

*This contribution is published
to honor Dr. Amnon Freidberg,
a scientist, a colleague and a friend,
on the occasion of his 75th birthday.*

Taxonomical notes on the Neotropical genus *Pterocalla* Rondani (Diptera: Ulidiidae), with description of a new species from Mexico

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ABSTRACT

Currently seven species of *Pterocalla* Rondani are known to occur in Mexico, including two endemics. In the present paper, *Pterocalla amnoni* n. sp. is described, along with redescription of its sibling species, *P. maculata* Hernández-Ortiz & Arias-Velázquez, based on specimens collected in the tropical rainforest of the Biosphere Reserve Los Tuxtlas, Mexico.

KEYWORDS: Tephritoidea, Pterocallinae, Pterocallini, picture-winged flies, Mesoamerica, new species.

RESUMEN

Para México, actualmente se conocen siete especies de *Pterocalla* Rondani, incluyendo dos endémicas. En este trabajo se describe una especie nueva, *Pterocalla amnoni*, además de la redescipción de su especie hermana, *P. maculata* Hernández-Ortiz & Arias-Velázquez, con base en el estudio de especímenes recolectados en la selva tropical lluviosa de la Reserva de la Biosfera Los Tuxtlas, México.

PALABRAS CLAVE: Tephritoidea, Pterocallinae, Pterocallini, moscas de alas pintadas, Mesoamérica, especie nueva.

INTRODUCTION

The genus *Pterocalla* Rondani is endemic to the Neotropical region consisting of 21 described species found mainly in South America, primarily reported from a few countries such as Bolivia (10 spp.) and Peru (9 spp.) (Hendel 1909, 1914). Eight species are known to occur in Central America, especially from Panama (7 spp.) and Costa Rica (7 spp.) (Steyskal 1968; Kameneva 2003). Currently seven species have been recorded from Mexico: *P. costalis* Wulp, *P. ocellata* (Fabricius), *P. quadrata* Wulp, *P. pantherina* (Walker), and *P. fenestrata* Wulp, found also in Central America; in addition to two endemic ones, *P. bella* Giglio-Tos and *P. maculata* Hernández-Ortiz & Arias-Velázquez (Giglio-Tos 1895; Wulp 1899; Hernández-Ortiz & Arias-Velázquez 1989). Most of the species are found in tropical

and subtropical environments, and adults are commonly captured in food-baited traps. The biology of this genus is virtually unknown; however, given the larval habits of other Ulidiinae species, it is thought that larvae could be saprophagous on rotting plant material. *Pterocalla* Rondani is the type genus of the tribe Pterocallini (sensu Kameneva & Korneyev 2006) mainly featured by the dull brown or gray body, setulose or bare vein R_1 , sinuous vein R_{2+3} (if sometimes straight, then vein R_{4+5} setulose dorsally); most members sexually dimorphic, with pterostigma in males usually strongly enlarged (as long as, or even longer than costal cell), bare or short sparsely setulose phallus; and female with 3 spherical spermathecae, with smooth surface. The genus *Pterocalla* Rondani can be recognized by the following combination of characters: ocellar setae moderately developed nearly as long as postocellars, or sometimes reduced, 1 orbital, 1 postpronotal, 1–2 dorsocentral, 2–4 anepisternal, 2 pairs of scutellar setae; cell cup with a long (subgenus *Pterocalla*) or short (subgenus *Parapterocalla*) posteroapical extension; crossvein r–m located approximately in the last third of discal cell; crossveins r–m and dm–cu separated at least by a distance as long as or longer than dm–cu length, the latter oblique and divergent of the former.

The Station of Tropical Biology Los Tuxtlas-UNAM (STBLT) comprises 640 hectares of tropical rainforest preserved in good condition (IBUNAM 2018), which is engulfed within the Biosphere Reserve Los Tuxtlas (BRLT) located at the central region of the state of Veracruz, Mexico. The region is especially interesting since it is the northernmost remnant of tropical rainforest in the Americas, stemming from the Mexican Transition Zone, where Nearctic and Neotropical flora and fauna converge, and it has been the most studied tropical region of Mexico.

In a recent survey conducted in the best-preserved area of this reserve, we detected five of the seven *Pterocalla* species recorded in Mexico, including specimens of *P. maculata*, which was formerly described from this locality based on a single female specimen, and furthermore, we encountered a number of specimens of another closely related undescribed species. In view of these findings, in the current study we provide the taxonomic description of this new species, along with redescription of female and the first description of male of *P. maculata*.

MATERIALS AND METHODS

The present study was carried out on material collected at the Station of Tropical Biology Los Tuxtlas, UNAM (Veracruz, Mexico) throughout the period 2013–2016; the research forms part of the ongoing project concerning the diversity of Tephritoidea of this Reserve. The examined specimens were taken from McPhail-type traps baited with Ceratrap©, which were hung at approximately 10 m above ground in the forest canopy. For examination of genitalia in both sexes, the abdomen was dissected and soaked in warm sodium hydroxide solution 10 % for 10 min, then rinsed and stored in a glycerin-filled micro vial pinned below corresponding specimen. Measurements shown in the species description are the range of variation,

while proportions (e.g., length/width of wing, or thorax/wing length) are expressed as the ratio and variance among surveyed specimens. Measurements were made with a Zeiss Stemi 508 stereomicroscope using the eye micrometer. Micrographs were made with an Olympus digital camera C-5050 fitted to the stereomicroscope and processed with the Helicon Focus Pro software. The nomenclature used in this paper follows adult morphology by Cumming and Wood (2009), and family-specific nomenclature for Ulidiidae used by Kameneva and Korneyev (2010). The examined specimens were placed in the Insect National Collections (CNIN) of the Instituto de Biología UNAM (Mexico City), and in the Entomological Collection IEXA of the INECOL (Xalapa, Veracruz).

TAXONOMY

Genus *Pterocalla* Rondani, 1848

Pterocalla (Pterocalla) ammoni n. sp.

(Figs 1–3, 7–11)

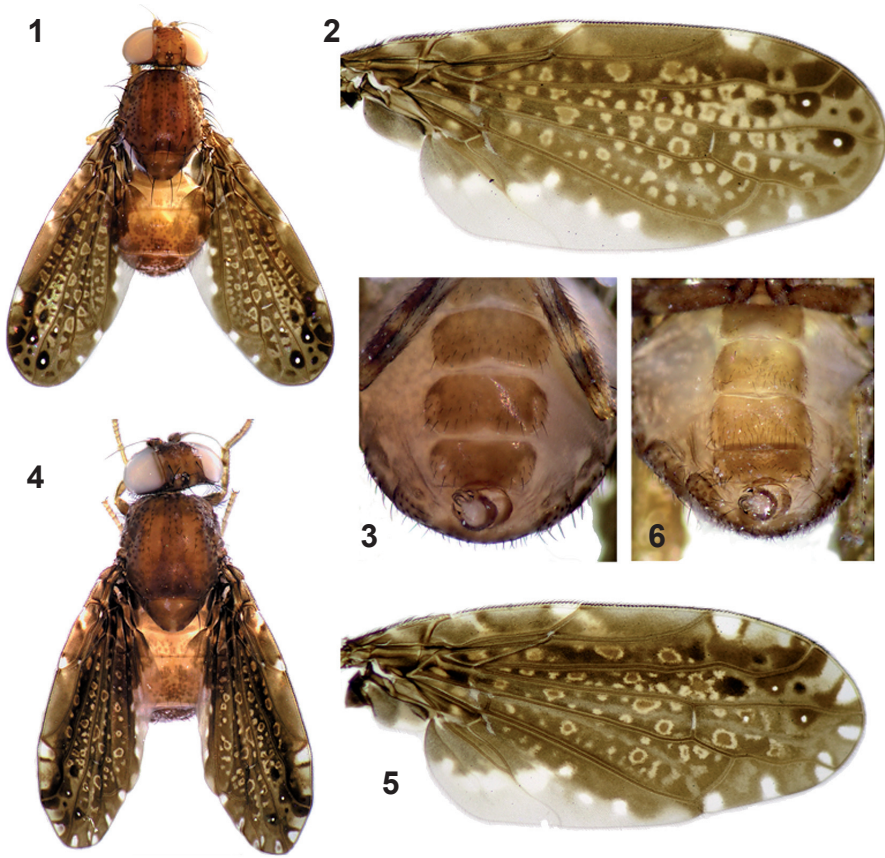
LSID: urn:lsid:zoobank.org:act:F4A97DA8-5B14-4E7E-9E96-1ED43A8F7D64.

Etymology: This species is named to honor Amnon Freidberg, a great friend and world citizen, fellow expert in the tropical dipterofauna and the organizer of the memorable First Symposium on Biotaxonomy of the Tephritoidea held in Israel.

Diagnosis: Body mostly reddish brown with irregular dark brown spots primarily on scutum, pleuron and abdominal tergites; orbital setae well-developed, ocellars nearly $\frac{1}{2}$ length of orbitals; wing pattern mostly dark brown with numerous yellow spots, encircled by hyaline halo mostly occurring in cells r_1 , r_3 , r_5 , br and dm; apical third of wing with three marginal hyaline spots, one in cell r_1 , and two others in cell m; lateral surstylus apically rounded in posterolateral view; medial surstylus with robust sclerotized preniseta, ca. $\frac{1}{2}$ as long as lateral surstylus, preceded by 6–8 translucent spines; phallus membranous fitted with some cuticular spines scattered along the structure; distiphallus translucent or hyaline, without visible sclerites.

Description (Fig. 1): *Head.* As wide as long in lateral view, mostly reddish brown with orbital margins and frons covered with fine whitish pollinosity and golden shade, extending anteriorly near the lunula; frons with lower margin somewhat darker than upper portion close to ocellar triangle, with scattered black setulae; scape and pedicel mostly yellow, flagellomere blackish, rounded apically extended to clypeal edge, arista bare; palpus yellowish, elongated, rather dark brownish in apical third; occiput and gena dark brown; one orbital seta reclined; ocellars present, ca. $0.5\times$ as long as orbitals; medial and lateral vertical setae present.

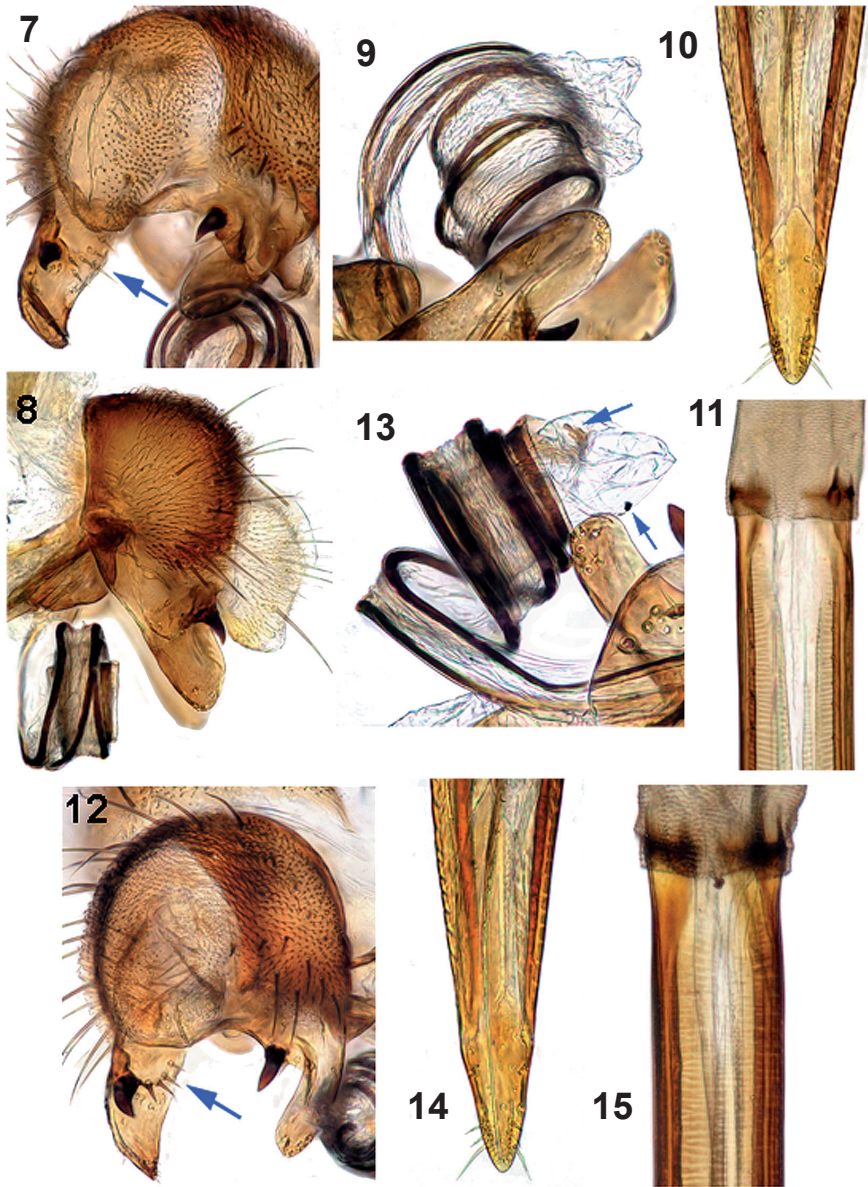
Thorax. Measurements (mm): female length 1.93–2.24; male length 1.86–2.10. Scutum and scutellum reddish brown coated by golden pollinosity, and brownish black setulae arranged in longitudinal stripes; scutum surface with black spots, at points of insertion of setae and setulae, becoming larger in middle and close to posterior margin; postpronotal lobe yellow. One postpronotal, 2 notopleurals, 1 postsutural



Figs 1–6: Male features of *Pterocalla amnoni* n. sp. (1–3) and *P. maculata* (4–6): (1, 4) dorsal habitus, specimens in alcohol; (2, 5) wing patterns; (3, 6) abdominal sternites.

supra-alar, 1 postalar, 1 intra-alar, 2 dorsocentrals (anterior shorter than posterior), and 1 acrostichal setae present. Pleuron mostly dark brown with few paler irregular spots; anepisternum with three setae present in vertical line at posterior margin, the upper one being larger; katepisternal seta well developed; scutellum brownish yellow, with brown transverse stripe; two pairs of scutellar setae present. *Legs*. Mostly yellow, with brownish markings forming irregular rings on the femora and tibiae; fore femur with ventral row of 5 or 6 large black setae; tarsi yellow.

Wing (Fig. 2). Measurements (mm): female 4.7–5.52 long, 1.67–2.19 wide (ratio length/width 2.71 ± 0.08); male 4.43–4.76 long, 1.62–1.86 wide (ratio length/width 2.59 ± 0.07); ratio thorax/wing $0.40\text{--}0.42 \pm 0.01$. Vein R_{2+3} bent from level of r-m and curved forward at wing margin; vein M gently undulated just before apical margin of wing; length from r-m to dm-cu nearly as long as dm-cu; cell cup with posteroapical angle protruded, nearly as long as cell body. Pattern predominantly



Figs 7–15: Male and female terminalia of *Pterocalla amnoni* n. sp. (7–11) and *P. maculata* (12–15): (7–9, 12, 13) male genitalia: epandrium, proctiger and surstyli in posterolateral (7, 12) and lateral (8) views, details of phallus and distiphallus (9, 13); (10, 11, 14, 15) female genitalia: aculeus tip in ventral view (10, 14) and connection of eversible membrane with the aculeus base (11, 15).

dark brown, with a series of paler yellow spots encircled by hyaline halo, arranged irregularly in cells r_1 , r_3 , r_5 , br and dm; apical third of wing with two well-defined ocellar spots (described as small hyaline dot surrounded by black ring), one in cell r_3 and other in cell r_5 located near vein R_{4+5} , and diffuse hyaline dot (without surrounding black coloration) in r_5 , at level of dm-cu; pterostigma dark brown; wing margin with hyaline stain contiguous to apex of cell sc; semi-circular hyaline spot at apex of vein R_1 ; two hyaline spots on margin of cell m, one in middle and other at end of vein Cu₁; lower half of cell cu₂ hyaline adjacent to lower edge of wing. Coloration pattern in both sexes seems similar; however, male pterostigma ca. 1.2× as wide as in female. Haltere whitish.

Abdomen. Predominantly yellow, with many irregular dark spots and blackish hair scattered on all tergites, except in tergite 1+2 which is largely yellow. Male with second abdominal tergite with 2 irregular light brown patches on the middle area.

Male terminalia (Figs 3, 7–9). Epandrium brownish red, nearly spherical; medial surstylus with single sclerotized preniseta sided by 6–8 sturdy hyaline spines; phallus coiled about three times, with dark edges throughout its length, and fitted with a few translucent teeth or spines scattered over its membrane, distiphallus membranous and fully translucent, without any visible internal or external sclerites.

Female terminalia (Figs 10, 11). Oviscape heart-shaped, shining brownish covered with scarce black pilosity, 0.80–0.87 mm long (nearly long as two apical tergites combined), and 0.91–1.06 mm wide basally; aculeus 1.43–1.58 mm long, gradually tapering toward the apex with three pre-apical sensory spines.

Holotype: ♂ **Mexico:** Veracruz, Station of Tropical Biology Los Tuxtlas-UNAM (STBLT) [18°34'56"N 95°04'37"W], 246 m, 17.xii.2013, M. Madora.

Paratypes: **Mexico:** same data as holotype, 17.xii.2013 (1♂ 2♀ IEXA, 2♀ CNIN); same locality [18°34'56"N 95°04'37"W], 246 m, M. Madora: 30.xii.2013 (1♂ CNIN), 3.iii.2014 (1♂ CNIN, 2♀ IEXA), 16.iv.2014 (3♂ 2♀ IEXA, 2♀ CNIN), 14.v.2014 (1♀ CNIN), 15.viii.2014 (1♀ IEXA); same locality [18°35'47"N 95°06'07"W], 204 m, 17.vi.2016, M. Madora & F. Ramirez (1♂ IEXA, 1♀ CNIN); same locality [18°34'58"N 95°04'35"W], 231 m, M. Madora: 17.xii.2013 (1♂ 1♀ IEXA, 1♀ CNIN), 31.i.2014 (3♂ IEXA), 14.ii.2014 (1♂ IEXA, 1♀ CNIN), 3.iii.2014 (1♂ 1♀ IEXA), 16.iii.2014 (1♀ CNIN), 14.vii.2014 (1♀ IEXA), no date (1♀ IEXA); same locality [18°34'55"N 95°04'35"W], 207 m, M. Madora: 3.iii.2014 (1♀ CNIN), 30.xii.2013 (1♀ CNIN), 31.i.2014 (1♂ CNIN), 31.iii.2014 (2♀ IEXA), 30.vi.2014 (1♀ CNIN); same data but 29.x.2013, F. Acevedo (1♂ 2♀ CNIN, 1♀ IEXA).

Pterocalla (Pterocalla) maculata Hernández-Ortiz & Arias-Velázquez, 1989
(Figs 4–6, 12–15)

Pterocalla (Pterocalla) maculata Hernández-Ortiz & Arias-Velázquez, 1989: 399, fig. 1B. (Type locality: Los Tuxtlas, Mexico.)

Diagnosis: Body generally reddish brown coated with fine greyish pollinosity with golden reflections, with irregular dark brown spots specially on scutum and pleuron; orbital setae well developed, ocellars about 0.5× as long as orbitals; wing pattern with distinctive coloration similar to *P. ammoni*, with two hyaline spots in cell sc; apical third of wing characterized by six well-defined marginal hyaline spots:

each one in cells r_1 and r_3 , respectively; two others in cell r_5 , one in the middle and lower shared with cell m crossing vein M ; in addition to two other spots at lower margin of cell m ; lateral surstylus sharpened apically in posterolateral view; medial surstylus with strong sclerotized prensiseta, preceded by 4 translucent spine-like setae; phallus membranous and smooth; distiphallus fitted with yellow internal sclerite and a single apical black protrusion.

Redescription (Fig. 4): *Head*. Reddish yellow with dark spots on the lower margin of frons close to lunula, at the vertex and the ocellar triangle; orbital margins with greyish pollinosity and brown dark spots surrounding the bases of the orbital and vertical setae; frons with few short hairs on the lower half; antennae reddish brown basally (scape and pedicel), flagellomere mostly dark brown; face dark yellow; ocellar setae nearly $0.5\times$ as long as orbitals.

Thorax. Measurements (mm): female length 1.93–2.02; male length 1.90–2.14. Scutum covered by fine grayish pollinosity with golden reflections from presutural area, fading gradually backwards until brown color prevails, in addition to brown dots on yellowish areas on bases of setae and setulae, being larger medially along dorsocentral and acrostichal lines; scutellum with some areas covered by gray pollinosity, including two big dark spots extending from middle disc towards basal scutellar seta, and two others surrounding apical scutellar seta; pleuron dark brownish with irregular darker spots. *Legs*. Foreleg with femur yellow apically and several dark spots lengthwise, tibia and tarsomeres mostly yellow; mid- and hind-legs with femora and tibiae mostly yellow with wide black rings (especially in mid-leg), all tarsi yellow.

Wing (Fig. 5). Holotype 4.9 mm long; measurements for additional specimens: female 4.43–4.52 mm long, 1.81–1.95 mm wide (ratio length/width 2.38 ± 0.07); male 4.57–4.67 mm long, 1.95–2.10 mm wide (ratio length/width 2.28 ± 0.06); ratio thorax/wing = 0.44 ± 0.02 . Wing pattern brownish black, except in the bottom half which is hyaline in cell CuA_1 ; cells r_1 , r_3 , r_5 , br and dm with paler conspicuous spots, surrounded by a distinctive hyaline halo; apical margin with remarkable hyaline spots as follows: one basal and one apical in cell sc ; large hyaline mark in cell r_1 , immediately after tip of vein R_1 ; two placed in apical margin in cells r_3 and r_5 ; besides three marginal hyaline markings in cell m . Apical third of wing with two well-defined small ocellar spots, one in cell r_3 and other in cell r_5 , along with hyaline point (without surrounding dark halo) on the latter, at level of the $dm-cu$ vein. Haltere whitish.

Abdomen. Tergites covered by fine yellow pollinosity with irregular brown dots; ovipositor sheath heart-shaped, nearly as long as the three preceding tergites combined.

Male terminalia (Figs 6, 12, 13). Epandrium brownish red, nearly spherical; medial surstylus with a single robust prensiseta, preceded by four translucent spines of subequal length; lateral surstylus about $\frac{1}{2}$ of epandrium length, with apex rounded in posterior view, but sharpened in posterolateral view; phallus coiled approximately

three times, with blackish strongly sclerotized edges, lacking cuticular teeth along membrane; distiphallus hyaline membranous, with yellow inner sclerite, besides black heavily sclerotized rounded protrusion.

Female terminalia (Figs 14, 15). Oviscape 0.75–0.81 mm long and 0.90–0.98 mm wide basally; aculeus length 1.40–1.41 mm (n=2); aculeus tip tapering gradually to the apex with three subapical sensorial spines in ventral view.

Holotype (examined): ♀ **Mexico:** Veracruz, Estación de Biología Los Tuxtlas, 160 m, 14.xi.1986, E. Ramírez (CNIN, formerly IBUNAM).

Other specimens examined: Mexico: Veracruz, San Andres Tuxtla, Est. Biol. Tropical Los Tuxtlas UNAM, 231 m [18°34'58"N 95°04'35"W], M. Madora: 9.ii.2014 (1♂ IEXA), 3.iii.2014 (1♂ 1♀ IEXA; 1♂ CNIN), 31.iii.2014 (1♀ CNIN); same locality [18°34'06"N 95°04'37"W], 246 m, 3.iii.2014, M. Madora (1♀ IEXA).

DISCUSSION

As result of the present study, the genus *Pterocalla* is now represented in Mexico by eight species, including the new one described herein. The species addressed in this paper belong to the subgenus *Pterocalla*, supported by the large posteroapical extension of the cell cup, nearly as long as body cell, and the distance between r–m and dm–cu, about as long as or shorter than dm–cu. Both can be distinguished from all known species of the genus by the singularity of their wing spots, which are paler than background color, encircled by the hyaline halo, a unique pattern among all known species so far.

The new species *P. amnoni* differs from *P. maculata* by having the following set of characters: tip of wing uniformly pale brown (with a single hyaline spot in cell r_1 at the end of vein R_1), along with two marginal hyaline spots on cell m; male with lateral apically rounded surstylus, medial surstylus with 6–8 translucent spine-like setae anterior of prensiseta, phallus smooth throughout, distiphallus membranous lacking any visible sclerotized structures. Conversely, *P. maculata* has its wing apex with 3 suboval or subtriangular hyaline spots, between the apices of veins R_{2+3} , R_{4+5} , at the apex of cell r_{4+5} , and at the apex of vein M, which is shared between cells r_5 and m respectively; male with apically sharpened lateral surstylus, medial surstylus with 4 or 5 hyaline spine-like setae anterior of prensiseta, phallus with a set of translucent cuticular teeth spread lengthwise, distiphallus fitted with internal yellow sclerite, and a single black sclerotized protrusion.

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