2019. Journal of Arachnology 47:77–83

Revision of the spider genus *Rishaschia* Makhan, 2006 (Araneae: Salticidae)

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Abstract. *Attus mandibularis* Taczanowski, 1871, *Attus cabanisi* Taczanowski, 1872 and *Asaracus roeweri* Caporiacco, 1947 are here transferred to *Rishaschia* Makhan, 2006. After the study of type specimens and additional material, these taxa, along with the type species *Rishaschia amrishi* Makhan, 2006, are all considered variations within a single species. Herein, the male is redescribed and the correct female is formally described for the first time. The coiling of the embolus around the tegulum varies continuously from 450° to 540°, even at the same locality. Distribution records are given, showing the presence of the species in the Amazon forest from the coast of the Atlantic Ocean to the foothills of the Andes.

Keywords: Aelurillini, Freyina, taxonomy

The Salticidae is the largest of the spider families (World Spider Catalog 2018) and has recently been the target of a complete re-classification (Maddison 2015), which introduced the concept of Linnean tribes into the systematics of jumping spiders. Despite the large number of salticid species, the morphological simplicity of their reproductive organs and historical geographical bias have together led to artificial groupings since the first attempts at classification (Peckham et al. 1889; Banks 1892; F.O. Pickard-Cambridge 1900; Simon 1901, 1903). The new classification is built upon a strong molecular phylogenetic foundation and is well-supported by morphology, and incorporated a thoroughly representative sample of jumping spiders from around the world (Maddison 2015; Maddison et al. 2017). The subfamily Salticinae includes over 90% of all known species in almost 30 tribes. One of these tribes — the Aelurillini Simon, 1901 — includes the Freyina Edwards, 2015 and two other subtribes.

Freyina was recently proposed as a subfamily to include a diverse group of Neotropical jumping spiders (Edwards 2015), but was later reduced to a subtribe in the phylogenetic re-classification by Maddison (2015). Presently, the Freyina includes 27 genera (Edwards 2015; Ruiz & Bustamante 2016), some already sampled in molecular studies and others included in the subtribe based on shared morphology. *Rishaschia* Makhan, 2006 is one of the genera that have been sampled in these phylogenetic reconstructions. Maddison et al. (2008: fig. 8) found *Rischaschia* nested in a strongly supported clade with *Freya* C.L. Koch, 1850, *Kalcerrytus* Galiano, 2000 and what the authors identified as *Chira* Peckham & Peckham, 1896, all considered freyines by Edwards (2015).

Rishaschia includes jumping spiders found on vegetation in the Amazon forest. Presently, the genus is monotypic (World Spider Catalog 2018), but other species were described in different genera and await revision. The aim of this contribution is to review the nominal species of this poorly known genus, and provide redescriptions and illustrations of the male and female that can help arachnologists determine the species and evaluate its morphology for future studies.

METHODS

The material examined belongs to collections of the following institutions: Instituto Butantan, São Paulo, Brazil (IBSP); Museu Paraense Emílio Goeldi, Belém, Brazil (MPEG); Polska Akademia Nauk, Łomna, Poland (PAN); Museo Zoologico de "La Specola", Firenze, Italy (MZLS); Beaty Biodiversity Museum, University of British Colombia, Vancouver, Canada (UBC); Department of Entomology, University of Suriname, Paramaribo, Suriname.

Images of preserved specimens, including male palps, were taken with a Leica DFC450 camera attached to a Leica M205 A microscope, and compiled with Leica Application Suite version 4.2, to maximize overall focus. Drawings of male palps and the external view of the epigyne were made using a drawing tube attached to a microscope. The internal structures of the palp and epigyne were observed after clearing them in clove oil. Measurements are in millimeters, and macrosetae notation follows Petrunkevitch (1925). Abbreviation: RTA, retrolateral tibial apophysis.

TAXONOMY

Subfamily Salticinae Blackwall, 1841
Tribe Aelurillini Simon, 1901
Subtribe Freyina Edwards, 2015
Genus *Rishaschia* Makhan, 2006

Rishaschia Makhan, 2006: 11.

Type species.—*Rishaschia amrishi* Makhan, 2006, by original designation.

Rishaschia mandibularis (Taczanowski, 1871), comb. nov.
(Figs. 1–5)

Attus mandibularis Taczanowski, 1871: 49. NB. Considered a *nomen dubium* by World Spider Catalog, 2018.
Attus cabanisii Taczanowski, 1872: 66. NB. Considered a *nomen dubium* by World Spider Catalog, 2018. **NEW SYNONYMY**
Asaracus röweri Caporiacco, 1947: 32; Caporiacco, 1948: 715, figs. 145–146. **NEW SYNONYMY**
Asaracus roeweri Caporiacco: Roewer, 1955: 1068.
Salticus cabanisi (Taczanowski): Roewer, 1955: 1421.
Salticus mandibularis (Taczanowski): Roewer, 1955: 1426.
"Unident. (Ec.)" Maddison & Hedin, 2003: 547, figs. 1, 3–5.

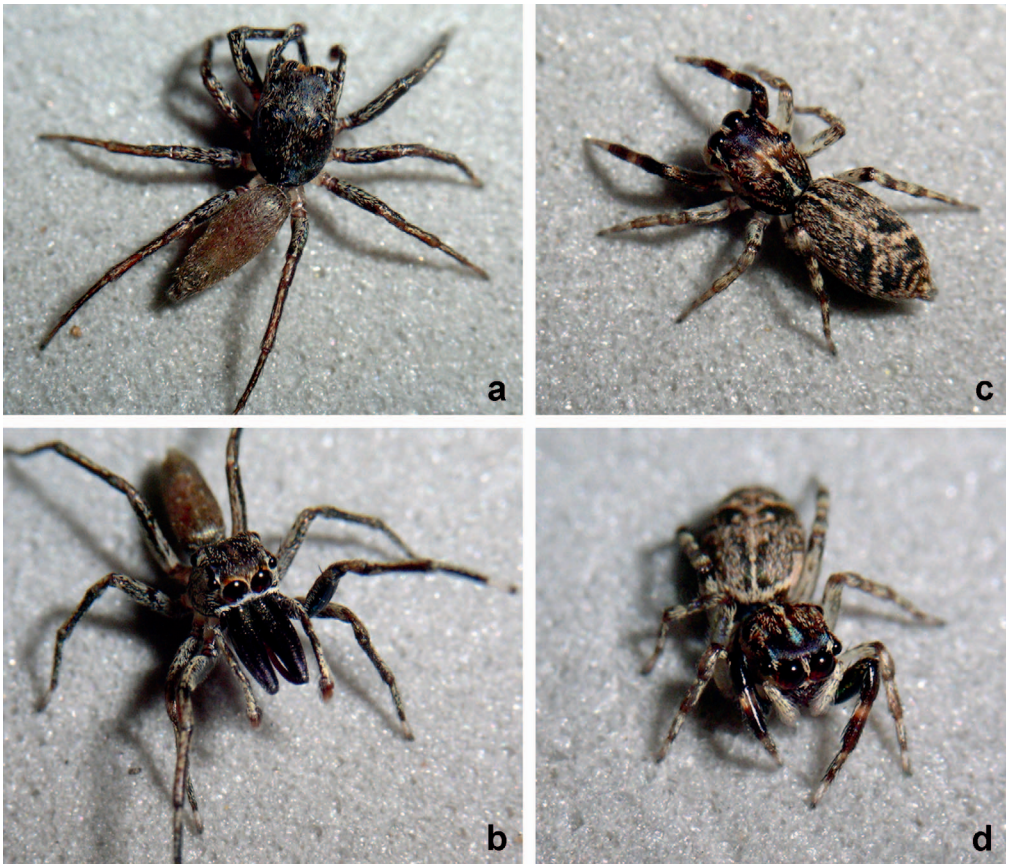

Figure 1.—*Rishaschia mandibularis*: **a.** Male from Belém, Pará, Brazil, dorsal view. **b.** Same, anterodorsal view. **c.** Female from same locality, dorsal view. **d.** Same, anterodorsal view (© W. Maddison, under a Creative Commons Attribution 4.0 International license).

Rishaschia amrishi Makhan, 2006: 11, figs. 11–17; Edwards, 2015: 60, figs. 26A–G. **NEW SYNONYMY**
Rishaschia "sp. (Ecu.)" Maddison et al., 2008: 50, figs. 8, 11. "Salticidae gen. 1 (part)" Rego et al., 2009: 94.

Type material (of *A. mandibularis*).—*Lectotype male (here designated)*. **BRAZIL: *Amapá*:** Rio Uaçá [formerly Uassa, French Guiana; see discussion about this locality in Ruiz & Bustamante 2016], R. Jelski (deposited in PAN; examined). NB. Mismatched female paralectotype also in the vial.

Type material (of *A. cabanisii*).—*Syntypes*. **BRAZIL: *Amapá*:** 2 ♂, 1 juvenile, Rio Uaçá [formerly Uassa, French Guiana; see discussion about this locality in Ruiz & Bustamante 2016], R. Jelski (deposited in PAN, examined).

Type material (of *A. röweri*).—*Holotype male*. **GUYANA:** Two Mouths, Esequibo River, 9 July 1936 (deposited in La Specola 571; examined).

Type material (of *R. amrishi*).—*Holotype male*. **SURINAME:** Suriname district (sic), 30 June 1990, D. Makhan (deposited in University of Suriname; not examined).

Other material examined.—**ECUADOR: *Sucumbíos*:** 1 ♂, 2 ♀, Cuyabeno Wildlife Reserve, W.P. Maddison (UBC; examined by photographs). **BRAZIL: *Amazonas*:** 6 ♂, 4 ♀, Barcelos, Rio Demeni, Lago Tabatinga, 0.176389°S, 62.79°W, 22 August 2008, A.A. Nogueira (INPA); 3 ♂, 3 ♀, Lago Alubiá, 0.3225°S, 62.766111°W, 20 August 2008, A.A. Nogueira (INPA); 1 ♂, São Paulo de Olivença, Rio Camatiã, Lago Sakambu, 3.477°S, 69.05°W, 13 September 2003, E.M. Venticinque & F.N.A.A. Rego (INPA); 1 ♀, Juruá, Ilha da Consciência, 2.603°S, 65.774°W, 19 September 2003, E.M. Venticinque & F.N.A.A. Rego (INPA); 1 ♀, Igapó Tarumã-Mirim, 3°S, 60.161°W, 04 October 1987, R.K.B. (INPA); 1 ♂, 3 ♀, Itacoatiara, Ilha do Januário, 3.181°S, 59.309°W, 08 November 2003, F.N.A.A. Rego & A.C. Rheims (IBSP); 1 ♀, Lago Compridão, 3.175°S, 59.311°W, 08 November 2003, F.N.A.A. Rego & A.C. Rheims (IBSP); 1 ♂, Camitaum, 3.319°S, 58.724°W, 06 November 2003, F.N.A.A. Rego & A.C. Rheims (IBSP); 2 ♂, Urucurituba, Ilha Grande Cucuiari, 2.782°S, 57.917°W, 05 November 2003, F.N.A.A. Rego & A.C. Rheims (IBSP); 1 ♂, 1 ♀, Urucará, Cachorra, 2.426°S, 57.503°W, 03 November 2003, F.N.A.A. Rego & A.C. Rheims (IBSP); 1 ♂, 11 ♀, Socoró, 2.476°S, 57.488°W, 03 November 2003, F.N.A.A. Rego & A.C. Rheims (IBSP); 1 ♂, 1 ♀, Quitéria, 2.397°S, 57.515°W, 03 November 2003, F.N.A.A. Rego & A.C. Rheims (IBSP); 1 ♂, 8 ♀, Parintins, Catuaba, 2.542°S, 56.546°W, 01 November 2003, F.N.A.A. Rego & A.C. Rheims (IBSP); 3 ♀, Lago do Celso, 2.540°S, 56.532°W, 01 November 2003, F.N.A.A. Rego & A.C. Rheims (IBSP); 1 ♀, Ilha do Meio, 2.522°S, 56.529°W, 01 November 2003, F.N.A.A. Rego & A.C. Rheims (IBSP). ***Pará*:** 4 ♀, Juruti, Moscau, 2.090°S, 55.946°W, 31 October 2003, F.N.A.A. Rego & A.C. Rheims (IBSP); 4 ♂, 8 ♀, Óbidos, Ilha Grande,

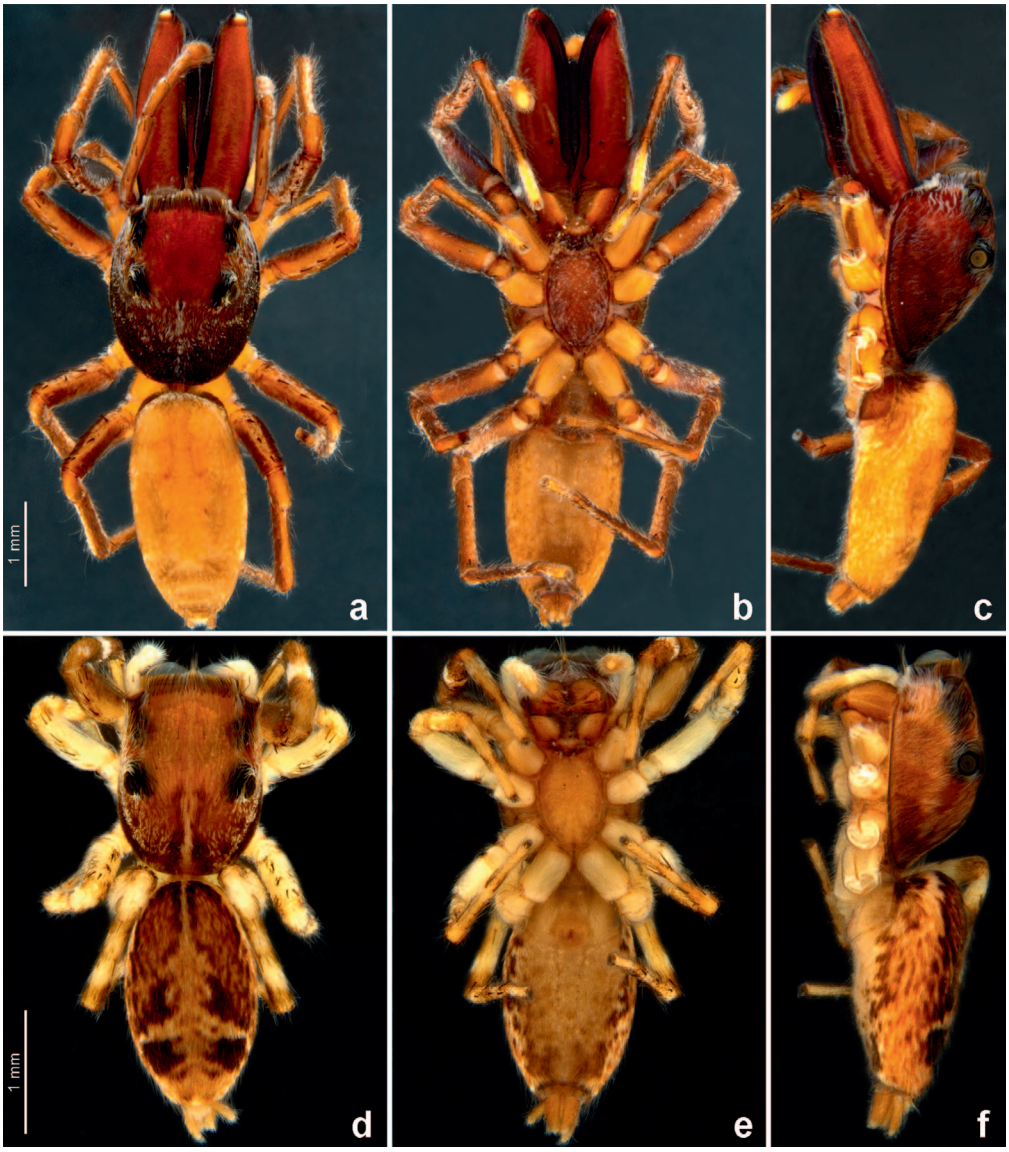

Figure 2.—*Rishaschia mandibularis*: **a.** Male from Juruti, Pará, Brazil, dorsal view. **b.** Same, ventral view. **c.** Same, lateral view (left palp and legs removed). **d.** Female from same locality, dorsal view. **e.** Same, ventral view. **f.** Same, lateral view (left palp and legs removed).

2.098°S, 55.299°W, 29 October 2003, F.N.A.A. Rego & A.C. Rheims (IBSP); 1 ♂, 1 ♀, Januária, 2.090°S, 55.275°W, 30 October 2003, F.N.A.A. Rego & A.C. Rheims (IBSP); 1 ♀, Santarém, Paranã Maicá, 2.506°S, 54.329°W, 26 October 2003, F.N.A.A. Rego & A.C. Rheims (IBSP); 5 ♂, 1 ♀, Ituqui, 2.473°S, 54.316°W, 25 October 2003, F.N.A.A. Rego & A.C. Rheims (IBSP); 4 ♂, 2 ♀, Prainha, Restinga do Mureru, 2.394°S, 54.087°W, 24 October 2003, F.N.A.A. Rego & A.C. Rheims (IBSP); 6 ♂, 6 ♀, Restinga do Pixuna, 2.383°S, 54.082°W, 24 October 2003, F.N.A.A. Rego & A.C. Rheims (IBSP); 1 ♂, 1 ♀, Restinga do Botero, 2.394°S, 54.073°W, 24 October 2003, F.N.A.A. Rego & A.C. Rheims (IBSP); 1 ♀, Cachorrinho, 1.863°S, 53.727°W, 23 October 2003, F.N.A.A. Rego & A.C. Rheims (IBSP); 2 ♂, Almeirim/Prainha, Merendeira, 1.744°S, 53.175°W, 21–22 October 2003, F.N.A.A. Rego & A.C. Rheims (IBSP); 1 ♂, Belém, Empresa Brasileira Agropecuária, 1.459561°S, 48.424833°W, 08 September 2001, D.D. Guimarães (MPEG 11221); 1 ♂, Benevides (anthropic environment), 16 January 2002, D.R. Santos-Souza & A.C. Souza (MPEG 4667); 2 ♂, Bragança, Ilha das Canelas, 0.785132°S, 46.723463°W, 25 August 2001 (MPEG 11641, 11644).

Diagnosis.—Edwards (2015) diagnosed *Rishaschia* as follows: male has horizontal projecting chelicerae (an autapomorphy within freyines), and spiral embolus like *Asaracus* C.L. Koch, 1846, but mostly membranous. Female has epigyne with subposterior narrow posteriorly-opening coupling pocket (pCP) and small median atrium immediately in front of pCP, whereas in *Asaracus*, the pCP and atrium are well separated. Both sexes are somewhat like *Akela* Peckham & Peckham, 1896 in appearance, but the latter genus lacks the elongate chelicerae, spiral embolus, and median atrium. The

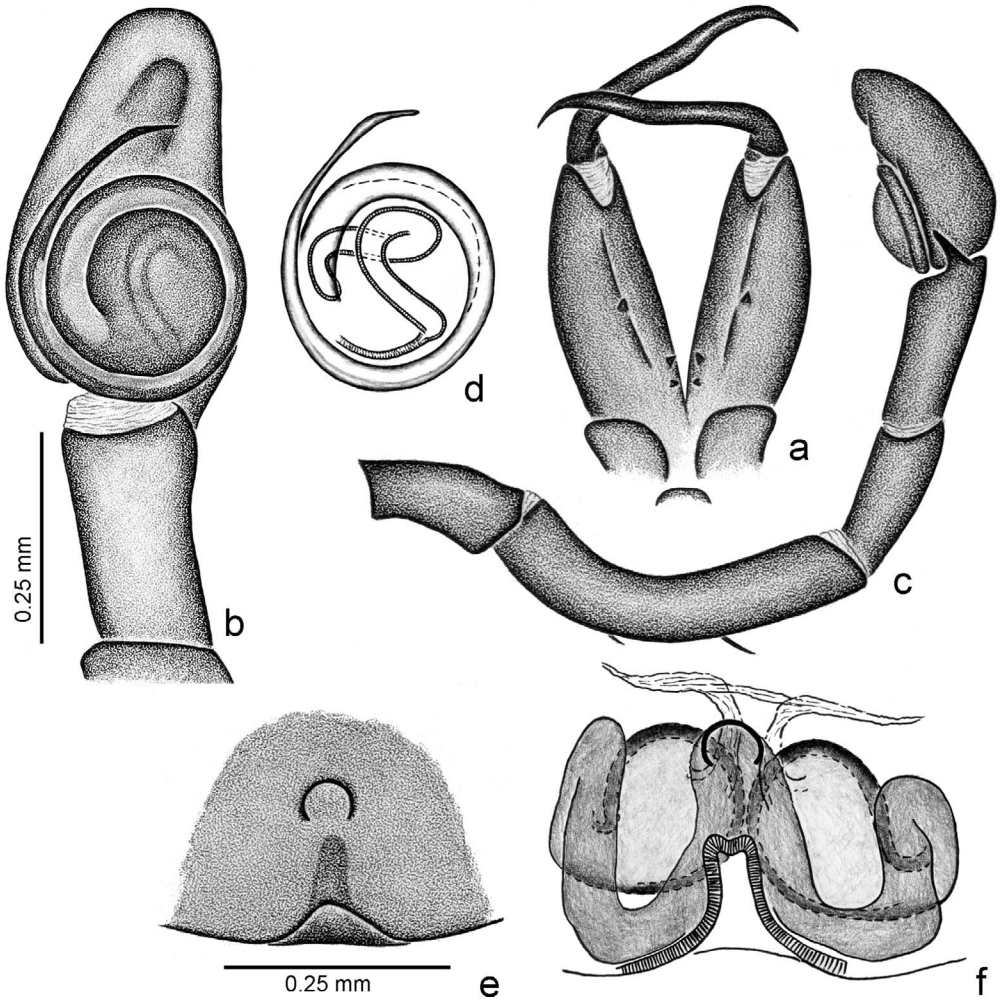

Figure 3.—*Rishaschia mandibularis*: **a.** Male chelicerae (holotype of *Asaracus roeweri* Caporiacco), ventral view. **b.** Left male palp (holotype of *Asaracus roeweri* Caporiacco), ventral view. **c.** Same, lateral view. **d.** Left male palp, dissected bulb, cleared, ventral view. **e.** Epigyne, ventral view. **f.** same, cleared, ventral view.

carapace is higher and more rounded laterally in *Rishaschia* than in *Akela*.

The genus was considered by Makhan (2006) to be allied to *Acragas* Simon, 1900 (Amycini) and *Hentzia* Marx, 1883 (Dendryphantini) based on morphological similarities, but these are simply poor convergences of two unrelated groups with *Richaschia*. Although the type specimen of *R. amrishi* has not been examined, the synonymy is safely established based on the illustrations provided by Makhan (2006, figs. 11–17).

Redescription of the male (MPEG 21107).—Total length: 6.10. Carapace reddish dark brown, 2.90 long, 1.70 wide and 1.25 high, with sparse white hairs (Figs. 2a, c). Ocular quadrangle 1.30 long. Anterior and posterior eye rows 1.35 wide. Clypeus low, covered with white scales. Chelicera reddish dark brown, long, extending forwards, dorsally flattened, with a single tooth on the middle of retromargin and two teeth at the base of promargin (Fig. 3a). Palp: yellow, with long and curved femur, long tibia with simple RTA (Fig. 3c). Spoon-shaped cymbium. Round and small tegulum, with sinuous sperm duct (Fig. 3d). Long embolus arising from the prolateral side of tegulum and curling approximately one and a half turns around the tegulum, with the tip in the embolar groove on cymbium (Figs. 3b, 4a–i, k–l). Labium, endite and sternum light brown (Fig. 2b). Endite with retrolateral distal round projection (Fig. 3a). Legs 1432, light brown; coxae and front tarsi white; coxa I retrolaterally dark brown. Length of femur I 1.70, II 1.40, III 1.45, IV 1.70; patella + tibia I 2.35, II 1.60, III 1.65, IV 1.80; metatarsus + tarsus I 1.85, II 1.40, III 1.70, IV 2.05. Leg macrosetae: femur I d1-1-1, p1di, II d1-1-1, p1di, r1di, III d1-1-1, p0-1-2, r0-1-1, IV d1-1-1, p1-1, r1di; patella I-II p1, III-IV p1, r1; tibia I v2-2-2, p0-1, II v2-2-2, p1-1-0, III-IV v1p-2, d1-0-0, p1-1-1, r1-1-1; metatarsus I v2-2, II v2-2, p0-1, III v2-2, p1-1-2, r1-2, IV v2-2, p1-0-2, r1-1-2. Abdomen light yellowish brown, with faded dorsal color pattern (Fig. 2a). Spinnerets light brown.

In live specimens, carapace and chelicerae are almost black, abdomen is reddish brown and legs are darker (Figs. 1a–b).

Description of the female (MPEG 21115).—Total length: 3.45. Carapace light brown, 1.65 long, 1.12 wide and 0.75 high, with a longitudinal light line extending from the fovea to the posterior border (Fig. 2d). Ocular quadrangle 1.00 long. Anterior eye row 1.00 wide and posterior eye row 1.05 wide.

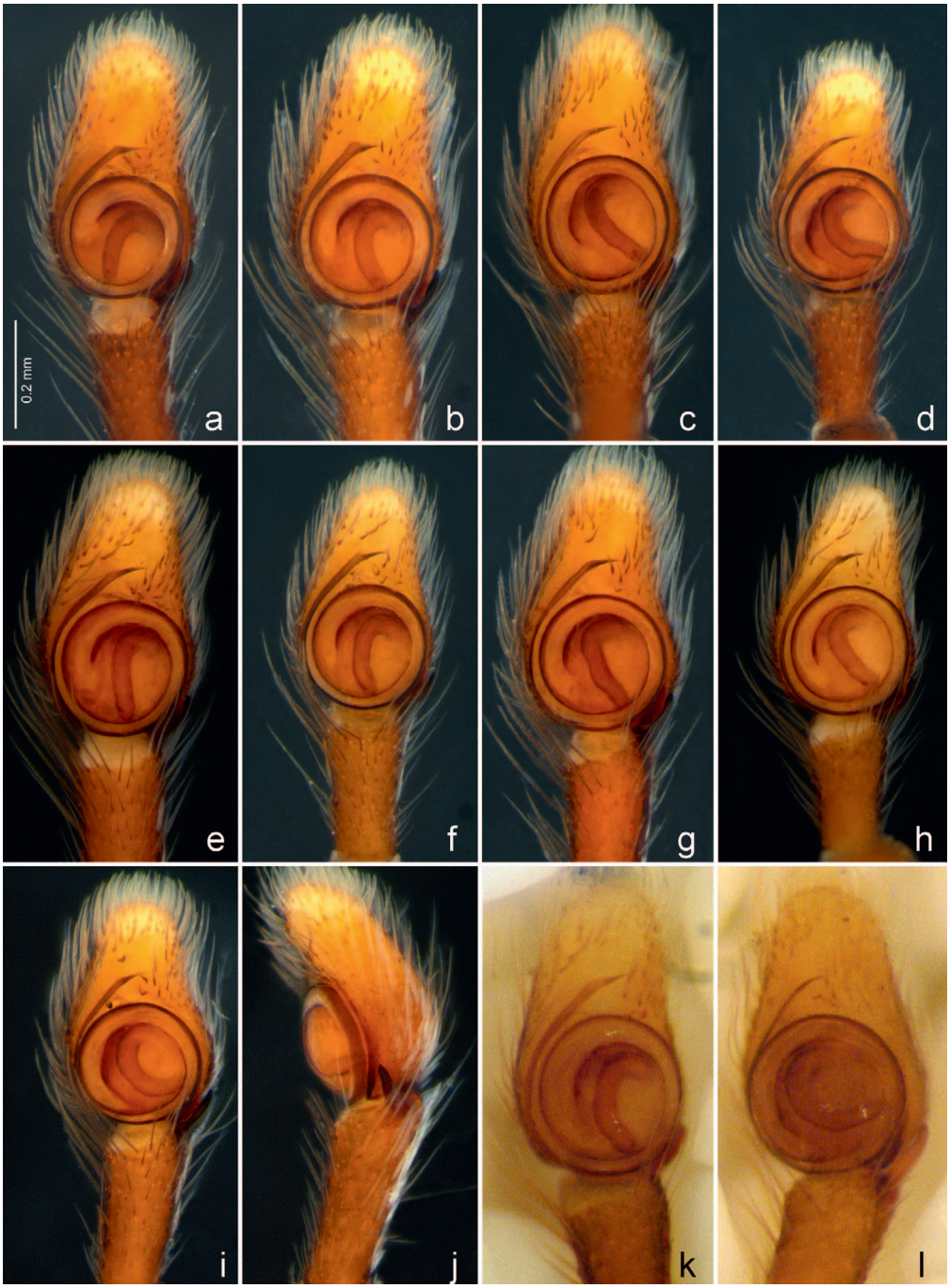

Figure 4.—*Rishaschia mandibularis*, left male palp, ventral view: **a–i.** Specimens from Juruti, Pará, Brazil, showing variation in embolus length and position of sperm duct. **a.** MPEG 21106. **b.** MPEG 21107. **c.** MPEG 21108. **d.** MPEG 21109. **e.** MPEG 21110. **f.** MPEG 21111. **g.** MPEG 21112. **h.** MPEG 21113. **i.** MPEG 21114. **j.** Same, retrolateral view. **k.** Male holotype of *Attus mandibularis* Taczanowski. **l.** Male syntype of *Attus cabanisi* Taczanowski.

Chelicera light brown, vertical, with one retrolateral and two promarginal teeth. Palp white. Labium, endite and sternum light brown (Fig. 2e). Legs 4312; I light brown, with white proximal tibia, II–IV yellow; coxae and tarsi white. Length of femur I 0.85, II 0.75, III 0.90, IV 1.10, patella + tibia I 1.05, II 0.85, III 0.90, IV 1.25, metatarsus + tarsus I 0.85, II 0.75, III 1.05, IV 1.30. Leg macrosetae: femur I d1-1-1, p1di, II-IV d1-1-1, p1di, r1di; patella I 0, II p1, III-IV p1, r1; tibia I v2-2-2, p0-1, II v1r-1r-1p, p0-1, III v0-2, p0-1, r1-1, IV v1p-2, p1-1, r1-1-1; metatarsus I v2-2, II v2-2, p0-1, III v1p-2, p1-2, r1-1-2, IV v2-2, p1-1-2, r1-1-2. Abdomen light brown, covered with short orange and dark brown scales: dorsally with a light cross, with the transverse stripe on the posterior half; small chevrons along the longitudinal stripe; two pairs of dark brown spots, in the middle and on the posterior portion; ventrally yellow (Figs. 2d–f). Spinnerets light brown.

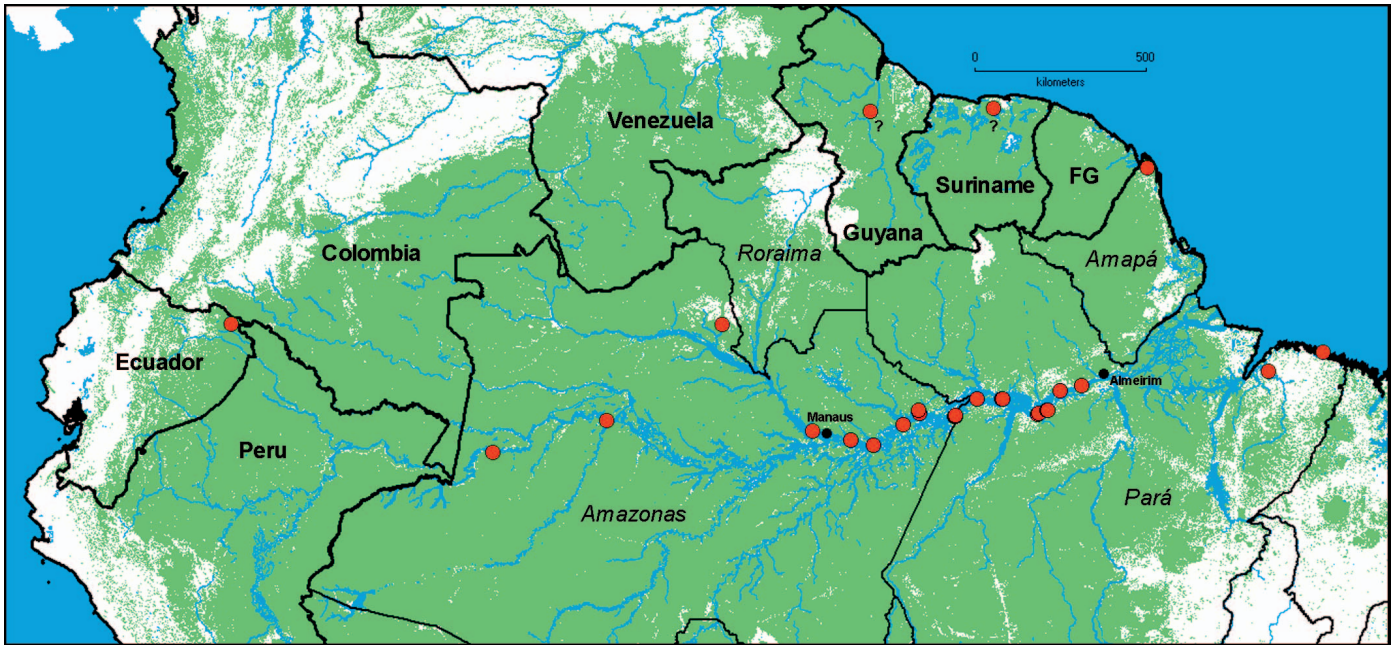

Figure 5.—Distribution records of *Rishaschia mandibularis*. FG = French Guiana.

Carapace and front legs are almost black in live specimen (Figs. 1c–d).

Variation.—Variation in male palp is greater than expected, when compared to other species. The length of the coiled embolus was found to vary continuously from about 450° (one entire turn around the tegulum + 90°) to about 540° (one-and-a-half turns around the tegulum, a variation of about 15–20%), even at the same locality (Figs. 4a–l). This variation is obvious because it can be seen in the orientation of the tegulum, given that the tip of the embolus is constrained to end in the cymbial apical grove. Studies to verify variation in the length of the membranous copulatory ducts of the epigyne were not attempted.

Discussion.—The variation in embolus length in male spiders with a long embolus is yet poorly understood. Of the few cases reported, we can mention the statement "embolus relative length varies" in the redescription of *Menneus camelus* Pocock, 1902 (Deinopidae) by Coddington et al. (2012: 14). However, these cases of variation in embolus length do not seem to be universal in salticids. In well-studied species of jumping spiders with a long embolus, such as many Nearctic species of *Habronattus* F.O. Pickard-Cambridge, 1901, no such extreme variation is observed (W. Maddison, pers. comm.). On the other hand, no correlation was found between embolus length and any other somatic variation, which points against the presence of two closely-related species with potential hybrids. All the specimens examined were considered as belonging to a single species.

Distribution.—This species is known from the Amazon forest, on vegetation along rivers, and has been recorded from Guyana, Suriname, Ecuador and northern Brazil (see Fig. 5). It is possibly also present in southern Colombia, southern Venezuela, French Guiana and northern Peru. The species seems to be common between the Brazilian cities of Manaus (Amazonas) and Almeirim (Pará), where precipitation is lower than in other localities along the Amazon River (Vasconcelos et al. 2010).

ACKNOWLEDGMENTS

We would like to thank the following persons for various types of assistance: Wayne Maddison for allowing the use of the photos; Cristina Rheims and Eduardo Venticinque for helping collect most specimens examined; and G. B. Edwards and Wayne Maddison for helpful comments on an earlier draft of the manuscript.

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Manuscript received 28 September 2017, revised 21 August 2018.