ZooKeys 1192: 9–27 (2024)
DOI: 10.3897/zookeys.1192.114230

Research Article

First amphibious Crinocheta (Isopoda, Oniscidea) from the Neotropics with a troglobitic status: a relictual distribution

Carlos Mario López-Orozco[1], Ivanklin Soares Campos-Filho[2], Livia Medeiros Cordeiro[3,4], Jonas Eduardo Gallão[1,3], Yesenia M. Carpio-Díaz[1,5], Ricardo Borja-Arrieta[1,5], Maria Elina Bichuette[1,3]

1 *Laboratório de Estudos Subterrâneos, Universidade Federal de São Carlos, São Carlos, São Paulo, Brazil*
2 *Department of Biological Sciences, University of Cyprus, Lefkosia (Nicosia), Cyprus*
3 *Instituto Brasileiro de Estudos Subterrâneos, São Paulo, Brazil*
4 *Grupo de Espeleologia Serra da Bodoquena, São Paulo, Brazil*
5 *Grupo de Investigación en Biología Descriptiva y Aplicada, Universidad de Cartagena, Programa de Biología, Campus San Pablo, Cartagena de Indias, Colombia*
Corresponding author: Carlos Mario López-Orozco (clopezo1610@gmail.com)

Abstract

The first freshwater amphibian representative of Crinocheta (Oniscidea) from the Neotropics is described from caves within the Brazilian Cerrado biome, state of Mato Grosso do Sul. *Kadiweuoniscus rebellis* **gen. et sp. nov.** is placed in the family Philosciidae. The present work represents a significant contribution to future studies seeking to understand the ecological and evolutionary processes of Crinocheta within the Neotropical region. Moreover, it highlights the importance of biodiversity surveys in subterranean environments toward effective conservation efforts of these unique habitats and their surroundings.

Key words: Cave fauna, new genus, new species, Serra da Bodoquena, southwestern Brazil, terrestrial isopods, troglobitic species

Academic editor: Stefano Taiti
Received: 15 October 2023
Accepted: 4 December 2023
Published: 19 February 2024

ZooBank: https://zoobank.org/66B3F257-E9D4-48A5-830D-0D3FC7426CB5

Citation: López-Orozco CM, Campos-Filho IS, Cordeiro LM, Gallão JE, Carpio-Díaz YM, Borja-Arrieta R, Bichuette ME (2024) First amphibious Crinocheta (Isopoda, Oniscidea) from the Neotropics with a troglobitic status: a relictual distribution. ZooKeys 1192: 9–27. https://doi.org/10.3897/zookeys.1192.114230

Introduction

Terrestrial isopods (Oniscidea) are considered the most diverse group of isopods, with more than 4000 species in more than 500 genera in 38 or 39 families (Schmalfuss 2003; Taiti 2004; Javidkar et al. 2015; Sfenthourakis and Taiti 2015; Dimitriou et al. 2019; Campos-Filho and Taiti 2021). These organisms are distributed in almost all terrestrial environments on the planet, ranging from the supralittoral zone to high mountains, and from tropical zones to deserts (Schmalfuss 2003; López-Orozco et al. 2022). Additionally, a considerable number of species inhabit subterranean environments (Vandel 1973; Schmalfuss 2003; Taiti and Gruber 2008; Bedek et al. 2011; Taiti and Xue 2012; Tabacaru and Giurginca 2013; Reboleira et al. 2015).

Regarding the phylogeny of the group, morphological studies show Oniscidea as monophyletic, including the Sections Ligiidae, Tylidae, Mesoniscidae, Synocheta, and Crinocheta (Schmalfuss 1989; Wägele 1989; Erhard 1998; Schmidt 2008). All these authors recognized Synocheta as the sister group of Crinocheta. The last section is the most diverse, representing more than 80% of the entire suborder inhabiting various types of habitats (Schmidt 2002, 2003, 2008; Schmalfuss 2003). Recent molecular evidence has revealed that the genus *Ligia* Fabricius, 1798, is closer to marine groups of isopods, which raises doubts about the monophyly of Oniscidea (Lins et al. 2017; Dimitriou et al. 2019). However, future studies with integrative approaches will be necessary to clarify the phylogenetic relationships of the group.

In the last two decades, studies of terrestrial isopods have increased globally (Vittori and Dominko 2022). To date, Brazil holds the highest diversity of species in the Neotropical region, comprising more than 250 species (see Campos-Filho et al. 2018, 2019, 2020; Cardoso et al. 2020a, 2020b, 2021). Among them, more than 40 are considered obligatory cave-dwellers (troglobites), grouped in the families Armadillidae, Philosciidae, Pudeoniscidae, Scleropactidae and Styloniscidae (Campos-Filho et al. 2018, 2019, 2020, 2022a, 2022b, 2022c, 2023; Cardoso et al. 2020a, 2020b, 2021; Cardoso and Ferreira 2023; López-Orozco et al. in press). Moreover, Styloniscidae comprise the highest number of troglobitic species, some of which have amphibious habits (e.g., *Xangoniscus* spp. and *Spelunconiscus* spp.) (Campos-Filho et al. 2014, 2022a; Bastos-Pereira et al. 2017, 2022; Cardoso et al. 2020a).

Most of the amphibian species of Oniscidea found in caves belong to the Section Synocheta, primarily from the families Styloniscidae and Trichoniscidae (Vandel 1973; Taiti and Gruber 2008; Bedek et al. 2011; Taiti and Xue 2012; Tabacaru and Giurginca 2013; Campos-Filho et al. 2014, 2019, 2022a, 2022b, 2022c; Souza et al. 2015; Cardoso et al. 2020a, 2021; Bastos-Pereira et al. 2022; Reboleira et al. 2015). In Crinocheta, this type of habit has been described in the family Olibrinidae, which includes species found in caves and marine littoral environments in the genera *Castellanethes* Brian, 1952, *Olibrinus* Budde-Lund, 1912 and *Paradoniscus* Taiti & Ferrara, 2004 (Taiti and Ferrara 2004; Taiti and Gardini 2022; Moutaouakil et al. 2023). Regarding the American continent, there is only the record of *Olibrinus antennatus* (Budde-Lund, 1902) in the marine coast of the state of Rio Grande do Norte, Brazil, inhabiting mangrove swamps and under coral rock in the coastal environment (Araujo and Taiti 2007; Campos-Filho et al. 2018). In the family Philosciidae, this habit is present in some representatives of *Haloniscus* Chilton, 1920 from Australia (Taiti and Humphreys 2001; Guzik et al. 2019; Stringer et al. 2019), and epigean species *Androdeloscia tarumae* (Lemos de Castro, 1984) in the Central Amazon (Warburg et al. 1997). This amphibious habit has been considered as a secondary condition that appeared several times within Oniscidea (Schmidt 2008; Taiti and Xue 2012; Taiti et al. 2018; Sfenthourakis et al. 2020).

In the present study, a freshwater amphibian representative of Crinocheta (Philosciidae) with troglobitic status is described for the first time in the Neotropical region. *Kadiweuoniscus rebellis* gen. et sp. nov. is described from caves in the Brazilian Cerrado biome, state of Mato Grosso do Sul, Serra da Bodoquena karst area.

Materials and methods

Study area

The material was collected from three limestone caves of Serra da Bodoquena karst area, located in the Bodoquena municipality, state of Mato Grosso do Sul, southwestern Brazil (Figs 1, 2). The caves occupy an area about 220 km N to S and may reach 40 km E to W, encompassing many flooded caves beside a few sparse limestone hills, located about 100 km N to W along the Paraguay Belt. The area belongs to the Corumbá (geomorphological) Group, Bocaina Formation, and it is classified as having an Aw (tropical) climate, characterized by a dry winter and humid summer (Bedek et al. 2018, 2020). It is known for its high diversity of troglobites (Camargo and Lourenção 2007; Cordeiro et al. 2014), surpassing 34 species, many of them aquatic (Trajano et al. 2016). The native vegetation in the area consists of savanna in contact with semi-deciduous seasonal forest, within the Cerrado Biome (Galati et al. 2003; Boggiani et al. 2011). Two of the caves are located within the Serra da Bodoquena National Park (PNSB, Parque Nacional Serra da Bodoquena), a National Conservation Unit created in 2000 that covers an area of 76,481 hectares and contains numerous caves (Camargo and Lourenção 2007; Lobo 2007; Cordeiro et al. 2014). Currently, livestock is the main economic activity in the region, followed by tourism, including speleotourism. The latter has grown in economic importance for the municipalities of Bonito, Bodoquena and Jardim (Lobo 2007; Cordeiro et al. 2014).

Collections and taxonomy

Specimens were collected by active search with the aid of tweezers and brushes, and stored in 75% ethanol; microhabitat data was also recorded. The identifications were based on morphological characters with the use of micropreparations in Hoyer's medium (Anderson 1954). The illustrations were made with the aid of a camera lucida mounted on a Zeiss Stemi SV6 stereomicroscope and Leica DMLS microscope. The final illustrations were prepared using the software GIMP v.2.8 with the method proposed by Montesanto (2015, 2016). For scanning electron microscopy (SEM), two individuals were used, one male and one female, without performing dissections. The specimens were dried using Critical Point Drying and mounted on a plastic sheet. Uncoated SEM preparations were examined using an FEI Quanta 250 (at the UFSCar). The figures were edited using GIMP v.2.8.

The material examined is deposited in the zoological collection of the Laboratório de Estudos Subterrâneos (LES), Universidade Federal de São Carlos, São Carlos, Brazil (curator: Maria E. Bichuette).

Systematic account

Suborder Oniscidea Latreille, 1802
Family Philosciidae Kinahan, 1857

Genus *Kadiweuoniscus* López-Orozco, Campos-Filho & Bichuette, gen. nov.

https://zoobank.org/C1386E76-7F74-45AA-9097-C7A757FD39C3

Type species. *Kadiweuoniscus rebellis* López-Orozco, Campos-Filho & Bichuette sp. nov., by present designation and monotypy.

Diagnosis. Troglobitic species with amphibious habit; animals about 5 mm long; dorsal surface weakly granulated; *noduli laterales* absent; cephalon with lateral lobes weakly developed, frontal and suprantennal lines absent; pleonites 3–5 with epimera elongated, forming acute tips; telson triangular; antennula of three articles, distal article separated from medial article by fine suture; antenna with flagellum of three articles, apical organ long; molar penicil of mandibles dichotomized; maxillule outer branch with eight teeth; maxilla bilobate; maxilliped endite without penicil; male pereopods 1–7 gradually elongated; dactylar seta short and simple; uropod endopod inserted slightly proximally; pleopods 3–5 exopods with fringe of thin setae on all margins.

Etymology. The new genus is named after the Kadiwéu indigenous people. The Kadiwéu are known as "Indian riders", due to their horse-riding prowess, keeping in their mythology, art and rituals the way of being of a hierarchical society between masters and captives.

Remarks. The family Philosciidae comprises more than 600 species in 113 genera widely distributed in Australia, southern Asia, Africa, Europe and the Americas (Leistikow 2001; Schmalfuss 2003; Boyko et al. 2023). To date, the family is considered paraphyletic due to characteristics shared with the Halophilosciidae and Scleropactidae (Leistikow 2001; Schmidt 2003, 2008).

The family has great morphological plasticity and the representatives are mainly recognized by the 'runner-type' habitus (sensu Schmalfuss 1984), body with a dorsal surface smooth or slightly tuberculated, pereonites 1–7 with one or two lines of *noduli laterales* per side (sometimes present on cephalon and pleonites), antennula and antennal flagellum of three articles, mandibles with molar penicil simple or dichotomized, maxillula outer endite with outer set of teeth simple or cleft or pectinated, maxilla bilobated, maxilliped endite bearing ventral penicil or triangular seta (sometimes absent), uropod branches unequal or similar in length and inserted at same or on distinct levels, and pleopod exopods with out respiratory areas or with covered monospiracular lungs (Taiti and Ferrara 1980, 1982; Ferrara et al. 1994; Araujo and Leistikow 1999; Leistikow and Araujo 2001; Leistikow 2001).

Kadiweuoniscus gen. nov. is included in Philosciidae by having most of these mentioned characters. The new genus is easily distinguishable from the other genera of Philosciidae due to its amphibian habit, and the pleonites 3–5 epimera elongated. As mentioned, the amphibious behavior is also present in species of *Haloniscus*; however, the new genus differs in the cephalon lacking frontal and suprantennal lines (vs. present in *Haloniscus*, except *H. anophthalmus* Taiti, Ferrara & Iliffe, 1995), pleonites 3–5 epimera elongated (vs. pleonites 3–5 epimera reduced in *Haloniscus*), antennula distal and medial articles separated by fine suture (vs. antennula with three distinct articles in *Haloniscus*), antennal flagellum with long apical organ (vs. short in *Haloniscus*), maxillula outer branch with 4 + 4 teeth, long and curved (vs. maxilla with 4 or 5 + 6 in *Haloniscus*), and maxilliped endite without penicil (vs. present in *Haloniscus*).

Kadiweuoniscus rebellis **López-Orozco, Campos-Filho & Bichuette, sp. nov.**

https://zoobank.org/F5A2614F-20F7-44CC-865F-C2A16F2329D1

Figs 1–7, Suppl. material 1

Type material. Brazil • 1♂, ***holotype***, Flor da Bodoquena Cave, Bodoquena, state of Mato Grosso do Sul, 20°45'19"S, 56°48'8"W, 14.VIII.2011, leg. LM Cordeiro, LES 0029048 • 1♂, 1♀ (part in micropreparations), ***paratypes***, Dente de Cão Cave, 20°44'48"S, 56°47'4.2"W, 13.VI.2022, leg. LM Cordeiro, A Chagas-Jr, ME Bichuette, LES 0029049 • 2♀♀, ***paratypes***, same data as previous, LES 0029050

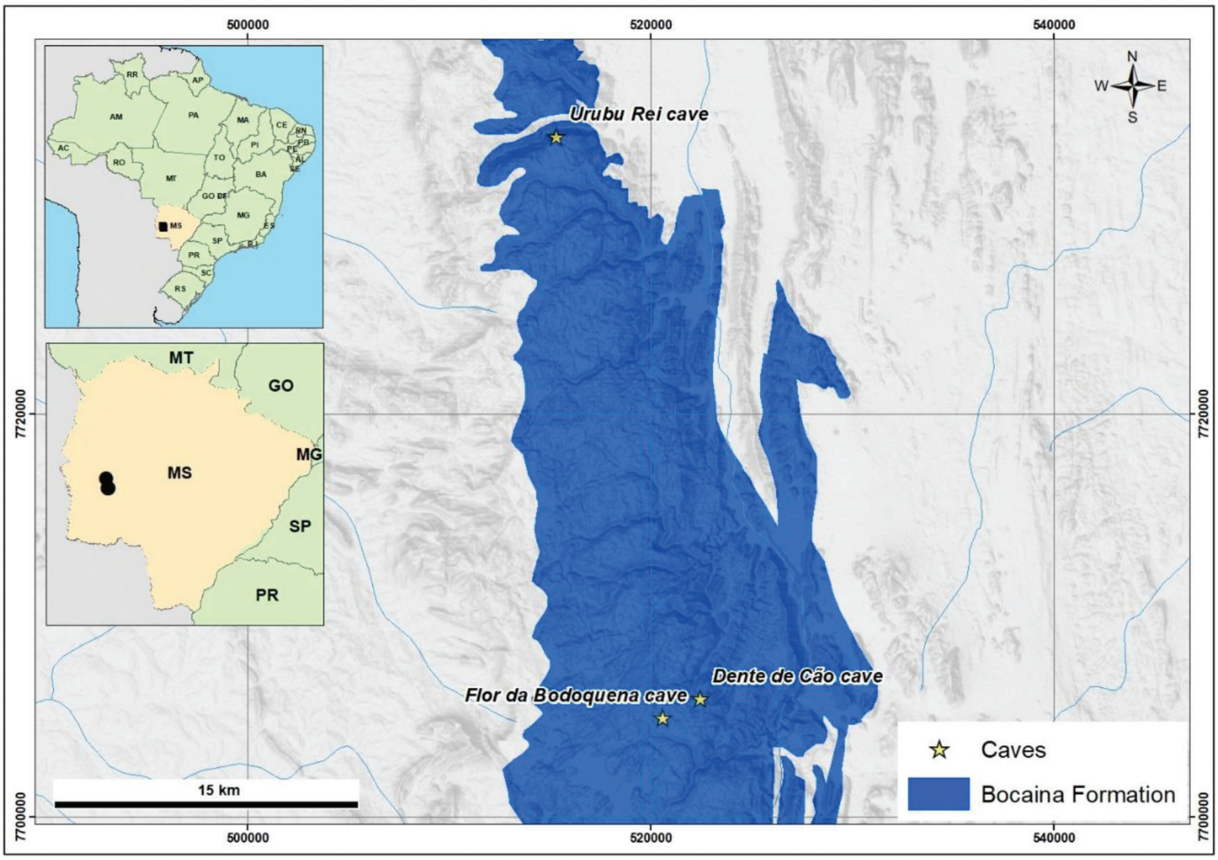

Figure 1. Map of the study area and distribution of *Kadiweuoniscus rebellis* López-Orozco, Campos-Filho & Bichuette gen. et sp. nov. in the Serra da Bodoquena, Mato Grosso do Sul.

• 1♀, ***paratypes***, same data as holotype, LES 0029051 • 1♀, ***paratypes***, Urubu Rei Cave, 20°29'40"S, 56°51'11"W, 16.VI.2022, leg. LM Cordeiro, A Chagas-Jr, ME Bichuette, LES 0029052 • 1♀, ***paratypes***, same data as previous, LES 0029053 • 1♂, same data as previous, LES 0029054.

Description. Maximum body length: male 4.5 mm, female 5 mm. Body outline as in Fig. 3A, B. Colourless (Fig. 3B). Dorsal surface granulated bearing pointed scale-setae (Fig. 3A, C, D). Cephalon (Fig. 3E–G) with small semicircular antennary lobes; eyes absent. Pereonites 1–2 with epimera semicircular, 3–7 with posterior corners gradually more acute (Fig. 3A, B, D, F, G). Pleon (Fig. 3H) narrower than pereon, pleonite 3–5 epimera elongated and acute. Telson (Fig. 3H) broader than long, lateral sides almost straight, rounded apex. Antennula (Fig. 3I) distal article longest with four apical aesthetascs. Antenna (Fig. 4A) long, not surpassing pereonite 3 when extended backwards; flagellum of articles subequal in length; apical organ shorter than basal article of flagellum, bearing small free sensilla. Mandibles with molar penicil of six to seven branches; right mandible (Fig. 4B) with 1+1 free penicils; left mandible (Fig. 4C) with 2+1 free penicils. Maxillula (Fig. 4D) inner endite bearing two setose penicils, distal margin rounded; outer endite with 4 + 4 teeth simple, elongated and curved. Maxilla (Fig. 4E) with setose lobes; outer lobe slightly smaller than inner lobe, quadrangular and covered with thin and long setae; inner lobe rounded and covered with thin and thick setae. Maxilliped (Fig. 4F) basis rectangular; first article of palp bearing two setae; endite rectangular, medial seta overpassing distal margin, ventrally with setose sulcus. Uropod (Fig. 4G) protopod and

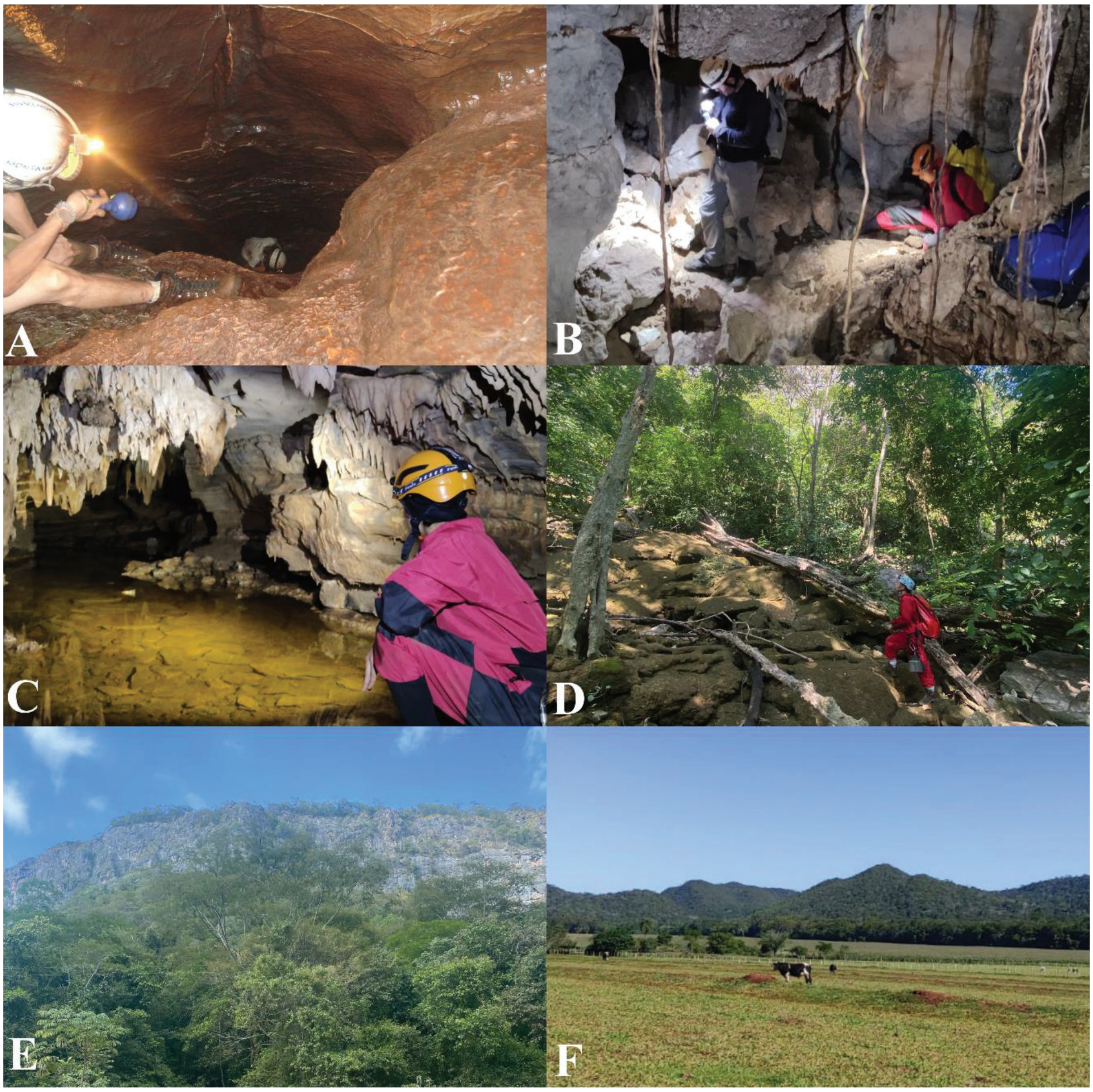

Figure 2. Study area: **A** Flor da Bodoquena Cave **B** Urubu Rei Cave **C** Dente de Cão Cave **D** epigean environment in Flor da Bodoquena Cave **E** limestones in the Serra da Bodoquena karst area **F** livestock and agriculture in the Serra da Bodoquena.

exopod grooved on outer margin. Pereopods 1–7 bearing sparse setae on sternal margin. Pereopod 1 (Fig. 5A) carpus with antennal grooming brush reduced, composed by short scale-setae; dactylus with ungual and dactylar setae simple (Fig. 5B). Pleopod exopods without respiratory areas.

Male. Pereopod 1–7 (Fig. 5A–H) gradually more elongated, without particular modifications. Genital papilla (Fig. 6A) with lanceolate ventral shield; papilla longer than ventral shield bearing two subapical orifices. Pleopod 1 (Fig. 6A) exopod ovoidal, inner margin with one small seta; endopod stout, three times longer than exopod, slightly bent outwards, apex bearing setae on inner margin. Pleopod 2 (Fig. 6E) exopod triangular, outer margin concave bearing four setae; endopod flagelliform, slightly longer than exopod. Pleopod 3 and 4 (Fig. 6C, D) exopods rhomboid, outer margin with four setae, inner margin slightly convex. Pleopod 5 (Fig. 6E) exopod rhomboid, longer than wide, distal and outer margins rounded bearing four small setae.

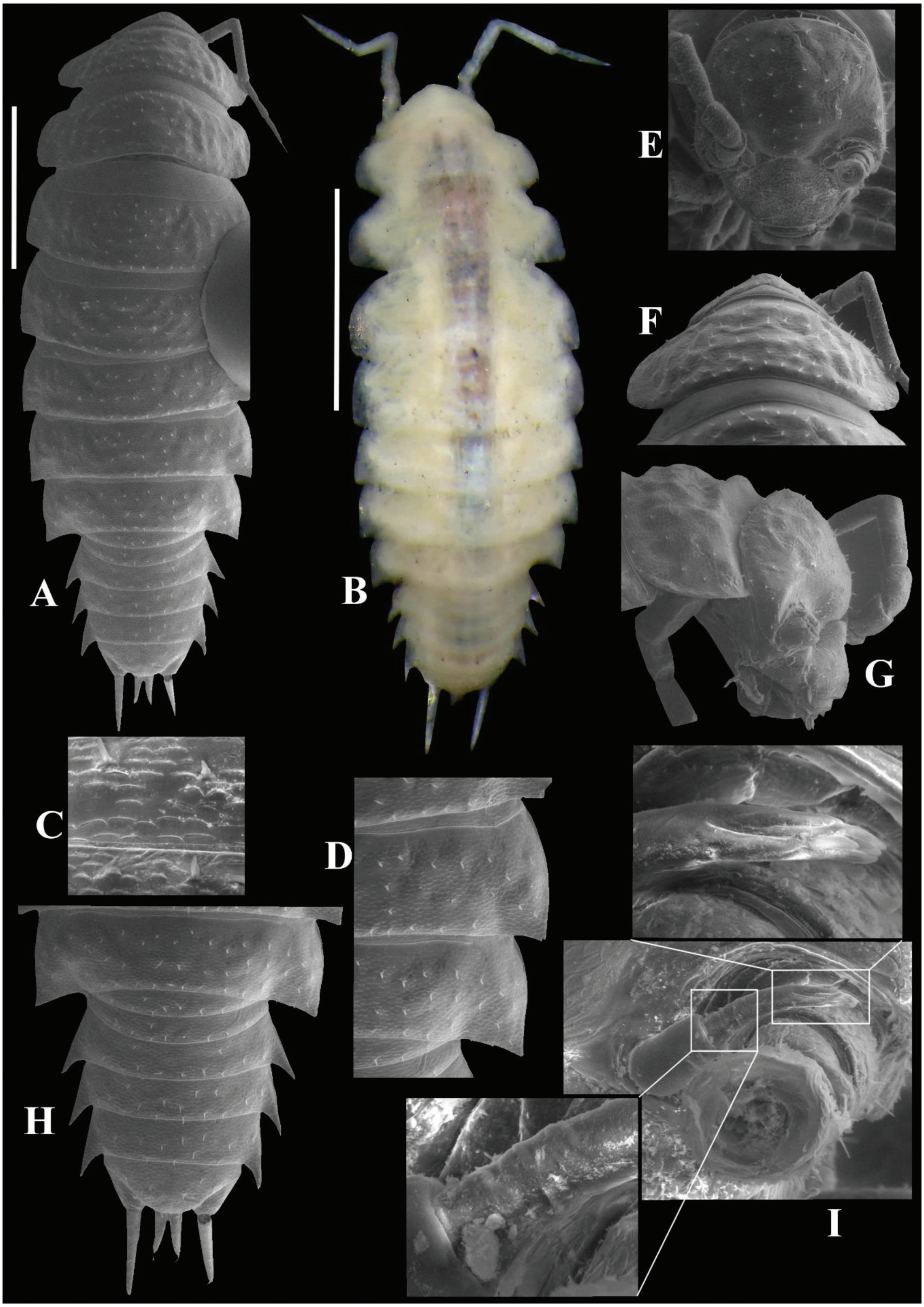

Figure 3. *Kadiweuoniscus rebellis* López-Orozco, Campos-Filho & Bichuette gen. et sp. nov. (♀ paratype, LES 0029050) **A, B** habitus, dorsal view **C** dorsal scale-seta **D** epimera 6–7 **E** cephalon, frontal view **F** cephalon and pereonite 1, posterior view **G** cephalon and pereonite 1, lateral view **H** pleon, telson and uropods **I** antennula. Scale bars: 1 mm.

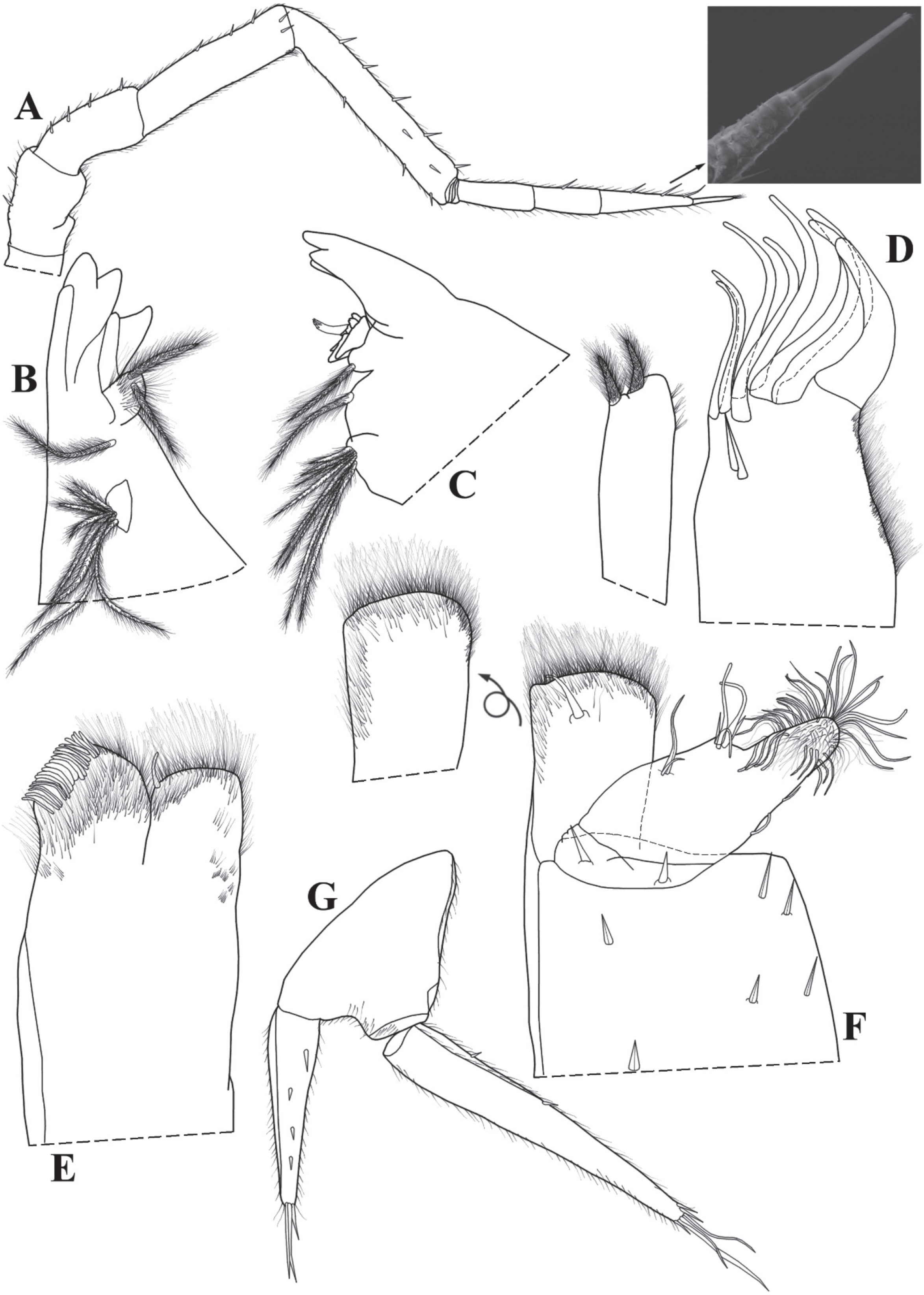

Figure 4. *Kadiweuoniscus rebellis* López-Orozco, Campos-Filho & Bichuette gen. et sp. nov. (♀ paratype, LES 0029049) **A** antenna, with flagellum detail **B** left mandible **C** right mandible **D** maxillula **E** maxilla **F** maxilliped, arrow illustrating the endite in caudal view **G** uropod.

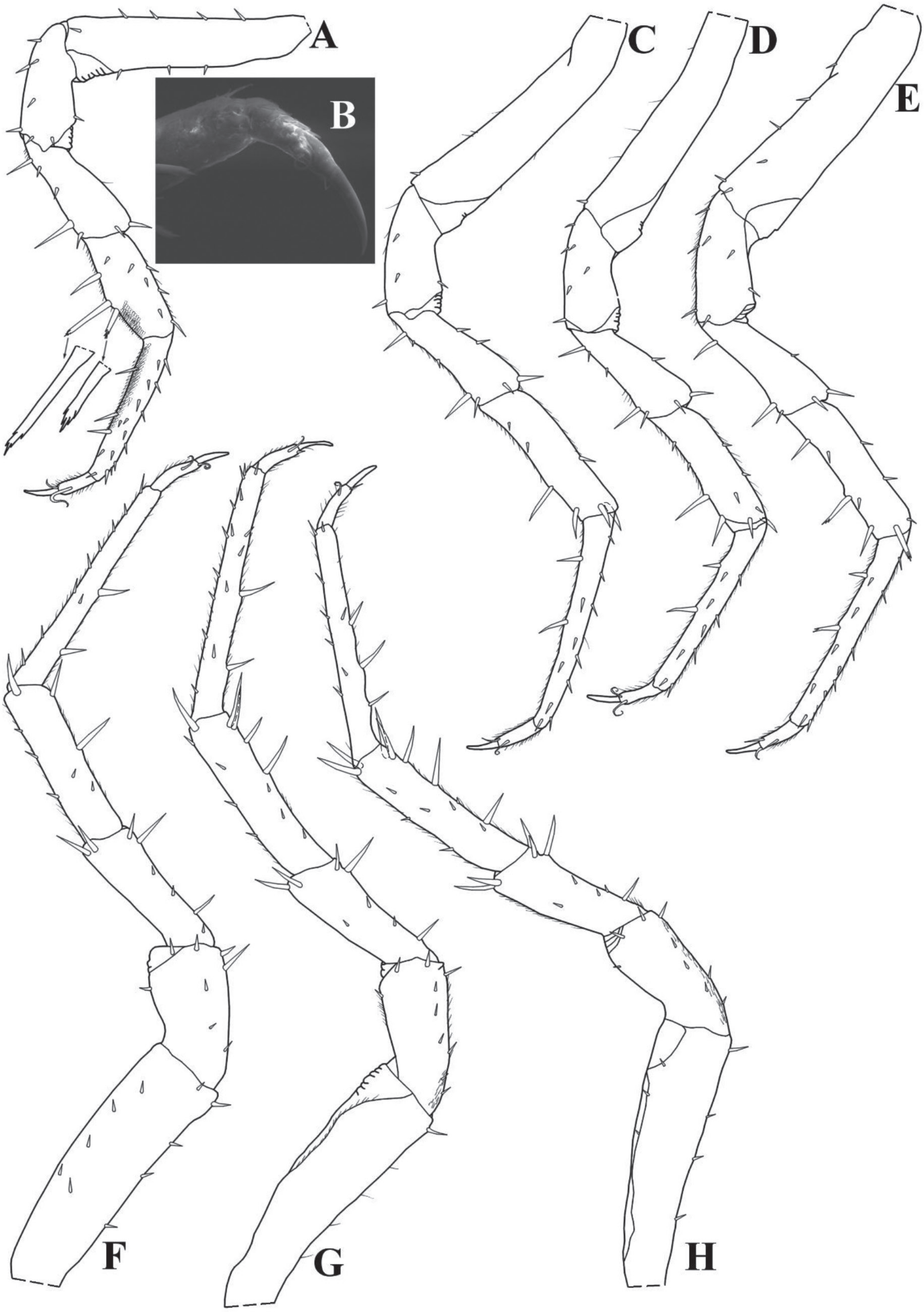

Figure 5. *Kadiweuoniscus rebellis* López-Orozco, Campos-Filho & Bichuette gen. et sp. nov. (♂ holotype, LES 0029048) **A** pereopod 1 **B** dactylus in rostral view; (♂ paratype, LES 0029049) **C** pereopod 2 **D** pereopod 3 **E** pereopod 4 **F** pereopod 5 **G** pereopod 6 **H** pereopod 7.

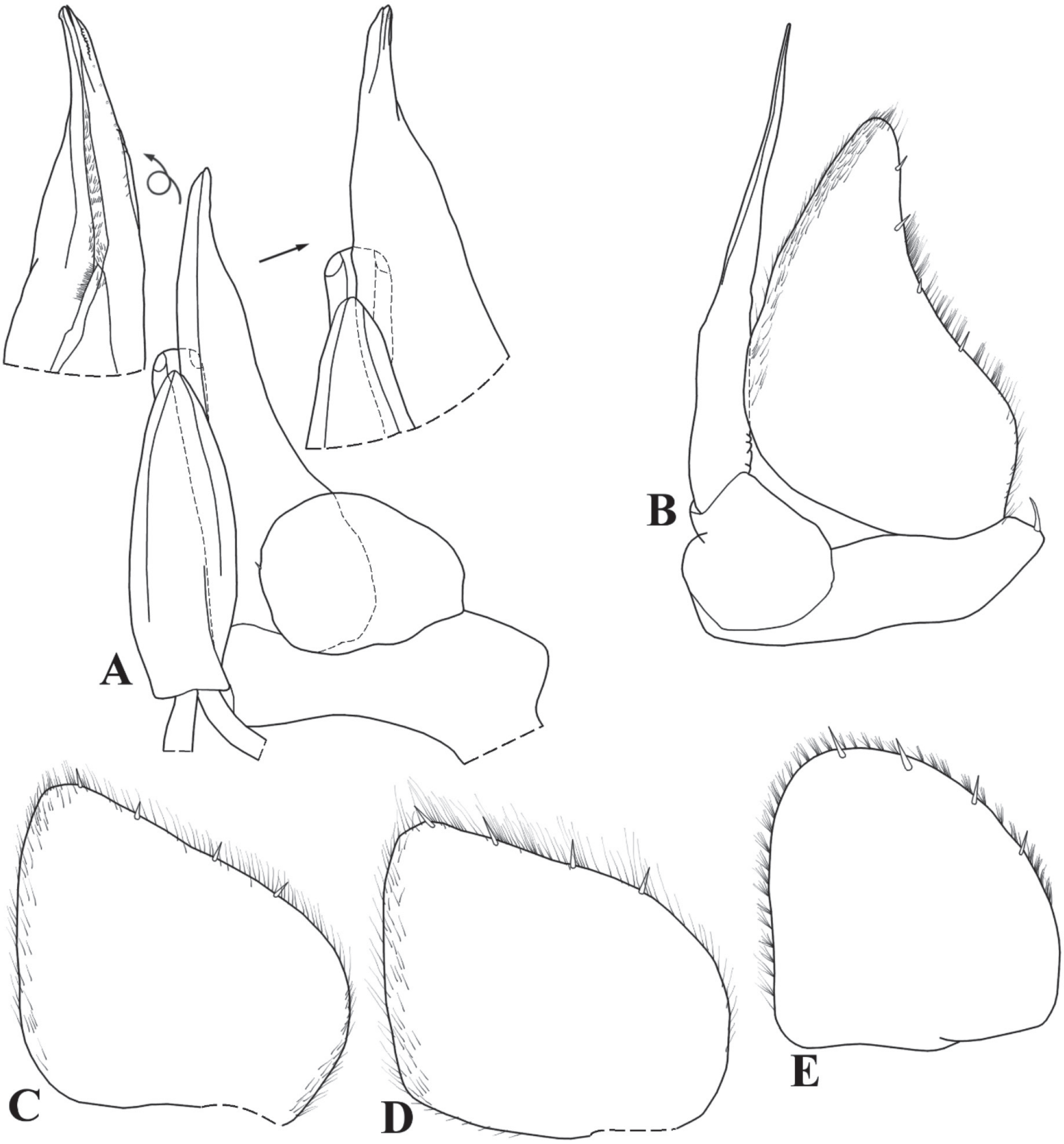

Figure 6. *Kadiweuoniscus rebellis* López-Orozco, Campos-Filho & Bichuette gen. et sp. nov. (♂ paratype, LES 0029049) **A** genital papilla and pleopod 1 **B** pleopod 2 **C** pleopod 3 exopod **D** pleopod 4 exopod **E** pleopod 5 exopod.

Etymology. The new species name alludes to the resistance group from the Star Wars fiction series, the Rebel Alliance, that fights against the Empire. The Kadiwéu indigenous people were known as warriors, and they fought for Brazil in the Paraguayan War to reclaim and secure their lands in the Serra da Bodoquena region. Today, they are confined to the outskirts of the Bodoquena plateau and the Pantanal plain. The designation 'rebellis' is used as an adjective for the genus name.

Ecological remarks. The physicochemical data of microhabitats of *Kadiweuoniscus rebellis* gen. et sp. nov. are: pH = 7.5, high conductivity (c. 0.450 µS.cm^{-1}), moderate temperature (22 °C) and moderate dissolved oxygen (ca. 6.0 mg.l^{-1}). pH values (neutral to basic) are typical of karst waters. The abundance is particularly low in each cave, and they have a preference for rocky substrates with a silty and pebble bottom (Fig. 7A, B). Amphibious habit (see Suppl. material 1).

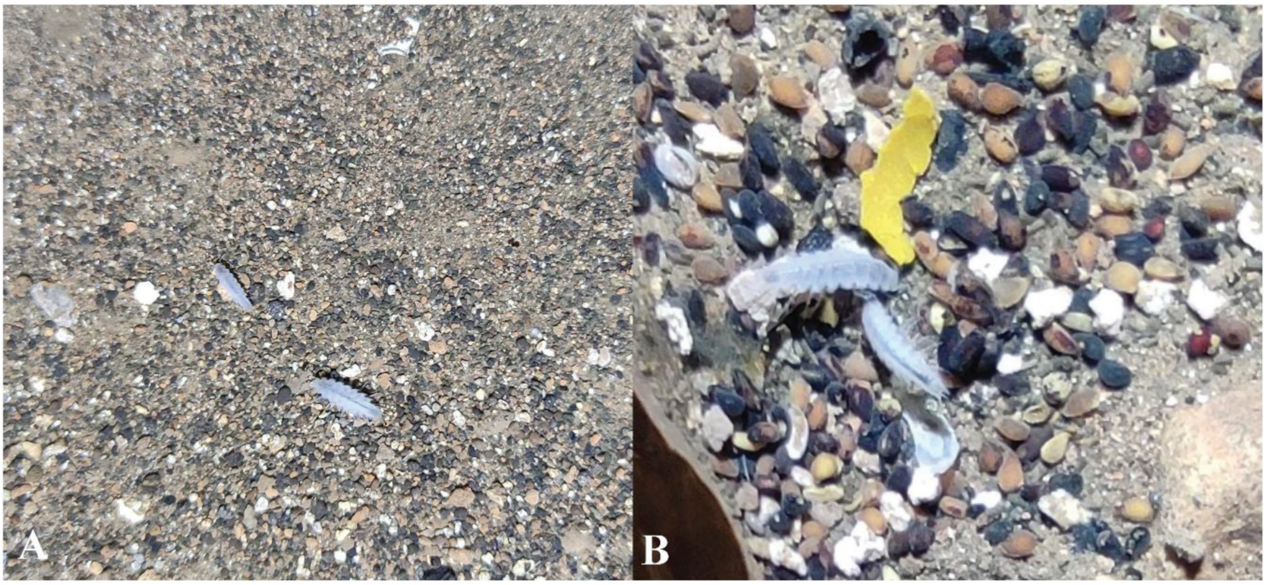

Figure 7. A and **B** *Kadiweuoniscus rebellis* López-Orozco, Campos-Filho & Bichuette gen. et sp. nov. submerged on rocky substrate with silt and pebbles.

Discussion

The Serra da Bodoquena karst area exhibits taxonomic singularities among invertebrates, housing some remarkable phylogenetic relicts among peracarid crustaceans, such as *Potiicoara brasiliensis* Pires, 1987 (Spelaeogriphacea) and *Megagidiella azul* Koenemann & Holsinger, 1999 (Amphipoda) (Pires 1987; Koenemann and Holsinger 1999). To date, no records of such singularities within Isopoda, particularly Oniscidea, have been documented. Cordeiro et al. (2014) reported a low diversity of terrestrial isopods in this region. At present, the records include *Circoniscus intermedius* Souza & Lemos de Castro, 1991 and *Diploexochus carrapicho* Campos-Filho, López-Orozco & Taiti (Campos-Filho et al. 2014, 2023). The discovery of a new freshwater amphibian genus highlights the taxonomic significance to both Serra da Bodoquena karst areas and the Neotropical region. Moreover, *K. rebellis* gen. et sp. nov. represents a significant addition to our ecological knowledge of Neotropical Philosciidae, considering its amphibious habit. It is worth noting that the majority of species within this family commonly inhabit the edaphofauna in the epigeal environment (Leistikow 2001).

Kadiweuoniscus rebellis gen. et sp. nov. exhibits several distinctive features, including troglomorphisms, such as the absence of eyes and body pigments, as well as the elongation of the pereiopods. These characteristics are typical traits found in amphibious troglobitic Oniscidea (Campos-Filho et al. 2014, 2019, 2022a, 2022b; Souza et al. 2015; Cardoso et al. 2020a, 2020b, 2021; Bastos-Pereira et al. 2022). One key trait common among representatives with this type of habit is the absence of *noduli laterales*, which represents an important character in the classification of some groups of terrestrial isopods (Schmidt 2008). This characteristic is observed in several genera with epigean species within Philosciidae (e.g., *Oxalaniscus* Leistikow, 2000, *Ischioscia* Verhoeff, 1928, *Parischioscia* Lemos de Castro, 1967, *Mirtana* Leistikow, 1997, *Pentoniscus* Richardson, 1913, *Yaerikima* Leistikow, 2001, *Formicascia* Leistikow, 2001, *Roraimoscia* Leistikow, 2001, *Oreades* Vandel, 1968 and *Ecuadoroniscus* Vandel, 1968 (Leistikow 2001). However, the significance of this character remains unknown in many fields of biology, and further research is needed to elucidate its usefulness (Leistikow 2001; Schmidt 2008).

Based on the phylogeny of South American Philosciidae, the genera *Quintanoscia* Leistikow, 2000 and *Oxalaniscus* were recovered as basal groups (Leistikow 2001). These two genera show typical characters of the ground-pattern Oniscidea, such as a subrectangular maxilla, the maxilliped palp with prominent setal tufts and the endite with a prominent penicil (Leistikow 2000, 2001). *Kadiweuoniscus* gen. et sp. nov. shares the first two characteristics, however, it lacks the penicil in the endite of the maxilliped, which may suggest it is basal within Philosciidae. Further investigations including molecular data are necessary to clarify the position of the new genus within the family. Our discovery marks the initial documentation of the troglobitic amphibian Crinocheta in the Neotropics, serving as a pivotal link for comprehending aspects related to the biology, ecology, morphology, distribution and evolution of Philosciidae.

The Flor da Bodoquena Cave is a vertical fracture (Fig. 2A), with the water reaching 20 m deep and extending only 150 meters. Specimens of *K. rebellis* gen. et sp. nov. were found in the walls of the cave. The fracture ends at the level of the sheet, where the stygobitic catfish *Trichomycterus dali* Rizzato, Costa, Trajano & Bichuette, 2011 is also recorded, possibly a predator of the isopods. During the rainy season, the current increases and the water level rises, oscillating between 10 and 12 m. Dispersion of the species possibly follows this oscillation. This cave is at a higher altitude compared to the other two where the species occurs (Urubu Rei and Dente de Cão, Fig. 2B–D), and may represent the source population. Urubu Rei and Dente de Cão caves have conduits with lentic waters and bottoms formed by silt, pebbles and rocky substrate (Fig. 2B, Urubu Rei Cave). In the case of Urubu Rei, the water rises drastically in the rainy season, becoming extremely lotic, which also could disperse/spread the isopods; the same is not observed for Dente Cão Cave.

Considering the species distribution, although the limestones are continuous at the surface (Fig. 2E), hydrological barriers have been formed due to fluvial incisions that, in the north plateau, have cut down to non-carbonate rocks, forming compartments corresponding to micro-basins (Cordeiro et al. 2014). The species occurs in the upper part of these compartments, and its distribution in the three caves could be explained by one colonization event and, after the regional uplifting prior to the Pliocene/Pleistocene transition, raising the area to altitudes of 1000 m, followed by the current subsidence responsible for the formation of the adjacent Pantanal Basin. The three populations may be isolated by geological processes, as suggested by Moracchioli and Trajano (2002) for *P. brasiliensis*. These facts, allied with the marked troglomorphisms and unique characteristics, could indicate a relictual occupation of the Serra da Bodoquena subterranean habitats.

Conservation remarks

The species occurs in caves within the boundaries of the Serra da Bodoquena National Park, and is, a priori, legally protected. However, the caves are not controlled or even inspected by governmental bodies dealing with tourism and visitors. Furthermore, their surroundings have deforested areas with livestock farming and agriculture activities (Fig. 2F), which drastically reduces the quality of the habitat. These facts make the species vulnerable in relation to its effective protection. Ecological monitoring projects can help in the understanding of the distribution and singularities of the species, which would assist in conservation efforts. The restricted distribution makes the species vulnerable and potentially endangered.

Finally, considering that specimens of the taxon described here have been collected since 2011, it is essential to emphasize the significance of scientific collections in the study of biodiversity. These collections serve as repositories of historical information about natural environments. Therefore, it becomes crucial to review the materials collected over extended periods and stored in such institutions. By doing so, we can enhance our understanding of the vast taxonomic diversity present in our ecosystems. Scientific collections play a crucial role in research, allowing the examination of specimens over time and across different locations, and safeguarding our biodiversity. Without these collections, our knowledge of the natural world and the species it harbors would be severely limited.

Acknowledgements

We thank to A. Chagas-Jr, D. M. Borges, S. G. Jimenez and D.F. Torres for help in the fieldtrip and collections; to B. D. Lenhare for preparation of map of Fig. 1; to LES team (UFSCar) for help in the organization of scientific collection, especially to M. F. C. Zancheta and E. L. da Silva; to L. B. R. Fernandes for help in taking SEM images; to Odete Rocha for the loan of her laboratory facilities for the development of illustrations; to Sistema de Autorização e Informação em Biodiversidade/ICMBio for collection permits to MEB (SISBIO # 28992); to CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil) for a scholarship to CML-O and RB-A and CNPq (Conselho Nacional de Desenvolvimento Científico e Tecnológico), for the scholarship to YMC-D; to Research Project titled "Biodiversity of terrestrial isopods (Crustacea, Isopoda, Oniscidea) from Cyprus in the light of integrative taxonomy", "ONISILOS Research Program – 2018", funded by the University of Cyprus, for the postdoctoral fellowship granted to ISC-F; to Vicerrectoría de Investigaciones of the University of Cartagena for the financial support to the Grupo de Investigación en Biología Descriptiva y Aplicada (Project Semilleros, Acta de Compromiso N° 053–2022).

Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

No ethical statement was reported.

Funding

The research was partially granted by ICMBio (Instituto Chico Mendes de Conservação da Biodiversidade)/Vale S.A. (TCCE 02/2020), under the project "Teste de metodologias propostas em Legislação Ambiental relacionadas à fauna subterrânea e proposição de novas áreas prioritárias para conservação de cavernas", coordinated by MEB with operational management carried out by the IABS (Instituto Brasileiro de Desenvolvimento e Sustentabilidade). This study was financed in part by the Brazilian funding agencies CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil) – Finance Code 001 (PROAP/CAPES PPGERN).

Author contributions

Conceptualization: MEB, CMLO, JEG. Data curation: CMLO, YMCD, JEG, MEB. Formal analysis: ISCF, CMLO, MEB. Funding acquisition: LMC, MEB, JEG. Investigation: YMCD, MEB, RBA, LMC, CMLO, ISCF. Methodology: CMLO, RBA, ISCF, YMCD, MEB. Project administration: MEB, LMC, JEG. Supervision: MEB. Visualization: RBA, YMCD. Writing – original draft: CMLO, RBA, YMCD, ISCF. Writing – review and editing: JEG, LMC, CMLO, ISCF, RBA, YMCD, MEB.

Author ORCIDs

Carlos Mario López-Orozco https://orcid.org/0000-0002-3251-7739
Ivanklin Soares Campos-Filho https://orcid.org/0000-0001-6139-8241
Livia Medeiros Cordeiro https://orcid.org/0000-0002-0742-897X
Jonas Eduardo Gallão https://orcid.org/0000-0002-5268-7946
Yesenia M. Carpio-Díaz https://orcid.org/0000-0001-5116-9736
Ricardo Borja-Arrieta https://orcid.org/0000-0002-5064-5080
Maria Elina Bichuette https://orcid.org/0000-0002-9515-4832

Data availability

All of the data that support the findings of this study are available in the main text or Supplementary Information.

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Supplementary material 1

Supplementary video

Authors: Carlos Mario López-Orozco, Ivanklin Soares Campos-Filho, Livia Medeiros Cordeiro, Jonas Eduardo Gallão, Yesenia M. Carpio-Díaz, Ricardo Borja-Arrieta, Maria Elina Bichuette

Data type: mp4

Explanation note: *Kadiweuoniscus rebellis* López-Orozco, Campos-Filho & Bichuette gen. et sp. nov. locomotor behavior in the Flor da Bodoquena Cave, in rocky substrate with silt and pebbles. Video on YouTube: https://youtube.com/shorts/bNqp97PdPcY?feature=share.

Link: https://doi.org/10.3897/zookeys.1192.114230.suppl1