



New records of Harpacticoida (Crustacea, Copepoda) from a coastal system of northern Colombia

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Abstract. Ten species of harpacticoids are reported from Ciénaga Grande de Santa Marta, Magdalena, Colombia. Zooplankton samples were collected from the littoral zone with vegetation and from offshore zones. All the species were recorded in the vegetation-related area. Three of them, *Nitokra lacustris lacustris* (Shmankevich, 1875), *Parategastes caprinus* Wellershaus, 1970 and *Tisbella pulchella* (Wilson, 1932) are new to the Colombian harpacticoid fauna. Comparative morphological comments and illustrations of these species are also provided. This is the third report on the harpacticoid copepod fauna in this hydrological system.

Key words: Taxonomy, Neotropic, distribution, benthic organisms, Ciénaga

Resumen: Nuevos registros de Harpacticoida (Crustacea, Copepoda) de un sistema costero del Norte de Colombia. Se documenta la presencia de diez especies de harpacticoides en la Ciénaga Grande de Santa Marta, Magdalena, Colombia. Las muestras de zooplankton fueron colectadas en la zona litoral con vegetación y de la zona costera. Todas las especies fueron registradas en el área relacionada con la vegetación. Tres de ellas, *Nitokra lacustris lacustris* (Shmankevich, 1875), *Parategastes caprinus* Wellershaus, 1970 y *Tisbella pulchella* (Wilson, 1932) son nuevas para la fauna de harpacticoides de Colombia. El análisis taxonómico incluye comentarios morfológicos comparativos y fotografías digitales de estas especies. Este es el tercer reporte sobre la diversidad de la fauna de copépodos harpacticoides en este sistema hidrológico.

Palabras claves: Taxonomía, Neotrópico, distribución, organismos bentónicos, Ciénaga

Introduction

Harpacticoida is a primarily benthic order of the Copepoda. This order is one of the most important components of coastal epibenthic community and plays a key role in the energy transfer to the higher trophic levels (Danovaro *et al.* 2007). Harpacticoida is also the second most abundant taxon in the meiobenthos outnumbered only by the nematodes (Suárez-Morales *et al.* 2009). Their size ranges between 0.2 and 1 mm in length, and within Copepoda. Harpacticoids are the most abundant and frequent free-living copepod order in marine benthic ecosystems (Cunha-Sarmiento & Parreira-Santos 2012).

The marine and estuarine harpacticoids have been more intensely studied in México (Gómez & Fiers 1997, Morales-Serna & Gómez 2008, Suárez-Morales *et al.* 2009, Gutiérrez-Aguirre *et al.* 2011, Gómez & Morales-Serna 2013, 2014), Brazil (Cunha Sarmiento & Parreira Santos, 2012), the United States (Lang 1965, Fleeger 1980), Argentina (Pallares, 1970, Gómez & Gee, 2009) and Chile (George 1996, George & Schminke 1999, Mielke, 2000). The study of the biodiversity of the harpacticoid fauna from Colombia has been largely disregarded due to the scarcity of Colombian specialists. However, our knowledge on the diversity of this group from brackish and marine habitats has undergone constant progress during the last decades

(Michele & Foyo 1976, Campos & Plata 1990, Bernal & Zea 2000, Rendón *et al.* 2003, Fuentes-Reinés & Zoppi de Roa 2013a,b, Fuentes-Reinés & Gómez 2014, Fuentes-Reinés & Suárez-Morales 2014a,b, Suárez-Morales & Fuentes-Reinés 2015 a,b, Fuentes-Reinés *et al.* 2015, Gómez & Fuentes-Reinés 2017a,b, Gómez *et al.* 2017, Fuentes-Reinés & Suárez-Morales, 2017, Fuentes-Reinés *et al.* 2018).

This is the third taxonomical report of harpacticoid copepods from Ciénaga Grande de Santa Marta and it aims to improve our knowledge on the distribution of some harpacticoids species in the Neotropical region and Colombia. Additionally, I present complementary descriptions and illustrations of some remarkable taxa.

Material and Methods

Littoral plankton samples were taken from the inshore area covered by vegetation (mangrove) and from offshore zones at Ciénaga Grande de Santa Marta, Magdalena, Colombia (10°59'42.6"N; 74°15'25.4"W) during August to November 2017. Water samples were collected using a 25-l bucket at both littoral and limnetic habitats. Samples were filtered with a zooplankton net (mesh size = 45 µm) and preserved in 70% alcohol.

Harpacticoid copepods were sorted from all the samples, transferred to 70% ethanol and then processed for taxonomical identification including the examination whole specimens and dissection of selected appendages. Dissected appendages were

mounted in glycerine and sealed with Canada balsam. The specimens were measured in lateral position, from the anterior end of the rostrum to the posterior margin of the caudal rami. The identification of the species recorded herein followed Lang (1948), Gómez *et al.* (2004); Gómez 2005, Wells (2007) and Gómez & Gee (2009). Microphotographs of taxonomically relevant appendages were obtained taken using a Kodak Easy Share C140 digital camera adapted to a compound microscope.

Morphological remarks and complementary descriptions follow the terminology proposed by Huys & Boxshall (1991). The following abbreviations are used in the text: P1-P6, first to sixth swimming legs; EXP, exopod; ENP, endopod. The specimens examined were dissected and mounted in slides. Undissected specimens (ethanol-preserved) were deposited at the Museo de Colecciones Biológicas at the Universidad del Atlántico (UARC), Colombia, where they are available for consultation and/or further examination

Results

The taxonomic analysis of the harpacticoid copepods collected in the surveyed area resulted in the identification of ten species belonging to seven families and seven genera. All of them were recorded in the vegetation-related area and are new records for this coastal system and three of them have not been hitherto recorded from Colombia and South America (Table I).

Table I: General distribution of different species of Harpacticoida in Ciénaga Grande de Santa Marta. Geographic category: NT, (Neotropical), NA (Nearctic), C (Cosmopolitan), and OR (Oriental). Departments: Gu (La Guajira), Mg (Magdalena). * New records for the Magdalena department. ** New record for Colombia

Family	Species	Worldwide distribution	Distribution in Colombia
Ameiridae	<i>Nitokra lacustris lacustris</i> ***	C	Mg
	<i>Nitokra</i> * sp.	NT	Mg
	<i>Cletocamptus sinaloensis</i> *	NT	Mg
Canthocamptidae	<i>Cletocamptus nudus</i> *	NT	Mg, Gu
	<i>Cletocamptus samariensis</i> *	NT	Mg
Laophontidae	<i>Quinquelaophonte quinquespinosus</i> *	C	Mg, Gu
Miraciidae	<i>Schizopera knabeni</i> *	NT, NA	Mg, Gu
Metidae	<i>Metis holothuriae</i> *	C	Mg, Gu
Tegastidae	<i>Parategastes caprinus</i> **	OR	Mg
Tisbidae	<i>Tisbella pulchella</i> **	NT, NA	Mg

The family Canthocamptidae was the most diverse, it was represented by three species, followed by and Ameiridae with two species; the families Tisbidae, Tegastidae, Laophontidae and Metidae were represented by one species each. Among the 10 genera recorded, *Cletocamptus* Schmankevitsch, 1875 was the most speciose (3 species), followed by *Nitokra* Boeck, 1865 (2 species). The remaining genera were represented by one species each.

Family AMEIRIDAE Boeck, 1865

Subfamily Ameirinae Boeck, 1865

Genus *Nitokra* Boeck, 1865

Nitokra lacustris lacustris (Schmankevitsch, 1875)
(Figures 1-2)

Syn.: *Canthocamptus treforti* Daday, 1883, *Nitokra treforti* Chappuis, 1923, *Canthocamptus yahiai* Blanchard, 1891, *Nitokra yahiai* Sewell 1924, *Nitokra simplex* Schmeil, 1894, *Nitokra muelleri* Van Douwe, 1904, *Nitokra lacustris* f. *typical* Chappuis 1933 (Defaye and Dussart, 2011).

Material examined: 2 adult females (UARC1182)

Remarks: This species was originally described as *Transfuga lacustris* by Schmankevitsch, 1875 from Black Sea in Ukraine. It is considered a holeuryhalin and eurytherm species (Lang 1948).

Complementary description and remarks: Female body cylindrical (Figure 1A), body length ranging from 476 μm to 504 μm (mean, 490 μm ; $n = 2$). Antennal exopod one-segmented with three setae (Figure 1B). P1 ENP and EXP 3-segmented (Figure 1C); ENP1 reaching middle of EXP2. P2-P4 EXP 3-segmented (Figures 1D, 2A-B), distal segments with 7,7,7 setae and spines, respectively. P2-P3 ENP 3-segmented, distal segments bearing 3,5,5 setae and spines, respectively. P5 baseoendopod and EXP separated, endopodal lobe quadrangular reaching middle of EXP, with 5 setae, EXP with 6 setae, as long as wide (Figure 2C). Anal somite with a ventral semilunar structure (arrowed in Figure 2D), anal operculum with strong spinules (Figure 2E). Caudal rami about 1.3 times as long as wide (Figure 2E).

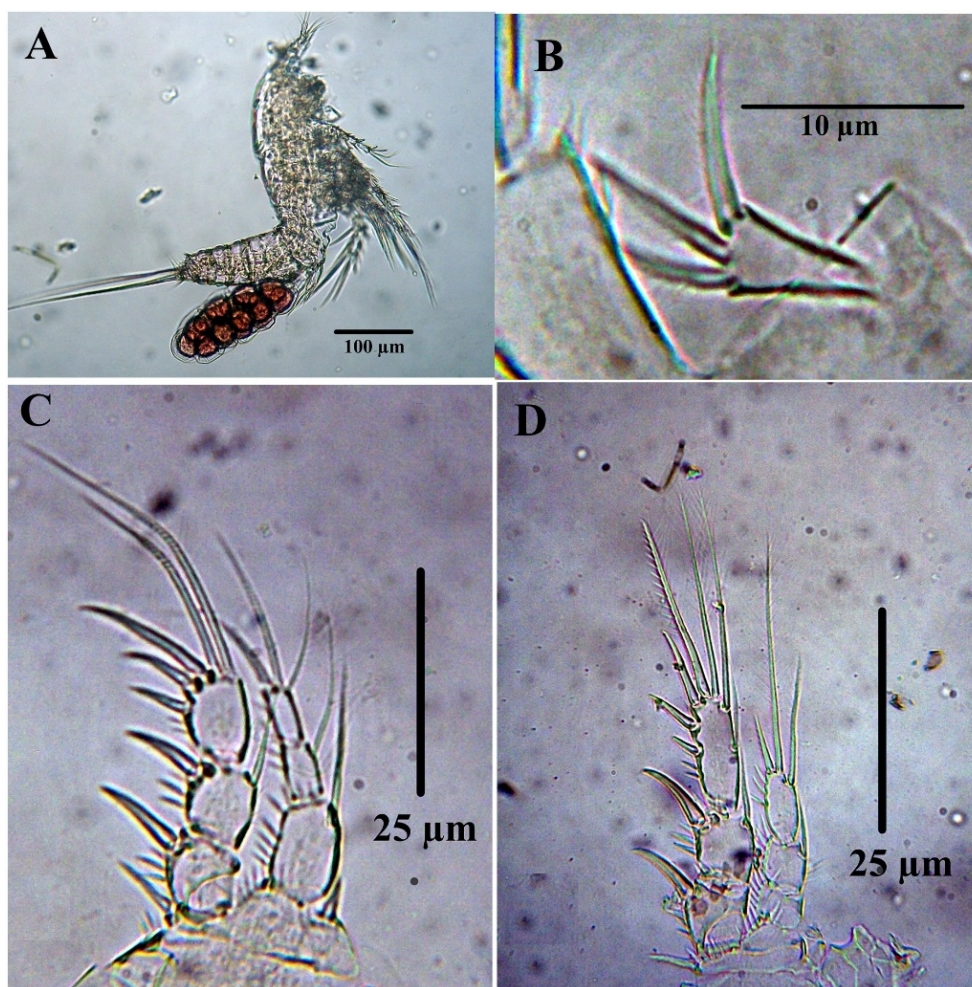


Figure 1. *Nitokra lacustris lacustris*. Female from Ciénaga Grande de Santa Marta, Colombia. A. Habitus. B. Antennal exopod. C. P1. D. P2.

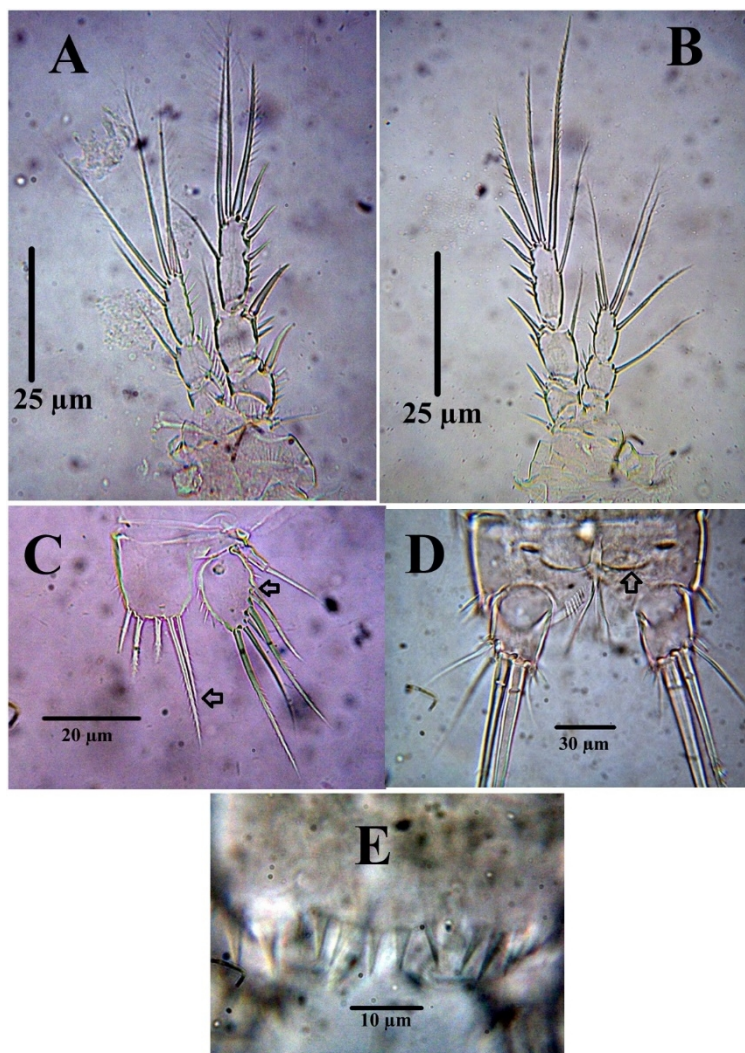


Figure 2. *Nitokra lacustris lacustris*. Female from Ciénaga Grande de Santa Marta, Colombia. A. P3. B. P4. C. P5. D. Anal somite and caudal rami, ventral. E. Anal operculum, dorsal.

Nitokra lacustris lacustris belongs to a group of species of the genus characterized by the presence of one inner, and five elements on P1EXP2 and EXP3, respectively. The material presented herein was identified as *N. lacustris lacustris* by its possession of the following distinctive characters: (1) P2ENP3 armed with only 2 setae and 1 spine; (2) P1ENP1 not elongated, shorter than EXP1 and EXP2 combined; (3) ENP1 of P2-P4 without inner seta (Wells, 2007).

According to Karanovic *et al.* (2015), six subspecific forms of *Nitokra lacustris* are known: *N. lacustris lacustris* (Shmankevich, 1875); *N. lacustris richardi* (Chappuis, 1933); *Nitokra lacustris sinoi* Marcus and Por, 1961; *Nitokra lacustris pacifica* Yeatman, 1983; *Nitokra lacustris azorica* Kunz, 1983 and *Nitokra lacustris colombianus* Reid, 1988. Of these, *N. lacustris sinoi*, *N. lacustris colombianus*

and *N. lacustris lacustris* are present in Colombia (Fuentes-Reinés & Zoppi de Roa 2013b, Fuentes-Reinés & Suárez-Morales 2014b, Reid 1988, present data) and they can be differentiated by: 1) P1ENP1 reaching the middle of EXP3 in *N. lacustris sinoi* (Marcus & Por 1961, Abb. 9, Suárez-Morales *et al.* 2009, fig. 73a, Fuentes-Reinés & Zoppi de Roa 2013b, fig. 2D, Fuentes-Reinés & Suárez-Morales 2014b, fig. 4B), but P1ENP1 comparatively shorter *N. lacustris lacustris* (Dussart 1967, fig 75-2, Chang 2010, fig. 33D, Jaber *et al.* 2011, fig. 3I, present data fig. 1C) and *N. lacustris colombianus* (Reid 1988, pag. 200), 2) outer seta of female P5ENP beyond the middle of outermost seta in *N. lacustris lacustris* (Lang 1948, Abb. 326-1 female P5, Suárez-Morales *et al.* 2009, fig. 74J, Chang 2010, fig. 33E, Jaber *et al.* 2011, fig. 3E, present data, fig. 2C) and *N. lacustris colombianus* (Reid 1988, pag. 200), but

outer seta of female P5ENP comparatively shorter in *N. lacustris sinoi* (Petkovski 1976, Abb. 11, Suárez-Morales *et al.* 2009, fig. 74a, Fuentes-Reinés & Zoppi de Roa 2013b, fig. 3B, Fuentes-Reinés & Suárez-Morales 2014b, fig. 4F), 3) caudal seta II about 2.2 as long as seta I in *N. lacustris colombianus* (Reid 1988, fig. 6b), but less 2 times as long as seta I in *N. lacustris lacustris* (Lang 1948 Abb. 326-1 dorsal Fu female, Chang 2010, fig. 33C, Jaber *et al.* 2011, fig. 3F, present data, fig. 7) and *N. lacustris sinoi* (Petkovski 1976, Abb. 1, Suárez-Morales *et al.* 2009, fig. 72a), 4) medial surface of caudal rami spinulose in *N. lacustris colombianus* (Reid 1988, fig. 6b), but medial surface smooth *N. lacustris lacustris* (Lang 1948, Abb. 326-1 dorsal and ventral female Fu, Chang 2010, fig. 33C, Jaber *et al.* 2011, fig. 3F, present data, fig. 2D) and *N. lacustris sinoi* (Petkovski 1976, Abb. 1,2, 12), 5) paired semicircular ventral structures on the anal somite in *N. lacustris lacustris* (Lang 1948, Abb. 1, ventral Fu female, Chang 2010, fig. 33C, present data, fig. 2D), but such structures absent in *N. lacustris sinoi* (Petkovski 1976, Abb. 2, Suárez-Morales *et al.* 2009, fig. 72a, Fuentes-Reinés & Zoppi de Roa 2013b, fig. 3D) and *N. lacustris colombianus* (Reid 1988, fig. 6b).

Intraspecific variability is common in some species of the genus. For example the anal operculum of *N. taylory* bears 3, 4 or 5 spines (Gómez *et al.* 2012, Fuentes-Reinés & Suárez-Morales 2014b), P1ENP1 of *N. l. sinoi* extends to approximately the middle of P1EXP3 in populations from Mexico and Colombia, but it reaches the end of P1EXP2 in specimens from Cuba. Similarly, the relative length ratio of the female P1EXP1-2/P1ENP1 in *N. lacustris lacustris* is 1.4 in the Colombian population, but 1.3 in the populations from France (Dussart 1967, fig. 75-2P1) and Syria (Jaber *et al.* 2011, fig. 3I), and 1.59 in the population from Korea (Chang 2010, fig. 33D). Also, the length/width ratio of the female P5ENP is about 1.4 in the Colombian population (present data, fig. 2C), but about 1.33 in the Mexican material (Suárez-Morales *et al.* 2009, fig. 74j), 2.5 in the population from Syria (Jaber *et al.* 2011, fig. 3E), 1.95 in the material from the United Kingdom (Dussart 1967, fig. 75-2P5), 1.91 in the specimens from Korea (Chang 2010, fig. 33E), and 1.45 in the Ukrainian material (Lang 1948, Abb. 326-1 female P5). The anal operculum is also variable. The Colombian (present data, fig 2E) and Korean specimens (Chang 2010, fig. 33B) bear 6-7 spinules, the material from Syria (Jaber *et al.* 2011, fig 3F) and Ukraine (Lang

1948, Abb. 326-1 dorsal Fu) bear nine spinules, and the French specimens bear 8 spinules (Dussart 1967, fig. 75-2 ventral Fu).

Distribution: This is a very widespread species. It has been recorded from different geographic regions, including the Palaearctic (Jaber *et al.* 2011, Chang 2010), the Neotropical (Suárez-Morales *et al.* 2009), the Oriental (Sewell 1924) and the Afrotropical (Blanchard 2011), regions. This is the first record in Colombia and South America, expanding its distributional range.

An additional, undetermined specimen of this genus was found in the samples, and probably represents an undescribed taxon.

Family CANTHOCAMPTIDAE Brady, 1880
incertae sedis (Por 1986)

Genus *Cletocamptus* Schmankevitch, 1875

Cletocamptus sinaloensis Gómez, Fleeger, Rocha-Olivares and Foltz, 2004 (Figs. 3-5).

Material examined: 3 adult females and 2 adults male (UARC1175, UARC1177).

Remarks: The studied specimens fully agree with the descriptions by Gómez *et al.* (2004), Gómez (2005) and Fuentes-Reinés *et al.* (2018).

Complementary description and remarks: Female. Habitus as in figure 3A. Body length ranged from 630 μm to 700 μm ($n = 3$). Antennule six-segmented.

Male: (Fig. 4) Habitus as in figure 5B. Body length 574 μm ($n = 2$). Antennule six-segmented, subchirocer, fourth segment swollen, last segment with two acute teeth (Figure 5C). Caudal rami as in female (Figure 5D). Anal operculum distally naked and proximally with fine spinules (arrowed in Fig. 5E). P1 (Figure 6A) as in female except for dimorphic projection on inner distal corner of basis. P2 (Figure 6B) and P4 (Figure 6D) as in the female, except for relatively stouter outer spines in the male exopod, and relatively shorter apical setae on the second endopodal segment. P3 EXP as in female except for relatively stouter outer spines. ENP three-segmented, first segment unarmed, second segment with inner distal apophysis reaching beyond third endopodal segment, third segment with two apical setae (Figure 6C). P5 EXP and baseoendopod fused, EXP and endopodal lobe separated by a deep notch, EXP and endopodal lobe with four and three setae respectively (Figure 5F).

The material presented herein was identified with *Cletocamptus sinaloensis* on account of the following combination of characters: 1) antennal exopod one-segmented with three setae (Figure 3C),

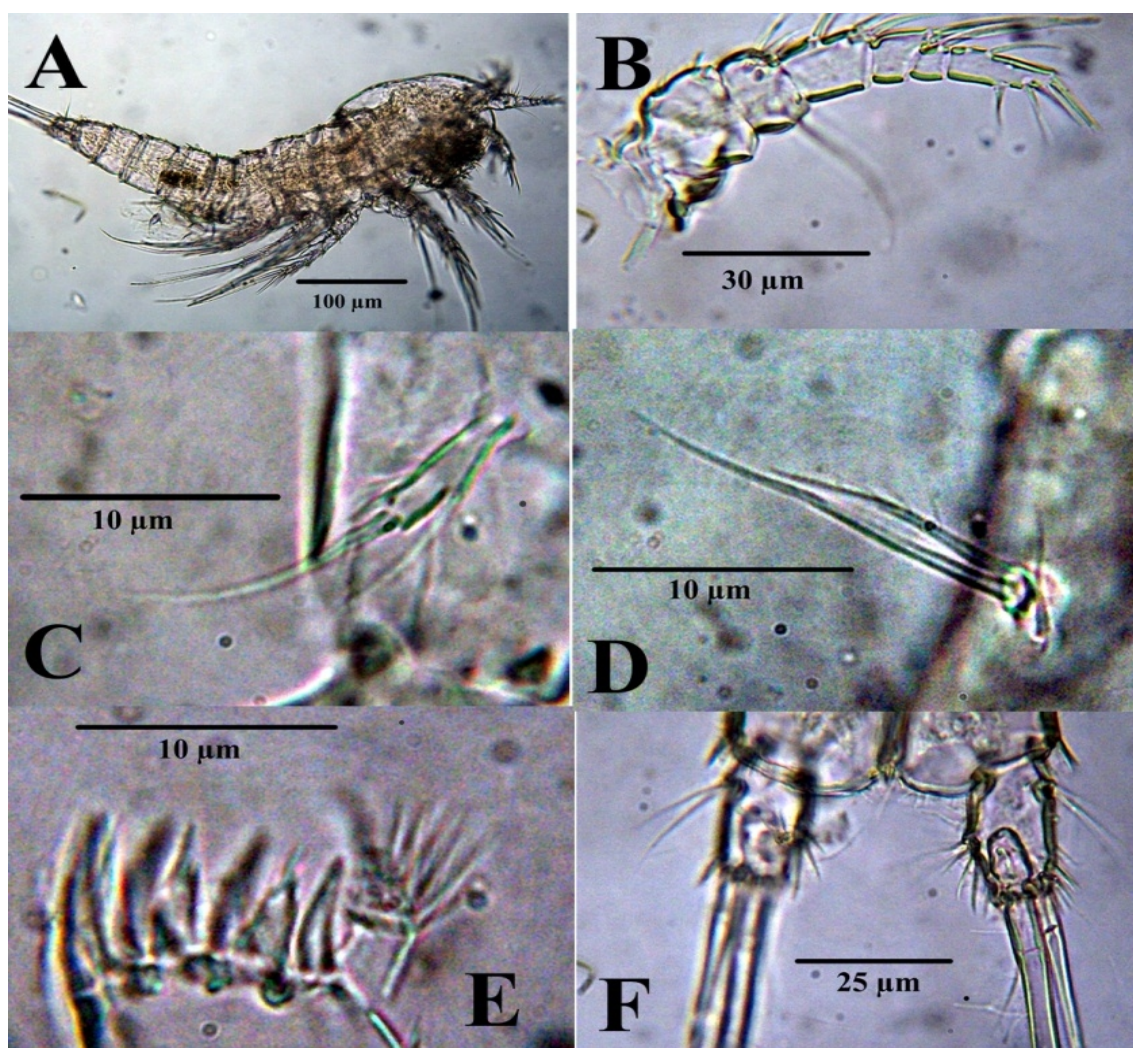


Figure 3. *Cletocamptus sinaloensis*. Female from Ciénaga Grande de Santa Marta, Colombia. A. Habitus. B. Antennule. C. Antennal exopod. D. Mandibular palp. E. Arthrite of maxillule. F. Caudal rami

2) mandibular palp with two elements plus an accompanying seta (Figure 3D), 3) lateral seta on arthrite of maxillule spinulose and very strong (Figure 3E), 4) caudal rami about 1.3-1.5 times as long as wide (Figure 3F), 5) caudal setae IV and V separated, not fused (Figure 3F), 6) female P2-P4 EXP3 and ENP2 with 5-5-4 and 3-3-2 elements respectively (Figures 4A-C), 7) female and male P5EXP and ENP separated by a deep notch (Figures 4D, 5F), male P5EXP with 4 setae (Figures 5F), 8) female anal operculum with two rows of strong spinules (Figure 5A).

The specimens from Colombia agree with descriptions by Gómez *et al.* (2004) and Gómez (2005). However, some subtle differences were observed in Colombian male specimens: 1) the inner spine on ENP2 is thick in the Mexican and Brazilian populations (Gómez *et al.* 2004, fig 32B, Gómez

2005, fig. 12C), but it is comparatively thinner in the Colombian specimen (present data, fig 6B), 2) the anal operculum bears fine and small spinules proximally, and is naked distally in Colombian specimens (present data, fig 5E), whereas the Mexican population possesses large spinules proximally and distally (Gómez *et al.* 2004, fig 29C), and is naked distally but with few large spinules proximally in the Brazilian population (Gómez 2005, fig. 11A).

Variability observed in the material presented herein. The left and right P4EXP1 of one male possesses three and seven spinules on the ventral surface, respectively.

Distribution: Mexico (Gómez *et al.* 2004), Brazil (Gómez 2005) and Colombia (Fuentes-Reinés *et al.* 2018).

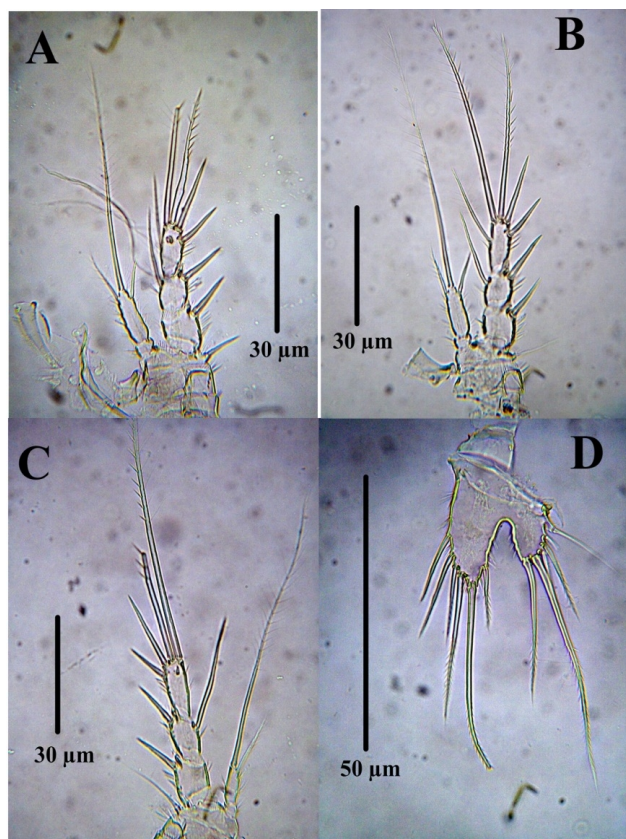


Figure 4. *Cletocamptus sinaloensis*. Female from Ciénaga Grande de Santa Marta, Colombia. A. P2. B. P3. C. P4. D. P5.

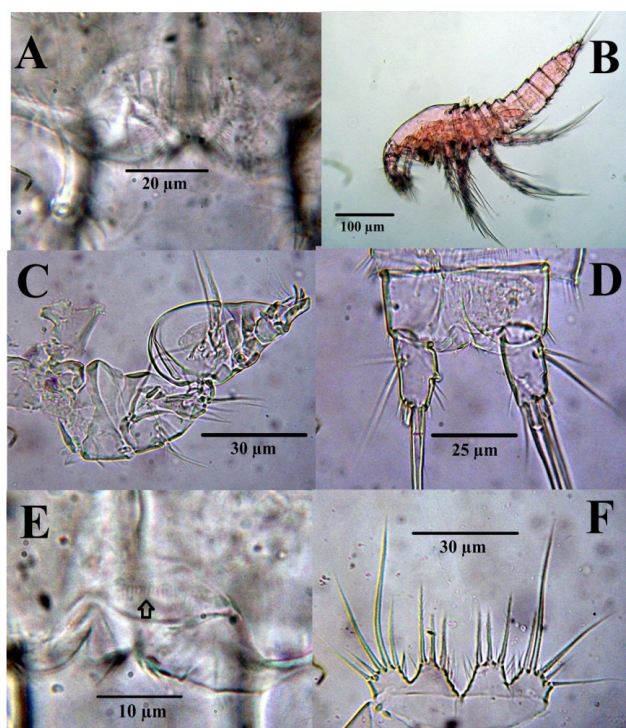


Figure 5. *Cletocamptus sinaloensis*. Female from Ciénaga Grande de Santa Marta, Colombia. A. Anal operculum, dorsal. B-F. Male. B. Habitus. C. Antennule. D. Anal somite and caudal rami, ventral view. E. Anal operculum, dorsal. F. P5

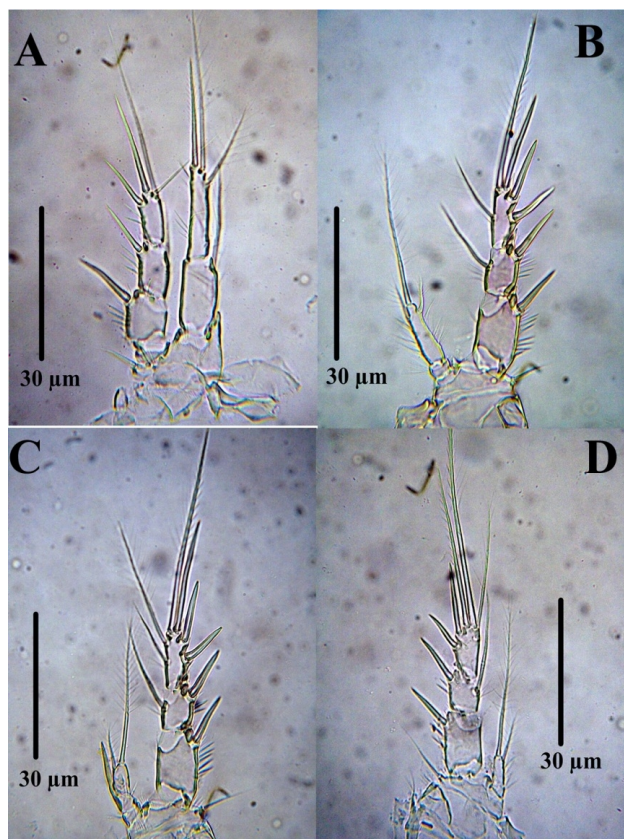


Figure 6. *Cletocamptus sinaloensis*. Male from Ciénaga Grande de Santa Marta, Colombia. A. P1. B. P2. C. P3. D. P4.

***Cletocamptus nudus* Gómez, 2005**

Material examined: 6 undissected adult females and 2 undissected adult males (UARC1176)

Remarks: The specimens from Ciénaga Grande de Santa Marta agree with the descriptions by Gómez (2005) and Fuentes-Reinés *et al.* (2015). The female of this species was originally described by Gómez (2005) from Brazil and the male by Fuentes-Reinés *et al.* (2015) from Colombia. This was the most abundant *Cletocamptus* species and was found within the roots of mangrove.

Distribution: It is a Neotropical species. It is known from Brazil (Gómez 2005) and Colombia (Fuentes-Reinés & Suárez-Morales 2014, Fuentes-Reinés *et al.* 2015). In the latter has been reported in the Guajira and Magdalena departments (Fuentes-Reinés & Suárez-Morales 2014b, Fuentes-Reinés *et al.* 2015)

***Cletocamptus samariensis* Fuentes-Reinés, Zoppi de Roa & Torres, 2015.**

Material examined: 2 adult females (UARC1178).

Remarks: It was the less abundant of the species of *Cletocamptus*. This species seems to be endemic to the Neotropical Region.

Distribution: Hitherto, this species has been recorded in Colombia (Fuentes-Reinés *et al.* 2015).

Family MIRACIIDAE Dana, 1846

Genus *Schizopera* Sars, 1905

Schizopera knabeni Lang, 1965 (Figs. 7-8).

Material examined: 2 adult females (UARC1183).

The studied specimens fully agreed with Lang (1965), Gómez & Vargas-Arriaga (2008), and Fuentes-Reinés & Suárez-Morales (2014b).

Complementary description: Habitus as in figure 7A. Body length, 518 μm ($n = 2$). Antennule with 8 segments (Figure 7B).

The Colombian material reported here was identified with *S. knabeni* by the unique combination of the following characters: 1) antennal exopod two-segmented, with one and two setae on the first and second segment, respectively (Figure 7C), 2) anal operculum bare (Figure 7D), 3) caudal rami about 1.5 times as long as wide, with inner setules (Figure 7E), 4) P1-P4 EXP and ENP three-segmented (Figures 8A-D), 5) P1-P4EXP3 and P1-P4ENP3 with 4,4,4,4 and 3,4,4,3 setae, respectively (Figures 8A-D), 6) P2-P4EXP3 with 2,2,2 outer spines (Figures 8B-D), 7) length ratio of ENP1/EXP about 1-1.1 (Figure 8A), 8) P5EXP with six setae (Figure 7F).

The Mexican and North American populations are similar to those from Colombia. Nevertheless, small differences were observed in the length/width ratio of the caudal rami, being 1.3 in material from Mexico (Gómez & Vargas-Arriaga 2008, figs 2A-D) and U.S.A. (Lang 1965, fig. 182a), but 1.5 in the Colombian population (Fuentes-Reinés & Suárez-Morales 2014b, fig 18C, present data fig. 7E).

This species can be easily confused with *S. clandestina* s. str. (*sensu* Noodt 1953). However, they can be distinguished by the relative length of P1ENP/EXP. P1ENP1 is visibly longer or extends only to approximately the middle of Exp-3 than P1EXP in *S. clandestina* (Wells 2007), but both rami are subequal in length in *S. knabeni* P1ENP1 (Gómez & Vargas-Arriaga 2008, Fuentes-Reinés & Suárez-Morales 2014b, present data, fig. 8A)

Distribution: It has been reported from Nearctic (Lang 1965) and Neotropical regions (Gómez & Vargas-Arriaga 2008, Suárez-Morales *et al.* 2009). In Colombia it has been recorded in La Guajira department (Fuentes-Reinés & Suárez-Morales 2014b). This is the first record for Magdalena department expanding its distributional range.

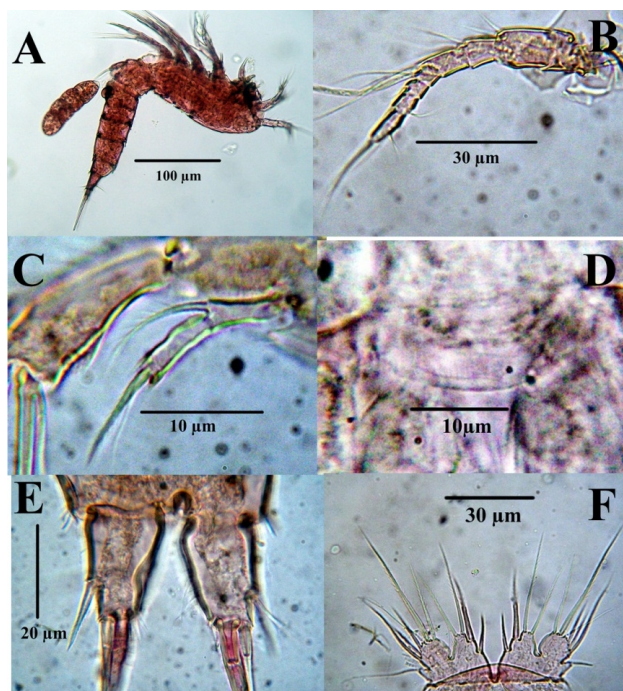


Figure 7. *Schizopera knabeni*. Female from Ciénaga Grande de Santa Marta, Colombia. A. Habitus. B. Antennule. C. Antennal exopod. D. Anal operculum, dorsal. E. Caudal rami, dorsal view. F. P5

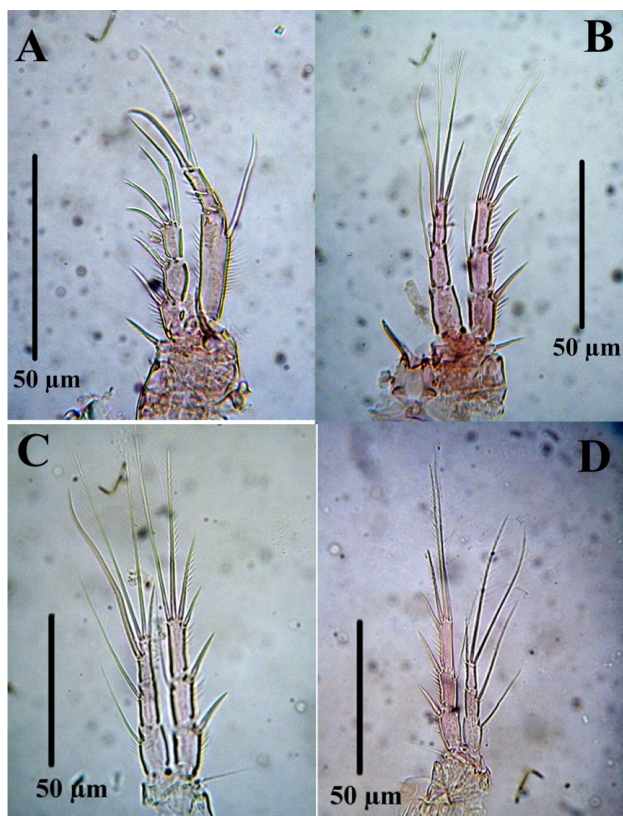


Figure 8. *Schizopera knabeni*. Female from Ciénaga Grande de Santa Marta, Colombia. A. P1. B. P2. C. P3. D. P4

Family TISBIDAE Stebbing, 1910.

Genus *Tisbella* Gurney 1927

Tisbella pulchella (Wilson, 1932) (Figs. 9-11)

Material examined: 6 adult females (UARC1184).

Syn.: *Chappaquiddicka pulchella* Wilson, 1932

(Lang, 1948: 401); *Tisbella timsae* sensu Willey, 1930 (Lang 1948: 402).

Complementary description and remarks: Body fusiform, tapering posteriorly (Figure 9A). Body length: 812 – 910 μm (mean, 851; $n = 6$). Labrum rather prominent, tapering distally, terminal edge with eight strong denticles and fine setules laterally (Figure 9B). Urosome (Figure 9C) with four segments, second and third urosomite fused. Caudal rami about 1.5 times as long as wide (Figure 9D). Antennule seven segmented, third segment longest (Figure 9E). Antennal exopod three-segmented, first and second segment with one seta, third segment with three elements (Figure 9F). P1 EXP three segmented and ENP two segmented, first and second exopodal segment with inner seta, third exopodal segment with six elements. ENP1 with inner seta, ENP2 with four elements (Figure 10A). P2-P4 EXP and ENP three segmented (Figure 10B-D). First and second exopodal segment of P2-P4 with inner seta, third exopodal segment of P2-P4 with 7,8,8 elements, respectively. First and second endopodal segment of P2-P4 with one and two inner setae respectively, third endopodal segment of P2-P4 with 5,6,5 elements, respectively. P5 endopodal lobe (Figure 11A) with 1 inner, small, bare seta, and 1 long pinnate element. Exopod with five elements in all. P6 (Figure 11B) with two inner long setae and one small element.

Remarks: This species was collected in the mangrove zone. Only four species of the genus *Tisbella* has been described so far (Volkmann, 1979, Wells, 2007): *T. timsae* (Guerney, 1927) from Egypt, *T. pulchella* (Wilson, 1932) from Massachusetts and Bermuda island, *T. rosea* (Volkmann, 1979) from Bermuda Island, and *T. alba* (Volkmann, 1979) from Bermuda Island and Florida. The Colombian material agrees with the redescription of the species given by Morales-Serna & Gómez (2008). *Tisbella pulchella* can be differentiated from its congeners by the antennal exopod (three-segmented in *T. pulchella*, but four-segmented in the rest of the species of *Tisbella*).

Distribution: This species was recorded in Bermuda Island as *T. timsae* (Willey 1930) but was originally described from the Woods Hole regions (Massachusetts) by Wilson 1932 as *Chappaquiddicka pulchella*, since then, *T. pulchella*

has only been reported in Mexico (Serna-Morales & Gómez, 2008) and Colombia (present study). This is the first record of *T. pulchella* in South America.

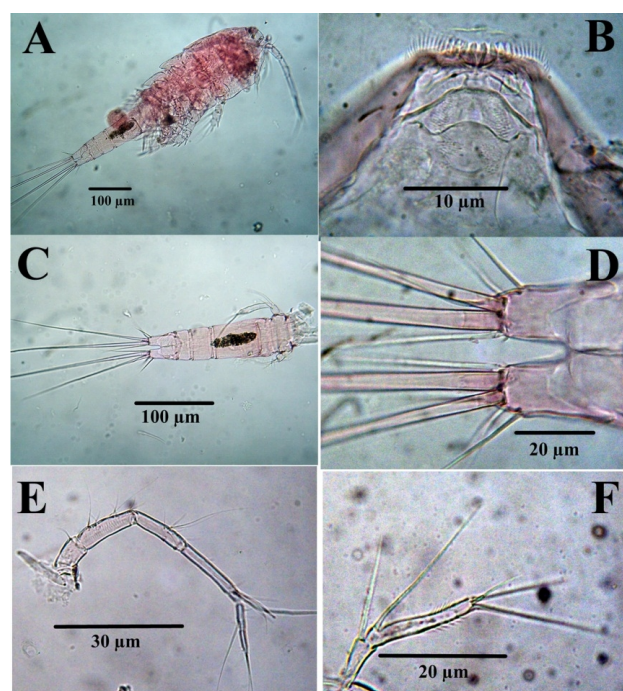


Figure 9. *Tisbella pulchella*. Female from Ciénaga Grande de Santa Marta, Colombia. A. Habitus. B. Labrum. C. Urosome. D. Caudal rami, dorsal view. E. Antennule. F. Antennal exopod.

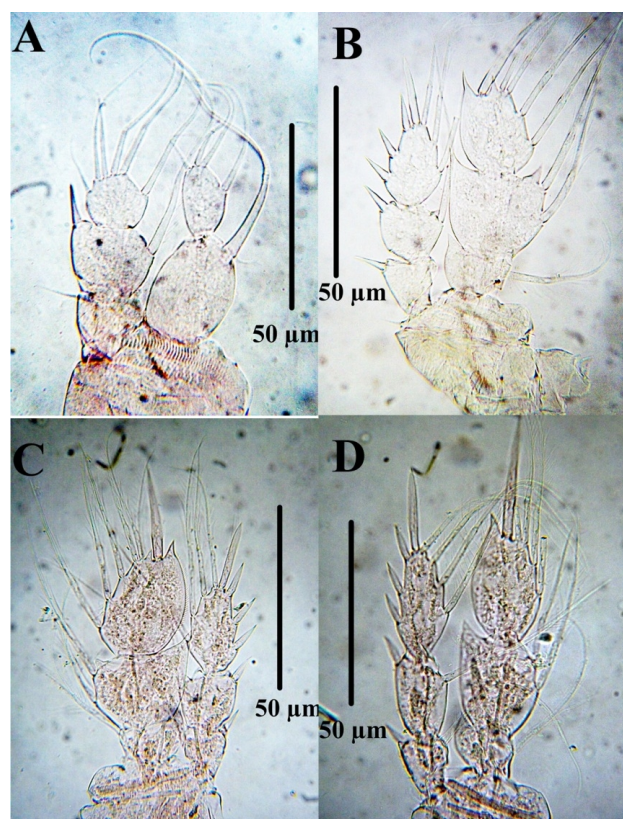


Figure 10 (previous page). *Tisbella pulchella*. Female from Ciénaga Grande de Santa Marta, Colombia. A. P1. B. P2. C. P3. D. P4.

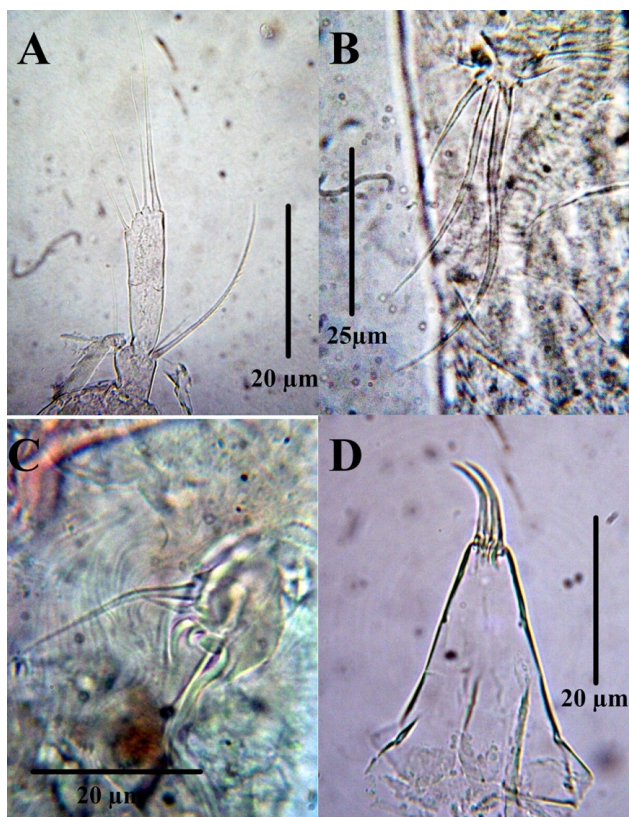


Figure 11. *Tisbella pulchella*. Female from Ciénaga Grande de Santa Marta, Colombia. A. P5. B. P6. C. *Quinquelaophonte quinquespinosa*, Female. C. P6. D. *Metis holothuriae*, Female. D. Rostrum.

Family LAOPHONTIDAE T. Scott, 1905
Genus *Quinquelaophonte* Wells, Hicks & Coull, 1982

Quinquelaophonte quinquespinosa (Sewell, 1924)
(Fig. 11C)

Material examined: Ten adult females and four adult males (UARC1180).

Remarks: *Quinquelaophonte quinquespinosa* was originally described by Sewell (1924) from Chilka Lake (India). Specimens from Ciénaga Grande de Santa Marta-Colombia agree with previous descriptions by Gómez & Morales-Serna (2013), and Fuentes-Reinés & Suárez-Morales (2014b). Nevertheless two setae were observed in the female P6 in the Colombian population (present study, Figure 11C), and one seta was observed in the Mexican population (Gómez & Morales-Serna, 2013, fig 4A). Unfortunately, Fuentes-Reinés & Suárez-Morales 2014b did not illustrate the female P6.

Distribution: It is regarded a cosmopolitan species (Gómez and Morales-Serna, 2013).

Family METIDAE Boeck, 1873

Genus *Metis* Philippi, 1843

Metis holothuriae (Edwards, 1891) (fig. 11D)

Syn.: See Tanaka and Soo (1965).

Material examined: Thirty adult females (UARC1181).

Remarks: This was the most abundant species. It was originally described as *Abacola holothuriae* by Edwards in 1891. This species can be easily separated from its congeners by the 2 apical spiniform processes on the rostrum (Figure 11D). Its ample intraspecific variability (Wells 2007) suggests a species complex which deserves further study.

Distribution: It is considered as a cosmopolitan species (Boxshall & Halsey 2004).

Family TEGASTIDAE Sars, 1904

Genus *Parategastes* Sars, 1904

Parategastes caprinus Wellershaus, 1970 (figures. 12-15)

Material examined: Four adult females and three adult males (UARC1173-UARC1174).

Complementary description and remarks: Female. The specimens examined bear the diagnostic features of *P. caprinus* as described by Wellershaus (1970). Body length, excluding caudal setae, ranging from 400 to 420 µm (mean, 410 µm; n = 4). Habitus in ventral position as in figure 12A. Body curled forward both anteriorly and posteriorly. Caudal rami as long as wide. Rostrum ventro-laterally pointed (Figure 12B). Antenna 4-segmented (Figure 12C), comprising coxa, basis and 2-segmented endopod. Coxa without ornamentation. EXP 1-segmented bearing 3 distal setae (Figure 12D). ENP1 with a subdistal seta, ENP with 8 setae (two lateral and six apical elements). Antennule 7-segmented (Figure 12E); aesthetasc on fourth and seventh segments, with setal formula 1(1)-2(10)-3(7)-4(3+ae)-5(5)-6(2)-7(6+ae). Mandible (Figure 12F) gnathobase with four teeth. Coxa-basis with row of long spinules and with two setae; endopod 1-segment with two setae; exopod represented by one seta. Maxillule (Figure 13A). Prae-coxal arthrite bearing six elements. Coxal endite with one seta. Endopod elongated with a row of spinules, four terminal setae, and two setae at outer margin. Maxilla (Figure 13B). Syncoxa with transverse row of spinules proximo-laterally and with two endites. Prae-coxal endite with four setae (Figure 13C), the distal one

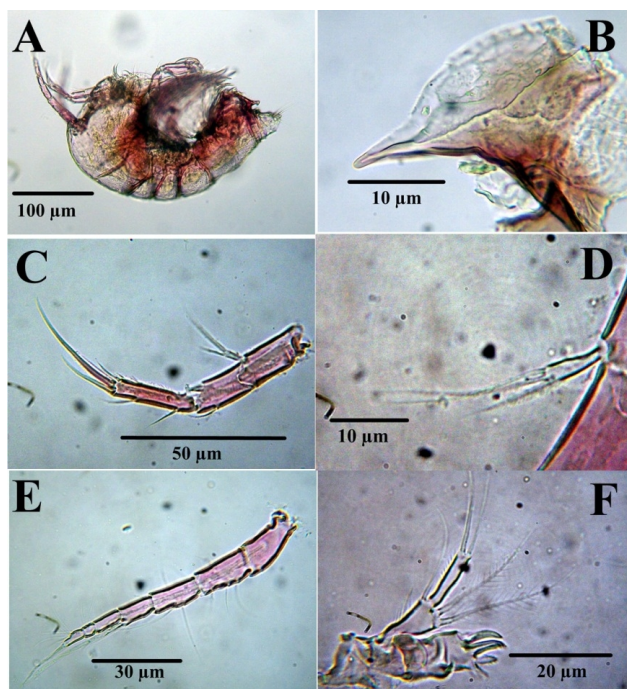


Figure 12. *Parategastes caprinus*. Female from Ciénaga Grande de Santa Marta, Colombia. A. Habitus. B. Rostrum. C. Antenna. D. Antennal exopod. E. Antennule. F. Mandible.

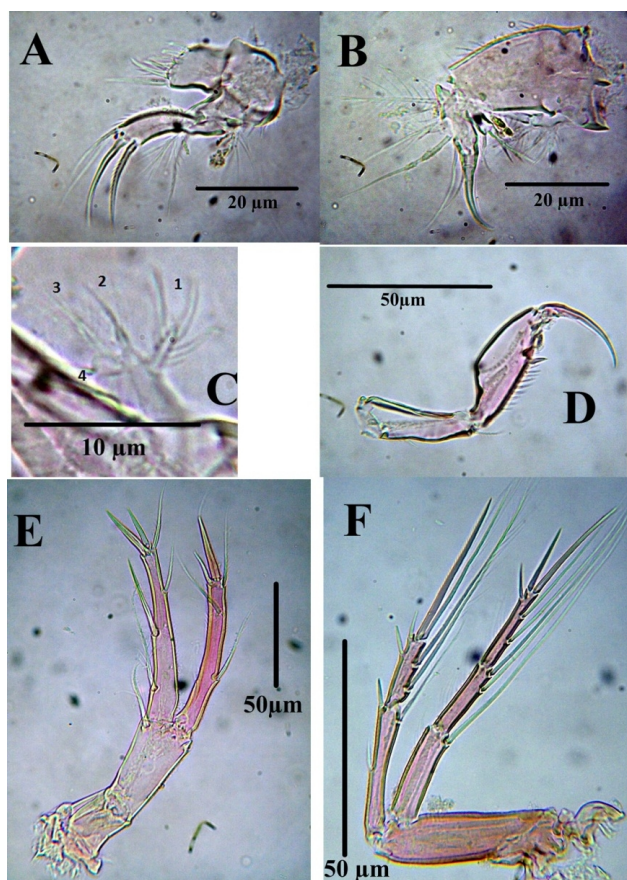


Figure 13. *Parategastes caprinus*. Female from Ciénaga Grande de Santa Marta, Colombia. A. Maxillule. B. Maxilla. C. Idem, precoxal endite. D. Maxilliped. E. P1. F. P2.

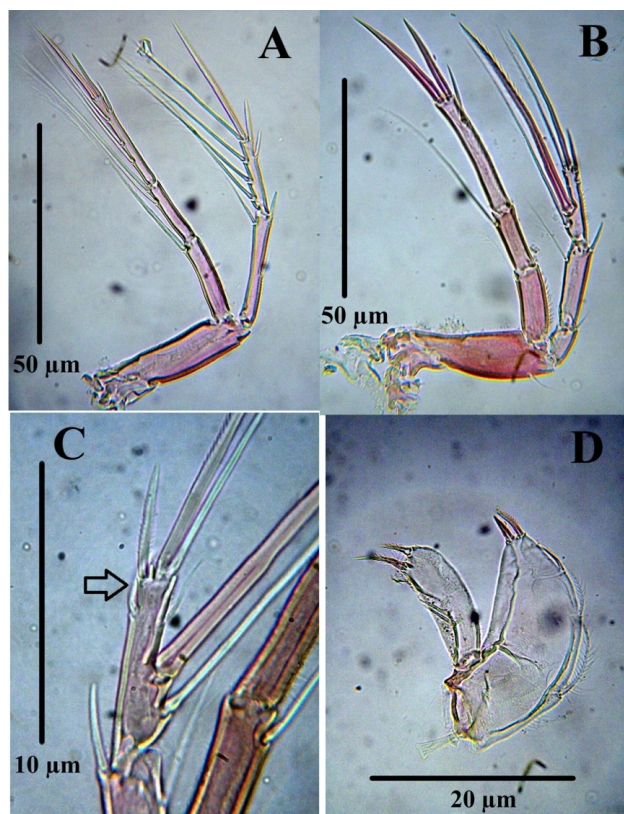


Figure 14. *Parategastes caprinus*. Female from Ciénaga Grande de Santa Marta, Colombia. A. P3. B. P4. C. P4EXP3 showing the spiniform element. D. P5

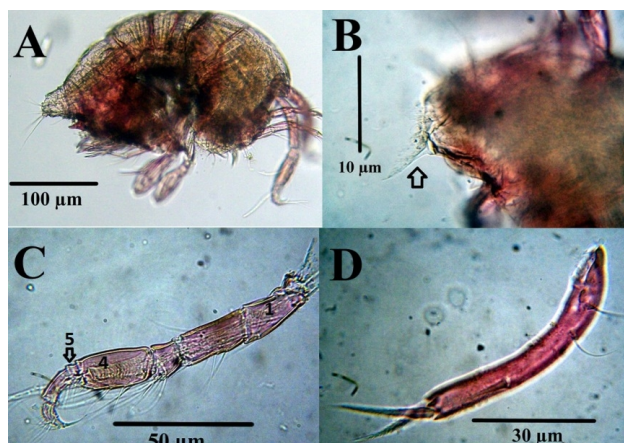


Figure 15. *Parategastes caprinus*. Male from Ciénaga Grande de Santa Marta, Colombia. A. Habitus. B. Rostrum. C. Antennule. D. P5

elongated and plumose; coxal endite with two setae. Allobasis with a strong claw and five setae, of which three outer setae representing endopod. Maxilliped (Figure 13D) subchelate, 2-segmented, comprising syncoxa and basis. Syncoxa with one pinnate seta at the inner distal corner. Basis with row of spinules, one pad-like process ornamented with short spinules on its surface. Endopod 1-segmented, forming a strong claw with one seta proximally. P1 EXP and

ENP 1-segmented (Figure 13E). EXP and ENP with 5 and 6 setae, respectively. EXP shorter than ENP: ENP: EXP length ratio about 1.1. Proximal inner seta of ENP1 about 0.7 times as long as the segment. P2 EXP 2-segmented. EXP1 with inner seta, EXP2 with 6 elements in all. ENP 3-segmented. ENP1 with inner seta, ENP2 with 2 setae, ENP3 with 5 setae (Figure 13F). P3 as in P2 except for EXP2 with 7 elements in all and ENP3 with 6 elements (Figure 14A). P4 EXP and ENP 3-segmented (Figure 14B). EXP1 without inner seta, EXP2 with 1 inner seta, EXP3 with 7 elements in all, the outer element rudimentary (arrowed in Figure 14C). ENP1 and ENP2 with one inner seta respectively; ENP3 with 3 elements in all. P5 (Figure 14D). Baseoendopod with three lateral plumose setae, and two apical spines. Exopod with two lateral setae and two apical spinulose spines, with one small seta at its base. *Male*: Habitus similar to female (Figure 15A). Body length, excluding caudal setae ranging from 400 to 420 μm (mean, 410 μm ; $n = 4$). Caudal rami as in female. Rostrum quadrangular, with an anterior seta (arrowed in Figure 15B). Antennule 7-segmented (Figure 15C), aesthetasc on third, fourth and eight segments. Armature formula 1(1)-2(9)-3(7 + ae)-4(9 + ae)-5(1)-6(2)-7(8+ae). Antenna, mandible, maxillule, maxilla, maxilliped, P1-P4 (not shown) as in female. P5 (Figure 15D) two-segmented, the first segment with one seta, second segment with a proximal seta, and one middle and two apical spines.

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