

Terrestrial isopods (Isopoda: Oniscidea) of the Botanical Garden of Cartagena “Guillermo Piñeres”, Colombia, with the description of three new species

Мокрицы (Isopoda: Oniscidea) ботанического сада Картахены «Гильермо Пиньерес», Колумбия, с описанием трех новых видов

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KEY WORDS: Woodlice, Oniscidea, New species, Colombian Caribbean, Neotropical.

КЛЮЧЕВЫЕ СЛОВА: мокрицы, Oniscidea, новые виды, карибский регион Колумбии, Неотропика.

ABSTRACT. To date, 17 species of terrestrial isopods are recorded from the Colombian Caribbean. During recent surveys in the Botanical Garden of Cartagena “Guillermo Piñeres”, Turbaco, Bolívar, Colombia, six species were recognized, belonging to the families Philosciidae, Scleropactidae, Platyarthridae and Armadillidae, of which three are new to the science, and described here: *Colomboniscus carpioi* sp.n. (Scleropactidae), *Ctenorillo dazai* sp.n. (Armadillidae), and *Trichorhina bermudezae* sp.n. (Platyarthridae). This represents the first record of *Ctenorillo* to Colombia and of *Trichorhina* and *Colomboniscus* to the Colombian Caribbean region. Finally, *Venezillo gigas* is re-described.

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РЕЗЮМЕ. К настоящему времени с карибского побережья Колумбии известно 17 видов наземных изопод. В результате исследования территории ботанического сада Картахены «Гильермо Пиньерес» (муниципалитет Турбако, департамент Боливар, Колумбия) выявлено 6 видов наземных изопод из семейств Philosciidae, Scleropactidae, Platyarthridae

и Armadillidae, три из которых описаны как новые для науки: *Colomboniscus carpioi* sp.n. (Scleropactidae), *Ctenorillo dazai* sp.n. (Armadillidae), и *Trichorhina bermudezae* sp.n. (Platyarthridae). Род *Ctenorillo* впервые отмечен в фауне Колумбии, а роды *Trichorhina* и *Colomboniscus* — в фауне карибского региона Колумбии. Дано переописание *Venezillo gigas*.

Introduction

Terrestrial isopods (Oniscidea) constitute one of the most diverse groups within Isopod crustaceans (ca. 3,700 species), and have adapted to various terrestrial environments [Schmalfuss, 2003; Sfenthourakis, Taiti, 2015].

To date, 39 species belonging to 23 genera and 12 families are known from Colombia, occurring from the supralittoral zone to the tropical and mountain forest areas [Richardson, 1912; Pearse, 1915; Vandel, 1972; Taiti *et al.*, 1995; Leistikow, 2001a, b; Schmalfuss, 2003; Schmidt, 2007; Preciado, Martínez, 2014; López-Orozco *et al.*, 2014, 2016, 2017; Carpio-Díaz *et al.*, 2016]. Among them, 17 species are known to the Caribbean region of Colombia, i.e. *Ligia baudiniana* Milne-Edwards, 1840, *L. simoni* (Dollfus, 1893) (Ligiidae), *Tylos niveus* Budde-Lund, 1885 (Tyliidae), *Androdelsocia colombiana* López-Orozco, Carpio-Díaz et Campos-Filho, 2016, *Ischioscia curvaculeus* Leis-

Leistikow, 2001, *Pulmoniscus turbanaensis* López-Orozco, Carpio-Díaz et Campos-Filho, 2017 (Philosciidae), *Colomboscia bituberculata* Taiti, Allspach et Ferrara, 1995, *C. gaigei* (Pearse, 1915), *Scleropactes colombi-ensis* (Pearse, 1915) (Scleropactidae), *Littorophilosia culebrae* (Moore, 1901) (Halophilosciidae), *Synarmadillo ruthveni* (Pearse, 1915), *Venezillo brevispinis* (Pearse, 1915), *V. gigas* (Miers, 1877), *V. grenadensis* (Budde-Lund, 1893), *V. vincentis* (Budde-Lund, 1904) (Armadillidae), *Agabiformius lentus* (Budde-Lund, 1885), and *Porcellionides pruinosus* (Brandt, 1833) (Porcellionidae) [Richardson, 1912; Pearse, 1915; Leistikow, 2001b; Schmalfuss, 2003; Schmidt, 2007; López-Orozco *et al.*, 2014, 2016, 2017; Carpio-Díaz *et al.*, 2016].

The seasonally dry tropical forest areas (SDTF) have disjunct distribution along the Neotropical region [Pennington *et al.*, 2006; Banda-R *et al.*, 2016], comprising distinct ecosystems and harboring high levels of endemic biota [Lamoreux *et al.*, 2006; Olsen *et al.*, 2001; Morrone, 2014]. The Botanical Garden of Cartagena “Guillermo Piñeres” (BGGP), Turbaco, Bolívar, represents a well conserved area of SDTF and, together with other SDTF areas, are considered priority for conservation [Myers *et al.*, 2000; Banda-R *et al.*, 2016].

Recent surveys in the BGGP allowed us to recognize six species of terrestrial isopods, which belong to the families Philosciidae, Scleropactidae, Platyarthridae and Armadillidae. Among them, three species are new to the science, and described here. In addition, *Trichorhina heterophthalma* Lemos de Castro, 1964 has the first record from Colombia and *V. gigas* is re-described.

Material and methods

Study area. The BGGP is located at 5 km from the municipality of Turbaco, sector Matute, north of the department of Bolívar. The botanical garden has an area of nine hectares, including a small patch of native forest, collections of living plants (Arboretum, Palmetum, Fruit trees and Ornamentals), and gardens of mosses and ferns. It is located in an altitude of 130 m a.s.l., with a temperature of 28 °C, annual precipitation from 900 to 1200 mm, and has three defined seasons (dry, rainy and transition) with annual relative air humidity of approximately 70% [Alcaldía de Turbaco-Bolívar, 2012].

Sampling, preservation and identification. Direct Intuitive Searches [Taiti, Wynne, 2015] were assumed as hand-collect method. The surveys consisted in searches in moss or fern gardens, earth, fallen leaves, fallen trunks, under rocks, roots and bark of living trees. The estimated time of the searches was about 20 minutes per observer (two observers). The specimens were preserved in 75% ethanol. The methodology of Vandel [1962] was used to obtain the coordinates of the *noduli laterales*. The previous records provided here include only the works mentioning Colombia. The images were obtained using an Axio Lab A1 microscope and a ste-

reomicroscope SteREO Discovery.V12 ZEISS with an adapted camera Axiocam ERc 5s. The final illustrations were made by using the GIMP Software v2.8.14 (GNU Program for Image Manipulation available at <https://www.gimp.org/downloads/>) following the methodology of Coleman [2006] and Montesanto [2015, 2016].

The material examined was deposited in the Collection of the Universidad de Cartagena, Cartagena, Colombia (CUDC-CRU) and in the Collection of the Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá, Colombia (ICN- CI).

Taxonomic part

Order **Isopoda** Latreille, 1817

Suborder **Oniscidea** Latreille, 1802

Family **Philosciidae** Kinahan, 1857

Genus ***Androdeloscia*** Leistikow, 1999

TYPE SPECIES. *Chaetophiloscia hamigera* Vandel, 1952 [= *Androdeloscia hamigera* (Vandel, 1952)], by original designation.

DIAGNOSIS. After Leistikow [1999] and Schmidt & Leistikow [2005]: animals with reduced size, up to 6 mm; cephalon with lateral lobes and frontal line reduced, supran-tennal line present; eyes composed of 6–15 ommatidia; *noduli laterales* very long; antennula with distal article bearing one subapical tuft of aesthetascs plus apical pair; antenna with flagellum of three articles, apical organ long; mandibles with molar pecinil dichotomized; maxillula outer endite of 4 simple teeth on outer set plus 4–6 teeth on inner set, most of them cleft at apex; maxilliped endite with small penicil knob-like; pereopods slender, pereopod 1 carpus with transverse antennal grooming brush; dactylus of two claws, inner claw not surpassing outer claw; uropod protopod and exopod grooved on outer margin bearing glandular pores, endopod inserted proximally; pleopod 1–5 exopods without respiratory structures; male pleopod 1 endopod stout, sometimes bearing complex distal apparatus and/or outer medial lobe; male pleopod 2 endopod very long, male pleopod 5 exopod with medial groove to accommodate endopod 2, often with medial portion elongated (see also Grangeiro & Christoffersen, 2010; López-Orozco *et al.*, 2016).

Androdeloscia colombiana López-Orozco, Carpio-Díaz et Campos-Filho, 2016

Fig. 1.

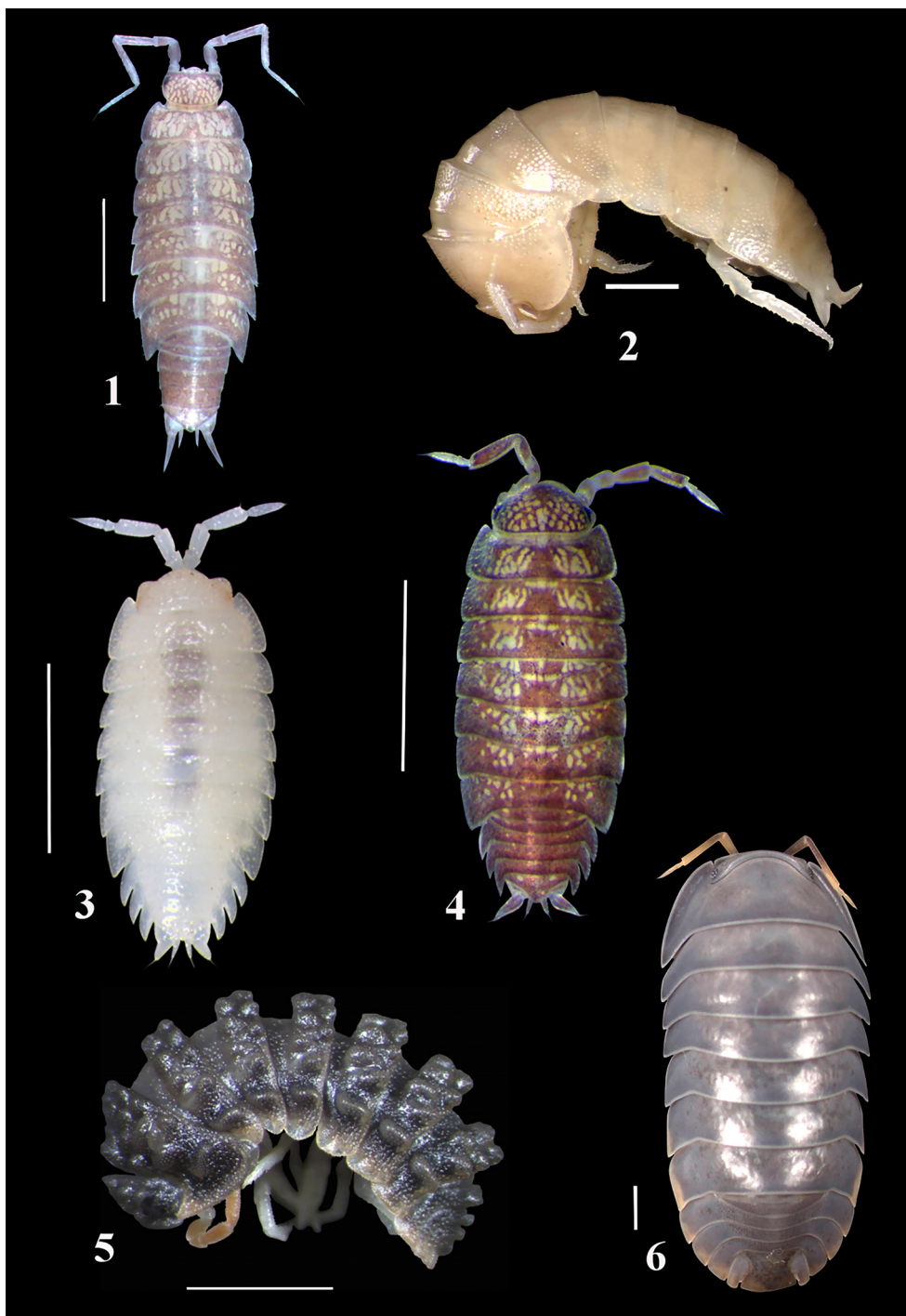
MATERIAL EXAMINED. 27 ♂♂, 63 ♀♀ (CUDC-CRU 68), Colombia, Bolívar, Turbaco: Botanical Garden Guillermo Piñeres, 10°20'51.59"N, 75°25'30.79"W, 19.09.2015, leg. C.M. López-Orozco; 11 ♂♂, 20 ♀♀ (CUDC-CRU 98), same locality and collector as previous, 19.05.2017; 10 ♂♂, 20 ♀♀ (ICN-CI-92), same data as previous.

DISTRIBUTION. This species is recorded from El Chorro, north of Bolívar, Soplaviento, and in the Botanical Garden “Guillermo Piñeres”, Turbaco [López-Orozco *et al.*, 2016].

Family **Scleropactidae** Verhoeff, 1938

Genus ***Colomboniscus*** Vandel, 1972

TYPE SPECIES. *Colomboniscus regressus* Vandel, 1972, by monotypy.



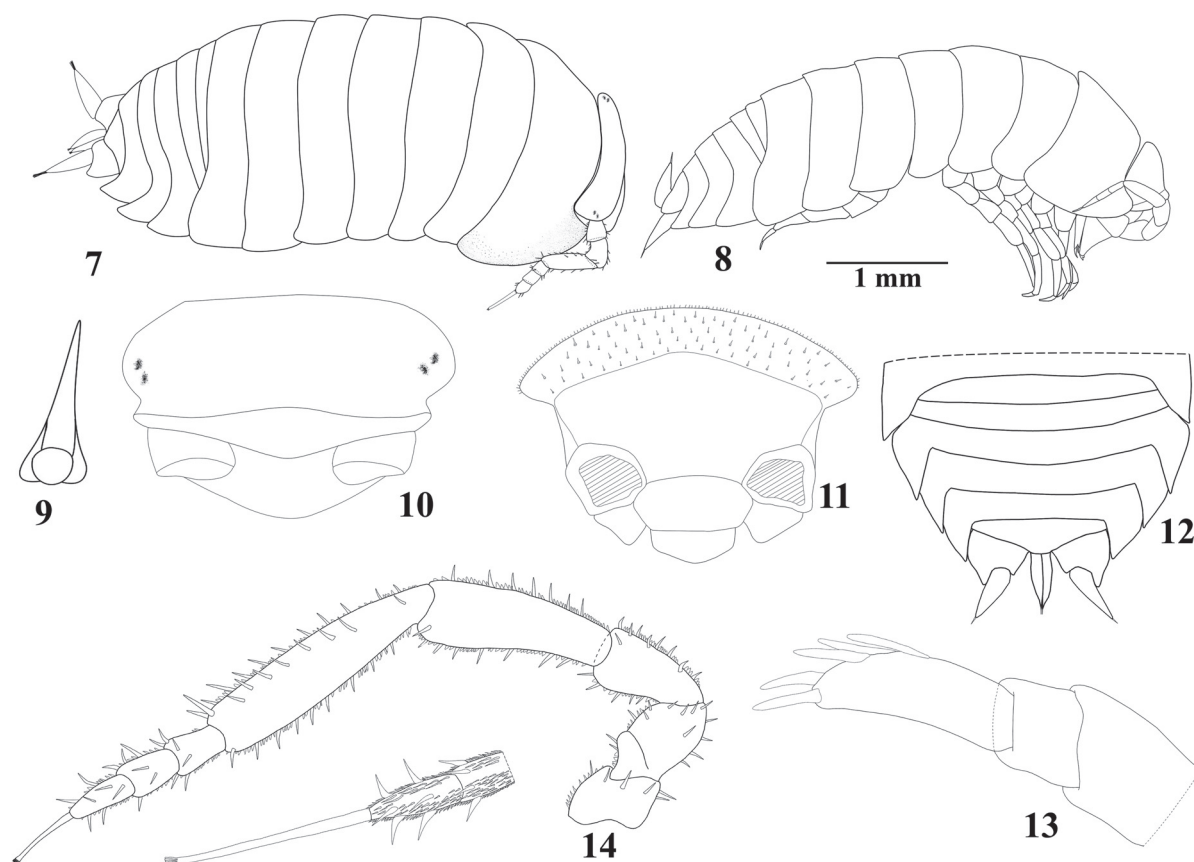
Figs 1–6. Terrestrial isopods from the Botanical Garden “Guillermo Piñeres”. Scale bars 1 mm.

1 — *Androdeloscia colombiana*; 2 — *Colomboniscus carpioi* sp.n.; 3 — *Trichorhina heterophthalma*; 4 — *Trichorhina bermudezae* sp.n.; 5 — *Ctenorillo dazai* sp.n.; 6 — *Venezillo gigas*.

Рис. 1–6. Мокрицы ботанического сада “Гильермо Пиньерес”. Масштаб: 1 мм.

DIAGNOSIS. After Schmidt [2007]: animals with maximum size, ca. 4.5 mm; endoantennal conglobation; dorsal surface smooth covered with small and thin triangular scale-setae; cephalon with subtrapezoidal frontal shield, upper margin and corners rounded; frontal shield bent backwards over vertex of cephalon; eyes reduced to pigment spots without lenses, or completely absent; pereopnites 1–7 epi-

mera with one line of *noduli laterales* per side; telson rounded; antennula of three articles, distal article with subapical row of aesthetascs plus apical pair; antenna with flagellum of three articles, apical organ long; mandibles with molar penicil dichotomized; maxillula outer endite with 4 simple teeth on outer set (sometimes with accessory tooth), and 4 or 5 teeth on inner set, most of them cleft at apex; pereopod 1



Figs 7–14. *Colomboniscus carpioi* sp.n., female paratype: 7 — adult specimen, dorsal habitus; 8 — adult specimen, lateral view; 9 — dorsal scale-seta; 10 — cephalon, dorsal view; 11 — cephalon, frontal view; 12 — pleonites 3–5, telson and uropods; 13 — antennula; 14 — antenna.

Рис. 7–14. *Colomboniscus carpioi* sp.n., паратип самка: 7 — взрослая особь, дорсально; 8 — взрослая особь, вид сбоку; 9 — дорсальные сетки; 10 — голова, дорсально; 11 — голова, вид спереди; 12 — плеониты 3–5, тельсон и уropоды; 13 — антеннула; 14 — антенна.

carpus 1 with short antennal grooming brush; dactylus of two claws, inner claw not surpassing outer claw; uropod protopod flattened, endopod inserted proximally; pleopod 1–5 exopods without respiratory structures.

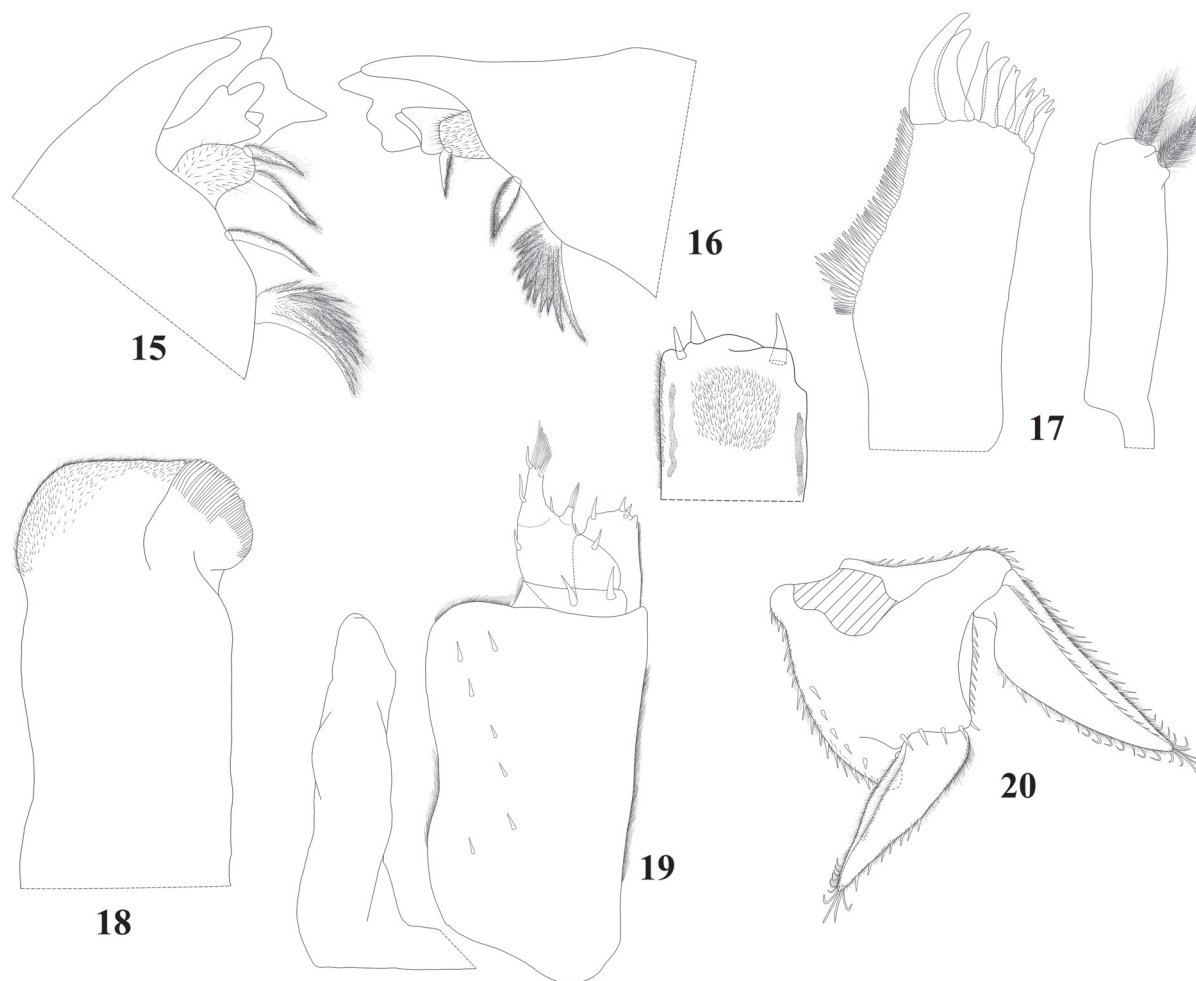
Colomboniscus carpioi Carpio-Díaz, López-Orozco
et Campos-Filho, **sp.n.**
Figs 2, 7–28.

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TYPE MATERIAL. Holotype ♂ (CUDC-CRU 122), Colombia, Bolivar, Turbaco: Botanical Garden Guillermo Piñeres, 10°20' 51.59"N, 75°25'30.79"W, 19.09.2015, leg. Y. Carpio-Díaz. Paratypes: 1 ♂ (CUDC-CRU 123), same data as holotype; 1 ♀ (CUDC-CRU 124), same data as holotype; 2 ♂♂, 6 ♀♀ (ICN-CI-90), same data as holotype; 6 ♂♂, 4 ♀♀ (CUDC-CRU 103), same locality and collector as holotype, 19.05.2017; 24 ♂♂, 18 ♀♀ (CUDC-CRU 61), same data as holotype.

DESCRIPTION. Maximum body length: ♂ 4.1 mm, ♀ 4.3 mm. Color pale yellowish (Fig. 2). Body convex (Figs 2, 7, 8). Dorsum covered with tiny triangular scale-setae (Fig. 9). Pereonites 1–7 epimera with one line of *noduli laterales* per side, near posterior margins and almost at same distance

of lateral margins. Cephalon (Figs 10, 11) with frontal shield obtuse on medial upper margin and straight lateral margins, bent downwards above vertex; eyes with one pale lent or entirely absent, with small brown ocular spots on usual ommatidia position (Fig. 10). Pereonite 1 without schisma or ventral lobe; pereonites 1–7 gradually more arched; pereonites 3–5 epimera with outline continuous with that of pereonite 7, apex acute and directed backwards (Figs 7, 8, 12). Telson (Fig. 12) with lateral sides almost straight and distal margin rounded. Antennula (Fig. 13) with distal article as long as first and second articles together, bearing three sub-apical and two apical aesthetascs. Antenna (Fig. 14) with fifth article of peduncle slender; flagellum with articles subequal in length; apical organ longer than distal article of flagellum. Mandibles with molar penicil of many branches; left mandible (Fig. 15) with 2+1 free penicils, right mandible (Fig. 16) with 1+1 penicils. Maxillula (Fig. 17) inner endite with two long penicils covered with thin setae, distal margin rounded with small outer tip; outer endite of 4+4 teeth, inner set cleft. Maxilla (Fig. 18) inner lobe rounded and covered with thick setae; outer lobe about twice as wide as inner lobe, covered with thin setae. Maxilliped (Fig. 19) basis rectangular bearing sparse scale-setae; palp with two setae on proximal article, medial and distal articles with two



Figs 15–20. *Colomboniscus carpioi* sp.n., female paratype: 15 — left mandible; 16 — right mandible; 17 — maxillula; 18 — maxilla; 19 — maxilliped; 20 — uropod.

Рис. 15–20. *Colomboniscus carpioi* sp.n., паратип самка: 15 — левая мандибула; 16 — правая мандибула; 17 — максиллула; 18 — максилла; 19 — максиллипед; 20 — уропод.

tufts of setae; endite with medial seta inserted near of distal margin, distal margin irregular bearing two strong setae, ventral portion densely covered with thin setae medially. Uropod (Fig. 20) protopod subquadrangular and bearing many setae on inner and outer margins; endopod longer than exopod and inserted proximally. Pereopods 1–7 merus and carpus with sparse long setae on sternal margin; dactylus with short inner claw, ungual seta and dactylar organ simple and surpassing outer claw.

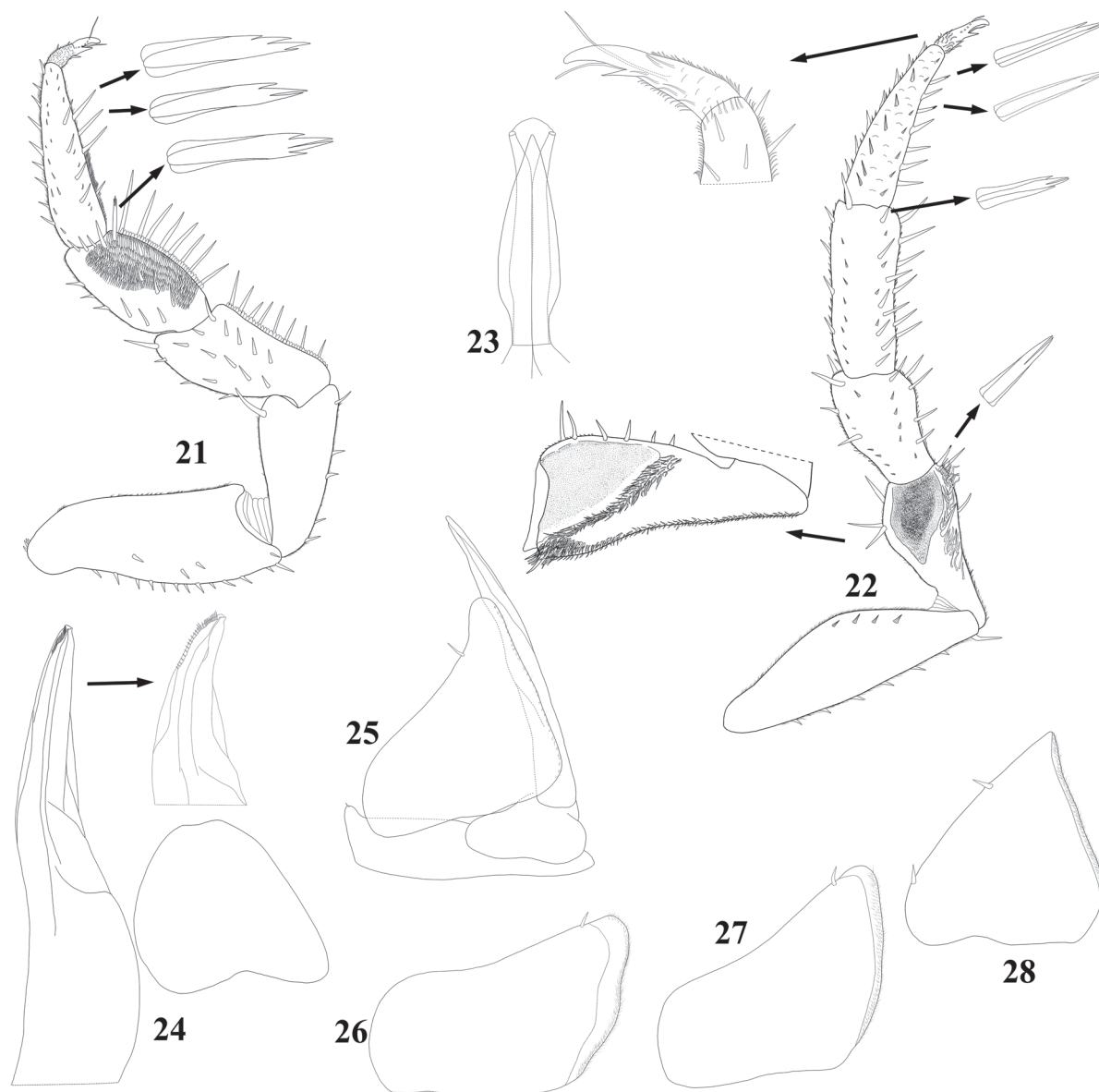
Male: Pereopod 1 (Fig. 21) merus and carpus bearing fringe of scales on sternal margin; carpus with wide brush of setae. Pereopod 7 (Fig. 22) ischium elongated, sternal margin slightly concave and covered with setae, distal portion with longitudinal depression and bearing transverse row of setae. Genital papilla (Fig. 23) with triangular ventral shield and subapical orifices. Pleopod 1 (Fig. 24) exopod as long as wide, inner and distal margins rounded, outer margin straight, proximal margin concave; endopod about twice as long as exopod, slightly arched bearing small setae along inner margin, distal portion slightly stout with small setae. Pleopod 2 (Fig. 25) exopod triangular, outer margin concave with one seta; endopod stout, longer than exopod.

Pleopod 3 and 4 exopods (Figs 26, 27) rhomboid, outer margin slightly concave with one seta, inner margin sinuous bearing small thin setae. Pleopod 5 exopod (Fig. 28) triangular, outer margin almost straight with two setae, inner margin covered with small setae.

ETYMOLOGY. The new species is named in honor to Mr. Estanislao Carpio for all his assistance during the surveys and stimulus to the graduation for Yesenia Margarita Capió-Díaz as biologist.

REMARKS. To date, *Colomboniscus* includes two species, i.e., *Colomboniscus regressus* Vandel, 1972 from the Andean region of Colombia, between 2600–2700 m, *Colomboniscus tristani* (Arcangeli, 1930) from San José, Costa Rica, and Caripe, Venezuela, and an unnamed species from Tibabitá, Colombia (see Schmidt, 2007). The genus is mainly characterized by endoantennal conglobation ability, eyes reduced, represented by a spot of pigment without lens, or entirely absent, antennal flagellum three-jointed, dorsal surface with short tinny scale-setae, and frontal shield with medial margin rounded (see Schmidt, 2007).

Colomboniscus carpioi sp.n. differs from its congeners in having the frontal shield with lateral margins straight (vs.



Figs 21–28. *Colomboniscus carpioi* sp.n., male paratype: 21 — pereopod 1; 22 — pereopod 7 (arrow showing the ischium in rostral view); 23 — genital papilla; 24 — pleopod 1; 25 — pleopod 2; 26 — pleopod 3 exopod; 27 — pleopod 4 exopod; 28 — pleopod 5 exopod.

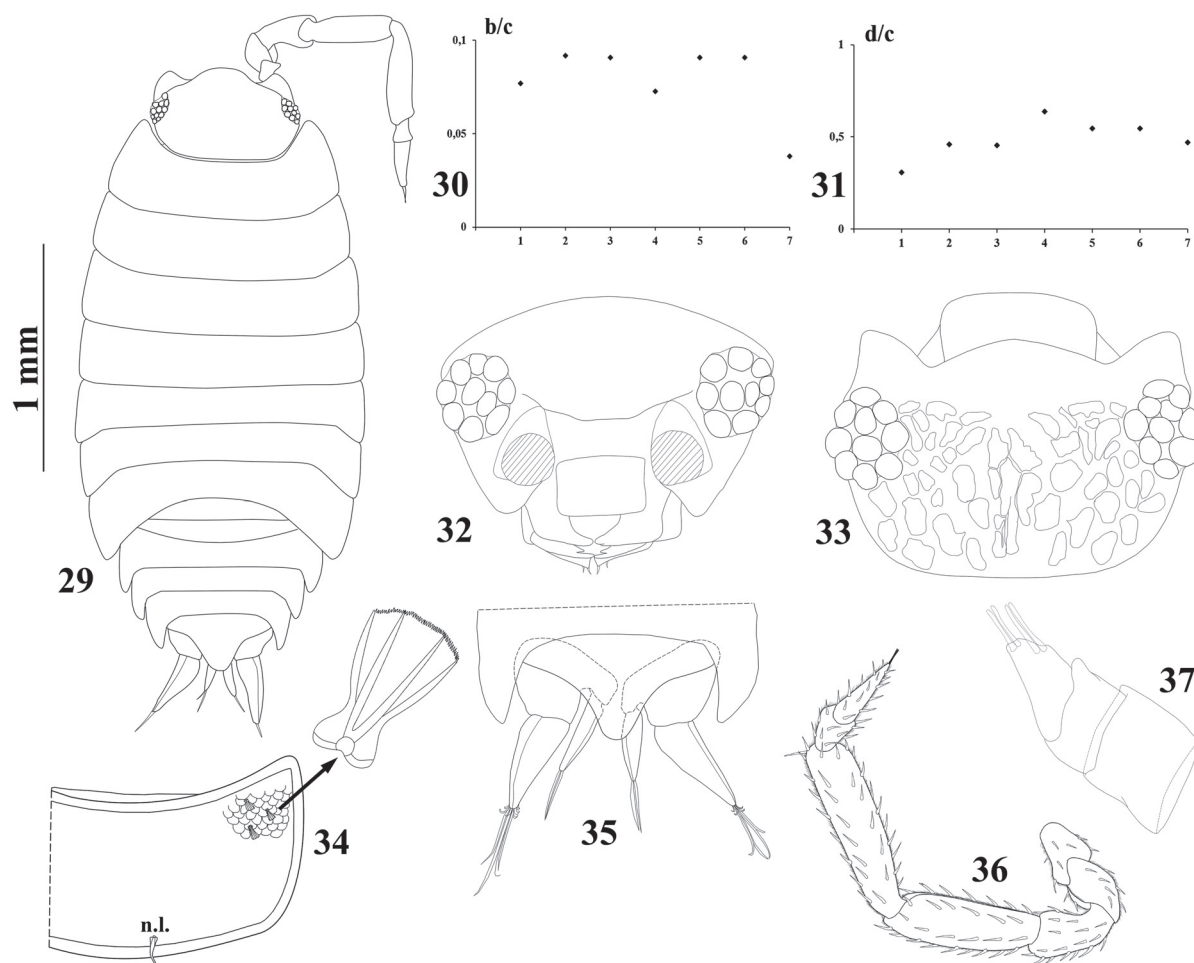
Рис. 21–28. *Colomboniscus carpioi* sp.n., паратип самец: 21 — переопод 1; 22 — переопод 7 (стрелкой указан исхиум рострально); 23 — генитальная папилла; 24 — плеопод 1; 25 — плеопод 2; 26 — экзопод плеопода 3; 27 — экзопод плеопода 4; 28 — экзопод плеопода 5.

rounded in all species), antenna with the fifth article of the peduncle slender and apical organ as long as distal article of flagellum (vs. stout and apical organ longer in all species), male pereopod 7 ischium with longitudinal depression bordered by a row of transverse setae (vs. absent in all species), and male pleopod 1 exopod subtriangular shaped (vs. subrectangular in *C. regressus* and *C. tristani*).

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

TYPE SPECIES. *Bathytropa thermophila* Dollfus, 1896 [= *Trichorhina tomentosa* (Budde-Lund, 1893)], by original designation.

DIAGNOSIS. After Schmidt [2003] and Souza *et al.* [2011]: animals of reduced size, up to 6 mm; dorsal pigment varying from absent to brown color; cephalon with lateral lobes well developed, frontal line absent in most species, suprantennal line present; eyes composed of 1–15 ommatidia, or absent in endogean species; dorsal surface smooth, densely covered with fan-shaped scale setae; pereonites 1–7 with one line per side of short *noduli laterales*, sometimes with two *noduli* on pereonite 7; telson triangular, sometimes trapezoidal; antennula of three articles; antenna with flagellum of two articles, distal article much longer than proximal one; mandibles with molar penicil simple or dichotomized; maxillula outer endite with outer set composed of 3–5 simple teeth, inner set of 3 or 4 teeth, simple and/or cleft at



Figs 29–37. *Trichorhina bermudezae* sp.n., female paratype: 29 — adult specimen, dorsal habitus; 30 — b/c *noduli laterales* coordinates; 31 — d/c *noduli laterales* coordinates; 32 — cephalon, dorsal view; 33 — cephalon, frontal view; 34 — dorsal scale-seta and *nodulus lateralis* (n.l.); 35 — telson and uropods; 36 — antennula; 37 — antenna.

Рис. 29–37. *Trichorhina bermudezae* sp.n., паратип самка: 29 — взрослая особь, дорсально; 30 — b/c координаты *noduli laterales*; 31 — d/c координаты *noduli laterales*; 32 — голова, дорсально; 33 — голова, фронтально; 34 — дорсальные сетки и *nodulus lateralis* (n.l.); 35 — тельсон и уropоды; 36 — антеннула; 37 — антенна.

apex; pereopod 1 carpus with transverse or longitudinal antennal grooming brush; dactylus of two claws, inner claw not surpassing outer claw; uropod protopod and exopod grooved on outer margin, endopod inserted proximally; male pereopods 1–4, sometimes 5, with brush of setae on sternal margin of merus and carpus, sometimes without modifications on both sexes; pleopod 1–5 exopods without respiratory structures.

Trichorhina heterophthalma Lemos de Castro, 1964
Fig. 3.

DIAGNOSIS. *Sensu* Souza-Kury [1993] and Souza *et al.* [2011]: cephalon with lateral lobes well developed; eyes composed of two unequally sized ommatidia; pereonite 7 with two *noduli laterales* per side; antennula with eight distal aesthetascs; antenna with distal article of flagellum twice as long as proximal one; male pereopod 7 ischium slightly concave on sternal margin; male pleopod 1 exopod

subcircular; male pleopod 1 endopod more than two times as long as exopod (see also Lemos de Castro, 1964).

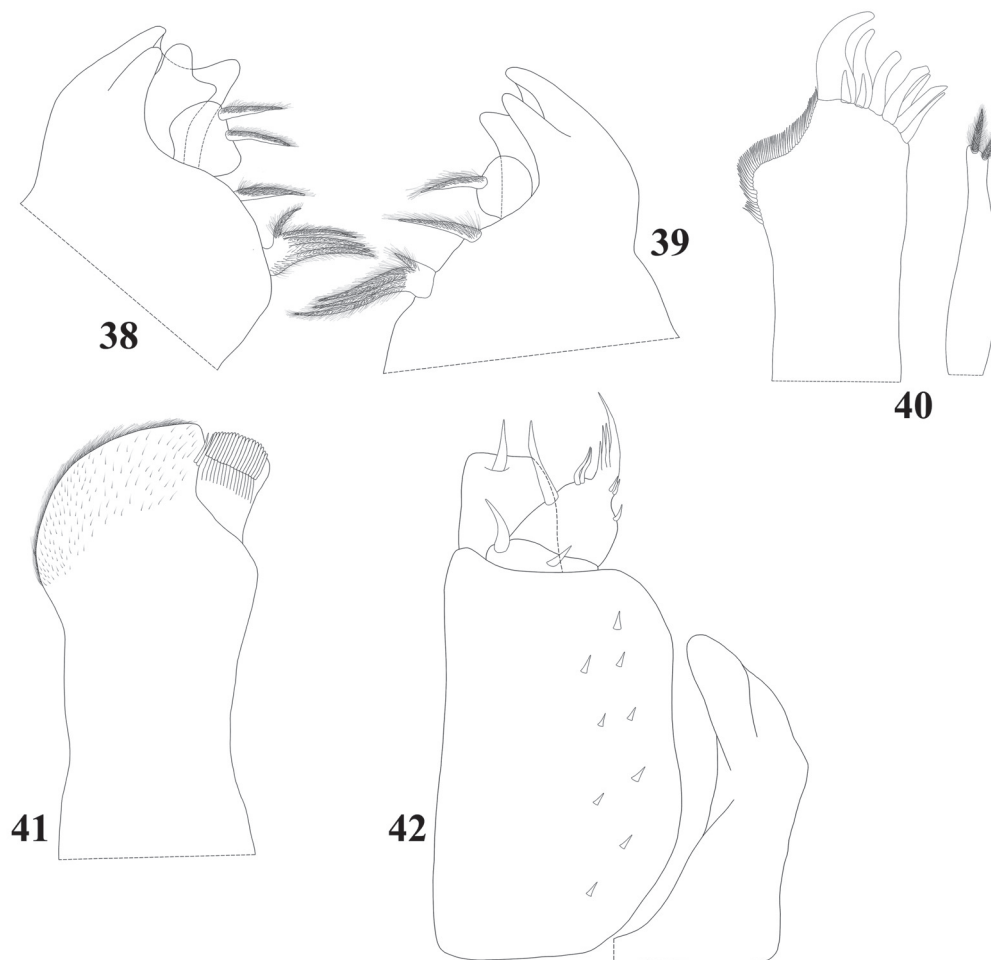
MATERIAL EXAMINED. 11 ♂♂, 14 ♀♀ (CUDC-CRU 62), Colombia, Bolívar, Turbaco: Botanical Garden Guillermo Piñeres, 10°20'51.59"N, 75°25'30.79"W, 19.09.2015, leg. Y. Carpio-Díaz; 5 ♂♂, 12 ♀♀ (CUDC-CRU 99), same locality as previous, 19.05.2017, leg. C.M. López-Orozco; 5 ♂♂, 8 ♀♀ (ICN-CI 88), same data as previous.

DISTRIBUTION. Pantropical species [Schmalfuss, 2003]. To date, this species is not recorded from Colombia and, therefore, this work constitutes the first record of the species in this country.

Trichorhina bermudezae Carpio-Díaz, López-Orozco et Campos-Filho, **sp.n.**
Figs 4, 29–50.

Zoobank: urn:lsid:zoobank.org:act:048A6F0B-3807-4E29-A3CF-BD98FD56954D

TYPE MATERIAL. Holotype ♂ (CUDC-CRU 125), Colombia, Bolívar, Turbaco: Botanical Garden Guillermo Piñeres, 10°20'



Figs 38–42. *Trichorhina bermudezae* sp.n., female paratype: 38 — left mandible; 39 — right mandible; 40 — maxillula; 41 — maxilla; 42 — maxilliped.

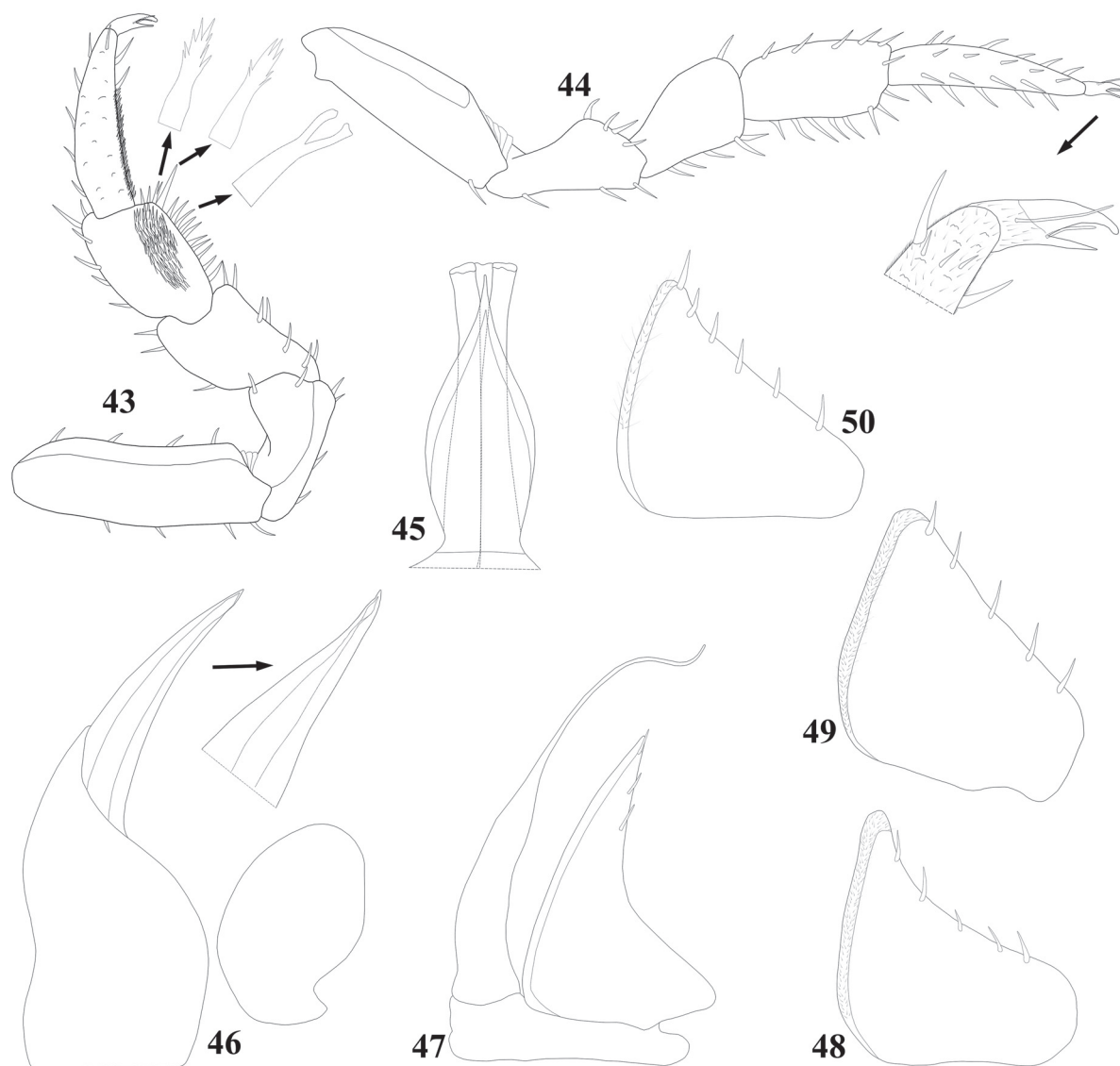
Рис. 38–42. *Trichorhina bermudezae* sp.n., паратип самка: 38 — левая мандибула; 39 — правая мандибула; 40 — максиллула; 41 — максилла; 42 — максиллипод.

51.59°N, 75°25'30.79"W, 19.09.2015, leg. Y. Carpio-Díaz. Paratypes: 3 ♀♀ (CUDC-CRU 126), same data as holotype; 3 ♂♂, 9 ♀♀ (CUDC-CRU 73), same data as holotype; 1 ♂, 4 ♀♀ (ICN-CI-92), same data as holotype; 1 ♀ (CUDC-CRU 100), same locality as holotype, 19.05.2017, leg. C.M. López-Orozco.

DESCRIPTION. Maximum body length: ♂ 2.9 mm, ♀ 3.1 mm. Body convex, outline as in Figs 4, 29. Color brown; antennal peduncle, median portion of pereon, pleon and uropod branches strongly pigmented; cephalon, antenna and uropods with irregular unpigmented spots; pereon with unpigmented areas on paramedian portions; telson with three unpigmented spots (Fig. 4). Dorsal surface scaled, covered with fan-shaped scale-setae (Fig. 34). Pereonites 1–7 epimera with one line of small *noduli laterales*, inserted close to posterior margins and shifted from lateral margins (Fig. 34); b/c and d/c coordinates as in Figs 30, 31, respectively. Cephalon (Figs 32, 33) with triangular lateral lobes, slightly directed outwards; suprantennal line slightly bent downwards on middle; eyes composed of ten ommatidia strongly pigmented. Pleon slightly narrower than pereon, epimera 3–5 well developed and falciform (Figs. 29, 35). Telson (Fig. 35) triangular with lateral margins concave, apex narrow with distal margin rounded. Antennula (Fig. 36) with distal

article bearing two subapical plus two apical aesthetascs. Antenna (Fig. 37) when extended posteriorly surpassing posterior margin of pereonite 2; distal article of flagellum twice as long as proximal one, with lateral aesthetascs on distal portion; apical organ short. Mandibles with molar penicil consisting of five branches, left mandible (Fig. 38) with 2+1 penicils, right mandible (Fig. 39) with 1+1 penicils. Maxillula (Fig. 40) inner endite with two penicils; outer endite with 5+4 simple teeth. Maxilla (Fig. 41) inner lobe subquadrangular, distal margin slightly rounded and covered with thick setae; outer lobe about three times as wide as inner lobe, covered with thin setae. Maxilliped (Fig. 42) basis rectangular bearing sparse scale-setae; palp with two setae distinct in length on proximal article; endite with medial seta surpassing distal margin. Uropod (Fig. 35) protopod subquadrangular; exopod slightly longer than endopod. Pereopod 1 carpus with longitudinal antennal grooming brush and distal setae cleft at apex; dactylus with long inner claw; ungual seta and dactylar organ simple, not surpassing outer claw.

Male: Pereopod 1 (Fig. 43) carpus with brush of setae on sternal margin. Pereopod 7 (Fig. 44) without any particular



Figs 43–50. *Trichorhina bermudezae* sp.n., male paratype: 43 — pereopod 1; 44 — pereopod 7; 45 — genital papilla; 46 — pleopod 1; 47 — pleopod 2; 48 — pleopod 3 exopod; 49 — pleopod 4 exopod; 50 — pleopod 5 exopod.

Рис. 43–50. *Trichorhina bermudezae* sp.n., паратип самца: 43 — переопод 1; 44 — переопод 7; 45 — генитальная папилла; 46 — плеопод 1; 47 — плеопод 2; 48 — экзопод плеопода 3; 49 — экзопод плеопода 4; 50 — экзопод плеопода 5.

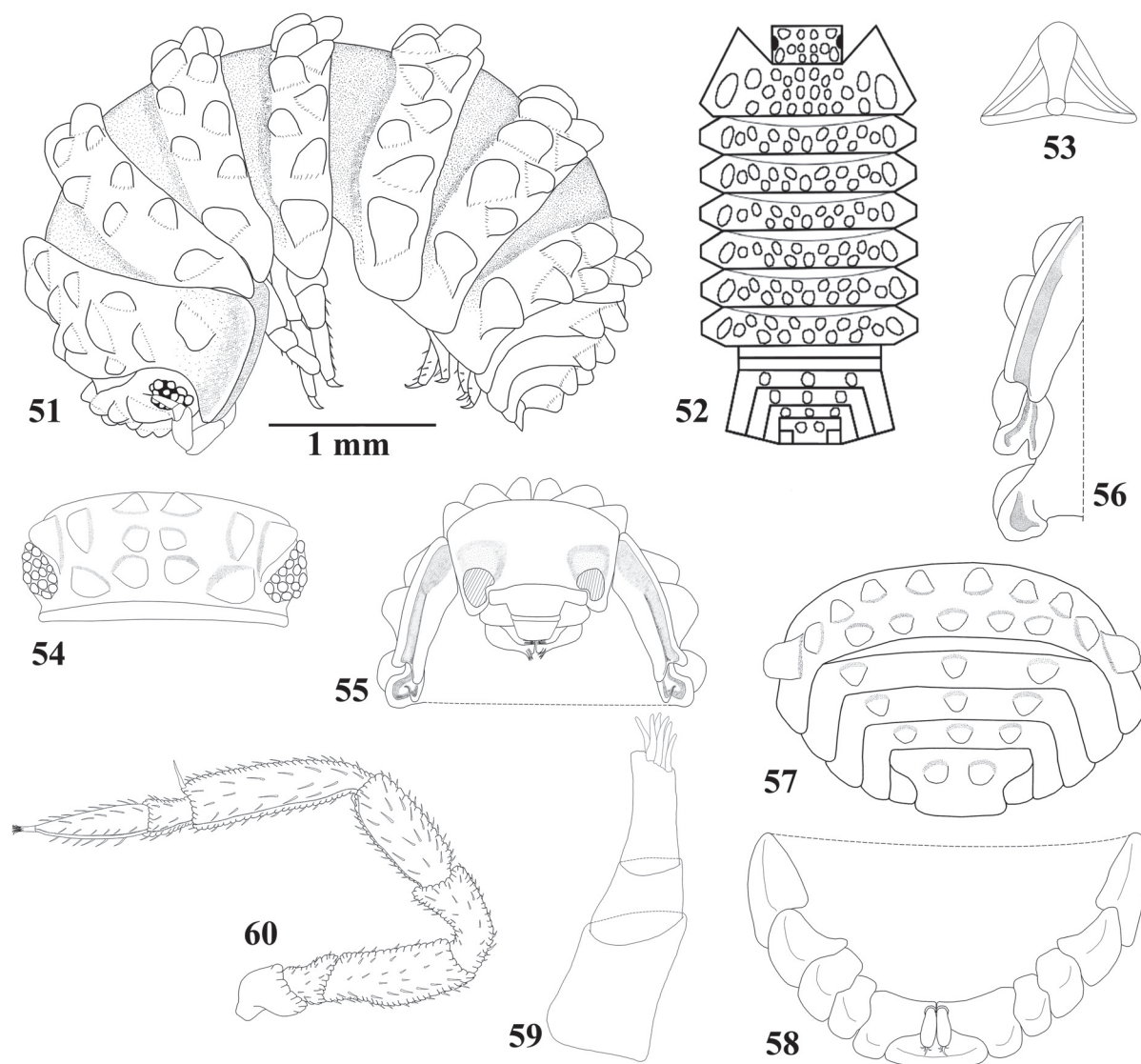
modification. Genital papilla as in Figure 45. Pleopod 1 (Fig. 46) exopod ovoid; endopod three times as long as exopod, distal portion tapering and directed outwards. Pleopod 2 (Fig. 47) exopod triangular, outer margin concave bearing three setae; endopod flagelliform, longer than exopod, distal portion slender. Pleopod 3 exopod (Fig. 48) triangular, outer margin concave bearing five setae. Pleopod 4 exopod (Fig. 49) triangular, outer margin almost straight bearing five setae. Pleopod 5 exopod (Fig. 50) triangular, outer margin almost straight bearing six setae.

ETYMOLOGY. The new species is named after Dr. Adriana Bermúdez for her contributions to the knowledge of Crustacea from Colombia.

REMARKS. To date, the genus *Trichorhina* comprises 69 species, of which 44 are recorded from the Neotropical

region [Schmalfuss, 2003; Boyko *et al.*, 2008a; Souza *et al.*, 2011; Campos-Filho *et al.*, 2014; Taiti *et al.*, 2018]. In Colombia, only *T. papillosa* (Budde-Lund, 1893) is recorded from Medellín, department of Antioquia. *Trichorhina bermudezae* sp.n., together with *T. heterophthalma*, constitute the first records of the genus to the department of Bolívar and Caribbean coast of Colombia.

In having ten ommatidia, *T. bermudezae* sp.n. is similar to *T. amazonica* Souza-Kury, 1997, *T. mariani* Arcangeli, 1930, *T. pubescens* (Dollfus, 1893) and *T. yiara* Campos-Filho, Araujo et Taiti, 2014; however, it is distinguished by the distal article of antennula with four aesthetascs and shape of male pleopods 1 and 2.



Figs 51–60. *Ctenorillo dazai* sp.n., female paratype: 51 — adult specimen, lateral view; 52 — disposition of dorsal tubercles; 53 — dorsal scale-seta; 54 — cephalon, dorsal view; 55 — cephalon and pereonites 1 and 2, frontal view; 56 — epimera of pereonites 1 and 2, ventral view; 57 — pleonites 3–5, telson and uropods, dorsal view; 58 — pleonites 3–5, telson and uropods, ventral view; 59 — antennula; 60 — antenna.

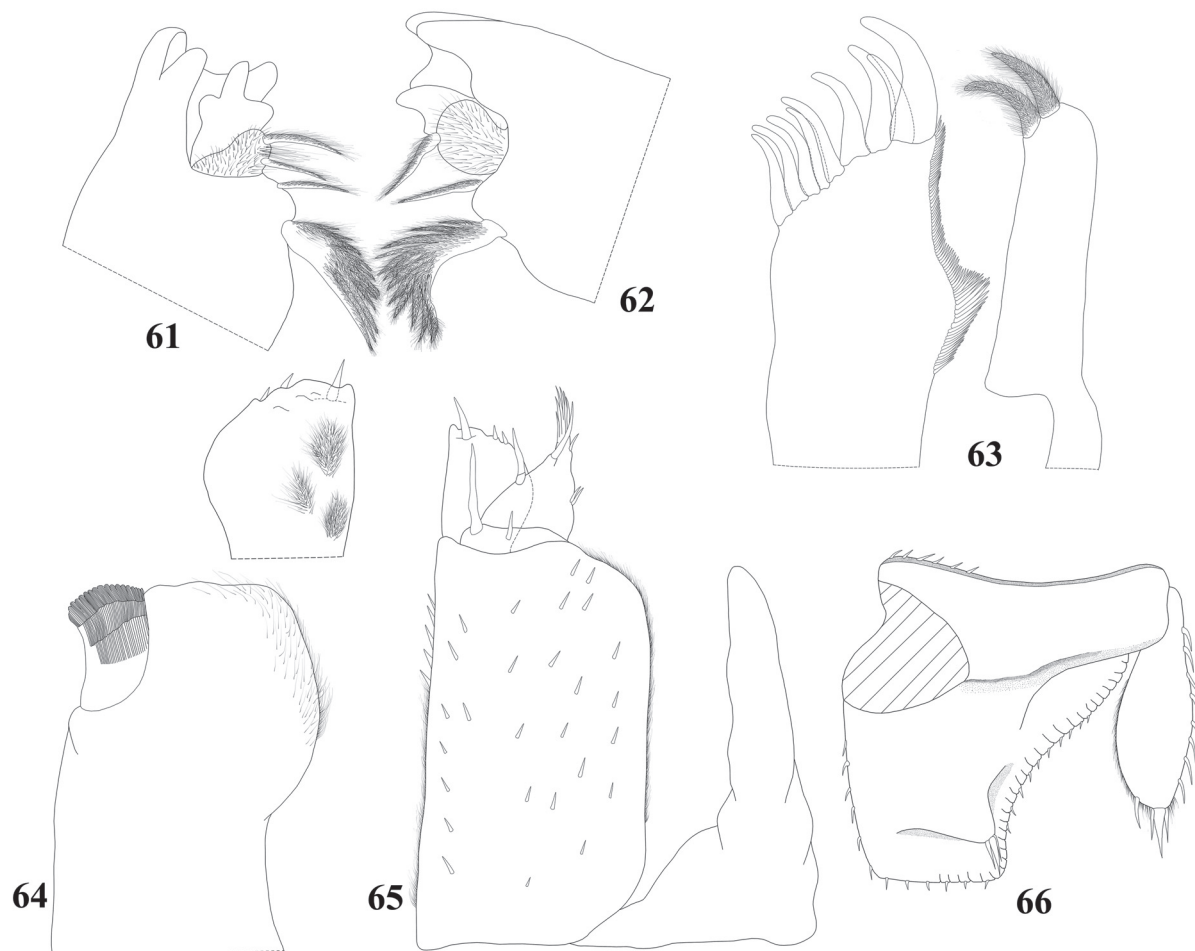
Рис. 51–60. *Ctenorillo dazai* sp.n., паратип самка: 51 — взрослая особь, вид сбоку; 52 — расположение досальных бугорков; 53 — dorsальные сеты; 54 — голова, дорсально; 55 — голова и переониты 1 и 2, вид спереди; 56 — эпимеры переонитов 1 и 2, вентрально; 57 — плеониты 3–5, тельсон и уropоды, дорсально; 58 — плеониты 3–5, тельсон и уropоды, вентрально; 59 — антеннула; 60 — антенна.

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

TYPE SPECIES. *Ctenorillo buddehundi* Verhoeff, 1942 [= *Ctenorillo regulus* (Van Name, 1920)], by monotypy.

DIAGNOSIS. After Schmalfuss & Ferrara [1983] and Taiti *et al.* [1998]: animals with reduced size and strongly convex; endoantennal conglobation; cephalon, pereon and pleon with dorsal surface bearing more or less developed ribs and/or tubercles; cephalon with frontal shield subquadrangular; pereonite 1 epimera with schisma; pereonites 1

and 2 with ventral lobe, pereonite 2 with triangular lobe; pereonites 1–7 with one line of tiny *noduli laterales* per side; telson hour-glass shaped; antennula of three articles; antenna with flagellum of two articles, distal article longer than proximal one; mandibles with molar penicil dichotomised or semidichotomised; maxillula with simple teeth; pereopod 1 carpus with transverse antennal grooming brush; dactylus of two claws, inner claw not surpassing outer claw; uropod subquadrangular, protopod flattened with concave medial margin, exopod tiny inserted near medial margin; pleopod 1–5 exopods with monospiracular covered lungs (see also Campos-Filho *et al.*, 2014, 2017; Taiti, 2018).



Figs 61–66. *Ctenorillo dazai* sp.n., female paratype: 61 — left mandible; 62 — right mandible; 63 — maxillula; 64 — maxilla; 65 — maxilliped; 66 — uropod.

Рис. 61–66. *Ctenorillo dazai* sp.n., паратип самка: 61 — левая мандибула; 62 — правая мандибула; 63 — максиллула; 64 — максилла; 65 — максиллипод; 66 — уропод.

Ctenorillo dazai Carpio-Díaz, López-Orozco
et Campos-Filho, sp.n.

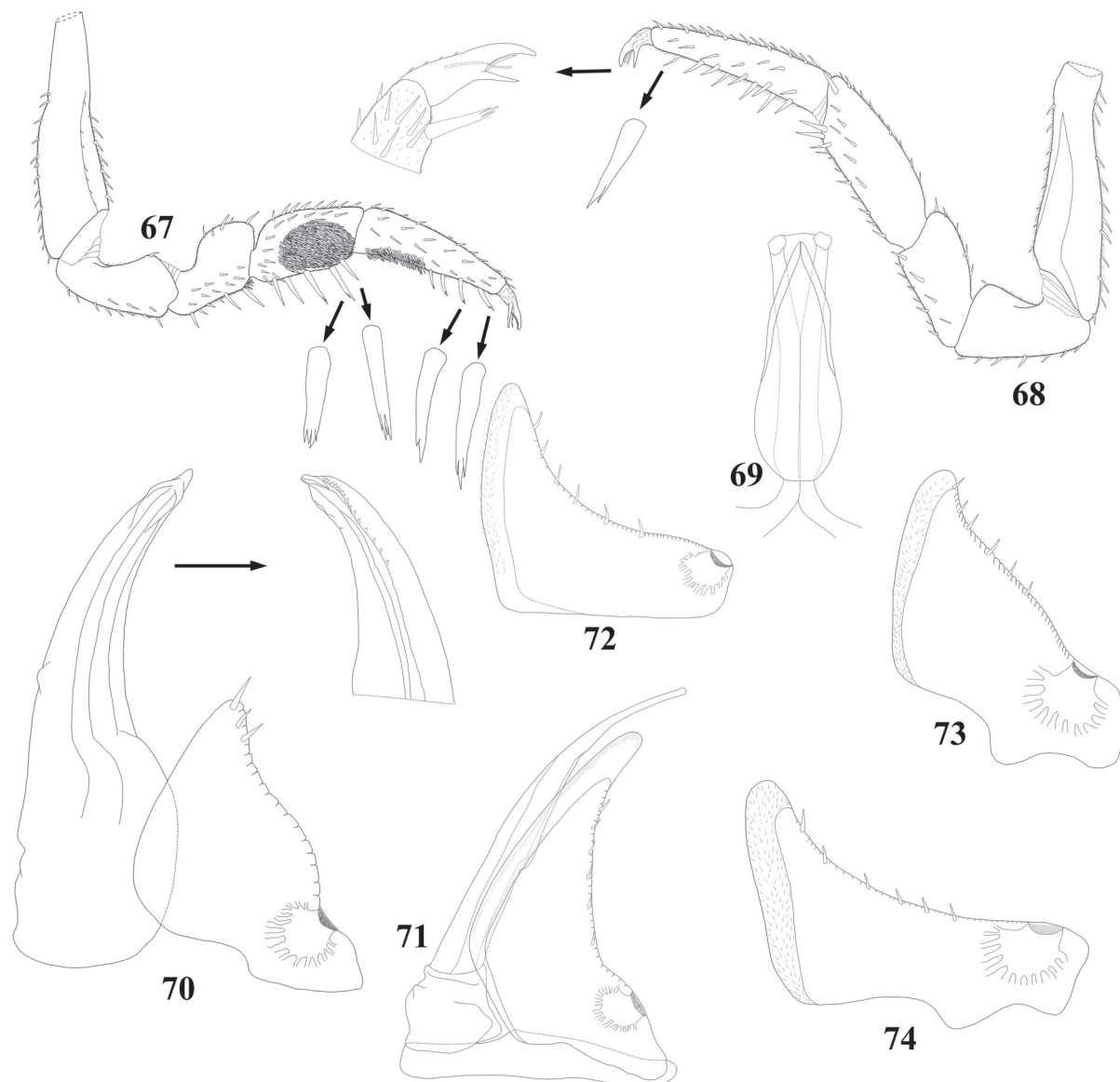
Figs 5, 51–74.

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TYPE MATERIAL. Holotype ♂ (CUDC-CRU 119), Colombia, Bolívar, Turbaco: Botanical Garden Guillermo Piñeres, 10°20' 51.59"N, 75°25'30.79"W, 19.09.2015, leg. Y. Carpio-Díaz. Paratypes: 1 ♂ (CUDC-CRU 120), same data as holotype; 1 ♀ (CUDC-CRU 121), same data as holotype; 1 ♂, 2 ♀♀ (ICN-CI 89), same data as holotype; 1 ♀ (CUDC-CRU 102), same locality as holotype, 19.05.2017, leg. C.M. López-Orozco; 5 ♂♂, 2 ♀♀ (CUDC-CRU 51), same data as previous.

DESCRIPTION. Maximum body length: ♂ 3 mm, ♀ 4.2 mm. Color dark brown (Fig. 5). Dorsum covered with large ribs and tubercles, arranged as follows (Figs 51, 52, 54, 57): vertex of cephalon with three rows, one anterior row of four tubercles, one middle row of six tubercles and posterior row of two tubercles; pereonite 1 with anterior row of six tubercles, middle row of ten tubercles and posterior row of seven tubercles; pereonites 2–7 with anterior row of ten tubercles and posterior row of five tubercles; pleonites 3–5 with row

of three tubercles each; telson with two tubercles. Dorsal surface with verruca-like prominences and short triangular scale-setae (Fig. 53). Pereonites 1–7 with *noduli laterales* inserted on lateral surface of second outer tubercle. Cephalon (Figs 54, 55) with frontal shield slightly protruding above vertex; eyes consisting of 17 ommatidia. Pereonite 1 epimera grooved on lateral margins, inner lobe of schisma rounded, extending beyond posterior margin of outer lobe; pereonite 2 with ventral lobe slightly triangular, extending beyond three quarters of its length (Figs 55, 56); epimera of pereonites 2–4 subtriangular, 5–7 subquadrangular (Fig. 51). Telson (Fig. 57, 58) with proximal portion broader than distal portion, distal margin truncated. Antennula (Fig. 59) with distal article bearing six apical aesthetascs. Antenna (Fig. 60) short and stout, surpassing posterior margin of cephalon when extended backwards; flagellum with distal article twice as long as proximal one; apical organ short, about 1/3 as long as distal article of flagellum. Mandibles with molar penicil semidichotomised consisting of several branches, left mandible (Fig. 61) with 2+1 penicils, right mandible (Fig. 62) with 1+1 penicils. Maxillula (Fig. 63) inner endite with two long penicils; outer endite of 4+5



Figs 67–74. *Ctenorillo dazai* sp.n., male paratype: 67 — pereopod 1; 68 — pereopod 7; 69 — genital papilla; 70 — pleopod 1 (arrow showing the detail in ventral view); 71 — pleopod 2; 72 — pleopod 3 exopod; 73 — pleopod 4 exopod; 74 — pleopod 5 exopod.

Рис. 67–74. *Ctenorillo dazai* sp.n., паратип самец: 67 — переопод 1; 68 — переопод 7; 69 — генитальная папилла; 70 — плеопод 1 (стрелкой показана вентрально часть плеопода); 71 — плеопод 2; 72 — экзопод плеопода 3; 73 — экзопод плеопода 4; 74 — экзопод плеопода 5.

simple teeth. Maxilla (Fig. 64) inner lobe truncated covered with thick setae; outer lobe three times as wide as inner lobe, covered with thin setae. Maxilliped (Fig. 65) basis subrectangular; palp with two setae distinct in length on proximal article; endite with medial seta surpassing distal margin, distal margin with two setae. Uropod (Fig. 66) protopod flattened, enlarged on basal portion, distal portion trapezoidal; exopod very short, inserted dorsally near medial margin of protopod; endopod stout, not surpassing distal margin of protopod. Pereopod 1 carpus with transverse antennal grooming brush; dactylus with long inner claw; unguis seta and dactylar organ simple, not surpassing outer claw.

Male: Pereopods 1 and 7 without particular modifications (Figs 67, 68). Genital papilla (Fig. 69) with triangular

ventral shield, papilla slightly surpassing ventral shield with apical orifices. Pleopod 1 (Fig. 70) exopod wider than longer, outer distal margin bearing three setae, outer margin sinuous and inner margin straight; endopod with distal portion triangular, slightly swollen, bent outwards and bearing small setae on the caudal surface near distal margin. Pleopod 2 (Fig. 71) exopod triangular, outer margin concave bearing six setae, inner margin with strong edge, almost straight; endopod longer than exopod. Pleopod 3 exopod (Fig. 72) triangular, outer margin strongly concave bearing six setae. Pleopod 4 exopod (Fig. 73) rhomboid, outer margin slightly sinuous bearing six setae. Pleopod 5 exopod (Fig. 74) rhomboid, outer margin concave bearing six setae, inner margin almost straight.

ETYMOLOGY. The new species is named after Mr. Mario López Daza, for all his interest in nature and support and encouragement to Carlos Mario López-Orozco as biologist.

REMARKS. To date, the genus *Ctenorillo* comprises 14 species, of which three are recorded from the Neotropical region [Schmalfuss, 2003; Boyko *et al.*, 2008b; Campos-Filho *et al.*, 2014, 2017], i.e., *C. mineri* (Van Name, 1936) from Brazil, Guyana and Venezuela; *C. ferrarai* Campos-Filho, Araujo et Taiti, 2014 from Brazil; and *C. tuberosus* (Budde-Lund, 1904) from Brazil, Haiti and Germany (introduced).

Ctenorillo dazai sp.n. is readily distinguished from all the other species of the genus in the number and arrangement of the dorsal tubercles on cephalon, pereon and pleon.

Genus *Venezillo* Verhoeff, 1928

TYPE SPECIES. *Armadillo clausus* Budde-Lund, 1885 [= *Venezillo clausus* (Budde-Lund, 1885)], by monotypy.

DIAGNOSIS. After Arcangeli [1957] and Schultz [1995]: animals with conglobation ability; body strongly convex; dorsal surface of cephalon, pereon and pleon smooth, sometimes with tubercles and/or bosses; cephalon with subquadrangular frontal shield; pereonite 1 epimera with schisma; pereonites 1 and 2 epimera with ventral lobe; pereonite 2 with ventral lobe elongated, directed backwards; pereonites 1–7 with one line of *noduli laterales* per side; telson hourglass shaped; antennula of three articles; antenna with flagellum of two articles, distal article longer than proximal one; mandibles with molar penicil dichotomized; maxillula outer endite of simple teeth; uropod protopod flattened with medial margin concave, exopod inserted near medial margin; pleopod 1–5 exopods with monospiracular covered lungs (see also Taiti *et al.*, 1998).

Venezillo gigas (Miers, 1877)

Figs 6, 75–97.

Cubaris gigas Miers, 1877: 666, Pl. LXVIII, fig. 1; Richardson, 1901: 572; 1905: 648, fig. 691; Pearse, 1915: 44; Arcangeli, 1930: 2; Van Name, 1936: 363, figs 218 & 219.

Armadillo gigas Budde-Lund, 1879: 7; 1885: 40; 1904: 108.

Venezillo (Venezillo) gigas Arcangeli, 1957: 116.

Venezillo gigas Leistikov & Wägele, 1999: 48; Schmalfuss, 2003: 288.

MATERIAL EXAMINED. 9 ♂♂, 8 ♀♀ (CUDC-CRU 63), Colombia, Bolívar, Turbaco: Botanical Garden Guillermo Piñeres, 10°20'51.59"N, 75°25'30.79"W, 10.02.2015, leg. Y. Carpio-Díaz; 1 ♂, 2 ♀♀ (CUDC-CRU 52), same locality and collector as previous, 19.09.2015; 31 ♂♂, 74 ♀♀ (CUDC-CRU 64), same data as previous; 8 ♂♂, 17 ♀♀ (ICN-CI 91), same data as previous; 27 ♂♂, 50 ♀♀ (CUDC-CRU 60), same data and locality, leg. C.M. López-Orozco; 1 ♀ (CUDC-CRU 65), same data as previous; 1 ♂, 11 ♀♀ (CUDC-CRU 101), same locality, 19.05.2017, leg. Y. Carpio-Díaz.

PREVIOUS RECORDS. Fundación, department of Magdalena [Pearse, 1915].

RE-DESCRIPTION. Maximum body length: ♂ 12 mm, ♀ 14 mm. Color dark gray; pereonites 5–7 and pleonites 3–5 epimera with orange pigmented lateral edges (Fig. 6). Pereonites 1–7 with posterior margin gradually arched, pleonites 3–5 epimera well developed with outline following that of pereonite 7; uropod filling gap between pleonite 5 and telson, conferring a continuous aspect (Figs 75, 76). Endoantennal conglobation. Dorsum smooth, covered with small

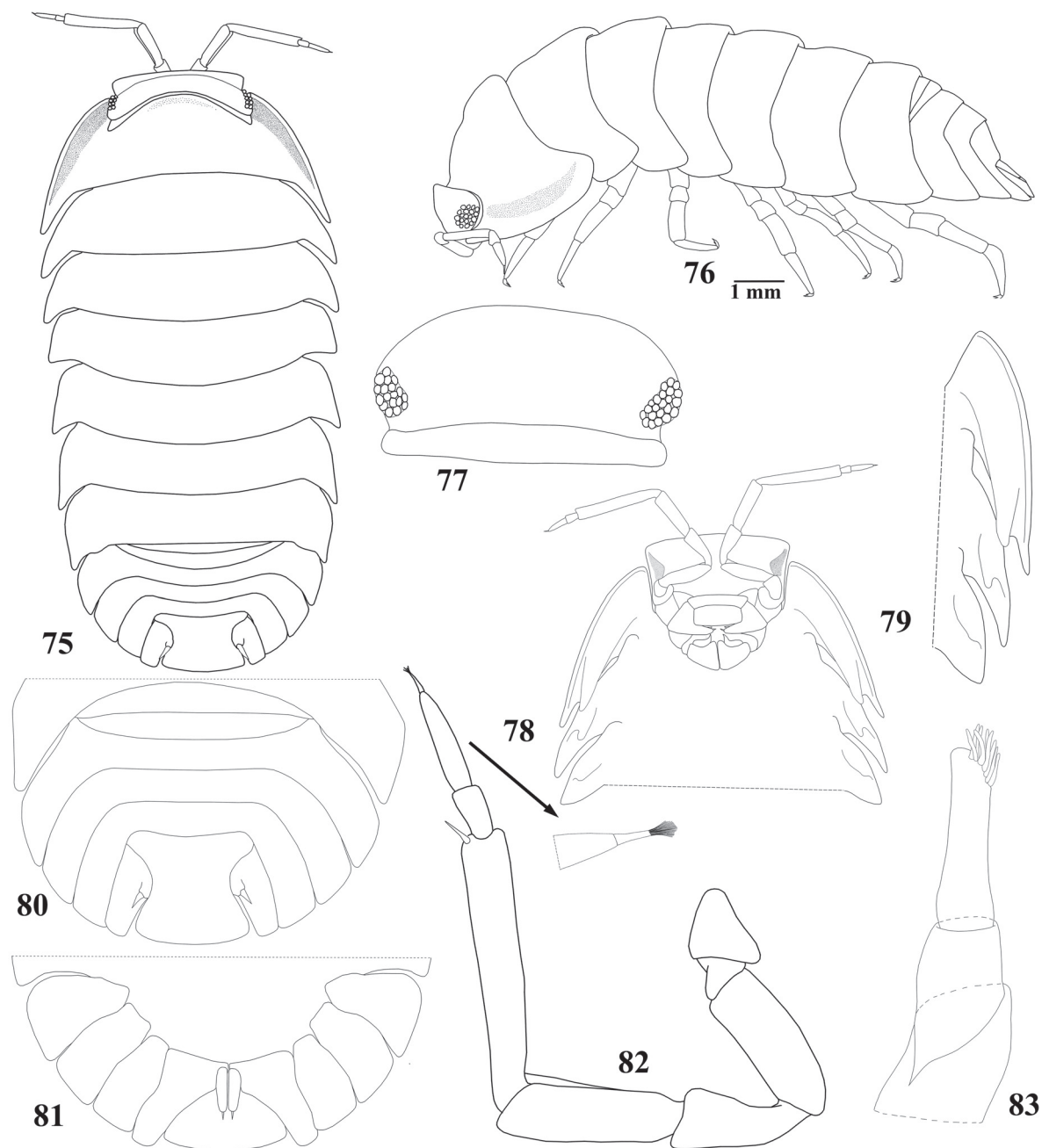
scale-setae. Cephalon (Fig. 77, 78) with frontal shield protruding above vertex and slightly concave on middle; eyes consisting of 20 ommatidia. Pereonite 1 epimera grooved on lateral margin, about 1/3 as long as epimera; inner lobe of schisma rounded, not extending beyond posterior margin of outer lobe; pereonite 2 with oblique ventral lobe, not extending beyond posterior margin of epimera; pereonite 3 with slightly inner lobe (Figs 78, 79). Pereonites 2–7 epimera subquadrangular, gradually more acute and directed backwards (Fig. 76). Telson hourglass-shaped (Figs 80, 81), proximal portion narrower than distal portion, distal margin slightly rounded. Antennula (Fig. 82) with distal article longest bearing nine subapical aesthetascs. Antenna (Fig. 83) short and slender, not surpassing pereonite 2 when extended backwards; flagellum with distal article twice as long as proximal one; apical organ short, 1/3 as long as distal article of flagellum. Mandibles with molar penicil consisting of several plumose setae, left mandible (Fig. 84) with 2+1 penicils, right mandible (Fig. 85) with 1+1 penicils. Maxillula (Fig. 86) inner endite with two long penicils; outer endite bearing of 4+5 teeth (five of them cleft at apex). Maxilla (Fig. 87) inner lobe rounded covered with thick setae; outer lobe three times as wide as inner lobe and covered with thin setae. Maxilliped (Fig. 88) basis subrectangular, outer margin rounded covered with thin setae; palp with two setae distinct in length on proximal article; endite with medial seta surpassing distal margin, distal margin truncated bearing two strong setae. Uropod (Fig. 89) protopod enlarged on basal portion, distal portion elongated and trapezoidal; exopod short, inserted dorsally near medial margin of protopod; endopod not surpassing distal margin of protopod. Pereopods 1–7 merus and carpus with sparse setae on sternal margin, carpus 1 with longitudinal antennal grooming brush; dactylus with long inner claw, ungual seta and dactylar organ simple, not surpassing outer claw.

Male: Pereopods without particular modifications (Figs 90, 91). Genital papilla (Fig. 92) with triangular ventral shield, papilla slightly surpassing ventral shield with two subapical orifices. Pleopod 1 (Fig. 93) exopod subtriangular, wider than longer, outer margin almost straight, distal margin rounded; endopod three times as long as exopod, distal portion tapering, directed outwards and bearing small setae on median margin. Pleopod 2 (Fig. 94) exopod triangular, outer margin strongly concave, inner margin with strong edge; endopod slightly longer than exopod. Pleopod 3 exopod (Fig. 95) triangular, outer margin concave. Pleopod 4 exopod (Fig. 96) rhomboid, outer margin concave. Pleopod 5 exopod (Fig. 97) rhomboid, outer margin almost straight.

REMARKS. The genus *Venezillo* comprises 136 species, of which 51 are recorded from the Neotropical region [Schmalfuss, 2003; Boyko *et al.*, 2008c].

Miers [1877] described *Cubaris gigas* from Nicaragua. Budde-Lund [1885] placed the species into the genus *Armadillo* Latreille, 1802 without a clear explanation. Arcangeli [1957] based in the work of Vandel [1952] moved this species to the genus *Venezillo*. Regarding the diagnostic characters of the genus (see Arcangeli, 1957; Schultz, 1995), *V. gigas* is easily recognized by the large size of adult specimens (>14 mm), shape of the schisma on pereonite 1 epimera, pereonite 2 with ventral lobe oblique, and pereonite 3 with small ventral lobe.

DISTRIBUTION. Nicaragua, San Juan; Costa Rica; Colombia, Magdalena (Fundación) [Miers, 1877; Pearse, 1915; Schmalfuss, 2003].



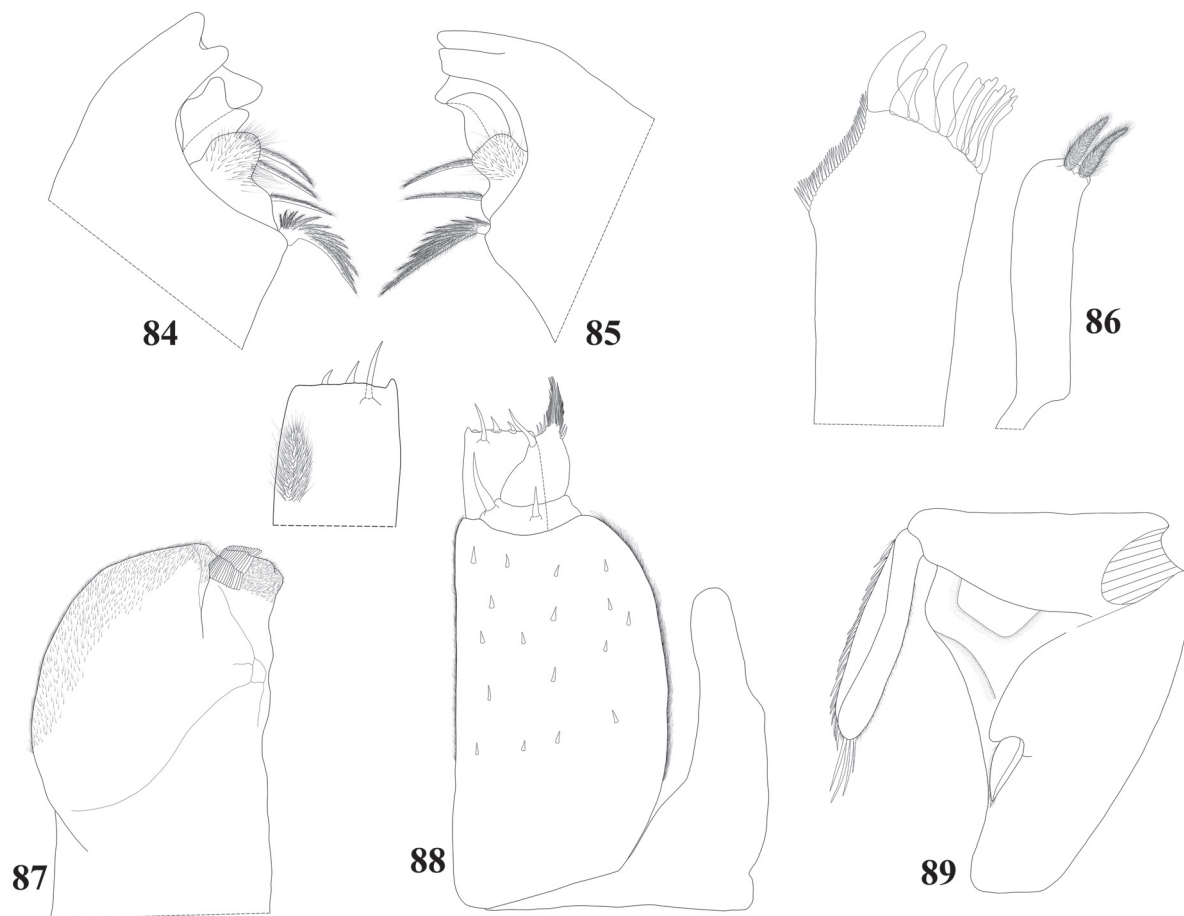
Figs 75–83. *Venezillo gigas* (Miers, 1877), female: 75 — adult specimen, dorsal habitus; 76 — adult specimen, lateral view; 77 — cephalon, dorsal view; 78 — cephalon and pereonites 1–3, frontal view; 79 — epimera of pereonites 1–3, ventral view; 80 — pleonites 3–5, telson and uropods, dorsal view; 81 — pleonites 3–5, telson and uropods, ventral view; 82 — antennula; 83 — antenna.

Рис. 75–83. *Venezillo gigas* (Miers, 1877), самка: 75 — взрослая особь, дорсально; 76 — взрослая особь, вид сбоку; 77 — голова, дорсально; 78 — голова и переониты 1–3, вид спереди; 79 — эпимеры переонитов 1–3, вентрально; 80 — плеониты 3–5, тельсон и уropоды, дорсально; 81 — плеониты 3–5, тельсон и уropоды, вентрально; 82 — антеннула; 83 — антенна.

Conclusions

The present study recognized six species of terrestrial isopods from the BGGP (Fig. 1), i.e., *Androdeloscia colombiana*, *Colomboniscus carpioi* sp.n., *Trichorhina heterophthalma*, *Trichorhina bermudezae* sp.n., *Ctenorillo dazai* sp.n., and *Venezillo gigas*. Only

A. colombiana have been recorded from the BGGP [López-Orozco *et al.*, 2016], and *V. gigas* from Fundación [Pearse, 1915], both places at the Caribbean coastal region of Colombia. *Trichorhina heterophthalma* is widely distributed in the Neotropical region [Lemos de Castro, 1964; Schmalfuss, 2003]; however, it is first recorded in Colombia in this study. Finally, *V.*



Figs 84–89. *Venezillo gigas* (Miers, 1877), female: 84 — left mandible; 85 — right mandible; 86 — maxillula; 87 — maxilla; 88 — maxilliped; 89 — uropod.

Рис. 84–89. *Venezillo gigas* (Miers, 1877), самка: 84 — левая мандибула; 85 — правая мандибула; 86 — максиллула; 87 — максилла; 88 — максиллипед; 89 — уропод.

gigas originally described from Nicaragua [Miers, 1877], and recorded from Costa Rica and Colombia [Pearse, 1915; Van Name, 1936; Schmalfuss, 2003], is first recorded for the department of Bolívar.

Regarding the 17 species recorded from Caribbean coasts of Colombia, four species have been found in tropical dry forest (TDF) areas: *A. colombiana*, *P. turbanaensis*, *V. gigas* and *V. grenadensis* [Richardson, 1912; Pearse, 1915; López-Orozco *et al.*, 2016, 2017]. Our work increases the known diversity of terrestrial isopods from the Caribbean regions of Colombia to 21 species, and 43 species to the country. Considering the current diversity of ecosystems of Colombia [Etter, van Wyngaarden, 2000; Olsen *et al.*, 2001], and the number of known species of Oniscidea, future investigations are necessary to have a better understanding about the diversity and relationships of the group along the Colombian territory.

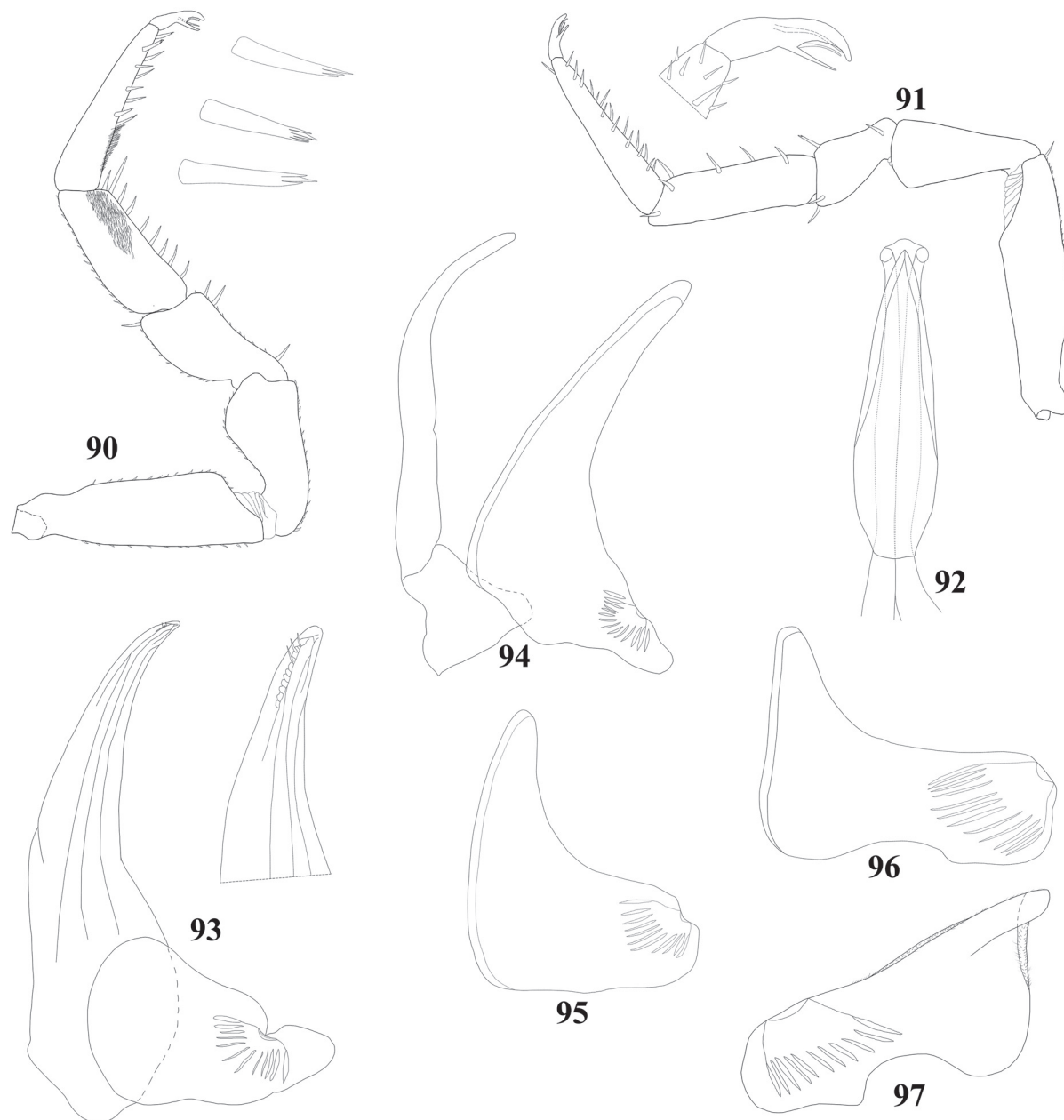
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Figs 90–97. *Venezillo gigas* (Miers, 1877), male: 90 — pereopod 1; 91 — pereopod 7; 92 — genital papilla; 93 — pleopod 1; 94 — pleopod 2; 95 — pleopod 3 exopod; 96 — pleopod 4 exopod; 97 — pleopod 5 exopod.

Рис. 90–97. *Venezillo gigas* (Miers, 1877), самец: 90 — переопод 1; 91 — переопод 7; 92 — генитальная папилла; 93 — плеопод 1; 94 — плеопод 2; 95 — экзопод плеопода 3; 96 — экзопод плеопода 4; 97 — экзопод плеопода 5.

Arcangeli A. 1957. I generi *Diploexochus*, *Venezillo*, *Paramardillo* [sic] (crostacei isopodi terrestri) // Bollettino dell'Istituto e Museo di Zoologia dell'Università di Torino. Vol.5. P.101–142.

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