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Research article

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Four new species of *Nopsma* Sánchez-Ruiz, Brescovit & Bonaldo, 2020 (Arachnida: Caponiidae) from Peru

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Abstract. Four new species of the genus *Nopsma* Sánchez-Ruiz, Brescovit & Bonaldo, 2020 are described: *Nopsma miraflores* sp. nov. (♂♀), *Nopsma nauta* sp. nov. (♂), *Nopsma putuime* sp. nov. (♂) and *Nopsma rioja* sp. nov. (♂). The taxonomic key proposed by Sánchez-Ruiz *et al.* (2021) for *Nopsma* is updated to include the new species proposed herein. A map showing the known distribution of the species of *Nopsma* is included.

Keywords. Arachnida, taxonomy, neotropical, synspermiata.

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Introduction

Nopinae Petrunkevitch, 1939 contains the greatest diversity of the family Caponiidae Simon, 1890, with its members distributed throughout the Americas (World Spider Catalog 2024). Members of the subfamily are characterized by having adesmatic joints in the tarsi and membranous modifications on the anterior metatarsi and tarsi (Platnick 1995; Sanchez-Ruiz & Brescovit 2018; Galán-Sánchez & Álvarez-Padilla 2022). However, in some genera within this subfamily, these membranous modifications are either absent or greatly reduced, as in some species of *Medionops* Sánchez-Ruiz & Brescovit, 2017, which lack the gladius or have an almost unnoticeable crista, *Nyetnops* Platnick & Lise, 2007 which

lacks all three modifications absent and *Nopsma* Sánchez-Ruiz, Brescovit & Bonaldo, 2020 which retains only the gladius on the anterior legs (Sánchez-Ruiz *et al.* 2020).

Currently, *Nopsma* comprises seven species distributed across Central and South America. In Colombia, three species have been recorded: *Nopsma florencia* Sánchez-Ruiz, Brescovit & Bonaldo, 2020, from the Chocó Department; *Nopsma leticia* Sánchez-Ruiz, Martínez & Bonaldo, 2021, from the Amazonas Department, and *Nopsma macagual* from the Caquetá Department. In Ecuador, the type species *Nopsma juchuy* (Dupérré, 2014) is found in the Los Ríos Province. In Nicaragua, *Nopsma armandoi* Sánchez-Ruiz, Brescovit & Bonaldo, 2020, is known from the Zelaya Department. Finally, the only one species from Peru, *Nopsma enriquei* Sánchez-Ruiz, Brescovit & Bonaldo, 2020 was described from the Huánuco Department.

Although *Nopsma* is relatively diverse in comparison with other nopines, excepting *Nops* MacLeay, 1839, its species apparently have a restricted distribution, as all species are known only from a few specimens collected at their type localities, and only two species have both sexes described. Recently, Sánchez-Ruiz & Bonaldo (2024) included, for the first time, two species of the genus in a phylogenetic analysis based on morphological data and found that *Nopsma* is part of a group formed by *Cubanops* Sánchez-Ruiz, Platnick & Dupérré, 2010 and *Nyetnops* Platnick & Lise, 2007, characterized by the presence of a cephalothoracic pattern. This supports the view of Sánchez-Ruiz *et al.* (2020), who suggested that the genus is very likely to be closely related to *Nyetnops* and *Cubanops* due to shared morphological characteristics, such as the presence of a dorsal carapace pattern and a similarly shaped carapace.

Herein, we expand the knowledge of the genus by presenting the description of four new species from Peru: *Nopsma nauta* sp. nov., *Nopsma putuime* sp. nov. and *Nopsma rioja* sp. nov. based on males, and *Nopsma miraflores* sp. nov., based on both male and female. Additionally, the key and the distribution map proposed by Sánchez-Ruiz *et al.* (2020) are updated.

Material and methods

The specimens herein examined are deposited in the Universidad Nacional Mayor de San Marcos, Lima, Peru (MUSM-ENT; curator: D. Silva).

Descriptions were made following the general taxonomic method and description format used in Sánchez-Ruiz *et al.* (2020, 2021). Coloration patterns were described based on specimens preserved in 70–80% ethanol. All measurements are expressed in millimeters and were taken with a Leica S8AP0 stereo microscope. Interocular measurements were included based on Petrunkevitch (1925).

Female genitalia were dissected with fine forceps and scalpel, and their soft tissues were digested for 24 hours by immersion in a solution of pancreatin based on Álvarez-Padilla & Hormiga (2007) for better visualization of internal structures.

The multifocal images of the copulatory structures were taken with a Leica MC–190 HD digital camera attached to a Leica S8AP0, and a DM500 Leica stereo microscope and microscope respectively, with extended focal range. All multifocal images were assembled with Helicon Focus Pro ver. 6.6. All images of male genitalia are from left palps, except when mentioned.

The figures and plates were edited and prepared in Adobe Photoshop® CS ver. 12.0. Maps were obtained in QGIS (QGIS Development Team 2023). Locality coordinates are in parenthesis and were obtained from specimen labels, for some specimens coordinates were estimated through GeoNames or Google Earth (GeoLocator© Development Team 2021).

Abbreviations for morphological terms

ap	= anterior plate
as	= anterior tracheal spiracle
dmr	= distal margin of receptaculum
ess	= external sclerotization around spiracles
lep	= lateral extensions of posterior plate
mk	= membranous keel
PME	= posterior median eyes
pmr	= proximal margin of receptaculum
pp	= posterior plate
ps	= posterior tracheal spiracle
re	= receptaculum

Results

Taxonomy

Class Arachnida Cuvier, 1812
Order Araneae Clerck, 1757
Family Caponiidae Simon, 1890

Genus *Nopsma* Sánchez-Ruiz, Brescovit & Bonaldo, 2020

Nopsma Sánchez-Ruiz, Brescovit & Bonaldo, 2020: 474.

Type species

Nyetnops juchuy Dupérré, 2014 (by original designation).

Diagnosis

See Sánchez-Ruiz *et al.* (2020)

Key for males of *Nopsma* Sánchez-Ruiz, Brescovit & Bonaldo, 2020 updated from Sánchez-Ruiz *et al.* (2021)

1. Dorsal carapace pattern formed by large spots (Fig. 7A–D) *N. rioja* sp. nov.
– Dorsal carapace pattern formed by small black dots (Figs 1A, 4A, 5A) 2
2. Large tegulum, reaching or exceeding the palpal tibia length (Sánchez-Ruiz *et al.* 2020: figs 11b, 17b) 3
– Small tegulum, not reaching the palpal tibia length (Sánchez-Ruiz *et al.* 2020: figs 15b, 18b; Figs 2A, 4E, 5E) 4
3. Elongated palpal tibia, two times the patella length (Sánchez-Ruiz *et al.* 2020: fig. 11b), embolus projecting from the prolateral distal surface of the tegulum with a keel bordering the tip (Sánchez-Ruiz *et al.* 2020: figs 11b–c, 14a, d–f) *N. enriquei* Sánchez-Ruiz, Brescovit & Bonaldo, 2020
– Short palpal tibia, just a little longer than patella length (Sánchez-Ruiz *et al.* 2020: fig. 17b), embolus projecting from the prolateral median surface of the tegulum with three very thin, long projections on the tip (Sánchez-Ruiz *et al.* 2020: fig. 17b–c, f)
..... *N. armandoi* Sánchez-Ruiz, Brescovit & Bonaldo, 2020
4. Embolus protruding anteriorly (Figs 5E–G, 6C–D, 9E–G) *N. putuime* sp. nov.
– Embolus protruding distally or posteriorly (Figs 6A–C, 4E–G, 7E–G) 5

5. Embolus anteriorly directed (Sánchez-Ruiz *et al.* 2021: 386, figs 3c-d, 5c-d)
..... *N. macagual* Sánchez-Ruiz, Martínez & Bonaldo, 2021
– Embolus posteriorly directed (Figs 2A–C, 4E–G, 5E–G) 6
6. Embolus with membranous keel restricted to the opening of embolus tip (Sánchez-Ruiz *et al.* 2021:
fig. 6g–h) 7
– Embolus with a membranous keel at the opening, extended proximally towards the embolus shaft
(Sánchez-Ruiz *et al.* 2021: figs. 6e–f, 4e–g) 8
7. Embolus curved, cymbium elongated, more than $4 \times$ as long as wide (Figs 2A–C, 3A–B)
..... *N. miraflores* sp. nov.
– Embolus straight, cymbium less than $3.5 \times$ as long as wide (Sánchez-Ruiz *et al.* 2021: fig. 4e, g) ..
..... *N. paya* Sánchez-Ruiz, Martínez & Bonaldo, 2021
8. Tegulum one-third of the cymbium length (Sánchez-Ruiz *et al.* 2020: fig. 15b–d; Sánchez-Ruiz
et al. 2021: fig. 2c–d) 9
– Tegulum conspicuously small, only one-fifth the cymbium length (Sánchez-Ruiz *et al.* 2020:
fig. 18b–c) *N. florencía* Sánchez-Ruiz, Brescovit & Bonaldo, 2020
9. Embolus with a membranous keel at the opening long, reaching more than one-third of the embolus
shaft (Sánchez-Ruiz *et al.* 2021: figs 2c–d, 5e–f)
..... *N. leticia* Sánchez-Ruiz, Martínez & Bonaldo, 2021
– Embolus with a membranous keel at the opening short, reaching only one-fourth or less of the
embolus shaft (Sánchez-Ruiz *et al.* 2020: fig. 15b–d) *N. juchuy* (Dupérré, 2014)

Nospsma miraflores sp. nov.

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Figs 1–3, 9A–B, 10

Diagnosis

Nospsma miraflores sp. nov. is similar to *N. macagual* and *N. paya* by having an oval tegulum with an embolus protruding anteriorly (but can be distinguished by the more elongated cymbium more than $4 \times$ as long as wide and the tegulum very small $5 \times$ shorter than the cymbium (Sánchez-Ruiz *et al.* 2021: 386, fig. 3c–d; 387, fig. 4e–f; Fig. 2A–C). Females differ from those of *N. juchuy* and *N. paya* by having a triangular receptaculum without median concavity, instead straight in *N. juchuy* and concave in distal margin on *N. paya* (Sánchez-Ruiz *et al.* 2021: fig 7a–b; Fig. 2D–E).

Etymology

The specific epithet is a noun in apposition taken from the type locality.

Type material

Holotype

PERU • ♂; Loreto Department, Miraflores; 69 m a.s.l.; 9–13 Jun. 2010; MUSM-ENT 0507358.

Paratypes

PERU • 1 ♀; same data as for holotype; MUSM-ENT 0515829.

Description

Male (holotype (MUSM-ENT 0507358))

COLORATION (Fig. 1A–B, E, G). Carapace orange with conspicuous dorsal pattern. Chelicerae, endites and labium light orange, sternum orange-brownish. Legs light yellow. Abdomen pale gray, without dorsal noticeable pattern (Fig. 1A).

MEASUREMENTS. Total length 4.24, carapace length 1.99, width 1.70, height 0.63. Clypeus height 0.41. Eye diameters and interdistances: PME 0.20, PME–PME 0.46. Chelicerae length 0.63. Sternum length 1.23, width 1.13. Legs: I: 7.02; II: 6.58; III: 6.09; IV: 8.49. Abdomen length 2.43.

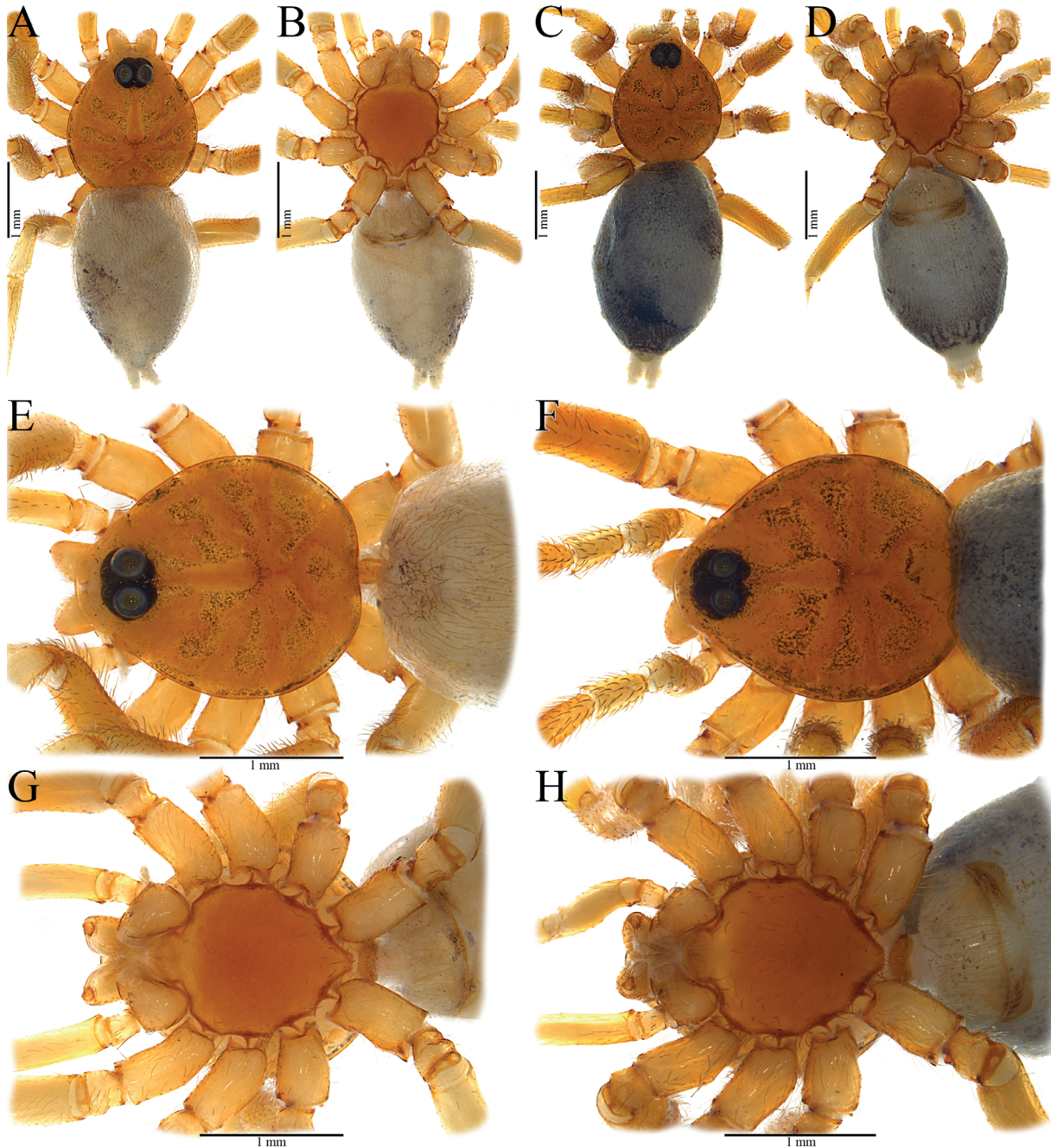


Fig. 1. *Nopsma mirafleres* sp. nov. **A–B, E, G.** ♂, holotype (MUSM-ENT 0507358). **C–D, F, H.** ♀, paratype (MUSM-ENT 0515829). **A–B.** Habitus, dorsal view. **C–D.** Habitus, ventral view. **E–F.** Prosoma, dorsal view. **G–H.** Prosoma, ventral view.

PALP. Cymbium very long, more than $2\times$ as long as palpal tibia; tegulum oval, longer than wide, embolus as long as palpal tibia, almost straight, widened in final third and membranous keel only at opening tip (Figs 2A–C, 3A–B, 8A–B).

Female (paratype (MUSM-ENT 0515829))

COLORATION AND ABDOMINAL PATTERN. As male, but with vivid color tones (Fig. 1C–D, F, H).

MEASUREMENTS. Total length 4.82, carapace length 1.93, width 2.03, height 0.56. Clypeus height 0.35. Eye diameters and interdistances: PME 0.16, PME–PME 0.41. Chelicerae length 0.59. Sternum length 1.25, width 1.14. Legs: I: 6.32; II: 6.20; III: 5.72; IV: 8.00. Abdomen length 2.44.

GENITALIA. External genital area strongly sclerotized around spiracles (Fig. 2D). Internal genitalia with receptaculum with triangular shape (Fig. 2E).

Distribution

Known only for the type locality in Loreto, Peru (Fig. 10).

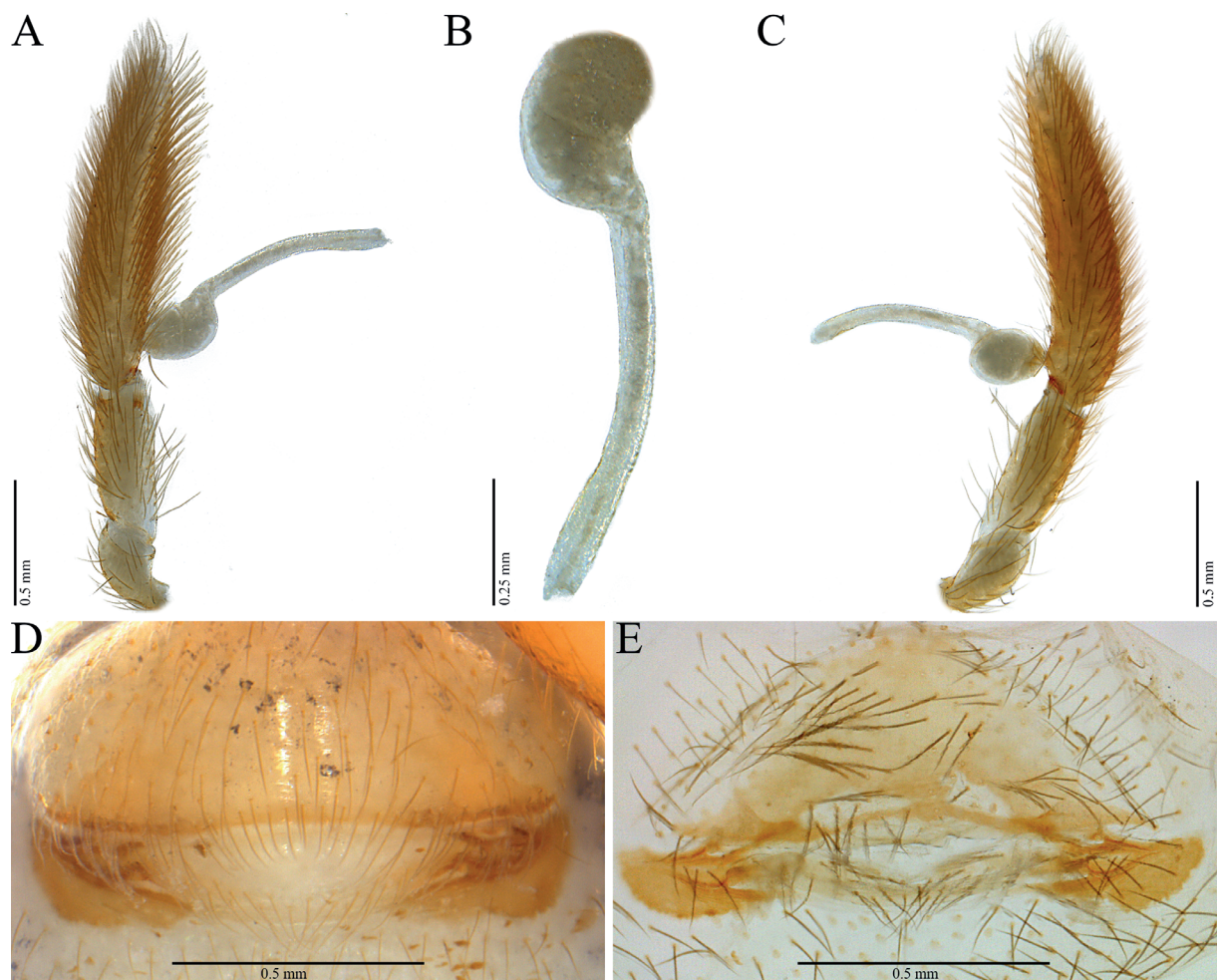


Fig. 2. *Nopsma miraflores* sp. nov. **A–C.** ♂, holotype (MUSM-ENT 0507358). **D–E.** ♀, paratype (MUSM-ENT 0515829). **A.** Left palp, prolateral view. **B.** Left palp, ventral view. **C.** Left palp, retrolateral view. **D.** External genitalia, ventral view. **E.** Internal genitalia, dorsal view.

Nopsma nauta sp. nov.

urn:lsid:zoobank.org:act:77EC6745-0637-4547-82B3-59A26F8A165F

Figs 4, 6A–B, 9C–D,10

Diagnosis

Nopsma nauta sp. nov. is similar to *N. leticia* by having an oval tegulum with an embolus almost as long as the palpal tibia but can be distinguished by the very elongated cymbium more than $5 \times$ as long

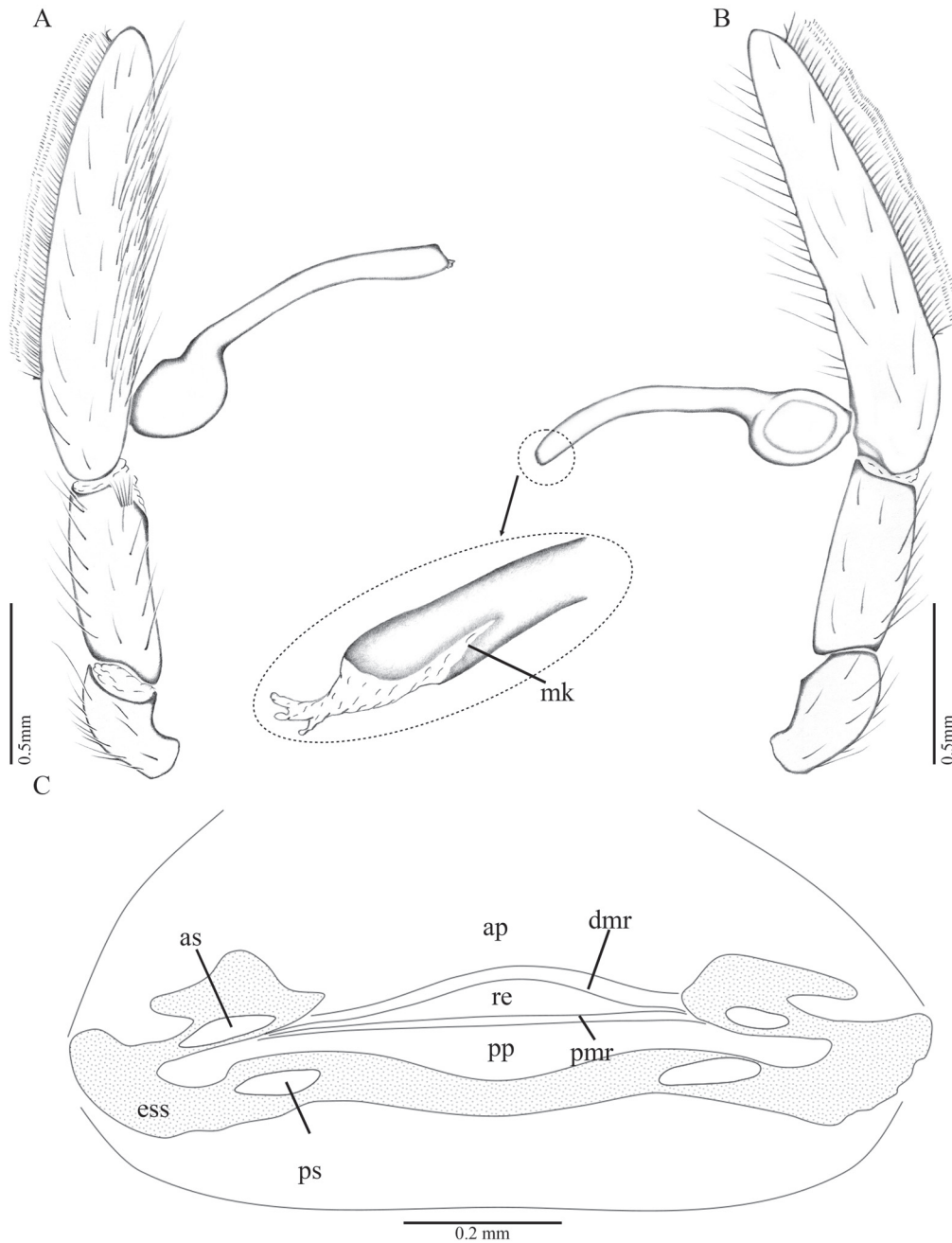


Fig. 3. *Nopsma miraflores* sp. nov. **A–B.** ♂, holotype (MUSM-ENT 0507358). **C.** ♀, paratype (MUSM-ENT 0515829). **A.** Left palp, prolateral view. **B.** Left palp, retrolateral view with embolus tip highlighted. **C.** Internal genitalia, dorsal view.

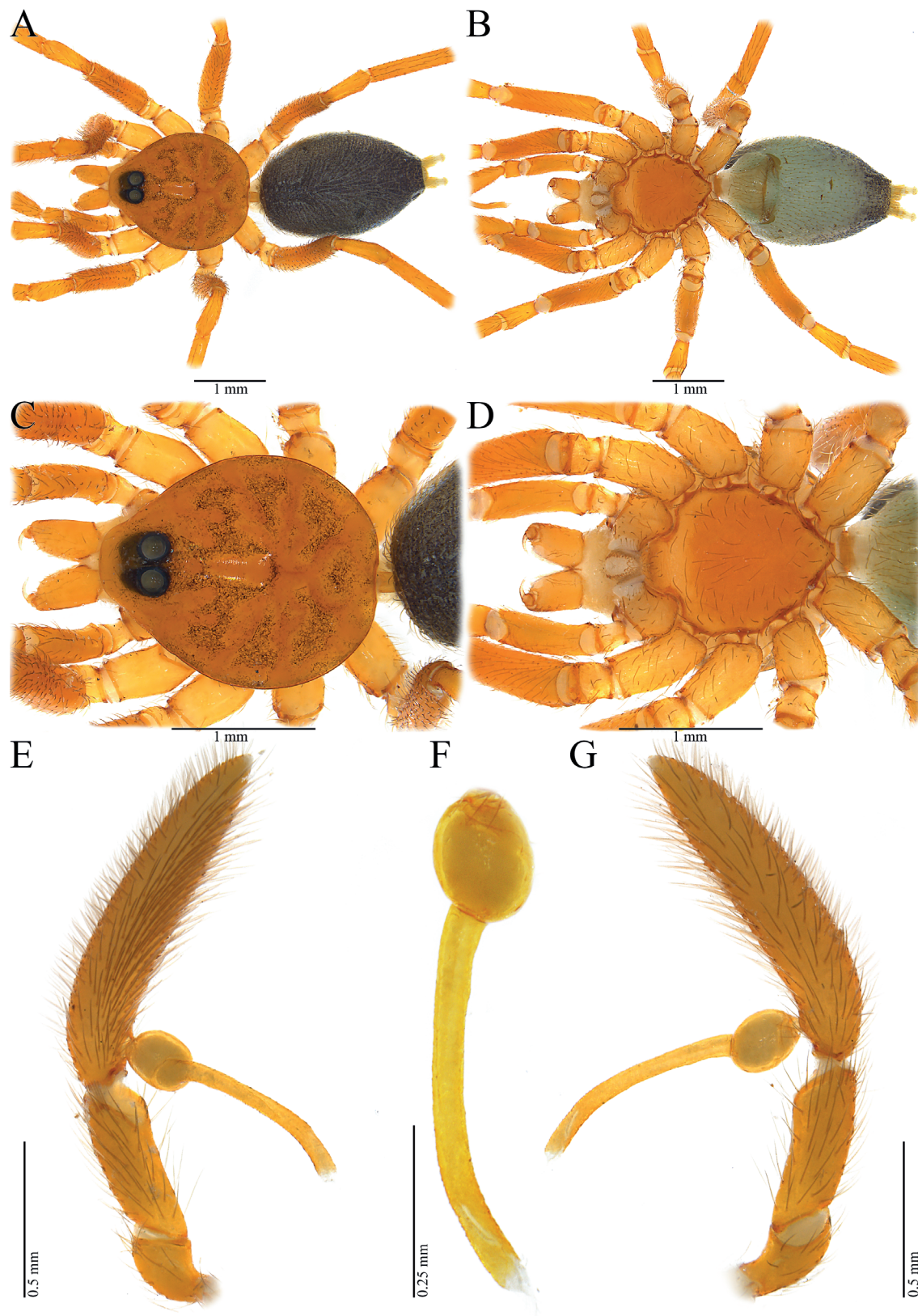


Fig. 4. *Nopsma nauta* sp. nov., ♂, holotype (MUSM-ENT 0506879). **A–B.** Habitus. **A.** Dorsal view. **B.** Ventral view. **C–D.** Prosoma. **C.** Dorsal view. **D.** Ventral view. **E.** Left palp, prolateral view. **F.** Copulatory bulb, retrolateral view. **G.** Left palp, retrolateral view.

as wide ($3.2 \times$ as long as width in *N. leticia*) and the elongated small oval tegulum only as $\frac{1}{6}$ the length of the cymbium ($\frac{1}{4}$ of length of the cymbium in *N. leticia*) (Sánchez-Ruiz *et al.* 2021: 385, fig. 2c–d; Fig. 4E–G).

Etymology

The specific epithet is a noun in apposition taken from the type locality.

Type material

Holotype

PERU • ♂; Loreto Department, km 25 road to Nauta; May 2005; A. Catenazzi leg.; MUSM-ENT 0506879.

Description

Male (holotype (MUSM-ENT 0507101))

COLORATION (Fig. 4A–D). Carapace orange-brownish with remarkable dorsal pattern form by several black dots. Chelicerae, endites and labium light orange, sternum orange-brownish, lighter in edges. Legs orange. Abdomen dorsally dark gray, without noticeable pattern (Fig. 4A). Ventrally gray darker close to spinnerets. Spinnerets yellow.

MEASUREMENTS. Total length 4.33, carapace length 1.94, width 1.64, height 0.54. Clypeus height 0.35. Eye diameters and interdistances: PME 0.22, PME–PME 0.45. Chelicerae length 0.57. Sternum length 1.26, width 1.11. Legs: I: 6.78; II: 6.17; III: 5.90; IV: 7.92. Abdomen length 2.32.

PALP. Cymbium very long, $2 \times$ as long as palpal tibia; tegulum oval, slightly longer than width, embolus almost as long as palpal tibia, with membranous keel in distal third (Figs 4E–G, 6A–B, 9C–D).

Female

Unknown.

Distribution

Known only for the type locality in Amazonas, Peru (Fig. 10).

Nopsma putuime sp. nov.

urn:lsid:zoobank.org:act:CC54AF35-7CA0-4035-B5E9-2268246205C9

Figs 5A, 6C–D, 9E–F, 10

Diagnosis

Nopsma putuime sp. nov. is similar to *N. juchuy* by having an enlarged tegulum with an embolus protruding anteriorly but can be distinguished by the embolus straighter, thicker and longer than the palpal cymbium (Sánchez-Ruiz *et al.* 2020: 479, fig. 15b–d; Figs 5E–G, 6C–D, 9E–F).

Etymology

The specific epithet is a noun in apposition taken from the type locality.

Type material

Holotype

PERU • ♂; Amazonas Department, Condorcanqui, Quebrada Putuime; $4^{\circ}22'24.97''$ S, $77^{\circ}56'4.64''$ W; 311 m a.s.l.; 25 Aug. 2010; W. Paredes leg.; MUSM-ENT 0507101.

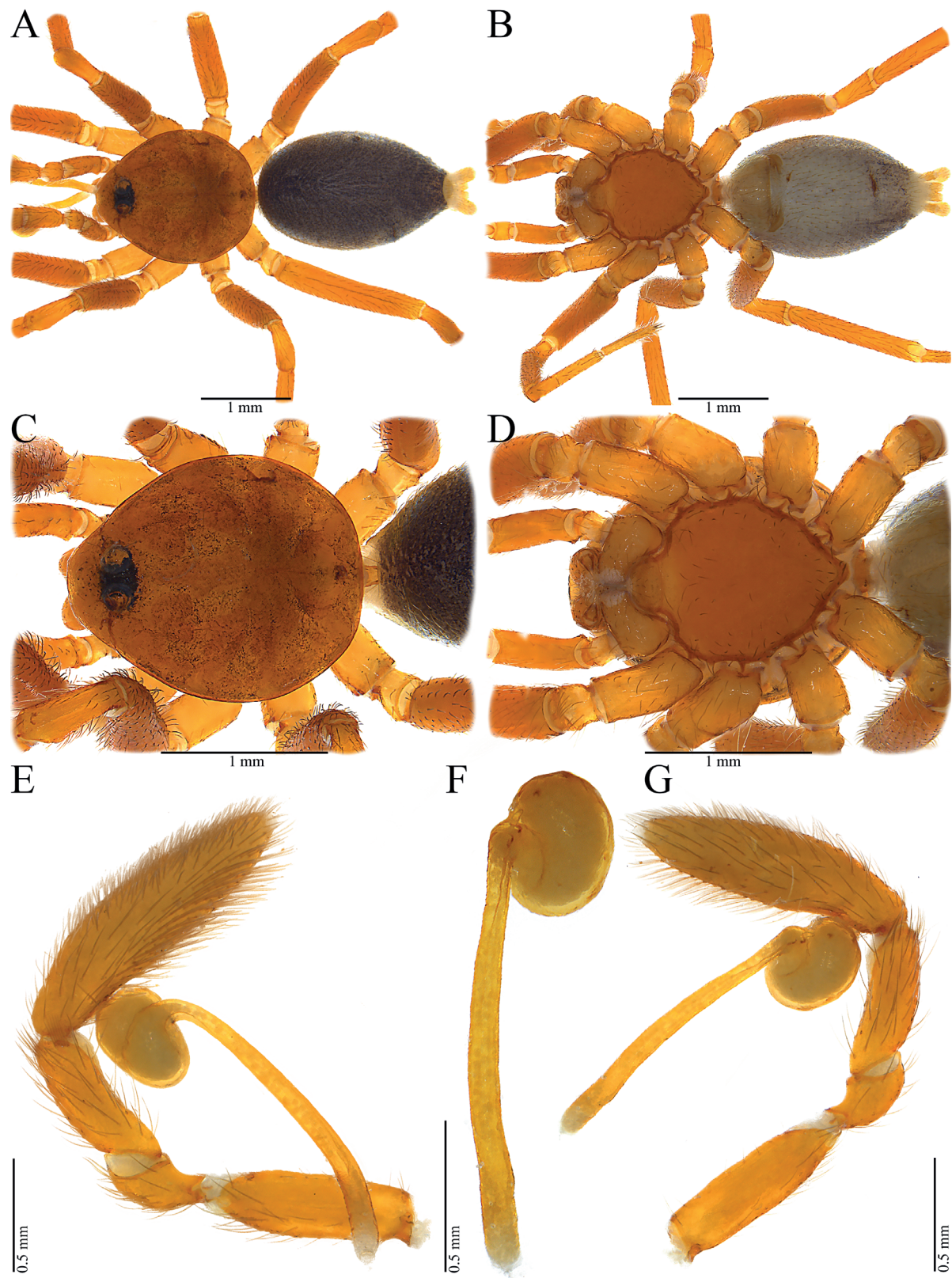


Fig. 5. *Nopsma putuime* sp. nov., ♂, holotype (MUSM-ENT 0507101). **A–B.** Habitus. **A.** Dorsal view. **B.** Ventral view. **C–D.** Prosoma. **C.** Dorsal view. **D.** Ventral view. **E.** Left palp, prolateral view. **F.** Copulatory bulb, retrolateral view. **G.** Left palp, retrolateral view.

Description

Male (holotype (MUSM-ENT 0507101))

COLORATION (Fig. 5A–D). Carapace orange-brownish with disperse dorsal pattern form by several black dots. Chelicerae, endites and labium light orange, sternum orange-brownish. Legs light orange. Abdomen dorsally dark gray, without noticeable pattern (Fig. 5A). Ventrally gray darker in edges. Spinnerets yellow.

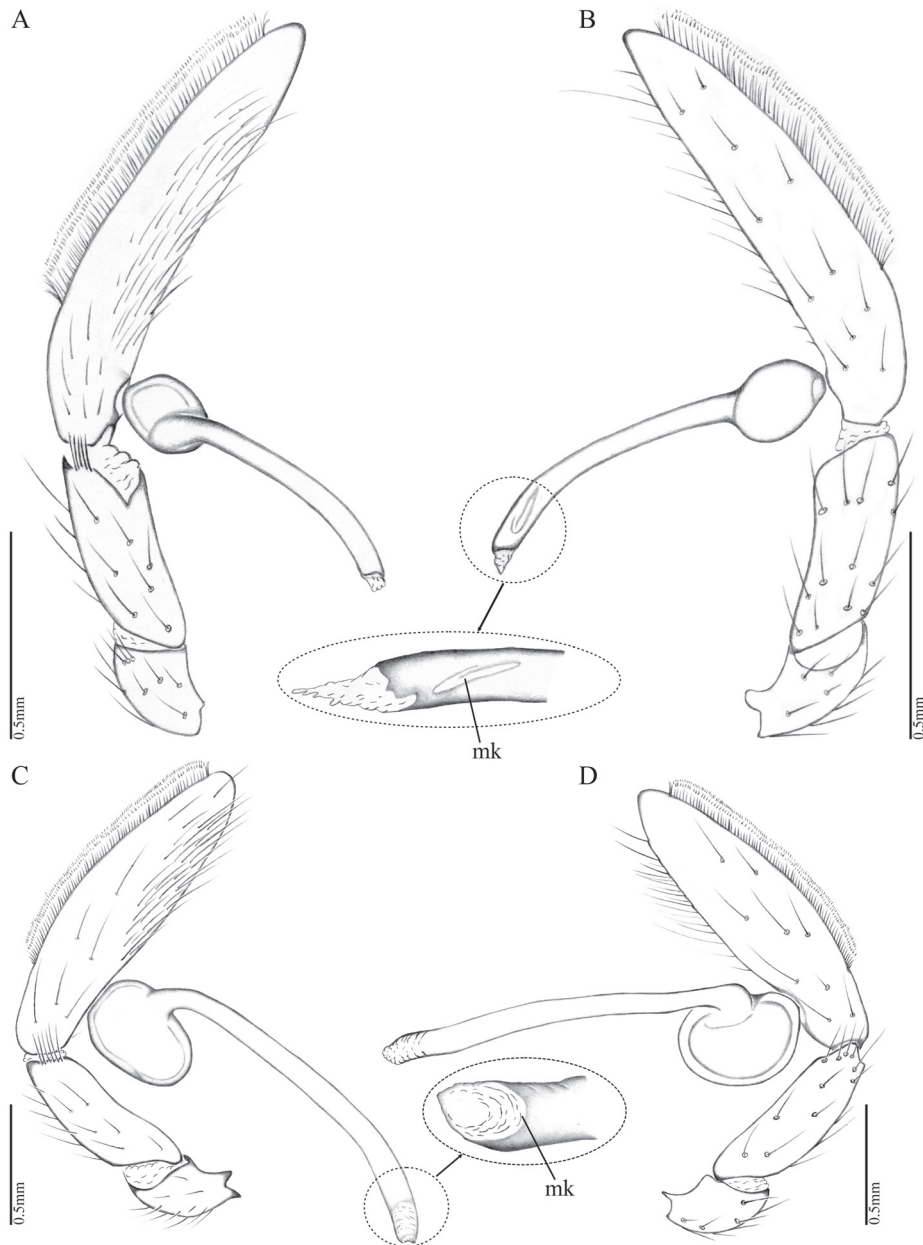


Fig. 6. A–B. *Nopsma nauta* sp. nov., ♂, holotype (MUSM-ENT 0506879). A. Left palp, prolateral view. B. Left palp, retrolateral view with embolus tip highlighted. C–D. *Nopsma putuime* sp. nov., ♂, holotype (MUSM-ENT 0507101). C. Left palp, prolateral view. D. Left palp, retrolateral view with embolus tip highlighted.

MEASUREMENTS. Total length 3.97, carapace length 1.78, width 1.48, height 0.46. Clypeus height 0.33. Eye diameters and interdistances: PME 0.18, PME–PME 0.38. Chelicerae length 0.55. Sternum length 1.15, width 1.02. Legs: I: 5.63; II: 3.42; III: 4.51; IV: 6.53. Abdomen length 2.14.

PALP. Tegulum oval, longer than width, embolus longer than palpal tibia, almost straight and widened from two thirds to end, membranous keel inconspicuous, restricted to tip (Figs 5E–G, 6C–D, 9E–F).

Female

Unknown.

Distribution

Known only for the type locality in Amazonas, Peru (Fig.10).

Nopsma rioja sp. nov.

urn:lsid:zoobank.org:act:FC949F61-94C6-446B-A0EA-70C6A5C5493A

Figs 7–8, 9G–H, 10

Diagnosis

Nopsma rioja sp. nov. is similar to *N. florencía*, by having the tegulum spherical, very small, up to $\frac{1}{5}$ the cymbium length, and embolus clearly longer than the palpal tibia, but can be distinguished by the dorsal carapace pattern form by large spots instead of small black dots, and the palpal embolus anteriorly directed (Sánchez-Ruiz *et al.* 2020: 483, fig.18c–d; Figs 7E–G, 8A–B).

Etymology

The specific epithet is a noun in apposition taken from the type locality.

Type material

Holotype

PERU • ♂; San Martín Department, Rioja, Bajo Naranjillo; 5°48'43.41" S, 77°20'24.43" W; 839 m a.s.l.; 27 Sep. 2009; W. Paredes and C. Albuja leg.; MUSM-ENT 0515822.

Description

Male (holotype (MUSM-ENT 0515822))

COLORATION (Fig. 7A–D). Carapace orange-brownish with a darker dorsal pattern. Chelicerae, endites and labium light orange, sternum orange-brownish. Legs orange. Abdomen dorsally gray, without noticeable pattern (Fig. 7A). Ventrally beige. Spinnerets beige.

MEASUREMENTS. Total length 4.13, carapace length 1.89, width 1.53, height 0.50. Clypeus height 0.39. Eye diameters and interdistances: PME 0.17, PME–PME 0.44. Chelicerae length 0.66. Sternum length 1.24, width 1.07. Legs: I: 6.51; II: 6.06; III: 5.22; IV: 7.72. Abdomen length 2.31.

PALP. Very small spherical tegulum, embolus longer than palpal tibia, membranous keel inconspicuous, restricted to final third (Figs 7E–G, 8, 9G–H).

Distribution

Known only for the type locality in San Martín, Peru (Fig. 10).

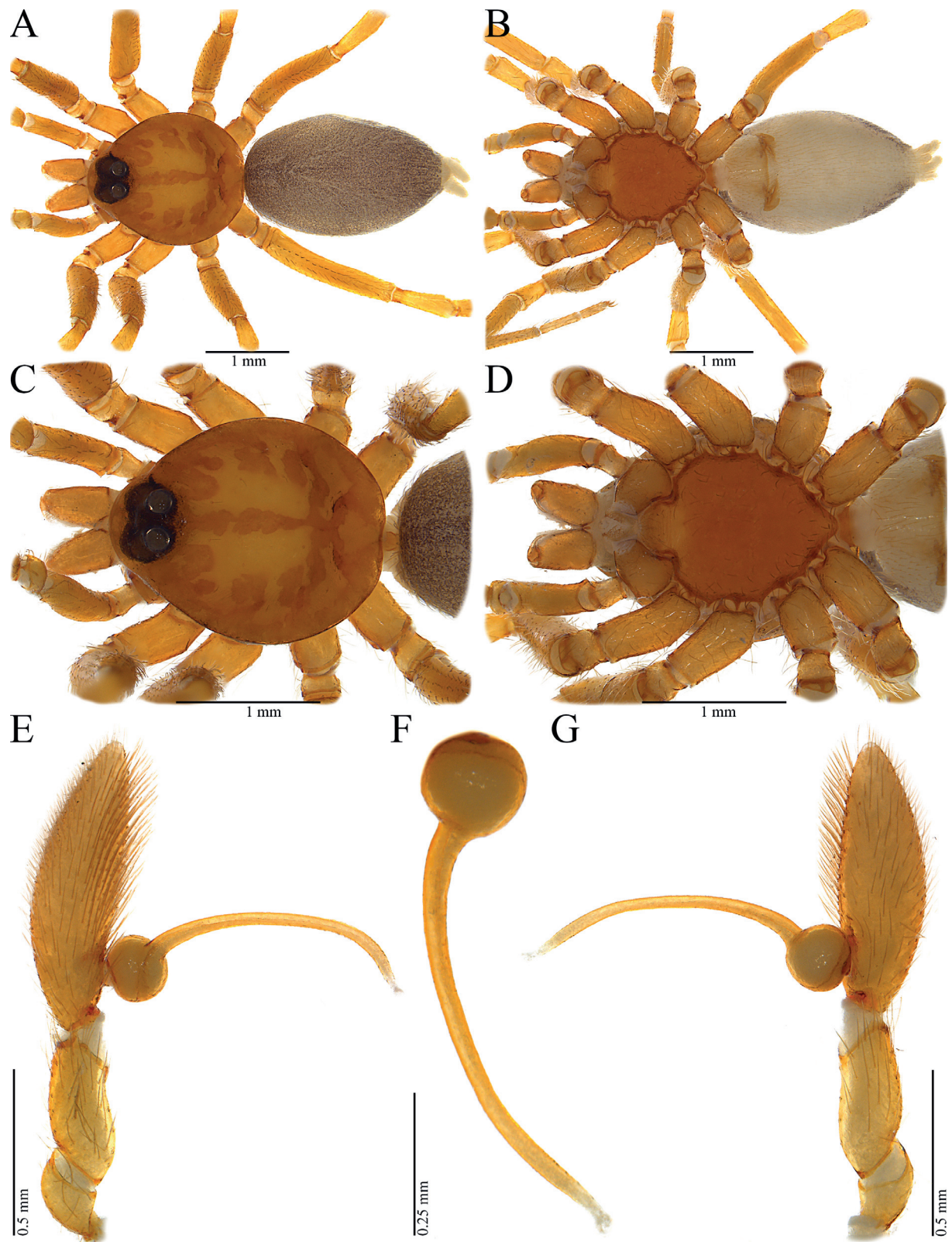


Fig. 7. *Nopsma rioja* sp. nov., ♂, holotype (MUSM-ENT 0515822). **A–B.** Habitus. **A.** Dorsal view. **B.** Ventral view. **C–D.** Prosoma. **C.** Dorsal view. **D.** Ventral view. **E.** Left palp, prolateral view. **F.** Copulatory bulb, retrolateral view. **G.** Left palp, retrolateral view.

Remarks

The genus *Nopsma*, with the new species described here, now comprises 11 species, distributed from Nicaragua to southern Peru. Peru harbors the highest diversity, with five species, followed by Colombia with four species, while Nicaragua and Ecuador each have one species.

The distribution of the genus currently falls into three main groups, separated by the Andean Mountain range: species distributed along the Pacific margin of South America (*N. florencía* and *N. juchuy*), species with an Amazonian distribution (the remaining species), and a Central American species, *N. armandoi*, which occurs in Nicaragua. The genus has always been recorded in lowland areas below 1000 m a.s.l. The highest record is *N. rioja* sp. nov., found in San Martín, Peru, at 839 m a.s.l., although the greatest diversity is observed at elevations ranging from 69 to 320 m a.s.l.

Acknowledgments

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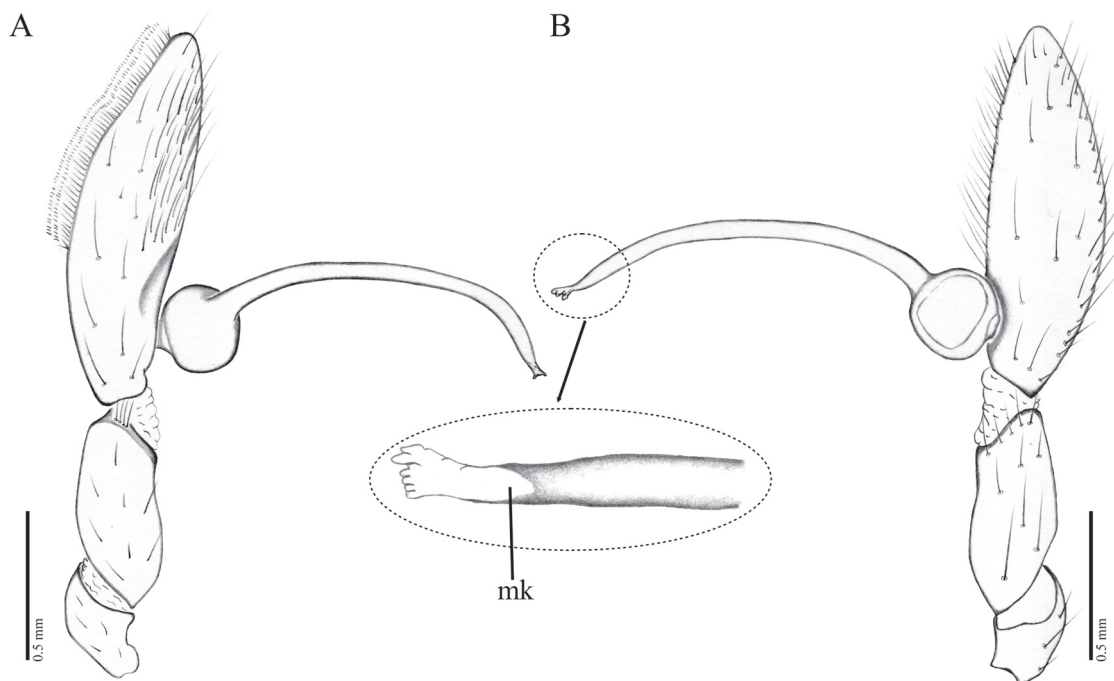


Fig. 8. *Nopsma rioja* sp. nov., ♂, holotype (MUSM-ENT 0515822). **A.** Left palp, prolateral view. **B.** Left palp, retrolateral view with embolus tip highlighted.

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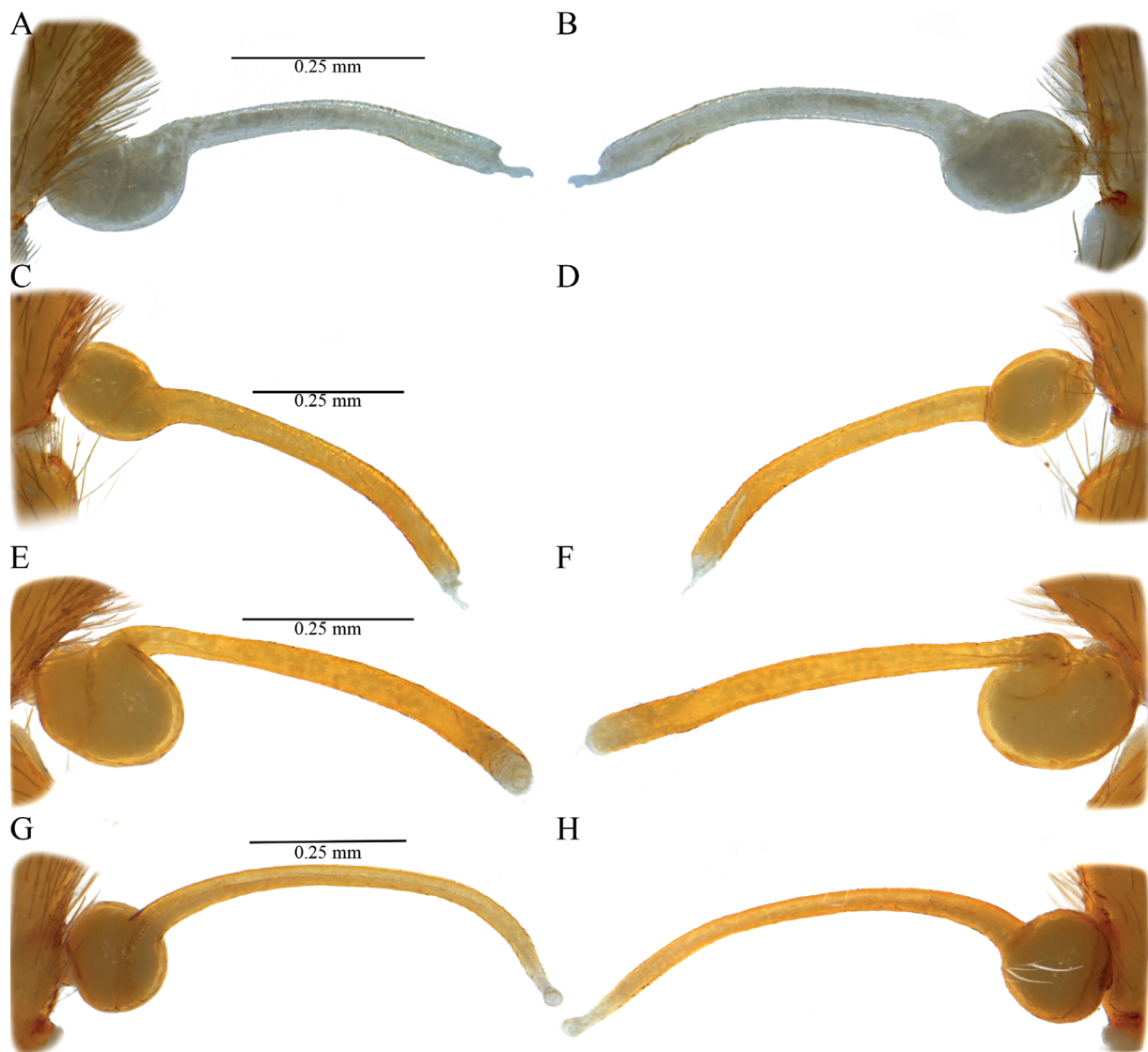


Fig. 9. Male copulatory bulbs of species of *Nopsma*. **A–B.** *Nopsma miraflores* sp. nov., holotype (MUSM-ENT 0507358). **C–D.** *Nopsma nauta* sp. nov., holotype (MUSM-ENT 0506879). **E–F.** *Nopsma putuime* sp. nov., holotype (MUSM-ENT 0507101). **G–H.** *Nopsma rioja* sp. nov., holotype (MUSM-ENT 0515822). **A, C, E, G.** Retrolateral view. **B, D, F, H.** Prolateral view. Scale bars: 0.25 mm.

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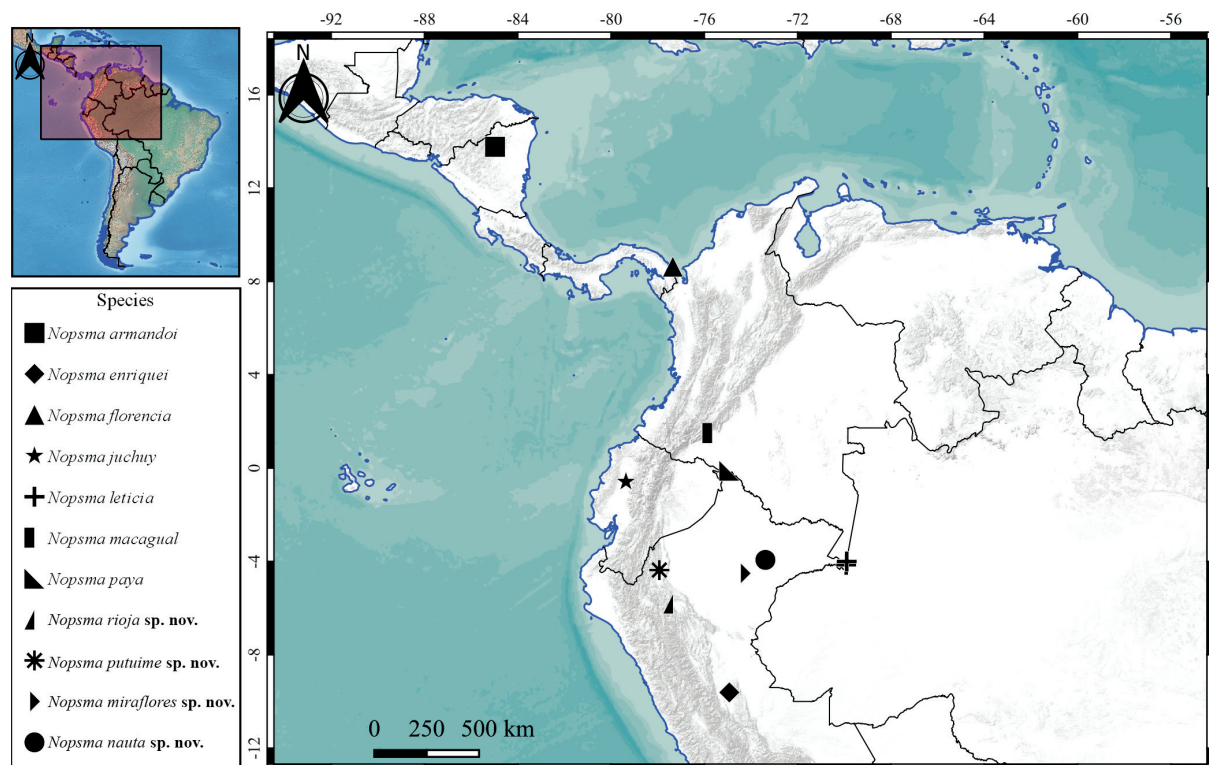


Fig. 10. Distribution of the species of *Nopsma* Sánchez-Ruiz, Brescovit & Bonaldo, 2020.

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