Arachnology (2017) **17** (4), 176–182

A new six-eyed sand spider *Sicarius* Walckenaer, 1847 (Araneae: Haplogynae: Sicariidae) from Colombia, with information on its natural history

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Abstract

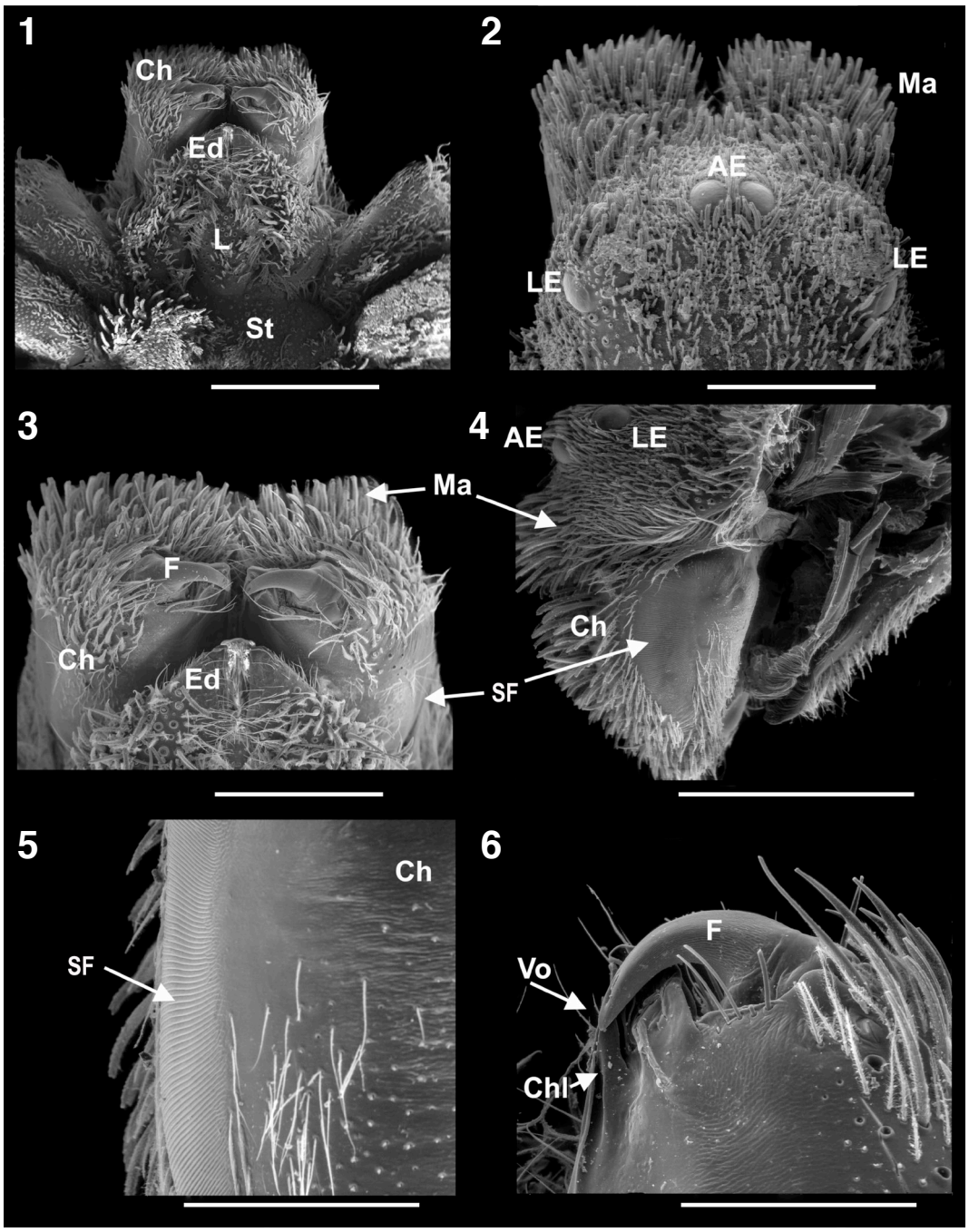
We describe a new species of the genus *Sicarius* Walckenaer, 1847 (Sicariidae), *S. vallenato* sp. nov., from the tropical dry forest in Valledupar and La Guajira, Colombia, representing the first species of the genus from Colombia. The new species is diagnosed from other species of the genus, and compared in detail.

Keywords: caves • dry forest • Neotropics

Introduction

The genus *Sicarius* Keyserling, 1880 (six-eyed sand spiders) currently includes 25 species found in the xeric environments of southern Africa and South and Central America, mostly in deserts and seasonally dry tropical forests (Binford *et al.* 2008; Magalhães *et al.* 2013; Werneck 2011; World Spider Catalog 2017). *Sicarius* are commonly called six-eyed sand spiders in reference to their habit of burying and covering the body with fine particles of sand (Duncan, Autumn & Binford 2007). Unlike the related recluse spiders (*Loxosceles* Heineken & Lowe, 1832) little is known about the effects of *Sicarius* bites. However, it is known that the venoms of some species in Africa cause serious dermonecrotic lesions (Alegre, Meneses & Aguilar 1977; Binford, Bodner & Cordes-Matthew 2009; Newlands & Atkinson 1990; Van Aswegen *et al.* 1997).

Simon (1893, 1903) transferred *Thomisoides rubripes* (Nicolet, 1849), *T. fumosa* (Nicolet, 1849), *T. lanuginosa* (Nicolet, 1849), *T. minorata* (Nicolet, 1849), *T. gracilis* (Keyserling, 1880), *T. nicoletii* (Keyserling, 1880), *T. peruensis* (Keyserling, 1880), *T. terrosa* (Nicolet, 1849), *T. utriformis* (Butler, 1877), and *Sicarioides rugosus* (F. O. Pickard-Cambridge, 1899), to *Sicarius* Walckenaer, 1847. Later, other authors transferred and described additional species (see Tullgren 1901; Strand 1908; Simon 1919; Lins-Duarte



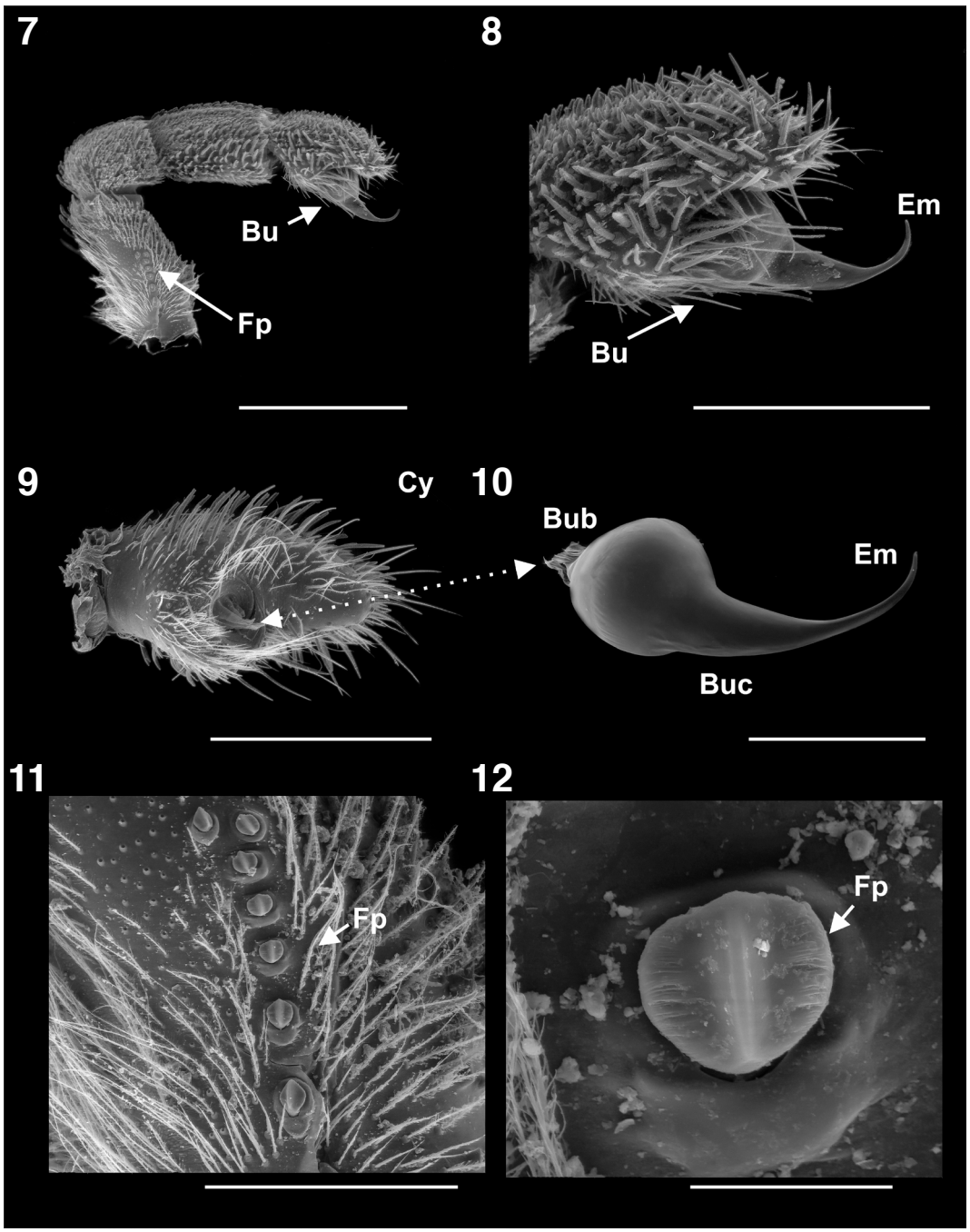
Figs. 1–6: Scanning electron microscope images of *Sicarius vallenato* sp. nov., male paratype from Besotes, Valledupar (ICN-Ar8071). **1** prosoma, ventral view; **2** prosoma, dorsal view; **3–4** prosoma, ventral and lateral views, arrows indicate in border of chelicera and cheliceral stridulatory file; **5** stridulatory file on the chelicera; **6** chelicera, retromarginal view, arrows indicate apex of cheliceral lamina and venom outlet. Abbreviations: AE, anterior eyes; Ch, chelicera; ChL, apex of cheliceral lamina; Ed, endite; F, fang; LE, lateral eyes; L, labium; Ma, macroseta; SF, stridulatory file; St, sternum; VO, venom outlet. Scale bars = 2 mm (1, 4), 1 mm (2–3), 500 µm (5–6).

1973). Taxonomic and systematic work on the genus is constantly being updated (Ramírez 2000; Binford & Wells 2003; Binford *et al.* 2008; Binford, Bodner & Cordes-Matthew 2009; Zobel-Thropp, Bodner & Binford 2010; Lotz 2012; Magalhães *et al.* 2013).

Magalhães *et al.* (2013) conducted the most recent study of *Sicarius* in South America. They described *Sicarius cariri* Magalhães *et al.* 2013, *S. diadorim* Magalhães *et al.* 2013, *S. ornatus* Magalhães *et al.* 2013, and designated a neotype of *Sicarius tropicus* (Mello-Leitão, 1936). The aim of this study is to describe the first species of *Sicarius* known from Colombia and provide basic data on its natural history.

Material and methods

Specimens were preserved in 96% ethanol. The extracted female genitalia were observed after digestion in potassium hydroxide (KOH). Measurements are expressed in mm and were preferentially taken on the left side of specimens. Female spermathecae were photographed using a Nikon Head DS-SI1 digital camera mounted on a Nikon 4024913 microscope. Multi-focal image using Combine ZP (Hadley 2010). Material for scanning electron microscopy was prepared following Magalhães *et al.* (2013): specimens were dried under an incandescent light bulb, attached to metallic stubs using either adhesive copper tape or carbon



Figs. 7–12: Scanning electron microscope images of *Sicarius vallenato* sp. nov., male paratype from Besotes, Valledupar (ICN-Ar8071), left palp, prolateral view. Arrows indicate femoral picks and palpal bulb. **7** whole palp; **8** detail of bulb and cymbium; **9** cymbium, ventral view; **10** bulb and embolus; **11** row of femoral picks; **12** single femoral pick. Abbreviations: Bu, palpal bulb; Bub, bulb base; Buc, bulb body; Cy, cymbium; Em, embolus; Fp, femoral picks. Scale bars = 2 mm (7), 1 mm (8, 9), 500 µm (10, 11), 50 µm (12).

stickers and sputter-coated (Q150R) with 10 nm of gold. Images were made in a QUANTA-200-FEI microscope at Laboratorio de Microscopia Electronica de Barrido, UNAL.

Specimens collected were georeferenced *in situ* using a GPS and indicated in the examined material lists. The map was prepared in the Geographic Information System QGIS Essen version 2.14 (http://qgis. org/es/site/index. html), with raster files from DIVA-GIS© (http://www. diva-gis. org/gdata).

General morphological terminology and abbreviations follows Magalhães *et al.* (2013): AE, anterior eyes; BC, bursa copulatrix; Bu, palpal bulb; Bub, Bulb base; Buc, Bulb body; Ch, chelicera; ChL, apex of the cheliceral lamina; Cy, cymbium; E, eye; Ed, endite; SF, stridulating files; Em, embolus; EF, epigastric furrow; F, fang; Fp, femoral picks; GD, gland 'ductless'; L, labium; LE, lateral eyes; M, dorsal membrane; Ma, macroseta; PME, posterior median eyes; PL, cheliceral promarginal lobe; S, spermathecae; St, sternum; Tr, trachea; VO, venom outlet.

Examined specimens are deposited in the following taxonomic collections (curators indicated in parentheses): ICN, Colección aracnológica, Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá, Colombia (E. Flórez); MACN, Museo Argentino de Ciencias Naturales, Buenos Aires, Argentina (M. Ramírez); MCZ, Museum of Comparative Zoology, Harvard University, USA (G. Giribet).

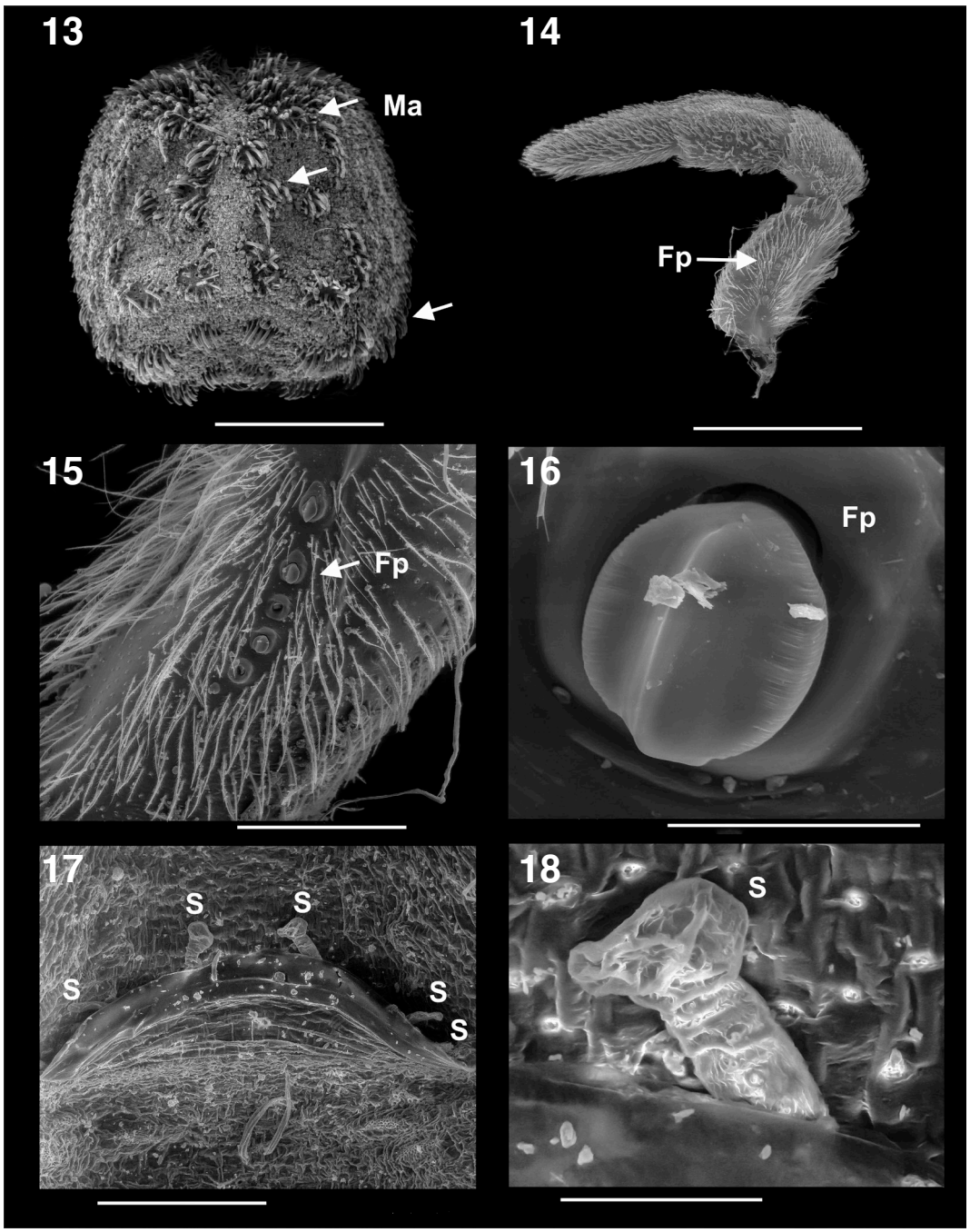


Fig. 13–18: Scanning electron microscope images of *Sicarius vallenato* sp. nov., female paratype from Besotes, Valledupar (ICN-Ar8071). **13** abdomen, dorsal view, arrows indicate central groups of macrosetae and macrosetae in the lateral border of the abdomen; **14–16** right palp, prolateral view, arrows indicate femoral picks; **17–18** female genitalia, cleared, dorsal view. Abbreviations: Fp, femoral picks; S, spermathecae. Scale bars = 2. 0 mm (13–14), 100 µm (18), 500 µm (15, 17), 50 µm (16).

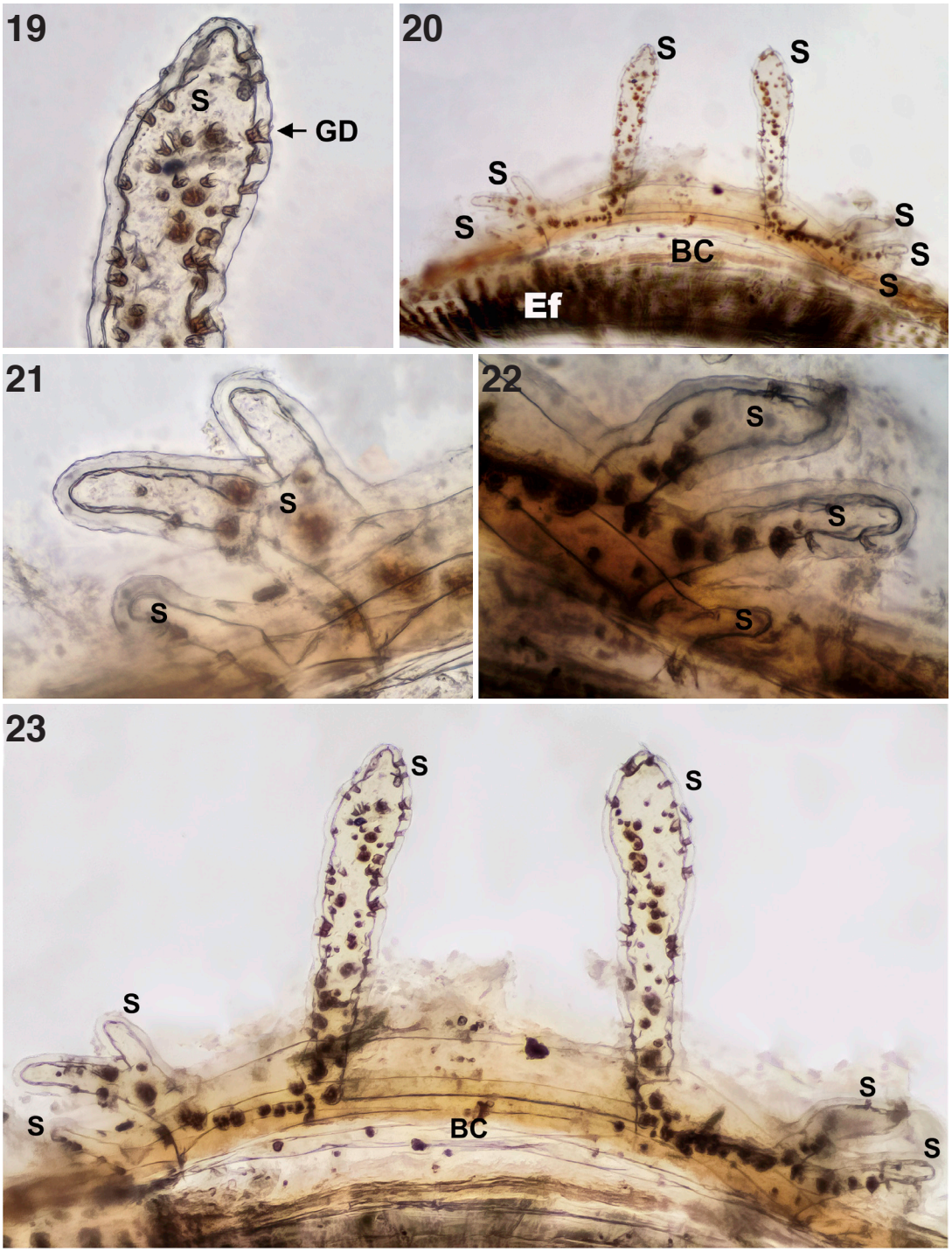
Sicariidae Keyserling, 1880

***Sicarius* Walckenaer 1847**

***Sicarius vallenato* sp. nov.** (Figs. 1–26)

Type Material: Holotype male from COLOMBIA: Cesar, Valledupar, Eco-parque 'Los Besotes', Sendero 'Bebedero del Tigre', Sierra Nevada de Santa Marta, 10°34′30.8″N 73°15′59.69″W, 29 July 2015, coll. CarBio (ICN-Ar8070). Paratype: 1♀, same data as holotype (ICN-Ar8070), 3♂♂, 2♀♀, 7 imm., same data as holotype (ICN-Ar8071).

Additional material examined: COLOMBIA: La Guajira, Barrancas; Corregimiento San Pedro, Cueva del Santo, 10° 52′31.1″N 72°45′25.2″W, 220 m a.s.l., 24 May 2015, coll. M. A. Gutiérrez-Estrada and A. Gonzalez-Vargas; 3♂♂, 2♀♀, 5 imm. (ICN-Ar8072). COLOMBIA: La Guajira, El Molino, Manantial; Tropical dry forest, 10°38′48.7″N 72°54′42.2"W, 259 m a.s.l., 19 November 2015, coll. M. A. Gutiérrez-Estrada; 8♂♂, 4♀♀, 4 imm. (ICN-Ar8073). La Guajira, El Molino, Manantial; Tropical dry forest, 10°38′48.7″N 72°54′42.2″W, 259 m a.s.l., 19 November 2015, coll. M. A. Gutiérrez-Estrada; 1♂, 1♀, 1 imm. (MCZ). La Guajira, El Molino, Manantial; Tropical dry forest, 10°38′48.7″N 72°5′42.2″W, 259 m a.s.l., 19 November 2015, coll. M. A. Gutiérrez-Estrada; 1♂, 1♀, 1 imm. (MACN).

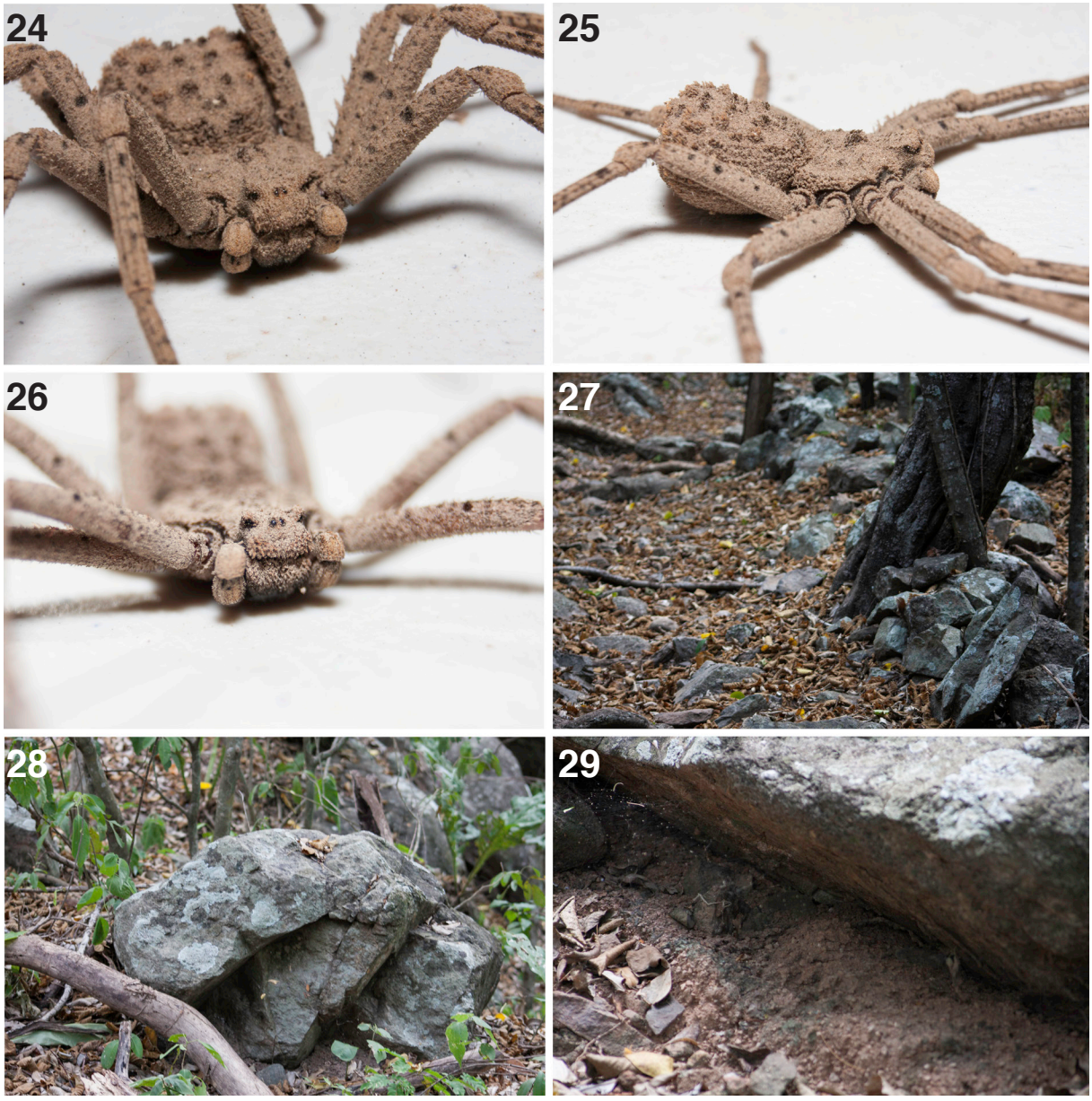


Figs. 19–23: *Sicarius vallenato* sp. nov., spermathecae of female paratype from Besotes, Valledupar (ICN-Ar8070). Abbreviations: BC, bursa copulatrix; Ef, epigastric furrow; GD, gland 'ductless", S, spermathecae.

Etymology: The species epithet is a noun in apposition referring to the Vallenato, folk music of Valledupar, Cesar department and La Guajira department, Colombia.

Diagnosis: The male of *S. vallenato* sp. nov. is similar to that of *S. rugosus* (F. O. Pickard-Cambridge, 1899) (see Lehtinen 1986:156, fig. 7) by the curved bulb body, but can be distinguished by the shorter embolus, which forms an almost obtuse angle in relation to the rest of the bulb (forming an almost right angle in relation to the rest of the bulb in *S. cariri* and *S. diadorim*, and parallel in *S. tropicus*, see Magalhães *et al*. 2013), not modified at tip, and length of cymbium more than half of length of the tibia (Figs. 7–8, 10). Females differ from the other species by having seven non-convoluted branches in the spermathecae (typically 12 or fewer in *S. cariri*, 16 or more in other species, see Magalhães *et al*. 2013), with the two central branches parallel to the main body axis and notably larger than the lateral ones (Figs. 17–23).

Description of male holotype (ICN-Ar8070): Coloration and general appearance as described by Magalhães *et al*. (2013) for the genus. Carapace and chelicera reddish-brown; sternum brownish-orange; endites brown; labium brown; legs yellowish orange; opisthosoma brownish-grey, lightly colored. Total length 11.6. Carapace 5.7 long, anterior width 2.4, thoracic region 5.5 wide. Clypeus 1.1 high. Eyes diameters and interdistances: ALE 0.23, PME 0.21, PLE



Figs. 24–29: Living *Sicarius vallenato* sp. nov., from Ecoparque Los Besotes, Valledupar, Colombia, and habitats where it has been found. **24–25** female; **26** male; **27–29** typical habitats of *S. vallenato*.

0.2; ALE-PLE 0.4, PME-ALE 0.85. Leg measurements: I: femur 7.0/ patella 2.3 / tibia 8.5 / metatarsus 6.4 / tarsus 2.4 / total 26.6; II: 8.1 / 2.1 / 8.6 / 6.4 / 2.4 / 27.6; III: 7.5 / 1.9 / 7.1 / 5.9 / 2.3 / 24.7; IV: 7.4 / 1.9 / 7.0 / 6.2 / 2.3 / 24.8. Leg formula: 2143. Sternum 2.3 long, 3.0 wide. Abdomen, 6.0 long, 5.2 wide. Palpal femur 1.75 long / patella 0.85 long /tibia 1.5 long/ cymbium 1.05 long; bulb body 0.43 long, 0.43 wide. Seven picks on palpal femur. Femur II 1.4× longer than carapace and 3.7× longer than patella. Palpal femur 1.9× longer than patella. Palp as in Figs. 7–10.

Female paratype (ICN-Ar8070, Valledupar, Besotes): Coloration and general appearance as male. Total length 12.7. Carapace 5.7 long, anterior width 2.3, thoracic region width 5.6. Clypeus 1.3 high. Eye diameters: ALE 0.25, PME 0.2, PLE 0.23, ALE–PLE 0.65, PME–ALE 0.82. Leg measurements: I: femur 6.2 / patella 2.1 / tibia 6.7 / metatarsus 5.3 / tarsus 2.3 / total 22.6; II: 6.8 / 2.1 / 6.6 / 5.1 / 2.1 / 22.7; III: 6.2 / 2.1 / 5.6 / 4.1 / 2.0 / 20.0; IV: 6.5 / 2.0 / 5.4 / 4.6 / 2.1 / 20.6. Leg formula: 2143. Sternum 2.2 long, 3.2 wide. Abdomen 7.5 long, 6.5 wide. Palpal femur 2.0 long, 0.9 wide, patella 1.1 long 0.8 wide, tibia 1.4 long 0.9 wide, tarsus 1.7 long, 0.7 wide. Five picks on the palpal femur. Femur II 1.09× longer than carapace. Spermathecae as in Figs. 17–23.

Variation: Carapace length: males 4.2–6.9 (n = 16), females 5.1–6.2 (n = 9). Femur II: males 6.1–10.0 (n = 16), females 6.1–7.4 (n = 9). Picks on the palpal femur: 5–7.

Natural history (Figs. 24–29): Specimens of *Sicarius vallenato* sp. nov. were found under sand, close to rock, logs, and termite nests in tropical dry forest of the Los Besotes area, northeastern Sierra Nevada de Santa Marta. This species is also known from the Cueva del Santo cave and tropical dry forest of the Manantial area, in the central valley between the Sierra Nevada de Santamarta and Serranía del Perijá. The del Santo cave is surrounded by fragmented secondary forest. The species lives sympatrically with *Scytodes* (Scytodidae), *Loxosceles* (Sicariidae), and scorpions of the families Buthidae and Hormuridae.

Distribution: *Sicarius vallenato* sp. nov. is known from northeastern Colombia, in the municipality of Valledupar, Barrancas and El Molino (Fig. 30).

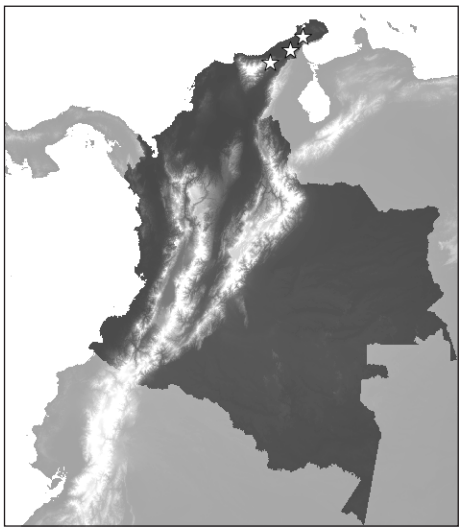


Fig. 30: Map showing the geographical distribution of *Sicarius vallenato* sp. nov. in Colombia.

Acknowledgments

We are very grateful to the entire Colombian CarBio team for their help during the sampling and support. We are grateful for the collaboration of the Dr. Tomas Dario Gutierrez and rangers of the Ecoparque 'Los Besotes', Valledupar, Colombia and Dr. Claudia Henriquez Iguaran and Dr. Jorge Luis Lopez Ibarra. Funding came from National Science Foundation (DEB-1314749-1050187-1050253) to IA and G. Binford.

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