



First description of the male of the spider *Tibellus paraguensis* Simon, 1897 (Araneae: Philodromidae), with new distribution records

HELGA C. ACHITTE-SCHMUTZLER¹ & GONZALO D. RUBIO²

¹*Cátedra de Biología de los Artrópodos, Universidad Nacional del Nordeste (CARTROUNNE, FaCENA-UNNE), Corrientes, Argentina. ceciliaachitte@hotmail.com*

²*Instituto de Biología Subtropical, Universidad Nacional de Misiones (IBS, CONICET-UNaM), Puerto Iguazú, Misiones, Argentina. grubio@conicet.gov.ar*

The genus *Tibellus* Simon, 1875 currently includes 51 species (WSC 2016); it presents some taxonomic difficulties, due to morphological variability, and similarities among some congeners (Efimik 1999). Studies on the genus were undertaken by Gertsch (1933) and Schick (1965) from America, Tikader (1980) from India, Van den Berg & Dippenaar-Schoeman (1994) from the Afrotropical region, and Efimik (1999) from the East Palearctic region.

From the Neotropical region six species of *Tibellus* are known, of which five are represented only by females: *T. affinis* O. Pickard-Cambridge, 1898 (juvenile), *T. chilensis* Mello-Leitão, 1943, *T. insularis* Gertsch, 1933, *T. paraguensis* Simon, 1897 and *T. spinosus* Schiapelli & Gerschman, 1941; and only one, *T. duttoni* (Hentz, 1847), is known from both sexes (WSC 2016). This demonstrates the incomplete knowledge of a region where new species still can be expected. From Argentina two species are known, *T. spinosus* and *T. paraguensis* (CAA 2016).

In this paper, the male of *T. paraguensis* is described for the first time and further illustrations of the female are provided with new geographic records for this species, including the first record from Bolivia.

Specimens examined are deposited in the following collections: Facultad de Ciencias Exactas y Naturales y Agrimensura, Universidad Nacional del Nordeste, Corrientes, Argentina (CARTROUNNE [abbreviated CNNE], G. Avalos); Instituto de Biología Subtropical, Misiones, Argentina (IBSI-Ara, G. Rubio); and Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Buenos Aires, Argentina (MACN-Ar, C.L. Scioscia and M. Ramírez). Description formats and morphological terms follow Van den Berg & Dippenaar-Schoeman (1994), spination pattern on legs is presented according to the same authors. Female genitalia were dissected and examined after digestion in a hot ~10% KOH solution and clarified in clove oil. Temporary preparations were observed using a Leica DM500 compound microscope and an Olympus S2H10 stereomicroscope, and sketched with camera lucida. Measurements are given in millimeters. The individual described belongs to Formosa province (Argentina), it was selected for its proximity to the type locality in Asunción (Paraguay); variability is based on ten specimens of each sex and is shown in brackets. Leg measurements are shown as: total length [femur, patella, tibia, metatarsus, tarsus]. Abbreviations used in the text are: AME-ALE—distance between anterior median and anterior lateral eyes; ALE-PME—distance between anterior lateral and posterior median eyes; MOA-WA—width of anterior median ocular area; MOA-L—median ocular area length; MOA-WP—width of posteromedian ocular area.

Taxonomy

Philodromidae Thorell, 1870

Tibellus Simon, 1875

Tibellus paraguensis Simon, 1897

Fig. 1

Tibellus paraguensis Simon, 1897: 7 (female holotype from Paraguay, Asuncion; not examined).

Tibelloides spatuliferus Mello-Leitão, 1939: 76, f. 60–62 (type from Paraguay, not examined).

Tibellus paraguensis Simon. Mello-Leitão, 1945: 224 (synonymy); CAA 2016; WSC 2016.

Material examined. BOLIVIA: Santa Cruz: 1♀, Chiquitos Province, S16.433, W62.167, 20 October 2010, C. Grismado, S. Avila & M. Pérez (MACN-Ar 29111). **ARGENTINA: Formosa:** 2♂, 2♀, Fortín Quebracho, S23.867, W61.817, 8 July 2004, G. Rubio and G. Avalos (CNNE 8403); 1♀, Colonia Pastoral, S25.700, W58.233, 7 July 2006, G.

Avalos (CNNE 8404). **Chaco:** 2♀, Pampa del Indio, S26.267, W59.967, 12 December 2005, G. Avalos (CNNE 8379); 5♀, La Leonesa, S26.967, W58.650, 14 November 2013, G. Avalos (CNNE 8396); 2♂, 2♀, 14 November 2013, G. Avalos (IBSI-Ara 0554); 1♀, Presidencia de la Plaza, S27.017, W59.633, 28 February 2003, G. Avalos (CNNE 8383); 3♀, 20 December 2006, G. Avalos (CNNE 8392); 2♀, 29 December 2006, G. Avalos (CNNE 8388); 6♂, 12♀, 28 February 2007, G. Avalos (CNNE 8391); 1♂, 6 March 2007, G. Avalos (CNNE 8393); 1♂, 4♀, 27 April 2007, C. Alvarez Bohle (CNNE 8394); 3♀, 1 May 2007, G. Avalos and C. Alvarez Bohle (CNNE 8385), 2♀, 22 June 2007, C. Alvarez Bohle (CNNE 8386); 1♂ and 3♀, 26 November 2007, C. Alvarez Bohle (CNNE 8387); 12♂, 9♀, 29 November 2007, C. Alvarez Bohle (CNNE 8390); 3♂, Colonia Benítez, S27.317, W58.933, 19 October 2011, M.J. Escobar (CNNE 8380); 9♂, 6♀, 19 November 2011, M.J. Escobar (CNNE 8381); 2♂, 4♀, 10 December 2011, M.J. Escobar (CNNE 8382); 2♂, 1♀, Antequeras, S27.433, W58.883, 26 November 2014, C. Achitte-Schmutzler *leg* (CNNE 8397); 1♀, 22 December 2014, C. Achitte-Schmutzler (CNNE 8398); 1♂, 20 February 2015, C. Achitte-Schmutzler (CNNE 8399); 5♀, 23 March 2015, C. Achitte-Schmutzler (CNNE 8400); 3♀, 27 April 2015, C. Achitte-Schmutzler (CNNE 8401); 1♂, 25 August 2015, C. Achitte-Schmutzler (CNNE 8402); 7♂, 9♀, Basail, S27.733, W59.217, 19 November 2014, G. Avalos (CNNE 8395). **Corrientes:** 1♀, San Cayetano, S27.533, W58.667, 5–10 November 2007, C. Grismado, L. Piacentini, M. Izquierdo, L. Compagnucci and J. Martínez (MACN-Ar 13557); 1♀, Capital, S27.493, W58.808, 10 November 2010, A. Tacuare (CNNE 8377); 1♀, Bella Vista, S28.433, W58.917, 1 October 2005, G. Avalos (CNNE 8378).

Other material examined for comparison. *Tibellus spinosus* Schiapelli & Gerschman, 1941 (Paratypes: 3 females from ARGENTINA, Buenos Aires, Punta Médanus, 10 August 1960, Barrio J. Gnasso, deposited in MACN-Ar 5077).

Diagnosis. *Tibellus paraguensis* resembles Neotropical members of *Tibellus* in general body shape and color. These spiders are pale yellow, bearing numerous dark spots on the dorsal surface of the body. From *T. duttoni*, *T. spinosus*, *T. affinis* and *T. chilensis* it can be distinguished in having a shorter body (Fig. 1D; as compared with fig. 620 in Comstock 1912, and fig. 16 in Schiapelli & Gerschman, 1942). From *T. duttoni* and *T. insularis*, female also differ by having parallel, not convergent copulatory opening guides (Fig. 1E; compare with fig. 347 in Dondale & Redner 1978, and fig. 15 in Gertsch 1933). From *T. spinosus*, it also differs in having fewer macrosetae on tibiae I and II (2-2 vs. 8). Male of *T. paraguensis* can be distinguished from the only Neotropical known male (*T. duttoni*) by having a conspicuous retrolateral tibial apophysis (Fig. 1C).

Description. Male (CNNE 8403, Figs 1A–D) (variability in brackets): Total length 4.01 (3.36–4.89); carapace 1.58 (1.50–2.00) long, 1.47 (1.39–1.76) wide; clypeal length 0.06 (0.04–0.09); abdomen 2.00 (1.76–2.75) long, 1.00 (0.82–1.15) wide. MOA-WA 0.07 (0.05–0.09), MOA-WP 0.16 (0.15–0.18), MOA-L 0.12 (0.12–0.15); AME-ALE 0.06 (0.05–0.09), ALE-PME 0.06 (0.04–0.07). Leg formula 2143 (legs I and IV can be subequal in length). Leg measurements: I 6.75 (6.75–10.18) [1.90 (1.90–3.00), 0.64 (0.62–0.95), 1.87 (1.80–2.61), 1.57 (1.55–2.42), 0.77 (0.77–1.35)]; II 8.6 (8.6–12.7) [2.44 (2.38–3.46), 0.71 (0.70–1.12), 2.31 (2.31–3.26), 2.07 (2.07–3.23), 1.07 (1.07–1.63)]; III 5.14 (5.04–7.63) [1.57 (1.57–2.41), 0.45 (0.43–0.74), 1.25 (1.21–1.82), 1.17 (1.02–1.77), 0.70 (0.66–0.92)]; IV 6.59 (6.59–9.91) [2.10 (2.05–3.12), 0.43 (0.43–0.74), 1.68 (1.56–2.48), 1.66 (1.57–2.55), 0.72 (0.71–1.05)]. Legs I and II macrosetae: femora with 1-1-1 dorsal, 1-1-1 prolateral and 1-1-1 retrolateral (smaller) distally; tibiae with 2-2-2a ventral paired, 1 dorsal distally, 1-1-1 prolateral and 1-1-1 retrolateral; metatarsus with 2-2 ventral paired, 1-1 prolateral and 1-1 retrolateral. Carapace pale yellow, covered with simple hairs with some thicker and longer setae on cephalic region and clypeus; numerous black spots, present mostly on carapace margins and cephalic region. Thoracic region with a dark brown elongated spot, just behind fovea; thoracic groove slightly marked. Clypeus with sclerotized edges at outer corner of chelicerae bases. Chelicerae with two promarginal teeth, no teeth on retromargin. Sternum pale yellow, with some black marginal spots. Abdomen white, reticulated, with a pale yellow dorsal stripe, which extends from the front to the middle of the abdomen, ends with a dark brown spot; dorsally covered with sparse black, short, and thick setae. Numerous black spots form a pair of longitudinal bands on the lateral margins, and a pair of dorsal bands whose density points increases towards posterior end; ventral side pale, without spots. Legs thin and long, pale yellow-orange; covered with some hairs and numerous black spots. Metatarsus and tarsus scopulate. Palp: cymbium with four spines; embolus only partly visible, tip extends beyond tegulum, claw-shaped, slightly and prolaterally curved. Conductor small translucent, originating apically on tegulum. Retrolateral tibial apophysis large, ventrally directed, with two small tips, one of them more sclerotized.

Female (CNNE 8403, Fig. 1E–F) (variability in brackets): Total length 5.15 (5.15–7.10); carapace 1.73 (1.73–3.81) long, 1.59 (1.53–2.07) wide; clypeal length 0.15 (0.09–0.22); abdomen 3.29 (3.29–4.75) long, 1.66 (1.59–2.31) wide. MOA-WA 0.07 (0.07–0.13), MOA-WP 0.18 (0.18–0.25), MOA-L 0.15 (0.13–0.21); AME-ALE 0.07 (0.06–0.10), ALE-PME 0.09 (0.06–0.12). Leg formula 2143 (legs I and IV can be subequal in length). Leg measurements: I 6.41 (6.41–9.09) [1.76 (1.76–2.72), 0.71 (0.71–1.08), 1.73 (1.70–2.41), 1.36 (1.36–2.14), 0.85 (0.78–1.12)]; II 7.53 (7.53–10.93) [2.04 (2.04–3.12), 0.95 (0.91–1.25), 1.87 (1.87–2.82), 1.66 (1.66–2.55), 1.05 (0.91–1.32)]; III 4.78 (4.78–7.19) [1.36

(1.36–2.48), 0.61 (0.50–0.78), 1.08 (1.08–1.70), 1.05 (0.86–1.59), 0.68 (0.54–0.81)]; IV 5.97 (5.97–8.72) [1.97 (1.76–2.89), 0.51 (0.51–0.75), 1.39 (1.39–2.10), 1.39 (1.39–2.07), 0.71 (0.68–1.02)]. Leg macrosetae as in male. Color and shape as in male. Epigyne: spermathecae elongated, with curved posterior extensions; a spherical spermathecal gland on anterior margin of each spermatheca; copulatory opening spherical, near anterior margin of epigyne; copulatory opening guide medium-sized, tip of guide not reaching anterior edge of spermatheca; median septum diverging anteriorly, V-shaped.

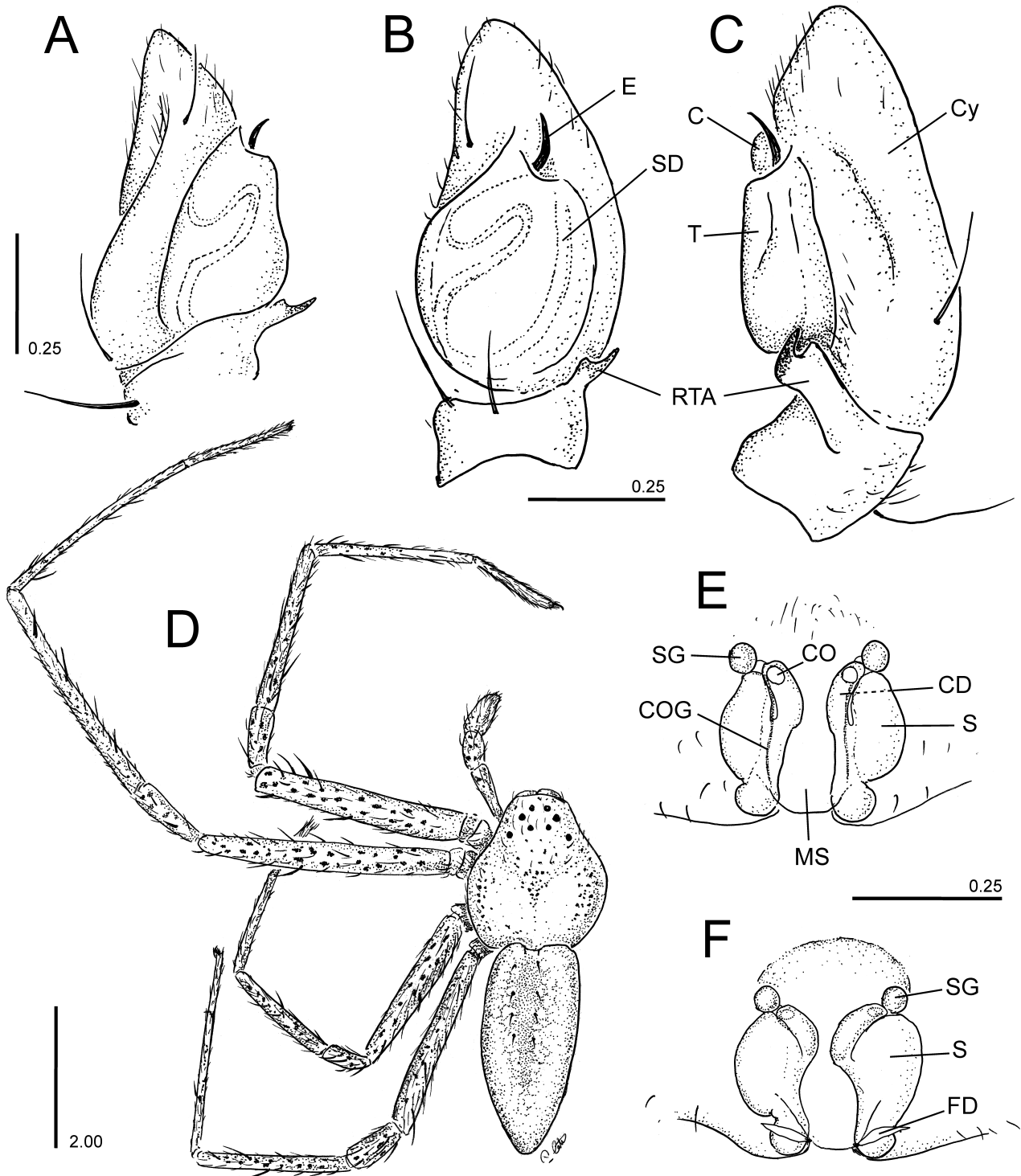


FIGURE 1. *Tibellus paraguensis*, Simon from Formosa (CNNE 8403). A–C left male palp (A prolateral, B ventral, C retrolateral); D dorsal habitus; E–F female (E cleared epigyne ventral, F vulva, dorsal. Abbreviations: C = conductor; CD = copulatory duct; CO = copulatory opening; COG = copulatory opening guide; Cy = cymbium; E = embolus; FD = fertilization duct; MS = median septum; RTA = retrolateral tibial apophysis; S = spermatheca; SD = sperm duct; SG = spermathecal gland; T = tegulum). Scale bars in mm.

Sexual dimorphism. Males and females did not differ in their somatic morphology; only females are slightly larger than males.

Natural history. Most specimens were captured sweeping in the Chaco grasslands. Grasslands of Antequeras (Chaco) are characterized by the presence of numerous palm trees (*Copernicia alba*). Spiders were collected monthly, and adults were present in samples every month. Some juveniles were kept in captivity and fed on fruit flies. They are voracious and agile hunters. In the Iberá reserve (central-north of Corrientes), grasslands and marshlands were intensively sampled using a G-Vac method but no *T. paraguensis* were sampled.

Distribution. Southern Paraguay (Asunción) and northeastern Argentina (Misiones, Corrientes, Entre Ríos). New records from Formosa and Chaco provinces (northern Argentina), and Santa Cruz (eastern Bolivia).

Remarks. Spiders of the genus *Tibellus* have the carapace longer than wide, with median and marginal brown stripes, great distance between PME and PLE, long leg II, and small or absent RTA (Simon 1875). These characters distinguish *Tibellus* from other closely related genera such as *Apollophanes* O. Pickard-Cambridge, 1898. Exceptionally, in *T. paraguensis* the RTA is well developed, a similarity with *Apollophanes*; however other *Tibellus* species also have developed RTA, such as *T. californicus* Schick, 1965 and *T. macellus* Simon, 1875.

Tibellus differs from Argentinean genus *Paracleocnemis* Schiapelli & Gerschman, 1942 in the color pattern of the body, in lack of long and curved setae on the cephalic region, and in having different leg formula. According to Gertsch (1933), *T. paraguensis* is closely related to *Cleocnemis punctulata* (Taczanowski, 1872), previously included in *Tibellus* and later transferred to the South American genus *Cleocnemis* Simon, 1886 by Caporiacco (1955); this genus differs from *Tibellus* mainly in having stout legs with strong spines, and the tarsus without scopulae.

Evidently *T. paraguensis* shows some non-typical characters for the genus; e.g. the relatively short body, with lateral stripes and a dorsal band. With respect to the last character, we conclude that the stripes and band of *T. paraguensis* are formed by dark scattered spots, similar to African species *T. kibonotensis* Lessert, 1919 and *T. septempunctatus* Millot, 1942 (see Dippenaar-Schoeman & Van den Berg 1994).

As was noted by Efimik (1999) there are general similarities between various philodromid genera, e.g. the color pattern of *T. paraguensis* is the same as in *Thanatus oblongiusculus* (Lucas, 1846) having Palearctic distribution (Efimik 1999). However copulatory structures of *Thanatus* differ from *Tibellus*. Within these known analogies of Philodromidae, *T. paraguensis* has some atypical characters of the genus, but retains other diagnostic characters of *Tibellus*.

As alluded above, *Tibellus* is a genus partly revised, there are few studies concerning South American species, which increases the importance of contributions with detailed species descriptions from poorly explored but biodiversity-rich areas. Taxonomic papers should not be all or nothing; although not in a monographic context, single species description can be useful to complement existing monographs, with the aim of expanding those revisions (Rubio *et al.* 2013).

Acknowledgments

We wish to thank Pedro Cuaranta (Universidad Nacional del Nordeste –UNNE) for the drawings, Gilberto Avalos (UNNE), Cristian Grismado (MACN-Ar) and Christoph Muster (University of Greifswald) for contributions to this work. H.C. Achitte-Schmutzler holds a doctoral scholarship from Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET); G.D. Rubio is Career Researcher of CONICET and PICT-2013-1664 grant beneficiary.

References

- CAA (2016) *Catálogo de Arañas de Argentina*. Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Buenos Aires. Available from: <https://sites.google.com/site/catalogodearanasdeargentina/home> (accessed 11 March 2016).
- Caporiacco, L. di (1955) Estudios sobre los arácnidos de Venezuela. 2a parte: Araneae. *Acta Biologica Venezuelica*, 1, 265–448.
- Comstock, J.H. (1912) *The spider book; a manual for the study of the spiders and their near relatives, the scorpions, pseudoscorpions, whipscorpions, harvestmen and other members of the class Arachnida, found in America north of Mexico, with analytical keys for their classification and popular accounts of their habits*. Garden City, New York, 721 pp.
- Dondale, C.D. & Redner, J.H. (1978) *The insects and arachnids of Canada, Part 5. The crab spiders of Canada and Alaska, Araneae: Philodromidae and Thomisidae*. Research Branch Canada Department of Agriculture Publication, 1663, 1–255.
- Efimik, V.E. (1999) A review of the spider genus *Tibellus* Simon, 1875 of the East Palearctic (Aranei: Philodromidae). *Arthropoda selecta*, 8, 103–124.
- Gertsch, W.J. (1933) Notes on American spiders of the family Thomisidae. *American Museum Novitates*, 593, 1–22.
- Mello-Leitão, C.F. (1939) Araignées américaines du Musée d'histoire naturelle de Bale. *Revue Suisse de Zoologie*, 46, 43–93. <http://dx.doi.org/10.5962/bhl.part.117928>
- Mello-Leitão, C.F. (1945) Arañas de Misiones, Corrientes y Entre Ríos. *Revista del Museo de La Plata, New Series (Zoology)*, 4, 213–302.
- Rubio, G.D., Izquierdo, M.A. & Piacentini, L.N. (2013) A new orb-weaving spider from the Argentinean flooding pampas grasses:

- Aculepeira morenoae* new species (Araneae, Araneidae). *Zootaxa*, 3613 (6), 548–556.
<http://dx.doi.org/10.11646/zootaxa.3613.6.2>
- Schiapelli, R.D. & Gerschman, B.S. (1942) Arañas argentinas (1a parte). *Anales del Museo Argentino de Ciencias Naturales*, 40, 317–332.
- Schick, R.X. (1965) The crab spiders of California (Araneae, Thomisidae). *Bulletin of the American Museum of Natural History*, 129, 1–180.
- Simon, E. (1875) *Les arachnides de France*. 2. Roret, Paris, 350 pp.
- Simon, E. (1897) Liste de arachides recueillis aux îles du Cap Vert, dans la République Argentine et le Paraguay et descriptions d'espèces nouvelles. In: Viaggio del Dott. A. (Ed.), Borelli nella Repubblica Argentina e nel Paraguay. *Bollettino dei Musei di Zoologia ed Anatomia Comparata della Reale Università di Torino*, 12 (270), pp. 1–8.
- Tikader, B.K. (1980) *Fauna of India (Araneae). Part 1: Thomisidae (crab-spiders)*. *Zoological Survey of India*, 247 pp.
- Van den Berg, A. & Dippenaar-Schoeman, A.S. (1994) A revisión of the Afrotropical species of the genus *Tibellus* Simon (Araneae: Philodromidae). *Koedoe*, 37, 67–114.
<http://dx.doi.org/10.4102/koedoe.v37i1.327>
- WSC (2016) *World Spider Catalog. Version 17*. Natural History Museum, Bern. Available from: <http://wsc.nmbe.ch> (accessed 11 March 2016)