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A glimpse into a remarkable unknown diversity of oniscideans along the Caribbean coasts revealed on a tiny island

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[12] urn:lsid:zoobank.org:author:02E80644-C566-4F32-98F1-0051A90CAB26

Abstract. In this study, we report the results of a taxonomic survey of terrestrial isopods from Isla Grande, a ca 2 km^2 island located in the north of Cartagena de Indias, Colombia. We found a total of 17 species belonging to nine families and 10 genera. Eight of these species have been reported only from the Caribbean region, nine are recorded for the first time in Colombia, and three are new to science and described here: *Tylos negroi* López-Orozco, Carpio-Díaz & Campos-Filho sp. nov., *Stenoniscus nestori* López-Orozco, Taiti & Campos-Filho sp. nov. and *Armadilloniscus luisi* Carpio-Díaz, Taiti & Campos-Filho sp. nov. Our revision also determined that the genus *Microphiloscia* is a junior synonym of *Halophiloscia*; and moreover, *Halophiloscia trichoniscoides* comb. nov. is redescribed. We also provide illustrations for *Armadilloniscus caraibicus* and *Armadilloniscus ninae*. Most (16) of the species were found in coastal habitats (i.e., beaches, coastal lagoons and mangroves), whereas the tropical dry forest harbored only two species. Molecular phylogenetic inferences supported the presence of three species of *Tylos* in Isla Grande (i.e., one new species and a new lineage within each of two known species). Our work on *Tylos* highlights the importance of combining taxonomic and molecular analyses to support taxonomic decisions and uncover cryptic diversity. Due to the multiple threats to Caribbean coastal habitats, taxonomic and molecular genetic research are urgently needed to understand biodiversity patterns of oniscideans in the Caribbean, which will inform strategies for their protection. Such studies will also contribute to our knowledge of their evolution, ecology, and potential uses, as well as the factors that have shaped the remarkable Caribbean biodiversity.

Keywords. Caribbean Islands, mangroves, Tropical Dry Forest, terrestrial isopods.

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Introduction

Terrestrial isopods (Oniscidea Latreille, 1802) constitute one of the most diverse groups within Isopoda Latreille, 1817, including more than 3800 species in 38 families and more than 500 genera (Schmalfuss 2003; Javidkar *et al.* 2015, 2017; Sfenthourakis & Taiti 2015). They appear to form a monophyletic group, with the exception of the predominantly marine supralittoral genus *Ligia* Fabricius, 1798, which, according to recent molecular phylogenetic analyses, seems to be more closely related to marine isopods (Lins *et al.* 2017; Dimitriou *et al.* 2019). Pending a taxonomic revision, however, in this study we treat *Ligia* as being within the Oniscidea. Oniscideans are distributed in almost all terrestrial habitats, from the marine supralittoral to high mountain ranges, and from tropical forest to deserts, being absent in polar regions (Warburg 1993; Schmalfuss 2003; Sfenthourakis *et al.* 2020; WoRMS 2020a). A very large number of oniscideans remains to be discovered, but the taxonomic impediment is still a major cause of the delay in the recognition of this fauna (Ebach *et al.* 2011; Campos-Filho *et al.* 2014, 2020; Coleman 2015). Recent molecular studies have uncovered high levels of cryptic diversity within nominal species of marine coastal oniscideans that were considered broad-ranging, but that instead encompass many genetically highly differentiated lineages, each with relatively small ranges (Hurtado *et al.* 2010, 2013, 2014, 2018; Eberl *et al.* 2013; Santamaria *et al.* 2013, 2014). Their high potential for diversification stresses the importance of continuing taxonomic and systematic studies of oniscideans in coastal habitats, to better recognize their patterns of diversity, which, in turn, will serve as the foundation for understanding aspects of their ecology, evolution and potential uses (Hurtado *et al.* 2014; García-Hernández *et al.* 2015; Mattos *et al.* 2018). In addition, coastal habitats are under high pressure from sea level rise, pollution, and habitat destruction and modification (e.g., Guarderas *et al.* 2008; Lorde *et al.* 2013). Thus, it is urgent to identify the diversity of coastal oniscideans to better design conservation strategies, which can in turn benefit other species in this environment (Hurtado *et al.* 2010, 2013; Santamaria *et al.* 2013).

The Caribbean region is considered a natural laboratory for research on biodiversity evolution. A complex geological history, along with other factors, has contributed to a remarkable diversity of marine and terrestrial organisms, the highest in the Atlantic Basin (Myers *et al.* 2000; Roberts *et al.* 2002; Brummitt & Lughadha 2003; Kerswell 2006; Ricklefs & Bermingham 2008; Miloslavich *et al.* 2010). Although oniscideans have long been considered a group that can be highly informative on Caribbean biogeography (Rosen 1975), they have been poorly studied in this region. Two recent molecular phylogenetic studies showed a high level of diversification of coastal oniscideans in this region. Santamaria *et al.* (2014) identified a phylogenetic clade of supralittoral *Ligia* distributed in the Caribbean Sea, Bahamas, southern Florida, Bermuda, and the Pacific coast of Central America and Colombia, which represented the range of *Ligia baudiniana* Milne-Edwards, 1840. The authors recovered seven highly divergent lineages within this clade, probably corresponding to different species, five of which were observed in the Caribbean and two in the Pacific. Similarly, high levels of genetic differentiation have been reported for some Caribbean populations of another supralittoral oniscidean, *Tylos* sp., even over relatively short geographic distances (Hurtado *et al.* 2014). However, sampling of *Tylos* Audouin, 1826 was very limited and more efforts are needed throughout the Caribbean Sea to better understand the diversity of this taxon in the region. These two studies suggest that a high diversity of coastal oniscideans in the Caribbean is yet to be discovered, underscoring the importance of taxonomic and molecular systematics studies for these organisms in the region.

Despite an extensive coastline of about 1600 km of the Caribbean Sea in Colombia, studies of the diversity of oniscideans in coastal habitats have been very limited. Van Name (1936) recorded *Porcellionides pruinosus* (Brandt, 1833) from San Andrés Island, a Colombian island located about 190 km off the coast of Nicaragua. López-Orozco *et al.* (2014) recorded *L. baudiniana* from Cartagena de Indias, northern Bolívar. Carpio-Díaz *et al.* (2016) recorded *Tylos niveus* Budde-Lund, 1885 and *P. pruinosus* from Barú Island, northern Bolívar. López-Orozco *et al.* (2017) described *Pulmoniscus turbanaensis* López-Orozco, Carpio-Díaz & Campos-Filho, 2017 from northern Bolívar, including specimens from Tierra Bomba Island. In addition, one of the five *Ligia* clades identified by Santamaria *et al.* (2014) in the Caribbean was observed on the coast of the Magdalena Department of Colombia.

Herein, we conducted a taxonomic survey of the oniscideans present at littoral, mangrove, and inland habitats of Isla Grande, a tiny island off the Caribbean coast of Colombia. Detailed external morphology was examined for all samples. In addition, we conducted molecular phylogenetic analyses of specimens of *Tylos*. Based on these examinations, three new species of oniscideans are described, and one previous junior synonym is redescribed. Full illustrations of the new and several species are provided as well as a taxonomic key for the identification of all species. Our study highlights the immense potential of combined taxonomic and molecular systematics studies to uncover the diversity of oniscideans in coastal habitats of the Caribbean Basin, a region that needs urgent attention due to the multiple threats to its conservation.

Material and methods

Study area

Isla Grande is located in the archipelago of Nuestra Señora del Rosario, in the Colombian Caribbean, separated by 4.6 km from the continent (the closest point is Barú), and has an area of about 2 km^2

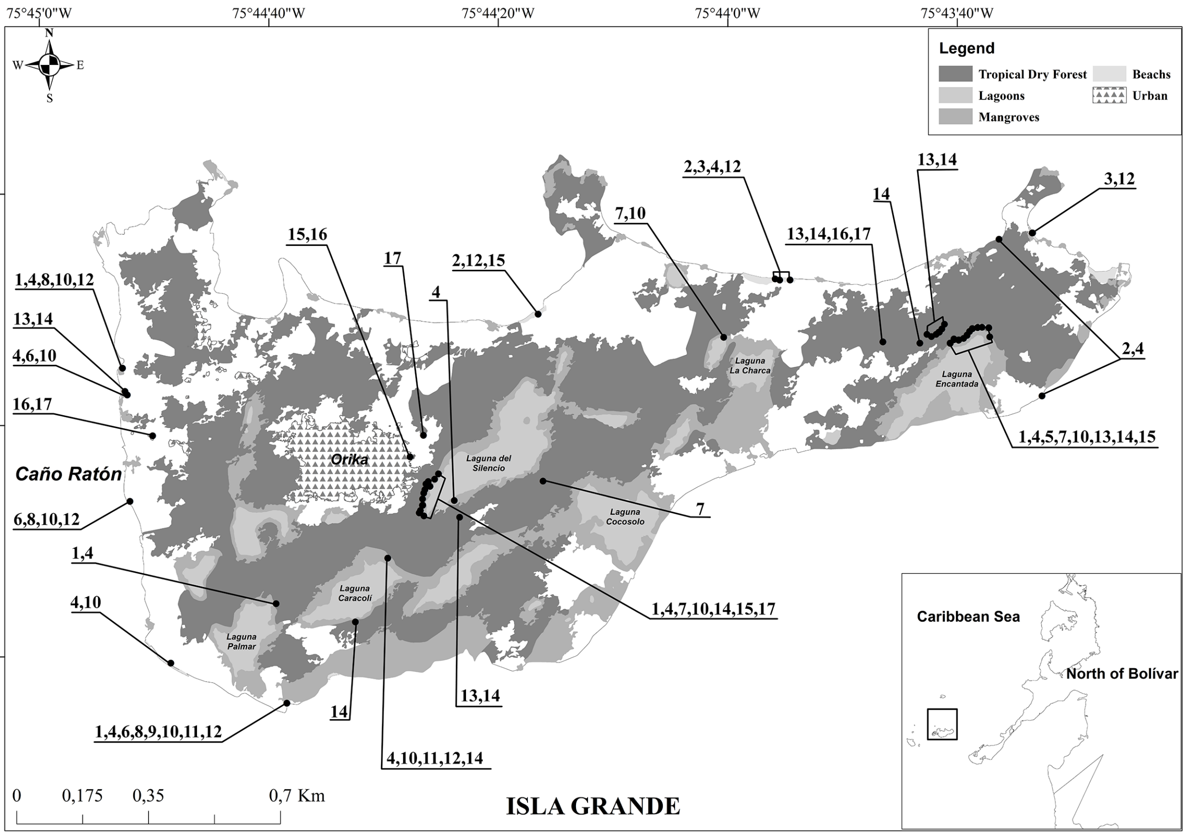

Fig. 1. Map of the study areas and distribution of species of terrestrial isopods from Isla Grande. **1**. *Ligia baudiniana* Milne Edwards, 1840. **2**. *Tylos negroi* López-Orozco, Carpio-Díaz & Campos-Filho sp. nov. **3**. *Tylos marcuzzii* Giordani Soika, 1954. **4**. *Tylos niveus* Budde-Lund, 1885. **5**. *Stenoniscus nestori* López-Orozco, Taiti & Campos-Filho sp. nov. **6**. *Armadilloniscus caraibicus* Paoletti & Stinner, 1989. **7**. *Armadilloniscus luisi* Carpio-Díaz, Taiti & Campos-Filho sp. nov. **8**. *Armadilloniscus ninae* Schultz, 1984. **9**. *Halophiloscia trichoniscoides* (Vandel, 1973) comb. nov. **10**. *Littorophiloscia amphindica* Taiti & Ferrara, 1986. **11**. *Littorophiloscia denticulata* (Ferrara & Taiti, 1982). **12**. *Littorophiloscia tropicalis* Taiti & Ferrara, 1986. **13**. *Trichorhina heterophthalma* Lemos de Castro, 1964. **14**. *Trichorhina bermudezae* Carpio-Díaz, López-Orozco & Campos-Filho, 2018. **15**. *Porcellionides pruinosus* (Brandt, 1833). **16**. *Agnara madagascariensis* (Budde-Lund, 1885). **17**. *Ctenorillo tuberosus* (Budde-Lund, 1904).

(Fig. 1). The climate classification is semi-arid tropical domain, with an average annual temperature of 24.7°C (min 21°C, max 33°C), average annual precipitation of 916 mm and humidity ranging between 80% and 85% (Pineda *et al.* 2006; Niño *et al.* 2010).

This study was conducted in mangrove, littoral zones, Tropical Dry Forest (TDF), and inhabited areas of the island. The mangrove ecosystem is located on the edge of the inland lagoons and swamps, with a forest strip no wider than 80 m, with vegetation composed of *Avicennia germinans* (L.)L., *Laguncularia racemosa* L., *Conocarpus erectus* L. and *Rhizophora mangle* (L.)C.DC, the last one being the dominant species (Rojas *et al.* 2012; Romero & Niño 2014). The littoral zone includes rocky and sandy beaches. These ecosystems in the area comprise a wide diversity of invertebrates (Núñez *et al.* 1999). The beaches on Isla Grande are narrow and characterized by discontinuous white sand portions fragmented by rocky coastline (Romero & Niño 2014). The TDF is the main vegetative cover of the island, represented by *Gliricidia sepium* (Jacq.)Kunth ex Walp., *Guazuma ulmifolia* Lam., *Spondias mombin* L., *Bursera simaruba* (L.)Sarg., *Astronium graveolens* Jacq., *Morinda panamensis* Seem. and *Cnidoscolus urens* (L.)Arthur (Rojas *et al.* 2012).

Taxonomy

Two sampling methodologies were used. Direct Intuitive Searches (Taiti & Wynne 2015), implemented at all sites, consisted of hand-collection of specimens during searches in the sand and decomposing organic matter, roots and bark of trees, fallen logs and under rocks. The estimated time of the searches was about 20 minutes per observer (three observers) at each sampling site. In the TDF, we also used a Winkler sack (mesh size: 1 cm) to screen leaf litter; extraction of specimens was performed immediately by spreading the material on a white cloth. The specimens were preserved in 75% ethanol. The identifications were based on morphological characters with the use of micropreparations. The illustrations were made from photographs taken with Axio Lab A1 microscope and SteREO Discovery.V12 ZEISS stereo microscope with an adapted Axiocam ERc 5s camera and the aid of a camera lucida mounted on Wild M5 and M20 microscopes. The final illustrations were prepared using the software GIMP (ver. 2.8) with the method proposed by Montesanto (2015, 2016). For the already described species, material examined and distributions are presented. The synonymy lists include original descriptions and publications mentioning species occurring in Colombia. Additional references containing relevant taxonomic and distribution data are also included when necessary. For each new species, the type material, etymology, description, remarks, and distribution are given. The material is deposited in the research laboratories of the Biology program at Cartagena University, Cartagena, Colombia (CUDC-CRU) and the Collection of Isopod Crustaceans of the Instituto de Ciencias Naturales, National University of Colombia, Bogotá, Colombia (ICN-CR-is). Specimens from Cuba are deposited in the Museo di Storia Naturale, Sezione di Zoologia "La Specola", Florence, Italy (MZUF).

Molecular phylogenetic analyses of specimens of *Tylos* Audouin, 1826

Genomic DNA was isolated from 1 leg for seven specimens of *Tylos* with the DNEasy kit, following the manufacturer's protocol (Qiagen Inc., Valencia, CA). These specimens represented the three different species identified by taxonomic analyses and different localities where they were sampled (see Results): *Tylos marcuzzii* Giordani Soika, 1954 from La Punta; *Tylos niveus* from Laguna Caracolí and Caño Ratón; and *Tylos negroi* López-Orozco, Carpio-Díaz & Campos-Filho sp. nov. from Playa Libre, El Silencio and La Punta-El Terminal. We attempted to PCR-amplify fragments of the mitochondrial genes 16S rDNA (using primers 16Sar and 16Sbr) and 12S rDNA (using primers Crust-12f and Crust-12r; primers and PCR conditions in Hurtado *et al.* 2013). PCR-amplified products were cleaned with Exonuclease and Shrimp Alkaline Phosphatase, and subsequently cycle sequenced using the Sanger method. We used the software Sequencher ver. 4.8 (Gene Codes, Ann Arbor, MI) for sequence editing and primer removal.

The sequences obtained were manually aligned with sequences of the 16S rDNA and 12S rDNA mitochondrial genes for 17 of the 21 nominal species of *Tylos*, reported in Hurtado *et al.* (2013, 2014). In addition, we included a 16S rDNA sequence from a specimen identified as *T. niveus* collected at the type locality of this species in the Florida Keys, USA (24°53′24″ N, 80°40′33.6″ W). Based on preliminary phylogenetic analyses, we identified the closest relatives to the new specimens to generate a smaller dataset (i.e., clade N in Hurtado *et al.* 2014) that excluded highly divergent taxa, which are more likely to produce homoplasies and complicate homology assessments. Alignments of the 12S rDNA, the 16S rDNA, and both genes concatenated, indicating included and excluded positions in subsequent analyses, are available as Supplementary file 1, Supplementary file 2 and Supplementary file 3. We used IQTree ver. 1.6.12 (Lam-Tung *et al.* 2015) to implement ModelFinder (Kalyaanamoorthy *et al.* 2017) and perform maximum likelihood (ML) analyses with standard bootstrap (100 replicates) and the Shimodaira-Hasegawa approximate Likelihood Ratio Test (SH-aLRT; 1000 replicates). We used

Table 1. List of terrestrial isopods from Isla Grande. Abbreviations: A = Americas; C = Caribbean; CO = Cosmopolitan; CSA = Central and South America; P = Pantropical; TDF = Tropical Dry Forest. * indicates first record for Colombia.

Family/Species	Habitat sampled				Distribution
	Littoral	Mangrove	TDF	Urban	
Ligiidae					
Ligia baudiniana	X	X	–	–	A
Tylidae					
Tylos niveus	X	X	–	–	A
Tylos negroi sp. nov.	X	–	–	–	C
Tylos marcuzzii *	X	–	–	–	C
Stenoniscidae					
Stenoniscus nestori sp. nov.	–	X	–	–	C
Detonidae					
Armadilloniscus caraibicus *	X	–	–	–	C
Armadilloniscus luisi sp. nov.	–	X	–	–	C
Armadilloniscus ninae *	X	–	–	–	C
Halophilosciidae					
Halophiloscia trichoniscoides comb. nov. *	X	–	–	–	C
Littorophiloscia amphindica *	X	X	–	–	P
Littorophiloscia denticulata *	X	X	–	–	P
Littorophiloscia tropicalis *	X	X	–	–	P
Platyarthridae					
Trichorhina bermudezae	–	X	X	X	C
Trichorhina heterophthalma	–	X	X	X	P
Porcellionidae					
Porcellionides pruinosus	X	X	–	X	CO
Agnaridae					
Agnara madagascariensis *	–	–	–	X	P
Armadillidae					
Ctenorillo tuberosus *	–	X	–	X	CSA
Total	11	11	2	5	

MrBayes ver. 3.2.7a x86_64 (Altekar *et al.* 2004; Ronquist *et al.* 2012) as implemented in the CIPRES web portal (phylo.org) to perform Bayesian analyses (parameters in Dataset S1–3). We used PAUP* ver. 4.0a (build 168) (Swofford 2002) to compute pairwise uncorrected p-distances among taxa, for which all positions in the alignment were used, with missing or ambiguous positions ignored for each pairwise comparison.

Results

A total of 17 species of oniscideans belonging to nine families and 10 genera were identified from Isla Grande. Of these, 16 were collected in coastal habitats (littoral and mangroves), two in Tropical Dry Forest, and five in urban habitats (Table 1).

Systematic account

Order Isopoda Latreille, 1817
Suborder Oniscidea Latreille, 1802
Family Ligiidae Leach, 1814
Genus *Ligia* Fabricius, 1798

Ligia baudiniana Milne-Edwards, 1840
Fig. 1

Ligia baudiniana Milne-Edwards, 1840: 155.

Ligia (*Hirtiligia*) *baudiniana* – Van Name 1936: 58, figs 5a, 14.
Ligia baudiniana – Ríos & Ramos 1990: 93, fig. 7. — Schmalfuss 2003: 124. — Lazarus-Agudelo & Cantera-Kintz 2007: 226. — López-Orozco *et al.* 2014: 196, figs 1–3.

Additional references

Jackson (1922); Schultz (1984); Kensley & Schotte (1989); Leistikow (1997); Leistikow & Wägele (1999); Espinosa-Pérez & Hendrickx (2001); Santamaria *et al*. (2014).

Material examined

COLOMBIA – **Bolívar, Cartagena de Indias, Islas del Rosario, Isla Grande** • 3 ♂♂, 1 ♀; El Silencio, Laguna del Silencio; 10°10′34.8″ N, 75°44′26.6″ W; 24 Aug. 2017; C.M. López-Orozco, R. Borja-Arrieta and Y.M. Carpio-Díaz leg.; CUDC-CRU 141 • 3 ♂♂, 2 ♀♀; same collection data as for preceding; 10°10′35″ N, 75°44′26.4″ W; CUDC-CRU 142 • 1 juv.; same collection data as for preceding; 10°10′35.4″ N, 75°44′26.2″ W; CUDC-CRU 143 • 1 ♂, 1 ♀; same collection data as for preceding; 10°10′34.3″ N, 75°44′26.7″ W; CUDC-CRU 144 • 1 ♂; same locality and collectors as for preceding; 10°10′32.9″ N, 75°44′27.3″ W; 25 Aug. 2017; CUDC-CRU 145 • 1 ♀; same collection data as for preceding; 10°10′32.3″ N, 75°44′27.2″ W; CUDC-CRU 146 • 1 ♂; same collection data as for preceding; 10°10′32.5″ N, 75°44′27.1″ W; CUDC-CRU 147 • 1 ♀; Caño Ratón, Laguna Palmar; 10°10′24.5″ N, 75°44′39.7″ W; 24 Nov. 2017; same collectors as for preceding; CUDC-CRU 148 • 2 ♂♂, 1 ♀; El Silencio, Laguna del Silencio; 10°10′35.4″ N, 75°44′26″ W; 24 Nov. 2017; same collectors as for preceding; CUDC-CRU 149 • 1 ♀; same locality and collectors as for preceding; 10°10′48″ N, 75°43′39.3″ W; 25 Aug. 2017; CUDC-CRU 150 • 1 ♂; same collection data as for preceding; 10°10′34″ N, 75°44′26.8″ W; CUDC-CRU 151 • 1 juv.; same collection data as for preceding; 10°10′47.74″ N, 75°43′39.93″ W; CUDC-CRU 152 • 1 ♂, 1 ♀; same collection data as for preceding; 10°10′35″ N, 75°44′26.9″ W; ICN-CR-is 260 • 1 ♂, 2 ♀♀; Caño Ratón; 10°10′44.91″ N, 75°44′53.01″ W; 24 Nov. 2017, same collectors as for preceding; ICN-CR-is 261 • 1 juv.; Paraíso Secreto; 10°10′15.9″ N, 75°44′38.8″ W; 4 Apr. 2018, C.M. López-Orozco, R. Borja-Arrieta and K. Meza leg.; CUDC-CRU 222.

Previous records

Valle del Cauca: Bahía Málaga (Pacific); Bolívar: Cartagena de Indias (Caribbean); Magdalena: Santa Marta (Ríos & Ramos 1990; Lazarus-Agudelo & Cantera-Kintz 2007; López-Orozco *et al.* 2014; Santamaria *et al*. 2014).

Distribution

This species was originally described from Veracruz, Mexico (but see Discussion). Molecular phylogenetic analyses, however, revealed that what has been denominated as this species corresponds to a clade composed of highly divergent lineages (probably a complex of cryptic species), distributed in southern Florida, across the Caribbean Sea, Bahamas, Bermuda, and probably in northern Brazil, and the Pacific coast from Costa Rica, Panamá, Colombia, probably to Ecuador (Santamaria *et al.* 2014). Although this species has been reported in the Gulf of California and California, extensive sampling for phylogeographic studies conducted by some of us suggest that these previous records are likely misidentifications (Hurtado *et al.* 2010; Eberl *et al.* 2013; Hurtado *et al.* 2018).

Family Tylidae Dana, 1852
Genus *Tylos* Audouin, 1826

Tylos niveus Budde-Lund, 1885
Fig. 1

Tylos niveus Budde-Lund, 1885: 278.

Tylos niveus – Carpio-Díaz *et al.* 2016: 435, fig. 3.

Additional references

Boone (1934); Van Name (1936); Schultz (1970); Kensley & Schotte (1989); Silva & Alves (2000); Hurtado *et al.* (2014); Taiti *et al.* (2018).

Material examined

COLOMBIA – **Bolívar, Cartagena de Indias, Islas del Rosario, Isla Grande** • 3 ♂♂, 1 ♀; La Punta, Laguna Encantada; 10°10′48.1″ N, 75°43′37.5″ W; 24 Aug. 2017; Y.M. Carpio-Díaz, C.M. López-Orozco and R. Borja-Arrieta leg.; CUDC-CRU 153 • 4 ♂♂, 5 ♀♀; same locality and collectors as for preceding; 10°10′48.4″ N, 75°43′38.4″ W; 25 Aug. 2017; CUDC-CRU 154 • 2 ♂♂, 1 ♀; same collection data as for preceding; 10°10′48.3″ N, 75°43′38.9″ W; CUDC-CRU 155 • 5 ♂♂, 7 ♀♀; same collection data as for preceding; 10°10′48.1″ N, 75°43′39.1″ W; CUDC-CRU 156 • 4 ♂♂, 1 ♀; same collection data as for preceding; 10°10′48″ N, 75°43′39.3″ W; CUDC-CRU 157 • 5 ♂♂, 2 ♀♀; same collection data as for preceding; 10°10′47.72″ N, 75°43′40.09″ W; CUDC-CRU 158 • 2 ♂♂, 1 ♀; same collection data as for preceding; 10°10′47.76″ N, 75°43′40.27″ W; CUDC-CRU 159 • 5 ♂♂, 2 ♀♀; same collection data as for preceding; 10°10′47.7″ N, 75°43′39.93″ W; CUDC-CRU 160 • 9 ♂♂, 17 ♀♀; El Silencio, Laguna del Silencio; 10°10′32.9″ N, 75°44′27.3″ W; 24 Aug. 2017, same collectors as for preceding; CUDC-CRU 161 • 3 ♂♂, 5 ♀♀; same collection data as for preceding; 10°10′35″ N, 75°44′26.4″ W; CUDC-CRU 162 • 10 ♂♂, 6 ♀♀; same locality and collectors as for preceding; 10°10′48.3″ N, 75°43′38.9″ W; 25 Aug. 2017; CUDC-CRU 163 • 15 ♂♂, 12 ♀♀; La Punta, El Terminal; 10°10′55.75″ N, 75°43′36.57″ W; 6 Oct. 2017; C.M. López-Orozco leg.; ICN-CR-is 263 • 2 ♀♀; La Punta, Laguna Encantada; 10°10′47.8″ N, 75°43′39.5″ W; 25 Aug. 2017; Y.M. Carpio-Díaz, C.M. López-Orozco and R. Borja-Arrieta leg.; CUDC-CRU 164 • 2 ♂♂, 2 ♀♀; La Punta, Hotel Cocoliso; 10°10′42.19″ N, 75°43′32.88″ W; 6 Oct. 2017; same collectors as for preceding; CUDC-CRU 165 • 4 ♀♀; Hotel La Pola; 10°10′19.4″ N, 75°44′48.9″ W; 24 Nov. 2017; same collectors as for preceding; CUDC-CRU 166 • 1 ♂, 2 ♀♀; Caño Ratón, Laguna Palmar; 10°10′24.5″ N, 75°44′39.7″ W; same date and collectors as for preceding; CUDC-CRU 167 • 4 ♂♂, 5 ♀♀; Playa Libre; 10°10′52.3″ N, 75°43′55.7″ W; same date as for preceding; C.M. López-Orozco leg.; CUDC-CRU 168 • 3 ♂♂, 2 ♀♀; El Silencio, Laguna del Silencio; 10°10′34.3″ N, 75°44′26.7″ W; 24 Aug. 2017; C.M. López-Orozco, Y.M. Carpio-Díaz and R. Borja-Arrieta leg.; CUDC-CRU 169 • 1 ♀; El Silencio, Laguna del Silencio; 10°10′35″ N, 75°44′26.4″ W; 25 Aug. 2017; same collectors as for preceding; CUDC-CRU 170 • 3 ♂♂, 6 ♀♀, 1 juv.; Paraíso Secreto; 10°10′15.9″ N, 75°44′38.8″ W; 24 Nov. 2017; C.M. López-Orozco leg.; CUDC-CRU 171 • 1 ♂, 6 ♀♀; El Silencio, Laguna del Silencio; 10°10′31.9″ N, 75°44′26.9″ W; 7 Sep. 2017; same collector as for preceding; CUDC-CRU 172 • 4 ♂♂, 6 ♀♀; La Punta, Laguna Encantada; 10°10′48.1″ N, 75°43′37.5″ W; 7 Sep. 2017; C.M. López-Orozco, Y.M. Carpio-Díaz and R. Borja-

Arrieta leg.; CUDC-CRU 173 • 9 ♂♂, 17 ♀♀; El Silencio, Mirador del Silencio; 10°10′33.36″ N, 75°44′24.14″ W; 5 Oct. 2017; same collectors as for preceding; CUDC-CRU 174 • 4 ♂♂, 6 ♀♀, 1 juv.; Caño Ratón; 10°10′44.91″ N, 75°44′53.01″ W; 24 Nov. 2017; C.M. López-Orozco leg.; CUDC-CRU 175 • 29 ♂♂, 38 ♀♀; Paraíso Secreto; 10°10′15.9″ N, 75°44′38.8″ W; 6 Sep. 2017; same collector as for preceding; CUDC-CRU 176 • 18 ♂♂, 17 ♀♀; El Silencio, Laguna Caracolí; 10°10′28.4″ N, 75°44′29.96″ W; 6 Oct. 2017; Y.M. Carpio-Díaz and R. Borja-Arrieta leg.; CUDC-CRU 177 • many ♂♂ and ♀♀; Caño Ratón; 10°10′42.6″ N, 75°44′52.6″ W; 24 Nov. 2017; C.M. López-Orozco leg.; CUDC-CRU 178 • 1 ♂; La Punta, Laguna Encantada; 10°10′48.2″ N, 75°43′38″ W; 24 Aug. 2017; Y.M. Carpio-Díaz, C.M. López-Orozco and R. Borja-Arrieta leg.; CUDC-CRU 179 • 5 ♂♂, 8 ♀♀; El Silencio, Laguna del Silencio; 10°10′35.4″ N, 75°44′26″ W; same date and collectors as for preceding; CUDC-CRU 180 • 4 ♂♂, 6 ♀♀; same collection data as for preceding; 10°10′34.8″ N, 75°44′26.6″ W; CUDC-CRU 181 • 10 ♂♂, 5 ♀♀; 10°10′32.3″ N, 75°44′27.2″ W; 25 Aug. 2017; C.M. López-Orozco leg.; CUDC-CRU 182 • 19 ♂♂, 21 ♀♀; La Punta, Laguna Encantada; 10°10′47.72″ N, 75°43′40.09″ W; 25 Aug. 2017; Y.M. Carpio-Díaz, C.M. López-Orozco and R. Borja-Arrieta leg.; CUDC-CRU 183 • 14 ♂♂, 7 ♀♀; Paraíso Secreto; 10°10′15.9″ N, 75°44′38.8″ W; 4 Apr. 2018; C.M. López-Orozco, R. Borja-Arrieta and K. Meza leg.; CUDC-CRU 184 • 10 ♂♂, 17 ♀♀; El Silencio, Laguna del Silencio; 10°10′35.4″ N, 75°44′26.2″ W; 24 Aug. 2017; Y.M. Carpio-Díaz, C.M. López-Orozco and R. Borja-Arrieta leg.; ICN-CR-is 264.

Previous records

Bolívar: Barú, Cartagena de Indias (Caribbean) (Carpio-Díaz *et al.* 2016).

Distribution

Widely distributed in Atlantic coastal areas of Mexico (Kensley & Schotte 1989); Florida, Cuba (Van Name 1936); Bahamas, Tobago, Bonaire (Schultz 1974); Dominica, Curacao, Virgin Islands, Belize, Venezuela (Kensley & Schotte 1989); Puerto Rico (Hurtado *et al.* 2014); Colombia (Carpio-Díaz *et al.* 2016); and Brazil (Silva & Alves 2000). It is also present on the Pacific coast of Costa Rica (Taiti *et al.* 2018). First record of the species for continental islands of the Colombian Caribbean.

Tylos marcuzzii Giordani Soika, 1954
Figs 1, 2A

Tylos marcuzzii Giordani Soika, 1954: 79, fig. 10/1.

Additional references

Schultz (1974); Kensley & Schotte (1989).

Material examined

COLOMBIA – **Bolívar, Cartagena de Indias, Islas del Rosario, Isla Grande** • 1 ♀; Playa Libre; 10°10′52.4″ N, 75°43′56.1″ W; 7 Sep. 2017; C.M. López-Orozco, R. Borja-Arrieta and Y.M. Carpio-Díaz leg.; CUDC-CRU 136 • 11 ♂♂, 39 ♀♀, 1 juv.; La Punta, Hotel Majagua; 10°10′56.41″ N, 75°43′33.51″ W; 6 Oct. 2017; same collectors as for preceding; CUDC-CRU 137.

Distribution

Florida, Bahamas, Leeward Islands, Belize, Venezuela and Cuba (Schultz 1974; Kensley & Schotte 1989; Schmalfuss & Vergara 2000; Schmidt 2001; Schmalfuss 2003; Hurtado *et al.* 2014). First record for Colombia.

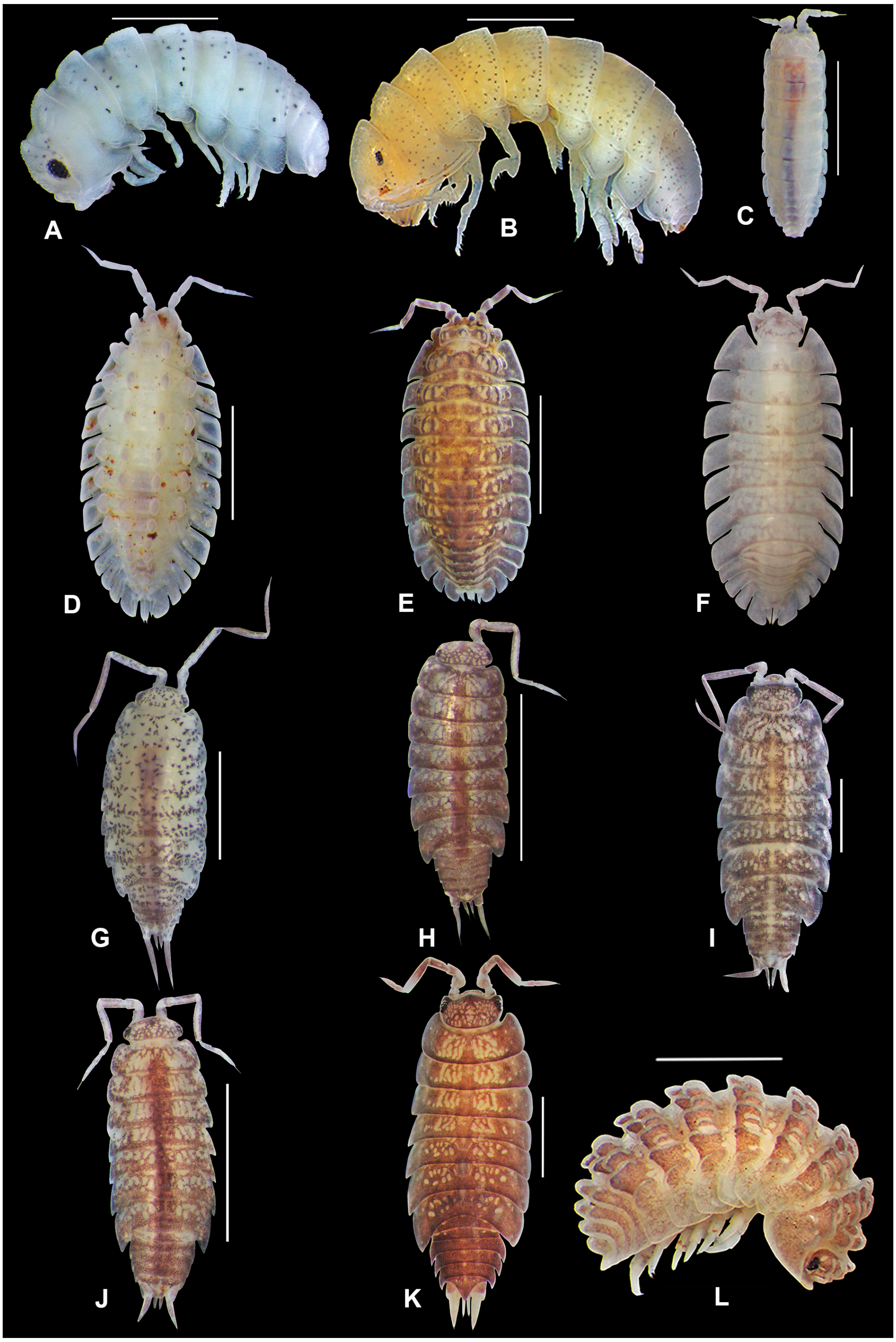

Fig. 2. A. *Tylos marcuzzii* Giordani Soika, 1954. **B**. *Tylos negroi* López-Orozco, Carpio-Díaz & Campos-Filho sp. nov. **C**. *Stenoniscus nestori* López-Orozco, Taiti & Campos-Filho sp. nov. **D**. *Armadilloniscus caraibicus* Paoletti & Stinner, 1989. **E**. *Armadilloniscus luisi* Carpio-Díaz, Taiti & Campos-Filho sp. nov. **F**. *Armadilloniscus ninae* Schultz, 1984. **G**. *Halophiloscia trichoniscoides* (Vandel, 1973) comb. nov. **H**. *Littorophiloscia amphindica* Taiti & Ferrara, 1986. **I**. *Littorophiloscia denticulata* (Ferrara & Taiti, 1982). **J**. *Littorophiloscia tropicalis* Taiti & Ferrara, 1986. **K**. *Agnara madagascariensis* (Budde-Lund, 1885). **L**. *Ctenorillo tuberosus* (Budde-Lund, 1904). Scale bars: 1 mm.

Tylos negroi López-Orozco, Carpio-Díaz & Campos-Filho sp. nov.
urn:lsid:zoobank.org:act:DFCDBD2C-AEBD-4754-951A-1D927E81E6DC
Figs 1, 2B, 3–5

Etymology

The new species is named after Mr Hernando Gómez Molina, also known as Mr Negro, for his efforts to conserve the biodiversity of the Rosario Islands.

Material examined

Holotype

COLOMBIA – **Bolívar, Cartagena de Indias, Islas del Rosario, Isla Grande** • ♂; Playa Libre; 10°10′52.3″ N, 75°43′54.8″ W; 5 Oct. 2017; C.M. López-Orozco, R. Borja-Arrieta and Y.M. Carpio-Díaz leg.; CUDC-CRU 127.

Paratypes

COLOMBIA – **Bolívar, Cartagena de Indias, Islas del Rosario, Isla Grande** • 1 ♂ (parts in micropreparations); same collection data as for holotype; CUDC-CRU 128 • 2 ♀♀ (parts in micropreparations); same collection data as for holotype; CUDC-CRU 129 • many ♂♂ and ♀♀; same collection data as for holotype; CUDC-CRU 130 • 7 ♂♂, 13 ♀♀; El Silencio, Playa La Cocotera; 10°10′49.3″ N, 75°44′16.7″ W; 6 Oct. 2017; same collectors as for holotype; CUDC-CRU 131 • 8 ♂♂, 10 ♀♀; La Punta, El Terminal; 10°10′55.75″ N, 75°43′36.57″ W; same collectors as for holotype; CUDC-CRU 132 • 5 ♀♀; Playa Libre; 10°10′52.3″ N, 75°43′55.7″ W; 7 Sep. 2017; same collectors as for holotype; CUDC-CRU 133 • 1 ♀; same collection data as for holotype; CUDC-CRU 134 • 4 ♂♂, 3 ♀♀; same collection data as for holotype; 5 Oct. 2017; ICN-CR-is 262 • 1 ♂; La Punta, Hotel Cocoliso; 10°10′42.19″ N, 75°43′32.88″ W; 6 Oct. 2017; same collectors as for holotype; CUDC-CRU 135.

Description

Measurements. Maximum body length: male 10 mm; female 8.1 mm.

Body. Colour yellowish with many irregular dark spots (Fig. 2B). Body outline as in Fig. 3A. Endoantennal conglobation. Dorsum covered with lanceolate scale-setae (Fig. 3B).

Cephalon. Frontal lamina triangular (Fig. 3C–D); eyes consisting of 26–27 ommatidia.

Pereon. Pereonite 1 epimera grooved on lateral margins, schisma with inner lobe triangular, slightly surpassing outer lobe (Fig. 3E); pereonite 2 with ventral lobe triangular, shorter than outer lobe (Fig. 3E); epimera of pereonites 2–4 subtriangular, 5–7 subquadrangular (Fig. 3A).

Pleon. Epimera of pleonites 3–5 with rounded distal margin (Fig. 3F). Ventral phylacomera present on pleonites 3–5; phylacomera 5 oar-shaped, with wide distal part, medial margin oblique and slightly sinuous (Fig. 3G). Telson rectangular, posterior margin slightly folded upwards (Fig. 3F).

Antennula. Composed of one article, flattened and triangular, several aesthetascs inserted on slightly rounded lobe (Fig. 3H).

Antenna. Short and thickset, flagellum of three articles, apical article as long as first and second articles (Fig. 4A).

Mouth. Mandibles with strong molar process, left mandible (Fig 4B) with two penicils on molar process, two on hairy lobe and five free penicils; right mandible (Fig. 4C) with two penicils on molar process, one on hairy lobe and five free penicils. Maxillula (Fig. 4D) inner endite with three long penicils densely covered with thin setae, apical penicil longest; outer endite composed of 5+5 simple teeth plus one sensory seta, inner set bearing two teeth slightly serrate, median portion bearing three short setae. Maxilla (Fig. 4E) of two lobes, inner lobe rounded, covered with thick setae, outer lobe covered with thin setae. Maxilliped (Fig. 4F) basis with rounded outer margin, palp proximal article triangular without setae; endite rectangular, bearing five apical and two subapical penicils.

Uropod. As in Fig 3G.

Pereopods. Pereopod 1 (Fig. 5A) basis with triangular latero-apical process. Pereopod 7 (Fig. 5B) propodus slightly inflated; dactylus of one claw, dactylar seta stout, not surpassing claw and bearing several small sensory setae on median to apical portion.

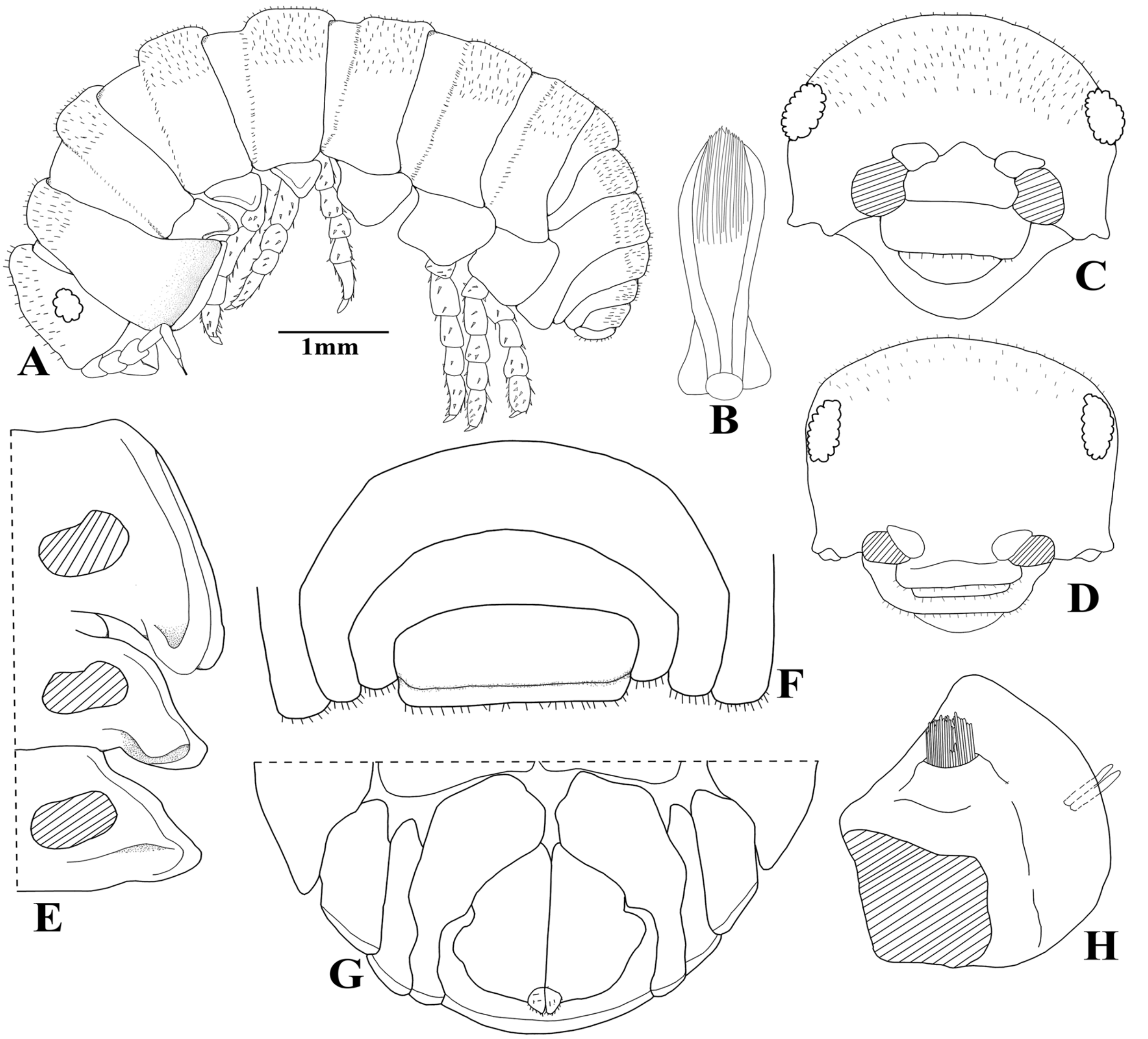

Fig. 3. *Tylos negroi* López-Orozco, Carpio-Díaz & Campos-Filho sp. nov., paratype, ♂ (CDUC-CRU 128). **A**. Habitus, lateral view. **B**. Dorsal scale-seta. **C**. Cephalon, frontal view. **D**. Cephalon, dorsal view. **E**. Epimera of pereonites 1–3, ventral view. **F**. Pleonites 4, 5 and telson, dorsal view. **G**. Pleon, ventral view. **H**. Antennula.

Male

Pereopods 1 and 7. Without any sexual dimorphism (Fig. 5A–B).

Pleopods. Pleopod 2 exopod rectangular (Fig. 5C) with respiratory folds; endopod with distal portion slightly directed inwards, apex covered with cleft scales of 2–4 branches (Fig. 5C).

Remarks

Presently, the genus *Tylos* has a worldwide distribution and comprises 21 coastal species (Schmalfuss & Vergara 2000; Schmalfuss 2003). In Colombia, only *T. niveus* Budde-Lund, 1885 was recorded from the Caribbean region (Carpio-Díaz *et al.* 2016). *Tylos negroi* sp. nov. can be distinguished from all species of the genus by the shape of the ventral phylacomera 5. Moreover, it differs from *T. niveus* in the pereonite 1 epimeron having the inner lobe of the schisma surpassing the outer lobe (vs inner lobe not surpassing outer lobe) and the pereopod 7 propodus being inflated (vs not inflated).

Distribution

Presently known only from Isla Grande, Cartagena de Indias, Colombia.

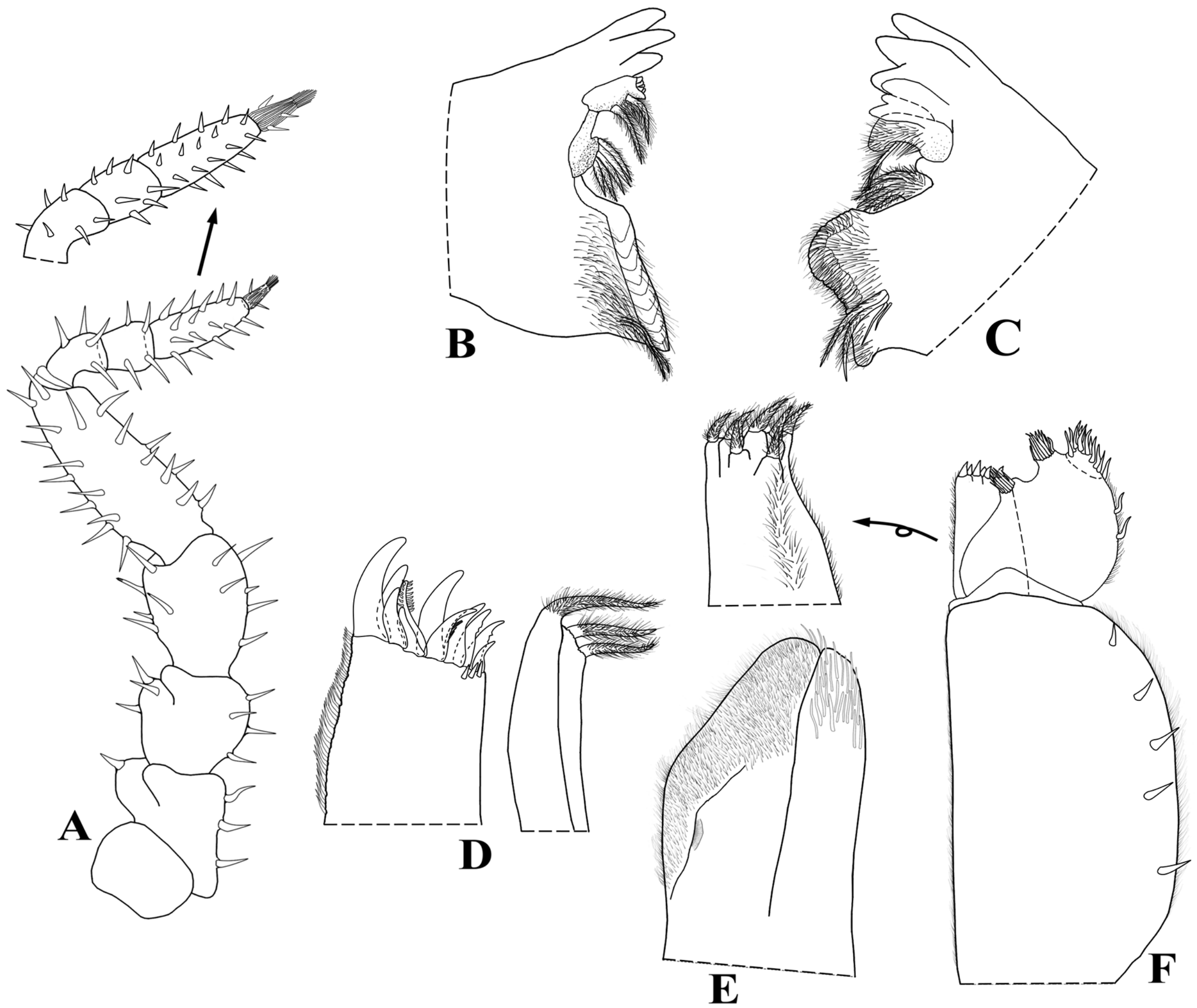

Fig. 4. *Tylos negroi* López-Orozco, Carpio-Díaz & Campos-Filho sp. nov., paratype, ♀ (CDUC-CRU 129). **A**. Antenna. **B**. Left mandible. **C**. Right mandible. **D**. Maxillula. **E**. Maxilla. **F**. Maxilliped.

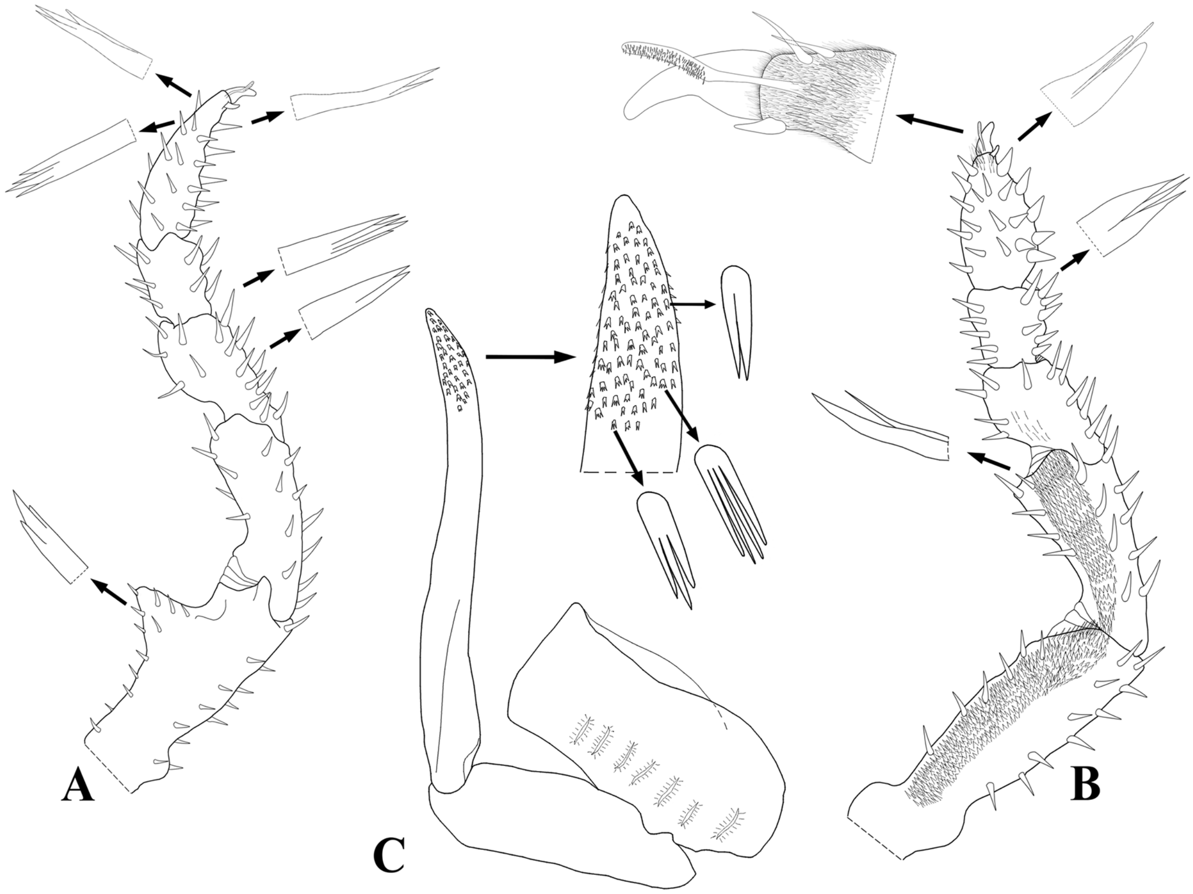

Fig. 5. *Tylos negroi* López-Orozco, Carpio-Díaz & Campos-Filho sp. nov., paratype, ♂ (CDUC-CRU 128). **A**. Pereopod 1. **B**. Pereopod 7. **C**. Pleopod 2.

Family Stenoniscidae Budde-Lund, 1904
Genus *Stenoniscus* Aubert & Dollfus, 1890

Stenoniscus nestori López-Orozco, Taiti & Campos-Filho sp. nov.
urn:lsid:zoobank.org:act:045F7904-E6DE-4912-9073-1473A522FAC7
Figs 1, 2C, 6–8

Etymology

The new species is named after Dr Nestor Hernando Campos, for his contribution to the knowledge of Crustacea from Colombia.

Material examined

Holotype

COLOMBIA – **Bolívar, Cartagena de Indias, Islas del Rosario, Isla Grande** • ♂ (parts in micropreparations); La Punta, Laguna Encantada; 10°10′48.1″ N, 75°43′37.5″ W; 7 Sep. 2017; C.M. López-Orozco, R. Borja-Arrieta and Y.M. Carpio-Díaz leg.; CUDC-CRU 185.

Paratypes

COLOMBIA – **Bolívar, Cartagena de Indias, Islas del Rosario, Isla Grande** • 1 ♂, 1 ♀ (parts in micropreparations); same collection data as for holotype; CUDC-CRU 186 • 2 ♀♀; same collection data as for holotype; CUDC-CRU 187 • 1 ♀; same locality and collectors as for holotype; 24 Aug. 2017; CUDC-CRU 188.

Description

Measurements. Maximum body length: male 1.8 mm; female 2.4 mm.

Body. Body pigments absent (Fig. 2C). Body (Fig. 6A–C) slender, about four times as long as wide, parallel sides. Dorsal surface bearing ribs and tubercles (Fig. 6A–C, E–G), as follows: cephalon with two tubercles on anterior portion and three on posterior portion; pereonite 1 with two transversal ribs; pereonites 1–4 with three longitudinal ribs (middle rib split in two on pereonites 2 and 3), one lateral tubercle and one tubercle between two lateral ribs per side; pereonites 5–7 with two longitudinal ribs and one lateral tubercle per side; pleonites 2–5 and telson with two paramedian tubercles. Dorsum bearing rectangular scale-setae with fringed apex (Fig. 6D).

Cephalon. Sub-rectangular (Fig. 6E–F), median lobe triangular, lateral lobes well-developed, directed frontwards, not surpassing median lobe; eyes absent.

Pereon. Epimera of pereonites 2–7 laterally grooved (Fig. 6B). Pereonites 4–5 ventrally with lateral sternal thickenings small, triangular; pereonites 6 and 7 ventrally with sub-rectangular sternal plates (Fig. 6C).

Pleon. Pleonite 2 dorsally visible, 3–5 with rectangular epimera (Fig. 6A–C). Telson (Fig. 6G) trapezoidal, distal margin broadly rounded.

Antennula. Composed of two articles (Fig. 6H), proximal article stout with shield-like projection on distal margin, distal article comma-shaped bearing two distal aesthetascs.

Antenna. Short (Fig. 6I), peduncle articles more or less subequal in length; flagellum of two articles, distal article twice as long as proximal article, bearing two lateral aesthetascs.

Mouth. Mandibles with molar penicil consisting of two plumose setae, left mandible (Fig. 7A) with two penicils on incisor process, right mandible (Fig. 7B) with one penicil. Maxillula (Fig. 7C) inner endite with two short apical penicils; outer endite bearing 4+4 teeth, inner set with two teeth apically cleft. Maxilla (Fig. 7D) of two rounded lobes, inner lobe bearing three thick setae. Maxilliped (Fig. 7E) basis with sparse setae; endite stout, distal margin rounded, bearing thin setae, one large penicil inserted near medial margin.

Uropod. Protopod stout and conical, exopod short, bearing two long apical setae, endopod inserted proximally (Fig. 7F).

Pereopods. Pereopods 1–7 short, stout, merus to propodus bearing sparse setae on sternal margins; pereopod 1 carpus with distal seta fringed at apex; dactylus of two claws, inner claw very short, ungual seta simple, not surpassing outer claw, dactylar seta stout, reaching distal margin of outer claw, apex bearing many small setae.

Male

Pereopods 1 and 7. Without sexual dimorphism (Fig. 8A–B).

Pleopods. Pleopod 1 exopod absent; endopod (Fig. 8C) enlarged on proximal portion, distal portion tapering. Pleopod 2 (Fig. 8D) exopod triangular, inner margin grooved, bearing one strong seta; endopod

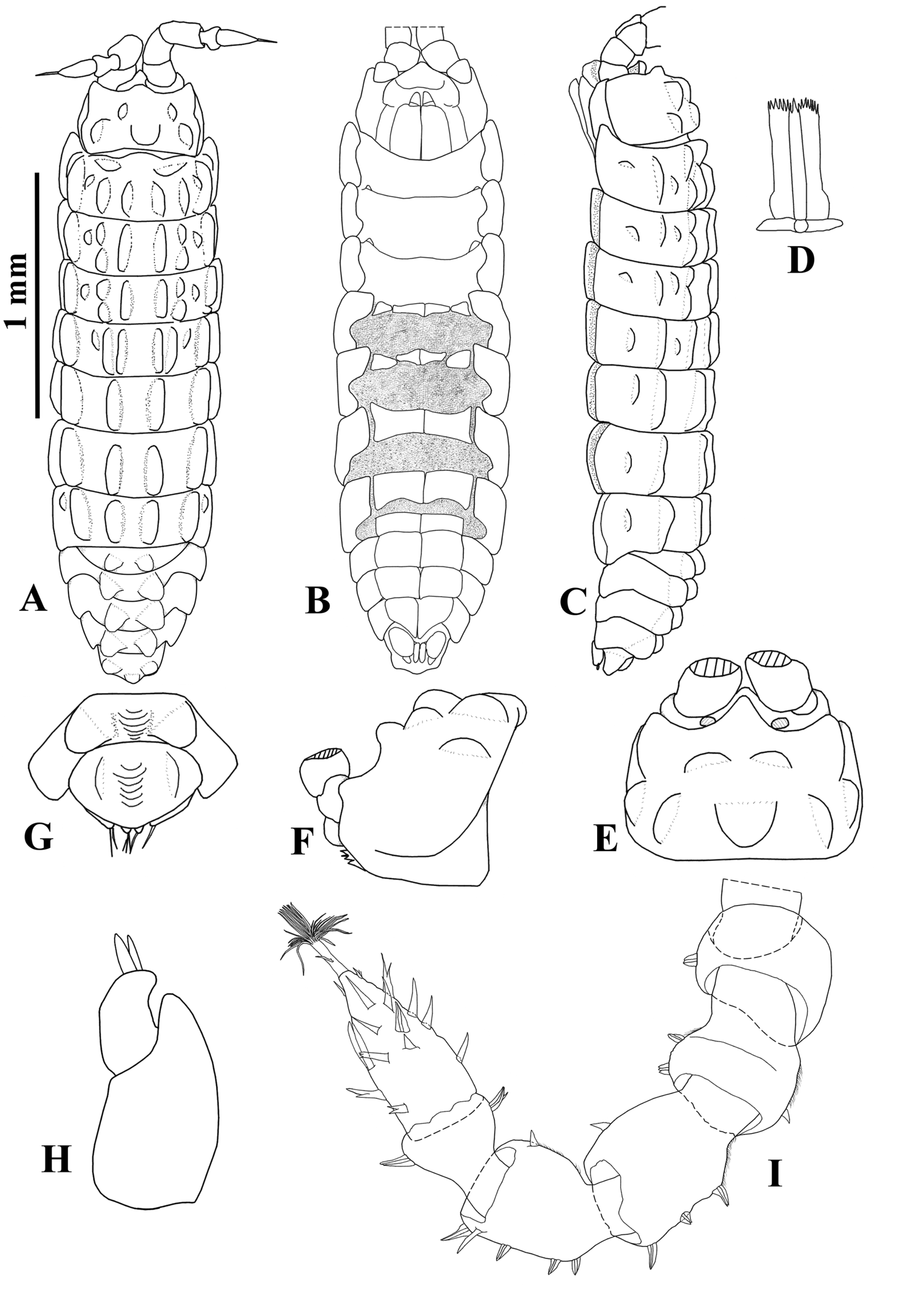

Fig. 6. *Stenoniscus nestori* López-Orozco, Taiti & Campos-Filho sp. nov., paratype, ♂ (CDUC-CRU 186). **A**. Habitus, dorsal view. **B**. Habitus, ventral view. **C**. Habitus, lateral view. **D**. Dorsal scale-seta. **E**. Cephalon, dorsal view. **F**. Cephalon, lateral view. **G**. Pleonite 5 and telson, dorsal view. **H**. Antennula. **I**. Antenna.

about twice as long as exopod. Pleopod 3 and 4 exopods (Fig. 8E–F) sub-quadrangular, inner margin grooved, distal margin slightly serrate. Pleopod 5 exopod (Fig. 8G) sub-rectangular, inner margin slightly serrate, distal margin straight, bearing one seta.

Remarks

Presently, *Stenoniscus* comprises four species (Schmalfuss 2003): *S. pleonalis* Aubert & Dollfus, 1890 from the northern coasts of the Mediterranean east to the Aegean, Bermuda, Bulgaria, Madeira and Mexico; *S. carinatus* Silvestri, 1897 from coastal areas of Croatia, Italy, Portugal and Spain; *S. aenariensis* (Verhoeff, 1942) and *S. plutonis* (Verhoeff, 1942) from Ischia Island, Italy, both most

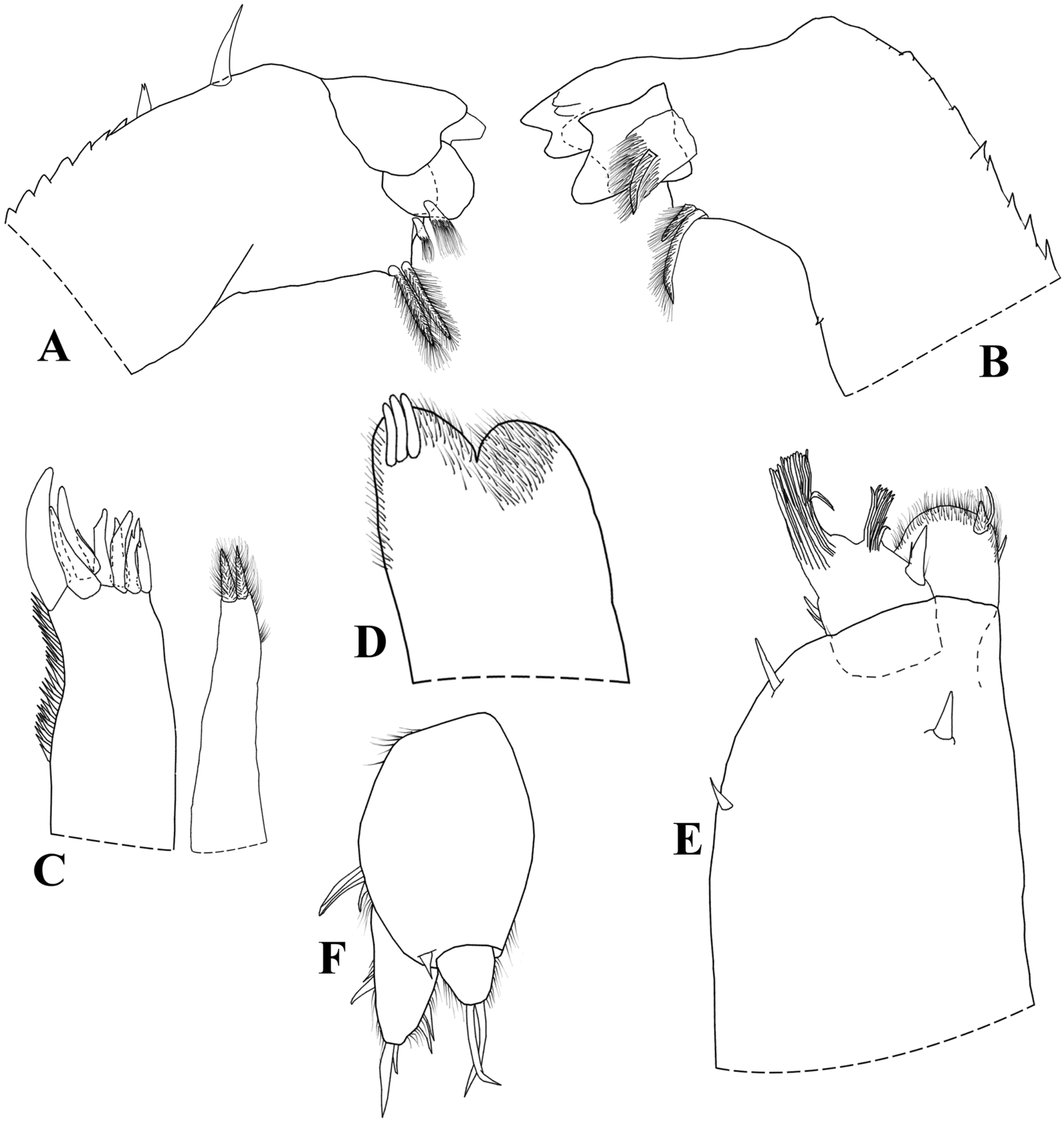

Fig. 7. *Stenoniscus nestori* López-Orozco, Taiti & Campos-Filho sp. nov., paratype, ♀ (CDUC-CRU 186). **A**. Left mandible. **B**. Right mandible. **C**. Maxillula. **D**. Maxilla. **E**. Maxilliped. **F**. Uropod.

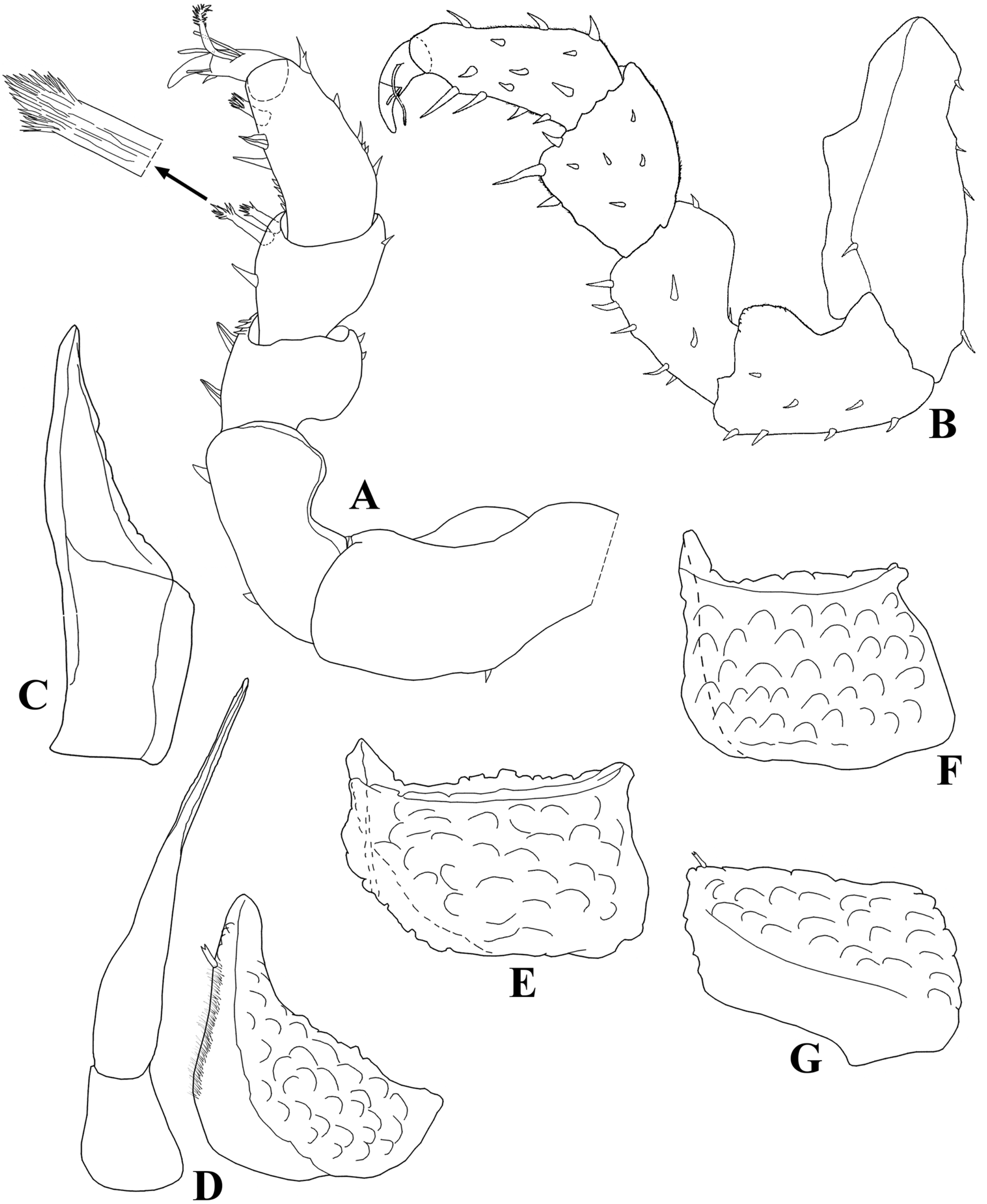

Fig. 8. *Stenoniscus nestori* López-Orozco, Taiti & Campos-Filho sp. nov., paratypes, ♂♂ (CDUC-CRU 185 and CDUC-CRU 186). **A**. Pereopod 1. **B**. Pereopod 7. **C**. Pleopod 1 endopod. **D**. Pleopod 2. **E**. Pleopod 3 exopod. **F**. Pleopod 4 exopod. **G**. Pleopod 5 exopod.

probably junior synonyms of *S. pleonalis* according to the short descriptions by Verhoeff (1942). The genus can be defined by animals of reduced size (up to 3.5 mm), body slender with lateral sides parallel, dorsum bearing longitudinal ribs and tubercles, sometimes reduced, epimera of pereonites 2–7 with lateral margins grooved, pereonites 4–5 ventrally with lateral sternal thickenings and 6–7 with sternal plates, antennula of two articles, pleonite 1 absent, uropods of conical shape, pleopod exopods without respiratory organs, and pleopod 1 absent on females (see Vandel 1962; Schmidt 2003).

Stenoniscus nestori López-Orozco, Taiti & Campos-Filho sp. nov. is morphologically similar to *Stenoniscus carinatus*, from which it differs mainly in the number and disposition of the dorsal ribs and tubercles on the cephalon and pereonites (compare Fig. 6A–B with Schmidt 2003: fig. 67 and Taiti & Ferrara 1982: fig. 6a for *S. carinatus*). The new species is readily distinct from *Stenoniscus pleonalis* in having a strong dorsal ornamentation (vs very weak) and lacking the tomentose appearance due to long dorsal scale-setae (see Vandel 1944: fig. 1a–c).

Distribution

Presently known only from Isla Grande, Cartagena de Indias, Colombia.

Family **Detonidae** Budde-Lund, 1904

Remarks

The family Detonidae Budde-Lund, 1904 comprises 39 littoral species in the genera *Armadilloniscus* Uljanin, 1875 (32 spp.), *Deto* Guérin-Méneville, 1836 (5 spp.) and *Detonella* Lohmander, 1927 (2 spp.), including two dubious species, *Armadilloniscus minutus* Uljanin, 1875 and *Deto spinicornis* Brandt, 1851 (Schultz 1984; Paoletti & Stinner 1989; Taiti & Ferrara 1989; Schmidt 2002; Schmalfuss 2003; Schmidt & Leistikow 2004; WoRMS 2020b). The family can be characterized by animals having a clinger habitus (sensu Schmalfuss 1984), cephalon with well-developed lateral lobes, dorsal surface more or less tuberculated or with longitudinal ridges, exopods of pleopods 1–5 without respiratory structures and lateral margins covered with thin setae conferring a fringe-like appearance (see Taiti & Ferrara 1989; Schmidt 2002).

Recently, Reinoso-Flórez *et al.* (2016) recorded the family from Páramo de Estambul (Tolima), Colombia. However, after the re-examination of the material deposited at Colección Zoológica de la Universidad del Tolima (CZUT-IT 1423–1426, see Reinoso-Flórez *et al.* 2016), the specimens belong to the families Styloniscidae and Philosciidae, and therefore, our work constitutes the first record of the family in the country.

Genus *Armadilloniscus* Uljanin, 1875

Armadilloniscus caraibicus Paoletti & Stinner, 1989
Figs 1, 2D, 9

Armadilloniscus caraibicus Paoletti & Stinner, 1989: 73, figs 6–12.

Additional reference

Schmidt (2002).

Material examined

COLOMBIA – **Bolívar, Cartagena de Indias, Islas del Rosario, Isla Grande** • 2 ♀♀; Paraíso Secreto; 10°10′15.9″ N, 75°44′38.8″ W; 4 Apr. 2018; C.M. López-Orozco, R. Borja-Arrieta and K. Meza leg.; CUDC-CRU 189 • 4 ♂♂, 10 ♀♀; same locality as for preceding; 6 Sep. 2017; C.M. López-Orozco, Y.M. Carpio-Díaz and R. Borja-Arrieta leg.; CUDC-CRU 190 • 1 ♀; Caño Ratón; 10°10′33.4″ N, 75°44′52.4″ W; 24 Nov. 2017; same collectors as for preceding; CUDC-CRU 191 • 2 ♀♀; 10°10′42.6″ N, 75°44′52.6″ W; same collection data as for preceding; CUDC-CRU 192.

Remarks

Paoletti & Stinner (1989) described *A. caraibicus* from Parque Marrocoy, Falcón State, Venezuela. In the description, no sexual dimorphism was noted in the dorsal ornamentation. However, the male specimens show four dorsal tubercles on pleonite 2, while females have only two (see Fig. 9 and Paoletti & Stinner 1989: fig. 11).

Distribution

Venezuela: Coralline cays of the Parque Natural Morrocoy (Paoletti & Stinner 1989), and north coast of the Península de Paria (Schmidt 2001). First record for Colombia.

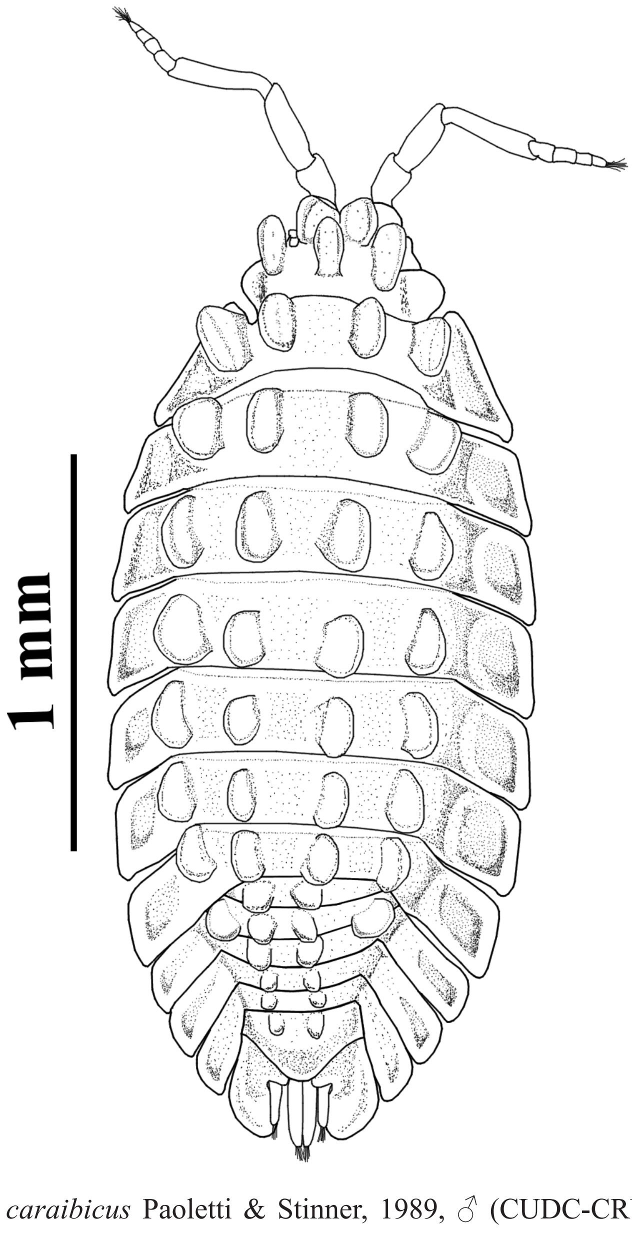

Fig. 9. *Armadilloniscus caraibicus* Paoletti & Stinner, 1989, ♂ (CUDC-CRU 190). Habitus, dorsal view.

Armadilloniscus luisi Carpio-Díaz, Taiti & Campos-Filho sp. nov.
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Figs 1, 2E, 10–12

Etymology

The new species is named after Mr Luis Felipe Arrieta Zúñiga, for his interest in nature and support to Ricardo Borja-Arrieta as a biologist.

Material examined

Holotype

COLOMBIA – **Bolívar, Cartagena de Indias, Islas del Rosario, Isla Grande** • ♂; Laguna del Silencio, El Silencio; 10°10′35.4″ N, 75°44′26″ W; 24 Aug. 2017; C.M. López-Orozco, Y.M. Carpio-Díaz and R. Borja-Arrieta leg.; CUDC-CRU 193.

Paratypes

COLOMBIA – **Bolívar, Cartagena de Indias, Islas del Rosario, Isla Grande** • 1 ♂, 1 ♀ (parts in micropreparations); same collection data as for holotype; CUDC-CRU 194 • 10 ♂♂, 5 ♀♀; same collection data as for holotype; CUDC-CRU 195 • 1 ♀; 10°10′32.9″ N, 75°44′27.3″ W; same date and collectors as for holotype; CUDC-CRU 206 • 1 ♀; 10°10′33.5″ N, 75°44′26.9″ W; same date and collectors as for holotype; CUDC-CRU 207 • 1 ♂; 10°10′35″ N, 75°44′26.4″ W; same date and collectors as for holotype; CUDC-CRU 208 • 1 ♂; 10°10′34.8″ N, 75°44′26.6″ W; same date and collectors as for holotype; CUDC-CRU 209 • 6 ♂♂, 12 ♀♀; same collection data as for holotype; 10°10′35″ N, 75°44′16.4″ W; CUDC-CRU 210 • 14 ♂♂, 10 ♀♀; 10°10′34″ N, 75°44′26.8″ W; 25 Aug. 2017; same locality and collectors as for holotype; CUDC-CRU 211 • 3 ♂♂; La Punta, Laguna Encantada; 10°10′48.4″ N, 75°43′38.4″ W; 25 Aug. 2017; C.M. López-Orozco, Y.M. Carpio-Díaz and R. Borja-Arrieta leg.; CUDC-CRU 196 • 1 ♂; same locality as for preceding; 10°10′47.72″ N, 75°43′40.09″ W; same date and collectors as for holotype; CUDC-CRU 197 • 1 ♂, 1 ♀; same locality as for preceding; 10°10′48″ N, 75°43′39.3″ W; same date and collectors as for holotype; CUDC-CRU 198 • 1 ♀; same locality as for preceding; 10°10′47.7″ N, 75°43′39.93″ W; same date and collectors as for holotype; CUDC-CRU 199 • 2 ♂♂, 3 ♀♀; same locality as for preceding; 10°10′48.3″ N, 75°43′38.9″ W; same date and collectors as for holotype; CUDC-CRU 200 • 3 ♀♀; same locality as for preceding; 10°10′48.1″ N, 75°43′39.1″ W; same date and collectors as for holotype; CUDC-CRU 201 • 2 ♀♀; same locality as for preceding; 10°10′48.1″ N, 75°43′37.5″ W; same date and collectors as for holotype; CUDC-CRU 202 • 4 ♂♂, 4 ♀♀; same locality as for preceding; 10°10′47.72″ N, 75°43′40.09″ W; same date and collectors as for holotype; CUDC-CRU 203 • 2 ♂♂, 2 ♀♀; same locality as for preceding; 7 Sep. 2017; same date and collectors as for holotype; CUDC-CRU 204 • 3 ♂♂, 4 ♀♀; Laguna La Charca; 10°10′47.8″ N, 75°44′0.4″ W; 7 Sep. 2017; C.M. López-Orozco, Y.M. Carpio-Díaz and R. Borja-Arrieta leg.; CUDC-CRU 205.

Description

MEASUREMENTS. Maximum length: male 2.5 mm; female 3.1 mm.

BODY. Color brown with usual pale muscle spots; antennae brown with pale flagellum (Fig. 2E). Body elongated and elliptical-shaped (Fig. 10A, H). Dorsal surface bearing elongated scale-setae (Fig. 10B). Dorsum covered with broad tubercles (Fig. 10A, C–E, H): cephalon bearing seven tubercles in two rows, anterior row with four and posterior row with three; ♂ pereonites 1–3 with one row of 10 tubercles, 4–7 with one row of eight tubercles; ♀ pereonites 1, 5 and 6 with one row of 10 tubercles, 2–4 and 7 with one row of eight tubercles; ♂ pleonites 1–5 and telson with two paramedian tubercles, pleonite 2 with two broad tubercles at sides, pleonite 3 with two small additional tubercles; ♀ pleonites 1–5 and telson with two paramedian tubercles, pleonites 2 and 3 with two additional small tubercles at sides.

CEPHALON. Lateral lobes well developed and directed outwards, median lobe triangular, slightly surpassing distal margin of lateral lobes, frontal and suprantennal lines absent; eyes consisting of four ommatidia (Fig. 10C–D).

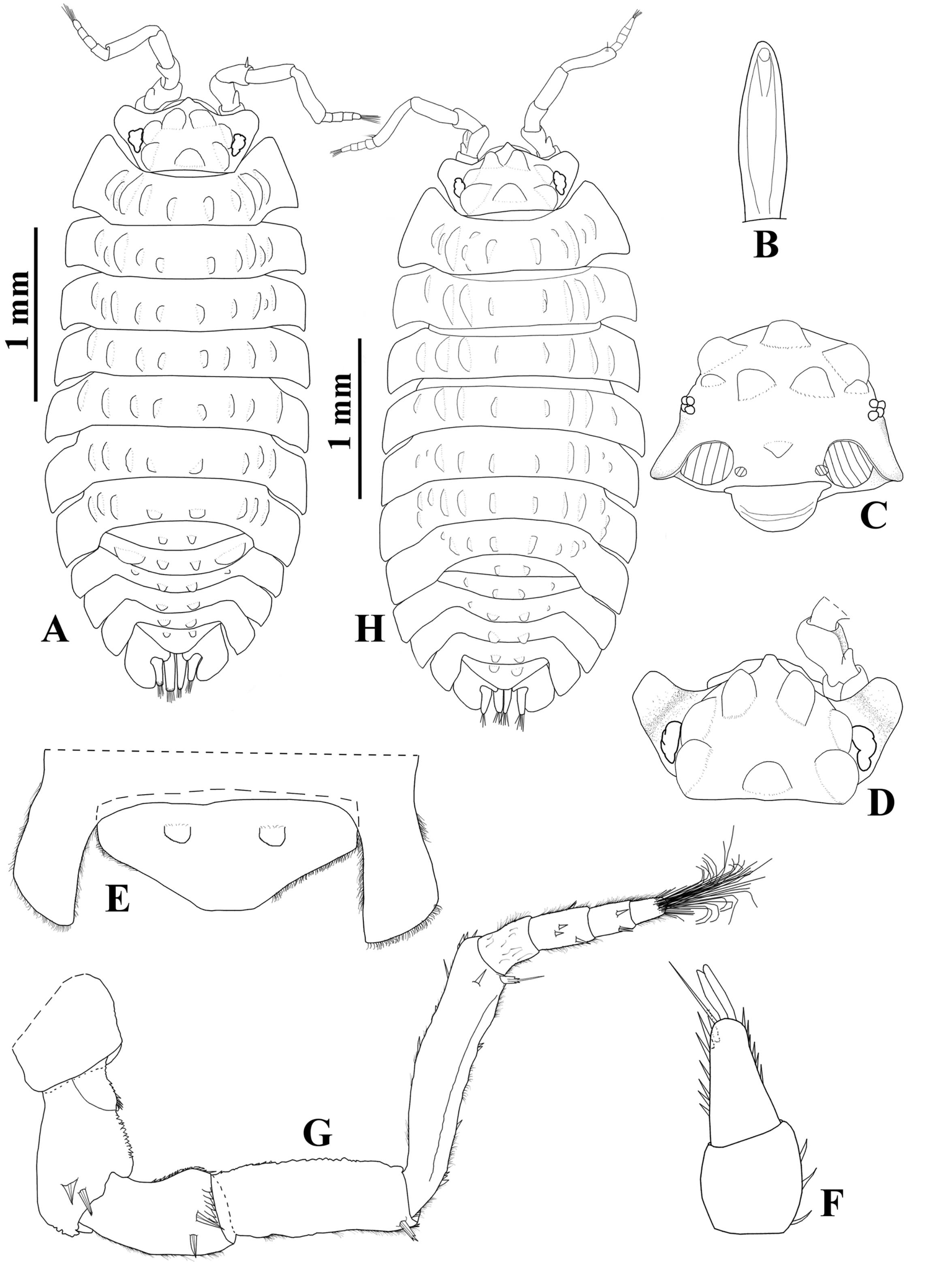

Fig. 10. *Armadilloniscus luisi* Carpio-Díaz, Taiti & Campos-Filho sp. nov. **A**–**G**. Paratype, ♂ (CUDC-CRU 194). **A**. Habitus, dorsal view. **B**. Dorsal scale-seta. **C**. Cephalon, frontal view. **D**. Cephalon, dorsal view. **E**. Pleonite 5 and telson. **F**. Antennula. **G**. Antenna. **H**. Paratype, ♀ (CDUC-CRU 194), habitus, dorsal view.

Pleon. Outline continuous with that of pereonite 7, epimera of pleonites 3–5 rectangular (Fig. 10A, E, H). Telson (Fig. 10E) triangular, lateral margins almost straight, distal part truncate and not surpassing distal margin of pleonite 5 epimera.

Antennula. Composed of two articles, second article bearing a few lateral setae, distal margin bearing one flagellar seta and two aesthetascs (Fig. 10F).

Antenna. When extended posteriorly slightly surpassing pereonite 1, flagellum of four articles (Fig. 10G).

Mouth. Mandibles with molar penicil of several plumose setae, left mandible with 2+1 penicils (Fig. 11A), right with 1+1 penicils (Fig. 11B). Maxillula (Fig. 11C) inner endite with two penicils; outer endite of 4+8 teeth, five of them pectinated, and one slender stalk between outer and inner set, outer distal margin bearing fringe of long thin setae. Maxilla (Fig. 11D) with lobes fused, inner middle portion with five long setae, distal margin rounded, bearing several thin and thick setae. Maxilliped (Fig. 11E) palp bearing two tufts of setae on first article, distal articles of palp fused, bearing several thin and thick setae; endite rectangular, inner margin bearing fringe of long thin setae plus four long thick setae, distal margin bilobed, bearing broad rounded penicil with long thick setae.

Uropod. Protopod enlarged with distal margin rounded, exopod not surpassing protopod, endopod longer than exopod (Fig. 11F).

Pereopods. Pereopods 1–7 stout, merus to propodus bearing sparse setae on sternal margin, carpus 1 with strong distal seta bearing long sensilla, dactylus with very long ungual seta, dactylar seta elongated, apically cleft and plumose.

Male

Pereopods 1 and 7. Without any sexual modifications (Fig. 12A–B).

Genital papilla. Ventral shield triangular, papilla slightly cleft at apex, bearing small setae (Fig. 12C).

Pleopods. Pleopod 1 (Fig. 12D) exopod ovoid; endopod three times as long as exopod, apical portion bent outwards. Pleopod 2 (Fig. 12E) exopod subtriangular; endopod with distal article flagelliform. Exopods of pleopods 3–5 as in Fig. 12F–H.

Remarks

In the Caribbean region, four species of *Armadilloniscus* have been recorded: *A. caraibicus* from Venezuela, *A. ellipticus* (Harger, 1878) from the Atlantic coasts of USA and Bermuda, *A. ninae* Schultz, 1984 from Belize, and *A. steptus* Schotte & Heard, 1991 from Turks and Caicos Islands (British West Indies) (Schultz 1984; Paoletti & Stinner 1989; Taiti & Ferrara 1989; Schotte & Heard 1991). For a definition of the genus see Arcangeli (1957), Vandel (1962), Taiti & Ferrara (1989), and Schmidt (2002).

Armadilloniscus luisi Carpio-Díaz, Taiti & Campos-Filho sp. nov. is readily distinguished from all the other species of the genus in the number and arrangement of the dorsal tubercles on the cephalon, pereon and pleon. Moreover, it can be distinguished from the other four Caribbean species in having two broad tubercles on pleonite 2 (vs small in *A. caraibicus* and *A. steptus*, absent in *A. ninae*), the cephalon with the median lobe triangular (vs rounded in *A. caraibicus*) and lateral lobes subquadrangular (vs subtriangular in *A. ninae* and *A. steptus*), eyes composed of four ommatidia (vs 4–5 in *A. caraibicus*, 6 in *A. ellipticus* and 5 in *A. ninae*), telson with distal margin truncate (vs rounded in *A. caraibicus* and *A. ellipticus*, triangular in *A. ninae*), and ♂ pleopod 1 exopod ovoid (vs subtriangular in *A. caraibicus*, *A. ellipticus* and *A. ninae*, almost rounded in *A. steptus*) (Paoletti & Stinner 1989; Schultz 1984; Schotte & Heard 1991; Garthwaite *et al.* 1992; Schmidt 2002).

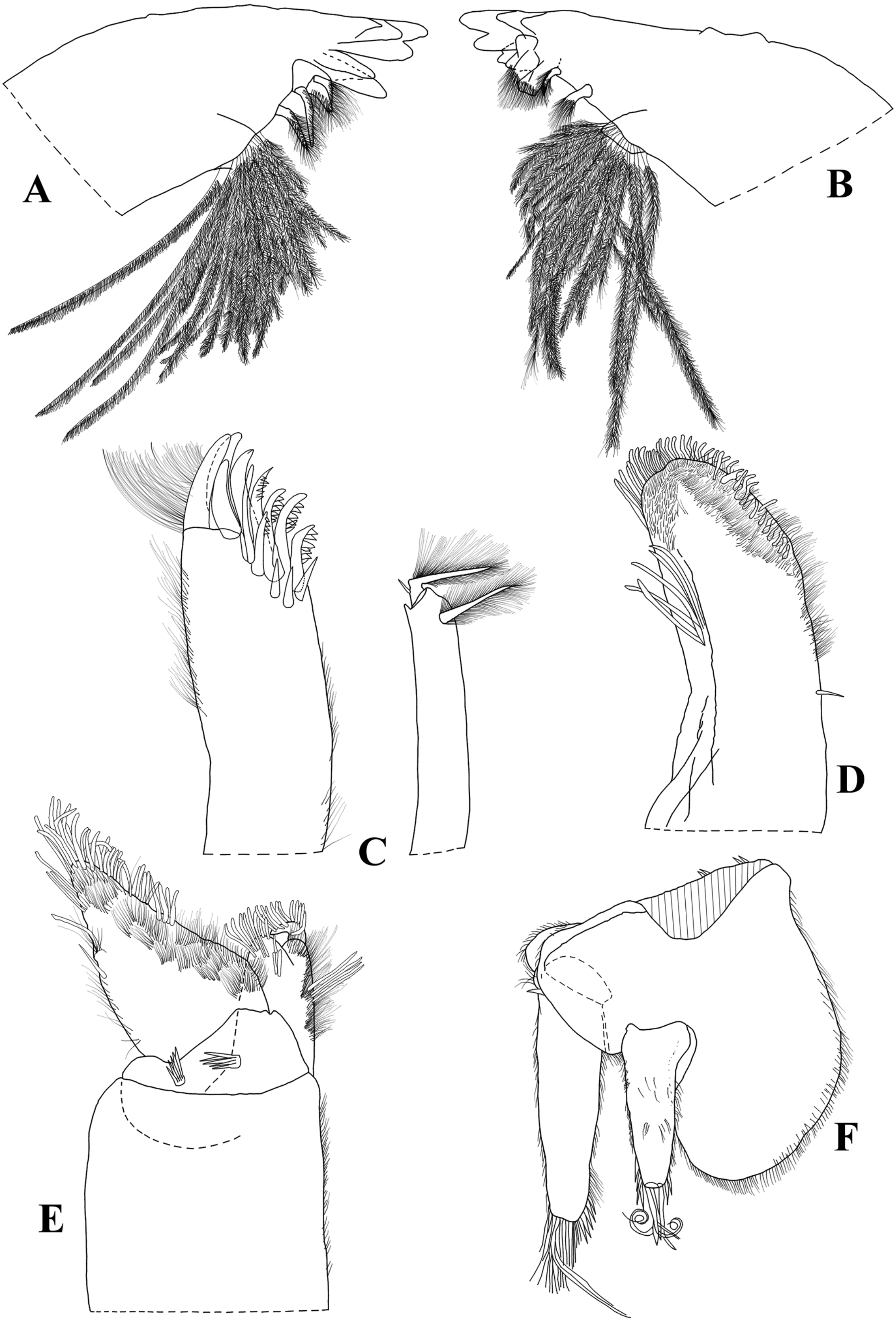

Fig. 11. *Armadilloniscus luisi* Carpio-Díaz, Taiti & Campos-Filho sp. nov., paratype, ♀ (CDUC-CRU 194). **A**. Left mandible. **B**. Right mandible. **C**. Maxillula. **D**. Maxilla. **E**. Maxilliped. **F**. Uropod.

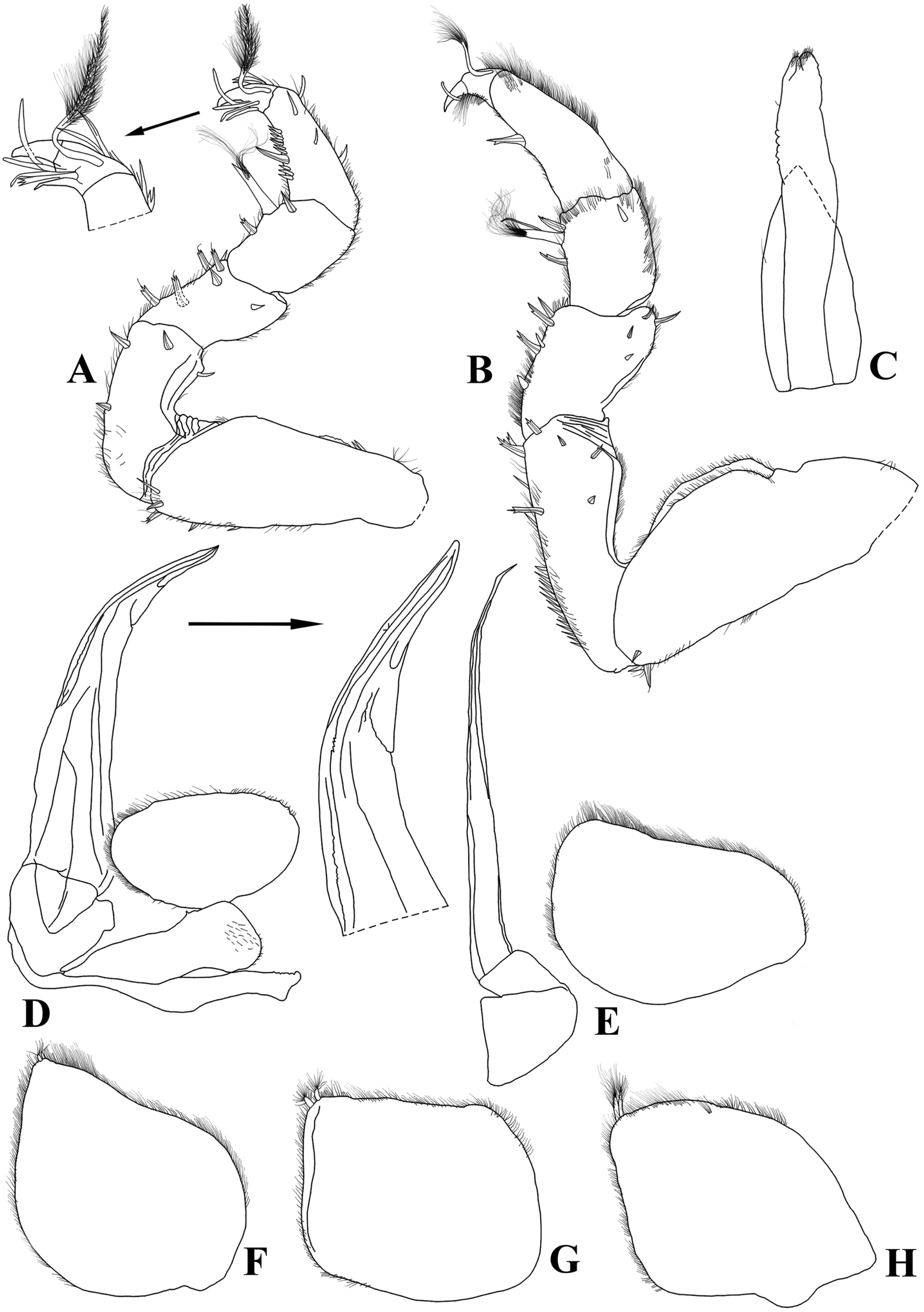

Fig. 12. *Armadilloniscus luisi* Carpio-Díaz, Taiti & Campos-Filho sp. nov., paratype, ♂ (CDUC-CRU 194). **A**. Pereopod 1. **B**. Pereopod 7. **C**. Genital papilla. **D**. Pleopod 1. **E**. Pleopod 2. **F**. Pleopod 3 exopod. **G**. Pleopod 4 exopod. **H**. Pleopod 5 exopod.

Distribution

Presently known only from Isla Grande, Cartagena de Indias, Colombia.

Armadilloniscus ninae Schultz, 1984
Figs 1, 2F, 13–14

Armadilloniscus ninae Schultz, 1984: 4, figs 1–2.

Material examined

COLOMBIA – **Bolívar, Cartagena de Indias, Islas del Rosario, Isla Grande** • 1 ♂ (parts in micropreparations); Paraíso Secreto; 10°10′15.9″ N, 75°44′38.8″ W; 24 Nov. 2017; C.M. López-Orozco leg.; CUDC-CRU 212 • 1 ♂, 4 ♀♀; same collection data as for preceding; CUDC-CRU 214 • 21 ♂♂, 61 ♀♀; same locality as for preceding; 4 Apr. 2018; C.M. López-Orozco, R. Borja-Arrieta and K. Meza leg.; CUDC-CRU 213 • 3 ♀♀; same locality as for preceding; 6 Sep. 2017; C.M. López-Orozco leg.; CUDC-CRU 215 • 1 ♂, 6 ♀♀ (one with parts in micropreparations); Caño Ratón; 10°10′33.4″ N, 75°44′52.4″ W; 24 Nov. 2017; C.M. López-Orozco leg.; CUDC-CRU 216 • 5 ♀♀; 10°10′44.91″ N, 75°44′53.01″ W; same collection data as for preceding; CUDC-CRU 217.

CUBA – **Cayo Piedras del Norte, Varadero** • 2 ♂♂, 2 ♀♀; 8 Aug. 1985; A. Poggesi leg.; MZUF 1824.

Redescription

Body. Color pale brown; cephalon, antennae, epimera of pereonites 1–7, epimera of pleonites 1–5 and uropod protopods more pigmented; pereon and pleon with median and paramedian region more depigmented (Fig. 2F). Body elongated and elliptical-shaped (Fig. 13A). Dorsal surface bearing elongated scale-setae (Fig. 13B). Cephalon and pereon covered with small tubercles (Fig. 13A, C–D): cephalon bearing six tubercles in two rows, anterior row with two and posterior row with four; pereonites 1–7 with one row of 8 tubercles.

Cephalon. Lateral lobes well developed and directed outwards, median lobe triangular, slightly surpassing distal margin of lateral lobes, frontal and suprantennal lines absent; eyes consisting of 5 ommatidia (Fig. 13C–D).

Pleon. Outline continuous with that of pereonite 7, epimera of pleonites 3–5 rectangular (Fig. 13A, E). Telson (Fig. 13E) triangular, wider than long, lateral margins almost straight, broadly rounded apex.

Antennula. Composed of two articles, second article bearing many lateral setae, distal margin bearing one flagellar seta and two aesthetascs (Fig. 13F).

Antenna. When extended posteriorly slightly surpassing pereonite 1, flagellum of four articles (Fig. 13G).

Buccal pieces. As in *Armadilloniscus luisi* sp. nov.

Uropod. Protopod enlarged with distal margin slightly rounded, exopod not surpassing protopod, endopod longer than exopod (Fig. 13E).

Pereopods. Pereopods 1–7 stout, merus to propodus bearing sparse setae on sternal margin, carpus 1 with strong distal seta bearing long sensilla, dactylus with elongated and digitform ungual seta, dactylar seta elongated, apically cleft and plumose.

Male

Pereopods 1 and 7. Without any sexual modifications (Fig. 14A–B).

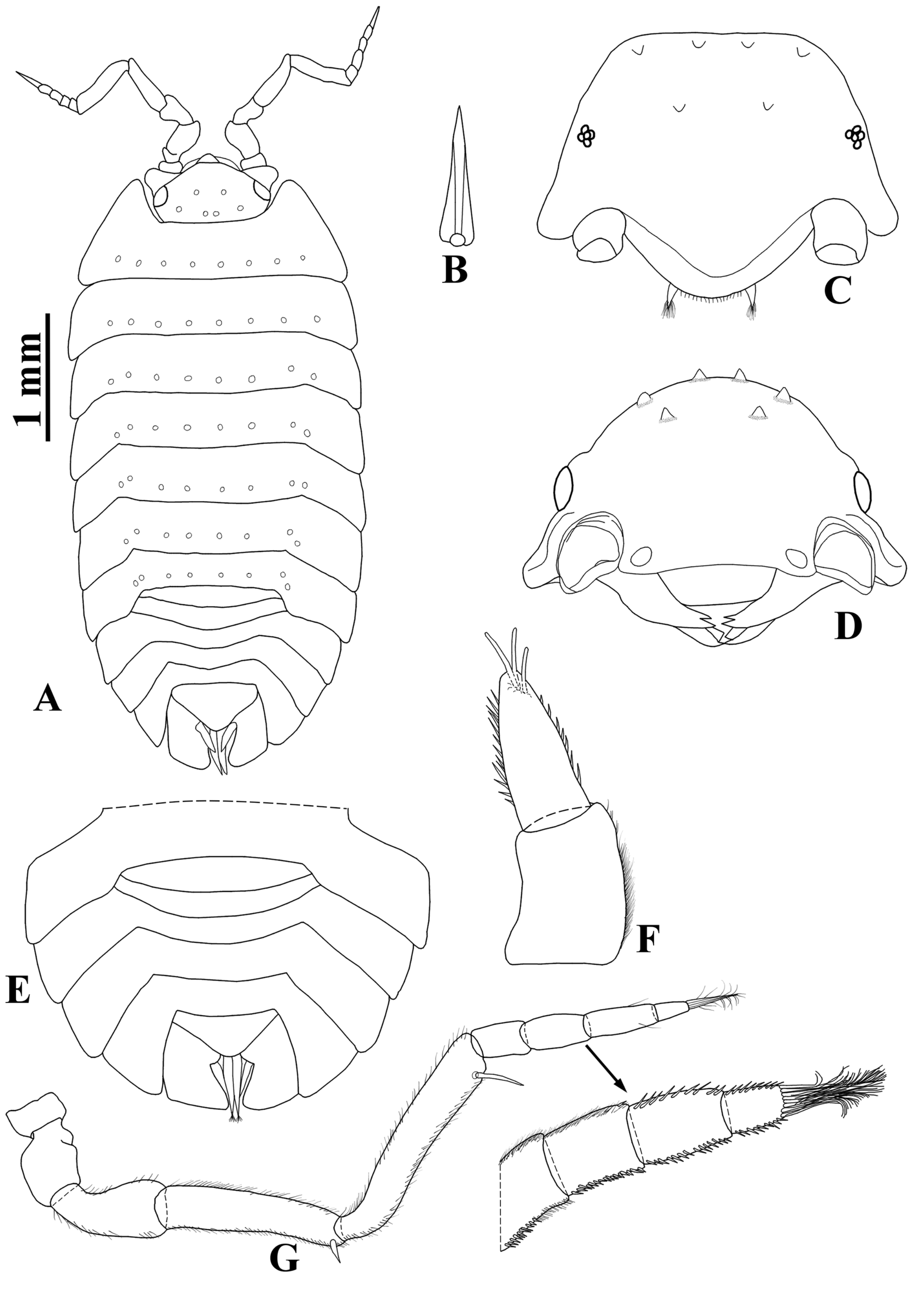

Fig. 13. *Armadilloniscus ninae* Schultz, 1984, ♀ (CDUC-CRU 216). **A**. Habitus, dorsal view. **B**. Dorsal scale-seta. **C**. Cephalon, dorsal view. **D**. Cephalon, frontal view. **E**. Pleon, telson and uropods. **F**. Antennula. **G**. Antenna.

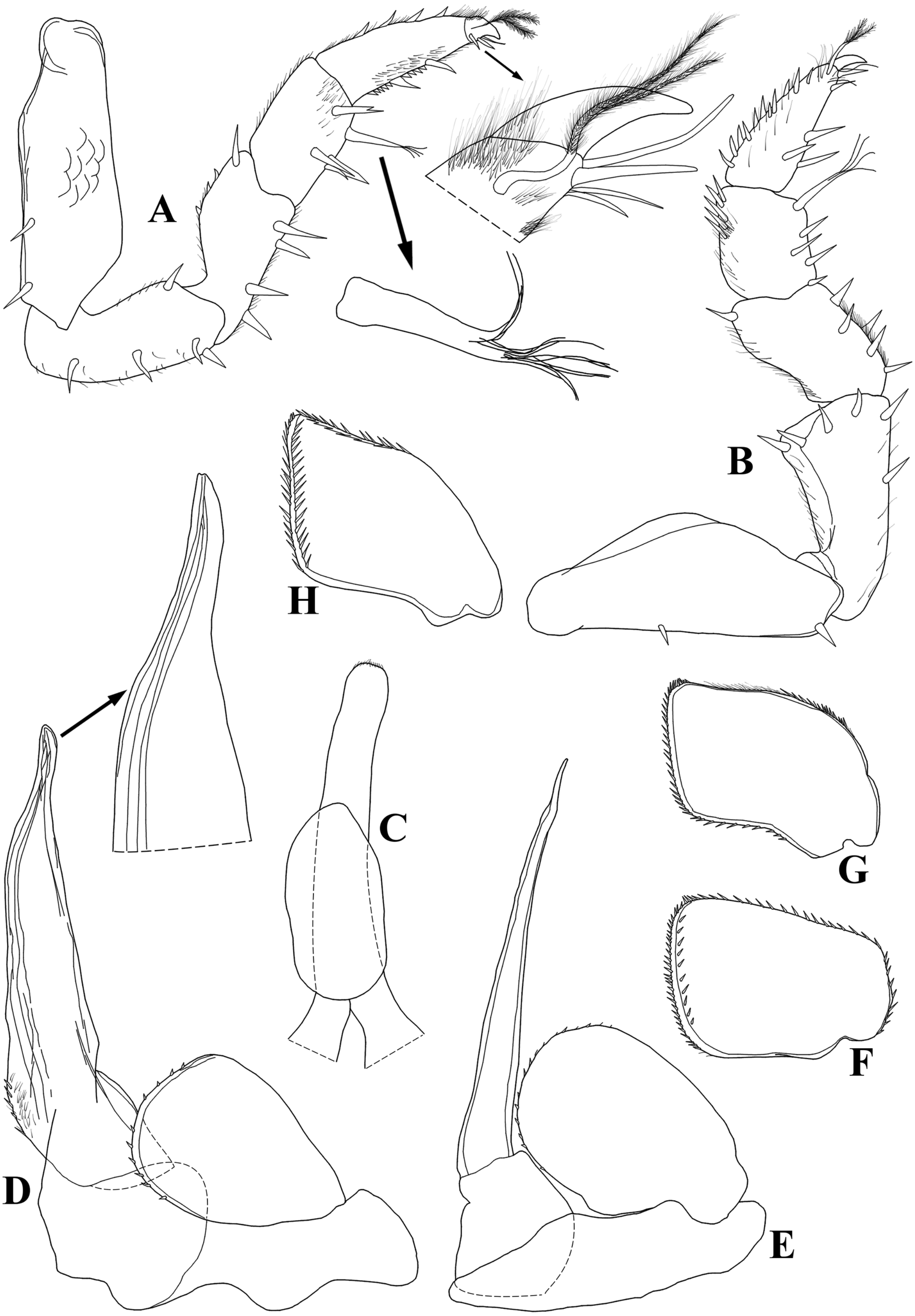

Fig. 14. *Armadilloniscus ninae* Schultz, 1984, ♂ (CDUC-CRU 216). **A**. Pereopod 1. **B**. Pereopod 7. **C**. Genital papilla. **D**. Pleopod 1. **E**. Pleopod 2. **F**. Pleopod 3 exopod. **G**. Pleopod 4 exopod. **H**. Pleopod 5 exopod.

Genital papilla. Ventral shield stout triangular, papilla rounded at apex, bearing small setae (Fig. 14C).

Pleopods. Pleopod 1 (Fig. 14D) exopod ovoid, wider than long; endopod stout, three times as long as exopod, apical portion slightly bent inwards. Pleopod 2 (Fig. 14E) exopod ovoid, wider than long; endopod with flagelliform distal article. Exopods of pleopods 3–5 as in Fig. 14F–H.

Remarks

Schultz (1984) described *A. ninae* from San Pedro beach, Ambergris Cay, Belize. Comparing Shultz's description with the specimens examined here, it was possible to observe that almost all characters mentioned, including the pale dorsal pigmentation, are quite similar. However, Schultz (1984) mentioned that *A. ninae* has eyes composed of 14 ommatidia and antennula with three articles, and herein the specimens showed the eyes composed of 5 ommatidia and antennula of two articles. Most probably, the author misinterpreted the composition of the eyes of this species, since the illustrations of the cephalon clearly show a smaller number. The same statement can be applied to the antennula. In general, within Oniscidea, the composition of the antennula does not vary within the genera, with just few exceptions (see Schmidt 2002, 2003). Moreover, analyzing other representatives of *Armadilloniscus*, it is possible to observe that the antennula is always composed of two articles (see Taiti & Ferrara 1989; Kwon & Wang 1996). Therefore, we identify our specimens as *A. ninae*.

Distribution

This species was previously recorded only from San Pedro beach, Ambergris Cay, Belize (Schultz 1984). First record for Colombia and Cuba.

Family **Halophilosciidae** Verhoeff, 1908

Remarks

The family Halophilosciidae comprises 34 species distributed in three genera, *Halophiloscia* Verhoeff, 1908 (9 spp.), *Littorophiloscia* Hatch, 1947 (22 spp.), and *Stenophiloscia* Verhoeff, 1908 (3 spp.) (WoRMS 2020c). In Colombia, Pearse (1915) recorded *Philoscia culebrae* Moore, 1901 [= *Littorophiloscia c.*] in coffee plantations from Hacienda Cincinati and Hacienda La Rosa, Sierra Nevada de Santa Marta (ca 1400 m a.s.l.), which is considered to be a misidentification by Van Name (1936). *Littorophiloscia culebrae* (Moore, 1901) is recorded from coastal areas of Angola, Brazil, Canary Islands, Caribbean islands, Florida (USA), Hawaii, Iraq, Madagascar, Socotra Archipelago and Yemen (Schmalfuss 2003; Taiti & Ferrara 2004; Araujo & Taiti 2007; Taiti & Lopez 2008; Naser *et al.* 2015; Lisboa *et al.* 2017; Campos-Filho *et al.* 2018). Recent expeditions to the north coast of Bolívar revealed the existence of this species in Colombia, inhabiting the coastal areas of the Barú Peninsula, Cartagena de Indias (C. López-Orozco & Y. Carpio-Díaz, pers. obs.).

Genus ***Halophiloscia*** Verhoeff, 1908

Microphiloscia Vandel, 1973. **Syn. nov.**

Halophiloscia trichoniscoides (Vandel, 1973) comb. nov.
Figs 1, 2G, 15–17

Microphiloscia trichoniscoides Vandel, 1973: 170, figs 19–21.

Material examined

COLOMBIA – **Bolívar, Cartagena de Indias, Islas del Rosario, Isla Grande** • 3 ♂♂; Paraíso Secreto; 10°10′15.9″ N, 75°44′38.8″ W; 4 Apr. 2018; C.M. López-Orozco, R. Borja-Arrieta and K. Meza leg.; CUDC-CRU 218, 220, 221 • 1 ♂, 1 ♀ (parts in micropreparations); same locality as for preceding; 6 Sep. 2017; C.M. López-Orozco, Y.M. Carpio-Díaz and R. Borja-Arrieta leg.; CUDC-CRU 219.

CUBA – **Matanzas, Bahia de Conchinos** • 4 ♂♂, 10 ♀♀; near Cueva de los Peces, between Playa Larga and Playa Giron; 10 Apr. 2002; S. Taiti leg.; MZUF 9607. – **Pinar del Rio** • 2 ♂♂, 3 ♀♀; Penisula Guanahacabibes, La Bajada; 7 Apr. 2002; S. Taiti leg.; MZUF 9608.

Redescription

Measurements. Maximum body length: male 2.8 mm and female 4 mm.

Body. Color light brown (Fig. 2G), mottled with the usual pale muscle spots; posterior margins of pereonites 4–7, pleonites 3–5 and uropod branches more pigmented. Body outline as in Fig. 15A. Back

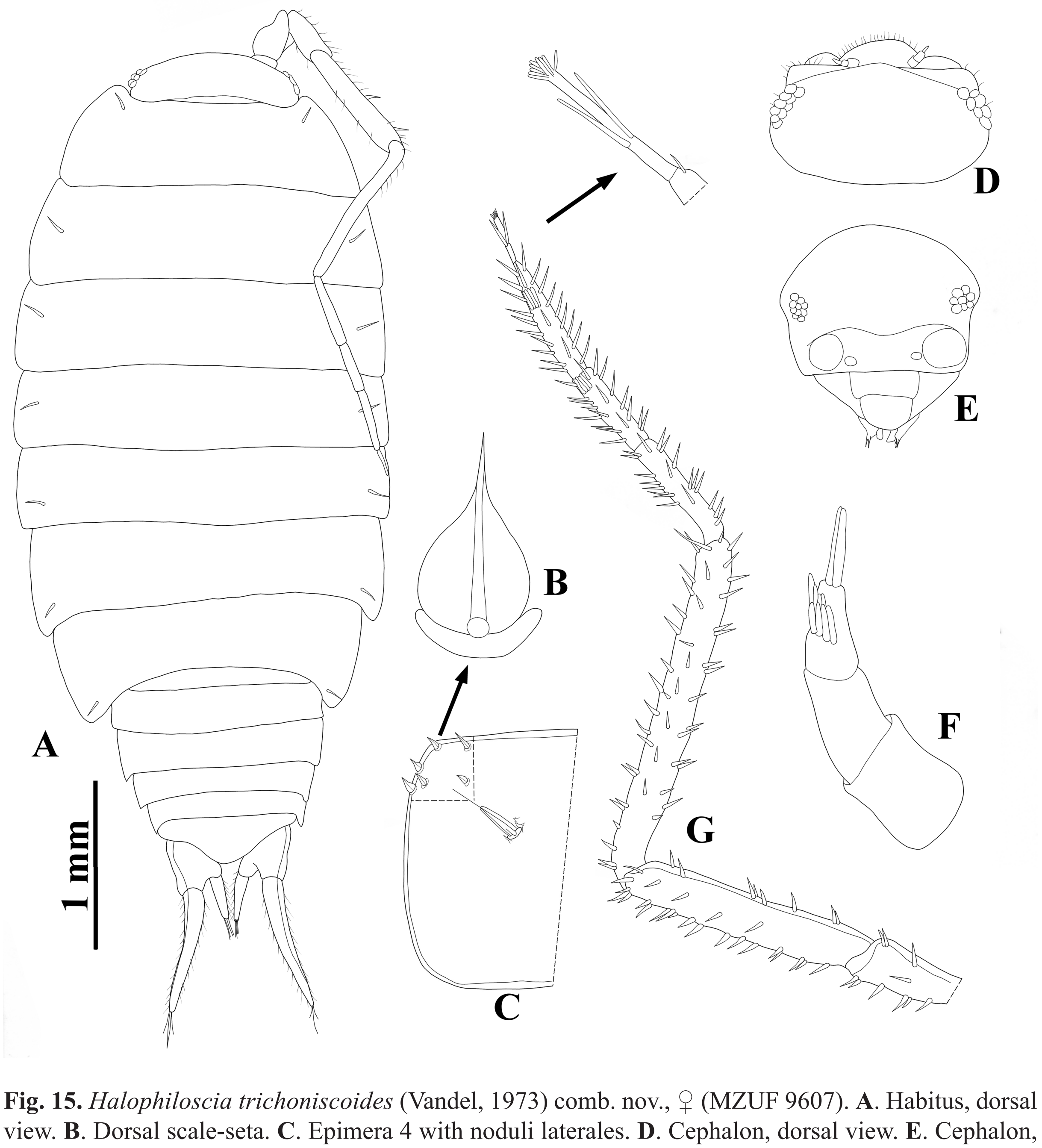

Fig. 15. *Halophiloscia trichoniscoides* (Vandel, 1973) comb. nov., ♀ (MZUF 9607). **A**. Habitus, dorsal view. **B**. Dorsal scale-seta. **C**. Epimera 4 with noduli laterales. **D**. Cephalon, dorsal view. **E**. Cephalon, frontal view. **F**. Antennula. **G**. Antenna.

smooth with numerous triangular scale-setae (Fig. 15B). One line of noduli laterales per side on the pereonites inserted at same distance from lateral margins (Fig. 15A, C).

Cephalon. Without frontal line, suprantennal line straight on median portion; eyes consisting of 10 ommatidia (Fig. 15D–E).

Pleon. Narrower than pereon; epimera of pleonites 3–5 not developed. Telson with lateral sides slightly concave, distal margin broadly rounded (Fig. 15A).

Antennula. Composed of three articles subequal in length, distal article with two lateral aesthetascs plus apical pair (Fig. 15F).

Antenna. When extended posteriorly reaches posterior margin of pereonite 5; flagellum as long as fifth article of peduncle, first article slightly longer than second and third, second and third articles with three and two lateral aesthetascs, respectively (Fig. 15G).

Mouth. Mandibles with molar penicil consisting of at least five branches, left mandible with 2+1 penicils (Fig. 16A), right mandible with 1+1 penicils (Fig. 16B). Maxillula (Fig. 16C) inner endite with two long penicils inserted transversely; outer endite of 5+5 teeth, inner set apically cleft. Maxilla (Fig. 16D) with

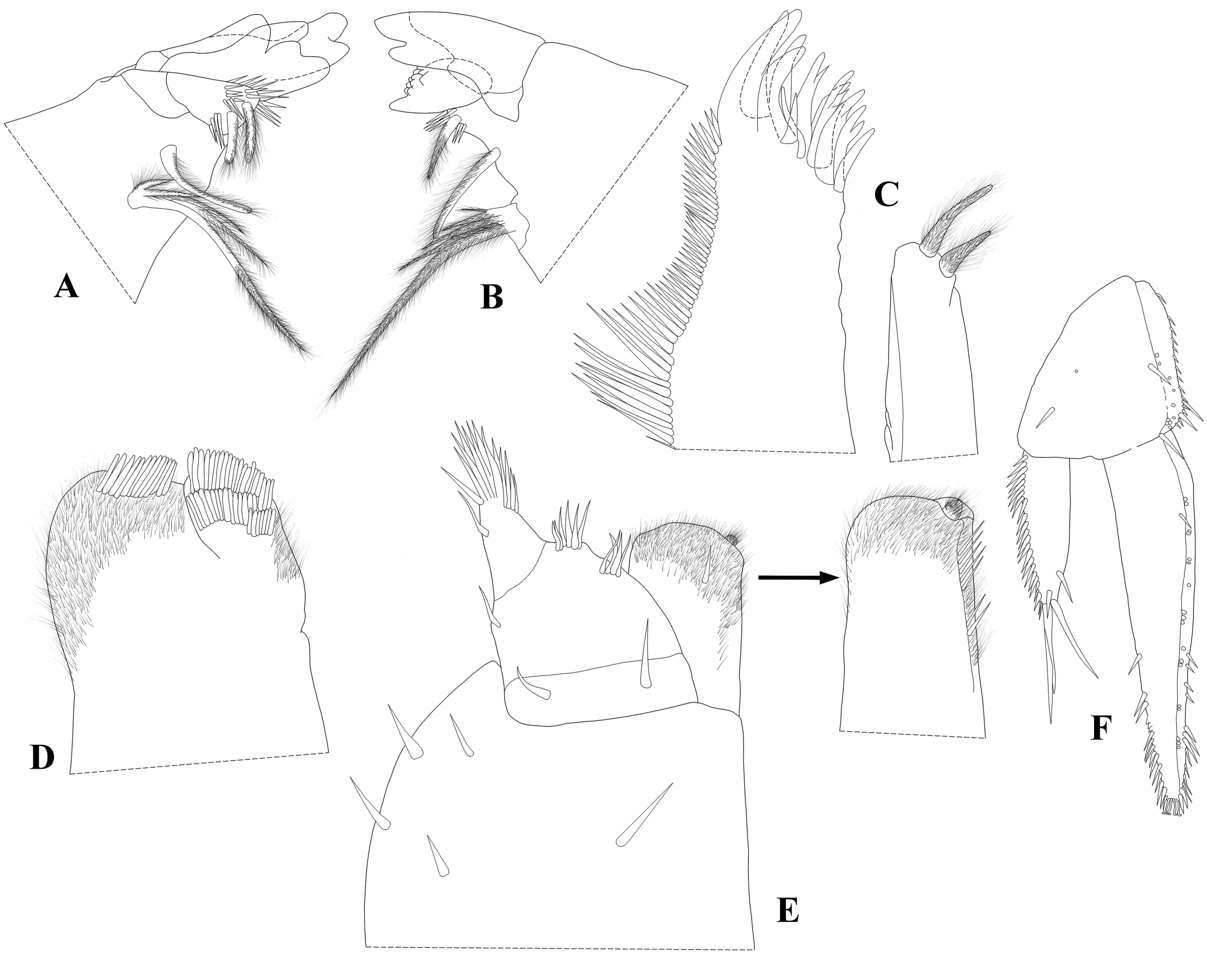

Fig. 16. *Halophiloscia trichoniscoides* (Vandel, 1973) comb. nov., ♀ (MZUF 9607). **A**. Left mandible. **B**. Right mandible. **C**. Maxillula. **D**. Maxilla. **E**. Maxilliped. **F**. Uropod.

bilobate apex, inner lobe rounded, bearing thick setae, outer lobe rounded, covered with thin setae plus three thick setae. Maxilliped (Fig. 16E) base bearing sparse setae, proximal article of palp with two stout setae slightly distinct in length; endite subrectangular, inner and distal margins bearing several thin setae, medial seta not surpassing distal margin, distal margin with one small hairy penicil.

Uropod. Protopod and exopod grooved on outer margin, bearing many glandular pores, exopod almost three times as long as endopod (Fig. 16F).

Pereopods. Rather slender, pereopod 1 carpus bearing transverse antennal grooming brush and distal seta apically cleft; dactylus with ungual seta simple and surpassing outer claw, dactylar seta simple, not surpassing outer claw.

Male

Pereopods 1 and 7. Pereopod 1 (Fig. 17A) propodus slightly flattened, carpus with transverse antennal grooming brush and distal seta hand-like. Pereopod 7 (Fig. 17B) without any sexual dimorphism.

Genital papilla. Ventral shield ovoid, papilla bifurcate with genital orifices opening at apex (Fig. 17C).

Pleopods. Pleopod 1 (Fig. 17D) exopod triangular, inner margin almost straight, outer margin sinuous, distal portion triangular with distal margin rounded; endopod with thickest distal part with sides almost parallel, inner distal part with long pointed process concave on outer margin, prominent subquadrangular apical lobe on outer distal portion bearing thin setae. Pleopod 2 (Fig. 17E) exopod triangular, outer margin concave, bearing seven stout setae; endopod robust, distinctly longer than exopod. Exopods of pleopods 3–5 as in Fig. 17F–H.

Remarks

Vandel (1973) erected the genus *Microphiloscia* to allocate the new species *M. trichoniscoides* from Cueva de la Colorada, Provincia de Oriente, Sierra Maestra, Colorada del Maso, Cuba. After the examination of material belonging to this species, *M. trichoniscoides* shows the shape of the genital papilla and male pleopod 1 endopod typical of members of *Halophiloscia* (see also Taiti & Lopez 2008). *Halophiloscia* includes 9 halophilic species mainly distributed along the Mediterranean and Atlantic coasts of Europe and Africa (Schmalfuss 2003; Taiti & Lopez 2008; Taiti & Argano 2009, 2011). In America, only *H. couchii* (Kinahan, 1858) was recorded, from Argentina, Bermuda, and USA (see Schmidt 2003). The genus is mainly characterized by the runner-type habitus (sensu Schmalfuss 1984), epimera of pereonites 1–7 with one or more lines of noduli laterales, male pereopod 1 and sometimes pereopod 2 carpus and propodus enlarged and covered with several scales on frontal side, male genital papilla distally bifurcated, and male pleopod 1 endopod stout bearing a long, pointed process on the apex (see Schmidt 2003; Taiti & Lopez 2008). The species is included within the genus since it shows all the previously mentioned characters, except that the male pereopods 1 and 2 do not have the carpus and propodus enlarged. Thus, *Microphiloscia* is considered to be a junior synonym of *Halophiloscia*.

Distribution

Cuba (Vandel 1973). First record for Colombia.

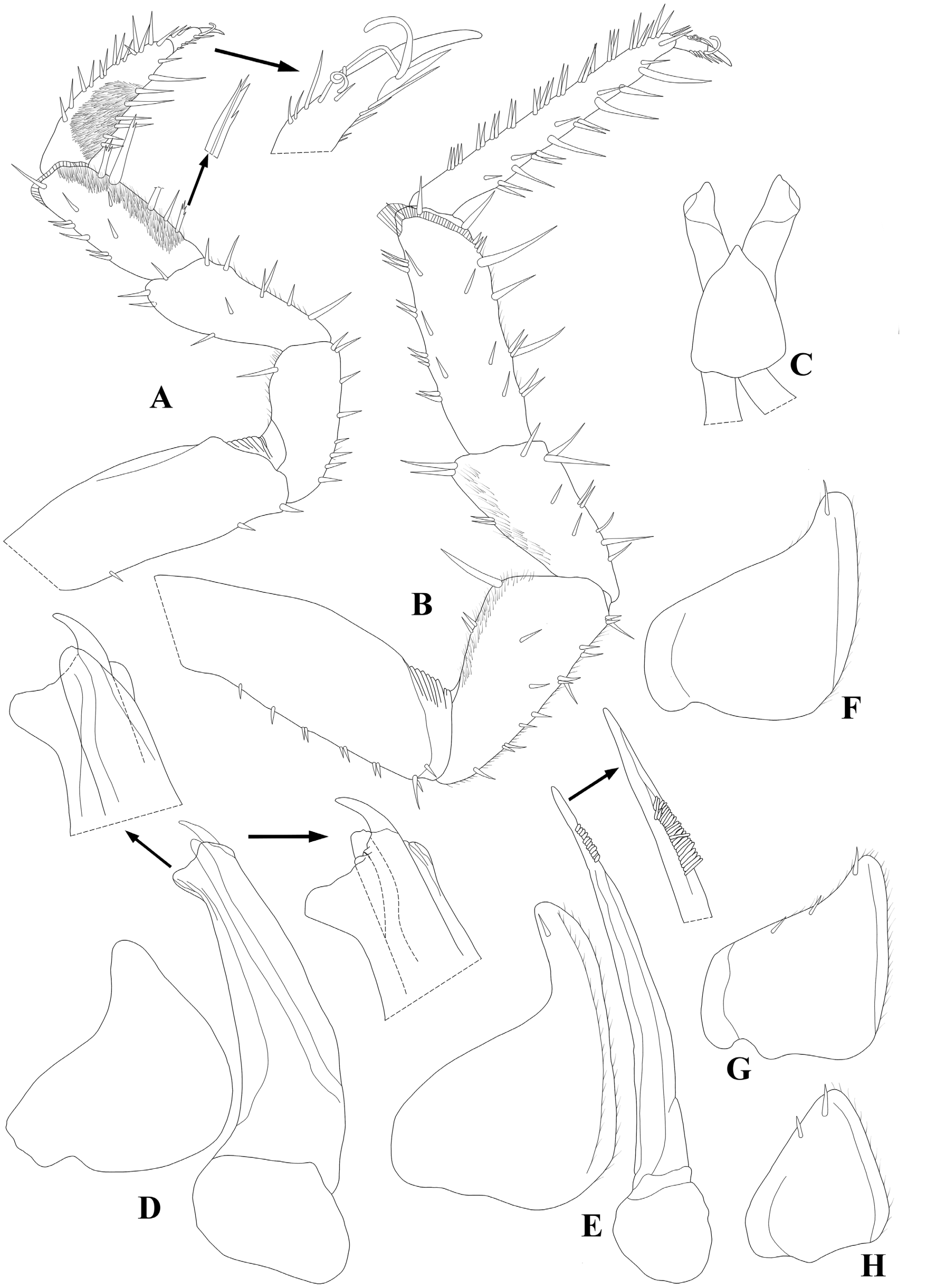

Fig. 17. *Halophiloscia trichoniscoides* (Vandel, 1973) comb. nov., ♂ (MZUF 9607). **A**. Pereopod 1. **B**. Pereopod 7. **C**. Genital papilla. **D**. Pleopod 1. **E**. Pleopod 2. **F**. Pleopod 3 exopod. **G**. Pleopod 4 exopod. **H**. Pleopod 5 exopod.

Genus *Littorophiloscia* Hatch, 1947

Littorophiloscia amphindica Taiti & Ferrara, 1986
Figs 1, 2H

Littorophiloscia amphindica Taiti & Ferrara, 1986: 1369, fig. 16.

Material examined

COLOMBIA – **Bolívar, Cartagena de Indias, Islas del Rosario, Isla Grande** • 5 ♂♂, 4 ♀♀; El Silencio, Laguna Caracolí; 10°10′28.4″ N, 75°44′29.96″ W; 6 Oct. 2017; Y.M. Carpio-Díaz and R. Borja-Arrieta leg.; CUDC-CRU 223 • 1 ♂, 1 ♀; El Silencio, Laguna del Silencio; 10°10′34″ N, 75°44′26.8″ W; 25 Aug. 2017; leg. Y.M. Carpio-Díaz, C.M. López-Orozco and R. Borja-Arrieta; CUDC-CRU 224 • 1 ♂, 4 ♀♀; Laguna La Charca; 10°10′47.8″ N, 75°44′0.4″ W; 7 Sep. 2017; same collectors as for preceding; CUDC-CRU 225 • 2 ♂♂, 3 ♀♀; Hotel La Pola; 10°10′19.4″ N, 75°44′48.9″ W; 24 Nov. 2017; same collectors as for preceding; CUDC-CRU 226 • 1 ♂, 1 ♀; Caño Ratón; 10°10′42.6″ N, 75°44′52.6″ W; 24 Nov. 2017; C.M. López-Orozco leg.; CUDC-CRU 227 • 1 ♂, 1 ♀; 10°10′33.4″ N, 75°44′52.4″ W; 24 Nov. 2017; C.M. López-Orozco, Y.M. Carpio-Díaz and R. Borja-Arrieta leg.; CUDC-CRU 228 • 1 ♂, 3 ♀♀; same collection data as for preceding; 10°10′44.91″ N, 75°44′53.01″ W; CUDC-CRU 229 • 1 ♂, 1 ♀; La Punta, Laguna Encantada; 10°10′48.3″ N, 75°43′38.9″ W; 25 Aug. 2017; C.M. López-Orozco, Y.M. Carpio-Díaz and R. Borja-Arrieta leg.; CUDC-CRU 230 • 5 ♂♂, 6 ♀♀; same collection data as for preceding; 10°10′48.1″ N, 75°43′39.1″ W; CUDC-CRU 231 • 9 ♀♀; same collection data as for preceding; 10°10′48.1″ N, 75°43′37.5″ W; CUDC-CRU 232 • 1 ♀; same collection data as for preceding; 10°10′48.4″ N, 75°43′38.4″ W; CUDC-CRU 233 • 1 ♀; same collection data as for preceding; 10°10′48″ N, 75°43′39.3″ W; CUDC-CRU 234 • 1 ♂, 5 ♀♀; same collection data as for preceding; 10°10′48.1″ N, 75°43′37.5″ W; 7 Sep. 2017; CUDC-CRU 235 • 3 ♂♂, 1 ♀; Paraíso Secreto; 10°10′15.9″ N, 75°44′38.8″ W; 24 Nov. 2017; C.M. López-Orozco leg.; CUDC-CRU 236 • 13 ♂♂, 13 ♀♀, 8 juvs; same locality and collector as for preceding, 6 Sep. 2017; CUDC-CRU 237 • 14 ♂♂, 32 ♀♀, 3 juvs; same locality as for preceding; 4 Apr. 2018; C.M. López-Orozco, R. Borja-Arrieta and K. Meza leg.; CUDC-CRU 238.

Distribution

Tanzania (Zanzíbar), Maldives, Comoro Islands, Indonesia (Bali) and Taiwan (Schmalfuss 2003; Taiti 2014). First record for Colombia.

Littorophiloscia denticulata (Ferrara & Taiti, 1982)
Figs 1, 2I

Bilawrencia denticulata Ferrara & Taiti, 1982: 469, figs 6–7.

Additional reference

Leistikow (2000).

Material examined

COLOMBIA – **Bolívar, Cartagena de Indias, Islas del Rosario, Isla Grande** • 1 ♂, 2 ♀♀; El Silencio, Laguna Caracolí; 10°10′28.4″ N, 75°44′29.96″′ W; 6 Oct. 2017; Y.M. Carpio-Díaz and R. Borja-Arrieta leg.; CUDC-CRU 239 • 3 ♂♂, 3 ♀♀; Paraíso Secreto 10°10′15.9″ N, 75°44′38.8″ W; 6 Sep. 2017; C.M. López-Orozco leg.; CUDC-CRU 240 • 13 ♂♂, 18 ♀♀; same locality as for preceding, 4 Apr. 2018; C.M. López-Orozco, R. Borja-Arrieta and K. Meza leg.; CUDC-CRU 241.

Distribution

Andaman Islands, Brazil and Guatemala (Schmalfuss 2003; Lisboa *et al.* 2017). First record for Colombia.

Littorophiloscia tropicalis Taiti & Ferrara, 1986
Figs 1, 2J

Littorophiloscia tropicalis Taiti & Ferrara, 1986: 1361, fig. 9.

Material examined

COLOMBIA – **Bolívar, Cartagena de Indias, Islas del Rosario, Isla Grande** • many ♂♂ and ♀♀; Playa Libre; 10°10′52.3″ N, 75°43′55.7″ W; 7 Sep. 2017; C.M. López-Orozco, R. Borja-Arrieta and Y.M. Carpio-Díaz leg.; CUDC-CRU 242 • 1 ♂, 6 ♀♀; same locality as for preceding; 10°10′52.3″ N, 75°43′54.8″ W; 5 Oct. 2017; C.M. López-Orozco leg.; CUDC-CRU 243 • 2 ♂♂; La Punta, Hotel Majagua; 10°10′56.41″ N, 75°43′33.51″ W; 6 Oct. 2017; C.M. López-Orozco and L. Vides leg.; CUDC-CRU 244 • 1 ♂, 2 ♀♀; El Silencio, Laguna Caracolí; 10°10′28.4″ N, 75°44′29.96″ W; 6 Oct. 2017; Y.M. Carpio-Díaz and R. Borja-Arrieta leg.; CUDC-CRU 245 • 1 ♂, 2 ♀♀, 1 juv.; El Silencio, Playa La Cocotera; 10°10′49.3″ N, 75°44′16.7″ W; 6 Oct. 2017; C.M. López-Orozco leg.; CUDC-CRU 246 • 1 ♂, 2 ♀♀; Caño Ratón; 10°10′44.91″ N, 75°44′53.01″ W; 24 Nov. 2017; C.M. López-Orozco, R. Borja-Arrieta and Y.M. Carpio-Díaz leg.; CUDC-CRU 247 • 2 ♂♂, 2 ♀♀; same locality, date and collectors; as for preceding; 10°10′33.4″ N, 75°44′52.4″ W; CUDC-CRU 248 • 1 ♂, 3 ♀♀; Paraíso Secreto; 10°10′15.9″ N, 75°44′38.8″ W; 24 Nov. 2017; C.M. López-Orozco leg.; ICN-CR-is 265.

Distribution

Circumtropical (Schmalfuss 2003; Taiti & Ferrara 2004; Taiti & Checcucci 2009; Taiti 2014; Lisboa *et al.* 2017). First record for Colombia.

Family Platyarthridae Verhoeff, 1949
Genus *Trichorhina* Budde-Lund, 1908

Trichorhina bermudezae Carpio-Díaz, López-Orozco & Campos-Filho, 2018
Fig. 1

Trichorhina bermudezae Carpio-Díaz, López-Orozco & Campos-Filho in Carpio-Díaz *et al*., 2018: 307, figs 29–50.

Material examined

COLOMBIA – **Bolívar, Cartagena de Indias, Islas del Rosario, Isla Grande** • 1 ♂; La Punta (TDF); 10°10′48.42″ N, 75°43′41.36″ W; 8 Sep. 2017; Y.M. Carpio-Díaz, C.M. López-Orozco and R. Borja-Arrieta leg.; CUDC-CRU 267 • 1 ♂, 1 ♀; same collection data as for preceding; 10°10′47.36″ N, 75°43′42.5″ W; CUDC-CRU 268 • 4 ♂♂, 6 ♀♀; same collection data as for preceding; 10°10′47.55″ N, 75°43′42.09″ W; CUDC-CRU 269 • 2 ♂♂, 7 ♀♀; same collection data as for preceding; 10°10′46.79″ N, 75°43′43.51″ W; CUDC-CRU 270 • 2 ♂♂, 6 ♀♀; same collection data as for preceding; 10°10′48.02″ N, 75°43′41.58″ W; CUDC-CRU 271 • 1 ♂, 6 ♀♀; same collection data as for preceding; 10°10′47.74″ N, 75°43′41.8″ W; CUDC-CRU 272 • 1 ♂, 6 ♀♀; same collection data as for preceding; 10°10′48.1″ N, 75°43′37.5″ W; CUDC-CRU 273 • 1 ♂; La Punta (TDF); 10°10′47.76″′ N, 75°43′40.27″ W; 25 Aug. 2017; Y.M. Carpio-Díaz, C.M. López-Orozco and R. Borja-Arrieta leg.; CUDC-CRU 274 • 1 ♂, 1 ♀; La Punta, Casa Sra. Miriam; 10°10′46.91″ N, 75°43′46.73″ W; 8 Sep. 2017; C.M. López-Orozco, R.

Borja-Arrieta and Y.M. Carpio-Díaz leg.; CUDC-CRU 275 • 2 ♀♀; El Silencio, Laguna Caracolí; 10°10′28.4″ N, 75°44′29.96″ W; 6 Oct. 2017; Y.M. Carpio-Díaz and R. Borja-Arrieta leg.; CUDC-CRU 276 • 4 ♂♂, 4 ♀♀, 3 juvs; El Silencio (TDF); 10°10′31.91″ N, 75°44′23.68″ W; 24 Aug. 2017; A. Figueroa and B. Valencia leg.; CUDC-CRU 277 • 1 ♂, 1 ♀; El Silencio, Laguna del Silencio; 10°10′32.3″ N, 75°44′27.2″ W; 24 Nov. 2017; C.M. López-Orozco leg.; CUDC-CRU 278 • 7 ♂♂, 12 ♀♀; El Paraiso (TDF); 10°10′22.9″ N, 75°44′32.8″ W; 6 Sep. 2017; C.M. López-Orozco, R. Borja-Arrieta and Y.M. Carpio-Díaz leg.; CUDC-CRU 279 • 3 ♂♂; Caño Ratón; 10°10′42.9″ N, 75°44′52.8″ W; 24 Nov. 2017; C.M. López-Orozco leg.; CUDC-CRU 280.

Previous records

Botanical Garden "Guillermo Piñeres", Turbaco, Bolívar (Carpio-Díaz *et al.* 2018).

Distribution

Colombia. First record for continental islands of the Colombian Caribbean.

Trichorhina heterophthalma Lemos de Castro, 1964
Fig. 1

Trichorhina heterophthalma Lemos de Castro, 1964: 2, figs 1–2.

Trichorhina heterophthalma – Carpio-Díaz *et al.* 2018: 303, fig. 3.

Material examined

COLOMBIA – **Bolívar, Cartagena de Indias, Islas del Rosario, Isla Grande** • 3 ♂♂, 9 ♀♀; La Punta, Casa Sra. Miriam; 10°10′46.91″ N, 75°43′46.73″ W; 8 Sep. 2017; C.M. López-Orozco, R. Borja-Arrieta and Y.M. Carpio-Díaz leg.; CUDC-CRU 260 • 3 ♀♀; Caño Ratón; 10°10′42.9″ N, 75°44′52.8″ W; 24 Nov. 2017; C.M. López-Orozco leg.; CUDC-CRU 261 • 3 ♀♀; El Silencio, Laguna del Silencio; 10°10′31.91″ N, 75°44′23.68″ W; 25 Aug. 2017; Alison Figueroa leg.; CUDC-CRU 262 • 1 ♂, 1 ♀; La Punta (TDF), Laguna Encantada; 10°10′47.36″ N, 75°43′42.5″ W; 8 Sep. 2017; C.M. López-Orozco, Y.M. Carpio-Díaz and R. Borja-Arrieta leg.; CUDC-CRU 263 • 2 ♂♂, 3 juvs; same locality, date and collectors as for preceding; 10°10′47.55″ N, 75°43′42.89″ W; CUDC-CRU 264 • 2 ♀♀; same locality and collectors as for preceding; 10°10′47.8″ N, 75°43′37.5″ W; 25 Aug. 2017; CUDC-CRU 265 • 2 ♂♂, 2 ♀♀; La Punta; 10°10′47.74″ N, 75°43′41.85″ W; 8 Sep. 2017, same collectors as for preceding; CUDC-CRU 266.

Previous records

Botanical Garden "Guillermo Piñeres", Turbaco, Bolívar (Carpio-Díaz *et al.* 2018).

Distribution

Pantropical (Schmalfuss 2003). First record for continental islands of the Colombian Caribbean.

Family Porcellionidae Brandt, 1831
Genus *Porcellionides* Miers, 1877

Porcellionides pruinosus (Brandt, 1833)
Fig. 1

Porcellio pruinosus Brandt, 1833: 19.

Porcellionides pruinosus – Carpio-Díaz *et al.* 2016: 434, figs 1–2.

Material examined

COLOMBIA – **Bolívar, Cartagena de Indias, Islas del Rosario, Isla Grande** • 3 ♂♂, 7 ♀♀; Orika; 10°10′37.2″ N, 75°44′27.59″ W; 8 Sep. 2017; A. Figueroa leg.; CUDC-CRU 249 • 2 ♀♀; El Silencio, Playa La Cocotera; 10°10′49.3″ N, 75°44′16.7″ W; 6 Oct. 2017; C.M. López-Orozco, R. Borja-Arrieta and Y.M. Carpio-Díaz leg.; CUDC-CRU 250 • 1 ♂, 11 ♀♀; El Silencio, Laguna del Silencio; 10°10′33.5″ N, 75°44′26.9″ W; 24 Aug. 2017, same collectors as for preceding; CUDC-CRU 251 • 1 ♀; same collection data as for preceding; 10°10′32.9″ N, 75°44′27.3″ W; CUDC-CRU 252 • 18 ♂♂, 15 ♀♀, 1 juvenile; same collection data as for preceding; 10°10′35″ N, 75°44′26.4″ W; CUDC-CRU 253 • 3 ♀♀; La Punta, Laguna Encantada; 10°10′47.76″ N, 75°43′40.27″ W; 25 Aug. 2017; C.M. López-Orozco, Y.M. Carpio-Díaz and R. Borja-Arrieta leg.; CUDC-CRU 254.

Previous records

San Andrés (Van Name 1936); Angelópolis, Cafetal La Camelia Antioquia Dept, and near Nevado del Ruíz, Caldas Dept (Richardson 1912); Cartagena de Indias, Barú, Bolívar Dept (Caribbean region) (Carpio-Díaz *et al.* 2016).

Distribution

Cosmopolitan species (Schmalfuss 2003). First record for continental islands of the Colombian Caribbean.

Family Agnaridae Schmidt, 2003
Genus *Agnara* Budde-Lund, 1908

Agnara madagascariensis (Budde-Lund, 1885)
Figs 1, 2K

Metoponorthus Madagascariensis Budde-Lund, 1885: 189.

Additional references

Schmalfuss & Ferrara (1978); Ferrara & Taiti (1986).

Material examined

COLOMBIA – **Bolívar, Cartagena de Indias, Islas del Rosario, Isla Grande** • 5 ♂♂, 6 ♀♀; Caño Ratón, Casa Comunal; 10°10′39.06″ N, 75°44′50.4″ W; 8 Sep. 2017; C.M. López-Orozco, R. Borja-Arrieta, Y.M. Carpio-Díaz and A. Figueroa leg.; CUDC-CRU 138 • 2 ♀♀; Orika; 10°10′37.2″ N, 75°44′27.59″ W; 8 Sep. 2017; A. Figueroa leg.; CUDC-CRU 139 • 13 ♂♂, 49 ♀♀; La Punta, Casa Sra. Miriam; 10°10′46.91″ N, 75°43′46.73″ W; 8 Sep. 2017; C.M. López-Orozco, R. Borja-Arrieta and Y.M. Carpio-Díaz leg.; CUDC-CRU 140.

Distribution

Ascension Island, Senegal, Guinea Bissau, Arabian Peninsula, Madagascar, southern China, Taiwan and Venezuela (Ashmole & Ashmole 2000; Schmidt 2001; Schmalfuss 2003). First record for Colombia.

Family Armadillidae Brandt, 1831
Genus *Ctenorillo* Verhoeff, 1942

Ctenorillo tuberosus (Budde-Lund, 1904)
Figs 1, 2L

Armadillo tuberosus Budde-Lund, 1904: 109, pl. x, figs 1–4.

Additional reference

Campos-Filho *et al.* (2017).

Material examined

COLOMBIA – **Bolívar, Cartagena de Indias, Islas del Rosario, Isla Grande** • 1 ♂; Caño Ratón, Casa Comunal; 10°10′39.06″ N, 75°44′50.4″ W; 8 Sep. 2017; C.M. López-Orozco, R. Borja-Arrieta, Y.M. Carpio-Díaz and A. Figueroa leg.; CUDC-CRU 255 • 1 ♂; Orika; 10°10′39″ N, 75°44′26.8″ W; 25 Aug. 2017; C.M. López-Orozco, R. Borja-Arrieta and Y.M. Carpio-Díaz leg.; CUDC-CRU 256 • 2 ♂♂, 5 ♀♀; La Punta, Casa Sra. Miriam; 10°10′46.91″ N, 75°43′46.73″ W; 8 Sep. 2017; same collectors as for preceding; CUDC-CRU 257 • 4 ♂♂; El Silencio, Laguna del Silencio; 10°10′33.5″ N, 75°44′26.9″ W; 24 Aug. 2017, same collectors as for preceding; CUDC-CRU 258 • 2 ♂♂; same collection data as for preceding; 10°10′32.9″ N, 75°44′27.3″ W; CUDC-CRU 259 • 3 ♂, 11 ♀♀; same collection data as for preceding; 10°10′34.3″ N, 75°44′26.7″ W; ICN-CR-is 266.

Distribution

Brazil and Haiti (Schmalfuss 2003; Campos-Filho *et al.* 2017). First record for Colombia.

Molecular phylogenetic analyses of Tylos Audouin, 1826

Sequences obtained for the three species of *Tylos* from Isla Grande and the specimen from Florida have been deposited under GenBank Accession Numbers MW532964–MW532970 and MW533069–MW533075. Only the 12S rDNA sequence was obtained for the specimen from Isla Grande assigned to *T. marcuzzii*. Phylogenetic analyses using only 12S rDNA group this sequence with the two specimens of *T. marcuzzii* from Cuba reported in Hurtado *et al.* (2014); see Fig. 18. The 12S rDNA p-distance between *T. marcuzzii* from Isla Grande and *T. marcuzzii* from Cuba is 2.0–2.7%, whereas the distance between the specimens from the two Cuban localities is 2.0% (Table 2). Only the 16S rDNA sequence was obtained for the specimen of *T. niveus* from the Florida Keys, the type locality of this species. Phylogenetic analyses of 16S rDNA show that specimens identified as *T. niveus* from Isla Grande are most closely related to the *T. niveus* specimen from the Florida Keys. The 16S rDNA p-distance between *T. niveus* from Isla Grande and the Florida Keys is 2.7% (Table 2).

The concatenated (12S rDNA and 16S rDNA) dataset was comprised of 43 taxa and 740 characters (excluding characters with ambiguous homology), 236 of which were parsimony-informative. The specimens assigned to *T. marcuzzii* were used as outgroup. Five main lineages were identified for the ingroup taxa in the concatenated phylogenetic analyses, which formed a basal polytomy (Fig. 18): (1) *T. niveus* from Puerto Rico; (2) *Tylos* sp. from Yaguanabo, Cuba; (3) *T. niveus* from Florida and Isla Grande; (4) *T. negroi* sp. nov.; and (5) *Tylos punctatus* sensu lato from the Northeastern Pacific. The range of 16S rDNA and 12S rDNA p-distances between the four basal lineages excluding *T. punctatus* is 11.1–13.6% and 9.7–15.5%, respectively. The range of 16S rDNA and 12S rDNA p-distances between these ingroup lineages and *T. marcuzzii* is 19.4–22.2% and 19.5–23.8%, respectively.

Table 2. Genetic *p*-distance for 16S rDNA (above the diagonal) and 12S rDNA (below the diagonal) between the main genetic lineages of *Tylos* Audouin, 1826 in the Caribbean and Atlantic.

	T. niveus Puerto Rico	*Tylos* sp. Yaguanabo, Cuba	*T. negroi* sp. nov. Isla Grande	*T. niveus* Isla Grande	*T. niveus* Florida Keys	*T. marcuzzii* Cayo Coco, Cuba	*T. marcuzzii* Pinar del Rio, Cuba
T. niveus Puerto Rico	–	12.3%	11.1%	9.7%	11.4%	19.4%	19.9%
Tylos sp. Yaguanabo, Cuba	9.7%	–	12.1%	13.5%	13.6%	21.7%	22.2%
T. negroi sp. nov. Isla Grande	10.9%	14.7%	–	12.4%	12.5%	21.1%	21.4%
T. niveus Isla Grande	12.2%	12.8%	15.5%	–	2.7%	21.7%	21.7%
T. niveus Florida Keys					–		
T. marcuzzii Cayo Coco, Cuba	21.0%	20.0%	21.9%	20.4%	NA	–	2.0%
T. marcuzzii Pinar del Rio, Cuba	20.6%	19.7%	22.1%	20.4%	NA	2.0%	–
T. marcuzzii Isla Grande	20.6%	19.5%	23.8%	22.0%	NA	2.0%	2.7%

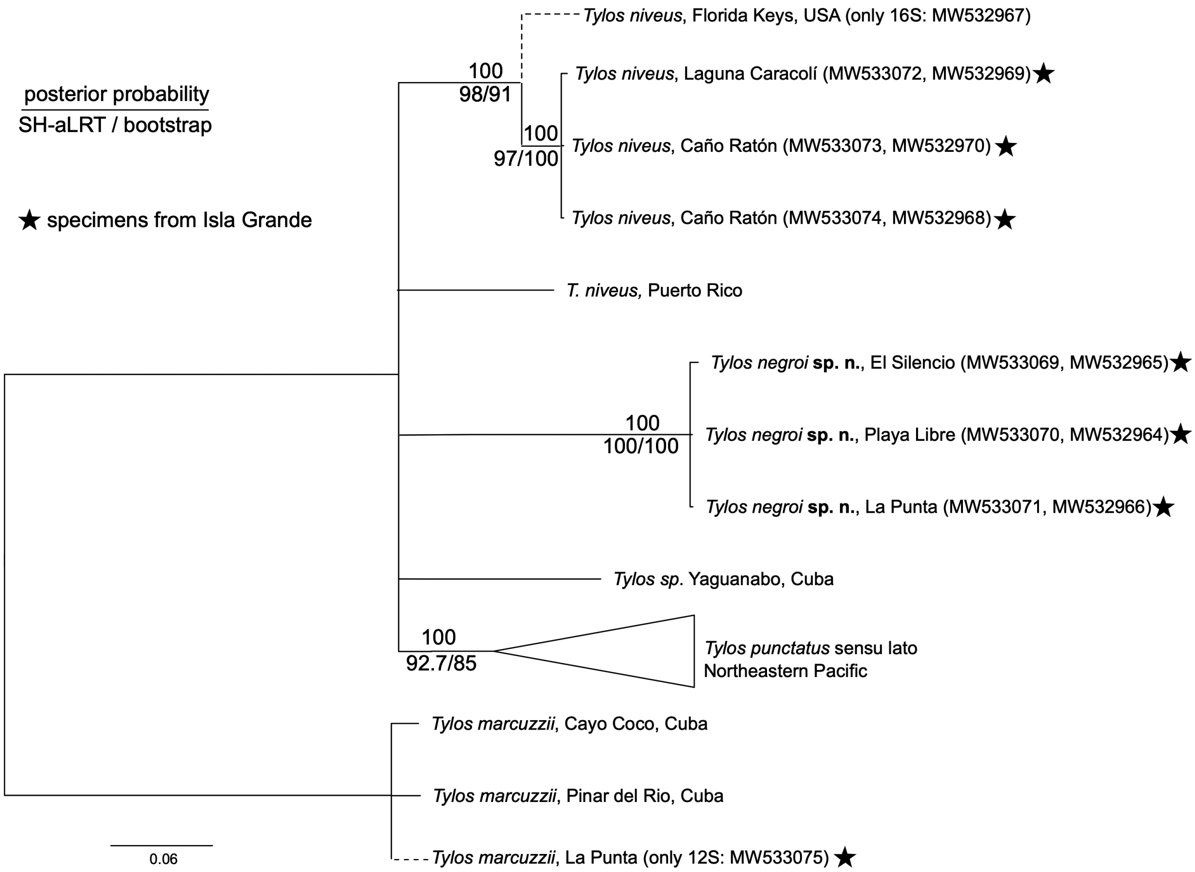

Fig. 18. Phylogenetic relationships among lineages of *Tylos* Audouin, 1826 from Isla Grande and their closest relatives. Majority rule consensus tree of the Bayesian posterior distribution (GTR+G+I model; 2 runs; 4 million generations; sampled every 1000; 10% burn-in), based on the dataset combining the 12S rDNA and 16S rDNA genes (Supplementary file 3). Nodes with less than 70% support (posterior probability, bootstrap, and SH-aLRT) for any dataset have been collapsed. Dashed lines represent relationships redrawn based on single gene analyses (Supplementary file 1 and Supplementary file 2). The split between the outgroup (*T. marcuzzii*) and the ingroup received 100% support in all analyses. Specimens from Isla Grande, Colombia are marked with a star. GenBank accession numbers for newly generated sequences are provided in parentheses.

Key to species of terrestrial isopods from Isla Grande

1. Eyes present 2
– Eyes absent .... ***Stenoniscus nestori*** López-Orozco, Taiti & Campos-Filho sp. nov.

2. Animal with conglobation ability 3
– Animal without conglobation ability. 6

3. Pereon dorsally smooth; pereonite 5 epimera with ventral phylacomera 4
– Pereon dorsally tuberculate; pereonite 5 epimera without phylacomera ....
.... ***Ctenorillo tuberosus*** (Budde-Lund, 1904)

4. Phylacomera 5 paddle-shaped, extended anteriorly 5
– Phylacomera 5 sickle-shaped.. ***Tylos marcuzzii*** Giordani Soika, 1954

5. Inner lobe of schisma extending beyond posterior margin of outer lobe ....
.... ***Tylos negroi*** López-Orozco, Carpio-Díaz & Campos-Filho sp. nov.
– Inner lobe of schisma not extending beyond posterior margin of outer lobe ....
.... ***Tylos niveus*** Budde-Lund, 1885

6. Flagellum of the antennae with 4 or more articles 7
– Flagellum of the antennae with 2–3 articles 10

7. Flagellum of the antennae with 4 articles 8
– Flagellum of the antennae with more than 10 articles......... ***Ligia baudiniana*** Milne-Edwards, 1840

8. Dorsal surface almost smooth or with small tubercles 9
– Dorsal surface of pereon with 4 prominent longitudinal ribs ....
.... ***Armadilloniscus caraibicus*** Paoletti & Stinner, 1989

9. Dorsal surface almost smooth.. ***Armadilloniscus ninae*** Schultz, 1984
– Dorsal surface with small tubercles ....
.... ***Armadilloniscus luisi*** Carpio-Díaz, Taiti & Campos-Filho sp. nov.

10. Flagellum of the antennae with 3 articles 11
– Flagellum of the antennae with 2 articles 14

11. Genital papilla with truncate apex 12
– Genital papilla with bifurcated apex....... ***Halophiloscia trichoniscoides*** (Vandel, 1973) comb. nov.

12. Male pleopod 1 endopod without lobe on outer margin of apical part 13
– Male pleopod 1 endopod with a lobe on outer margin of apical part ....
.... ***Littorophiloscia tropicalis*** Taiti & Ferrara, 1986

13. Male pleopod 1 endopod with apex divided into three points ....
.... ***Littorophiloscia amphindica*** Taiti & Ferrara, 1986
– Male pleopod 1 endopod with a long spine and 2 small distinct denticles on the inner margin of the apical part.. ***Littorophiloscia denticulata*** (Ferrara & Taiti, 1982)

14. Pleopod exopods with lungs 15
– Pleopod exopods without lungs 16

15. Pleopodal lungs present in first two pairs of pleopods ...... ***Porcellionides pruinosus*** (Brandt, 1833)
– Pleopodal lungs present in all five pairs of pleopods .... ***Agnara madagascariensis*** (Budde-Lund, 1885)

16. Colorless body; eyes composed of two unequal ommatidia.. ....***Trichorhina heterophthalma*** Lemos de Castro, 1964
– Pigmented body; eyes with 10 ommatidia.. .... ***Trichorhina bermudezae*** Carpio-Díaz, López-Orozco & Campos-Filho, 2018

Discussion

Despite its small area, Isla Grande appears to harbor a high diversity of oniscideans in coastal habitats (i.e., from beaches, coastal lagoons and mangroves), where 16 of the 17 species reported here were observed (Table 1). These include species commonly found in the Caribbean region (*Ligia baudiniana*, *Tylos niveus*, *T. marcuzzii*, *Armadilloniscus caraibicus*, *A. ninae*, and *Halophiloscia trichoniscoides* comb. nov.) and three new species (*Tylos negroi* López-Orozco, Carpio-Díaz & Campos-Filho sp. nov., *Stenoniscus nestori* López-Orozco, Taiti & Campos-Filho sp. nov., and *Armadilloniscus luisi* Carpio-Díaz, Taiti & Campos-Filho sp. nov.). Only two species were observed in the tropical dry forest, *Trichorhina bermudezae* and *T. heterophthalma*, which had previously been reported in this habitat on the mainland, in the northern Bolívar department (Carpio-Díaz *et al.* 2018). Eight of the 17 species have only been reported in the Caribbean region and nine are reported for the first time in Colombia (Table 1).

Molecular phylogenetic analyses supported the identification of three species of *Tylos* in Isla Grande and the recognition of one of them as a new species. The species identified as *T. marcuzzii* clustered with specimens identified as this species from two Cuban localities. The genetic distance between the specimens from Isla Grande and those from Cuba ranged between 2.0 and 2.7% for 12S rDNA, whereas the divergence between the two Cuban specimens was 2.0%. These probably correspond to species-level divergences (Hurtado *et al.* 2013). The Isla Grande specimens from Laguna Caracolí and Caño Ratón recognized as *T. niveus* were recovered as closely related with the specimen from the Florida Keys, type locality of the species. The genetic distance between specimens of *T. niveus* from the Isla Grande and the Florida Keys was 2.7% for 16S rDNA. The lineage formed by the *T. niveus* from Isla Grande and Florida is part of a cluster in which a basal polytomy of five lineages, including this lineage, was observed. Another basal lineage corresponds to the new species *T. negroi* sp. nov., indicating the high degree of genetic differentiation of this isopod within this cluster. The other three basal lineages include a clade of specimens from the Northeastern Pacific (referred to as *T. punctatus* sensu lato in Hurtado *et al.* 2014), which appears to be a clade conformed by multiple species (Hurtado *et al.* 2013), a lineage previously identified as *T. niveus* from Aguada, Puerto Rico (Hurtado *et al.* 2014), and a lineage previously identified as *Tylos* sp. from Yaguanabo, Cuba (Hurtado *et al.* 2014). Genetic distances among the basal lineages range from 9.7 to 15.5% for 12S rDNA and 11.1 to 13.6% for 16S rDNA, which appear to correspond to species-level divergences in *Tylos*. Hurtado *et al.* (2013) reported smaller genetic divergences among multiple lineages that show morphological differences and appear to represent different species within the Northeastern Pacific clade. Although the lineage from Puerto Rico was previously identified as *T. niveus*, it probably corresponds to a different species, because it is highly divergent from the specimen from the Florida Keys, type locality of *T. niveus*. Similarly, *Tylos* sp. from Yaguanabo, Cuba, also appears to correspond to a different species. It is important to obtain more specimens of *Tylos* from the Caribbean to better understand the diversity patterns of this group in the region, and to use more markers, employing genomic methods, which could help solve the relationships among the five basal lineages.

We identified the *Ligia* found in Isla Grande as *L. baudiniana*. The taxonomy of *L. baudiniana*, however, needs revision. This species was originally described by Milne-Edwards (1840), from the surrounding of the San Juan de Ulúa Fort in the city of Veracruz, Gulf of Mexico, Mexico. However, specimens recently collected by LH from there corresponded to *Ligia exotica* Roux, 1828 (Santamaria *et al.* 2014; Hurtado *et al.* 2018). Santamaria *et al.* (2014) identified a monophyletic clade of *Ligia* distributed in the Caribbean Sea, Bahamas, southern Florida, Bermuda, and the Pacific coast of Central America and Colombia. Males of this clade have in their pleopod 2 endopod a large lateral process that bifurcates close to the apex (Leistikow 1997: fig. 6 and Santamaria *et al.* 2014: fig. 4). Schultz (1972) and Schultz & Johnson (1984) assigned specimens from Florida and Bermuda with this characteristic to *L. baudiniana*. Santamaria *et al.* (2014) found that this clade is comprised of seven highly divergent lineages, which, based on their divergences, might warrant separate species status. One of the clades (Clade E in Santamaria *et al.* 2014), was observed on the Magdalena coast of Colombia, about 280 km northeast of Isla Grande. Unfortunately, we could not obtain molecular data for the specimens of Isla Grande, but molecular analyses will reveal whether they also belong to Clade E or to another lineage.

This study clearly shows the high potential for discovering unknown biodiversity of coastal oniscideans, a poorly studied group, in the Caribbean region. An examination of the oniscidean diversity on a tiny island of the Colombian Caribbean resulted in the description of three new species of coastal oniscideans. This and previous phylogeographic studies of isopods of *Tylos* and *Ligia* are revealing high levels of cryptic biodiversity in the Caribbean region, suggesting a high potential for finding much more diversity if sampling is expanded (Hurtado *et al.* 2014; Santamaria *et al.* 2014). As coastal habitats are threatened by multiple factors in the region, and unique evolutionary lineages of coastal oniscideans are at imminent risk, it is important to continue taxonomic and systematic studies of this group to identify diversity patterns and protect members of this highly diverse group. Coastal isopods can be informative on the processes that have contributed to the extraordinary diversity of the Caribbean region. For example, the phylogeographic study of *Ligia* allowed for testing different hypotheses to explain diversification patterns within this group, which included competing geological hypotheses and oceanic circulation patterns, and also provided evidence of multiple Atlantic-Pacific divergences, which appear to reflect separate vicariant events (Santamaria *et al.* 2014). Interestingly, studies of other coastal isopods have also shown multiple transisthmian divergences, a highly debated topic in evolutionary studies of the region (Hurtado *et al.* 2016, 2017). Coastal oniscideans also have the potential of being used as biomonitors of contamination (García-Hernández *et al.* 2015), and it is important to understand their diversity well in order to correctly interpret coastal ecological studies (Mattos *et al.* 2018). Our work on *Tylos* highlights the importance of combining taxonomic and molecular analyses to support taxonomic decisions and uncover cryptic diversity. The already published dataset of mitochondrial sequences for most nominal species of this genus (Hurtado *et al.* 2014) made the molecular phylogenetics analyses for specimens of *Tylos* possible. Given the multiple threats to coastal habitats in the Caribbean region, it is of upmost importance to generate similar molecular information for other oniscidean species to better analyze their diversification patterns in the region.

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Suppl. file 1. Dataset S1. Alignment of 12S rDNA dataset with all positions. It contains 53 taxa and 539 characters. https://doi.org/10.5852/ejt.2022.793.1643.5897

Suppl. file 2. Dataset S2. Alignment of 16S rDNA dataset with all positions. It contains 59 taxa and 502 characters. https://doi.org/10.5852/ejt.2022.793.1643.5899

Suppl. file 3. Dataset S3. This file contains the concatenated 12S and 16S rDNA genes after removal of positions deemed of ambiguous homology. It contains 43 taxa and 740 characters.
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