

RESEARCH PAPER

Chalarus (Diptera: Pipunculidae) of Colombia, with description of two new species and an updated key to males of the Neotropical species

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Abstract. *Chalarus* Walker, 1834 (Diptera: Pipunculidae: Chalarinae) has a cosmopolitan distribution, with 11 known species in the Neotropical Region, but none recorded in Colombia. Two new species of *Chalarus* are described from Colombia, namely *Chalarus boyacensis* sp. nov. (type locality: Cabaña Chaina, Santuario de Fauna y Flora Iguaque) and *C. chairensis* sp. nov. (type locality: Vereda Tigrera Alta, Cartagena del Chaira). *Chalarus absonus* Rafael, 1990, *C. delicatus* Rafael, 1990 and *C. connexus* Rafael, 1988 are recorded in Colombia for the first time, with amended and comparative diagnoses. Photographs of five South American species, distribution map and a dichotomic key to males of all Neotropical species are included.

Resumen. *Chalarus* Walker, 1834 (Diptera: Pipunculidae: Chalarinae) tiene distribución cosmopolita, con 11 especies conocidas en la Región Neotropical, pero ninguna registrada en Colombia. Se describen dos nuevas especies de *Chalarus* de Colombia, a saber *Chalarus boyacensis* sp. nov. (locality tipo: Cabaña Chaina, Santuario de Fauna y Flora Iguaque) y *C. chairensis* sp. nov. (locality tipo: Vereda Tigrera Alta, Cartagena del Chaira). *Chalarus absonus* Rafael, 1990, *C. delicatus* Rafael, 1990 y *C. connexus* Rafael, 1988 se registran por primera vez en Colombia, con diagnosis modificados y comparativos. Fotografías de cinco especies de América del Sur, mapa de distribución y una clave dicotómica para las especies Neotropicales (solo machos) es incluida.

Key words. Diptera, Pipunculidae, Chalarinae, big-headed fly, diversity, new species, taxonomy, Colombia, Neotropical Region

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Introduction

Chalarus Walker, 1834 is a cosmopolitan genus of the subfamily Chalarinae, Pipunculidae, with 43 species (KEHLMAIER & ASSMANN 2010, KEHLMAIER 2010). Before the formal description of *Chalarus*, the species were treated under *Cephalops* Fallén, 1810 (FALLÉN 1816, WESTWOOD 1840), *Pipunculus* Latreille, 1802 (MEIGEN 1824, MACQUART 1835, VERRAL 1901) or *Atelenevra* Macquart, 1834 (MACQUART 1834).

HARDY (1966) catalogued *Chalarus spurius* (Fallén, 1816) as the only species of the genus in most regions of Europe. In the same year, COE (1966) detailed and standardized the terminology of the male genitalia and described

five British species recognized as belonging to *Chalarus*. JERVIS (1985) described two species from Burma. Later, RAFAEL (1988) redescribed *Chalarus chilensis* Collin, 1931 and described two species from the Brazilian Amazon. The Neotropical species of *Chalarus* were reviewed by RAFAEL (1990), reporting nine species, of which five were already described. In his study, Rafael provided illustrations, distribution, as well as a new identification key. MORAKOTE & HIRASHIMA (1990) recorded *Chalarus* in Japan for the first time; they presented ten species, seven of which were new. JERVIS (1992) described 11 *Chalarus* species from Europe which were included in five species-groups proposed by him. KEHLMAIER & ASSMANN (2008) revised 22 European



species of *Chalarus* and described four species. SKEVINGTON & KEHLMAIER (2008) described one additional species from Fiji. RODRÍGUEZ et al. (2012) studied the *Chalarus* species of Argentina, including the description of *Chalarus tani* Rodríguez, Rafael & Virla, 2012.

RAFAEL & DE MEYER (1992) considered *Chalarus* a monophyletic group, forming a sister group to *Verrallia* Mik, 1899 + *Jassidophaga* Aczél, 1939. KEHLMAIER & ASSMANN (2010) confirmed the monophyly of Chalarinae as well as that of the sister groups *Chalarus* and *Verrallia* but failed to recover a monophyletic lineage for *Jassidophaga*. In recent phylogenetic analyses carried out by MOTAMEDINIA et al. (2022), *Chalarus* was recovered as monophyletic and placed as a sister group to *Verrallia* (including the former *Jassidophaga*).

Currently, 11 species of *Chalarus* occur in the Neotropical Region (Argentina, Brazil, Mexico, and Trinidad) (RAFAEL 1990, RODRÍGUEZ et al. 2012) but none has been recorded from Colombia. This paper aims to describe and illustrate the *Chalarus* species of Colombia, provide a new identification key to males and a distribution map of all the Neotropical species.

Material and methods

This study is based on pinned specimens deposited in the following collections:

IAvH	Colección del Instituto de Investigación de Recursos Biológicos Alexander von Humboldt, Villa de Leyva, Boyacá, Colombia;
INPA	Invertebrate Collection of Instituto Nacional de Pesquisas da Amazônia, Manaus, Amazonas, Brazil;
LEUA	Colección del Laboratorio de Entomología Universidad de la Amazonia, Florencia, Caquetá, Colombia.

The following abbreviations are used in the text:

B	ovipositor base.
EM	length of eye contiguity;
F	frons length;
LTC	length of the third costal section of the wing;
LFC	length of the fourth costal section of the wing;
LPP	postpedicel length;
LW	wing length
MWW	maximum wing width;
OL	ovipositor length;
PL	piercer length;
V	vertex length;
WPP	postpedicel width.

The total length of a specimen was measured in lateral view by summing the distances from the frons (antenna excluded) to the scutellar apex and from the scutellar apex to the abdominal apex. To study the internal characteristics of the male genitalia, the abdominal apex was cut off at the third tergite, placed into lactic acid (85%), and heated at 150°C over a Thermo Scientific Cimarec plate for approximately 1 hour, prior to the dissection of the genital pieces. The pieces were dissected and photographed in dehydrated glycerin using an excavated slide. After study, the pieces were stored in microvials containing glycerin. The wings were mounted on microslides with Canada balsam. The holotype specimens were pinned, mounted, and deposited in their original collections. The microvial and microslide

were pinned along with the respective specimen.

The morphological terminology follows CUMMING & WOOD (2017). The terminology for the male genitalia follows KEHLMAIER (2005), MARQUES et al. (2019), and RAMOS-PASTRANA et al. (2022), except for the phallic processes and the tip of the distiphallus, which follows KEHLMAIER & ASSMANN (2008).

The measurements (in millimeters) that refer to the head, antenna, and wing were made as proposed by KEHLMAIER (2005), MARQUES et al. (2019), and RAMOS-PASTRANA et al. (2022): frons length (F); length of eye contiguity (EM); vertex length (V); ratio between the length and the maximum width of the wing (LW/MWW); ratio between the lengths of the third and the fourth costal section of the wing (LTC/LFC); ratio between the length and the maximum width of the postpedicel (LPP/WPP).

Photographs were taken with a Leica DFC450 digital camera coupled to a Leica M205A stereomicroscope and connected to a computer with Leica Application Suite software, with automatic mounting module (synchronization software) (<http://www.syncroscopy.com/syncroscopy/>). The maps showing species geographic records were plotted using the SimpleMappr software (SHORTHOUSE 2010).

In the list of examined material, label data are given as presented on the labels. The square brackets ([]) are used to indicate complementary data that are not present on the specimen labels. One slash (/) indicates a new line in the label text and two slashes (//) indicate different labels. New records for the country are included within each species and mentioned as a “new record” in geographical distribution. Data for specimens with identical data were simplified with *idem* and only the data that differ from the anterior labels were written.

Results

Chalarus Walker, 1834

Chalarus Walker, 1834: 269. Type species: *Cephalops spurius* Fallén, 1816 (subsequent designation by WESTWOOD 1840: 135).

Chalarus: COE (1966: 149, Figs 1–26); JERVIS (1985: 435, Figs 1–6); RAFAEL (1988: 1, Figs 1–21); MORAKOTE & HIRASHIMA (1990: 161, Figs 19–28); RAFAEL (1990: 45, Figs 1–15); JERVIS (1992: 243, Figs 1–42); KEHLMAIER & ASSMANN (2008: 1, Figs 1–80); KEHLMAIER & ASSMANN (2010: 1, Figs 1–4); RODRÍGUEZ et al. (2012: 121, Figs 1–3); MOTAMEDINIA et al. (2022: 10).

Atelenevra Macquart, 1834: 356 (partim). Type species: *Pipunculus holosericeus* Meigen, 1824 (monotypy) (partim).

Atelenevra: VERRAL (1901): 120 (synonymy) (partim); MACQUART (1835): 663 (synonymy) (partim).

Atelenevra Agassiz, 1846: 3 (unjustified emendation).

Diagnosis. Head sub-hemispherical. Frons and ocellar triangle with setae. Males dichoptic. Occiput and face narrow. Cell dm absent and anal vein poorly developed; transverse vein dm-m and vein M_1 absent. Fore and mid femora with a row of long and black setae posterodorsally; hind femur with row of long and black setae anterodorsally. Syntergosternite 7 present in males. Syntergosternite 6 present in females. Epandrium small. Gonopods enlarged. Tip of distiphallus usually with phallic processes (sometimes absent). Phallus trifold and membranous, with ejaculatory ducts symmetric (sometimes reduced).

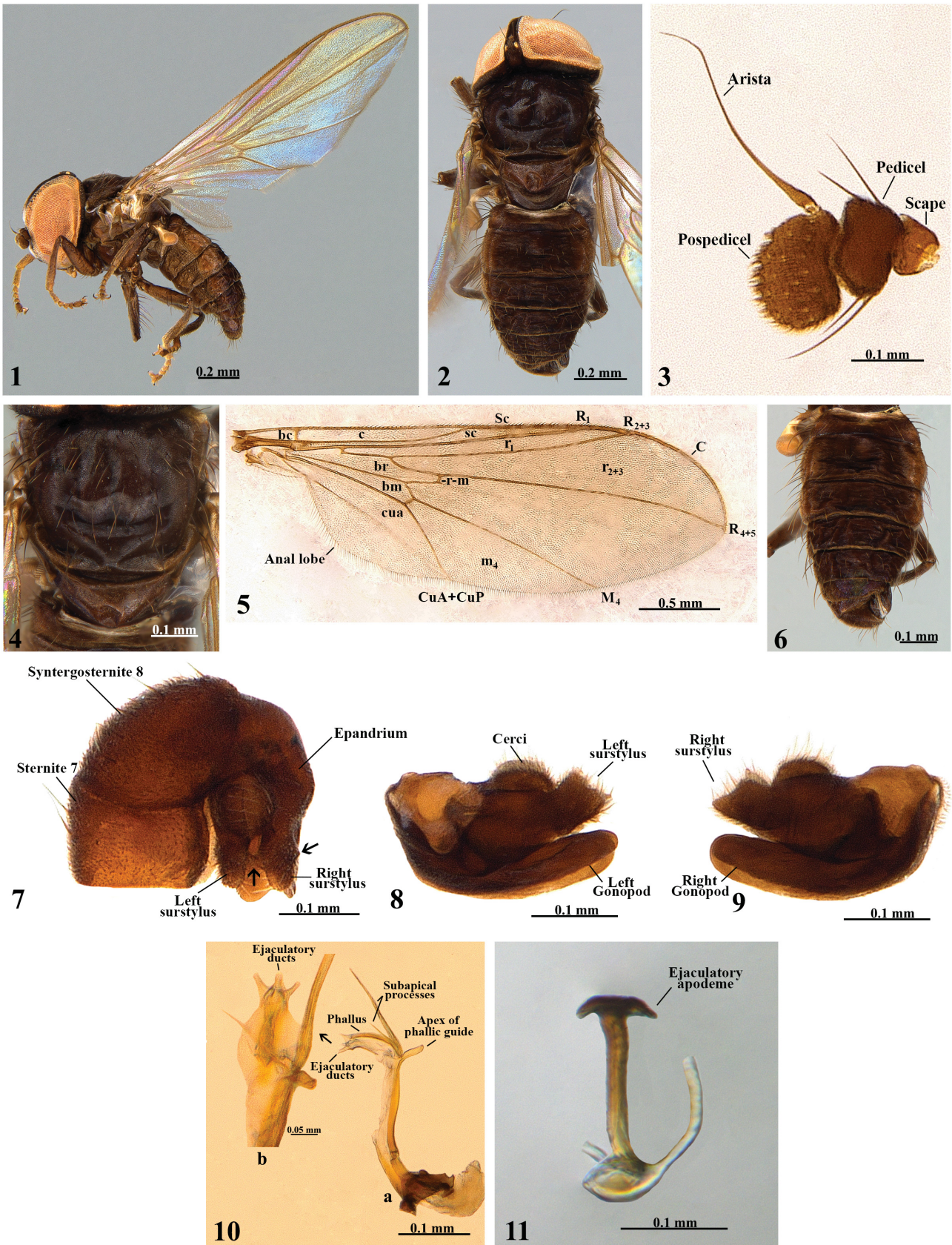
Chalarus species from Colombia**Chalarus absonus Rafael, 1990**

(Figs 1–11; 55)

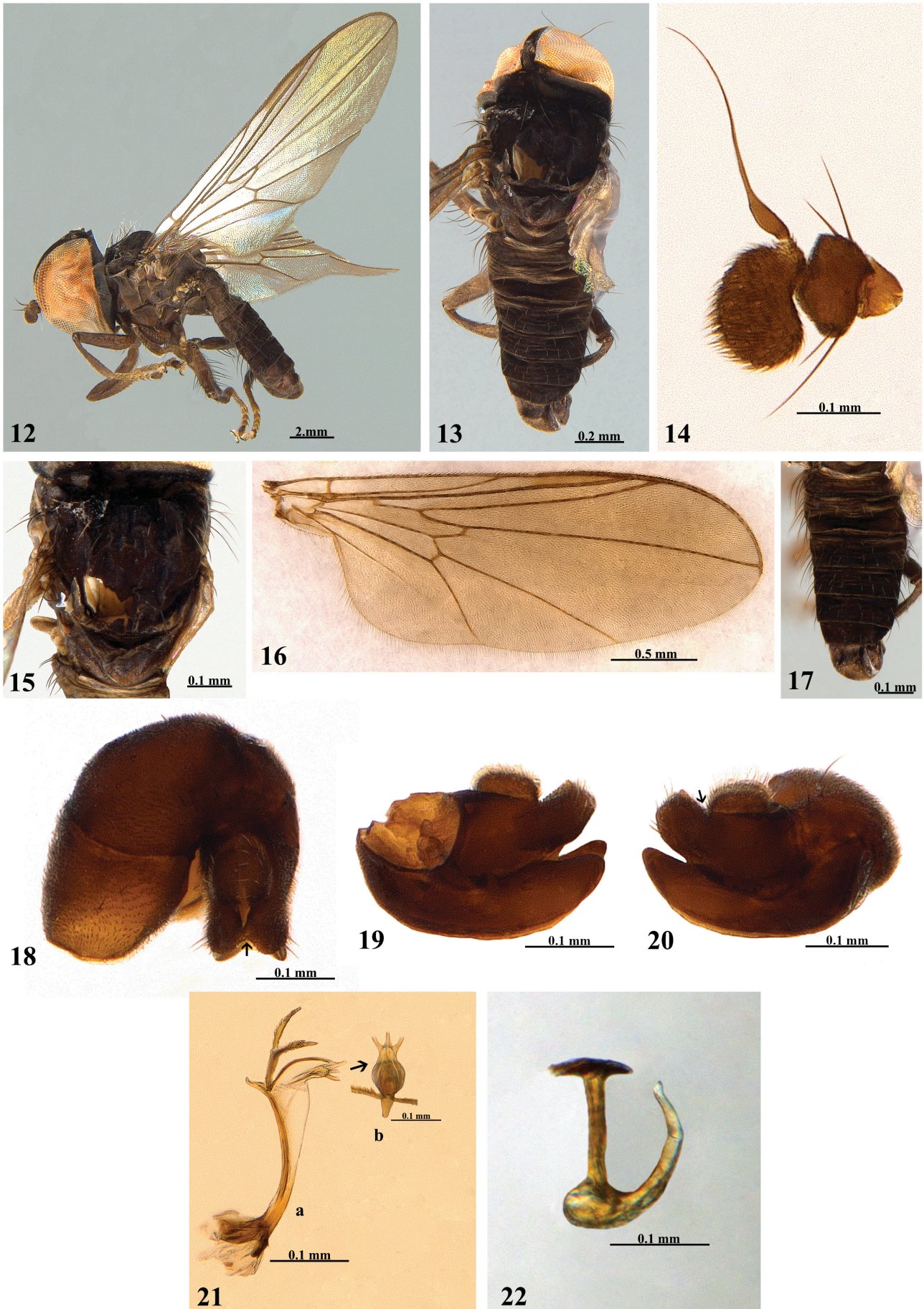
Chalarus absonus Rafael, 1990: 6, Figs 1–3.*Chalarus absonus*: JERVIS (1992: 346); DE MEYER (1996): 15; KEHLMAIER & ASSMANN (2010: 12); RODRÍGUEZ & RAFAEL (2012: 10, 16); RODRÍGUEZ et al. (2012: 121, Fig. 1c).*Chalarus spurius chilensis*: HARDY (1965): 2 (partim).**Material examined** (1 ♂). COLOMBIA, Boyacá, SFF[Santuario de Fauna y Flora] / Iguaque, Cab.[Cabaña] Chaina, / 05°25'N/73°27'W, 2250 m[eters], / 01–14.feb[II].2001, / A. Roberto M1271 (1 ♂ IavH) (photographed specimen).**Diagnosis. Male.** Pedicel with two setae dorsally and two ventrally. Hind tibia with one stout seta medially. Surstyli with apices rounded, with medial lobes on inner margins, right surstylus with small medial lobe on outer margin; both surstyli with small sinus at junction with epandrium; right surstylus in lateral view with lower margin longer and more acute than left one. Left gonopod thinner than right one. Tip of distiphallus short and slightly rounded, with two phallic processes, one thinner and reaching only about half length of the other. Phallus trifold, all ejaculatory ducts situated at apex.**Intraspecific variability.** We provide a comparison of the variations between the Colombian and Brazilian specimens (between parenthesis, when comparable). **Male.** **Head** (Figs 1–2). Occiput brown, gray-brown pruinose. Antenna (Fig. 3) brown; pedicel with two setae dorsally and two ventrally. **Thorax** (Figs 2, 4). Notopleuron brown, brown pruinose. Mediotergite brown, gray-brown pruinose. **Wing** (Fig. 5). Length 2.7 mm, width 1 mm. Membrane brown infuscated; pterostigma occupying 2/3 of third costal section (*versus* pterostigma occupying 1/2 of third costal section). Halter brown. **Legs** (Fig. 1) entirely dark brown, brown pruinose, except pulvilli light brown. **Abdomen** (Figs 1–2, 6). Tergite 1 light brown basally, dark brown posterolaterally; tergite 6 shorter than tergite 5; syntergosternite 8 brown, gray-brown pruinose, with long apical setae (Figs 6–7). **Terminalia** (Figs 7–11). Epandrium and surstyli brown (Fig. 7). Surstyli (Figs 7–9) subsymmetrical, completely setose and apices rounded, directed downward; both surstyli with medial lobes on inner margins; right surstylus with small medial lobe on outer margin (Fig. 7); right surstylus in lateral view with lower margin longer and more acute than left one (Figs 8–9). Gonopods subsymmetrical; left gonopod thinner than right one (Figs 8–9). Tip of distiphallus short and slightly rounded, with two phallic processes, one thinner and reaching only about half length of the other (Fig. 10A). Ejaculatory apodeme parasol-shaped (Fig. 11). Phallus trifold, all ejaculatory ducts situated at apex in lateral and dorsal view (Figs 10A–B).**Habitat.** The specimen was collected in the Santuario de Fauna y Flora Iguaque reserve, where the vegetation is composed of cloud Andean forests of the Cordillera of the Northeast region of Colombia.**Geographical distribution.** Argentina (Tucumán, Las Tipas) (RODRÍGUEZ et al. 2012), Brazil (São Paulo, Paraná) (RAFAEL 1990), Colombia (Boyacá) (new record) (Fig. 55).**Chalarus boyacensis sp. nov.**

(Figs 12–22, 55)

Type locality. Colombia: Boyacá: Cabaña Chaina, Santuario de Fauna y Flora Iguaque.**Type material** (2 ♂♂). HOLOTYPE: ♂, COLOMBIA, Boyacá, SFF[Santuario de Fauna y Flora] / Iguaque, Cab.[Cabaña] Chaina, / 5°25'N/73°27'W, 2550 m[eters], / 01–14.feb[II].2001, / A. Roberto leg. M1271 (IavH) (photographed specimen). Holotype with left wing mounted on microslide with Canada balsam. Left antenna and terminalia placed in a microvial with glycerin, both pinned along with the specimen. – PARATYPE: 1 ♂, *idem* (LEUA).**Diagnosis. Male.** Occiput dark brown, gray-brown pruinose. Both surstyli with one protuberance subapically, inward directed, outer margins slightly straight, apices rounded and downward directed; both surstyli with apices truncated and small sinus at junction with epandrium in lateral view. Left gonopod slightly shorter, wider, and with apex more rounded than right one. Tip of distiphallus short with apex hook-shaped and two symmetrical phallic processes, broad and dorsally with setae. Phallus trifold, all ejaculatory ducts situated at apex.**Description. Male** (holotype). Body length 2.6 mm. **Head** (Figs 12–13). Frons with upper 3/4 dark brown, dark brown pruinose, lower 1/4 gray-brown pruinose. Occiput dark brown, gray-brown pruinose. Antenna (Fig. 14) brown, pedicel with two dorsal and two ventral setae; LPP/WPP = 1.5. **Thorax** (Figs 13, 15). Postpronotal lobe brown, brown pruinose. Scutum dark brown, gray-brown pruinose. Notopleuron and scutellum concolorous with scutum. Mesopleuron brown, gray-brown pruinose. Mediotergite concolorous with mesopleuron. **Wing** (Fig. 16). Length 2.6 mm. LW/MWW = 2.7; LTC/LFC = 5.1. Membrane brown infuscated. Halter stem dark brown, knob brown. **Legs** (Fig. 12) entirely dark brown, except tarsomeres 1–4 brown; pulvilli light brown. **Abdomen** (Figs 12–13, 17) dark brown, gray-brown pruinose, with long setae laterally and short scattered setae dorsally; tergite 1 light brown basally, dark brown posterolaterally; tergites 1–5 with transverse brown pruinose bands; tergite 6 slightly shorter than tergite 5; syntergosternite 8 brown pruinose without long apical setae (Figs 17–18). **Terminalia** (Figs 18–22). Epandrium and surstyli brown (Fig. 18). Surstyli (Figs 18–20) subsymmetrical and setose, with long setae apically, apices rounded and downward directed; both surstyli with one protuberance subapically on inner margins; outer margins nearly straight (Fig. 18); both surstyli with apices truncated; left surstylus slightly thinner than right one, and with small sinus at junction with epandrium in lateral view (Figs 19–20). Gonopods subsymmetrical; left gonopod slightly shorter, wider, and with apex more rounded than right one (Figs 19–20). Tip of distiphallus short with apex hook-shaped and two symmetrical phallic processes, broad and with setae dorsally (Fig. 21A). Ejaculatory apodeme parasol-shaped (Fig. 22). Phallus trifold, with all ejaculatory ducts situated at apex in lateral and dorsal view (Figs 21A–B).**Female.** Unknown.**Etymology.** The specific epithet refers to the region of the type locality, Boyacá, Colombia; adjective.**Habitat.** The specimens were collected in the Santuario



Figs 1–11. *Chalarus absomus* Rafael, 1990 (IAvH–M1271). Male. 1 – habitus, left lateral view; 2 – habitus, dorsal view; 3 – antenna; 4 – thorax, dorsal view; 5 – wing; 6 – abdomen, dorsal view; 7 – terminalia, dorsal view; 8 – left surstylus and gonopod, lateral view; 9 – right surstylus and gonopod, lateral view; 10a – phallic guide, subapical processes and phallus, right lateral view; 10b – phallus dorsal view; 11 – ejaculatory apodeme.



Figs 12–22. *Chalarus boyacensis* sp. nov. (IAvH-M1271). Holotype male. 12 – habitus, left lateral view; 13 – habitus, dorsal view; 14 – antenna; 15 – thorax, dorsal view; 16 – wing; 17 – abdomen, dorsal view; 18 – terminalia, dorsal view; 19 – left surstylus and gonopod, lateral view; 20 – right surstylus and gonopod, lateral view; 21a – phallic guide, subapical processes and phallus, left lateral view, 21b – phallus dorsal view; 22 – ejaculatory apodeme.

de Fauna y Flora Iguaque reserve, where the vegetation is composed of forests of the cordillera of the Northeast region.

Geographical distribution. Colombia (Boyacá) (Fig. 55).
Taxonomic notes. *Chalarus boyacensis* sp. nov. runs to *C. chilensis* Collin, 1931 in couplet 7 of the key presented by RAFAEL (1990). It differs from *C. chilensis* in having the antenna brown; pedicel with two setae dorsally and two ventrally (Fig. 14) [*versus* antenna black, pedicel with three setae dorsally and four ventrally in *C. chilensis* RAFAEL (1988: Fig. 1)]; scutum and scutellum dark brown (Fig. 15) (*versus* scutum and scutellum black); the other different characters can be seen in the key below.

***Chalarus chairensis* sp. nov.**

(Figs 23–32, 55)

Type locality. Colombia: Caquetá, Cartagena del Chaira, Vereda Tigrera Alta.

Type material (1 ♂). HOLOTYPE: ♂, COLOMBIA, Caquetá, Cartagena del Chaira, / Vda.[Vereda] Tigrera Alta, Fca.[Finca] Las Palmeras, / 01°17'5.2"N/74°49'1.2"W, 235 m[eters], / 23–Nov.[xi] –07–Dic. [XII].2016, / trampa Malaise en dosel del bosque, Y. Ramos-Pastrana leg. (LEUA–0000049759) (photographed specimen). Holotype with left wing mounted on microslide with Canada balsam. Left antenna and terminalia placed in a microvial with glycerin, both pinned along with the specimen.

Diagnosis. Male. Postpronotal lobe yellowish brown, brown pruinose. Both surstyli with one lobe medially, inward directed, and apices downward directed; left surstylus with apex slightly rounded and outer margin curved; right surstylus with apex slightly acute and outer margin sinuous; both surstyli with apices clearly truncated, left surstylus slightly longer than right, without sinus at junction with epandrium when seen in lateral view. Right gonopod slightly thinner and with apex more acute than left one. Tip of distiphallus long, with two asymmetrical phallic processes of equal length but one twice as wide as the other. Phallus trifold, all ejaculatory ducts situated at apex; lateral ejaculatory ducts with inner margins straight, forming angle of approximately 110° in dorsal view.

Description. Male (holotype). Body length 2.2 mm. **Head** (Figs 23–24). Frons: upper 3/4 dark brown, dark brown pruinose, lower 1/4 gray-brown pruinose. Occiput dark brown. Pedicel with two setae dorsally and two ventrally; postpedicel lost. **Thorax** (Figs 24–25). Postpronotal lobe yellowish brown, brown pruinose. Scutum brown, brown pruinose. Notopleuron and scutellum concolorous with scutum. Mesopleuron light brown, brown pruinose. Mediotergite concolorous with mesopleuron. **Wing** (Fig. 26). Length 2.3 mm. LW/MWW = 3.1; LTC/LFC = 9. Membrane brown infuscated. Halter light brown. **Legs** (Fig. 23). Entirely brown, except tarsomeres 1–5 dark brown; pulvilli light brown. **Abdomen** (Figs 23–24, 27). Brown, gray-brown pruinose, with long setae laterally and short scattered setae dorsally; tergite 1 light brown basally, brown posterolaterally; tergite 1–5 with transverse bands brown pruinose; tergite 6 clearly longer than tergite 5; syntergosternite 8 with long apical setae (Figs 27–28). **Terminalia** (Figs 28–32). Epandrium and surstyli brown

(Fig. 28). Surstyli (Figs 28–30) subsymmetrical and setose, with apices directed downward; both surstyli with one lobe medially on inner margins; left surstylus with apex slightly rounded and outer margin curved; right surstylus with apex slightly acute and outer margin sinuous (Fig. 28); both surstyli with apices clearly truncated; left surstylus slightly longer than right, without sinus at junction with epandrium in lateral view (Figs 29–30). Gonopods subsymmetrical; right gonopod slightly thinner and with apex more acute than left one (Figs 29–30). Tip of distiphallus long, with two asymmetrical phallic processes, equal in length but one twice as wide as the other (Fig. 31A). Ejaculatory apodeme pin-shaped (Fig. 32). Phallus trifold, all ejaculatory ducts situated at apex in lateral and dorsal view (Figs 31A–B).

Female. Unknown.

Etymology. The specific epithet refers to the type locality, Cartagena del Chaira; adjective.

Habitat. The specimen was collected in preserved areas of tropical rainforest in the Colombian Amazon, Department of Caquetá.

Geographical distribution. Colombia (Caquetá) (Fig. 55).
Taxonomic notes. *Chalarus chairensis* sp. nov. runs to *C. absonus* Rafael, 1990 in the couplet 8 of the key presented by RAFAEL (1990). It differs from *C. absonus* in having the postpronotal lobe yellowish brown (*versus* postpronotal lobe brown); legs entirely brown, except tarsomeres 1–5 dark brown (Fig. 23) (*versus* legs entirely dark brown, brown pruinose); the other distinguishing characters can be seen in the key below.

***Chalarus connexus* Rafael, 1988**

(Figs 33–43, 55)

Chalarus connexus Rafael, 1988: 6, Figs 1–13, 20–21.

Chalarus connexus: RAFAEL (1990: 48); JERVIS (1992: 346); DE MEYER (1996: 15); KEHLMAYER & ASSMANN (2010: 12); RODRÍGUEZ & RAFAEL (2012: 17, 28, 43).

Material examined (1 ♂). COLOMBIA, Caquetá, San Vicente del Caguán, / Vda.[Vereda] Alto Quebradón, Fca.[Finca] Rancho Veracruz, / Bosque piso, 02°17'55.8"N/74°44'29.3"W, / 414 m[eters], 1–15. Feb[II].2017, / trampa Malaise en el piso del bosque, / Y. Ramos-Pastrana (LEUA–0000049808) (photographed specimen).

Diagnosis. Cell r_1 closed to the confluence of the veins R_1 and R_{2+3} . Both surstyli with one lobe apically, inward directed, inner margins curved and outer margins nearly straight; both surstyli without sinus at junction with epandrium; left surstylus with lower margin rounded; right surstylus with upper margin nearly straight; both surstyli with apex upwards directed, without sinus in union with epandrium in lateral view. Gonopods thickened, with apices acute; right gonopod slightly more acute than left one. Tip of distiphallus straight and acute, without phallic processes. Phallus trifold, all ejaculatory ducts situated little before apex; lateral ejaculatory ducts with inner margins forming straight line in dorsal view.

Intraspecific variability. RAFAEL (1988) provided a complete description and illustration of the Brazilian holotype; however, we found intraspecific variation, therefore, we provide a comparison of the Colombian and Brazilian specimens (between parenthesis, when comparable).

Male. Head (Figs 33–34). Occiput dark brown, brown pruinose. Antenna brown (Fig. 35) (*versus* antenna black in the holotype). **Thorax** (Figs 34–36). Postpronotal lobe light brown, light brown pruinose. Notopleuron concolorous with scutum. Mesopleuron brown, brown pruinose. Mediotergite brown pruinose. **Wing** (Fig. 37). Length 2.2 mm (*versus* 1.8 mm), width 0.7 mm (*versus* 0.6 mm), membrane slightly infuscate, pterostigma occupying 2/3 of third costal section (*versus* pterostigma occupying a little more than half of third costal section). Halter brown (*versus* halter dark brown). **Abdomen** (Figs 34–38). Tergite 1 light brown basally, dark brown posterolaterally; syntergosternite 8 dark brown, gray-brown pruinose, with long apical setae. **Terminalia** (Figs 39–43). Epandrium and surstyli brown (Fig. 39). Surstyli (Figs 39–41) subsymmetrical, completely setose, with long setae apically; both surstyli with one lobe apically, directed inward, inner margin curved and outer margin nearly straight and lower margin slightly truncated (Fig. 39); left surstylus with lower margin rounded, right surstylus with upper margin nearly straight, both surstyli with apex upwards directed, without sinus in union with epandrium in lateral view (Figs 40–41). Gonopods subsymmetrical, thickened, with apices acute, right slightly more acute than left one (Figs 40–41). Tip of distiphallus straight and acute, without phallic processes (Fig. 42A). Ejaculatory apodeme parasol-shaped (Fig. 43). Phallus trifold, all ejaculatory ducts situated little before apex in dorsal and lateral view (Figs 42A–B).

Habitat. The specimen was collected in preserved areas of tropical rainforest in the Colombian Amazon, Department of Caquetá.

Geographical distribution. Brazil (Amazonas) (RAFAEL 1990), Colombia (Caquetá) (new record) (Fig. 55).

Chalarus delicatus Rafael, 1990

(Figs 44–54, 55)

Chalarus delicatus Rafael, 1990: 49, Figs 7–9.

Chalarus delicatus: JERVIS (1992: 346); DE MEYER (1996: 15); KEHLMAIER & ASSMANN (2010: 12); RODRÍGUEZ & RAFAEL (2012: 17).

Chalarus spuruius: HARDY (1965): 2 (partim).

Material examined (1 ♂). **COLOMBIA, Caquetá**, San José del Fragua, / Vda. [Vereda] Bellavista, Fca.[Finca] Mi Ranchito, / 01°18'23"N/76°00'33"W, 265 m[eters], / 29.Mar[III]–12.Abr[IV].2017, / trampa Malaise en dosel del bosque, / Y. Ramos-Pastrana (LEUA-00000049809) (photographed specimen).

Diagnosis. Pedicel with four setae dorsally and two ventrally. Hind tibia with 1–2 strong setae medially. Both surstyli with outer margins slightly curved; inner margin of each surstylus forming an angle of approximately 130° centrally, apices truncated and converging, without sinus at junction with epandrium in lateral view. Gonopods with apices rounded; left gonopod with apex slightly thinner than right one. Tip of distiphallus short and acute, without phallic processes. Phallus trifold, one ejaculatory duct apically, the other two medially and forward-directed in ventral view, not visible in dorsal view.

Intraspecific variability. RAFAEL (1990) provided a complete description and illustrations of the Brazilian holotype; however, we found variations in the Colombian material. Therefore, we provide a comparison of the variations

between the Colombian and Brazilian specimens (between parenthesis, when comparable).

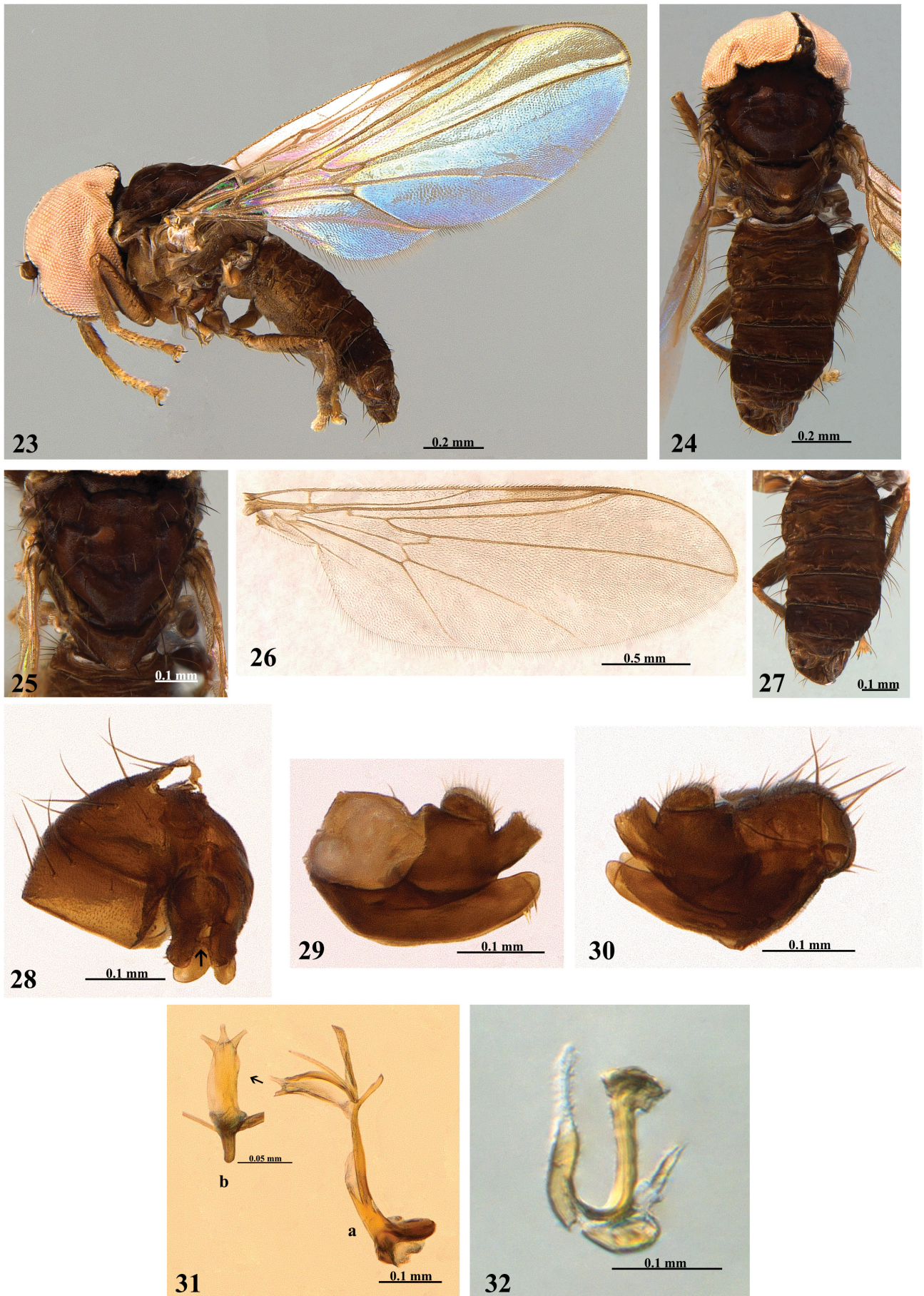
Male. Head (Figs 44–45). Occiput dark brown, gray-brown pruinose. Antenna (Fig. 46) brown (*versus* antenna dark brown to black in the holotype); pedicel with four setae dorsally and two ventrally. **Thorax** (Figs 45, 47). Postpronotal lobe brown, gray-brown pruinose. Scutum dark brown, gray-brown pruinose (*versus* scutum black, brown pruinose). Notopleuron and scutellum concolorous with scutum. Mesopleuron brown, gray-brown pruinose. Mediotergite concolorous with mesopleuron. **Wing** (Fig. 48). Membrane slightly infuscated. **Legs** (Fig. 44) entirely brown, except tarsomeres 1–4 light brown (*versus* legs black, except femoro-tibial articulations and all tarsomeres light brown); pulvilli light brown. **Abdomen** (Figs 45, 49) brown, gray-brown pruinose, with long setae laterally and short scattered setae dorsally; tergite 1 light brown basally, dark brown posterolaterally; tergite 1–5 with transverse bands brown pruinose dorsally; tergite 6 clearly shorter than tergite 5; syntergosternite 8 with long apical setae (Fig. X). **Terminalia** (Figs 50–54). Epandrium and surstyli brown (Fig. 50). Surstyli (Figs 50–52) subsymmetrical and setose, with long seta apically; both surstyli with outer margins slightly curved, inner margin of each surstylus forming angle of approximately 130° centrally, apices truncated and converging (Fig. 50); both surstyli with apices rounded; left surstylus in lateral view with apex slightly thinner than right one (Figs 51–52). Gonopods subsymmetrical; left gonopod with apex slightly thinner than right one (Figs 51–52). Tip of distiphallus short with tip acute (Fig. 53A). Ejaculatory apodeme pin-shaped (Fig. 54). Phallus trifold, one ejaculatory duct apically, the other two medially and forward-directed in ventral view, not visible in dorsal view (Figs 53A–B).

Habitat. The specimen was collected in the canopy in preserved areas of tropical rainforest in the Colombian Amazon, Department of Caquetá.

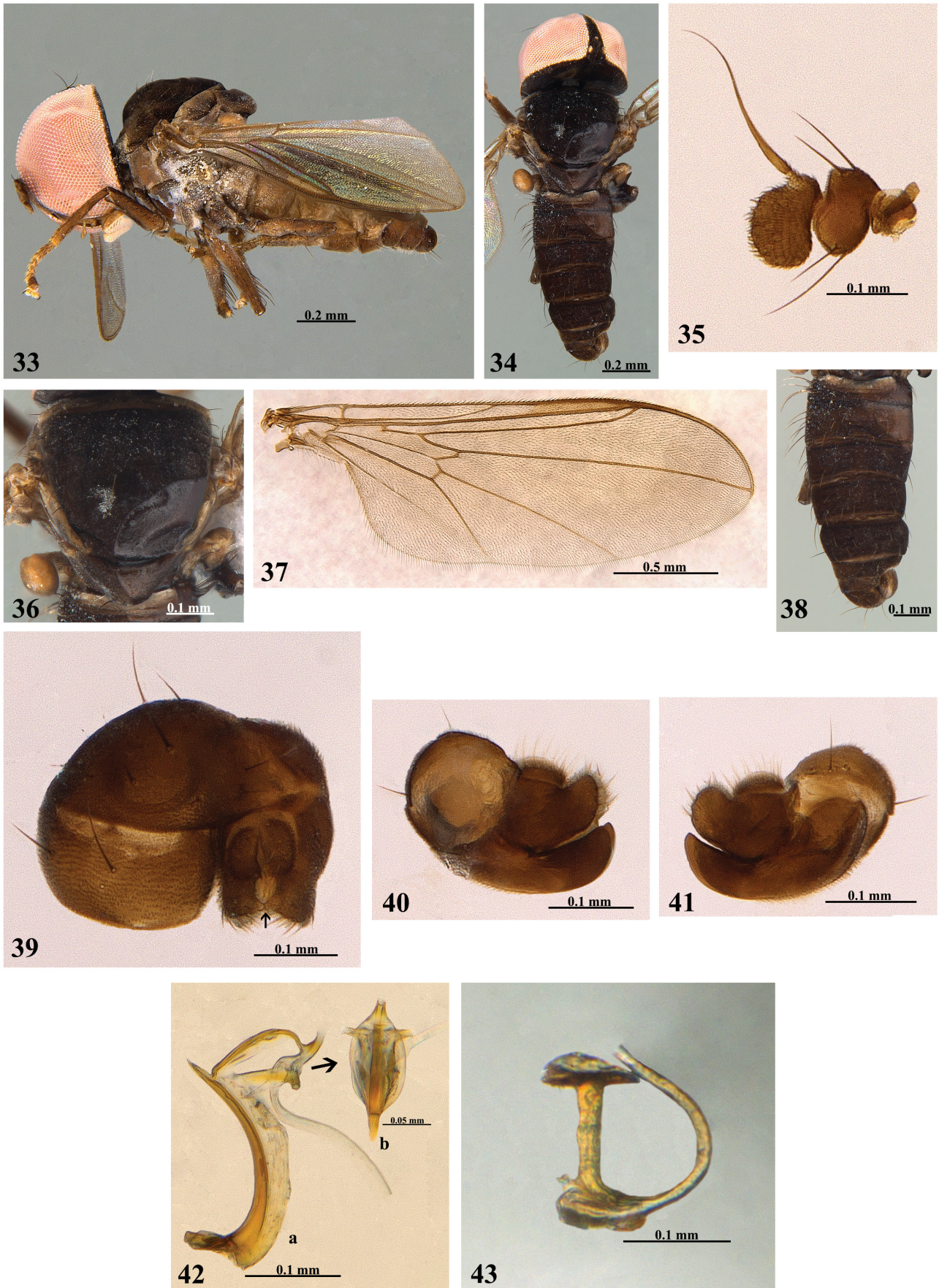
Geographical distribution. Brazil (São Paulo, Paraná, Santa Catarina) (RAFAEL 1990), Colombia (Caquetá) (new record) (Fig. 55).

Chalarus sp. (unidentified females)

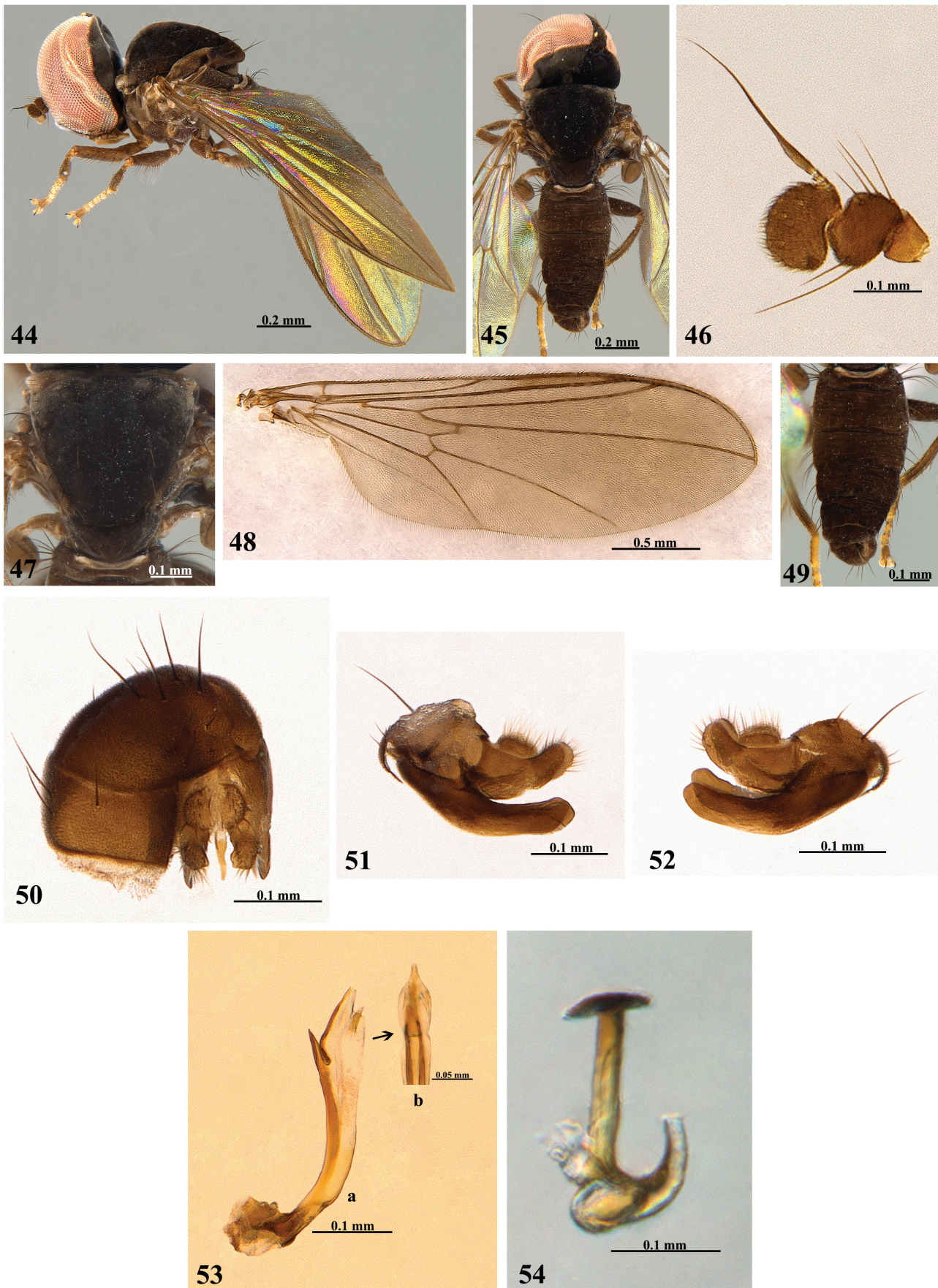
Material examined. (46 ♀♀ belonging to 14 morphospecies could not be associated with males). **COLOMBIA, Amazonas**, PNN[Parque Nacional Natural] Amacayacu, Matamata, / 03°23'S/70°06'W, 300 m[eters], 23–30.Oct[x].2000, / A. Parente M850 (1 ♀ IAvH); // *idem* 14–21.ago[VIII].2000, M848 (1 ♀ IAvH); // *idem* 25.sep[IX]–09.oct [x].2000, M851 (1 ♀ IAvH); // *idem* 150 m[eters], 15–20. Nov[XI].2000, M1120 (1 ♀ IAvH); // *idem* 17.dic[XII].1999–02. Ene[I].2000, M123 (1 ♀ IAvH); // *idem* San Martín, 05–13.dic [XII].2000, B. Armando Leg. M1312 (1 ♀ IAvH); // *idem* 07–28.05 [V].2001, M1866 (1 ♀ IAvH); // **Bolívar**, PNN[Parque Nacional Natural] Santa Marta, El Ramo, / 10°48'N/73°39'W, 2500 m[eters], 22.Nov[XI]–15.Dec[XII].2000, / J. Cantillo M1047 (1 ♀ IAvH); // *idem* **Boyacá**, SFF[Santuario de Fauna y Flora] Iguaque, / Cab.[Cabaña] Chaina, 5°25'N/73°27'W, 2550 m[eters], / 01–14.feb[II].2001, A. Roberto M1271 (10 ♀♀ IAvH); // *idem* 2600 m[eters], 31.VIII–16. IX.2001 (1 ♀ IAvH); // *idem* 10–28.VI.2001, P. Reina leg. M1836 (1 ♀ IAvH); // *idem* Qda.[Quebrada] Carrizal, 3360 m[eters], 04–21. dic[XII].2000, M1078 (1 ♀ IAvH); // *idem* Cabaña Carrizal, 2855 m[eters], 01–23.Sep[IX].2000, M614 (1 ♀ IAvH); // *idem* 2850



Figs 23–32. *Chalarus chairensis* sp. nov. (LEUA–00000049759). Holotype, male. 23 – habitus, left lateral view; 24 – habitus, dorsal view; 25 – thorax, dorsal view; 26 – wing; 27 – abdomen, dorsal view; 28 – terminalia, dorsal view; 29 – left surstylus and gonopod, lateral view; 30 – right surstylus and gonopod, lateral view; 31a – phallic guide, subapical processes and phallus, right lateral view, 31b – phallus dorsal view; 32 – ejaculatory apodeme.



Figs 33–43. *Chalarus connexus* Rafael, 1988 (LEUA–00000049808). Male. 33 – habitus, left lateral view; 34 – habitus, dorsal view; 35 – antenna; 36 – thorax, dorsal view; 37 – wing; 38 – abdomen, dorsal view; 39 – terminalia, dorsal view; 40 – left surstylus and gonopod, lateral view; 41 – right surstylus and gonopod, lateral view; 42a – phallic guide, subapical processes and phallus with ejaculatory duct dislocated in this figure, left lateral view, 42b – phallus dorsal view, 43 – ejaculatory apodeme.



Figs 44–54. *Chalarus delicatus* Rafael, 1990 (LEUA–00000049809). Male. 44 – habitus, left lateral view; 45 – habitus, dorsal view; 46 – antenna; 47 – thorax, dorsal view; 48 – wing; 49 – abdomen, dorsal view; 50 – terminalia, dorsal view; 51 – left surstylus and gonopod, lateral view; 52 – right surstylus and gonopod, lateral view; 53a – phallic guide, subapical processes and phallus, left lateral view, 53b – phallus dorsal view; 54 – ejaculatory apodeme.

m[eters], 02–22.VIII.2001, M2026 (1 ♀ IAvH); // *idem* Cabaña Chaina, 2600 m[eters], 31.VIII–16.ix.2001, A. Roberto. M2066 (2 ♀♀ IAvH); // *idem* Cerro Pan de Azúcar, 3300 m[eters], Malaise, 2–22.VIII.2001, P. Reina leg. M2023 (1 ♀ IAvH); // *idem* La Planada, 5°25'12"N/73°27'24"W, 2975 m[eters], 01–19.IV.2000, Malaise 8 (1 ♀ IAvH); // *idem* Lagunillas, 3380 m[eters], 09–24.Feb[II].2001, M1272 (1 ♀ IAvH); // *idem* 3360 m[eters], 25.jun[VI]–13.jul[VII].2000, Malaise 4 (1 ♀ IAvH); // *idem* 09–18.III.2001, M1511 (1 ♀ IAvH); // *idem* La Planada, 2850 m[eters], 02–19.apr[IV].2000, M32 (1 ♀ IAvH); // *idem* 21.I.–07.II.2001, M1249 (1 ♀ IAvH); // *idem* **Cundinamarca**, PNN[Parque Nacional Natural] Chingaza, Valle del Frailejón, / 04°31'N/73°45'W, 3170 m[eters], 20.dec[XII].2000–05.jan[I].2001, / L. Cifuentes, M1220 (1 ♀ IAvH); // *idem* **Huila**, PNN[Parque Nacional Natural] Cueva de los Guacharos, / 01°38'N/76°06'W, 1980 m[eters], 02–05.XII.2001, / D. Campos Leg. M2535 (1 ♀, IAvH); // *idem* **Magdalena**, PNN[Parque Nacional Natu-

ral] Santa Marta, El Ramo, / 10°48'N/73°39'W, 2500 m[eters], 21–29.dic[XII].2000, / J. Cantillo "M1047" (2 ♀♀ IAvH); // *idem* 01–15.jul[VII].2000, M365 (2 ♀♀ IAvH); // *idem* 16–31.aug[VIII].2000, M602 (1 ♀ IAvH); // *idem* 2400 m[eters], 10–24.jun[VI].2000, M1 (1 ♀ IAvH); // *idem* La Estación, 10°48'40"N/73°39'32"W, 15–31.jul[VII].2000, / J. Cantillo, M369 (1 ♀ IAvH); // *idem* PNN[Parque Nacional Natural] Tayrona, / 11°20'N/74°02'W, 60 m[eters], 23.sep[IX]–17.oct[X].2000, / R. Henriquez M793 (1 ♀ IAvH); // *idem* **Nariño**, RN[Reserva Natural] La Planada, Parcela Olga, / 1°15'N/78°15'W, 1850 m[eters], 02–16.sep[IX].2000, / G. Oliva Leg. M883 (1 ♀ IAvH); // *idem* 16.VI.–02.VII.2001, M2384 (1 ♀ IAvH); // *idem* **Valle del Cauca**, PNN[Parque Nacional Natural] Farrallones de Cali, / Alto Anchicaya, 03°26'N/76°48'W, / 650 m[eters], 02–16.jan[I].2001, / S. Sarría, M1544 (1 ♀ IAvH); // *idem* **Vichada**, PNN[Parque Nacional Natural] Tuparro, / Centro Administrativo, 140 m[eters], 19–29.jun[VI].2000, / W. Villaba, Malaise 17 (1 ♀ IAvH).



Fig. 55. Geographical records of *Chalarus* species in Colombia. *Chalarus absonus* Rafael, 1990, *C. boyacensis* sp. nov., *C. chairensis* sp. nov., *C. connexus* Rafael, 1988, and *C. delicatus* Rafael, 1990.

Key to males of the Neotropical species of *Chalarus*

(modified from RAFAEL 1990)

- 1 Cell r_1 closed (Fig. 37). *C. connexus* Rafael, 1988
Cell r_1 open (Figs 5, 16, 26, 48). 2
- 2 Legs and antennae yellow.
..... *C. xanthopodus* Rafael, 1990
– Legs and antennae brown to black. 3
- 3 Frons with 1–3 pair of setae. ... *C. latifrons* Hardy, 1943
– Frons without setae. 4
- 4 Tip of distiphallus with phallic processes (Figs 10A, 21A, 31A). 5
– Tip of distiphallus without phallic processes (Figs 42, 53). 11
- 5 Tip of distiphallus with phallic processes symmetrical (Figs 21A). 6
– Tip of distiphallus with phallic processes asymmetrical (Figs 10A, 31A). 9
- 6 Phallic processes of tip of distiphallus with seta conspicuous, long, and aristiform (Fig. 21A and see RAFAEL 1988: figs 5, 6). 7
– Phallic processes of tip of distiphallus short and flattened dorsoventrally (see RAFAEL 1990: fig. 13, RODRÍGUEZ et al. 2012: figs 2A, B). 8
- 7 Pedicel with two setae dorsally and two ventrally (Fig. 14); tip of distiphallus with apex acute (Fig. 21A); right gonopod thickened medially, thin apically, with apex slightly acute when seen in lateral view (Fig. 20). *C. boyacensis* sp. nov.
– Pedicel with three setae dorsally and four ventrally (see RAFAEL 1988: fig. 1); tip of distiphallus with apex truncated (see RAFAEL 1988: fig. 5); right gonopod thickened medially and apically, with apex rounded in lateral view (see RAFAEL 1988: fig. 4).
..... *C. chilensis* Collin, 1931
- 8 Right surstylus with apex slightly truncated in lateral view (see RODRÍGUEZ et al. 2012: fig. 3B)].
..... *C. tani* Rodríguez, Rafael & Virla, 2012
– Right surstylus with apex rounded in lateral view (see RAFAEL 1990: fig. 12). *C. lenkoi* Rafael, 1990
- 9 One phallic process very short, about 1/4 to 1/5 the length of the other (see RAFAEL 1988: figs 10, 11).
..... *C. amazonensis* Rafael, 1988
– Phallic processes equal in length (Fig. 31A) or one about 1/2 the length of the other (Fig. 10A). 10
- 10 Phallic processes equal in length, one thinner than the other (Fig. 31A); right gonopod with apex slightly acute when seen in lateral view (Fig. 30); ejaculatory apodeme pin-shaped (Fig. 32).
..... *C. chairensis* sp. nov.
– One phallic process about 1/2 the length of the other (Fig. 10A); right gonopod with apex rounded in lateral view (Fig. 9); ejaculatory apodeme parasol-shaped (Fig. 11). *C. absonus* Rafael, 1990
- 11 Surstyli with sinus at junction with epandrium in lateral view (see RAFAEL 1990: fig. 14); right surstylus with apex truncated in lateral view (RAFAEL 1990: fig. 15); right gonopod with apex slightly rounded in lateral view (RAFAEL 1990: fig. 15); phallus with lateral

ejaculatory ducts reaching far beyond the membranous area in dorsal view (RAFAEL 1990: fig. 15).
..... *C. triramosus* Rafael, 1990
– Surstyli without sinus at junction with epandrium in lateral view (Figs 51–52 and RAFAEL 1990: fig. 7); right surstylus with apex rounded in lateral view (Fig. 52 and RAFAEL 1990: fig. 7); phallus with lateral ejaculatory ducts short, not exceeding the membranous area in dorsal view (Fig. 53B and RAFAEL 1990: fig. 9).
..... *C. delicatus* Rafael, 1990

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