined: Phytaal: G10: 1♀ (dissected), 1♂ (dissected), 2♂♂; G11: 1♀, 2♂♂; G19: 1♀ (dissected), 18♀♀, 5♂♂; G34: 2♀♀ (dissected), 1♂ (dissected), 4♂♂; G35: 1♀, 1♂; G36: 1♀ (dissected), 9♀♀, 5♂♂; G37: 28♀♀, 12♂♂; G49: 3♀♀, 2♂♂; G52: 1♀; G61: 1♀, 1♂; G69: 1♀, G76: 4♀♀, 4♂♂; G80: 1♀; G85: 1♀ (dissected), 1♀, 1♂; G93: 47♀♀, 32♂♂. M10(II): 1♀ (dissected), 1♂ (dissected), 2♂♂; M26(III): 1♀, 2♂♂; M28(III): 1♀; M30(III): 2♀♀; M48(II): 1♂; M48(IV): 1♂; M61(III): 1♀, 1♂; M62 (I): 1♂; M62 (III): 6♀♀, 15♂♂; M65(III): 1♀.

Distribution in Turkey: Sea of Marmara (Noodt, 1955).

Sarsamphiascus kawamura (Ueda & Nagai, 2005)

Material examined Phytaal: G36: 4♀♀, 5♂♂; G48: 1♀, G57: 1♀ (dissected), 10♀♀, 11♂♂; G79: 13♀♀, 6♂♂; M9(I): 1♀ (dissected), M10 (II): 1♀, 1♂; M21(II): 1♀; MY4(II): 1♀.

Paratype: 3♂♂ & 3♀♀.

Distribution in Turkey: New Record.

Short Description: *Female*. Body tapers slightly to posterior, urosome and prosome distinction clear (Figure 24A). Rostrum well developed, long, narrow and pointed at tip, defined at base. Caudal rami (Figures 24B, C) very short, about 2 times as wide as long, bears 7 setae; seta I and II located at outer distal corner, seta I long and naked, seta II short and naked; seta III located near outer distal corner of ventral surface, short, naked and slender; seta IV and V well developed, located at terminal, with a fracture plane near base, seta IV about twice as long as seta V, ornamented with short spinules at distal half; seta VI located at inner distal corner, relatively long, slender and naked; seta VII located on dorsal surface, slender and tri-articulated at base. A1 (Figure 25A) 8-segmented, all setae naked, tapers gradually to the tip. Segment one short and squarish; segment two longest, about 1.5 times as long as wide, segment three short and squarish; segment four elongated about 1.5 times as long as wide, bears an aesthetasc; segment five very short; segment six and seven short and squarish; segment eight about 2.5 times as

long as wide with a short aesthetasc located at terminal. A2 with 3-segmented exopod (Figure 25B). Segment one elongated, about 4 times as long as wide, bears 1 bipinnate, thick seta at distal corner; segment two very short and naked; segment three about as long as segment one, bears a transverse spinular row at terminal, armatured with 1 long bipinnate seta near proximal corner, 1 long and 1 relatively short seta at terminal.

P1 (Figure 26A) basis bears well developed bipinnate inner spine, with 3-segmented rami. Enp-1 elongated, about 6 times as long as wide, bears 1 short plumose seta at inner distal corner, inner and outer margin ornamented with a few fine spinules; enp-2 short, ornamented with coarse spinules along outer margin, inner margin naked; enp-3 slightly longer than enp-2, bears 1 minute seta at inner distal corner, 1 long geniculate seta and 1 unipinnate claw like spine at terminal, outer margin ornamented with coarse spinules. Exopod reaches slightly beyond the half of enp-1; exp-1 and exp-2 inner margin naked, ornamented with coarse spinules along outer margin and bear 1 bipinnate outer spine; exp-3 inner margin with fine spinules, bears 1 long geniculate seta and 1 relatively short, geniculate and unipinnate setae at terminal, 1 strong, unipinnate spine at outer distal corner and 2 short spines at outer margin.

P2-P4 (Figures 26B-D) with 3-segmented rami. Endopod about as long as (P2, P3) or shorter than exopod (P4). Enp-1 bears 1 short (P2) or long (P3,P4) plumose inner seta, outer margin ornamented with fine spinules; enp-2 bears 1 short and 1 long plumose inner setae (P2) or 1 long plumose inner seta (P3,P4), outer margin with fine spinules; enp-3 with 1 (P2), 3 (P3) or 2 (P4) long, plumose inner setae, 2 long setae at terminal and 1 short bipinnate spine at outer distal corner. Exp-1 with 1 short inner seta, outer margin ornamented with coarse spinules and bears 1 short bipinnate spine; exp-2 with 1 long and plumose seta, ornamented with coarse spinules along outer margin, bears 1 bipinnate outer spine; exp-3 bears 1 (P2,P3) or 3 (P4) plumose inner setae, 1 long plumose seta at inner terminal, 1 long seta with plumose inner side and pinnate outer side at outer terminal, 1 relatively long unipinnate spine at outer distal corner and 2 short spines at outer margin, proximal part of outer margin ornamented with coarse spinules. Setal formula of the swimming legs:

	Endopod			Exopod		
P1	1	0	120	0	0	023
P2	1	2	121	1	1	123
P3	1	1	321	1	1	123
P4	1	1	221	1	1	323

P5 (Figures 25C, D) baseoendopod and exopod distinct, baseoendopod with long, slender and naked outer basal seta. Endopodal lobe ornamented with very short spinule rows at distal corners, armatured with 2 short spines with forked tip and 3 relatively long bipinnate setae. Exopod about 1.5 times as long as broad, ornamented with fine spinules along inner and outer margin, bears a small hyaline field near outer margin, armatured with 1 long bipinnate, 4 long naked and 1 short and naked setae.

Male. A1, P2 endopod, P5 and P6 sexually dimorphic. A1 (Figure 27A) 7-segmented, segment four and seven with an aesthetasc. P2 endopod (Figures 27B, C) second and third segment modified into a single segment; bears 2 plumose seta at inner margin, 1 very long, plumose seta at inner distal corner, 1 relatively short, unipinnate seta at terminal, 2 long modified spines with forked tip located on anterior surface of outer margin. P5 (Figure 27D) baseoendopod and exopod distinction clear. Endopodal lobe short, ornamented with coarse spinules at inner and outer margin, armatured with 2 short bipinnate spines. Exopod squarish, ornamented with fine spinules along inner margin and well developed spinules along outer margin; armatured with 2 long bipinnate spines, 1 long, naked and slender seta, 2 relatively short, thick and naked setae. P6 (Figure 27E) reduced to a short and wide plate with 1 bipinnate and 2 naked setae.

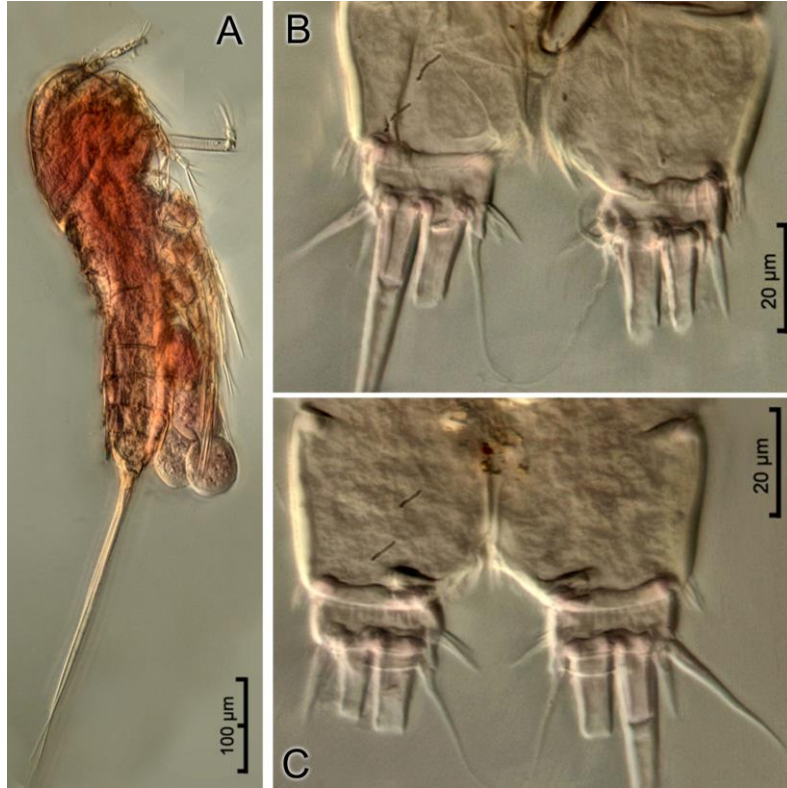


Figure 24. *Sarsamphiascus kawamurai*, ♀; A. Habitus, lateral; B. Caudal rami, dorsal, C. Caudal rami, ventral.

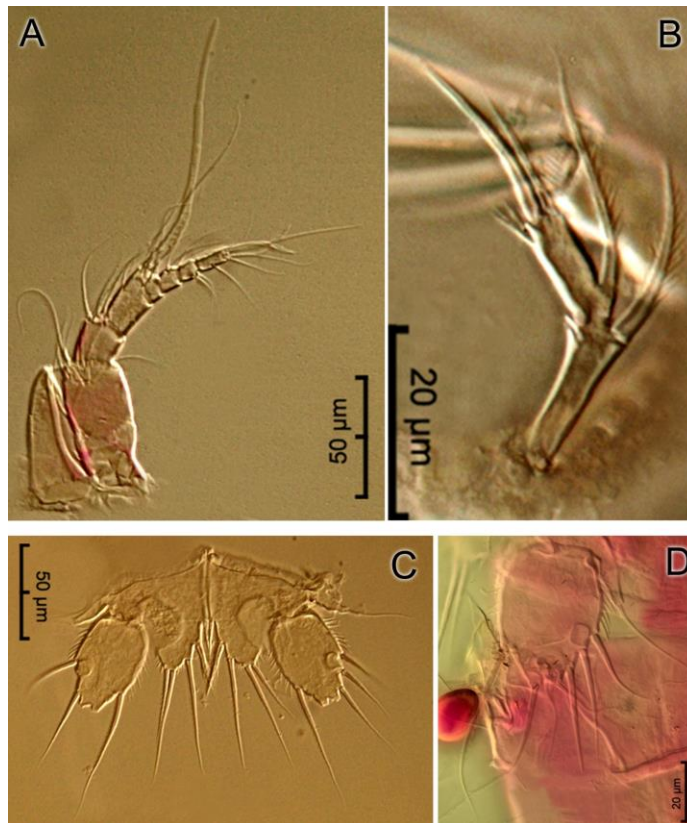


Figure 25. *Sarsamphiascus kawamurai*, ♀; A. A1; B. A2, exopod; C. P5; D. P5 exopod.

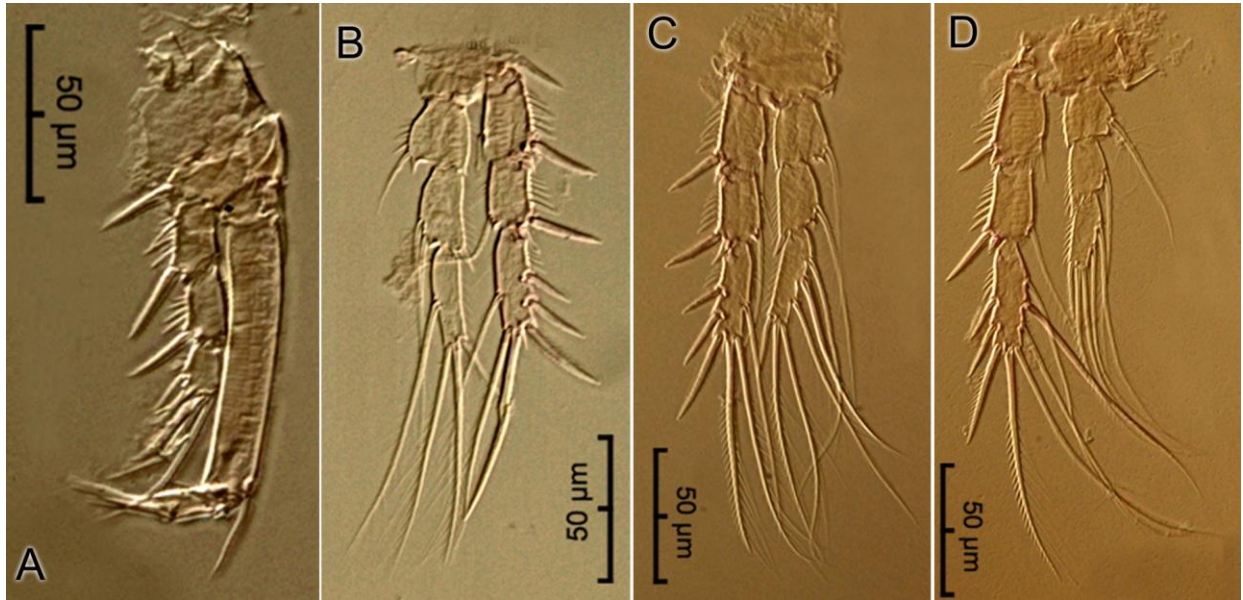


Figure 26. *Sarsamphiascus kawamurai*, ♀; A. P1; B. P2; C. P3; D. P4.

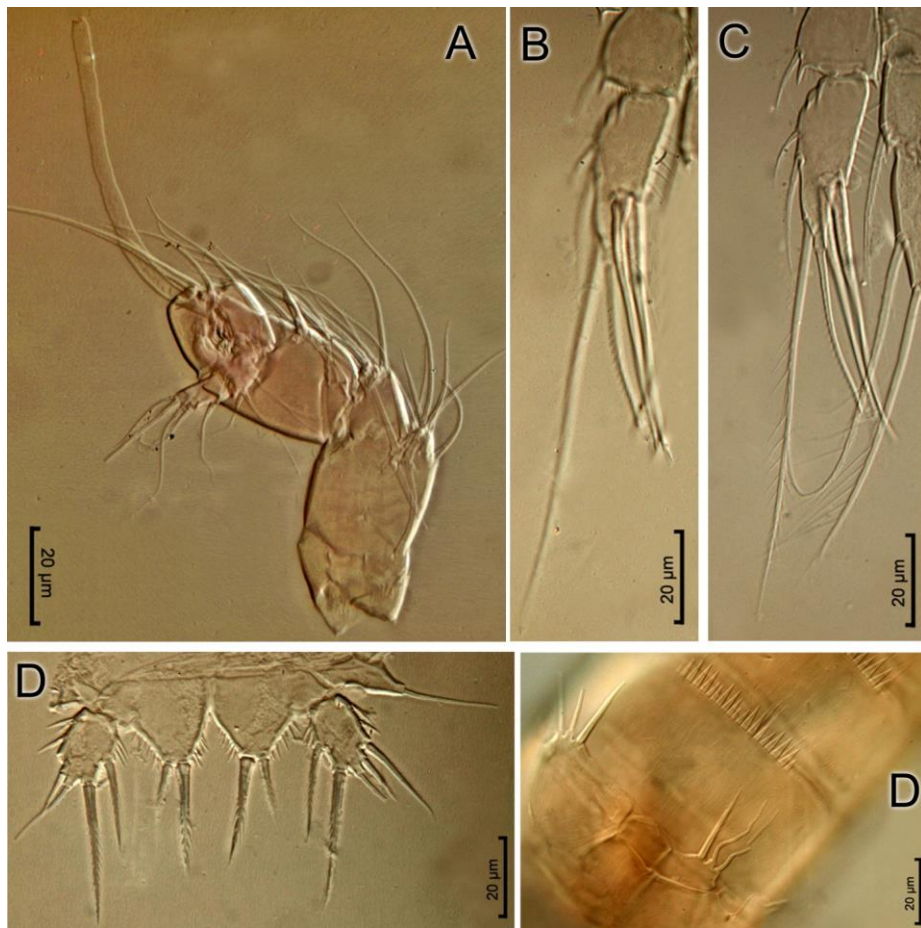


Figure 27. *Sarsamphiascus kawamurai*, ♂; A. A1; B. P2 endopod, anterior; C. P2 endopod, posterior; D. P5; E. P6.

Subfamily: Stenheliinae Brady, 1880

Genus: *Delavalia* Brady, 1880

Delavalia oblonga (Lang, 1965) *sensu* Wells & Rao, 1987

Material examined: Phytag: G48: 8♀♀, 1♂; G59: 1♀ (dissected); st60 2♀♀.

Distribution in Turkey: Datça (Alper ve ark., 2010).

Discussion

Identifications of miraciid specimens collected from the Turkish coasts have revealed 17 species and 1 subspecies, 10 of which were also reported by previous studies (Noodt, 1955; Karaytuğ ve Sak, 2006; Alper ve ark., 2010) that have been carried out in limited areas (Table 4). The remaining 7 species and 1 subspecies therefore, (*Diosaccus tenuicornis*, *Schizopera pratensis*, *Psammotopa vulgaris*, *Amonardia phyllopus*, *Metamphiascopsis hirsutus bermudae*, *Robertgurneya smithi*, *Paramphiascella robinsoni* and *Sarsamphiascus kawamurai*) are recorded for the first time with this study from Turkish marine waters. Although this study covers all Turkish coasts except Sea of Marmara, we did not encounter 15 formerly reported species (Table 4). The number of harpacticoid species that have been recorded so far from Turkey has reached to 140 with the results of this study.

Sch. pratensis, *R. smithi*, *M. hirsutus bermudae* and *S. kawamurai* are also recorded for the first time from the Mediterranean Sea. *Sch. pratensis* was originally described from Germany by Noodt (1958), and has not been reported since then. Comparison with its original description did not reveal any differences with our specimen. Hamond (1973) described *R. smithi* from Coobowie, Australia, and then Ventham (2011) reported it from Sussex coast (Eastern English Channel). Comparison with Hamond's detailed description and drawings indicated that our specimens are morphologically identical with *R. smithi* described by Hamond (1973). *M. hirsutus bermudae* was originally described by Willey (1930) from Bermuda Island. Yeatman (1976) reported and redescribed this subspecies from Montego Bay, Jamaica. The only known difference between females of subspecies is; *M. hirsutus bermudae* has fine spinules at outer margin of P5 endopod instead of long setules that nominate subspecies has. Our specimen matches well with Yeatman's (1976) drawing and description. This is the first record of the subspecies from Mediterranean waters. *S. kawamurai* was described by Ueda ve Nagai (2005) from a tank for nori cultivation on Ariake Bay, Japan. Examination of paratypes revealed only minor differences in male P6; i) the inner terminal seta of endopod is slightly longer in our specimen, ii) outermost seta of exopod is slightly shorter and thinner in our specimen. These subtle differences between the two populations do not justify the creation of a new species from Turkish materials.

Based on morphological data, Turkish populations of *R. smithi* and *M. hirsutus bermudae* are identical with the original population. But such disjunct distributions of these species require plausible explanations. Dispersal by floating seaweeds that are drifting in the open ocean currents discussed by Yeatman (1962) and Olafsson ve ark. (2001) as a possible explanation. Radziejewska ve ark. (2006) provided evidence that harpacticoids can easily be transported via ship's ballast water. They showed that meiobenthos survived in shipborne ballast tank sediment residues and suggested that such anthropogenic introduction may provide at least a partial explanation for the long distribution of meiofauna taxa.

Although dispersal events are possible explanations of the present distribution of the species mentioned above and despite the fact that there are still a number of cosmopolitan meiobentic species for which no differences have been detected between populations (Schmidt and Westheide, 2000; Radziejewska et.al., 2006), it is still questionable whether the confirmed records based on the morphology of the populations actually confirm the existence of true cosmopolitan species.

It is also possible that populations can diverge genetically whilst remaining extremely similar in their morphology. Lee (2000) collected *Eurytemora affinis* (Poppe, 1880) from a wide array of locations throughout the Northern Hemisphere and the phylogeny clearly showed that at least eight independent species exist, with each occupying a distinctive geographic area. He also showed that populations are unable to produce fertile offspring. The use of modern molecular and biological techniques that are independent of morphology might bring new insight into this phenomenon (Todaro ve ark.,1996; Schmidt ve Westheide, 2000; Glatzel ve Königshoff, 2005).

Table 4: Miraciid species that have been identified from the coasts of Turkey

Species	Noodt (1955) (Sea of Marmara)	Karaytuğ ve Sak (2006) (Coasts of Balıkesir)	Alper ve ark. (2010) (Datça & Bozburun)	Present Study
<i>Sarsamphiascus minutus</i> (Claus, 1863)	+	+	+	+
<i>Sarsamphiascus parvus</i> (Sars, 1906)	+			
<i>Sarsamphiascus angustipes</i> (Gurney, 1927)	+			+
<i>Sarsamphiascus varians</i> (Norman & T. Scott 1905)	+			
<i>Sarsamphiascus kawamurai</i> (Ueda & Nagai, 2005)				+
<i>Amphiascopsis cinctus</i> (Claus, 1866)		+	+	+
<i>Amonardia perturbata</i> Lang, 1965		+	+	
<i>Amonardia normani</i> (Brady, 1872)	+			
<i>Amonardia phyllopus</i> (Sars, 1906)				+
<i>Schizopera brucinae</i> Petkovski, 1954		+	+	+
<i>Schizopera gligici</i> Petkovski, 1957		+		+
<i>Schizopera pratensis</i> Noodt, 1958				+
<i>Bulbamphiascus imus</i> (Brady, 1872)		+		+
<i>Paramphiascella mediterranea</i> Lang, 1948			+	
<i>Paramphiascella vararensis</i> (T. Scott, 1903)	+			
<i>Paramphiascella robinsoni</i> (A. Scott, 1902)				+
<i>Robertgurneya rostrata</i> (Gurney, 1927)	+			
<i>Robertgurneya oligochaeta</i> (Noodt, 1955)	+			
<i>Robertgurneya similis</i> (A. Scott, 1896)	+			
<i>Robertgurneya smithi</i> Hamond, 1973				+
<i>Delavalia oblonga</i> (Lang, 1965)			+	+
<i>Delavalia normani</i> (T.Scott, 1905)	+			
<i>Pseudamphiascopsis attenuatus</i> (Sars, 1906)	+		+	
<i>Macrosetella gracilis</i> (Dana, 1847)			+	
<i>Haloschizopera marmarae</i> Noodt, 1955	+			+
<i>Robertsonia knoxi</i> (T. Scott, 1903)	+			+
<i>Robertsonia monardi</i> (Klie, 1937)	+			
<i>Diosaccus varicolor f. pentasetosus</i> (Noodt, 1955c)	+			
<i>Diosaccus tenuicornis</i> (Claus, 1863)				+
<i>Amphiascoides brevifurca</i> (Czerniavski, 1868)	+			+
<i>Amphiascoides subdebilis</i> (Willey, 1935)	+			
<i>Psammotopa vulgaris</i> (Pennak, 1942)				+
<i>Metamphiascopsis hirsutus bermudae</i> (Willey, 1930)				+

Acknowledgments

This is a part of a PhD thesis supervised by Drs. Serdar SAK and Süphan KARAYTUĞ. Such revisionary work would not have been possible without the use of extensive materials collected from previous projects funded by TÜBİTAK (project numbers; TBAG-1962 (100T120), TBAG 106T590 and TBAG 111T576) and Balıkesir University Research Fund (project number 2011/56). Dr. Alp ALPER is gratefully acknowledged for his help in sampling and Prof. Dr. Hiroshi Ueda for sending *S. kawamura* paratypes.

References

- Alper, A., Karaytuğ, S., Sak, S. 2010. Interstitial and Phytal Harpacticoida (Crustacea: Copepoda) Inhabiting the Mediollitoral Zone of the Dağca-Bozburun Peninsulas (Muğla, Turkey). *SDU Journal of Science*. 5(1): 16-28.
- Boeckner, M.J., Sharma, H.C. Proctor. 2009. Revisiting the Meiofauna Paradox: Dispersal and Colonization of Nematodes and Other Meiofaunal Organisms in Low- and High-energy Environments. *Hydrobiologia*. 624: 91-106.
- Boxshall, G.A., S.H. Halsey. 2004. An Introduction to Copepod Diversity. Ray Society, London.
- Chullasorn, S., Anansatitporn, W.P., Kangtia, P., Klangsin, R., Jullawateelert, R. 2011. Review of Naupliar Development among Miraciidae (Copepoda, Harpacticoida) with a Naupliar Description of *Paramphiascella choi* sp. nov. from Thailand. *Hydrobiologia*. 666: 21-43.
- Delamare-Deboutteville, C. 1953. Recherches Sur L'écologie Et La Répartition Du Mystacocaride *Derocheilocaris remanei* Delamare et Chappuis, En Méditerranée. *Vie et Milieu*. 4: 321-380.
- Gerlach, S.A. 1977. Means of Meiofauna Dispersal. *Mikrofauna Meeresboden*. 61: 89-103.
- Giere, O. 2009. Meiobenthology, the Microscopic Motile Fauna of Aquatic Sediments. Second Edition. Springer-Verlag, Berlin.
- Glatzel, T., Königshoff, D. 2005. Cross-breeding Experiments among Different Populations of the 'Cosmopolitan' Species *Phyllognathopus viguieri* (Copepoda: Harpacticoida). *Hydrobiologia*. 534: 141-149.
- Hamond, R. 1973. *Robertgurneya smithi* nov. sp. (Crustacea; Harpacticoida), with Notes on Other Species of the Genus. *Journal of Natural History*. 7: 65-76.
- Hicks, G.R.F. 1988. Evolutionary Implications of Swimming Behaviour in Meiobenthic Copepods. G.A. Boxshall & H.K. Schminke, Dordrecht- Kluwer Academic Publishers, (579-605), Biology of Copepods.
- Hicks, G.R.F., Coull, B. 1983. The Ecology of Marine Meiobenthic Harpacticoid Copepods. *Oceanography and Marine Biolog, An Annual Review*. 21: 67-175
- Huys, R., Mu, F. 2008. Description of A New Species of *Onychostenhelia* Itô (Copepoda, Harpacticoida, Miraciidae) from the Bohai Sea, China. *Zootaxa*. 1706: 51-68
- Huys, R., Gee, J.M., Moore, C.G., Hamond, R. 1996. Synopses of the British Fauna (New Series). Marine and Brackish Water Harpacticoids, Part 1. Field Studies Council, Shrewsbury.
- Karanovic, T., Cooper, S.J.B. 2012. Explosive Radiation of the Genus *Schizopera* on A Small Subterranean Island in Western Australia (Copepoda: Harpacticoida): Unravelling the Cases of Cryptic Speciation, Size Differentiation and Multiple Invasions. *Invertebrate Systematics*. 26: 115-192.
- Karaytuğ S., Sak, S. 2006. A Contribution to the Marine Harpacticoid (Crustacea, Copepoda) Fauna of Turkey. *Ege University Journal of Fisheries and Aquatic Sciences*. 23: 403-405.
- Lang, K. 1948. Monographie der Harpacticiden. Håkan Ohlsson, Lund.
- Lang, K. 1965. Copepoda Harpacticoida from the Californian Pacific coast. Kunglieren svenska Vetenskapsakademiens. *Handlingar*. 10(2): 1-560.
- Lee, C.E. 2000. Global Phylogeography of A Cryptic Copepod Species Complex and Reproductive Isolation between Genetically Proximate "Populations". *Evolution*. 54: 2014-2027.
- Noodt, W. 1955. Marine Harpacticoiden (Crust. Cop.) aus dem Marmara Meer. *İstanbul Üniversitesi Fen Fakültesi Mecmuası*. 20: 49-94.
- Noodt, W. 1958. *Schizopera pratensis* n. sp. von Salwiesen der Deutschen Meeresküste. *Kieler Meeresforschungen*. 14: 223-225.
- Olafsson, E., Ingolfsson, A., Steinarsdottir, M.B. 2001. Harpacticoid Copepod Communities of Floating Seaweed: Controlling Factors and Implications for Dispersal. *Hydrobiologia*. 453/454: 189-200.
- Palmer, M.A. 1988. Dispersal of Marine Meiofauna: A Review and Conceptual Model Explaining Passive Transport and Active Emergence with Implications for Recruitment. *Marine Ecology Progress Series*. 48: 81-91.
- Radziejewska, T., Gruszka, P., Rokicka-Praxmajer, J. 2006. A Home Away from Home: A Meiobenthic Assemblage in A Ship's Ballast Water Tank Sediment. *Oceanologia*. 48: 259-265.
- Schmidt, H., Westheide, W. 2000. Are the Meiofaunal Polychaetes *Hesionides arenaria* and *Stygocapitella subterranea* True Cosmopolitan Species? Results of RAPD-PCR investigations. *Zoologica Scripta*. 29: 17-27.
- Song, S.J., Rho, H. S., Kim, W. 2007. A New Species of *Amonardia* (Copepoda:Harpacticoida: Miraciidae) from the Cultivated Brown Alga, *Undaria pinnatifida*. *Integrative Biosciences*. 11(1): 69-77.

- Sönmez, S., Sak, S., Karaytuğ, S. 2012. Meiobenthic Ectinosomatids (Crustacea: Copepoda: Harpacticoida) of the Mediterranean Sea Coasts of Turkey. *Journal of Anatolian Natural Sciences*. 3(2): 1-14.
- Thistle, D., Sedlacek, L. 2004. Emergent and Nonemergent Species of Harpacticoid Copepods Can Be Recognized Morphologically. *Marine Ecology Progress Series*. 266: 195-200.
- Todaro, M.A., Fleeger, J.W., Hu, Y.P., Hrinkevich, A.W., Foltz, D.W. 1996 Are Meiofauna Species Cosmopolitan? Morphological and Molecular Analysis of *Xenotrichula intermedia* (Gastrotricha: Chaetonotida). *Marine Biology*. 125: 735-742.
- Ueda, H., Nagai, H. 2005. *Amphiascus kawamurai*, A New Species of Harpacticoid Copepod (Crustacea: Harpacticoida: Miraciidae) from Nori Cultivation Tanks in Japan, with a Redescription of the Closely Related *A. parvus*. *Species Diversity*. 10: 249-258.
- Ventham, D. 2011. Harpacticoid Copepods from the Sussex Coast (Eastern English Channel): Records 1992-1997. The Booth Museum of Natural History, Brighton.
- Wells, J.B.J. 2007. An Annotated Checklist and Keys to the Species of Copepoda Harpacticoida (Crustacea). *Zootaxa*. 1568: 1-872.
- Willen, E. 2002. Notes on the Systematic Position of the Stenheliinae (Copepoda, Harpacticoida) within the Thalestridimorpha and Description of Two New Species from Motupore Island, Papua New Guinea. *Cahiers de Biologie Marine*. 43: 27-42.
- Willey, A. 1930. Harpacticoid Copepoda from Bermuda. – Part I. *Annals and Magazine of Natural History Series* 10(6): 81-114.
- Yeatman, H.C. 1962. The Problem of Marine Littoral Copepods in the Atlantic Ocean, including Some Redescriptions of Species. *Crustaceana*. 4(4): 253-272.
- Yeatman, H.C. 1976. Marine Littoral Copepods from Jamaica. *Crustaceana*. 30: 201-219.