

## New records of halacarid mites (Acari: Halacaridae) from the Levantine coast of Turkey

### Türkiye'nin Levant Denizi kıyılarından yeni halacarid kayıtları

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**Abstract:** This paper reports on six marine halacarid species collected from the coasts of Antalya (3 stations) and Mersin (1 station), Turkey. The species are respectively: *Actacarus bacescui*, *Camactognathus tesselatus*, *Coloboceras drachi*, *Halacarus rismondoi*, *Rhombognathus paratonops*, and *Rhombognathus parvulus*. Among the species, 2 genera (*Camactognathus* and *Coloboceras*) and 4 species (*Camactognathus tesselatus*, *Coloboceras drachi*, *Halacarus rismondoi* and *Rhombognathus parvulus*) are being newly reported from the coasts of Turkey for the first time. Each species found in the area was briefly described with comments on their habitat preferences and geographical distributions.

**Keywords:** Systematics, meiofauna, Antalya, Mersin

**Öz:** Bu çalışmada, Antalya (3 istasyon) ve Mersin (1 istasyon) kıyılarından elde edilen 6 deniz halacarid kaydı verilmiştir. Bu türler sırasıyla, *Actacarus bacescui*, *Camactognathus tesselatus*, *Coloboceras drachi*, *Halacarus rismondoi*, *Rhombognathus paratonops* ve *Rhombognathus parvulus*'tur. Bunlardan 2 cins (*Camactognathus* ve *Coloboceras*) ve 4 tür (*C. tesselatus*, *C. drachi*, *H. rismondoi* ve *R. parvulus*) Türkiye kıyılarından daha önce kaydedilmemiştir. Çalışmada, her bir türün tanımları, habitat bilgileri ve dünyadaki dağılımları verilmiştir.

**Anahtar kelimeler:** Sistemistik, meiofauna, Antalya, Mersin

## INTRODUCTION

The family Halacaridae is meiobenthic and generally live in submerged habitats in a variety of substrata (e.g. on many animal groups and algae) (Bartsch, 2004; 2006; Giere, 2009). Many species are predators, but some genera evolved the ability to feed on macroalgae (Pepato et al., 2018). The family includes marine, brackish and freshwater species occupying areas from littoral to the deep sea (Bartsch, 2006). To date about 1200 species of Halacaridae have been reported worldwide (Bartsch, 2009; WoRMS Editorial Board, 2019). The first study about halacarids in Turkey was started by Dr. Ilse Bartsch (2000), who described a halacarid species "*Isobactrus ponticus*" new to science from the Sinop coast. She (2001, 2004, 2013 and 2015) also reported some species from the Black Sea region. Afterwards, three new species records were given from the Sea of Marmara (Bostancı coast, İstanbul) by Bilecenoglu et.al. (2013), Kapiris et al. (2014), Durucan and Boyaci (2016). The first study on the Levantine Sea (Antalya, Kaş) halacarids was started by Mytilineou et al. (2016), who gave a new record of the species "*Agauopsis microsyncha*". Recently, several papers (Durucan and Boyaci, 2017; 2018a; 2018b; Durucan, 2018; 2019; Stamouli

et al. 2017; Chartosia et al. 2018) have been published about the distribution of halacarid mites on the coast of Antalya.

In the present study, six species belonging to five genera were recorded and discussed from the Levantine coast of Turkey.

## MATERIAL AND METHODS

Samples of *Cystoseira barbata* and various size of sand habitats (interstitial, medium coarse and fine sand from 0,5 m to 12 m depths) were collected by hand using snorkelling and SCUBA diving at 4 stations along the coasts of Antalya and Mersin in 2017 (Figure 1 & Table 1). Immediately after collection, mites were extracted by washing the substrates. The meiofauna were retained in the set of sieves (63 µm, 500 µm, 1000 µm). The halacarids were sorted under binocular stereo microscope (Nikon SMZ10). In the laboratory, mite specimens were cleared in lactic acid and mounted in Hoyer's medium. Figures were drawn with the aid of a camera lucida (Nikon Eclipse E400). All measurements are given as micrometers (µm). The specimens were kept in the author's personal collection in Antalya, Turkey.

**Table 1.** List of recorded halacarid species in this study with their locations and habitats

Stations	Coordinates	Species	Habitat
Sta.1 Anamur	36.069263°N 32.866953°E	<i>Actacarus bacescui</i>	interstitial water (50 cm)
		<i>Rhombognathus paranotops</i>	<i>Cystoseira barbata</i> (6 m)
Sta.2 Yakamoz	36.845556°N 30.799167°E	<i>Camactognathus tesselatus</i>	well sorted fine sand (2 m)
Sta.3 Bilem	36.854722°N 30.743889°E	<i>Coloboceras drachi</i>	medium-size sand (6 m)
Sta.4 Kaş	36.156944°N 29.628333°E	<i>Rhombognathus parvulus</i>	<i>Cystoseira barbata</i> (6 m)
		<i>Halacarus rismondoi</i>	fine sand (12 m)



**Figure 1.** Map of sampling locations

## RESULTS

### SYSTEMATICS

Family Halacaridae Murray, 1877

Genus *Actacarus* Schulz, 1937

*Actacarus bacescui* Konnerth-Ionescu, 1970 (Figure 2)

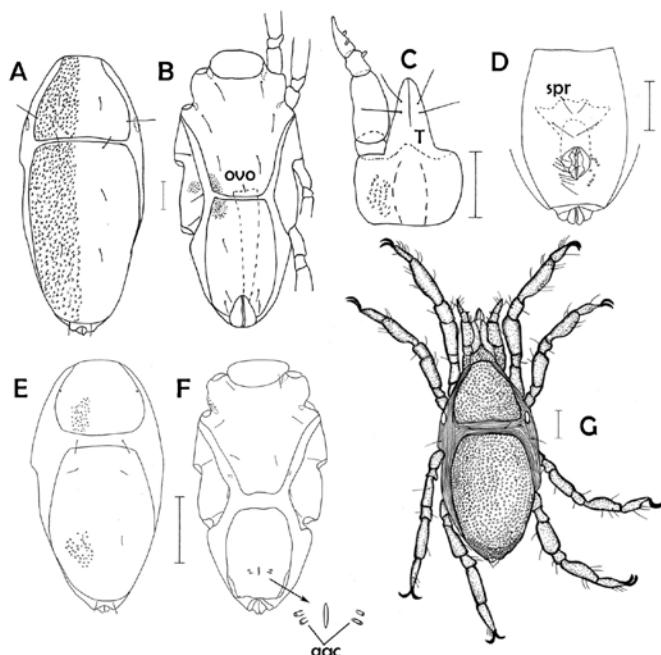
**Material examined.** Sta. 1; interstitial water at 50 cm depth below on the shore near the water, 5 ♀♀, 7 ♂♂, 5 deutonymphs.

**Morphology.** Idiosoma of female 210-225 µm long, 90-100 µm wide, that of male 170-200 µm long, 75-85 µm wide, that of deutonymphs between 175-187 µm long, 63-85 µm wide. Anterior dorsal plate 65 µm long, 80 µm wide in female. Ocular plate 12 µm long. Posterior dorsal plate 150 µm long, 90 µm wide in female. Anterior epimeral plate 85 µm long, 100 µm wide. Posterior epimeral plate 85 µm long, 17 µm wide (Figure 2A, B & E-G). Male genital opening surrounded by 20 perigenital setae and 2 pairs of subgenital setae (Figure 2D). Female genitoanal plate with 3-4 pairs of perigenital setae. Gnathosoma 55 µm long 50 µm wide. Palps are slender and 4 segmented. Total palp length 61 µm long (Figure 2C).

**Remarks.** The morphological characteristics and habitat preferences of the specimens reported here accord with the previously given records by Durukan and Boyaci (2018a) and original descriptions by Morselli and Mari (1979). This species is well characterized by possesses a median spine on the tectum which easily separates it from related species (*A. ponticus* and *A. pygmaeus*) (Bartsch, 1999).

**Habitat.** The species is found in sandy bottom in tidal areas (Bartsch, 2009).

**Distribution.** Atlantic coast, Mediterranean and Black Sea (Bartsch, 2009; Durukan and Boyaci, 2018a).



**Figure 2.** *Actacarus bacescui* Konnerth-Ionescu, 1970: A. idiosoma, dorsal view, female; B. idiosoma, ventral view, female; C. gnathosoma, ventral view, female; D. Genitoanal plate of male; E. idiosoma, dorsal view, deutonymph; F. idiosoma, ventral view, deutonymph; G. dorsal view, female (gac; genital acetabula, ovo; ovopositor, spr; spermatopositor, T; tectum) Scale bars: A-C= 50 µm; D-G= 25 µm

Genus *Camactognathus* Newell, 1984

*Camactognathus tesselatus* (Morselli & Mari, 1982) (Figure 3)

**Material examined.** Sta. 2; well sorted fine sand (2 m), 1 ♀.

**Morphology.** Idiosoma 260 µm long, 127 µm wide. Dorsal plates uniformly foveated. Anterior dorsal plate 88 µm long, 75 µm wide. Ocular plate 85 µm long, 23 µm wide. Posterior dorsal plate 174 µm long, 98 µm wide. Dorsal setae-1 on anterior dorsal plate, dorsal setae-2 on integument. Anterior epimeral plate 105 µm long, 114 µm wide, epimeral pores lacking. Posterior epimeral plate 100 µm long, 50 µm wide. Anterior epimeral plate and genitoanal plate almost equal in length. Genitoanal plate with four pairs of perigenital setae (Figure 3A,B & D). Gnathosoma

missing. Leg I 180 µm long. The chaetotaxy of leg I as follows from trochanter to tarsus 1, 2, 4, 4, 8, 5 (Figure 3C).

**Remarks.** This is the second record of this species from Turkey. The morphological characteristics, habitat preferences and body sizes of the specimens reported here accord with the previously given records by Bartsch (2013).

**Habitat.** The species was previously recorded from mixture of shell remains and muddy sand (3 m) in Sinop, Turkey by Bartsch (2013).

**Distribution.** Mediterranean and Black Sea (Bartsch, 2009; 2016).

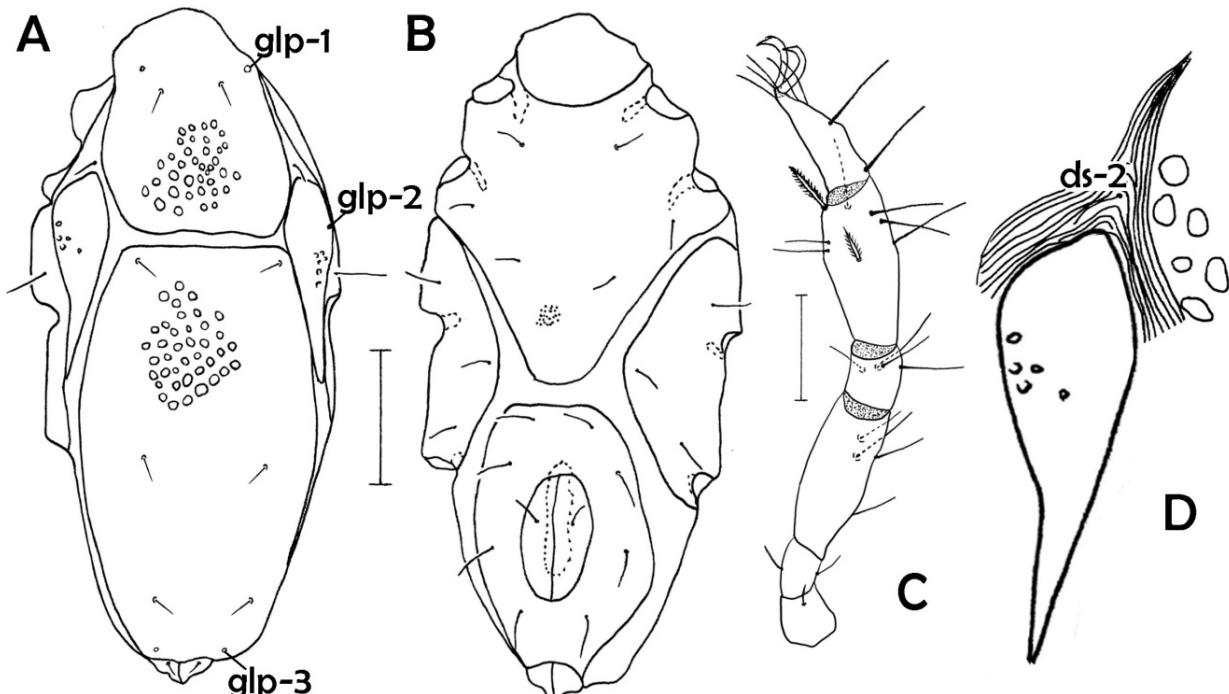


Figure 3. *Camactognathus tesselatus* (Morselli & Mari, 1982) (female): A. idiosoma, dorsal view; B. idiosoma, ventral view; C. leg I, lateral view; D. detail of ocular plate and second dorsal setae (ds-2; second dorsal setae, glp; gland pore) Scale bars: 50 µm

Genus *Coloboceras* Trouessart, 1889

*Coloboceras drachi* Monniot, 1962 (Figure 4)

**Material examined.** Sta. 3; medium-size sand (6 m), 1 ♀, 1 deutonymph.

**Morphology.** Idiosoma of female 450 µm long, 185 µm wide. Anterior dorsal plate 150 µm long, 100 µm wide in female. Ocular plate 85 µm long, 17 µm wide in female. Posterior dorsal plate 260 µm long, 125 µm wide in female. Female anterior epimeral plate 235 µm long, 210 µm wide without epimeral vesicles or epimeral pores. Genitoanal plate 161 µm long, 105 µm wide with three pairs of perigenital setae and two pairs of subgenital setae in female (Figure 4A & B). Idiosoma colour is slightly brown.

Gnathosoma missing in both female and deutonymph. Idiosoma of deutonymph 310 µm long, 185 µm wide (Figure 4C).

**Remarks.** This is the first record of this species from the Eastern Mediterranean, Levantine Sea of Turkey. With regard to the external morphological characters, the specimen corresponds with the record given by Monniot (1962).

**Habitat.** *Coloboceras drachi* was found in subtidal sediment (Bartsch, 2009).

**Distribution.** Northeastern Atlantic, Mediterranean Sea (Bartsch, 2009).

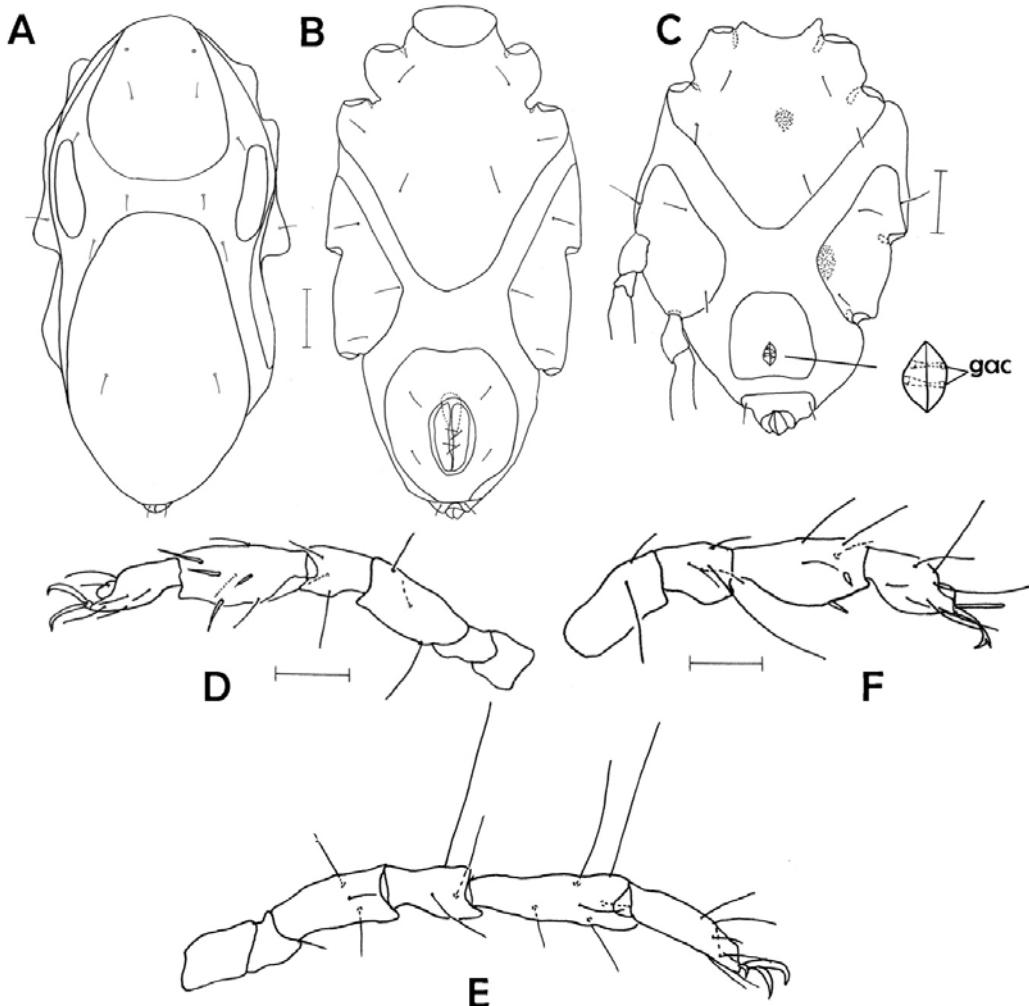


Figure 4. *Coloboceras drachi* Monniot, 1962: A. idiosoma, dorsal view, female; B. idiosoma, ventral view, female; C. idiosoma, ventral view, deutonymph; D. leg II, lateral view, female; E. leg IV, medial view, female; F. leg I (from telofemur to tarsus), lateral view, deutonymph. (gac: genital acetabula) Scale bars: 50 µm

#### Genus *Halacarus* Gosse, 1885

##### *Halacarus rismondoi* Viets, 1940 (Figure 5)

**Material examined.** Sta. 4; fine sand (12 m), 2 ♀♀, 1 ♂.

**Morphology.** Idiosoma of female 375 µm long, 183 µm wide, that of male 365 µm long, 190 µm wide, anterior dorsal plate in male 88 µm long, 65 µm wide with frontal process. Ocular plate with corneae and porus canalicus. Posterior dorsal plate 89 µm long, 65 µm wide. Anterior epimeral plate 88 µm long, 163 µm wide. Posterior dorsal plate 137 µm long, 65 µm wide with 1 dorsal and 3 ventral setae. Dorsum with 6 pairs of idiosomatic setae. First dorsal setae on anterior dorsal plate, second to fifth on integument, sixth dorsal setae on posterior dorsal plate. Epicuticula on plates, gnathosoma and legs with striae in parallel and fingerprint-like arrangement. Pair of first dorsal setae posterior to first gland pore. Pairs of gland pore 3 and gland pore 4 striated integument, gland pore 5 on posterior dorsal plate. Male

genital opening surrounded by 34 perigenital setae, 4 pairs of outlying setae. Female genitoanal plate with pair of crescent cerotegumental areas; anterior pair of perigenital setae on genito-anal plate (Figure 5A-C). Gnathosoma 87 µm long 62 µm wide. Palps slender and 4 segmented. Total palp length 78 µm long (Figure 5D). Leg I 355 µm long. The chaetotaxy of leg I as follows from trochanter to tarsus 1, 2, 8, 10, 10, 8 (Figure 5E).

**Remarks.** *Halacarus rismondoi* was originally described by Viets (1940) from the Adriatic Sea (Croatia-Rovinj). The morphology of the specimen is similar to given by Viets (1940) and Bartsch (2017).

**Habitat.** This halacarid mite was found by Viets (1940) among variety of macroalgae (*Geodia* sp., *Udothea* sp. and *Cystoseira* sp.).

**Distribution.** Mediterranean Sea (Rovinj, Croatia) (Bartsch, 2009).

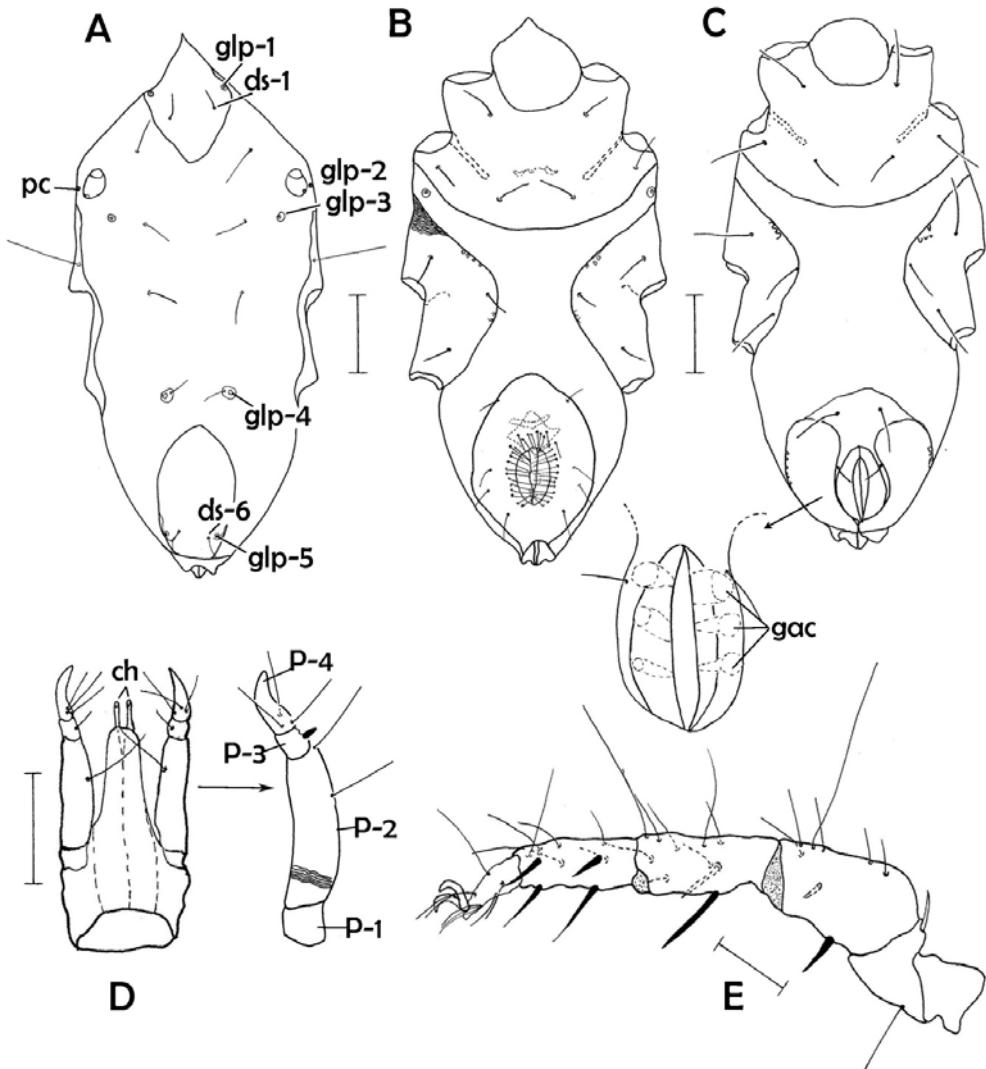


Figure 5. *Halacarus rismondoi* Viets, 1940: A. idiosoma, dorsal view, male; B. idiosoma, ventral view, male; C. gnathosoma, ventral view, female; D. gnathosoma, ventral view, male; E. leg I, lateral view, male (ch. chelicerae; ds-1 to ds-6. dorsal setae, from anterior to posterior; gac. genital acetabula; glp-1 to glp-5. gland pore/s, from anterior to posterior; P-1 to P-4. first to fourth segments of palp; pc. porus canaliculus) Scale bars: 50 µm

#### Genus *Rhombognathus* Trouessart, 1888

##### *Rhombognathus paranotops* Bartsch, 1986 (Figure 6)

**Material examined.** Sta 1; *Cystoseria barbata* (6 m), 5 ♂♂.

**Morphology.** Idiosoma of male 288 µm long, 186 µm wide. Anterior dorsal plate 93 µm long, 118 µm wide. Ocular plate 83 µm long, 65 µm wide with two corneae. Uniformly reticulated posterior dorsal plate 155 µm long, 96 µm wide. First dorsal setae (37 µm) on anterior dorsal plate, ds-2 to ds-4 (striated in integument). All ventral plates fused. Male GO surrounded by 22-24 perigenital setae and 2 pairs of subgenital setae (Figure 6A & B). Palps are slender and 4 segmented. Total palp length 90 µm long (Figure 6C). Leg I 275 µm long. The chaetotaxy of leg I as follows from trochanter to tarsus 1, 2, 7, 4, 5, 6 (Figure 6D & E).

**Remarks.** *Rhombognathus paratonops* is common in the Mediterranean Sea, and is distinguished from the other congener, *R. tonops* by having an accessory process and reticulation on the plates. In *R. paratonops*, the posterior dorsal plate is uniformly reticulated whereas in *R. tonops* the median and the pair of lateral foveate portions of the plate separated by longitudinal areas which are delicately porose but lack of a foveate or reticulate ornamentation; the accessory process on the claws of *R. paratonops* bear 13-14 tines, those of *R. tonops* 8 tines (Bartsch, 1986; 1996).

**Habitat.** The species previously was found from shallow water among seagrass and various red algae (*Corallina officinalis*, *Cystoseria barbata* and *C. crinita*) (Bartsch, 2009).

**Distribution.** Mediterranean and Black Sea (Bartsch, 2009).

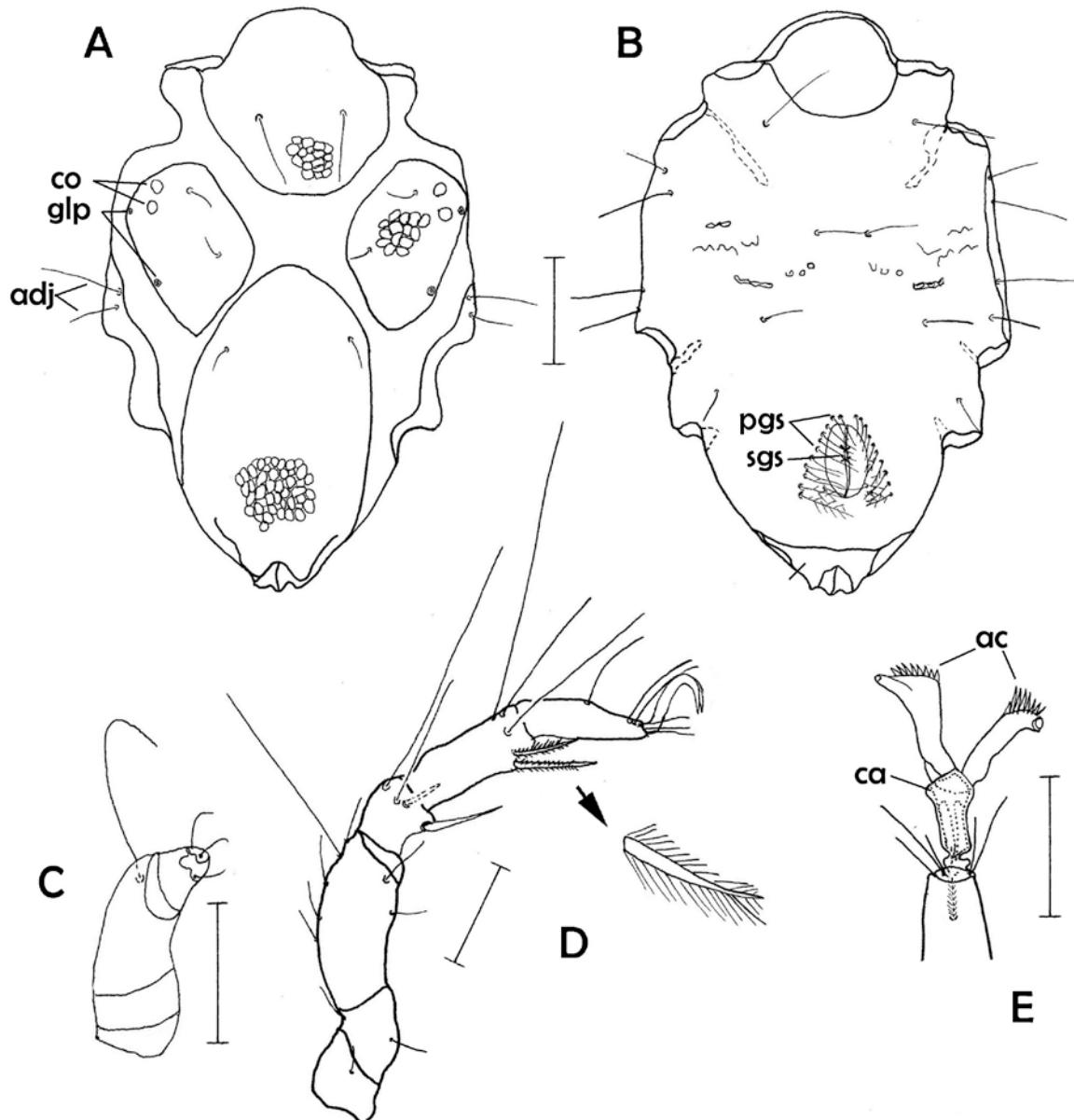


Figure 6. *Rhombognathus paranotops* Bartsch, 1986 (male): A. idiosoma, dorsal view; B. idiosoma, ventral view; C. palp, lateral view; D. Leg I, lateral view; E. tarsus I, lateral view (ac. accessory process with tines; adj. adjunct seta; ca. carpite; co. corneae; glp. gland pore; pgs. perigenital seta; sgs. subgenital seta) Scale bars: 50 µm

#### *Rhombognathus parvulus* Viets, 1939 (Figure 7)

**Material examined.** Sta.3; *Cystoseria barbata* (6 m), 1 ♀.

**Morphology.** Idiosoma of female 287 µm long, 165 µm wide. All dorsal and ventral plates fused. Ocular plate with 2 corneae. Five pair of perigenital setae are found on the sides of the genital opening. Ventral shield separated from anal plate by striated integument (Figure 7A & B). Gnathosoma 75 µm long and 50 µm wide (Figure 7C). Tibia I with two bipectinate setae (Figure 7D).

**Remarks.** The general morphological characteristics, habitat preferences and body sizes of the specimens reported here

agree with the previously given records by [Viets \(1939\)](#) and [Bartsch \(1986; 2009\)](#). *Rhombognathus parvulus* is similar to *R. peltatus*. But, two species are distinguished each other by long of carpite and comb structure on claws. In *R. parvulus*, carpite not conspicuously long while in *R. peltatus* carpite long. In *R. parvulus*, accessory process with teeth present, but no long claw comb while in *R. peltatus*, teeth of claw comb running along the concave side to base of the claw according to the [Bartsch \(1986\)](#).

**Habitat.** The species has been found in association with a variety of macroalgae ([Bartsch, 2009](#)).

**Distribution.** Mediterranean Sea ([Bartsch, 2009](#)).

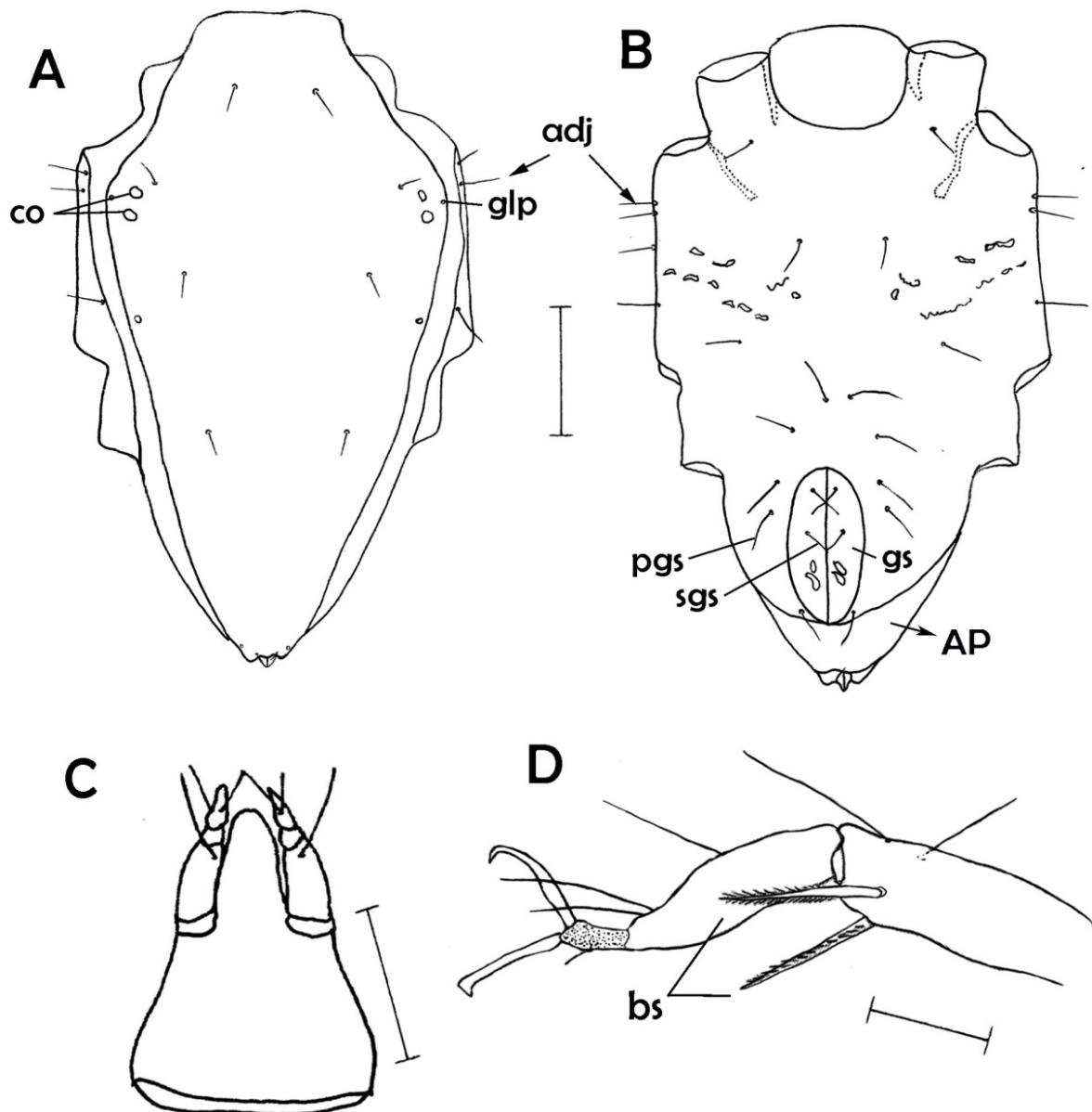


Figure 7. *Rhombognathus parvulus* Viets, 1939 (female): A. idiosoma, dorsal view; B. idiosoma, ventral view; C. gnathosoma, dorsal view; D. tarsus and tibia I, lateral view adj. adjunct seta; AP. anal plate; bs. bristle shaped setae; co. coxae; glp. gland pore; gs. genital sclerite; pgs. perigenital setae; sgs. subgenital setae) Scale bars: 50 µm

#### CONCLUSION

Six halacarid species belonging to five genera were found from various habitats of the Eastern Mediterranean, Levantine Sea of Turkey (Antalya and Mersin) in the present study. The genera *Camactognathus* and *Coloboceras* and the species of *Coloboceras drachi*, *Halacarus rismondoi* and *Rhombognathus parvulus* have not previously been recorded

from Levantine Sea of Turkey. The summary of my findings are contributed to an increase in the number and better knowledge of halacarid diversity. Knowledge about marine halacarid mites has increased considerably within the last few years. Further reports of new halacarid taxa from Turkey aimed to improve our knowledge in terms of their biodiversity and ecological remarks.

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