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First record of the genus *Helvetia* Peckham & Peckham, 1894 (Araneae: Salticidae: Chrysillini) from Colombia and extension of its distribution in Argentina

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Abstract. The jumping spider genus *Helvetia* Peckham & Peckham 1894 (Araneae: Salticidae: Chrysillini) is recorded for the first time from Colombia, with the species *H. albovittata* Simon 1901 associated with ant nests in mangrove forest from south of the Gulf of Morrosquillo, Caribbean Colombia. This is the first record of the genus from Colombia and the northernmost record of the genus for South America. New illustrations are shown, and additional records from Argentina are presented. A distribution map with both new and previously published records is included.

Key words. Córdoba, *Helvetia albovittata*, mangrove forest, taxonomy, zoogeography.

Introduction

The Chrysillini Simon (*sensu* Maddison 2015), formerly known as the Heliophaninae, are generally small to medium-sized foliage dwellers with delicate legs. Some chrysilline species fluoresce, some are myrmecophagous, some live in nest aggregations, and many have a stridulatory apparatus in both males and females (Jackson 1986; Maddison 1987; Lim et al. 2007; Ruiz & Brescovit 2008; Pekár & Haddad 2011; Maddison 2015). Many chrysilline genera, though not all, are comprised of species with a bump on the tegulum about 90° clockwise from the base of the embolus of the left palp as viewed from below (Maddison & Hedin 2003; Ruiz & Brescovit 2008). The tribe Chrysillini includes a large and well-delimited clade to which *Helvetia* belongs, supported as monophyletic by molecular data and morphological characters that include a stridulatory apparatus which generally consists of structures developed on the femora that are rubbed against a granulose portion of the carapace (Maddison & Hedin 2003; Ruiz & Brescovit 2008; Bodner & Maddison 2012; Maddison 2015).

The neotropical genus *Helvetia* was proposed by Peckham & Peckham (1894) for the species *H. santarema* Peckham & Peckham 1894 from Argentina and Brazil (Peckham & Peckham 1894; WSC 2018). Since *Helvetia* are seldom found in the field, authors (e.g. Ruiz & Brescovit 2008) have considered these species to be very problematic with respect to male–female matches. Males and females collected in proximity were often placed in the same species, a practice that has resulted in mismatched males and females (Ruiz & Brescovit 2008). This was tentatively corrected by Ruiz & Brescovit (2008), resulting in many species for which only one sex is known, and new synonyms or combinations. Currently, *Helvetia* includes 11 nominal species from South America and five synonyms (Ruiz & Brescovit 2008; WSC 2018). The species *H. albovittata* was described by Simon (1901) from Argentina. Subsequently Galiano (1963,

1965) redescribed and illustrated this species, and reported it for the first time from Paraguay. In addition to *H. albovittata*, localities for the species *H. cancrimana* (Taczanowski 1872), *H. galianoae* Ruiz & Brescovit 2008, *H. riojanensis* Galiano 1965, *H. santarema* (type species for *Helvetia*), *H. semialba* (Simon 1901) and *H.* cf. *cancrimana* (without defined taxonomic status) have also been reported (see Hill & Chiavone 2018, fig. 2, Appendix 1). Here, we present a first record of *H. albovittata* from Colombia in the Córdoba department, the northernmost record of *Helvetia* for South America. We also present additional records for *H. albovittata* from Argentina.

Materials and methods

The material examined was deposited in the following collections: Laboratorio de Entomología, Universidad de Córdoba, Colombia (LEUC–OARA; E. Bedoya–Roqueme), Instituto de Biología Subtropical, Universidad Nacional de Misiones, Argentina (IBSI–Ara; G. D. Rubio) and Cátedra de Biología de los Artrópodos, Universidad Nacional del Nordeste, Argentina (CNNE; G. Avalos). Multifocal photographs of the genitalia were taken in the Microscopy laboratory of the Universidad de Córdoba with a HD digital camera attached to a Carl Zeiss stereomicroscope, Axiostar, and then composited with the image stacking software AxioVision Carl Zeiss SE64 (Rel. 4.9.1. SP2). Measurements in millimeters were taken using a micrometer attached to a Carl Zeiss stereomicroscope, Axiostar, in conjunction with software AxioVision Carl Zeiss SE64 (Rel. 4.9.1. SP2). Morphological terms follow Galiano (1963).

Abbreviations used in the text are: AERW= anterior eye row width; AL= abdomen length; B= bulb; C= cymbium; CA= carena; CH= caparace height (~maximum); CL= caparace length; CW= caparace width; E= embolus; F= femur; LOQ= length of ocular quadrangle (ALE-PLE inclusive); M= metatarsus; P= patella; PERW= posterior eye row width; PMEP= posterior median eye position (as ratio of ALE–PME distance to ALE–PLE distance); RTA= retrolateral tibial apophysis; SD= sperm duct; T= tibia; TL= total length; TU= tuberosity.

Taxonomy

Salticidae Blackwall 1841
Salticinae Blackwall 1841
Chrysillini Simon 1901

Helvetia Peckham & Peckham 1894

Helvetia Peckham & Peckham, 1894: 119. Type species *H. santarema* Peckham & Peckham 1894: 119.

Diagnosis. According to Peckham & Peckham (1894) and Ruiz & Brescovit (2008) *Helvetia* can be distinguished from all other small chrysilline jumping spiders by their trapezoid carapace, much wider at the rear than at the front.

Remarks. Palps of *Helvetia* have the chrysilline bump and can have a short embolus originating distally on the prolateral side of the tegulum and a short RTA, or they can exhibit extensive modifications such as a very long embolus associated with a counterclockwise rotation of the tegulum in the left palp, grooves on the cymbium to hold the tip of the curling embolus, and a bifid RTA with a developed ventral branch or with a very well-developed dorsal branch (see Galiano 1976, fig. 10; Ruiz & Brescovit 2008, figs. 15–16, 19–20).

***Helvetia albovittata* Simon, 1901**

Figures 1–21

Helvetia albovittata Simon, 1901: 157; *Admestina insularis* Banks, 1902: 66, pl. 2, f. 4; *H. albovittata* Galiano, 1963: 361, pl. XIX, f. 17; *H. otiosa* Galiano, 1976: 54, f. 8–12; *H. insularis* Galiano, 1989: 49; *H. albovittata* Ruiz & Brescovit, 2008: 142, f. 13–14.

Material examined. 2♂ Colombia, Córdoba, San Antero: Punta Nisperal [9°23'47.0" N, 75°46'16.8" W], [2m] 22 Apr 2018, 3 Oct 2018, mangrove forest, manual collection, E. Bedoya–Roqueme col. (OARA–190); 1♂, Colombia, Córdoba, Tierralta: TuisTuis [8°2'2.881" N, 76°5'29.993" W], [178m], 3 Dec 2014, humid forest, manual collection, E. Bedoya–Roqueme col. (OARA–186). 1♂, Argentina, Chaco Province, Presidencia de la Plaza Department: Chaco National Park (26°47'20" S, 59°36'44" W], [79m], 4 Dec 2017, grassland, collected with garden–vacuum (G–vac), M. F. Nadal, G. Rubio, I. Zanone, E. Toledo & R. Aguirre col. (CNNE 8615); 1♀ Corrientes Province, San Martín Department, Colonia Carlos Pellegrini, [28°32'42.13" S, 57°11'55.29" W], [67m], 20 Dec 2004, grassland, G. Avalos col. (IBSI–Ara 690).

Habitat. The habitats of this species seem to be very diverse. The specimens of *Helvetia albovittata* from Colombia were collected by hand during daylight hours in association with ant nests, on tree bark of *Rhizophora mangle* L. (red mangrove), in a fragment of mangrove forest of the locality of Punta Nisperal, municipality of San Antero, Cordoba, in the south of the Gulf of Morrosquillo (Figure 1). Similarly on Fernandina Island this species was found associated with mangroves (Banks 1902). The specimens from Colombia were also collected in humid forest at about 200 m asl (Figure 2). In Corrientes and Chaco provinces of Argentina this species was found in grasslands, and in Córdoba, Argentina on the side of a hill (Figure 3).

Figures 1–3. Habitat of *Helvetia albovittata* Simon, 1901, reported in this study. **1,** Fragment of mangrove forest from Punta Nisperal, San Antero, Córdoba, Colombian Caribbean. **2,** Humid forest of TuisTuis, Tierralta, Córdoba, Colombian Caribbean. **3,** Pastures of Chaco, Chaco National Park, Argentina.

Diagnosis. *Acc*ording to Ruiz & Brescovit (2008), the male *H. albovittata* is easily distinguished from other *Helvetia* species by the very long embolus, the form of the RTA (Figures 17-18 and as described by Galiano 1976) and the presence of a depression on the retrolateral cymbium where the tip of the embolus is held in resting position (see Galiano 1976, figs. 10–11). The female resembles that of *H. santarema* but can be distinguished by the medial posterior fusion of the copulatory openings, similar to that of *H. labiata* (see Ruiz & Brescovit 2008, fig. 13).

***Comparative description of specimens*.** Cephalothorax long, narrow and flat, with the thoracic part slightly widened (Banks 1902). Upper margin of the AME higher than the top of the ALE, eyes of the second row closer to the third row than to the first (Galiano 1963). A line passing through the center of the four anterior eyes is slightly recurved (Banks 1902; Galiano 1963). Chelicerae small, straight and

parallel (Galiano 1963, 1976). The specimen described by Galiano (1976) has two teeth on the promargin and one tooth on the retromargin of each chelicera but the specimen described by the same author in 1963 had only one tooth on the retromargin. The new male and female specimens from Colombia and from Argentina described here have cheliceral teeth as described by Galiano in 1976. Endites long and straight with rounded external margins. Labium longer than wide (Galiano 1963), exceeding half the length of the endites. Sternum longer than wide, with anterior end of same width as base of the labium (Galiano 1963, 1976). Abdomen narrow and long. Tibia of each palp with two RTAs (Figures 6–7), one directed along the retrolateral side of the cymbium, long and thick, tapering towards the end (RTA1), and another spiniform (RTA2), directed towards the ventral side of the palp (Figures 17–18). The bulb is large and prominent at the base and has a high conical process in the middle zone (Figures 8–9). The very long embolus curves around on the retrolateral part of the cymbium, where it occupies a protective depression (Figures 19–20). In the Colombian specimen the embolus makes a longer turn, while in the Argentinean specimen the embolus makes a shorter turn (Figures 10–11, 15–16). The femur has a basal ventral tuberosity and in the basal prolateral position there is a curved carena bordering a depression (Figures 8, 19; see Galiano 1976, fig. 12). Legs short, the first the stoutest, especially the tibia (Banks 1902), and sparsely clothed with long fine hairs from the patella to the tarsus. The first femur is somewhat claviform, with the prolateral face slightly excavated and the other leg segments are cylindrical (Galiano 1976). Spines (specimens from Colombia): Leg I: F= d 1–1–1; P= 0; T= p 0–0–1; M= p 1–1, r 1–1. Leg II: F= d 1–1–1; P= 0; T= v 0–0–r1; M= p 1–1, r 1–1. Leg III: F= d 1–1–1; P= 0; T= v 0–0–r1; M= whorl apical 5. Leg IV: F= d 1–1–1; P= 0; T= v 0–0–2; r 0–1–0; M= whorl apical 5. Spines (specimens from Argentina): Male: Leg I: F= d 1–1–1; P= 0; T= 0; M= 0. Leg II: F= d 1–1–1; P= 0; T= 0; M= r 1 apical. Leg III: F= d 1–1–1; P= 0; T=M= whorl apical 5. Leg IV: F= d 1–1–1; P= 0; T= v 0–0–0–2; r 0–0–1–0; M= whorl apical 5. Female: Leg I: F=d 1–1–1; P= 0; T= v 1p–0–r1; M= p 1–1, r 1–1. Leg II: F= d 1–1–1; P= 0; T= v r1–0–0; M= p 1–1, r 1–1. Leg III: F= d 1–1–1; P= 0; T= 0; M= whorl apical 5. Leg IV: F= d 1–1–1; P= 0; T= v 0–0–2; r 0–1–0; M= whorl apical 5.

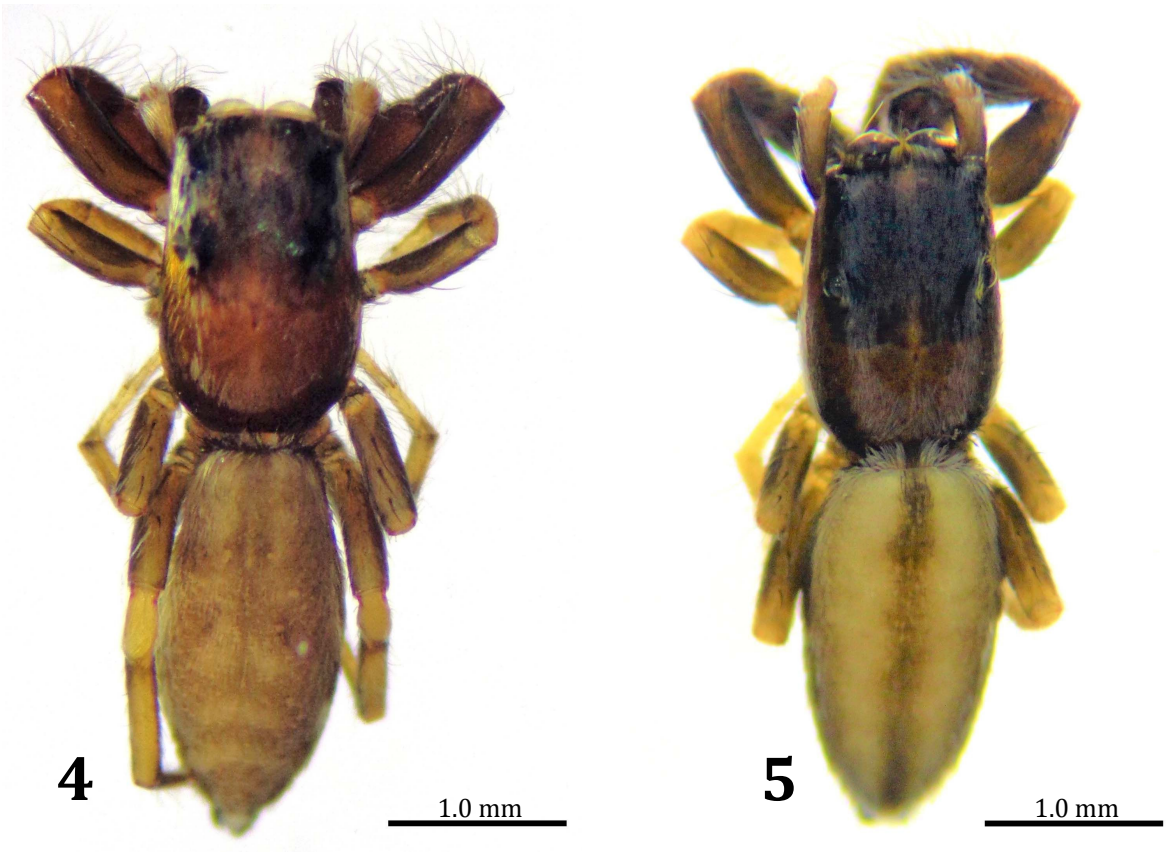
Measurements (mm; specimens from Colombia). Three males: TL= 3.61–3.81; CL= 1.54–167; CW= 0.88–0.91; AL= 1.87–1.94; AERW= 0.77–0.97; PERW= 0.81–0.91; LOQ= 0.63–0.74; PMEP= 0.367–0.386; eyes of the second row separated from the ALE by 0.176-0.178 mm and from the PLE by 0.163-0.165 mm.

Measurements (mm; specimens from Argentina). Male: TL= 3.58; CL= 1.58; CW= 1.00; AL= 2.00; AERW= 0.82; PERW= 0.82; LOQ= 0.67; PMEP= 0.29; eyes of the second row separated from the ALE by 0.36 mm and from the PLE by 0.15 mm. Female: TL= 4.55; CL= 1.75; CW= 1.05; AL= 2.65.

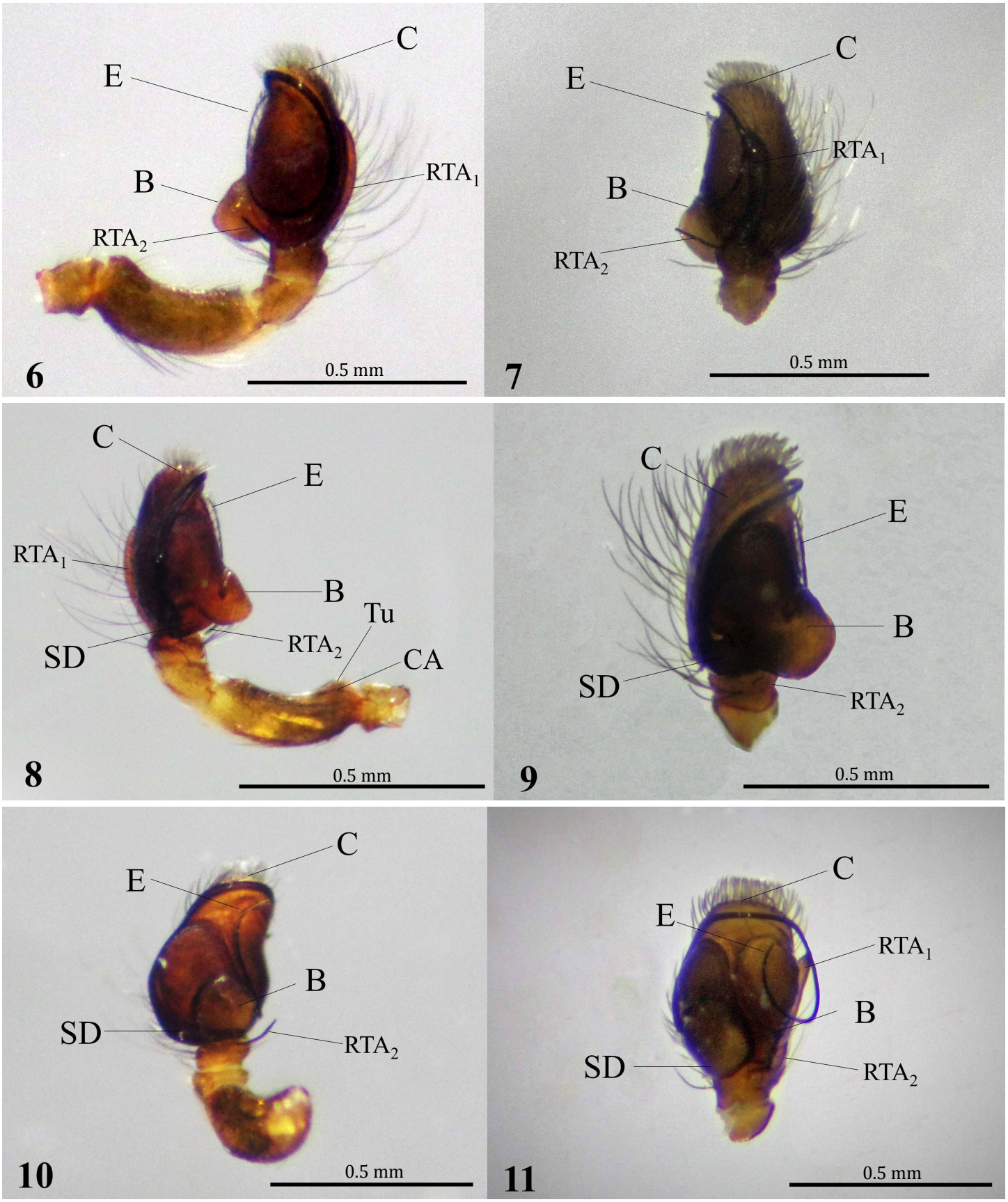
Coloration (specimens from Argentina). The male is very similar to the original description (Simon 1901), the description of Banks (1902) as *Admestina insularis,* the subsequent redescription by Galiano (1963) and the description of Galiano (1976) as *H. otiosa.* Cephalothorax dark brown, covered by some scattered white hairs, especially in the thoracic part. Cephalic region blackened, sides with three bands of a different color: the dorsal band, which is thicker, is reddish brown; the most ventral band, which is the thinnest, is black; the middle band, which has an intermediate thickness between the others, is covered by white silky hairs (as in Simon 1901; Banks 1902; Galiano 1976). Tuft of yellow hairs under the PLE (Simon 1901). Abdomen white (as described Simon 1901; Banks 1902), covered by three brown longitudinal bands (Simon 1901; Galiano 1963), one central and two lateral, ventral part ash brown (Galiano 1976). Sternum, chelicerae, endites and labium dark brown as described by Galiano (1976). First pair of legs dark brown and the other legs yellowish in all segments except the femur which is darker. Palps dark brown with a tuft of black hairs inserted on the basal ventral tuberosity of the femur and with feathery white hairs on the dorsal apical part of the femur (as in Galiano 1976).

The female is similar to the original description (Simon 1901) and the subsequent redescription (Galiano 1963). Cephalothorax brown–orange, covered with white hairs on the cephalic region, eyes surrounded by black spots and two black spots in the middle of the eye area (Figure 12). Yellow spot in the middle of the cephalic region and another in front of the thoracic stria (Figure 12). Abdomen light yellow as described by Simon (1901) and Galiano (1963), with 3 brown longitudinal bands, covered with brown hairs (Galiano 1963). Sternum, chelicerae, endites, labium and legs yellow as described by Galiano (1963). Epigyne as described by Galiano (1963) and Ruiz & Brescovit (2008), oval plate with slightly convex posterior margin, with a parens-like furrow on each side of the midline. Through the transparent cuticle over the epigynum can be seen two large, elongated, sinuous structures (Figures 13-14).

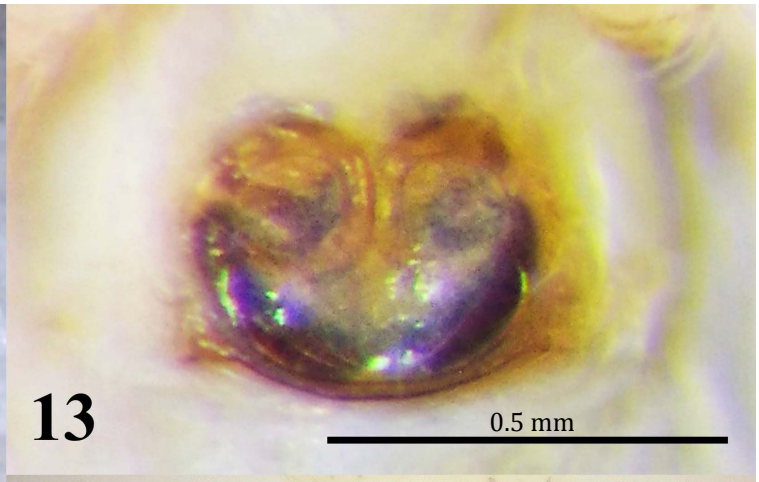
Coloration (male specimens from Colombia). Cephalothorax reddish brown covered by some scattered white hairs, especially in the thoracic part. Cephalic region blackened, sides have only two bands with different colors. The dorsal band, which is thicker, is reddish brown. The most ventral band, which is the thinnest, is black. Tuft of yellow hairs under the PLE (as described Simon 1901). Abdomen presents a pattern of coloration different from the specimens from Argentina. The habitus of the abdomen looks more like *H. semialba* (Simon, 1901), light coffee-brown with two diffuse longitudinal bands on the anterior followed by a pair of oblique spots and two diffuse transversal bands at the posterior. All of these bands with pale white-yellow hair. Unlike *H. semialba* the last band of the abdomen is transverse, not longitudinal. The sides of the abdomen are the same color as the bands and the venter is white-brown. Chelicerae, endites and labium dark reddish brown. Sternum coffee-brown. First pair of legs dark red-brown, the remaining legs with dark brown sides (Figures 4–5). Palps dark reddish brown, lighter on the top of the patella with a tuft of black hairs inserted on the basal ventral tuberosity of the femur and with feathery white hairs on the dorsal apical part of the femur (Galiano 1976).

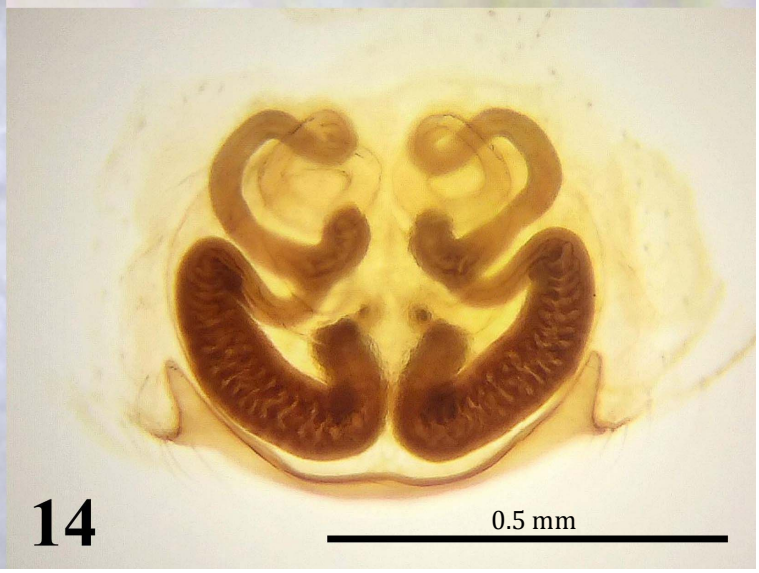


Figures 4–5. Habitus of adult male *Helvetia albovittata* Simon 1901 (pedipalps removed). **4,** Specimen from Colombia, San Antero, mangrove forest (OARA-190). **5,** Specimen from Argentina, Presidencia de la Plaza Department, Chaco National Park, grassland (CNNE 8615)

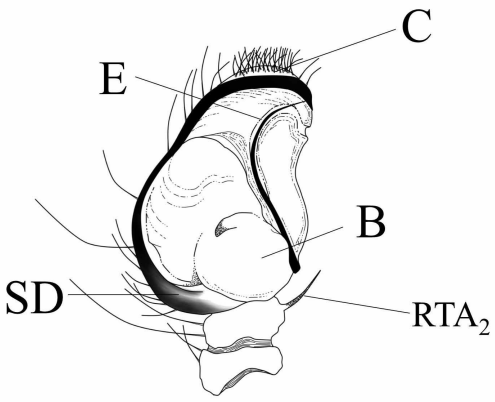


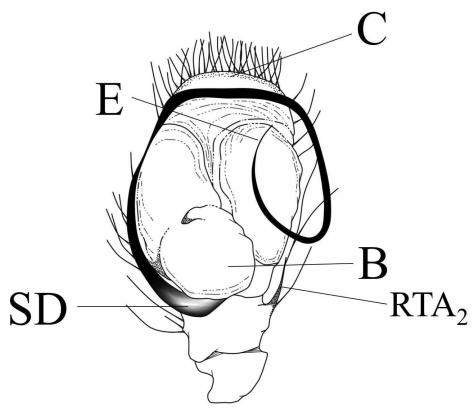
Figures 6–11. Left pedipalp of male *Helvetia albovittata* Simon 1901 (6, 8 and 10 specimen from Colombia; 7, 9 and 11 from Argentina). **6-7,** retrolateral views. **8-9,** prolateral views. **10-11,** ventral views.



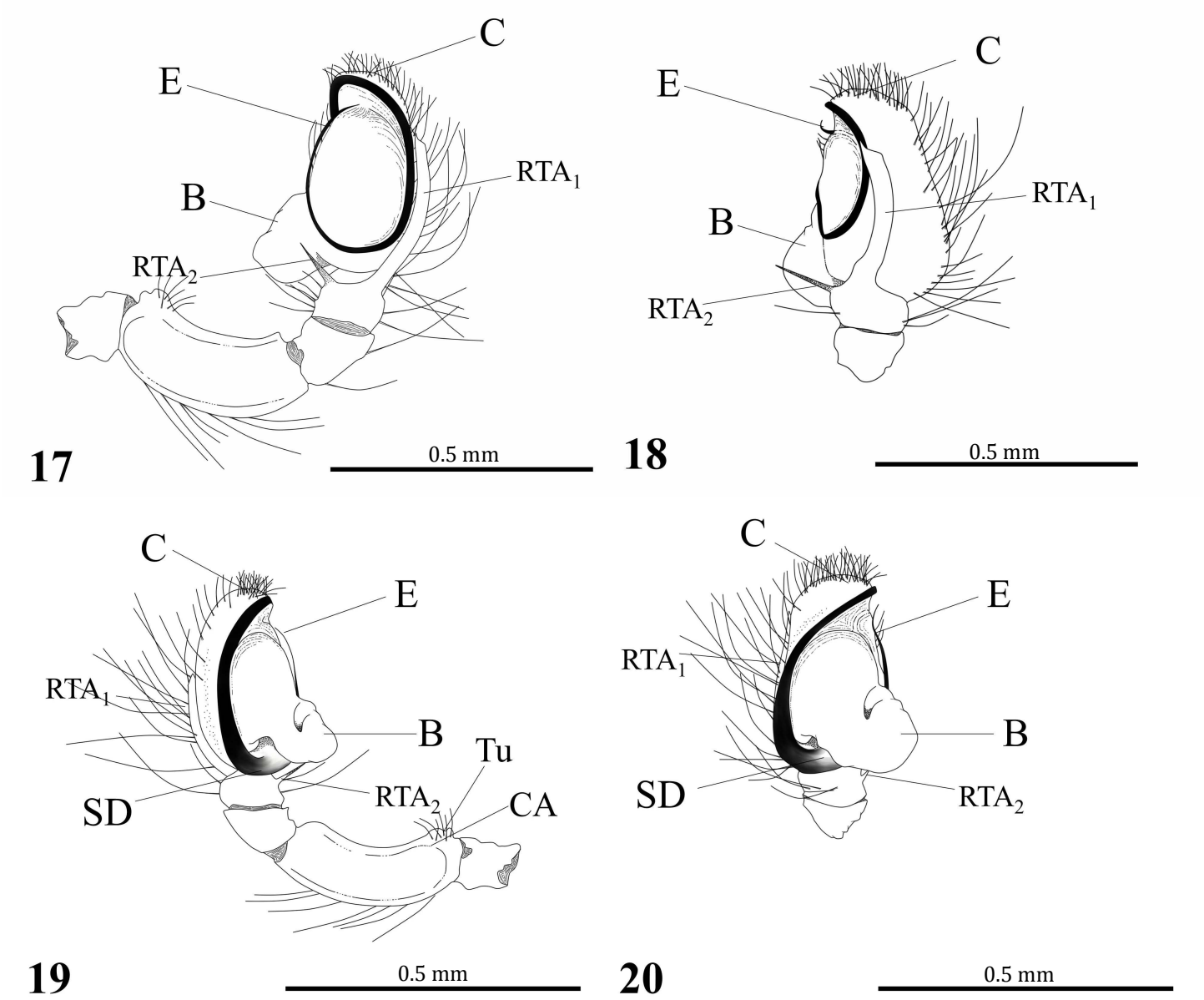


Figures 12–14. Adult female *Helvetia albovittata* from Corrientes Province, Argentina (IBSI–Ara 690). **12,** Dorsal view. **13**, Epigyne, ventral view. **14, E**pigyne, ventral view, cleared.





Figures 15–20 (continued on next page). Left palp of *Helvetia albovittata* Simon, 1901 (14, 16 and 18 specimens from Colombia; 15, 17 and 19 from Argentina). **15-16,** Ventral views.



Figures 15–20 (continued from previous page). Left palp of *Helvetia albovittata* Simon, 1901 (14, 16 and 18 specimens from Colombia; 15, 17 and 19 from Argentina). **17-18,** Retrolateral views. **19-20,** Prolateral views.

***Distribution*.** *Helvetia albovittata* is known from Ecuador (Galápagos Islands: Fernandina Island), Brazil (states of São Paulo and Santa Catarina), Argentina (Córdoba: Embalse; now extended to Chaco: PN Chaco, and Corrientes: Colonia Carlos Pellegrini), Paraguay (locality not specified) and Colombia (department of Córdoba). The last is the first record of this genus and species from Colombia, and the northernmost record from South America. The records from Chaco and Corrientes are new for Argentina and represent intermediate localities (Figure 21).

Figure 21. Known distribution of *Helvetia albovittata* Simon 1901 in South America. Map by Mapswire.com (https://mapswire.com), used subject to a Creative Commons Attribution 4.0 International (CC BY 4.0) License.

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