Epiperipatus puri sp. nov., a new velvet worm from Atlantic forest in Southeastern of Brazil (Onychophora, Peripatidae) (#59400)

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Epiperipatus puri sp. nov., a new velvet worm from Atlantic forest in Southeastern of Brazil (Onychophora, Peripatidae)

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We describe *Epiperipatus puri* sp. nov. from Reserva Ecológica de Guapiaçu (REGUA), located in Cachoeiras de Macacu, Rio de Janeiro, Brazil. The name is a homage to the extinct indigenous population who resided in coastal Brazil. The species can be diagnosed by large primary papillae close to the insertion of the legs drawing light band from the anterior to posterior regions of the body and the large dorsal primary papillae alternating on the dorsal plicae. Moreover, they are recognized in vivo by the color of the diamond-shape marks brownish orange. *Epiperipatus puri* sp. nov. seems to be related to *Epiperipatus ohausi* (Bouvier, 1900) by resemblance of dorsal papillae, and to *Epiperipatus acacioi* (Marcus & Marcus, 1955) by the shape of apical piece of the primary papillae. *Epiperipatus puri* sp. nov. is the second species described to Rio de Janeiro, a Brazilian state totally included in the Atlantic Forest, one of the most threatened biomes in the world.

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Abstract

After 120 years the last species of Onychophora was described for the state of Rio de Janeiro (RJ), we describe *Epiperipatus puri* sp. nov. from Reserva Ecológica de Guapiaçu (REGUA), located in Cachoeiras de Macacu, RJ, Brazil. The name is a homage to indigenous population who resided in coastal Brazil. The species can be diagnosed by large primary papillae close to the insertion of the legs drawing light band from the anterior to posterior regions of the body and the large dorsal primary papillae alternating on the dorsal plicae. Moreover, they are recognized in vivo by the color of the diamond-shape marks brownish orange. *Epiperipatus puri* sp. nov. seems to be related to *Epiperipatus ohausi* (Bouvier, 1900) by resemblance of dorsal papillae, and to *Epiperipatus acacioi* (Marcus & Marcus, 1955) by the shape of apical piece of the primary papillae. However, the phylogeny confirms only the close relationship to *E. ohausi* and a

second species of *Epiperipatus* still undescribed, forming a clade with species from Rio de Janeiro, Brazil. *Epiperipatus puri* sp. nov. is the second species described to Rio de Janeiro, a Brazilian state totally included in the Atlantic Forest, one of the most threatened biomes in the world.

Introduction

Onychophora (velvet worms) has received more attention in the last decade than ever, especially Neopatida (= the Neotropical Peripatidae) which was phylogenetically tested, and five species were newly described recently (Costa, Chagas-Junior, Pinto-da-Rocha, 2018; Giribet et al. 2018) Although velvet worms are among the most fascinating terrestrial groups of invertebrates, their biodiversity is poorly understood, and the taxonomy is elusive. This is due to poor sampling of individuals in the field, low numbers of lots available in museums often accompanied by inadequate ~~specimen~~ preservation, poor access to historical collections, scarce type-locality data ~~of some species~~, and the conservative morphology of the group (Froehlich, 1968; Peck, 1975; Read, 1988; Chagas-Júnior & Costa, 2014; Le Bras et al., 2015; Costa & Giribet, 2016; Costa, Chagas-Junior & Pinto-da-Rocha, 2018; Giribet et al., 2018). The lack of easy external characters capable of clearly delimiting the boundaries of the taxa led to the search for new approaches as scanning electron microscopy (e.g. Read, 1988; Morera-Brenes and Monge-Nájera, 1990; Oliveira et al., 2010; Costa and Giribet, 2016) and DNA sequences (e.g. Oliveira et al, 2013; Giribet et al., 2018).

Currently the *circa* 200 recent species of Onychophora are distributed in two families, Peripatidae Evans, 1901 (81 species) and Peripatopsidae Bouvier, 1905. *Epiperipatus* Clark, 1913 is the most diverse of the 11 recent genera within Peripatidae, with 35 valid species. ~~Those are~~ distributed in the Antilles, Central and South America, with 13 species from Brazil (Peck, 1975; Brito et al, 2010; Oliveira et al., 2011; Oliveira, Read & Mayer, 2012; Costa, Chagas-Junior & Pinto-da-Rocha, 2018; Costa, Giribet & Pinto-da-Rocha, 2020).

Epiperipatus was erected by Clark (1913) as a subgenus of *Peripatus* Guilding, 1826 along with other two new subgenera (*Plicatoperipatus* Clark, 1913 and *Macroperipatus* Clark, 1913), designating *Peripatus edwardsii* Blanchard, 1847 as the type species and transferring more nine species to this subgenus (Clark, 1913: 18). Since the revisionary work of Peck

(1975), *Epiperipatus* is treated as genus, although this author did not explicitly elevate the rank from subgenus. Peck cited it under an identification key for families and genera of Onychophora and made the combinations with the species without using *Peripatus* in the binomina (Peck 1975: 345). Until Peck's work *Epiperipatus* counted with 17 species. Subsequent works ~~added~~ species either newly described (Brito et al., 2010; Morera-Brenes & Monge-Nájera J. 2010; Oliveira et al, 2011; Costa, Chagas-Junior & Pinto-da-Rocha, 2018) or by transference from other genera (Oliveira, Wieloch & Mayer, 2010; Chagas-Júnior & Costa, 2014; Costa, Chagas-Junior & Pinto-da-Rocha, 2018; Costa, Giribet & Pinto-da-Rocha, 2020).

A revision of *Epiperipatus* ~~had~~ intended to improve the delimitation of the genus, ~~which remains poor,~~ based on morphological and molecular data (Costa, Giribet & Pinto-da-Rocha, 2020). In this paper, although *Epiperipatus* appears as non-monophyletic, a core monophyletic group emerges including the type species *Epiperipatus edwardsii*. The type species of the genus was recently redescribed under modern parameters (Costa, Chagas-Junior & Pinto-da-Rocha, 2018).

One of the undescribed species which according to Costa, Giribet & Pinto-da-Rocha (2020) belongs to *Epiperipatus* occurs in Cachoeiras de Macacu, Rio de Janeiro, Brazil. The area were the types were collected is a fragment of the Atlantic Forest (AF hereafter), a ~~biome~~ extremely threatened by ~~pressures of agriculture, cattle ranching, hunting, tourism and city expansion~~ (Ribeiro et al., 2011). The AF is one of the 36 conservation hotspots of the world (Myers et al. 2000; CEPF. 2019), being one of the most important given its conservation value in ~~contrast with the imperil that havocs this irreplaceable region~~ (Laurance, 2009).

In the present work, this species is newly described as *Epiperipatus puri* sp. nov. ~~Its~~ type-species are deposited at National Museum, Rio de Janeiro (MN), as a mark of rebuilding of the MN zoological collections, *Epiperipatus puri* sp. nov. its the first species of onychophorans deposited in MN after its main building lost in ruthless fire. The building was a historical Palace from the time Brazil was a Portuguese colony, and housed anthropological, archaeological, and paleontological collections, besides laboratories, post-graduation programs, the exhibition, and administrative facilities. The collection of Onychophora was held in together with the collections of Arachnida and Myriapoda, under the curatorship of Adriano B. Kury. Most of the three

collections were lost in the fire except for material under loan and all the data, which were safe due to the routine backup policy of the curator (Kury, Giupponi & Mendes, 2018).

Materials & Methods

The type series is composed of six specimens ~~that are~~ deposited in Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro (MNRJ) (curator A. B. Kury) and Museu de Zoologia da Universidade de São Paulo, São Paulo (MZUSP) (curator R. Pinto-da-Rocha), both in Brazil. The specimens were collected between 2012 and 2018 in a small patch of tropical humid forest (Fig. 1) around the Greater Rio de Janeiro (Metropolitan Region), under the deep-grown roots of grass (Fig. 7). Specimens were in 70% and 100% EtOH. We examined their morphology in detail and compared with specimens of *Epiperipatus ohausi* (Bouvier, 1900) from Nova Iguaçu municipality, Rio de Janeiro, Brazil ~~aiming~~ to detect diagnostic features of the new species: MNRJ 0056; 1♀; BRAZIL, Rio de Janeiro, Nova Iguaçu, Reserva Particular do Patrimônio Natural dos Petroleiros; 23.XII.2009; Costa, C.S., Giupponi, A.P.L. leg. MNRJ 0058; 1♂; same locality; 11.III.2010; Costa, C.S., Chagas-Jr, A., Giupponi, A.P.L., Kury, A.B. leg.

We studied one of the specimens (MNRJ 0093, voucher 065) using scanning electron microscopy (SEM). We dissected out one mandible, the fifth oncopod of the left side, and a small rectangular section of the dorsal integument ~~covering~~ from the dorsomedian furrow to the base of the oncopods. The structures were critical point dried and mounted in SEM stubs with bi-adhesive carbon tape. A 5-nm gold layer was applied. Samples were imaged with a JEOL JSM-6390LV at the SEM Platform Rudolf Barth at Instituto Oswaldo Cruz—Fundação Oswaldo Cruz (IOC-FIOCRUZ)

Photographs in vivo were taken with a SONY Cybershot DSC-HX1 with built-in flash, or Canon EOS Rebel XS with macro lens and flash circular camera. Images were edited using Adobe Photoshop CS5. ~~Coloration Photographs of a live specimen were taken. Coloration was described from the photographs of the living specimen~~ (Figs. 2–6) following the standard names of the 267 Color Centroids of the NBS/ISCC Color System (see Kelly, 1958; also available at Centore, 2016, and Colors - ISCC/NBS, by w3schools.com). We ~~compiled descriptions~~, and ~~dissection of dead specimens~~ using a stereomicroscope. Also, we combined the stereomicroscopy and Scanning Electron Microscopy (SEM) studies of the external morphology of the specimens for descriptions. The morphological descriptive nomenclature follows the

terminologies of Read (1988), Morera-Brenes & Monge-Nájera (2010),Oliveira, Wieloch & Mayer (2010) and Costa, Chagas-Junior & Pinto-da-Rocha (2018). All measurements are given in millimeters (mm). The species we described in here was ~~part of a more~~ detailed study of *Epiperipatus*, ~~combining morphological and molecular data for many specimens from the Neotropics~~ (Costa, Giribet & Pinto-da-Rocha, 2020) (see Fig. 13). Here, we chose to unify names of the references to simplify for the readers retrieving information about authors with two or more papers listed, and due to the names in references that do not follow rules of standardization (Kury et al., 2020).

The electronic version of this article in Portable Document Format (PDF) will represent a published work according to the International Commission on Zoological Nomenclature (ICZN), ~~and hence the new names contained in the electronic version are effectively published under that Code from the electronic edition alone.~~ This published work and the nomenclatural acts it contains have been registered in ZooBank, the online registration system for the ICZN. The ZooBank LSIDs (Life Science Identifiers) can be resolved and the associated information viewed through any standard web browser by appending the LSID to the prefix http://zoobank.org/. The LSID for this publication is: urn:lsid:zoobank.org:pub:6823B793-FD60-42D9-B3D4-184F680A34CB. The online version of this work is archived and available from the following digital repositories: PeerJ, PubMed Central and CLOCKSS.

Results

Taxonomic results

Family **Peripatidae** Evans, 1901

Genus ***Epiperipatus*** Clark, 1915

Epiperipatus puri **sp. nov.**

***Epiperipatus* [sp6]: Costa: 2016; Costa et al: 2020: 6, 8, 25.**

(Figs 2–6, 8–12)

Diagnosis. Large primary papillae close to the insertion of the legs drawing a narrow light band from the anterior to posterior regions of the body. The large dorsal primary papillae alternating on the dorsal plicae. Moreover, they are recognized in vivo by the color the diamond-shape marks brownish orange (Figs. 2–5)

Description of female holotype (MNRJ 0093).

Measurements. length 43; width 3.0, height 3.9.

Color ~~(for living specimen~~ Figs. 2–6). Background color of body moderate reddish brown overlaid by a shade of diamond-shape marks brownish orange. A broad dashed-line (close to the insertion of the legs) similarly colored as the diamond-shape marks. Dorsomedian furrow dark reddish brown. Anterior portion of head moderate reddish brown and antennae strong brown. Color of dorsal portion of legs grayish reddish orange. Legs and ventral surface displaying same color, moderate reddish brown. Ventral and preventral organs moderate brown.

Description of body (Figs 2–6, 8–12). Conspicuous dorsomedial furrow and hyaline organs along the main body axis (Figs 3, 8). Twelve plicae per segment, two incompletes as broad as the diamond-shape marks, and seven crossing ~~over~~ to ventral side (Fig. 8). Almost all dorsal papillae on the plicae, except by the smaller accessory papillae on the furrow between the plicae. Primary dorsal papillae aligned on top of folds; two primary papillae separated by one to five accessory papillae not occurring close together (Figs 5, 8). Both dorsal papillae with conical basal piece composed of scales that never overlap each other at base of papillae (Figs 8, 9). Primary papillae as the largest dorsal papillae, with roundish dome insertion and asymmetrical regular spherical apical piece (Fig. 9). Basal piece larger than apical, with a range of at least seven scale ranks (Fig. 9). Apical piece with three posterior scale ranks (Fig. 9).

Narrow scales both on base and apical piece (Fig. 9). Needle-shaped sensory bristle directed posteriorly (Fig. 9). Small and large primary papillae with conspicuous constriction between the base and the apical piece (Figs 8, 9). Two sized dorsal primary papillae: the largest are on the top of body in continuous plicae, (close to the dorsomedian furrow and drawing the diamond-shape) and close to the legs. Lateral papillae in alternated dorsal plicae. Accessory papillae are the smallest dorsal, with roundish insertion similar in shape to the base of the primary papillae; they are more abundant per plicae and differ in position in relation to primary papillae (Figs 5, 8).

Head. No evident structures or patterns on the head. Antennae (Figs 2–4) composed of 40 rings. Antennal tip composed of seven broad rings, excluding the disc on the top, followed by a sequence of narrow and broad rings alternating until at least ring 20. Eyes and frontal organs present ventrolateral to the antennal base. Conspicuous frontal organs as long as six fused

antennal papillae. Mouth opening surrounded by small, anterior, unique lobe, and seven flanked lobes decreasing in size from anterior to posterior ends of the mouth. Dental formula of inner and outer jaws (Figs 11–12), respectively: 1/1 and 1/2/10. The accessory tooth is thinner in the outer jaw. The second accessory tooth is reduced.

Legs. 28 pairs of legs (Fig. 6). Nephridial tubercle on fourth and fifth pairs of legs, between third and fourth spinous pads (Fig. 6), connected by the top to the third spinous pad. On fourth and fifth pairs of legs, four spinous complete pads present and no evidence of fifth spinous pad.

Sexual dimorphism. Male with two pregenital pairs of legs with crural papilla one in each leg. Two pairs of pregenital legs with one crural papilla (male) each, absent in females. Anal glands are inconspicuous and represented only by two pores on anterior margin of anal aperture, absent in females.

Type material. Holotype: MNRJ 0093, 1♀, BRAZIL, Rio de Janeiro, Cachoeiras de Macacu, Reserva Ecológica de Guapiaçu (REGUA), X.2012, A.P.L. Giupponi, J.S. Silva leg. Paratypes: MNRJ 0087, 1 unsexed specimen, MNRJ 0088, 1♂, same locality, 28.II – 02.III.2012, A.P.L. Giupponi, J.S. Silva leg; MNRJ 0107, 1 unsexed specimen, same locality, 19.III.2018, R.L.C. Baptista leg; MZUSP 0122, 1♀, same locality, 21.XII.2014, A. Ferreira, A.P.L. Giupponi, A. Rezende, C.S. Costa leg.

Distribution. Only known from type locality (Fig. 1).

Etymology. The epithet puri (in apposition) refers to the Puri indigenous group belonging to the *Macro-Jê* linguistic group. They inhabited, among other places, the mountain region of the Rio de Janeiro state where specimens of this species were collected. Noun in apposition.

Remarks. Paratype. Length 12 to 22; width 1.0 to 2.5. Legs. 26 and 27 pairs of legs.

Discussion

Classification of *Epiperipatus puri* sp. nov.

The fuzzy limits of genera due to lack of clear taxonomic characters is a major issue of Neopatida. Splitting species of Peripatidae in several genera might be a problem, especially in the systematics of Brazilian fauna (Giribet et al., 2018: 860; Costa, 2016 Unpublished PhD thesis). *Epiperipatus* is one of the most speciose genera of Peripatidae (Oliveira, Read & Mayer, 2012; Costa, Chagas-Junior & Pinto-da-Rocha, 2018) with 36 described species after this paper.

However recent studies based on the molecular data regards the genus as non-monophyletic (Costa, 2016 Unpublished PhD thesis; Giribet et al., 2018). Phylogenetically, Costa et al. (2020) based on the study of four molecular markers besides morphological data distinguished two clades of Brazilian species, a smallest with species from the state of Pará and the largest with almost all Brazilian examined specimens. *Epiperipatus puri* sp. nov. appears nested in the largest clade, into a smaller clade of species from the state of Rio de Janeiro: *Epiperipatus ohausi* (Bouvier, 1900) and a potentially undescribed species (see in Costa et al. (2020): 23, fig. 3, clade S, and Fig.e 13 here). This clade of species of Rio de Janeiro is sister-group to another composed by *Epiperipatus machadoi* (Oliveira & Wieloch, 2005) and three other unnamed species from Espírito Santo, Brazil.

Epiperipatus puri sp. nov. is characterized as a new species by the roundish insertion of dorsal papillae, the three posterior scale ranks and two prolateral and one retrolateral foot papillae in the feet of the fourth and fifth oncopods (Fig. 10). The presence of incomplete folds differs *E. puri* sp. nov. from *Epiperipatus brasiliensis* (Bouvier, 1899), *Epiperipatus tucupi* Froelich, 1968 and *Epiperipatus cratensis* Brito et al., 2010. The new species differs from *Epiperipatus diadenoproctus* Oliveira et al., 2011 by the inconspicuous anal glands in *E. puri* sp. nov.

In *Epiperipatus paurognostus* Oliveira et al., 2011 the background color of body is reddish brown (*in vivo*) and the fourth spinous pad can be complete or incomplete, in *E. puri* sp. nov. the background color of body is moderate reddish brown (*in vivo*) and the fourth spinous pad is complete. The apical piece is conical in *Epiperipatus adenocryptus* Oliveira et al., 2011 and *E. machadoi* and *Epiperipatus lucerna* Costa, Chagas-Jr & Pinto-da-Rocha, 2018 and *Epiperipatus marajoara* Costa, Chagas-Jr & Pinto-da-Rocha, 2018, and spherical in *E. puri* sp. nov. The apical piece is conical and reduced in *Epiperipatus beckeri* Costa, Chagas-Jr & Pinto-da-Rocha, 2018 and *Epiperipatus titanicus* Costa, Chagas-Jr & Pinto-da-Rocha, 2018, robust in

Epiperipatus hyperbolicus Costa, Chagas-Jr & Pinto-da-Rocha, 2018, while the apical piece is regular in *E. puri* sp. nov. The new species seems to be closely related to *Epiperipatus acacioi* (Marcus & Marcus, 1955) by the shape of apical piece of the primary papillae, however *E. puri* sp. nov. primary papillae are lighter than other papillae. *E. ohausi* and *E. puri* sp. nov. bear dorsal papillae with similar shape and size, but the latter also bear accessory papillae on the flanks, and uniform background color of body and oncopods.

Additionally, the results of Costa, et al. (2020) include the species in a clade containing the type species of the genus, although the clade also includes species of other genera. Giribet and collaborators (2018) suggested that Caribbean species of *Epiperipatus* are closer to *Peripatus* than to the remaining "*Epiperipatus*", however this could be confirmed only by the inclusion of *Peripatus juliformis* Guilding, 1826 (type species of *Peripatus*) in Peripatidae analyses, neither of both studies included this species. Although the boundaries between *Epiperipatus* and *Peripatus* remain unclear, we cautiously preferred keeping the new species as *Epiperipatus*, as their putative closer species *E. ohausi* is currently classified.

Conservation

Epiperipatus puri sp. nov. is the 21th species of Onychophora (all belonging to Peripatidae) and the 16th *Epiperipatus* species described from Brazil (Chagas-Jr & Oliveira, 2019). Besides *E. puri* sp. nov., only *E. ohausi* and two ~~further~~ undescribed species are recorded from Rio de Janeiro (See Costa, Chagas-Junior & Baptista, 2009; Costa, Chagas-Junior & Pinto-da-Rocha, 2018), a Brazilian state entirely located in the Atlantic Forest domain.

The Atlantic Forest is the second largest rainforest in South America and one of the most distinctive biogeographic unit in Neotropical Region with high levels of ~~endemicity~~ and biodiversity (Ribeiro et al., 2011) However, ~~the Atlantic Forest~~ has experienced large habitat losses since European colonization ~~and~~ currently only 12.59% remains of its original area (Ribeiro et al., 2009, 2011) making it one of the "hottest hotspots" for conservation (Mittermeier et al., 2004; Laurance, 2009).

Our species was collected in a private conservation unit, the RPPN Reserva Ecológica de Guapiaçu (REGUA) (Fig. 1), an effort to preserve the Atlantic Forest. The reserve is in the upper Guapiaçu River Valley and started as a group of farms registered as a non-governmental organization in the early 2000's. Today part of its area (in a total of 357ha of two areas) is

officially recognized as one of the private conservation units of Rio de Janeiro state, part of the state program of Private Reserves of Natural Patrimony (Portuguese acronym: RPPN) (see Guagliardi, 2018). The total area of the reserve (official and nonofficial) encompasses 7,500ha of forest in different stages of conservation, with an altitudinal range from 0 to above 2,000 m.a.s.l. (Soares et al., 2011) . The region is in a mountain ~~region~~ where the Guapi-Macacu Basin belongs, which contributes to the water supply of 2.5 million inhabitants of five municipalities (Rodríguez-Osuma et al., 2014). In this watershed the degradation of aquatic resources are ~~the processes of~~ urbanization, intense agriculture and conversion of riparian vegetation (Rodríguez-Osuma et al., 2014). The forest cover of the landscape in the Guapi-Macacu Basin is ~~circa~~ 40%, and it is a mosaic of different ~~ages~~; ~~unfortunately~~ fragments anterior to 1976 occupy only 12% of the landscape (Costa et al., 2017).

Although composed mainly by secondary forests, REGUA is ~~an~~ important ~~element~~ to the conservation of local fauna. The area is known for ~~the relevant~~ fauna of birds (Pimentel & Olmos, 2011), butterflies (Soares et al., 2011), mosquitoes (Silva et al., 2014) and ~~for being one of the richest spots~~ for dragonflies and damselflies in the world, with more than 200 species ~~recorded~~ (Kompier, 2015), ~~one of them just recently described (Pinto & Kompier, 2018).~~ *E. puri* sp. nov. is the first ~~record~~ of Onychophora ~~for~~ REGUA. This demonstrates the high value of this reserve ~~as a complement to the recuperation of the critical area where it is located,~~ mostly ~~deforested by agricultural practices.~~

For more than 30 years, scientists advocated for the importance of the invertebrates and their conservation (Wilson, 1987). Although we have made some progress, the perspective has not changed much: despite the crucial role they play in maintaining ecosystems, the knowledge is far behind comparing to vertebrates in terms of conservation (e.g. Collen et al., 2012). The velvet worms are at risk given their distribution in threatened biomes, as the Atlantic Forest itself, and because they seem to occur in small sized populations, although the amount of data available on population dynamics is scarce (New, 1995). Sometimes ~~the species are newly named~~ already critically endangered (e.g. Oliveira et al., 2015).

Currently 80% of Brazilian species of onychophorans are in the Livro Vermelho da Fauna Brasileira Ameaçada de Extinção (ICMBio, 2018). One of the species considered endangered in Brazil's Red Book is *E. ohausi* (see Costa, Cordeiro & Chagas-Jr, 2018), the only

named species from Rio de Janeiro state until this work, considered here to be a close species to *E. puri* sp. nov.

Epiperipatus ohausi is known from Petrópolis (type-locality) and Nova Iguaçu (Chagas-Júnior & Costa, 2014), forests from both localities suffer from pressures of urbanization. The population of the species is severely fragmented since it occupies humid shaded habitats, with an extent amount of litter, typical of forested areas (Costa, Cordeiro & Chagas-Jr, 2018). Although *E. puri* sp. nov. is distributed in a close area, also with high pressures of urbanization and agriculture, ~~fortunately it is inside a~~ Reserve, and probably its distribution extends to the area of Parque Estadual dos Três Picos, a State Reserve contiguous to REGUA. This reinforces the need for preservation of those reserves and encourages to expand their areas.

After a few years of political stability and economic growth, Brazil is passing through severe economic, political, and social turmoil. From 1995 to 2014 there were in the country policies prioritizing fight against poverty, environmental destruction, and the historical deficit in science and education (Dobrovolski et al., 2018). Current Brazilian government demonstrates that environmental policies are not in the list of priorities of the country, and its attitude jeopardizes Brazilian natural environments. Therefore, recently the indexes of deforestation are skyrocketing in all Brazilian biomes (INPE, 2020), which seems to be related to policies favoring livestock ranching and agribusiness, and the weakening of Brazilian system of protection of environment and Indigenous lands (Ferrante et al., 2020).

Although fires in Amazonian Forest, Cerrado and Pantanal usually are related to the replacement of natural vegetation by cattle ranching and soy crops, in the AF currently the deforestation is mostly related to urbanization (see Joly, Metzger & Tabarelli, 2014) and pressure of the real-estate market. The increment in the deforestation process in association with the negligence with its scientific institutions (the destruction of Museu Nacional and its collections being an emblematic symbol) which are suffering significative budget cuts (Martelli-Jr et al., 2019; Escobar, 2019), lack of staff replacement and direct federal political intervention in their management, undermine the protection of fragile biota.

Conclusions

One of the known obstacles to conservation of invertebrates is the poor state of knowledge of the species, many still unnamed. In case of velvet worms the difficulty to describe a species is notorious, and one recent proposed solution to deal with this problem is to connect information of undescribed species to common names (Sosa-Bartuano, Monge-Nájera & Morera-Brenes, 2018). Our description of *Epiperipatus puri* sp. nov. contributes to the knowledge of the biodiversity in a hotspot for conservation, the Atlantic Forest. We characterized the species morphologically with the use of SEMs and photographs, including *in vivo* (important for recognizing the species in the field). All the type material was collected in a private reserve which is contiguous to a State Protected Area, demonstrating the importance of this type of initiative. *E. puri* sp. nov. was assigned to *Epiperipatus* as their putative closer species is, *E. ohausi*, but future studies could reveal the actual boundaries of the genera for there is molecular evidence that they could belong to *Peripatus* (Giribet et al., 2018).

Acknowledgements

We are grateful to *Plataforma de Microscopia Eletrônica Rudolf Barth* (FIOCRUZ – IOC) and to their staff, Wendell Girard Dias, Roger Magno Macedo Silva, Rômulo Custódio dos Santos and Taíssa Ribeiro Adriano de Oliveira, for the help with the SEM images. We are grateful to Adriano B. Kury (MNRJ) who provided support with the Latin grammatical forms. We are in debit with Júlia dos Santos Silva (FIOCRUZ) Nicholas Locke, Raquel Locke who assisted with SEM images. Jorge Bizarro for valuable information of REGUA. We also thank Flávio Uemori Yamamoto for providing the beautiful photographs of the new species. This work and fieldwork for CSC was funded by São Paulo Research Foundation (FAPESP, who was supported by fellowships from FAPESP #2011/20211-0, 2012/02969-6 and 2014/20557-2).

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510

Figure 1

Maps

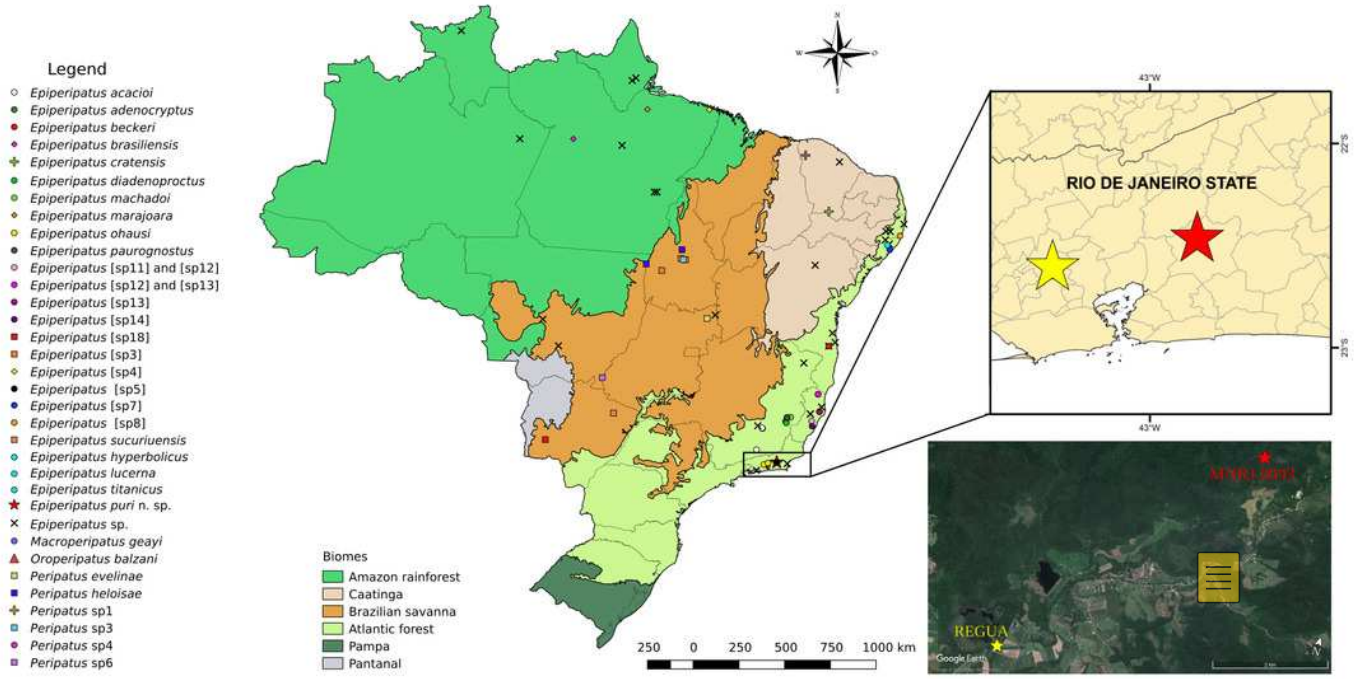

Figure 2

Photos female paratype


A
B
C
D
E
F

Figure 3

SEM holotype

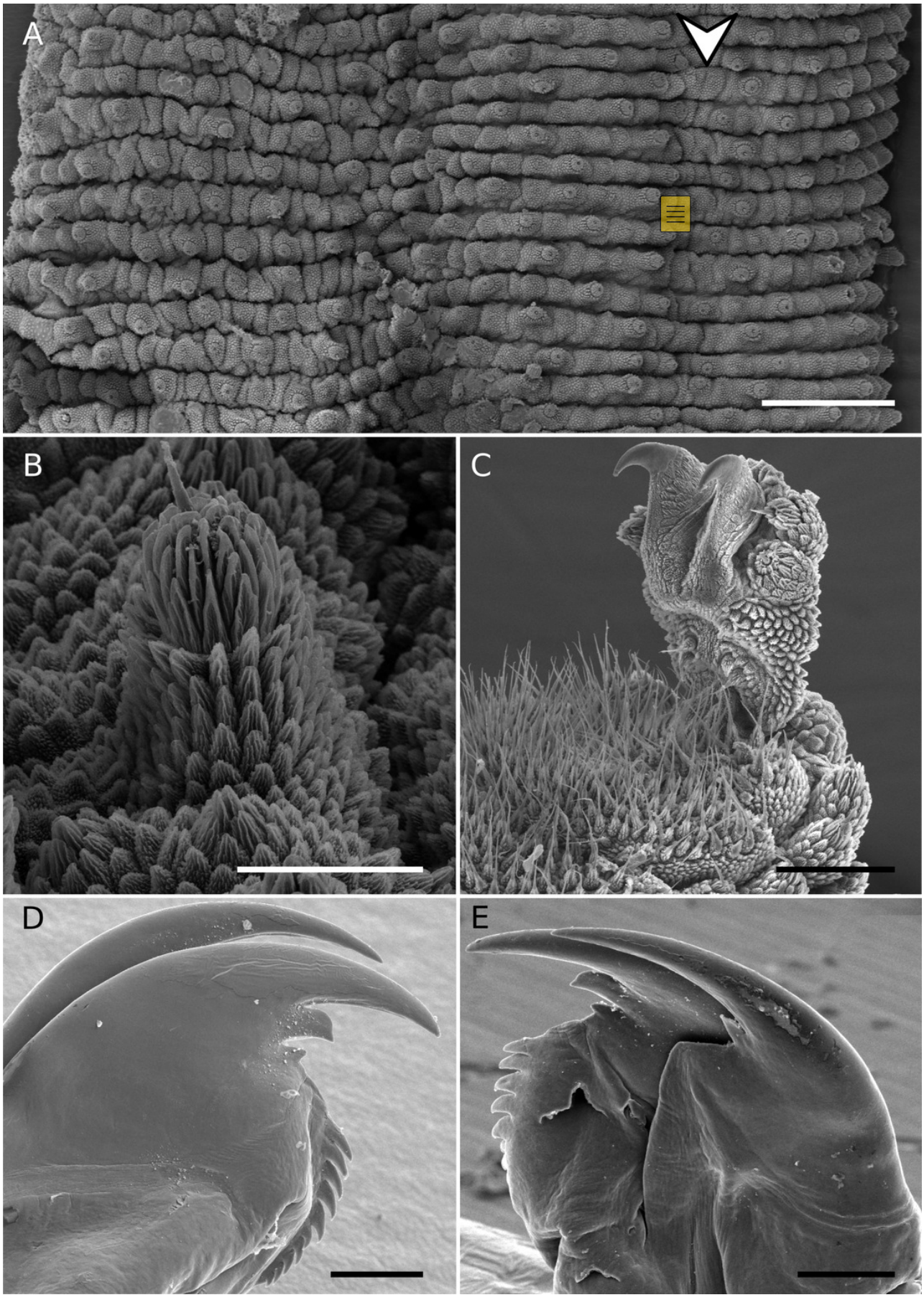
A
B
C
D
E

Figure 4

Tree