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Three new species of the genus *Trachelas* (Araneae: Trachelidae) from an oak forest inside the Mesoamerican biodiversity hotspot in Mexico

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Abstract

Three new species of the spider genus *Trachelas* L. Koch, 1872 are described and included in the *speciosus* group based on the following features: embolus as a separate sclerite from the tegulum with no basal coils, legs with a conspicuous fringe of long trichobothria and narrow copulatory ducts coiled irregularly. The new species described are: *T. crassus* **sp. n.**, *T. ductonuda* **sp. n.** and *T. odoreus* **sp. n.** A total of 46 specimens were collected in an oak forest near Pico de Orizaba Volcano, Mexico. Most individuals were collected on low vegetation using beating trays and direct collecting at night. Additional images are available at www.unamfcaracnolab.com.

Key words: Cybertaxonomy, Neotropical, Mexico, RTA clade

Introduction

The family Trachelidae currently includes 202 species with a cosmopolitan distribution except in Australia (WSC 2015). This family has been largely recognized as a monophyletic group traditionally placed with a subfamily rank inside Clubionidae (Gertsch 1942; Chickering 1972) and recently within Corinnidae (Bosselaers & Jocqué 2002). The first study that suggested trachelids as a separate family was Deeleman-Reinhold (2001), as part of her revision of six RTA clade families from Asia; however, that author did not change the rank. Trachelidae was recognized as a family by Ramírez (2014), separated from Corinnidae and placed within the CTC clade named after the claw tuft clasping mechanism. Trachelidae is supported by the following six synapomorphies: spination on legs III–IV reduced, absence of scales, absence of epiandrous spigots, number of major ampullate glands in female reduced to one, median apophysis absent, and secondary spermatheca (enlargement of the copulatory duct) about as large as the primary ones. In this phylogeny Corinnidae was placed several nodes away from Trachelidae (Ramírez 2014).

The genus *Trachelas* L. Koch, 1872 has currently 82 species described worldwide. In the last ten years only five species have been described, all of them from Asia (WSC 2015). America is the continent with the highest diversity, with 58 described species with a distribution extending from Canada to Paraguay. There are two taxonomic revisions that include the North, Central American and Caribbean taxa (Platnick & Shadab 1974a, 1974b), dividing *Trachelas* into four species groups: *bicolor*, *bispinosus*, *speciosus* and *tranquillus*. Forty-one species are known to inhabit the Neotropics and 18 of these have a distribution that includes Mexico (WSC 2015). Of the Mexican *Trachelas*, 14 species are known from both sexes, *Trachelas fuscus* Platnick & Shadab, 1974 only from one female specimen, and three species are only represented by male individuals: *T. rotundus* Platnick & Shadab, 1974, *T. spicus* Platnick & Shadab, 1974, *T. truncatulus* F. O. Pickard-Cambridge, 1899. Finally, some North American species have medical importance due to the mild envenomation cases that have been reported (Uetz 1973; Platnick & Shadab 1974a; Vossbrinck & Krinsky 2014). In this paper three new species of Mexican *Trachelas* are described and included in the *speciosus* group by the presence of the following diagnostic characters:

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embolus as a separate sclerite from the tegulum with no basal coils between these structures, legs with a conspicuous fringe of long trichobothria, and narrow copulatory ducts coiled irregularly (Platnick & Shadab 1974a).

Trachelas has been largely considered a polyphyletic group from which the following three genera have been separated based on their morphology and geographical distribution: *Metatrachelas* Bosselaers & Bosmans, 2010, *Paratrachelas* Kovblyuk & Nadolny, 2009, and *Meriola* Banks, 1985 (Platnick & Ewing 1995; Kobvlyuk & Nadony 2009; Bosselaers & Bosmans 2010). Some of these authors also suggested that all the *Trachelas* species in the New World could be misplaced, because they are not related to the type species *T. minor* O. Pickard-Cambridge, 1872 from the Mediterranean (Platnick & Ewing 1995; Bosselaers & Bosmans 2010). The three species described are placed in the North American *speciosus* group, taking into account the characters mentioned above; however, the placement of all the North American *Trachelas* could change as discussed by Platnick & Ewing (1995) and Bosselaers & Bosmans (2010) when the phylogenetic relationships of the Nearctic and Neotropical species are analyzed.

Material and methods

All species were collected as part of a spider inventory using standarized protocols (Coddington *et al*. 1991) in an oak forest located 15 km from the Pico de Orizaba Volcano in Atotonilco de Calcahualco, Mexico. Two one hectare plots were established with the following central coordinates and elevations: 19°08'30.2"N, 97°12'21.5"W at 2 238 m. a.s.l., and 19°08'17.4"N, 97°12'16.2"W at 2 300 m. a.s.l. Three expeditions were made during one year from May 2012 to February 2013. Specimens were collected and stored in 96% ethanol.

The female genitalia were dissected and digested following the protocol of Alvarez-Padilla & Hormiga (2007) and observed using semi-permanent slide preparations (Coddington 1983). External anatomy was observed using a Nikon SMZ1000 Stereomicroscope and cleared genitalia with a Nikon E200 Microscope. Drawings were done with the respective drawing tubes for both microscopes. All photographs were taken with a Nikon DS-Fi2 camera, captured using Nikon (NIS Elements 4.0) software and montages done with Helicon Focus (5.3.14). Ten male and ten female specimens were measured for *T. crassus* **sp. n.**, and all available specimens were measured for *T. ductonuda* **sp. n.** and *T. odorous* **sp. n.** All measurements were done using a micrometric ocular and are given in millimeters. Counts of ventral cusps for all measured specimens was done for tibia I and metatarsus I. Variation in the number of cusps grouping and pattern can be observed (Platnick & Shadab 1974a), therefore a mean and a range of variation for each species is given. More information regarding this inventory and high resolution versions of the images are available at www.unamfcaracnolab.com (Alvarez-Padilla Laboratory 2015). Descriptions and terminology follows Platnick & Shadab (1974a, b) and Ramírez (2014).

Type and examined material is deposited in the Laboratorio de Aracnología, Facultad de Ciencias, Universidad Nacional Autónoma de México (CAFC-UNAM). Paratypes of *Trachelas crassus* **sp. n.** were sent to the Museum of Comparative Zoology, Harvard (MCZ) and the California Academy of Sciences, San Francisco (CAS). Additional specimens were studied in the MCZ collection for the following species: *T. contractus* Platnick & Shadab, 1974, *T. digitus* Platnick & Shadab, 1974, *T. dilatus* Platnick & Shadab, 1974, *T. erectus* Platnick & Shadab, 1974, *T. oculus* Platnick & Shadab, 1974, *T. similis* F.O. Pickard-Cambridge, 1899, *T. speciosus* Banks, 1898, *T. tomaculus* Platnick & Shadab, 1974, *T. triangulus* Platnick & Shadab, 1974 and *T. trifidus* Platnick & Shadab, 1974.

Abbreviations used in text and figures: AER—anterior eye row, ALE—anterior lateral eyes, AME—anterior median eyes, CD—copulatory duct, CO—copulatory opening, E—embolus, FD—fertilization duct, PER—posterior eye row, RTA—male palp retrolateral tibial apophysis, S—spermatheca, Ss—secondary spermatheca, T—tegulum, VCT—ventral cusps tibia I, VCM—ventral cusps metatarsus I.

Systematics

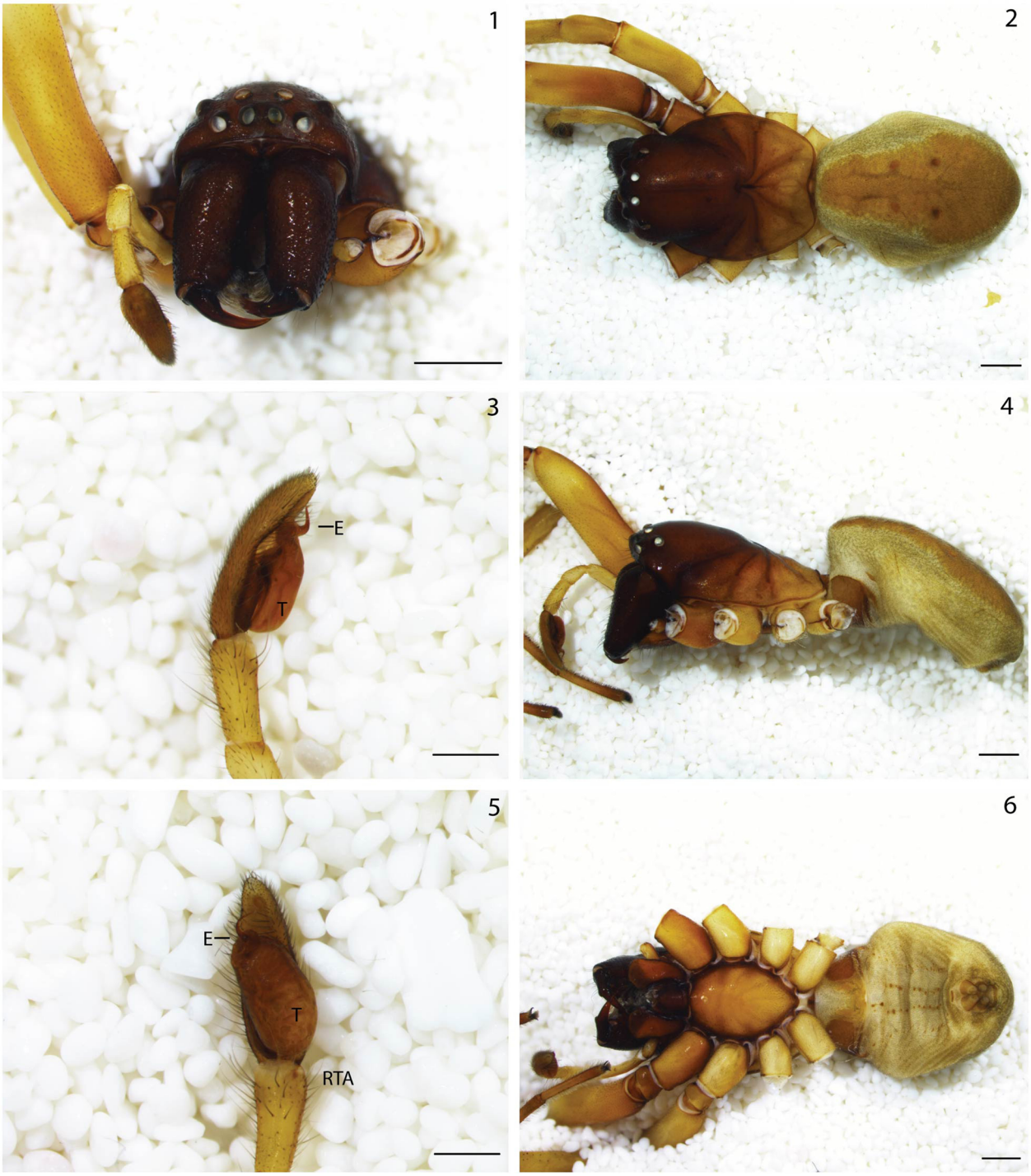
Trachelidae Simon, 1987

Trachelas L. Koch, 1872

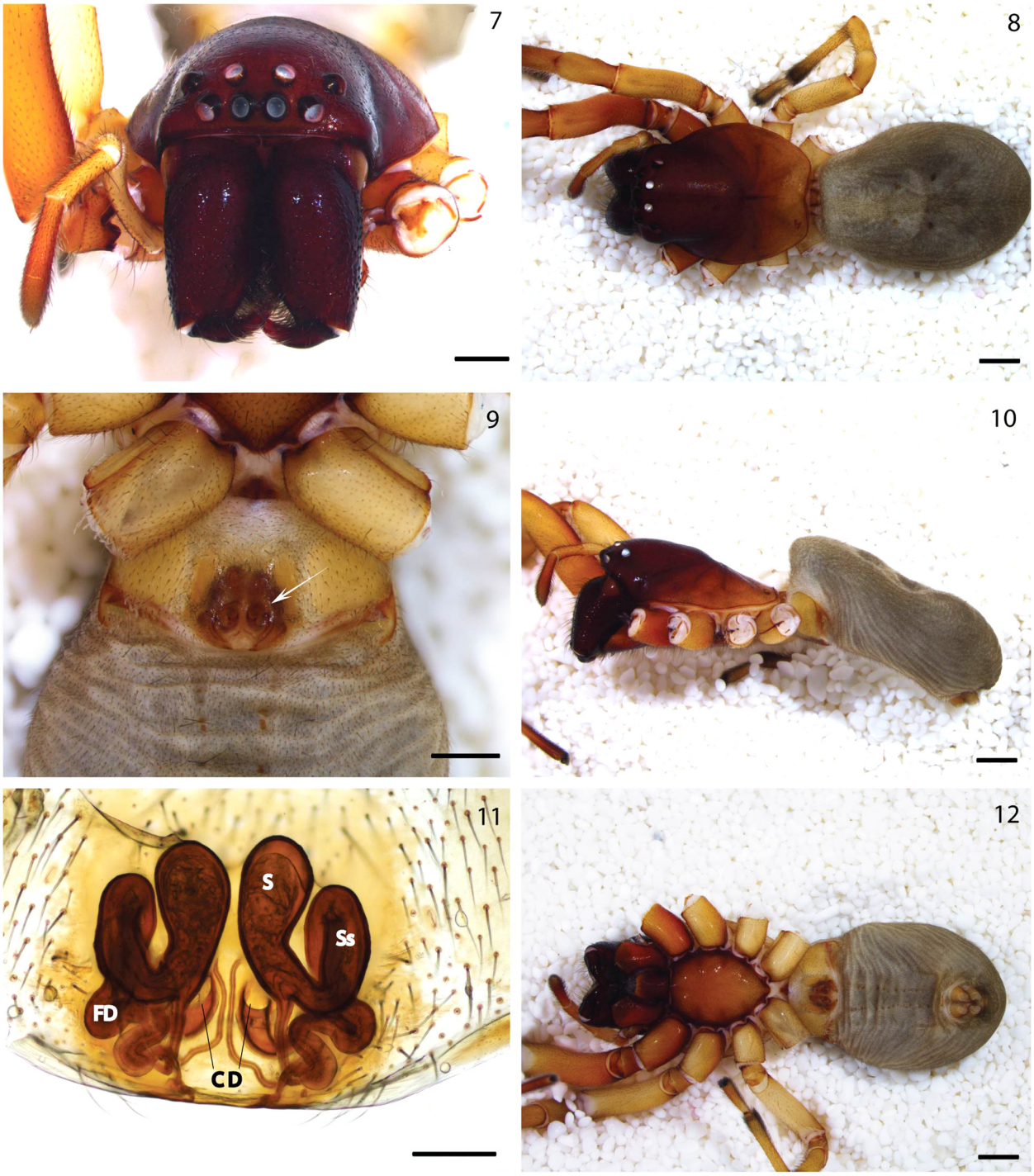
***Trachelas crassus* sp. n.**
Figures 1–17

Type material. ♂ holotype: MEXICO: *Veracruz*: Atotonilco de Calcahualco, near the Pico de Orizaba National Park (19°08'17.4"N, 97°12'16.2"W, 2 300 m), collected 4–14 October 2012, M. Hernández-Patricio (CAFC-UNAM).

♀ allotype from the same locality, collected 15–24 February 2013 by F.A. Rivera-Quiroz (CAFC-UNAM).



FIGURES 1–6. *Trachelas crassus* **sp. n.**, male. 1 Prosoma, anterior view; 2 Habitus, dorsal view; 3 Palp, retrolateral view; 4 Habitus, lateral view; 5 Palp, ventral view; 6 Habitus, ventral view. Scale bars: 1, 2, 4, 6 = 1.0 mm; 3, 5 = 0.5 mm.

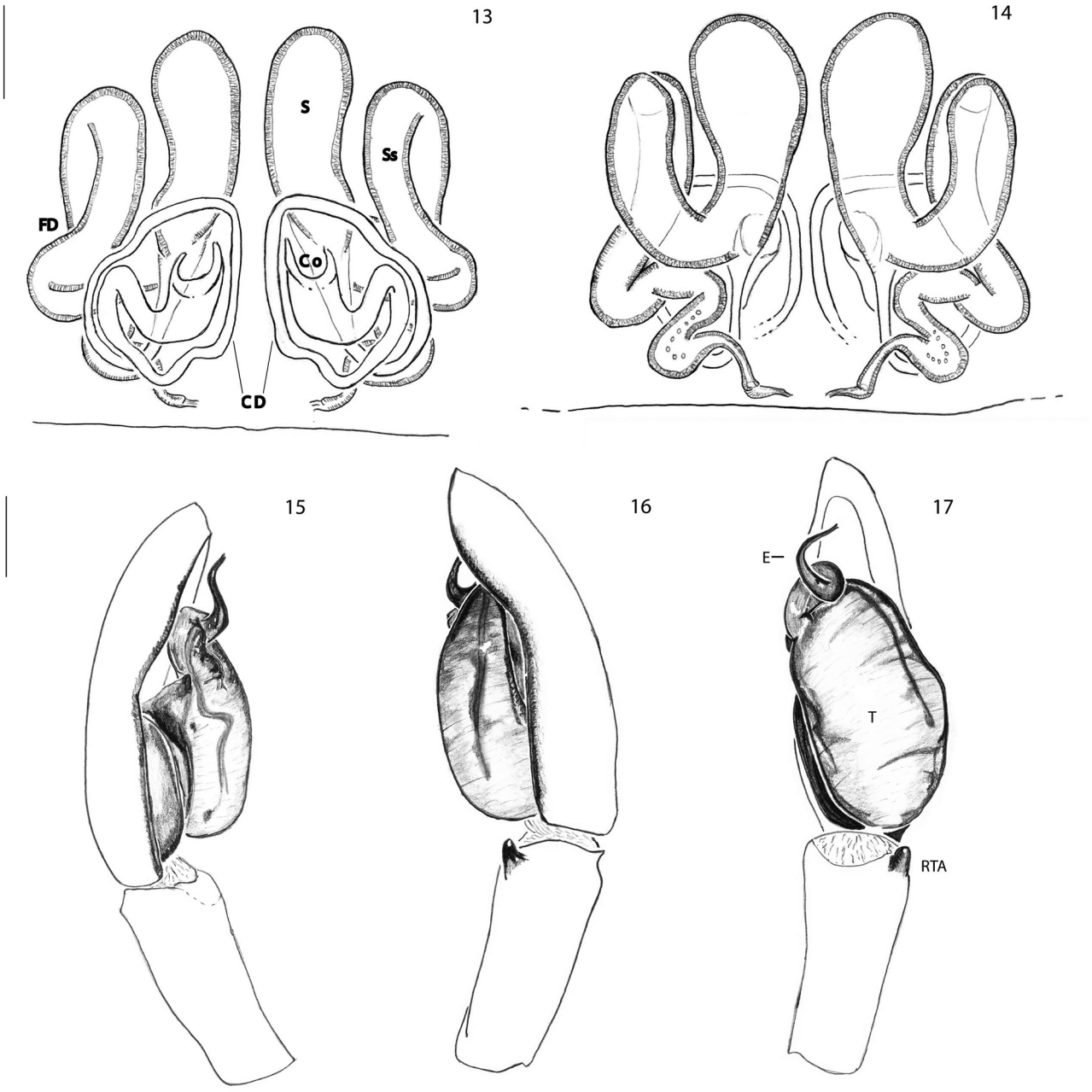


FIGURES 7–12. *Trachelas crassus* **sp. n.**, female. 7 Prosoma, anterior view; 8 Habitus, dorsal view; 9 Epigynum, ventral view; 10 Habitus, lateral view; 11 Epigynum, dorsal view; 12 Habitus, ventral view. Scale bars: 7, 9 = 0.5 mm; 8, 10, 12 = 1.0 mm; 11 = 0.2 mm.

Paratypes: MEXICO: *Veracruz*: Atotonilco de Calcahualco, Plot I, 19°08'30.2"N, 97°12'21.5"W, 2 238 m, 15–24 February 2013, M. Servín-Pastor, 1♂ (MCZ). Same locality, Plot II, 19°08'17.4"N, 97°12'16.2"W, 2 300 m, 4–14 October 2012, F. Alvarez-Padilla, 1♀ (MCZ), 1♀ (CAS); Same data as previous but F.A. Rivera-Quiroz, 1♂ (CAS).

Other material examined. N = 41. MEXICO: *Veracruz*: Atotonilco de Calcahualco, Plot I, 19°08'30.2"N, 97°12'21.5"W, 2 238 m, 21–30 May 2012, 1♀ (CAFC-UNAM); 4–14 October 2012, 6♀, 5♂ (CAFC-UNAM); 15–24 February 2013, 1♀, 1♂ (CAFC-UNAM). Same locality, Plot II, 19°08'17.4"N, 97°12'16.2"W, 2 300 m, 21–30

May 2012, 3♀, 2♂ (CAFC-UNAM); 4–14 October 2012, 7♀, 1♂ (CAFC-UNAM); 15–24 February 2013, 10♀ (CAFC-UNAM).



FIGURES 13–17. *Trachelas crassus* **sp. n.**, genitalia. 13 Epigynum, cleared ventral view; 14 Same, dorsal view; 15 Palp, prolateral view; 16 Same, retrolateral view; 17 Same, ventral view. Scale bars: 13, 14 = 0.1 mm; 15–17 = 0.3 mm.

Etymology. The species epithet is an adjective from the Latin crasso (thick) and refers to the basal portion of the fertilization duct that is almost as wide as the S.

Diagnosis. The male of *T. crassus* **sp. n.** is similar to *T. lanceolatus* F.O. P.-Cambridge, 1899 and *T. odoreus* **sp. n.** by the palpal tibia at least 0.6 times as long as the cymbium (Figs 15, 16; Platnick & Shadab 1974a: fig. 73), but differs from these two species by the E longer and curved clockwise (Fig. 17; Platnick & Shadab 1974a: fig. 72) and the straight RTA with a blunt tip on ventral view (Figs 17, 51; Platnick & Shadab 1974a: fig. 72), respectively. Female genitalia of *T. crassus* **sp. n.** are similar to those of *T. hamatus* Platnick & Shadab, 1974 and *T. latus* Platnick & Shadab, 1974 by having the S and Ss of similar length (Figs 11, 14; Platnick & Shadab 1974a: figs 83, 87), but differ from these two species by the FD curled distally and the less coiled CD, respectively.

Description. *Male:* Total length 9.05. Cephalothorax: 4.7 long. Carapace glabrous, without pattern, coloration reddish-brown, darker in ocular area, becoming lighter towards posterior edge, thoracic grooves deep, darker than surrounding cuticle (Fig. 2). Lateral and dorsal surfaces same color, cephalic area higher than thoracic (Fig. 4). Sternum glossy, almost same color as rear portion of carapace, darker at margins (Fig. 2). AME closer together than to ALE. Clypeus about one diameter of AME. All eyes subequal in size (Fig. 1). AER slightly procurved, PER procurved in dorsal view. Endites and labium dark brown, longer than wide, labium length ca. 3/4 of endites, darker in color. Chelicera dark red, greatly sclerotized, with rugose cuticle. Three promarginal and two retromarginal teeth. Abdomen length 4.7. Dorsal surface pale grey, covered by reddish longitudinal scutum, with leaf-like venation pattern under it (Fig. 2). Ventral surface light yellow, with four narrow lines of sclerotized red spots. Book lungs covers reddish, epigastric area slightly sclerotized (Fig. 6). Leg formula I-II-IV-III, first pair darker, second pair light yellow. VCT 43, VCM 38. Pedipalp light yellow, bulb reddish (Figs. 3, 5). Tibia long about 0.6 times length of cymbium, RTA short, about 0.2 times width of tibia.

Female: as in male except as noted (Fig. 8, 10, 12). Total length 10.5. Cephalothorax: 4.7 long. Abdomen length 5.3, without dorsal scutum, with lateral striated pattern composed of lighter lines (Fig. 10). Ventral surface with two longitudinal narrow lines of sclerotized red spots. Book lungs not as sclerotized as in male (Fig. 12). VCT 20, VCM 28. Epigynum red, with semi-transparent cuticle, atrium round, copulatory openings on middle portion, separated (Fig. 9); CD long, narrow, coiling around CO and FD (Fig. 13). FD with proximal part as wide as S, followed by S-shaped turns, with accessory gland openings on distal portion (Fig. 14).

Variation. *Males*: total length mean 9.05 (range: 8.0 to 9.8), carapace mean 4.7 (range: 4.0 to 5.1). Number of ventral cusps greatly variable, VCT mean 27.6 (range: 17 to 43), VCM mean 33.3 (range: 28 to 38). *Females*: total length mean 10.1 (range: 8.5 to 11.4), carapace mean 4.7 (range: 4.0 to 5.9). Ventral cusps also variable, VCT mean 25.0 (range: 16 to 34) and VCM mean 31.5 (range: 19 to 38).

Distribution. Known only from the type locality (Fig. 52).

Biology. All specimens were collected in a *Quercus* forest with secondary plant growth. Adult specimens were found during all three expeditions. Most specimens were caught by beating and direct collecting over vegetation; only one specimen found in cryptic search.

***Trachelas ductonuda* sp. n.**
Figures 18–34

Type material. ♂ holotype: MEXICO: *Veracruz*: Atotonilco de Calcahualco, near the Pico de Orizaba National Park (19°08'17.4"N, 97°12'16.2"W, 2 300 m), collected 4–14 October 2012 by U. Garcilazo-Cruz (CAFC-UNAM).

♀ allotype from the same locality, collected 15–24 February 2013 by F. Alvarez-Padilla (CAFC-UNAM).

Other material examined: N = 2. MEXICO: *Veracruz*: Atotonilco de Calcahualco, Plot II, 19°08'17.4"N, 97°12'16.2"W, 2 300 m, 4–14 October 2012, 1♂ (CAFC-UNAM); 15–24 February 2013, 1♀ (CAFC-UNAM).

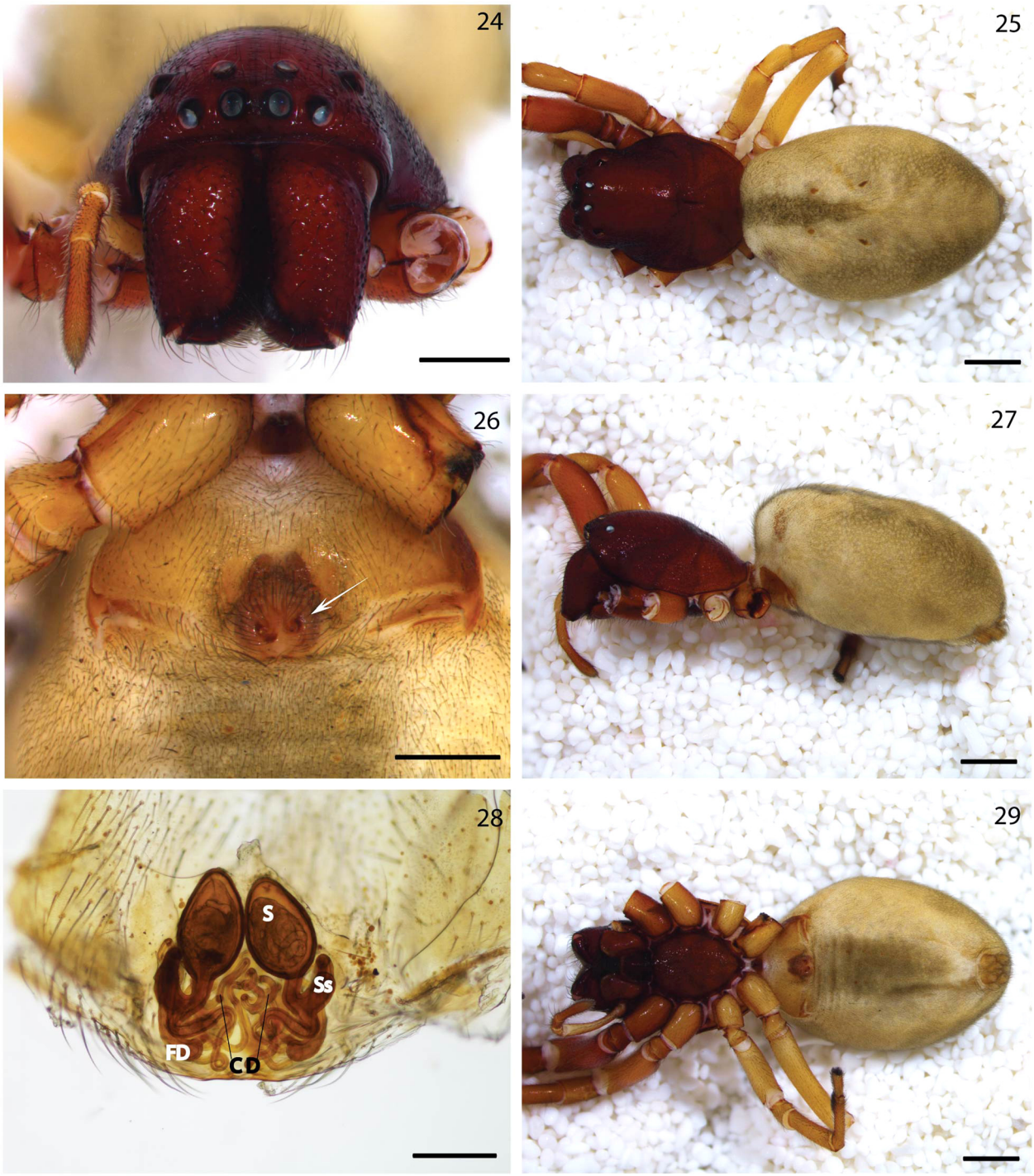
Etymology. The species epithet, a noun in apposition, from the Latin *ducto* (duct) and *nudum* (tangle) refers to the extremely convoluted copulation duct.

Diagnosis. The male of *T. ductonuda* **sp. n.** is similar to *T. latus* and *T. hamatus* in the E hook-shaped and the size of the palpal tibia in relation to the cymbium. Differs from these species by the E having a thicker base and longer hook (Fig. 34; Platnick & Shadab 1974a: fig. 84) and by having a straight RTA instead of hooked in a ventral view (Fig. 34; Platnick & Shadab 1974a: fig. 80) respectively. Female genitalia is similar to *T. spinulatus* F.O. P.-Cambridge 1899 and *T. latus* by having asymmetrical and complexly coiled CD, FD relatively straight and uncoiled, and Ss smaller than the S. It differs from these two species by having longer CD, S oval and considerably wider than the Ss, and atrium with two asymmetric genital openings (Figs 30, 31; Platnick & Shadab 1974a: figs 78, 79, 82, 83).

Description. *Male:* Total length 6.63. Cephalothorax: 2.8 long. Carapace glabrous, without pattern, dark uniform coloration (Fig. 19). Lateral and dorsal surfaces same coloration, cephalic area higher than thoracic (Fig. 21). Sternum same color as carapace (Fig. 23). AME closer together than to ALE. Clypeus about one diameter of AME. All eyes subequal in size (Fig. 18). AER straight, PER procurved in dorsal view. Endites same color as coxa I. Labium same color as carapace, longer than wide, labium about 3/4 of endite length. Chelicera same color as carapace, greatly sclerotized, with rugose cuticle. Three promarginal and two retromarginal teeth. Abdomen: 2.8

long, background pale grey. Dorsal surface without scutum, pattern with an anterior longitudinal dark mark and reticulated clearer patches (Fig. 19). Ventral surface with a darker median rectangular area. Epigastric area and book lung covers pale yellow, slightly sclerotized, middle section darker grey (Fig. 23). Leg formula I-II-IV-III, light yellow, first pair brown. Twenty-three VCT, 27 VCM. Pedipalp and bulb yellow (Figs 20, 22). Tibia short about 0.3 times length of cymbium. RTA large, about 0.4 times width of tibia. E hooked with no basal coil (Figs 32–34).

FIGURES 18–23. *Trachelas ductonuda* **sp. n.**, male. 18 Prosoma, anterior view; 19 Habitus, dorsal view; 20 Palp, retrolateral view; 21 Habitus, lateral view; 22 Palp, ventral view; 23 Habitus, ventral view. Scale bars: 18, 19, 21, 23 = 1.0 mm; 20, 22 = 0.2 mm.

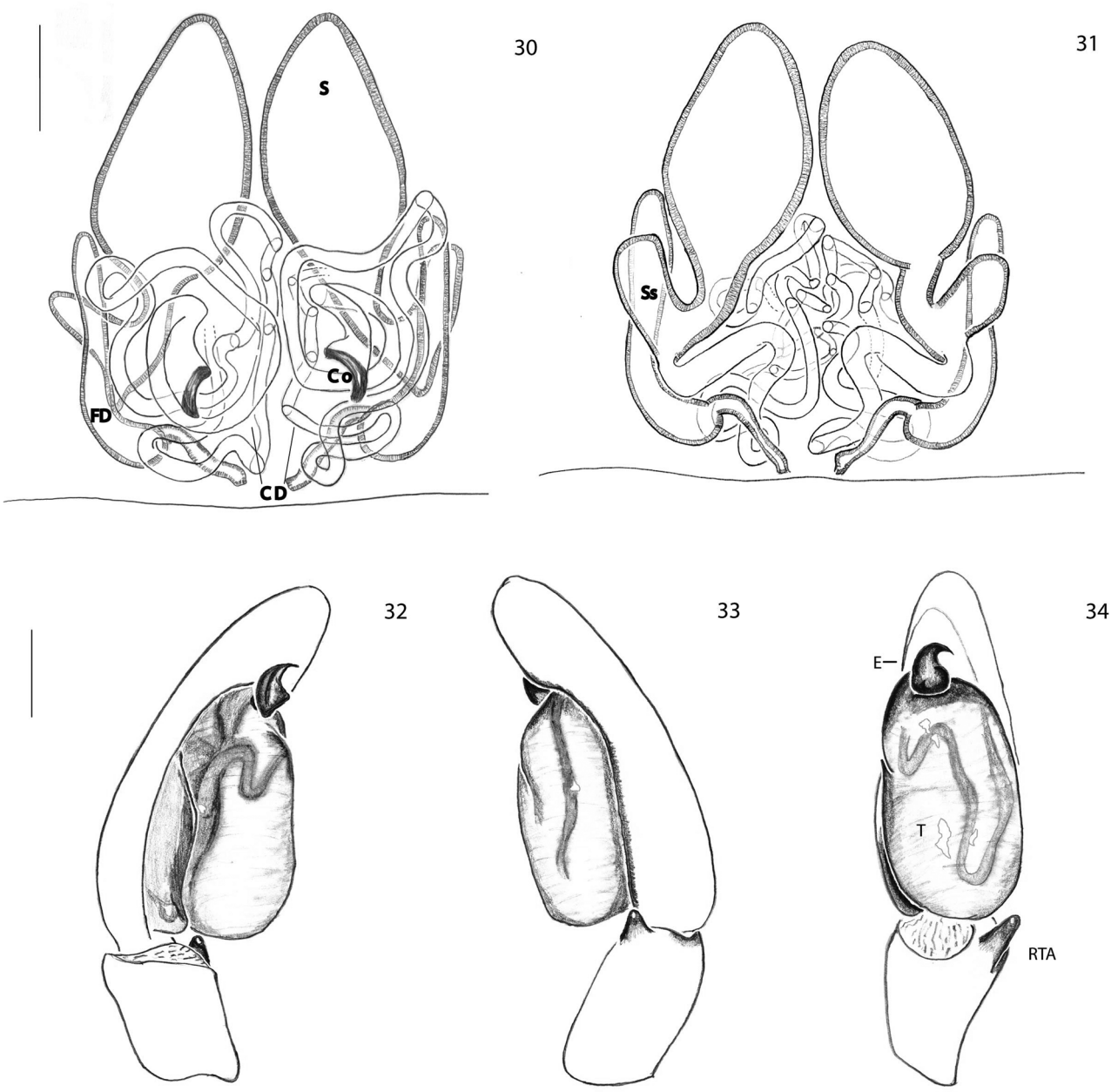


FIGURES 24–29. *Trachelas ductonuda* **sp. n.**, female. 24 Prosoma, anterior view; 25 Habitus, dorsal view; 26 Epigynum, ventral view; 27 Habitus, lateral view; 28 Epigynum, dorsal view; 29 Habitus, ventral view. Scale bars: 24, 26 = 0.5 mm; 25, 27, 29 = 1.0 mm; 28 = 0.2 mm.

Female: as in male except as noted (Figs 25, 27, 29). Total length 7.5. Cephalothorax: 3.5 long. Sternum rugose, same color as carapace (Fig. 29). Abdomen: 3.8 long. Five VCT, 8 VCM. Epigynum reddish, cuticle semi-transparent, atrium with two separated and asymmetrical CO on middle portion (Fig. 26); CD extremely long and slender, irregularly coiled (Figs 28, 30–31).

Distribution. Known only from the type locality (Fig. 52).

Biology. Both type specimens were collected in a *Quercus* forest with secondary plant growth. Adult specimens were found in October 2012 and February 2013. Specimens were caught by beating and direct collecting over vegetation.



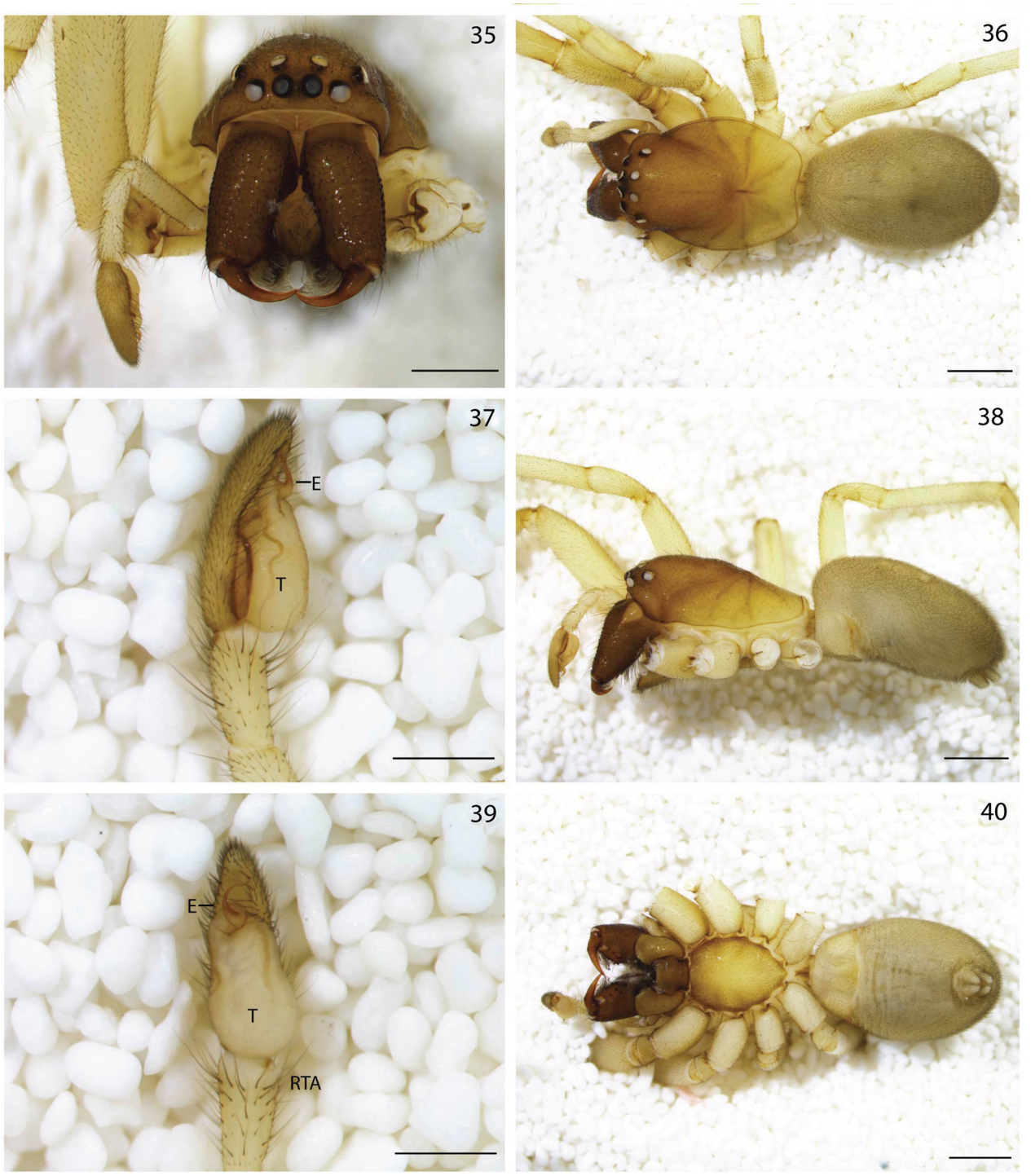
FIGURES 30–34. *Trachelas ductonuda* **sp. n.**, genitalia. 30 Epigynum, cleared ventral view; 31 Same, dorsal view; 32 Palp, prolateral view; 33 Same, retrolateral view; 34 Same, ventral view. Scale bars: 30, 31 = 0.1 mm; 32–34 = 0.2 mm.

***Trachelas odoreus* sp. n**
Figures 35–51

Type material. ♂ holotype: MEXICO: *Veracruz*: Atotonilco de Calcahualco, near the Pico de Orizaba National Park (19°08'30.2"N, 97°12'21.5"W, 2 238 m), collected 21–30 May 2012 by F.J. Salgueiro-Sepulveda (CAFC-UNAM).

♀ allotype from the same locality (19°08'17.4"N, 97°12'16.2"W, 2 300 m), collected 4–14 October 2012 by F.J. Salgueiro-Sepulveda (CAFC-UNAM).

Other material examined. N = 3. MEXICO: *Veracruz*: Atotonilco de Calcahualco, Plot I, 19°08'30.2"N, 97°12'21.5"W, 2 238 m, 21–30 May 2012, 1♂ (CAFC-UNAM); 4–14 October 2012, 1♀ (CAFC-UNAM). Same locality, Plot II, 19°08'17.4" N, 97°12'16.2"W, 2 300 m, 4–14 October 2012, 1♀ (CAFC-UNAM).

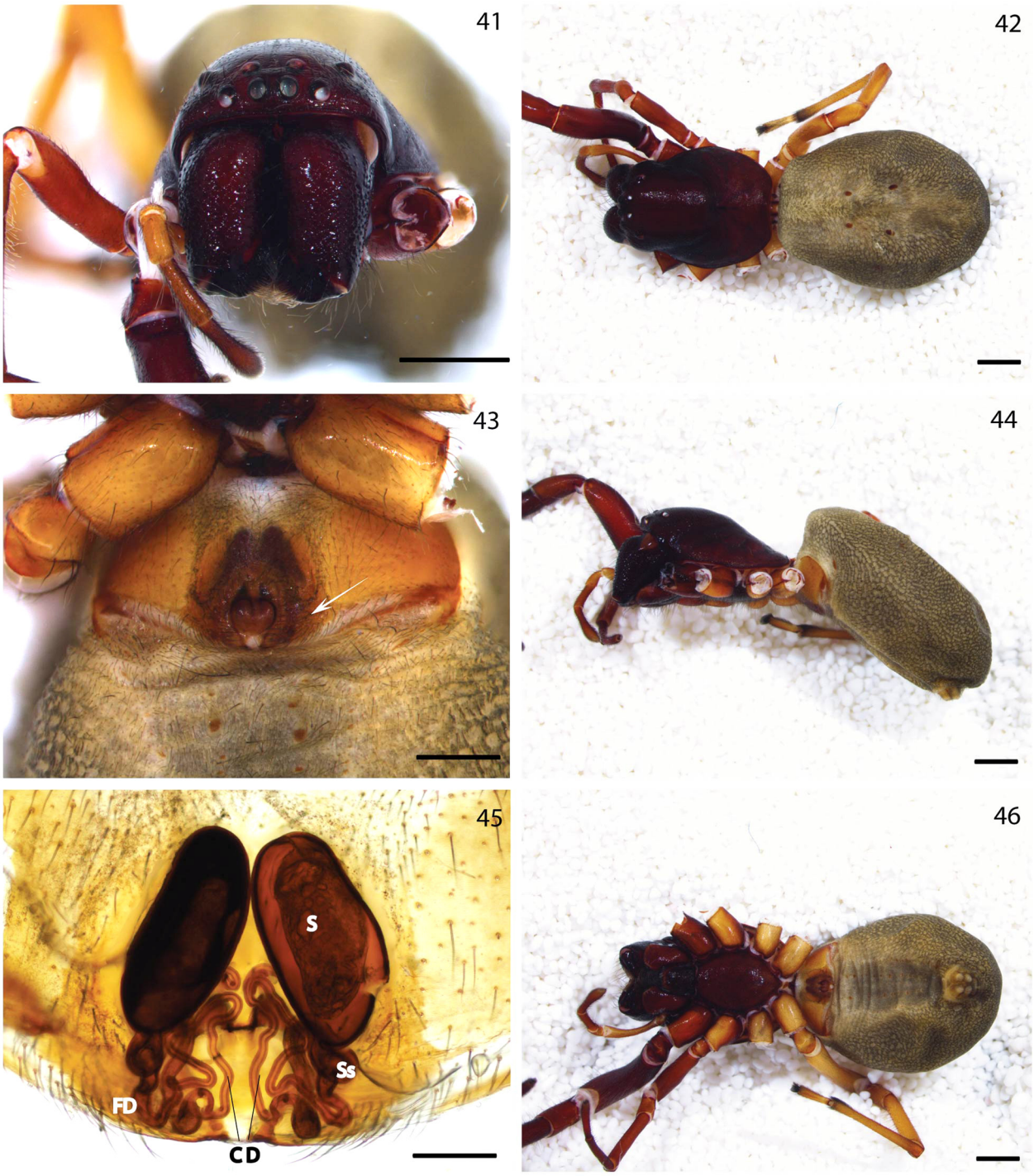


FIGURES 35–40. *Trachelas odoreus* **sp. n.**, male. 35 Prosoma, anterior view; 36 Habitus, dorsal view; 37 Palp, retrolateral view; 38 Habitus, lateral view; 39 Palp, ventral view; 40 Habitus, ventral view. Scale bars: 35 = 0.5 mm; 36, 38, 40 = 1.0 mm; 37, 39 = 0.5 mm.

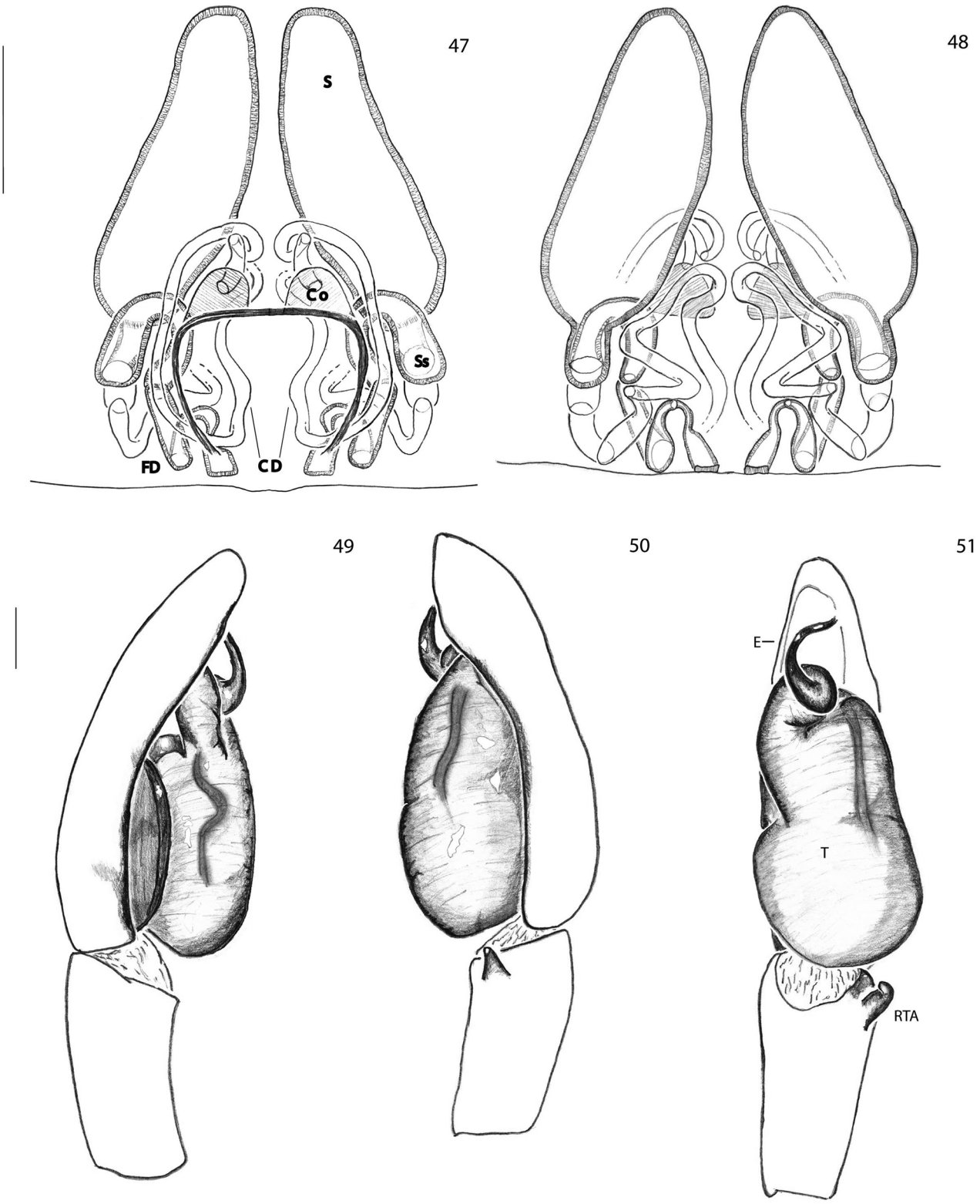
Etymology. The species epithet, formed from the Greek *odontos* (tooth) and the Dutch *reus* (big/giant), refers to the relatively large fangs that characterize *Trachelas*.

Diagnosis. The male of *T. odoreus* **sp. n.** is similar to *T. lanceolatus* and *T. crassus* **sp. n.** by having a large palpal tibia at least 0.6 times as long as the cymbium (Figs 15, 49; Platnick & Shadab 1974a: fig. 73), but it differs from these species by the E longer and curved clockwise (Fig. 17; Platnick & Shadab 1974a: fig. 72) and having a longer RTA with hooked tip on ventral view (Figs 17, 51; Platnick & Shadab 1974a; fig. 72), respectively. Female genitalia is similar to *T. bulbosus* F.O. P.-Cambridge, 1899, by having a wide atrium with two symmetrical genital

openings placed anteriorly, CD irregularly coiled and Ss very small compared to the S (Figs 47, 48: Platnick & Shadab 1974a: figs 70, 71). It differs from this species by having a heart-shaped atrium in ventral view (Fig. 43), symmetrical CD, FD thinner, and S length almost two and a half times the width (Figs 47, 48; Platnick & Shadab 1974a: figs 70, 71).



FIGURES 41–46. *Trachelas odoreus* **sp. n.**, female. 41 Prosoma, anterior view; 42 Habitus, dorsal view; 43 Epigynum, ventral view; 44 Habitus, lateral view; 45 Epigynum, dorsal view; 46 Habitus, ventral view. Scale bars: 41, 42, 44, 46 = 1.0 mm; 43 = 0.5 mm; 45 = 0.2 mm.



FIGURES 47–51. *Trachelas odoreus* **sp. n.**, genitalia. 47 Epigynum, cleared ventral view; 48 Same, dorsal view; 49 Palp, prolateral view; 50 Same, retrolateral view; 51 Same, ventral view. Scale bars: 47, 48 = 0.1 mm; 49–51 = 0.2 mm.

Description. *Male:* Total length 6.62. Cephalothorax: 3.5 long. Carapace glabrous without pattern, coloration light brown, darker in ocular area, becoming lighter towards posterior edge, thoracic grooves deep, darker in relation to surrounding cuticle (Fig. 36). Lateral and dorsal surfaces same color, cephalic area higher than thoracic

(Fig. 38). Sternum glossy, almost same color as rear portion of carapace, darker at margins (Fig. 40). AME closer together than to ALE. Clypeus about one diameter of AME. All eyes subequal in size (Fig. 35). AER straight, PER procurved in dorsal view. Endites and labium dark brown, longer than wide, labium length ca. 3/4 of endites and darker in coloration. Chelicera heavily sclerotized, rugose cuticle, brown, darker than carapace. Three promarginal and two retromarginal teeth. Abdomen: 2.75 long, background pale grey. Dorsal surface dark yellow without scutum or pattern (Fig. 36). Ventral surface light yellow, booklung covers pale yellow, epigastric area slightly sclerotized (Fig. 40). Leg formula I-II-IV-III, light yellow, first pair slightly darker. Nineteen VCT, 30 VCM. Pedipalp light yellow, bulb same color as tibia (Figs 37, 39), tibia long, about 0.6 times length of cymbium, RTA short and slightly hooked, about 0.3 times width of tibia (Figs 49–51).

Female: as in male except noted. Total length 9.7. Cephalothorax: 4.0 long. Carapace dark red, slightly darker in the eye area (Fig. 42). Sternum same color as rear portion of carapace (Fig. 46). Chelicera same color as anterior portion of carapace (Fig. 41). Abdomen: 5.5 long, background dark gray without scutum or characteristic pattern (Fig. 42). Ventral surface dark grey, booklungs slightly red, epigastric area highly sclerotized (Fig. 46). Legs reddish-yellow, first pair darker. VCT absent, 9 VCM. Epigynum ventrally dark red, atrium big, heart shaped, two separated copulatory openings placed anteriorly (Fig. 43); CD extremely long and slender, irregularly curled (Fig. 47). Oval elongated S that connects to a relatively short and stout FD, directly under S a bulge in the FD forms a small Ss (Fig. 48).

Variation. *Female*: total length mean 9.7 (range: 8.9 to 10.6), carapace length mean 4.0 (range: 4.0 to 4.1. Female with no VCT present, VCM mean 7.5 (range: 6 to 9).

Distribution. Known only from the type locality (Fig. 52).

Biology. All specimens were collected in a *Quercus* forest with secondary plant growth. Adult specimens were found in May and October 2012. Specimens were caught by beating and direct collecting over vegetation.

FIGURE 52. Map of the locality where *T. crassus*, *T. ductonuda* and *T. odoreus* were collected near Pico de Orizaba (Veracruz) marked with an X. Scale bar = 200 km.

Relevance for oak forests conservation in Mexico

The Mesoamerica biodiversity hotspot includes several ecosystems from the central part of Mexico to Central America (Myers *et al.* 2000). The "*Zona de Trancicion Mexicana*" (ZTM) is found inside this hotspot, formed by

the convergence of the Nearctic and Neotropical regions, which combined with the irregular topology of the Mexican Volcanic Belt (MVB) has created great endemism (Morrone 2006; Espinosa-Organista *et al.* 2008). The MVB extends from the Atlantic to the Pacific coasts, with the Pico de Orizaba Volcano on the eastern-most portion of this volcanic system (Macías 2007). Pico de Orizaba is a dormant volcano formed during the Pliocene and has been considered a National Park since 1936. However, its area was intended to protect only the *Pinus* and *Abies* forests (CONANP 2012), allowing the deforestation of nearby *Quercus* forests for commercial exploitation.

Mexico has the second largest *Quercus* flora in the world, including between 150–165 of the 600 species described (Rzedowski 1978; Jones 1986; Gonzalez 1993; Nixon 2006), of which at least 27 are endemic (Valencia 2004). There is only one arthropod inventory from oak forests in Mexico, comparing the canopy community of three forests differentiated by their degree of conservation. It was found that the better preserved areas had a greater morphospecies richness of 20 arthropod orders, showing the impact of destruction and fragmentation (Tovar-Sanchez *et al.* 2003). Most spider inventories in oak communities come from Europe (Urones *et al.* 1990; Espuny *et al.* 1993; Koponen 1996; Cardoso *et al.* 2008a, b). These studies found that the Trachelidae fauna in European oak forests have ca. five species of trachelids, with only one species probably shared: *T. minor* from the taxonomic revision of Bosselaers *et al.* (2009), with *T.* cf. *minor* from the spider inventory of Urones *et al.* (1990). In North America the spider fauna of oak communities has been studied only in fragmented patches of this vegetation type, finding only one species, *Meriola decepta* Banks, 1895 (Barnes 1953).

The three species described here were collected as part of the first spider inventory done in Mexican *Quercus* forests (Alvarez-Padilla *et al.* in prep.). This inventory found that two hectares of an oak forest inside the ZTM has approximately one third of all the trachelid species found in Europe and about 3% of the species found in America (WSC 2015). This result is preliminary because many more oak spider inventories are needed; however, it predicts a potentially high spider diversity and endemism for these ecosystems, providing data that may help in their conservation and probably include this kind of vegetation inside the protected area of Pico de Orizaba Volcano.

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