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A NEW SPECIES, NEW SYNONYMY, AND NOTES ON *PARAVELIA* BREDDIN (HEMIPTERA: HETEROPTERA: VELIIDAE)

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ABSTRACT

The broad-shouldered water strider *Paravelia cunhai* **sp. nov.** is described and illustrated based on material from the state of Pará, northern Brazil. The new species can be distinguished from all other species in this genus mainly by the dark color of the head and pronotum, absence of pruinosity or silvery pubescence on the anterior lobe of pronotum, maculae pattern on the fore wings, hind femur with row of 22 spines on mesal margin, and general shape of the paramere. This new species was collected in a pool inside a cave without incident light, a habitat recorded for the genus only recently, which reinforces the hypothesis that some species of *Paravelia* have troglomorphic habits. In addition, a photograph of the dorsal habitus and notes concerning *P. juruana* Polhemus & Polhemus are provided, and *P. cupariana* Polhemus & Polhemus **syn. nov.** is proposed as a junior synonym of *P. spinifera* Polhemus & Polhemus.

KEY-WORDS: Gerromorpha; South America; Veliinae; Broad-shouldered water striders.

INTRODUCTION

The genus *Paravelia* Breddin currently comprises 61 valid species and its range extends from Mexico to Argentina, with *P. taipiensis* (Chessman) described from the Marquesas Islands, eastern Pacific, as the unique exception (Rodrigues *et al.*, 2014b; Rodrigues & Moreira, 2016). The taxonomy of the genus, which until recently was problematic, is being refined by studies redescribing and illustrating the older species, as well as describing new species (Moreira & Barbosa, 2012; Polhemus, D.A., 2014; Rodrigues *et al.*, 2014b; Rodrigues & Moreira, 2016). However, these efforts are still not sufficient and new species of *Paravelia* are frequently found, which shows that this

water strider lineage is much more diverse than previously thought.

The description of *P. cunhai* Rodrigues & Moreira, **sp. nov.** from a cave in northern Brazil, is presented here. Additionally, a photograph of the dorsal habitus of *P. juruana* Polhemus & Polhemus is presented, and *P. cupariana* Polhemus & Polhemus **syn. nov.** is synonymized with *P. spinifera* Polhemus & Polhemus.

MATERIALS AND METHODS

The material examined consists of dry-mounted specimens deposited in the following collections: Mu-

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seu de Zoologia da Universidade de São Paulo, São Paulo, Brazil (MZUSP); and United States National Museum of Natural History, Washington D.C., U.S.A. (USNM). All measurements are given in millimeters. Body length is measured from the anterior margin of the head to the posterior margin of the abdomen, and body width across the humeral angles. Abdominal segment numbers are expressed as Roman numerals. Information given between brackets [] does not appear on the labels, but was provided in the publications or deduced subsequently.

RESULTS

Genus *Paravelia* Breddin, 1898

Diagnosis: Species of this genus can be differentiated from other Neotropical genera of Veliinae mainly by the (1) absence of lateral tubercles on the mesoacetabulum and metasternum, (2) tarsomere II of the middle leg usually 4-5 times longer than tarsomere I, (3) pretarsus of the middle and hind legs with setae-shaped arolia and two falcate claws, and (4) macropterous form usually with two maculae on each fore wing, with one basal and the other apical (Andersen 1982; Rodrigues *et al.*, 2014a).

Paravelia cunhai sp. nov. (Figs. 1-7, 11)

Type material: Holotype, macropterous ♂ (MZUSP), BRAZIL, Pará, Vitória do Xingu, comunidade Leonardo da Vinci, poça dentro de caverna, 03°09'07"S, 52°04'30"W, 08.II.2014, E.J.R. Cunha leg.

Description

Macropterous male: Holotype, length 4.42. Dorsal, ventral, and lateral habitus as in Figs. 1-3, respectively. General color dark brown to blackish, including head, thorax, and most of fore wing. Antenna brown, slightly darker ventrally. Rostrum with two basal segments brown, segment III yellow laterally and brown medially, distal segment blackish. Fore wing with basal ovate white macula, not touching humeral angle and ending beyond posterior margin of pronotum, at apex another rounded white macula, slightly smaller than basal (Fig. 1); veins whitish. Connexiva light brown on mesal margin and dark brown on lateral margin, yellow on intersegmental regions. Coxae, trochanters,

and approximately basal half of femora yellow; apical half of femora, tibiae and tarsi brown. Abdomen and genital segments brown to light brown, except darker region of insertion of lateral abdominal muscles.

Head: Length 0.80; maximum width 0.88. Declined anteriorly, covered by fine golden pubescence intermixed with elongate dark brown setae; midline impressed, shining, posteriorly with pair of dorsal oblique impressed, shining lines and pair of indentations near mesal margin of eyes; bucculae and jugum without black denticles. Ocular setae present. Antenniferous tubercle developed, shining. Antenna covered by golden pubescence and elongate golden setae scattered on segments II-IV; antennomere I more robust, curved outward; II thicker than III-IV; length of antennomeres, I 0.64, II 0.52, III 0.66, IV 0.82.

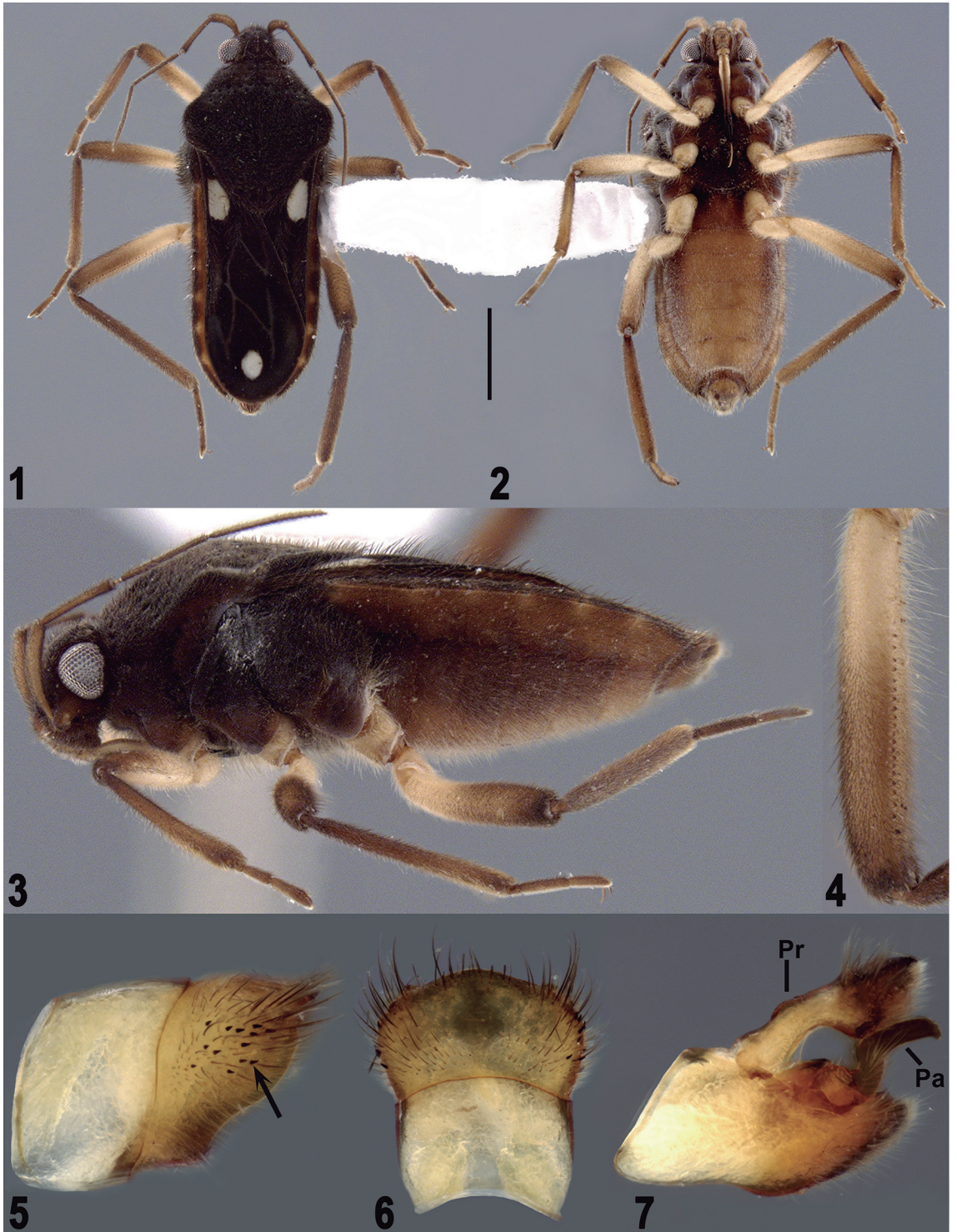
Thorax: Pronotum length at midline 1.80, maximum width 1.72; covered by fine golden pubescence, intermixed with elongate dark brown setae; anterior lobe with row of rounded punctations adjacent to anterior margin, without marks or pruinosity; posterior lobe covered by rounded punctations, larger towards apex; humeral angle slightly elevated; posterior angle rounded. Fore wing reaching tip of abdomen, leaving only posterior portion of genital segment exposed; with four closed cells; veins in basal half with elongate dark brown setae. Propleuron with two rows of rounded punctations on epimeron. Mesopleuron with row of rounded punctations on episternum. Metapleuron with scattered rounded punctations. Meso- and metapleura with whitish pruinosity on intersegmental region. Prosternum with row of four rounded punctations anteriorly. Meso- and metasterna centrally with two pairs of small tubercles on intersegmental region. Pro- and mesoacetabula with rounded punctation on mesal surface.

Legs: Densely covered with short, appressed, pale setae and elongate, brownish setae. Fore tibia with grasping comb (0.20 mm long) occupying 1/5 of its length. Hind femur slightly thicker than others, with 22 small spines on mesal margin (Fig. 4). Leg measurements as follows: foreleg, femur 1.16, tibia 1.04, tarsomeres 1-3, 0.06, 0.20, 0.30; middle leg, femur 1.30, tibia 1.36, tarsomeres 1-3, 0.10, 0.34, 0.36; hind leg, femur 1.52, tibia 1.80, tarsomeres 1-3, 0.10, 0.40, 0.31.

Abdomen: Connexiva covered by golden pubescence and elongate brown setae; not elevated, without black denticles. Sterna covered by fine golden pubescence and elongate dark brown setae, the latter concentrated

on lateral margins; II compressed laterally and bearing weak longitudinal carina anteriorly; VII without projections or nodules, with posterior margin evenly con-

cave and small black denticles. Segment VIII (= considered in literature as first genital segment) with fine golden pubescence on apical 2/3 intermixed with



FIGURES 1-7: *Paravelia cumbai* sp. nov., male holotype: (1) dorsal, (2) ventral and (3) lateral views; (4) hind femur; (5) lateral and (6) dorsal views of abdominal segment VIII, black arrow indicates black denticles; (7) genital capsule in lateral view, Pr = proctiger, Pa = paramere. Size bar = 1.00 mm and applies only to Figs. 1 and 2.

elongate dark brown setae dorsolaterally; several black denticles on lateral areas (Figs. 5-6). Proctiger with elongate golden setae on apical 1/3, without spines or projections. Paramere anteriorly notched on dor-

sal surface, sinuous, with elongate golden setae and rounded apex (Fig. 7).

Female: Unknown.



FIGURES 8-10: Dorsal view of *Paravelia* spp.: (8) *Paravelia juruana*, male paratype, white arrow indicates digitiform process of posterior angle of pronotum; (9) *P. cupariana* **syn. nov.**, female paratype, black arrow indicates the humeral angle; (10) *P. spinifera* (female from Ilha de Outeiro, Pará, Brazil).

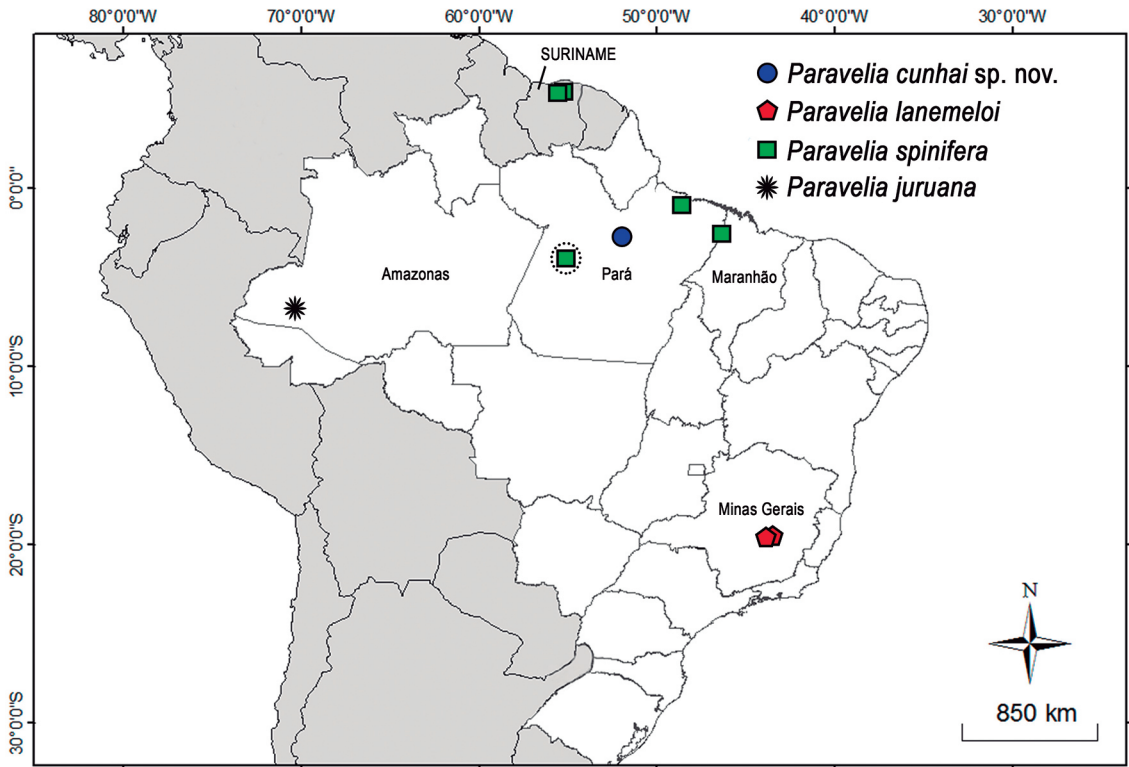


FIGURE 11: Distribution records for four species of *Paravelia*; green square surrounded by a dotted line represents the type locality of *P. cupariana*, a new junior synonymy of *P. spinifera*.

Distribution and habitat: This species was collected in a pool inside a cave in the state of Pará, northern Brazil (Fig. 11), where there was no incidence of light. This habitat was recorded for the genus recently by Rodrigues & Moreira (2016) for three species: *P. digitata* Rodrigues & Moreira, *P. nieseri* Moreira & Barbosa, and *P. splendoris* Drake & Harris. The habitat of the new species constitutes further evidence that some *Paravelia* have troglomorphic habits, but because they can also be found outside the caves, we must consider them facultative cave organisms.

Comparative notes: This species is known only from the macropterous form and is morphologically similar to *P. lanemelo* Moreira & Barbosa, 2012. Both species have in common the coloration of the body, maculae pattern on the fore wings, and general shape of the parameres. However, *P. cunhai* **sp. nov.** differs from it by the length of the grasping comb on the fore tibia, which occupies 1/5 of its length, presence of a row of spines on the inner margin of the hind femur, and absence of black denticles on abdominal sterna II-VI; whereas in *P. lanemelo* the grasping comb of the male occupies 1/3 of the inner margin of the fore tibia, the hind femur does not have spines, and abdominal sterna II-VI have small black denticles. In addition, the new species was collected in a cave from the state of Pará, northern Brazil, whereas *P. lanemelo* has been recorded only from the southern portion of the Espinhaço range, in the state of Minas Gerais, southeastern Brazil (Fig. 11) above 1000 m elevation (Moreira & Barbosa, 2012; Rodrigues *et al.*, 2014b).

Etymology: The specific epithet honors Erlane José Cunha, who kindly made this specimen available for study.

***Paravelia juruana* Polhemus & Polhemus
(Figs. 8, 11)**

Paravelia juruana Polhemus, J.T. & Polhemus, D.A., 1984b:501.

Type material examined: Paratypes, all specimens macropterous, 2 ♂, 2 ♀ (USNM), BRAZIL, S.A., [Amazonas] Vic. Joao Pessoa (Sao Phelipe) [= Eirunepé], River Juruá, 10.VII-20.IX.1936, No. 3796, A.M. Olalla.

Discussion: This species is known only from the type locality in southwestern Amazonas, Brazil (Fig. 11). In the original description, the authors compared it

with *P. cupariana*, mentioning that although both species are loosely related to each other, *P. juruana* differs from the latter by its longer body (*P. juruana*: male 5.65, female 5.71; *P. cupariana*: male and female 3.57), and the first antennomere smaller than the width of head. Later, Spangler (1989) described *P. biae* from the State of Pará, northern Brazil, and compared this species with *P. platensis* (Berg, 1883) and *P. williamsi* (Hungerford, 1930), species that are not morphologically similar to one another. In fact, *P. juruana* and *P. biae* are more similar to each other because both have the body color dark brown to blackish, posterior angle of the pronotum forming a digitiform process, and the basal macula of the fore wing does not start from the humeral angle and ends before the posterior margin of the pronotum. However, *P. juruana* has the apical macula of the fore wing projected laterally in the posterior region (Fig. 8), whereas in *P. biae* it is evenly ovate, without projections (Rodrigues *et al.*, 2014b: p. 22, fig. 13c).

***Paravelia spinifera* Polhemus & Polhemus
(Figs. 9-11)**

Paravelia spinifera Polhemus, J.T. & Polhemus, D.A., 1984a:341-342.

Paravelia cupariana Polhemus, J.T. & Polhemus, D.A., 1984b:500. (**syn. nov.**)

Type material examined: 1 ♀ macropterous (USNM), paratype of *P. cupariana*, BRAZIL, Pará, Rio Cupari, Igarapé Prainha, S209, 25.XII.1947, H. Sioli leg.

Additional material examined: All specimens macropterous, BRAZIL, Pará: 1 ♀ (USNM), Ilha de Outeiro, Caratatéua, 15.V.1974, R.T. Schuh leg. (*P. spinifera*, det. J.T. Polhemus). Maranhão: 90 ♂, 77 ♀ (MZUSP), Yavaruhu Village, Rio Gurupi, about 30 km West of Canindé, isolated trail, forest stream with mud, gravel and leaf litter, 14.II.1966, B. Malkin leg. [*P. spinifera*, same material examined by Rodrigues *et al.* 2014b].

Discussion: The expansion of the integument is common in the family Veliidae, such as humeral angles forming spines and projections on pronotal disc or in the posterior angle of pronotum. However, intraspecific variations are noticeable in all of these cases, and in extreme occasions specimens may not have such expansions. *Paravelia spinifera* is the only species of the genus that has the humeral angles forming spines (Polhemus, J.T. & Polhemus, D.A., 1984a), and as

might be expected, some specimens of the population from Maranhão examined have underdeveloped spines. Examination of the paratype of *P. cupariana* deposited at the USNM revealed that this species is similar to specimens of *P. spinifera* in coloration and morphology, including that of the male paramere (compare illustrations from the original descriptions, Polhemus, J.T. & Polhemus, D.A., 1984a: p. 349, fig. 5c and Polhemus, J.T. & Polhemus, D.A., 1984b, p. 504, fig. 3). The only difference between these two species is the absence of humeral spines in *P. cupariana*. However, despite this absence, a slight callosity is evident in the examined specimen of *P. cupariana* (Fig. 9). Thus, *P. cupariana* is here considered a junior synonym of *P. spinifera*. This species has been recorded only from Suriname (Polhemus, J.T. & Polhemus, D.A., 1984a) and Brazil (Polhemus, J.T. & Polhemus, D.A., 1984b; Rodrigues *et al.*, 2014b; present study) (Fig. 11).

RESUMO

A espécie de percevejo semi-aquático Paravelia cunhai sp. nov. é descrita e ilustrada com base em material do Estado do Pará, norte do Brasil. A espécie nova pode ser diferenciada de todas as outras espécies do gênero principalmente pela coloração escura da cabeça e do pronoto, ausência de pruiniosidade e de pubescência prateada sobre o lobo anterior do pronoto, padrão das máculas sobre as asas anteriores, fêmur posterior com uma fileira de 22 espinhos sobre a margem medial e a forma geral do parâmetro. Essa espécie foi coletada em uma poça dentro de uma caverna sem incidência de luz, habitat registrado para o gênero apenas recentemente, o que reforça a hipótese que algumas espécies de Paravelia podem ser troglófilas. Além disso é fornecida uma fotografia do habitus dorsal, bem como notas sobre P. juruana Polhemus & Polhemus. Paravelia cupariana Polhemus & Polhemus syn. nov. é estabelecido como sinônimo junior de P. spinifera Polhemus & Polhemus.

PALAVRAS-CHAVE: América do Sul; Gerromorpha; Veliidae; Percevejos semi-aquáticos.

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