



Idiopidae in the Brazilian Amazon: Description of a new species, characterization of an unknown male and expansion of geographic records

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João Pedro Costa Gomes[✉], Naila Amanda Sousa dos Santos[✉], Marlus Queiroz Almeida[✉],
Nikolas Gioia Cipola[✉] & José Wellington de Morais[✉]

Instituto Nacional de Pesquisas da Amazônia, Manaus, AM, Brazil.

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Abstract. Idiopidae is mostly composed of spiders known as trapdoor spiders, which create structures for shelter, hunting and protection against possible predators. It is divided into three subfamilies: Arbanitinae, with spiders restricted to Oceania, Genysinae, occurring in India, Sri Lanka, Madagascar and South America, and Idiopinae, from South America, Africa, East Middle and South to Southeast Asia. Idiopidae is widely distributed throughout the world, however, only two genera are present in Brazil: *Idiops* Perty, 1833 (Araneae: Idiopidae) and *Neocteniza* Pocock, 1895 (Araneae: Idiopidae). In this work, we describe a new species and a new record for the genus *Idiops*, the description of an unknown male of *Neocteniza*.

Keywords: Genysinae; Idiopinae; trapdoor; Neotropical.

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✉ Corresponding author:

João Pedro Costa Gomes

pedrogomes.bio@gmail.com



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Idiopidae is the fifth most diverse family among the mygalomorph spiders, currently comprising 441 valid species in 23 genera (World Spider Catalog 2023). Most species are known as trapdoor spiders, which construct structures for shelter, hunting, and protection against potential predators. The trapdoor also helps maintain the burrow with stable humidity and temperature, in addition to protecting against UV rays in open areas. Some species also camouflage the trapdoor using mud, twigs, leaves, and moss to hide from predators and enhance their predation strategy (Mason *et al.* 2013). Idiopidae is divided into three subfamilies: Arbanitinae restricted to Oceania, Genysinae occurring in India, Sri Lanka, Madagascar, and South America, and Idiopinae, with a pantropical distribution (South America, Africa, the Middle East, and southern to southeast Asia) (Raven 1985; World Spider Catalog 2023). Only two genera from the family are present in the Neotropical region: *Idiops* Perty, 1833 (Araneae: Idiopidae), and *Neocteniza* Pocock, 1895 (Araneae: Idiopidae) (World Spider Catalog 2023).

Idiops Perty, 1833 (Idiopinae) currently comprises 96 described species, with 13 reported in Brazil (World Spider Catalog 2023). These spiders are considered small-sized (with a body size ranging from 5 to 35 mm) and feature two rows of teeth on the prolateral and retrolateral margins of their chelicerae (Dippenaar-Schoeman 2002). The sternum possesses two pairs of sigilla (posterior pair absent), and the anterior lateral eyes protrude forward compared to the others, being close to the anterior margin of the carapace. Male spiders have tibial apophysis with one or two apical branches, an arched cephalic region, and numerous lateral spines on the distal segments of the front legs, with the absence of small spines on the thighs (Raven 1985; Dippenaar-Schoeman 2002).

Neocteniza (Genysinae) is a widely distributed genus in the Neotropics, comprising 18 species, with only four recorded in Brazil (World Spider Catalog 2023). Species within this genus exhibit strong sexual dimorphism, with females being three to four times the size of males (Platnick & Shadab 1976; Goloboff 1987). They are differentiated from other Idiopidae species by a set of characteristics, including a slit embolus in the male palpal bulbs, from which the embolus naturally breaks when inserted and secured in the female spermathecal ducts (Goloboff 1987). They also have a recurved tripartite (T-shaped) thoracic fovea, lacking clavate trichobothria on tarsi and palps, a male cymbium prolateral region without an angular lobe, and a palpal bulb with separate (non-fused) apical sclerites. Other distinguishing features include a well-developed median haematodocha and a reduced ocular arrangement with only two rows of eyes (Goloboff 1987; Simon 1903).

In addition to being known for their trapdoor burrows, it was recently discovered that some species of the *Neocteniza* genus employ ballooning—a dispersal tactic involving the creation of a silk “balloon” that, with the help of the wind, transports the spider from one point to another. The first record of such behavior was observed in a laboratory setting with specimens of the genus (Rossi *et al.* 2021).

Despite being highly diverse and found in virtually every part of the globe, the Idiopidae family still requires further studies focused on taxonomy, biogeography, and ecology. This need is particularly pronounced in the Amazon region, especially in Brazil, where only seven species of *Idiops* and two of *Neocteniza* have been recorded, still being the least sampled region compared to other Brazilian states (Fonseca-Ferreira et al. 2021; Rossi et al. 2021). Many areas in Brazil remain undersampled, and as a result, the actual distribution of the family in the country is not well understood (Fonseca-Ferreira et al. 2021; Rossi et al. 2021).

This study describes a new species of *Idiops* and describes the male of *Neocteniza coylei* (Goloboff & Platnick, 1992) from the Brazilian Amazon, including a new record and additional information in the description of *Idiops petiti* (Guérin, 1838). This research contributes to expanding our knowledge about the Idiopidae family in the Neotropical region, clarifying the biodiversity and ecological aspects of these spiders in the Brazilian context.

MATERIAL AND METHODS

The specimens are deposited in the Invertebrates Collection of the National Institute of Amazonian Research (INPA). The total length was measured with the spider in dorsal view, from the edge of the clypeus to the posterior edge of the abdomen, including chelicerae. All measurements are expressed in millimeters (MM). The terminologies used are based on Rossi et al. (2021), and Fonseca-Ferreira et al. (2021). Photographs and measurements were taken using a Leica M205C stereomicroscope and the Leica Application Suite version 4.10.0. Species locality maps were created based on Shorthouse (2010).

Abbreviations

AH: apical haematodocha; r: retrolateral; ALE: anterior lateral eye; ra: rastelum; AME: anterior median eye; STC: superior tarsal claw; EC: embolic crack; Ta: tarsus; fe: femur; ti: tibia; ITC: inferior tarsal claw; VTG: ventral palpal tibia grooves; MH: median haematodocha; mt: metatarsus; p: prolateral; pa: patella; PME: posterior median eye; PLE: posterior lateral eye; AK: apical keel; TT: tegular teeth; SD: seminal duct.

Taxonomy

Family: Idiopidae Simon, 1889

Subfamily: Idiopinae Simon, 1889

Genus: *Idiops* Perty, 1833

Idiops dilatatus sp. nov.

Figures 1-2, 6

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Etymology: the specific name refers to the femur of the third leg that has a dilation in the basal part.

Diagnosis: Females of *Idiops dilatatus* sp. nov. can be distinguished from other species within the genus by the following sets of characters: Presence of bristles on the ocular tubercle (Figure 1A, C); internal dilation of the femur (fe) on the third pair of legs (Figure 2A); inferior tarsal claw (ITC) and superior tarsal claw (STC) each with basal teeth on either side (Figure 2B); Base of the spermatheca little sclerotized, receptacles with a rounded shape, short ducts and almost as wide as the receptacles, are oppositely curved (Figure 2C).

Unknown males.

Holotype ♀ (INPA-ARA9162) Brazil, Amazonas, Manaus, Adolpho Ducke Reserve, 26.VII.1991, H. Höfer & T. Gasnier

Col.

Description ♀ (INPA-ARA9162) - Carapace and legs light brown, sternum yellowish, abdomen grayish with a small portion on the dorsal region depigmented (Figure 1). Total size 17.6; carapace 7.6 in length and 6.7 in width; procurved fovea; cephalic region with two rows of two spines; arrangement of ocular setae [disposition of ocular arrangement in Figure 1; AME with an unpaired and robust bristle, and PME with a pair of small bristles between them; eye sizes: AME 0.2, ALE 0.4, PME 0.2, PLE 0.2; sternum with a length of 2.3 and a width of 1.9, sigilla faintly visible; trapezoidal labium with a rounded upper part and five cusps, three larger subapical and two smaller median; maxillae with 86 cusps distributed sparsely throughout the region, with a small concentration in the anterior prolateral lobe; rastellum present with 16-18 closely grouped spines, all of similar size; cheliceral groove with seven teeth on both sides, presence of four basal denticles; measurements of palp and legs in Table 1; spines: Palp Fe v0-0-3, Pa v0-1, Ti p2-12-7, r3-12-9, Ta p4-15-7, r5-13-6. I Fe 0, Pa 0, Ti p2-13-6, r3-14-7, Mt p5-10-7, r5-11-3, Ta v0-0-4, p2-4-3, r4-7-0. II Fe 0, Pa 0, Ti p2-5-4, r0-0-1, Mt p7-8-6, r2-5-4, Ta v0-3, p3-4-4, r2-3-2. III Fe 0, Pa d0-0-3, p3-5-9, Ti p2-2-4, r1-1-4, Mt v0-0-2, d1-9-3, p3-3-2, r3-1-1, Ta v0-5, p0-1. IV Fe 0, Pa d10-6-0, Ti v0-2-2, Mt v0-0-1, p0-2-3, tA v0-1; femur of leg III internally dilated as in Figure 2A; tarsal claws with basal teeth and presence of inferior tarsal claw (ITC) (Figure 2B); short spermatheca with rounded lobes, base almost as wide as the apex (Figure 2C).

Table 1. Measures (in MM) palp and legs of *Idiops dilatatus* sp. nov.

	I	II	III	IV	Palp
Femur	1.4	1.4	1.2	0.9	1.3
Patella	0.8	0.7	0.7	0.6	0.8
Tibia	0.9	0.8	0.6	0.7	0.8
Metatarsus	0.5	0.6	0.6	0.6	-
Tarsus	0.3	0.4	0.5	0.4	0.7
Total	3.9	3.9	3.6	3.2	3.6

Idiops petiti (Guérin, 1838)

Figures 3, 6

Acanthodon petiti Guérin, 1838: 163, pl. 47 Figures 1-8, Santarém, Pará, Brazil.

Acanthodon santaremia O. Pickard-Cambridge, 1896: 733, pl. 34, Figure 13. First Synonymized by Fonseca-Ferreira et al. 2021: 47

Idiops crulsi Mello-Leitão, 1930: 55, Figure 2. Synonymized by Bücherl et al. 1971: 128.

Idiops petiti O. Pickard-Cambridge, 1870: 107; 1896: 732, pl. 34 Figures 9-12 (combination). - Mello-Leitão 1923: 48. - Bücherl et al. 1971: 121, Figure 5.

Idiops petiti Fonseca-Ferreira et al. 2021: 47, f. 26^a-L (Dm, f, S of de *Idiops santaremius*).

Diagnosis: The males of *I. petiti* differ from other Neotropical species, except for *Idiops carajas* Fonseca-Ferreira et al., 2017, by presenting spines concentrated on the basal half of the retrolateral depression of the palpal tibia, a tibial apophysis with a narrow apical branch in a rectangular shape, and the presence of a lateral lamella extending along the median portion of the embolus (Figure 3C). It differs from *I. carajas* in having the subapical portion of the embolus thin and straight (Figure 3D), and the metatarsus of leg I slightly curved with a small prolateral projection in the apical half (Figure 3C). Females are distinguished from their congeners, except *I. carajas*, by having spermathecae with a large trapezoidal base and ducts in a V shape (see Fonseca-Ferreira et al. 2021, Figure 26L). It differs from *I. carajas* by its large oval receptacles

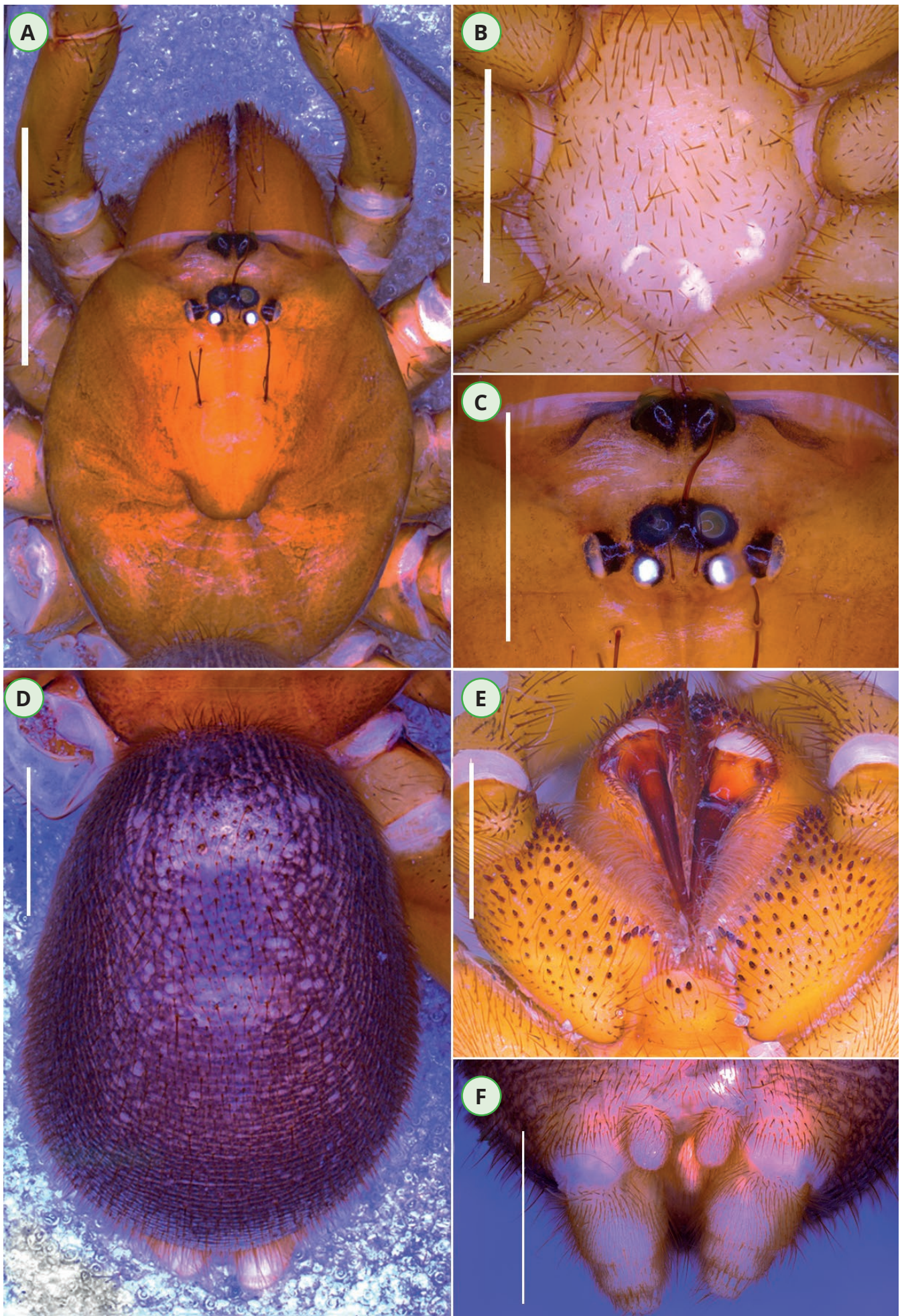


Figure 1. (A-F) ♀ *Idiops dilatatus* sp. nov. (INPA-ARA9162), A: Cephalothorax. B: Sternum and thighs, ventral view. C: Eye and bristle arrangement, dorsal view. D: Abdomen, dorsal view. E: Labium, chelicerae and palp in ventral view. F: Spinnerets, ventral view. Scale bar A-B: 2mm; C-F: 1mm.

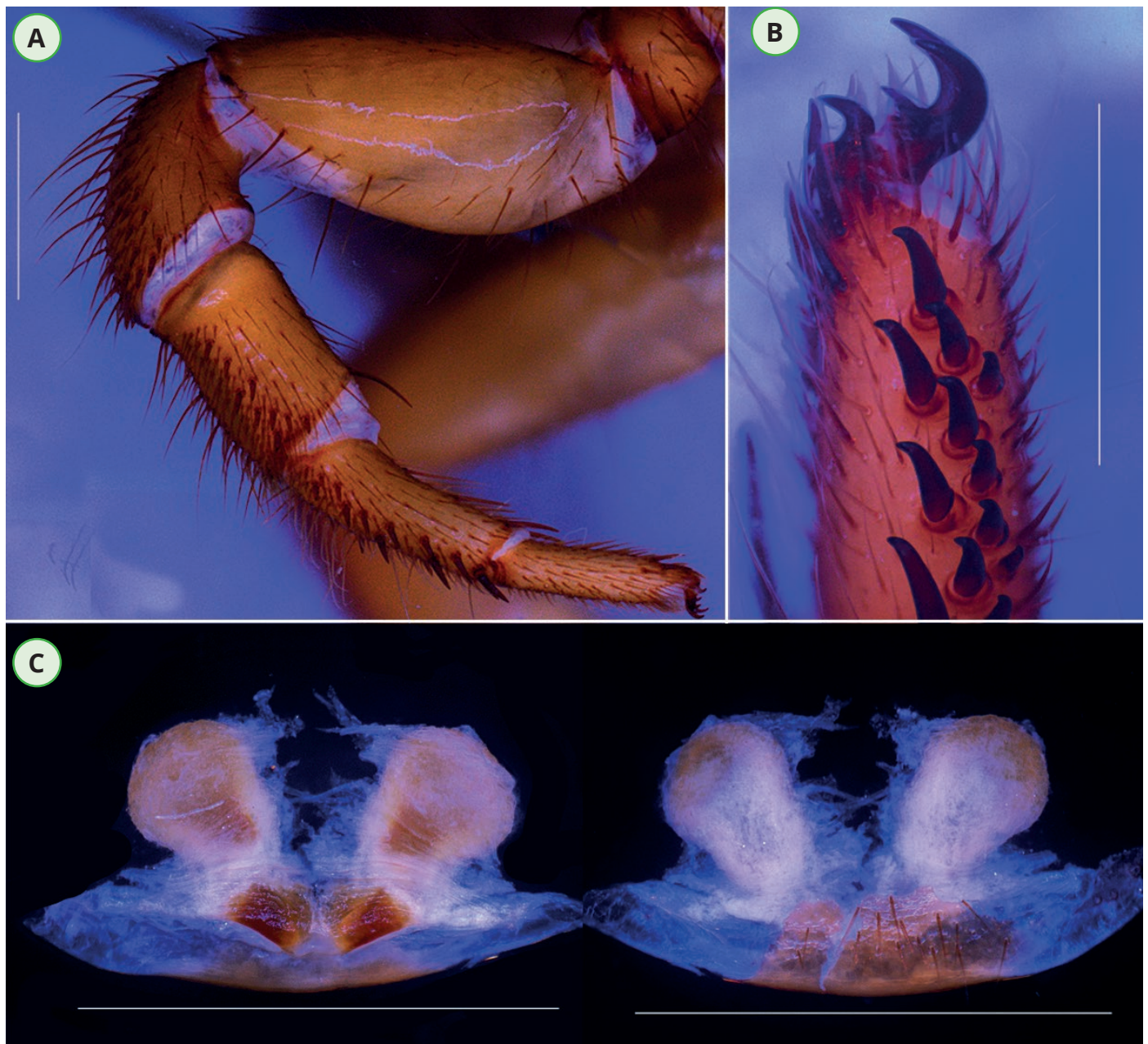


Figure 2. (A-C) ♀ *Idiops dilatatus* sp. nov. (INPA-ARA9162), A: Left leg III, retrolateral view, fe indicates internally dilated femur III. B: Distal tarsus and tarsal claws of leg II (prolateral), arrows indicate respectively lower tarsal claw (ITC) and upper tarsal claw (STG). C: Spermatheca, ventral and dorsal views, respectively. Scale bar: 1mm.

(Fonseca-Ferreira et al. 2021).

Examined material: Brazil - ♂ (INPA-ARA9163) Amazonas, Purus River, Beruri Lake, inside a clay termite mound at the base of a Brazilian nut tree, -3.8116666666667 -61.2722222222222 (Figure 6), 17.I.1987. N.O. Aquino Col.; ♂(INPA-ARA9164) Roraima, Amajari, Tepequem/Sesc 3.7458333333333, -61.7277777777778 (Figure 6), 15-31.II.2016. R. Boldrini Col.

Distribution: Amazonas, Pará, Rondônia (Fonseca-Ferreira et al. 2021), and Roraima (new record) (Figure 6).

Description ♂ (INPA-ARA9164) - Measurements: Total size 15.82; cephalothorax 7.21 in length, 6.66 in width; labium 0.96 in length, 1.1 in width; sternum 4.22 in length, 3.36 in width. Palp and legs: Palp = 10.62 (3.31, 2.32, 3.29, 1.7), I = 22.55 (7.82, 3.13, 5.78, 3.42, 2.4), II = 20.65 (6.59, 2.76, 4.95, 4.36, 1.99), III = 18.82 (5.33, 2.62, 3.59, 4.73, 2.55), IV = 26.36 (7.34, 2.99, 6.36, 6.16, 3.51); spines: Palp: Ti r14, Ta d0-0-4. I: Fe d1-1-1, Pa v0-1-4, Ti v11-19-11, p0-1-4, r4-5-6, Mt v6-10-15, p1-3-5, r0-7-3, Ta v0-2-0, p0-4-4, r4-6-4. II: Fe d1-1-1, Pa v0-0-3, Ti v4-10-15, p0-2-3, r1-3-4, Mt v6-6-8, p1-4-6, r2-5-9, Ta p1-5-3, r2-5-7. III: Fe d1-2-1, Pa p6-5-9, Ti v0-2-4, p1-2-3, r0-2-3. Mt d2-5-2, v2-6-8, p0-5-5, r1-2-2. Ta p6-10-6, r6-10-9. IV: Fe d1-1-1, Mt

v2-2-5, p0-1-3, r0-2-3, Ta p5-5-8, r5-4-8.

Subfamily: Genysinae Simon, 1903

Genus *Neecteniza* Pocock, 1895

***Neecteniza coylei* Goloboff & Platnick, 1992
Figures 4-6**

Neecteniza coylei Goloboff & Platnick, 1992: 4, f. 7-11 (Df).

Diagnosis: It partially resembles *Neecteniza fantastica* Platnick & Shadab, 1976, and *Neecteniza minima* Goloboff, 1987 in the structural form of the cymbia, palpal bulb and the presence of ventral spines on the palpal tibia and differs by dilation in the femurs of legs I and II (dilated in the femur of leg III in *N. fantastica*). Furthermore, it differs in the color pattern on the anterior and posterior legs, as well as in the number and arrangement of spines on the palpal tibia of males (Figure 5).

Material examined: ♂ Brazil: Acre, Mâncio Lima, Serra do Divisor National Park, Igarapé Paqueira, -7.4528611111111, -73.6676666666667 (Figure 6), 260m alt., 18-26.VII.2022, G.R. Desidério, A. Pes, J.O. Silva, R.B. Pinedo, H.L.M.S. Ferreira leg. Malaise trap (INPA-ARA9165).

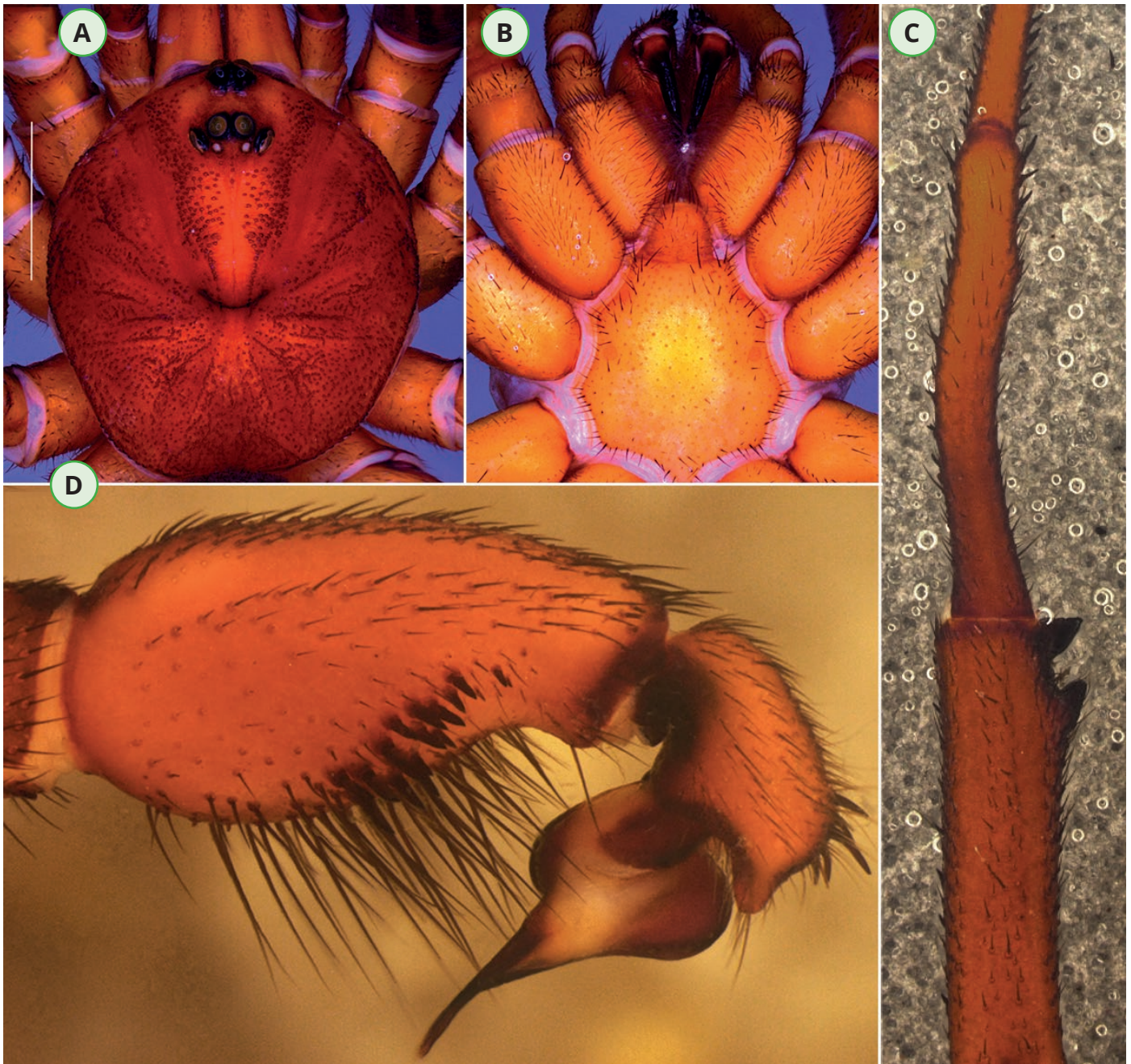


Figure 3. (A-D) ♂ *Idiops petiti* (Guérin, 1838) (INPA-ARA9164), A: Cephalothorax, dorsal view. B: Sternum, ventral view. C: Leg I, tibial apophysis and curved metatarsus, dorsal view. D: Left palp, prolateral view.

Description: Female described by Goloboff & Platnick (1992): 4, f. 7-11.

Male (INPA-ARA9165) - Carapace coloration is gray, particularly along the margins; brownish pigments on the carapace, ocular tubercle with black coloration, gray abdomen; total size 7.84; carapace length 3.82, width 2.9; recurved tripartite fovea (T-shaped), as in Figure 4; slightly procurved ocular tubercle with a length of 1.09 and a width of 0.4, eye sizes: AME 0.11, ALE 0.11, PME 0.09, PLE 0.09; eye interdistances AME-AME 0.02, AME-ALE 0.07, PME-PME 0.20, PME-PLE 0.07, ALE-PLE 0.04, AME-PME 0.02, ALE-ALE 0.36, PLE-PLE 0.51; sternum with a length of 1.27 and a width of 0.83, sigilla practically imperceptible; trapezoidal labium with a length of 0.15 and a width of 0.33, without cuspules; maxilla with a developed prolateral anterior lobe, without cuspules, almost as wide as long; chelicerae with a length of 1.4 and a width of 0.7 (individual), cheliceral groove with 6 teeth on the promargin and 10 small teeth on the retromargin; rastellum with four short strong spines and two spines outside the rastellum projection; measurements of the palp and legs in Table 2; palpal tibia strongly thickened with two clusters of spines, one with 23 spines divided into five rows (arrangement 3,

4, 7, 2, 7) followed by another distal cluster with five spines in a single row; femurs of legs I and II dilated; all coxae and trochanters are whitish, femurs dark brown, and patellae whitish; tibia I and II entirely whitish, and metatarsi and tarsi grayish, legs III and IV with light brown basal tibia and whitish distally (Figure 5); all legs with pectinate tarsal claws and the presence of a third tarsal claw; megasetae present - Leg I: Ti v0-0-3, Mt v0-0-3, Ta v2-2-0; Leg II: Ti v0-1-2, Mt v1-2-3, Ta v2-2-1; Leg III: Ti v0-0-2, Mt v0-0-2; Leg IV: Ti v0-1-2, Mt v0-0-4; spines - Palp, legs I and II without spines; Leg III: Pa d5-4-6, Ti d0-3-4, Mt d2-4-2; Leg IV: Mt d0-0-1; palpal bulb with a slender and strongly curved embolus, paraembolic apophysis (PA) present, haematodochae (MH, AH), tegular teeth (TT), apical keel (AK), and embolic crack (EA) (Figure 5).

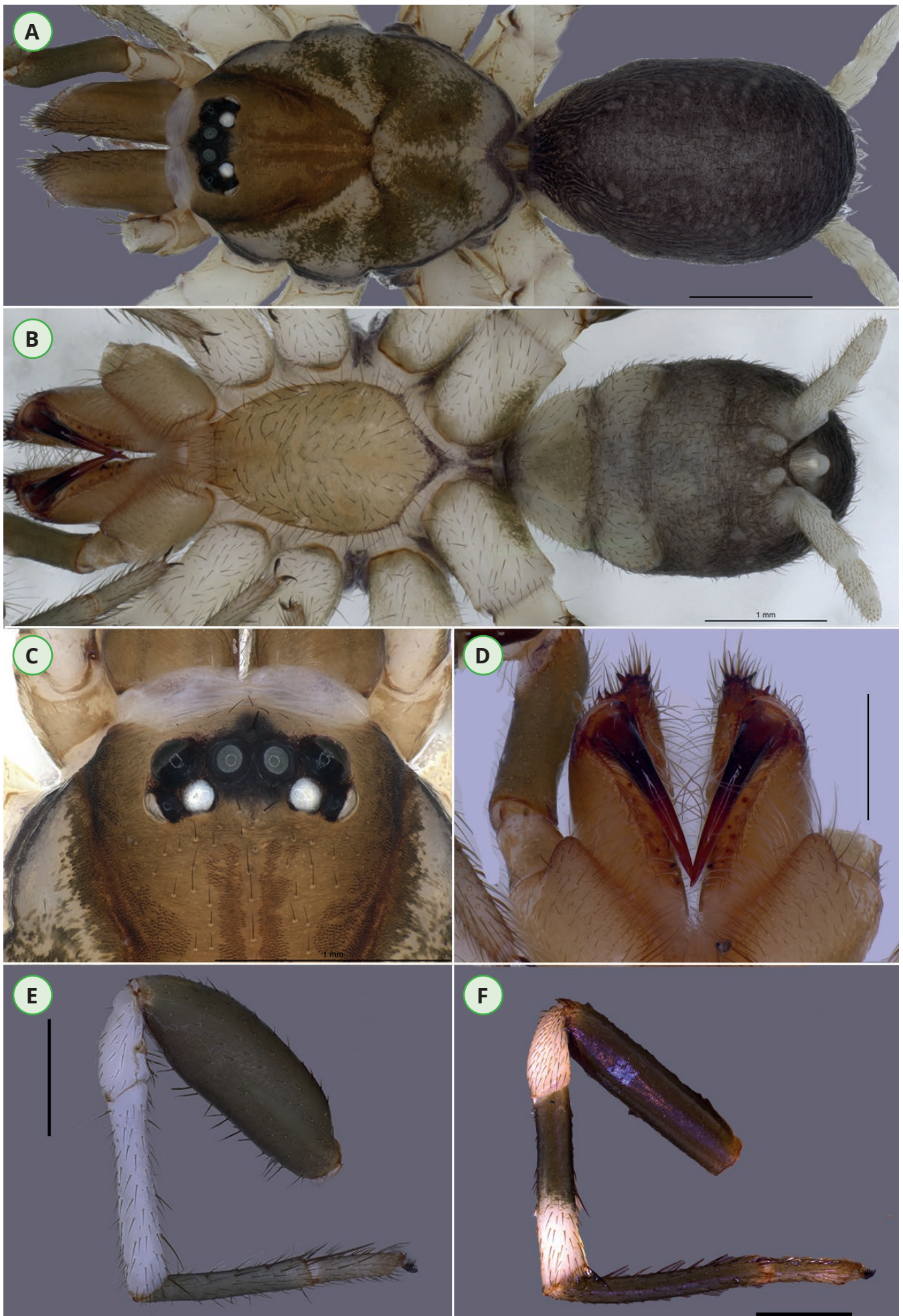


Figure 4. (A-F) ♂ *Neocteniza coylei* (INPA-ARA9165), A-B: Cephalothorax and abdomen, dorsal and ventral views, respectively. C: Ocular arrangement. D: Chelicerae, ventral view. E: Leg I, femoral dilation and color pattern on patella and tibia, prolateral view. F: Leg IV, color pattern on patella and tibia, prolateral view. Scale bar: 1 mm.

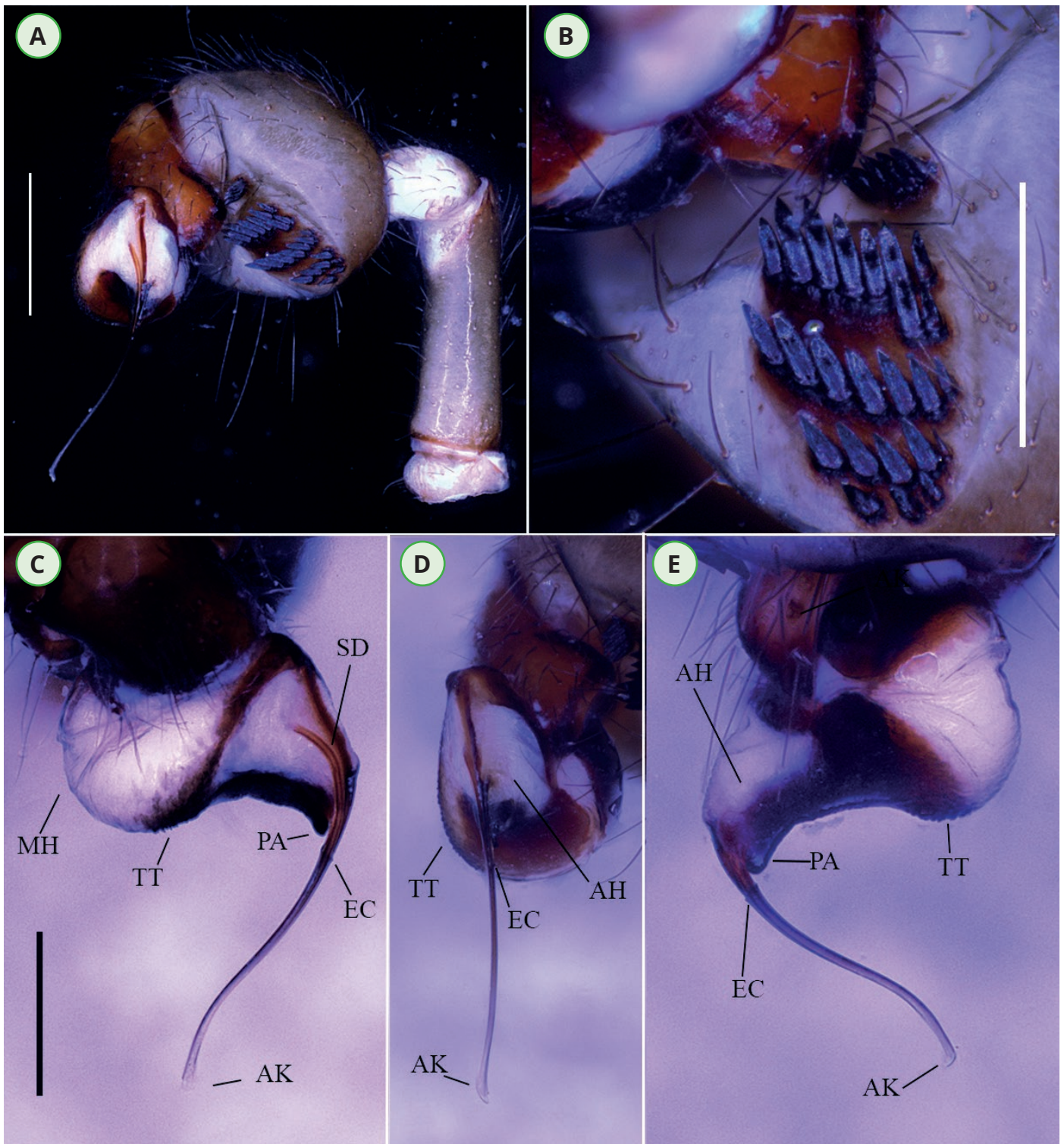


Figure 5. (A-E) ♂ *Neocteniza coylei* (INPA-ARA9165), A: Palp with incassate tibia and arrangement of ventral spines on the palpal tibia (VTG), prolateral view. B: Enlarged VTG spines. C, D & E: Palpal bulb, dorsal, prolateral, and ventral views, respectively. Scale bar A-B: 0.25mm; C, D and E: 1 mm.

Table 2. Measures (in MM) palp and legs of *Neocteniza coylei* (Goloboff & Platnick, 1992).

	I	II	III	IV	Palp
Femur	1.17	1.32	1.21	1.76	0.65
Patella	0.55	0.62	0.34	0.68	0.23
Tibia	1.08	0.81	0.78	1.37	0.57
Metatarsus	1.03	0.78	1.13	1.63	-
Tarsus	0.52	0.51	0.59	0.80	0.33
Total	4.35	4,04	4.05	6.24	1.78

DISCUSSION

The results of this study provide substantial contributions to the understanding of spider biodiversity in the Amazon region. Through meticulous taxonomic descriptions, we present the new species *Idiops dilatatus* **sp. nov.** and the descent

of the male *N. coylei* with the first record of the species for Brazil, as well as a new record of the presence of *I. petiti* in the Brazilian Amazon, significantly expanding our knowledge about its geographic distribution. The detailed analysis of the morphology of these species reinforces the importance of taxonomic studies in understanding the biological diversity of the region, providing valuable insights for future research in ecology and conservation in the Amazon. Furthermore, the absence of the new species' pair indicates a gap in our current understanding of its life history and behavior. This emphasizes the need for future research to explore and uncover missing aspects of the life cycle and interactions within these species, contributing to a more holistic understanding of the Amazon spider fauna and advocating efforts to preserve this exceptionally vital ecosystem.



Figure 6. New record of *Idiops petiti* (Guérin, 1838) and the respective localities of *Idiops dilatatus* sp. nov. (white circle) and *Neocteniza coylei* (Goloboff & Platnick, 1992) (blue circle).

TAXONOMIC AUTHORITIES

Idiops Perty, 1833 original description in Perty (1833); *Idiops petiti* (Guérin, 1838) original description in Guérin (1838); *Neocteniza* Pocock, 1895 original description in Pocock 1895; *Neocteniza coylei* Goloboff & Platnick, 1992 original description in Goloboff & Platnick (1992). *Neocteniza fantastica* Platnick & Shadab, 1976 original description in Platnick & Shadab 1976, and *Neocteniza minima* Goloboff, 1987 (original description) Goloboff 1987; *Idiops carajas* Fonseca-Ferreira et al., 2017 (original description) Fonseca-Ferreira et al. 2017.

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AUTHORS CONTRIBUTION

All authors contributed crucially to the elaboration of this study. JPCG: Specimen identifications, descriptions, and initial drafting of the article, as well as final article drafting. NASS: Review of identifications and final article drafting. MQA: Review of identifications and final article drafting. NGC: Review and final drafting. JWM: Review and supervision. All authors read and approved the final manuscript.

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CONFLICT OF INTEREST STATEMENT

The authors declare no competing interests.

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