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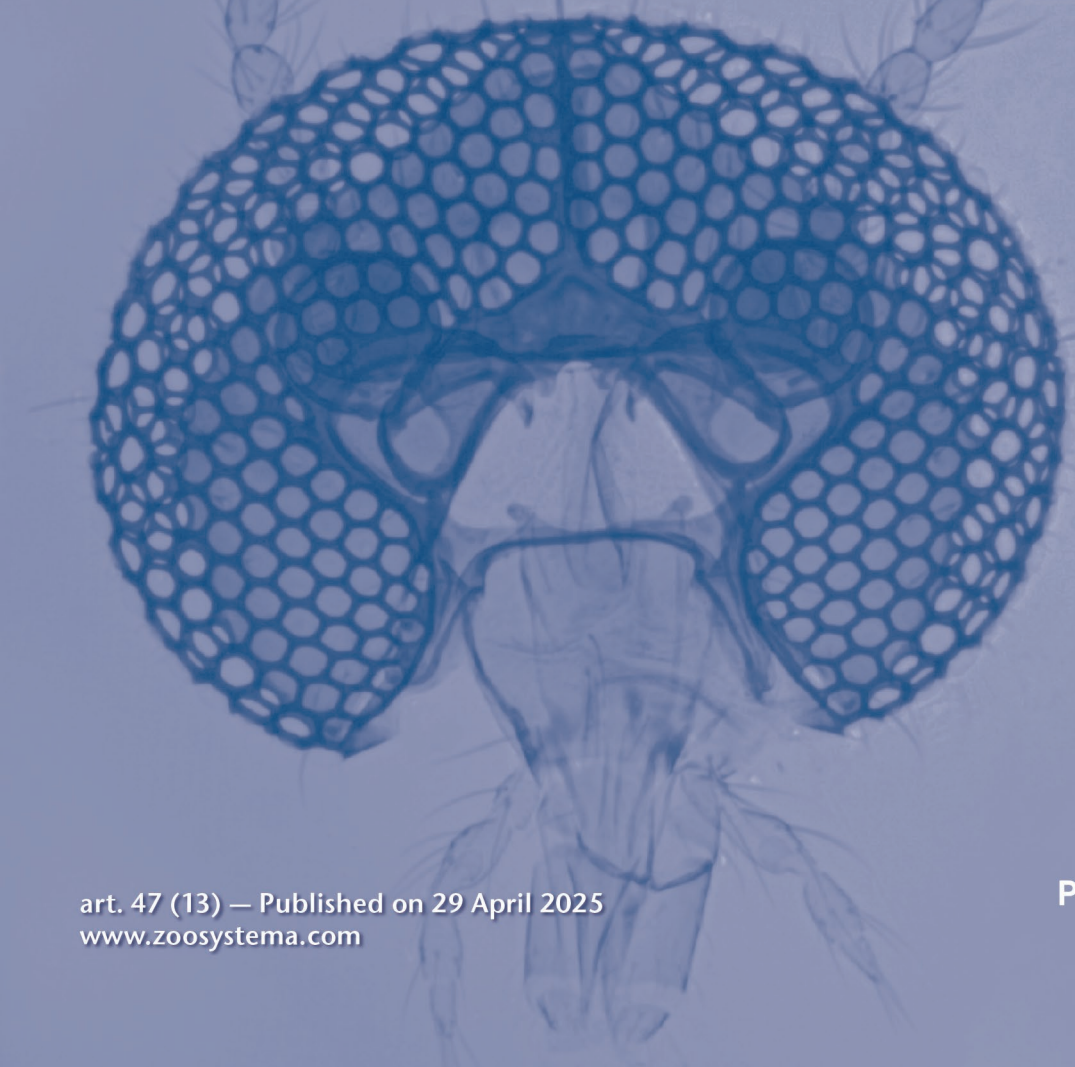
Four new species of *Atrichopogon* Kieffer, 1906 (Diptera, Ceratopogonidae) from Peruvian Amazonia and a key of Neotropical species of this genus with pigmented wings

Juan Francisco ROSSI, Gustavo Ricardo SPINELLI, Sabrina Ivanne HOCHMAN & Pablo Ignacio MARINO



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Head of *Atrichopogon* (*Atrichopogon*) *tricuspis* Rossi, Marino & Spinelli, n. sp. male.

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Four new species of *Atrichopogon* Kieffer, 1906 (Diptera, Ceratopogonidae) from Peruvian Amazonia and a key of Neotropical species of this genus with pigmented wings

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ABSTRACT
Four new Neotropical species of the biting midge genus *Atrichopogon* Kieffer, 1906 (Ceratopogonidae, Forcipomyiinae) with distinctive pigmented wings are described, photographed and illustrated from males and females collected at light in the Department of Cuzco in southern Peru. *Atrichopogon* (*Atrichopogon*) *tricuspis* Rossi, Marino & Spinelli, n. sp. can be distinguished by the pair of bunches of setae in the posterior margin of the scutum, with a heavily sclerotized spermatheca in female and lacking of secondary sexual dimorphism in male; *Atrichopogon* (*Atrichopogon*) *trochantispina* Rossi, Marino & Spinelli, n. sp. presents the hind leg with a trochanter bearing black spines; *Atrichopogon* (*Atrichopogon*) *soriai* Rossi, Marino & Spinelli, n. sp. can be differed by the fore and midlegs brown and hind leg pale brown; *Atrichopogon* (*Atrichopogon*) *delecollei* Rossi, Marino & Spinelli, n. sp. presents the posterodorsal prong of aedeagal-parameral complex slender and notched apically. The new species are compared with their most similar Neotropical congeners and a key to the adult *Atrichopogon* with pigmented wings of the Neotropical region is provided.

KEY WORDS
Ceratopogonidae,
Forcipomyiinae,
Atrichopogon,
Peru,
Amazonia,
morphology,
new species.

RÉSUMÉ
*Quatre nouvelles espèces d'*Atrichopogon *Kieffer, 1906 (Diptera, Ceratopogonidae) de l'Amazonie péruvienne et une clé des espèces néotropicales de ce genre aux ailes pigmentées.*
Quatre nouvelles espèces néotropicales du genre *Atrichopogon* Kieffer, 1906 (Ceratopogonidae, Forcipomyiinae) aux ailes pigmentées caractéristiques sont décrites, photographiées et illustrées à partir de mâles et de femelles collectés à la lumière dans le département de Cuzco, dans le sud du Pérou. *Atrichopogon* (*Atrichopogon*) *tricuspis* Rossi, Marino & Spinelli, n. sp. se distingue par une paire de groupes de soies sur le bord postérieur du scutum, une spermathèque fortement sclérifiée chez la femelle et l'absence de dimorphisme sexuel secondaire chez le mâle ; *Atrichopogon* (*Atrichopogon*) *trochantispina* Rossi, Marino & Spinelli, n. sp. présente des épines noires sur le trochanter de la patte postérieure ; *Atrichopogon* (*Atrichopogon*) *soriai* Rossi, Marino & Spinelli, n. sp. peut être différencié par la coloration des pattes, brune pour les pattes antérieures et médianes, brun pâle pour les pattes postérieures. Chez *Atrichopogon* (*Atrichopogon*) *delecollei* Rossi, Marino & Spinelli, n. sp. la branche postéro-dorsale du complexe aédéage-paramère est élancée et avec une encoche apicale. Les nouvelles espèces sont comparées à leurs congénères néotropicaux les plus similaires et une clé des *Atrichopogon* adultes aux ailes pigmentées de la région néotropicale est fournie.

MOTS CLÉS
Ceratopogonidae,
Forcipomyiinae,
Atrichopogon,
Pérou,
Amazonie,
morphologie,
espèces nouvelles.

INTRODUCTION

The worldwide genus *Atrichopogon* Kieffer, 1906, one of the most specious in the family Ceratopogonidae Newman, 1834, includes species of biting midges that are very similar in appearance and many of them cannot be confidently identified (Ewen & Saunders 1958; Debenham 1973; Borkent & Picado 2004). Borkent & Spinelli (2007) listed 100 species for the Neotropical region, and 22 have been subsequently described or cited for this region (Spinelli & Marino 2007; Huerta 2008; Tóthová *et al.* 2008, 2009; Marino *et al.* 2011, 2022; Huerta & Dzul 2012; Felippe-Bauer *et al.* 2012; Spinelli *et al.* 2015; Felippe-Bauer 2018; Farias *et al.* 2021). The following 15 species have distinctive pigmented wings, and based on this feature they can be easily distinguished from other members of the genus: *A. nebulosus* Macfie, 1939, *A. nubeculosus* Macfie, 1949, *A. maculipennis* Clastrier, 1968, *A. casali* Cavalieri & Chiossone, 1973, *A. pictipennis* Clastrier, 1979, *A. ornatipennis* Clastrier, 1987, *A. bicuspis* Borkent & Picado, 2004, *A. clastrieri* Spinelli & Marino, 2007, *A. cavus* Felippe-Bauer, 2012, *A. dactilus* Felippe-Bauer, 2012, *A. nukini* Felippe-Bauer, 2018, *A. shawadaua* Felippe-Bauer, 2018, *A. janseni* Pessoa & Farias, 2021, *A. riopardensis* Farias, Pessoa & Paulino-Rosa, 2021, and *A. sergioluzi* Farias, Santos & Pessoa, 2021.

As a result of numerous collecting trips carried out in the Department of Cuzco, Peru, a large collection of *Atrichopogon* was achieved and housed in the entomological collection of the Museo de La Plata, Argentina. The study of these specimens reveals the presence of four unnamed species with a distinctive pattern of pigmented wings, which are herein described, illustrated and included in a key to the Neotropical species of *Atrichopogon* with pigmented wings.

MATERIAL AND METHODS

Specimens were collected placing a funnel of approximately 20 cm in diameter above a jar of alcohol, near a source of light, and were slide-mounted in Canada balsam following the technique described by Borkent & Spinelli (2007). Males and females were associated by their similar wing pigmentation pattern and were collected at the same localities and dates in the province of Cuzco, Perú. Specimens were examined, measured and drawn using a binocular compound microscope with attached camera lucida. The photographs were taken with digital camera Micrometrics SE Premium, through Nikon Eclipse E200 microscope. The studied material, including the types of the new species, are deposited in the collection of the División Entomología, Museo de La Plata, Argentina (MLPA).

Terms for structures follow those used in the Manual of Central American Diptera (Brown *et al.* 2009). For special terms applying to *Atrichopogon* see Borkent & Picado (2004).

Abbreviations

Institutions

MPLA	División Entomología, Museo de La Plata.

Morphology

AR	antennal ratio;
CR	costal ratio;
PR	palpal ratio;
TR	tarsal ratio;
r-m	radial-medial crossvein;
r_3	radial cell 3;
R_3	radial vein 3;
m_1	medial cell 1;
m_2	medial cell 2;
CuA_2	cubital anterior vein 2.

RESULTS

Family Ceratopogonidae Newman, 1834
Genus *Atrichopogon* Kieffer, 1906

Atrichopogon (*Atrichopogon*) *tricuspis* Rossi, Marino & Spinelli, n. sp. (Figs 1; 2; 8A; 9A)

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Type material. — **Holotype**. **Peru** • ♂; Cuzco, Pagoreni; VII.2004, J. Williams; light trap; MLPA.
Allotype. **Peru** • ♀; same data as for holotype; MLPA.
Paratypes. **Peru** • 4 ♂, 8 ♀; same data as for holotype; MLPA • 1 ♀; Cuzco, Kirigueti; VII.2004; J. Williams; light trap; MLPA.

Etymology. — The name *tricuspis* refers to the three points at apex of the dorsal portion of male aedeagal-parameral complex.

Distribution. — *Atrichopogon* (*A.*) *tricuspis* Rossi, Marino & Spinelli, n. sp. is known only from two localities in the Cuzco province (Kirigueti, 11°38'13"S, 73°07'07"W, 395 m, and Pagoreni, 11°42'21.9"S, 72°54'21.9"W, 510 m).

Diagnosis. — Only extant species of *Atrichopogon* in the New World with pigmented wings and without secondary sexual dimorphism, with the scutum lacking a lateral suture and its posterior margin bearing a pair of bunches of 22-24 short setae, each on stout rounded base. Male: antenna similar to female, dorsal portion of aedeagal-paramere complex forming a posteriorly-directed trident. Female: spermatheca heavily sclerotized.

Description

Male adult (*Figs 1; 8A*)

Head (Fig. 1A). Dark brown. Ommatidia (Fig. 1B) with interfacet spicules, broadly abutting medially for length of seven ommatidia. Antenna light brown with plume setae not developed; flagellomeres separate, 1-8 vasiform, 9-13 elongated, proportions as shown in Figure 1A; flagellomere 13 with apical nipple, not basally constricted; AR 1.02-1.16 (1.07, n=5). Maxillary palpus (Fig. 1C) pale brown; third segment slender, with well developed pit just beyond midlength; segments 4, 5 separate; segment 5 conical; PR 2.00-2.20 (2.10, n=5). Head width/mouthparts length 3.13-3.53 (3.33, n =5).

Thorax. Dark brown except scutellum yellowish brown. Scutum (Fig. 1D) with all setae in dark pits; without lateral suture. Posterior margin of scutum with pair of bunches of 22-24 short setae, each on stout rounded base. Paratergite with one stout seta. Anepisternum narrow, slightly bilobed posteriorly. Legs light brown. Hind tibia expanded only at apex. Hind tibial spur length less than width of hind tibia at midlength; hind tibial comb with 8-11 spines; prothoracic TR 3.33-4.00 (3.66, n=5), mesothoracic TR 3.14-3.67 (3.32, n=5), metathoracic TR 2.66-3.14 (3.01, n=5); claws curved, moderately stout, bifid at tip; empodia present. Wing (Fig. 1E) with two slight dark spots in area of r-m and in r_3 posterior to apex of R_3; with macrotrichiae on membrane in apical portion of r_3, scarce or no macrotrichiae in m_1; both radial cells well formed, second radial cell three × longer than first; wing length 0.90-0.98 (0.94, n=5) mm; width 0.40-0.42 (0.40, n=5) mm; CR 0.69-0.74 (0.70, n=5). Halter pale.

Abdomen (Fig. 1F). Tergites 1-3 dark brown, 4-7 successively lighter, 8 entirely dark brown. Genitalia (Figs 1G; 8A) large, segment 9 about equal in width to segment 8; tergite 9 moderately elongate, extending to about level of apex of gonocoxites; posterior margin rounded. Sternite 9 with posterior margin broadly concave, with row of setae separated medially. Gonocoxite without medial lobe, twice as long as greatest breadth. Gonostylus tapering from base, 0.80 length of gonocoxite, anterolaterally flattened, gently curved, apex pointed with large subapical flange. Aedeagal-parameral complex elongate, broad; dorsal portion forming a posteriorly-directed trident, its mesal point truncate, lateral ones pointed; ventral portion somewhat rounded posteriorly, with lateral arms directed laterally. Cercus slender, elongate, extending beyond margin of tergite 9.

Female adult (*Figs 2; 9A*)

Head. As for male, with following differences: proportions of flagellomeres as shown in Figure 2A, flagellomeres 1-8 brown, slightly longer than broad, vasiform, flagellomeres 9-13 elongated; AR 1.39-1.51 (1.45, n=9). Maxillary palpus as in Figure 2B, basal 2/3 of third segment slightly swollen with shallow sensory pit near midlength; segments 4, 5 separate, its combined length longer than third segment; PR 2.18-2.50 (2.29, n=9); head width/mouthparts length 2.70-3.13 (2.86, n=9). Mandible poorly developed, without teeth.

Thorax. Legs with hind tibial comb with 9-11 spines; prothoracic TR 3.43-3.83 (3.68, n=9), mesothoracic TR 3.28-3.71 (3.46, n=9), metathoracic TR 2.70-3.33 (3.05, n=9); claws curved, not bifid at tip. Wing (Fig. 2C) with the same pattern of pigmented membrane, with numerous macrotrichiae in r_3, scarce in m_1; radial cells narrow, second 3.5 × longer than first; wing length 0.98-1.08 (1.02, n=9) mm; width 0.42-0.48 (0.45, n=9) mm; CR 0.69-0.72 (0.70, n=9).

Abdomen (Fig. 2D). Tergites 1-7 brown, segments 8-10 dark brown. Sternite 7 rectangular. Sternite 8 without elongate cuticular extensions, posterior margin boat-shaped. Sternite 9 (Figs 2E; 9A) subquadrangular, sclerotized anteriorly. One spermatheca heavily sclerotized, ovoid with short, slender neck, measuring 0.090-0.110 (0.100, n=5) by 0.064-0.080 (0.070, n=5) mm. Cercus brown.

Remarks

Borkent & Picado (2004) pointed out that the lack of a lateral scutal suture, shared by *A. asuturus* Borkent & Picado, 2004 and *A. tirzae* Borkent & Picado, 2004, both from Costa Rica, is a condition apparently unique within at least the Forcipomyiinae Lenz, 1934, and it is likely a synapomorphy for these two species. *Atrichopogon tricuspis* Rossi, Marino &

FIG. 1. — *Atrichopogon* (*Atrichopogon*) *tricuspis* Rossi, Marino & Spinelli, n. sp. male: **A**, head; **B**, ommatidia; **C**, palpus; **D**, scutum, lateral view; **E**, wing; **F**, abdomen; **G**, genitalia, ventral view. Scale bars: 0.1 mm.

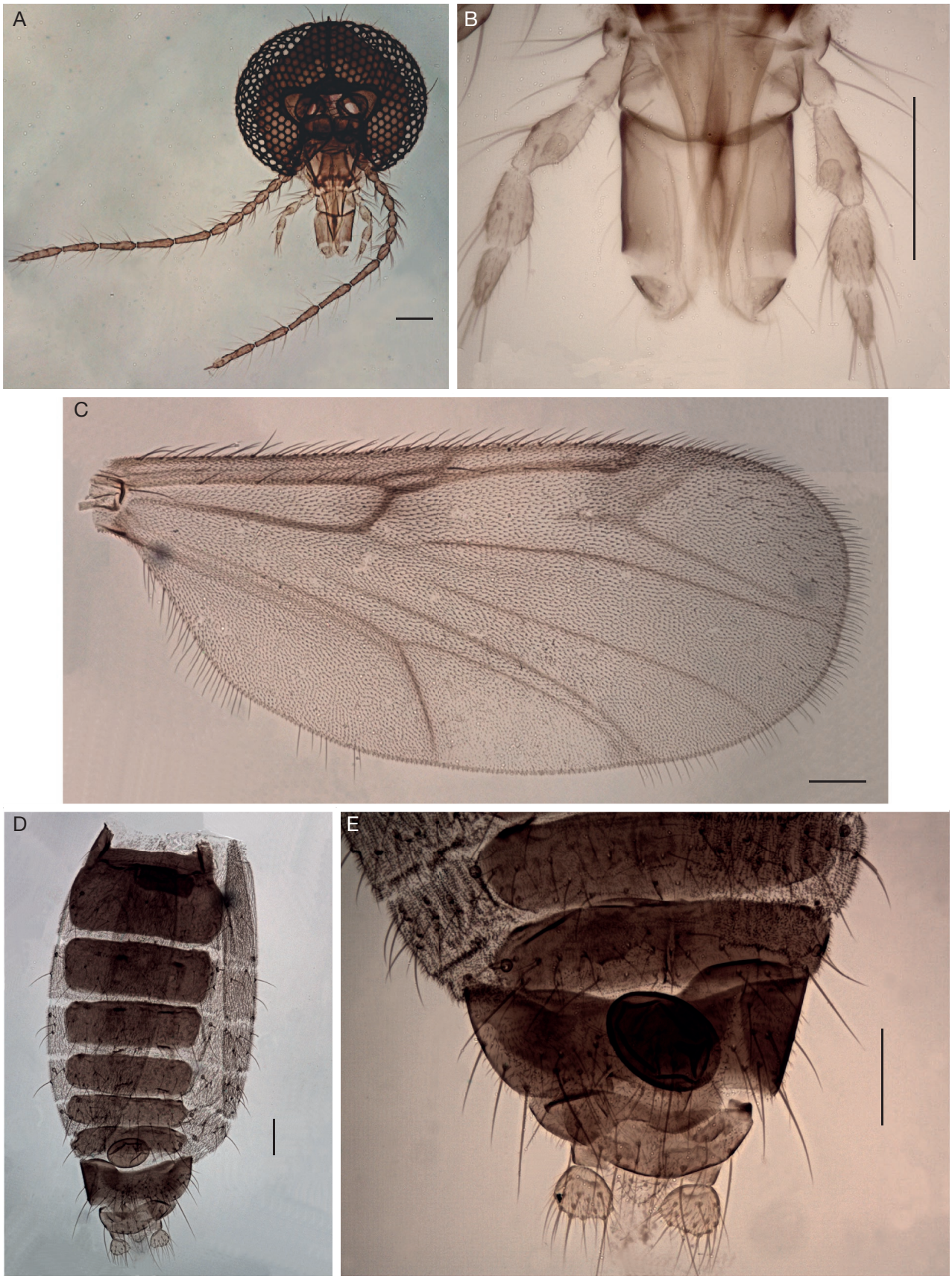

Fig. 2. — *Atrichopogon* (*Atrichopogon*) *tricuspis* Rossi, Marino & Spinelli, n. sp., female: **A**, head; **B**, palpus; **C**, wing; **D**, abdomen; **E**, tip of abdomen. Scale bars: 0.1 mm.

Spinelli, n. sp. shares the same condition with the two species mentioned before. The presence of setae arising from dark pits on the scutum is shared with *A. asuturus*, *A. tirzae* and *A. beccus* Borkent & Picado, 2004 and may be a synapomorphy of these four species; however, these pits are less developed, as in *A. beccus*. Furthermore, this new species shares with *A. asuturus* and *A. tirzae* the presence of female-like antenna (five flagellomeres elongated) and wing, the main differences between these species being in male genitalia. The aedeagal-parameral complex of *A. tricuspis* Rossi, Marino & Spinelli, n. sp. is elongate with the dorsal portion forming a posteriorly-directed trident, and the gonostylus ends in a pointed tip. The aedeagal-parameral complex of *A. tirzae* bears a posteriorly-directed prong, while in *A. asuturus* the dorsal portion tapers somewhat rounded. The apex of the gonostylus of both species is bifid.

During the present study we examined the female holotype of *A. nubeculosus* Macfie, 1949 a species with pigmented wings known from Mexico. It shares with *A. tricuspis* Rossi, Marino & Spinelli, n. sp. the pair of bunches of short setae on the posterior margin of the scutum, and this condition is likely a synapomorphy for these two species. However, the spermatheca of *A. nubeculosus* is very hyaline, nearly imperceptible, contrasting with the heavily sclerotized spermatheca of *A. tricuspis* Rossi, Marino & Spinelli, n. sp. The male of *A. nubeculosus* is unknown.

Atrichopogon (*Atrichopogon*) *trochantispina* Rossi, Marino & Spinelli, n. sp. (Figs 3; 4; 8B; 9B)

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TYPE MATERIAL. — **Holotype**. **Peru** • ♂; Cuzco, Kirigueti; VII.2004, J. Williams; light trap; MLPA.
Allotype. **Peru** • ♀; same data as for holotype; MLPA.
Paratype. **Peru** • 1 ♀; same data as for holotype; MLPA.

ETYMOLOGY. — The name *trochantispina* (spine) refers to the distinctive spines on the trochanter of hind leg.

DISTRIBUTION. — *Atrichopogon trochantispina* Rossi, Marino & Spinelli, n. sp. is known only from the type locality in Kirigueti (11°38'13"S, 73°07'07"W), at an elevation of 395 m.

DIAGNOSIS. — Only extant species of *Atrichopogon* in the New World with pigmented wings and the trochanter of hind leg bearing black spines.

DESCRIPTION

Male adult (*Figs 3; 8B*)

Head (Fig. 3A). Golden brown. Ommatidia (Fig. 3B) with interfacet spicules, abutting medially for length of 3-4 ommatidia. Antenna pale brown with plume setae well developed, flagellomeres 2-10 fused, flagellomere 9 with plume setae, flagellomere 10 without plume setae, 11-13 elongated, 10 slightly longer than 1-9; flagellomere 13 with apical nipple, not basally constricted; AR 0.96. Maxillary palpus (Fig. 3C) pale brown with third segment moderately elongate, swollen at midlength, with deep sensory pit opening just beyond midlength; segments 4, 5 closely apressed; segment 5 conical; PR 2.56. Proboscis short, head width/mouthparts length 2.8.

Thorax (Fig. 3E). Dark brown with small pale patch on humeral areas, ventral portion of pleurae lighter. Scutum with setae arising directly from surface, not in pits; with lateral suture. Paratergite with one stout seta. Anepisternum well developed, broadly bilobed posteriorly. Legs uniformly yellowish brown; hind trochanter with two black spines, the anterior one stouter; hind tibia slightly expanded at apex; hind tibial spur thick, length longer than width of hind tibia at midlength; hind tibial comb with nine spines; prothoracic TR 3.71, mesothoracic TR 3.57, metathoracic TR 3.00; claws curved, bifid at tip; empodia present. Wing (Fig. 3D) with two distinct dark patches in area of r-m and in r_3 posterior to apex of R_3; with macrotrichiae in apical portion of r_3, m_1; both radial cells well formed, second nearly five × longer than first; wing length 0.92 mm; width 0.32 mm; CR 0.67. Halter pale.

Abdomen (Fig. 3F). Tergites 1-6 light brown with dark lateral patches, 7-8 entirely light brown, genitalia dark brown. Genitalia (Figs 3G; 8B) large, segment 9 about equal in width to segment 8. Tergite 9 narrow, short, not extending to apex of gonocoxites, tapering distally, posterior margin somewhat rounded with 6 black, long setae, 4 medial stout, 2 lateral ones thinner; sternite 9 narrow, with narrow longitudinal wrinkle (probably due to slide mounting process), posterior margin protruding with 2 pairs of mesal setae, each pair contiguous to wrinkle. Gonocoxite moderately stout, without medial lobe, 2.2 × longer than greatest breadth. Gonostylus 0.7 length of gonocoxite, split from midportion to apex (0.4 distal), outer portion nearly straight with one stout seta; inner portion slightly shorter, curved, apex pointed. Aedeagal-parameral complex elongate; dorsal portion with V-shaped basal arch, mesolateral margins subparallel, greatly expanded distally, hyaline, with broad, convex apex, pair of slender, sclerotized, subparallel, inner prongs ending in an arrow-shaped process, contiguous with a feet-shaped process directed laterally; ventral portion stout, triangular, lateral arms stout, recurved, directed posterolaterally, posterolateral margins slightly sinuate, apex not well discernible, apparently bulbous, produced beyond tergite by a short distance. Cercus elongate, broad basally, apex rounded, extending beyond margin of tergite 9.

Female adult (*Figs 4; 9B*)

Head. As for male, with following differences: flagellum brown, proportions of flagellomeres as shown in Figure 4A; flagellomeres 1-8 longer than broad, vasiform, flagellomeres 9-13 elongated; AR 1.46-1.48 (1.47, n=2). Maxillary palpus (Fig. 4B) with third segment slender, with deep sensory pit opening near midlength; segments 4, 5 separate, their combined length slightly longer than third segment; PR 2.20 (n = 2); head width/mouthparts length 2.15-2.39 (2.27, n=2). Mandible with 21 teeth.

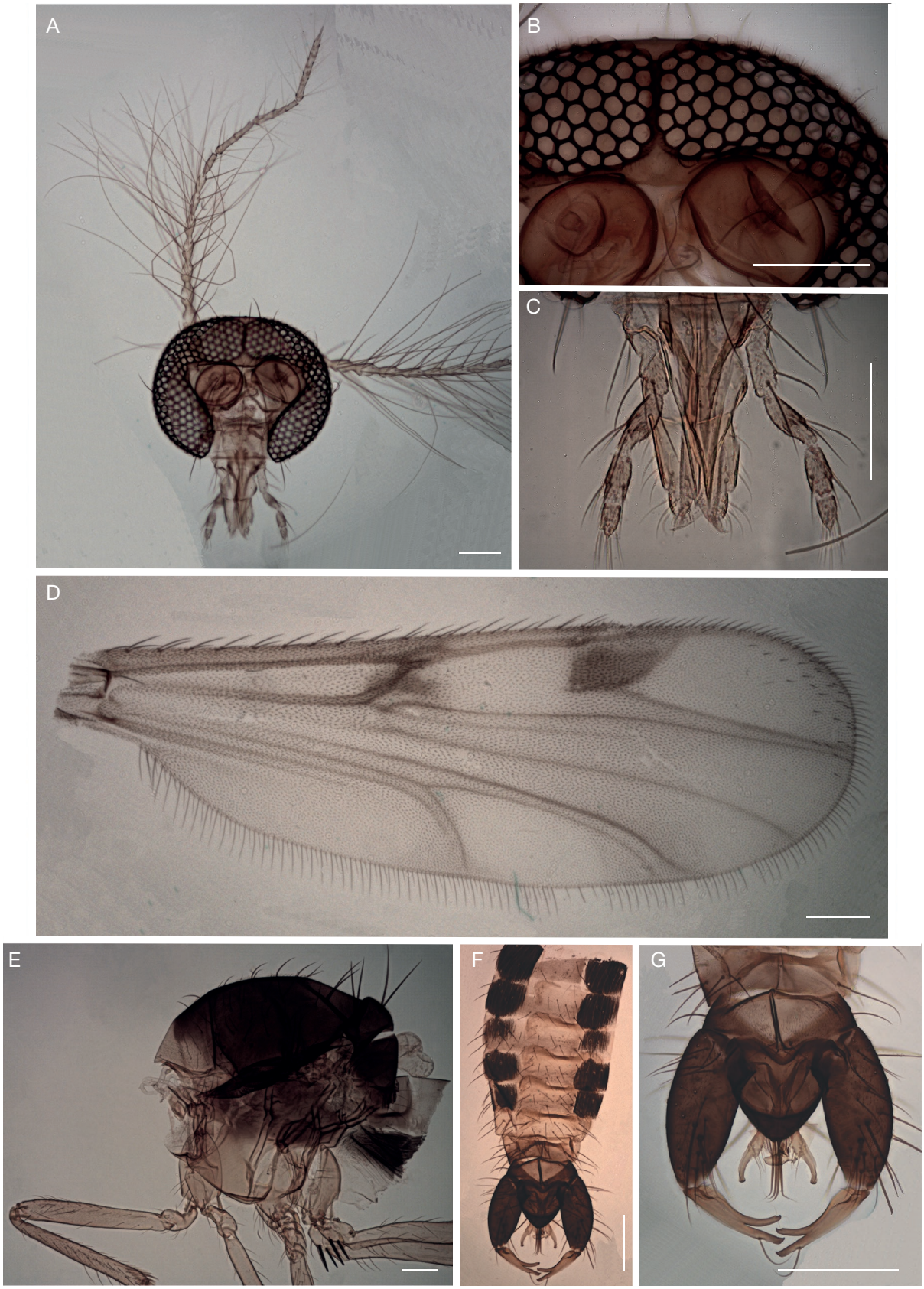

FIG. 3. — *Atrichopogon* (*Atrichopogon*) *trochantispina* Rossi, Marino & Spinelli, n. sp. male: **A**, head; **B**, ommatidia; **C**, palpus; **D**, wing; **E**, thorax, lateral view; **F**, abdomen; **G**, genitalia, ventral view. Scale bars: 0.1 mm.

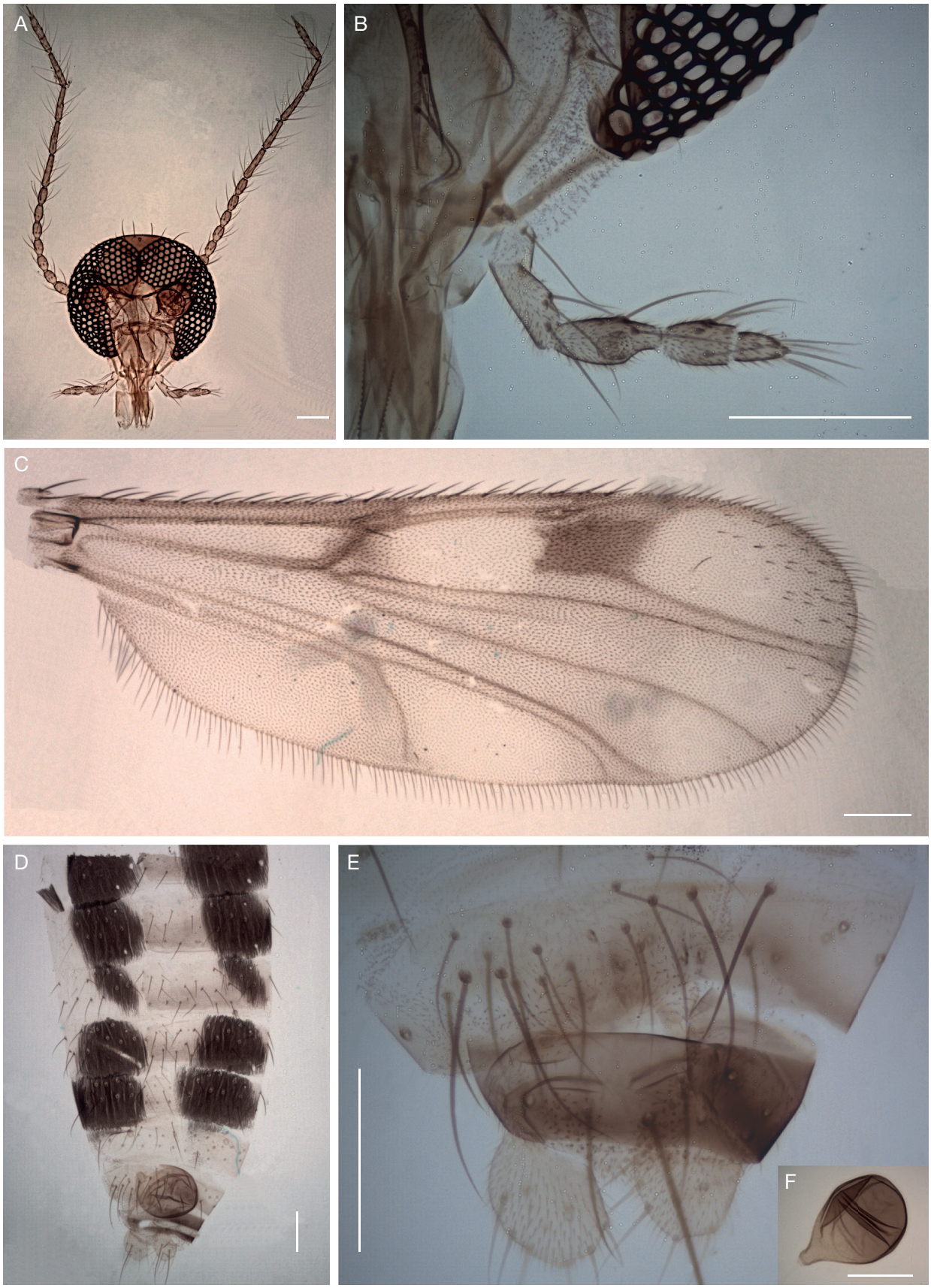

Fig. 4. — *Atrichopogon* (*Atrichopogon*) *trochantispina* Rossi, Marino & Spinelli, n. sp. female: **A**, head; **B**, palpus; **C**, wing; **D**, abdomen; **E**, tip of abdomen; **F**, spermatheca. Scale bars: 0.1 mm.

Thorax. Scutum dark brown with humeral areas yellowish. Legs uniformly yellowish brown; prothoracic TR 3.71 (n=2), mesothoracic TR 3.25-3.50 (3.38, n=2), metathoracic TR 2.80-3.00 (2.90, n=2); claws curved, not bifid at tip. Wing (Fig. 4C) with the same pattern of pigmented membrane, with abundant macrotrichiae on r_3, m_1; radial cells narrow, second five × longer than first; wing length 0.92-0.98 (0.95, n=2) mm; width 0.36-0.38 (0.37, n=2) mm; CR 0.65 (n=2).

Abdomen (Fig. 4D). Tergites 1-6 pale brown with dark lateral patches, 7-8 lighter, 9 dark brown, 10 uniformly light brown. Sternite 7 rectangular. Sternite 8 without elongate, cuticular extensions, posterior margin with narrow, mesal projection. Sternite 9 (Fig. 4E; 9B) subquadrangular. One spermatheca (Fig. 4F; 9B) large, ovoid with short, stout neck, sclerotized, measuring 0.120-0.124 (0.122, n=2) by 0.098-0.104 (0.100, n=2) mm. Cercus yellowish brown.

Remarks

Of the Neotropical species with distinctive pigmented wings, *Atrichopogon trochantispina* Rossi, Marino & Spinelli, n. sp. is the only one bearing stout black spines on the hind trochanter, likely an autapomorphy of this species. The presence of splitted gonostylus near midlength is shared with *Atrichopogon maculipennis* Clastrier, 1968 from French Guiana, *Atrichopogon nukini* Felippe-Bauer, 2018 and *Atrichopogon riopardensis* Farias, Pessoa & Paulino-Rosa, 2021 from Brazil. The wing of *A. maculipennis* has the distal ⅓ entirely dark and the gonostylus is shorter and thicker with the projections broadly separated. The dark spots of the wings of *A. nukini* and *A. riopardensis* are similar to the new species, however, the tergite 9 of *A. nukini* is moderately long, extending about the level of apex of gonocoxite, and the inner portion of the gonostylus of *A. riopardensis* is four times shorter than the outer portion.

Atrichopogon clastrieri Spinelli & Marino, 2007 from Argentina is also similar to this new species, but in males of *A. clastrieri* the posterior margin of the tergite 9 bears a small medial lobe, and the gonostylus is simple, among other genital differences. The female mandible of *A. clastrieri* is poorly developed, without teeth.

Atrichopogon (*Atrichopogon*) *soriai*
Rossi, Marino & Spinelli, n. sp.
(Figs 5; 6; 8C; 9C)

urn:lsid:zoobank.org:act:9EA13D98-D89B-456A-AE18-E715A76DF63F

Type material. — **Holotype**. **Peru** • ♂; Cuzco, Pagoreni; VII.2004, J. Williams; light trap; MLPA.
Allotype. **Peru** • ♀; same data as for holotype.
Paratypes. **Peru** • 6 ♂, 7 ♀; same data as for holotype.

Etymology. — This species is named after a good friend and colleague Saulo de Jesús Soria, in recognition of his wonderful contributions on the Neotropical pollinator species of Ceratopogonidae.

Distribution. — *Atrichopogon soriai* Rossi, Marino & Spinelli, n. sp. is known only from the type locality in Kirigueti (11°38'13"S, 73°07'07"W), at elevation of 395 m.

Diagnosis. — Only extant species of *Atrichopogon* in the New World with pigmented wings, and the fore and midlegs brown and hind leg pale brown.

Description of male (*Figs 5; 8C*)

Head (Fig. 5A). Golden brown. Ommatidia (Fig. 5B) with interfacet spicules, broadly abutting medially for length of 4-5 ommatidia. Antenna with pedicel and flagellomere 1 dark brown, flagellomeres 2-9 and basal half of 10 pale brown, distal half of 10, 11-13 slightly darker with plume setae well developed, flagellomeres 2-10 at least partially fused, flagellomere 9-10 with plume setae, 11-13 elongated, 10 slightly longer than 1-9; flagellomere 13 with apical nipple, not basally constricted; AR 1.29-1.42 (1.34, n=7). Maxillary palpus (Fig. 5C) pale brown with third segment short, swollen at midlength, with deep sensory pit opening just beyond midlength; segments 4, 5 separate, broadly abutting; segment 5 conical; PR 1.81-2.30 (2.06, n=7). Proboscis short, head width/mouthparts length 2.47-3.13 (2.69, n=7).

Thorax. Dark brown. Scutum with setae arising directly from surface, not in pits; with lateral suture. Paratergite with one stout seta. Anepisternum well developed, broadly bilobed posteriorly. Legs (Fig. 5E) brown, hind leg paler; fore and midlegs brown except narrow base of midfemur and knees pale brown, tarsi pale brown; hind tibia slightly expanded at apex; hind tibial spur thick, length longer than width of hind tibia at midlength; hind tibial comb with 7-8 spines; prothoracic TR 3.50-4.20 (3.89, n=7), mesothoracic TR 3.14-3.83 (3.60, n=7), metathoracic TR 3.00-3.57 (3.25, n=7); claws curved, bifid at tip; empodia present. Wing (Fig. 5D) with three dark spots, one covering r-m and first radial cell extending to base of m_1 and shortly in m_2, second covering distal ⅓ of wing, remaining one in CuA_2; macrotrichiae on membrane in apical portion of cell r_3; both radial cells well formed, second nearly three × longer than first; wing length 0.82-0.98 (0.89, n=7) mm; width 0.32-0.40 (0.34, n=7) mm; CR 0.65-0.69 (0.68, n=7). Halter whitish.

Abdomen. Tergites 1-7 light brown, 8 amber brown, genitalia amber brown. Genitalia (Figs 5F; 8C) of moderate size, segment 9 about equal in width to segment 8. Tergite 9 short, not extending to apex of gonocoxites, posterior margin rounded; sternite 9 narrow, posterior margin broadly concave, with two lateral sclerotized conical teeth, and row of 8 scattered setae. Gonocoxite moderately stout, without medial lobe, twice as long as greatest breadth. Gonostylus tapering from base, 0.9 length of gonocoxite, nearly straight, apex darker, pointed. Aedeagal-parameral complex broad, composed only of ventral portion; basal arch strongly sclerotized, deeply concave; lateral arms directed laterally; posterolateral margins convex; posteromedial prong triangular, tip blunt. Cercus somewhat elongate, apressed against lateral margin of tergite 9.

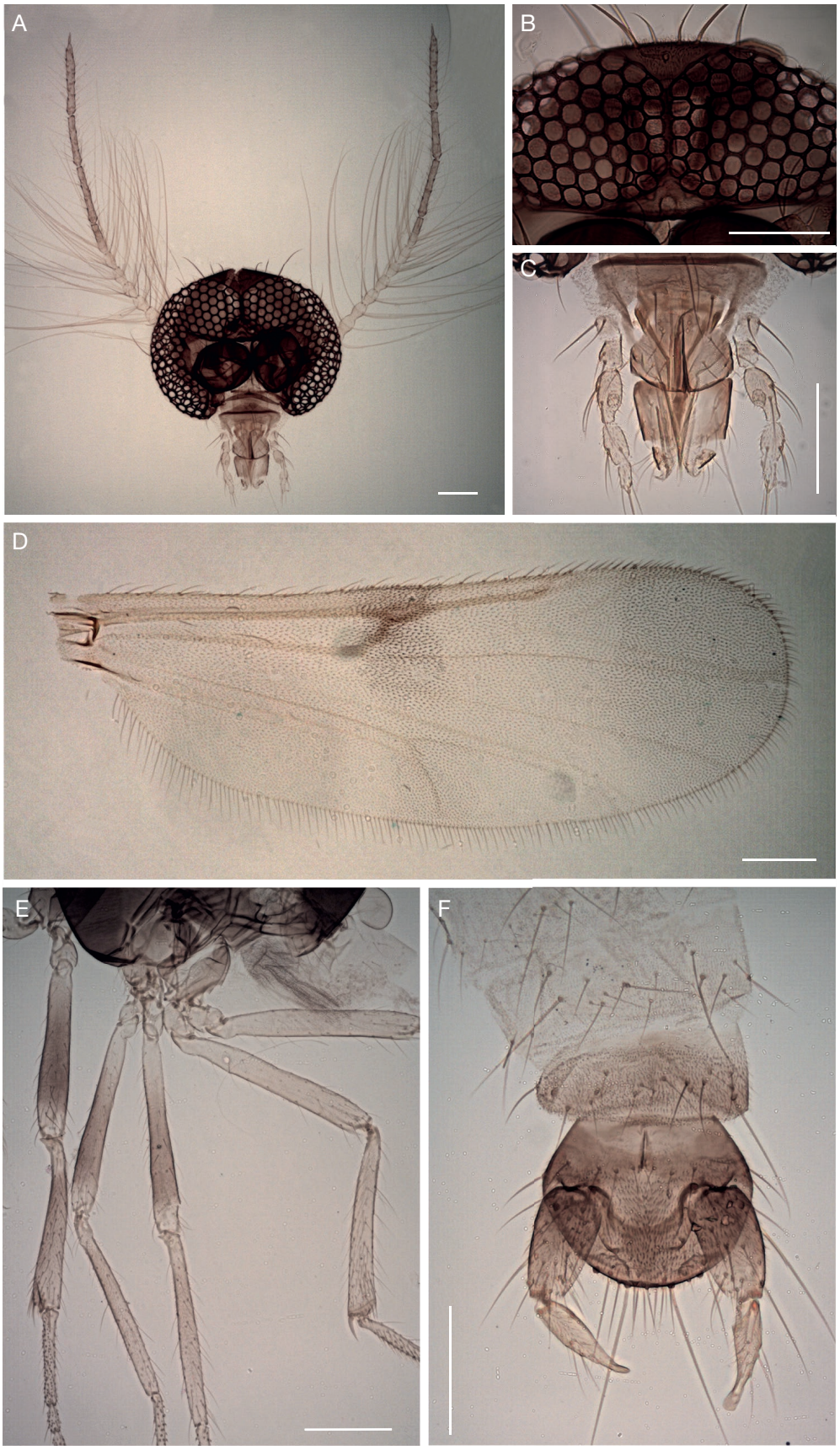

Fig. 5. — *Atrichopogon* (*Atrichopogon*) *soriai* Rossi, Marino & Spinelli, n. sp. male: **A**, head; **B**, ommatidia; **C**, palpus; **D**, wing; **E**, legs; **F**, genitalia, ventral view. Scale bars: 0.1 mm.

Fig. 6. — *Atrichopogon* (*Atrichopogon*) *soriai* Rossi, Marino & Spinelli, n. sp. female: **A**, head; **B**, palpus; **C**, wing; **D**, abdomen; **E**, tip of abdomen. Scale bars: 0.1 mm.

Female adult (*Figs 6; 9C*)

Head. As for male, with following differences: flagellum light brown, proportions of flagellomeres as shown in Figure 6A; flagellomeres 1-8 longer than broad, vasiform, flagellomeres 9-13 elongated; AR 1.53-2.23 (1.69, n = 8). Maxillary palpus (Fig. 6B) with third segment slender, with deep sensory pit opening near midlength; segments 4, 5 separate, their combined length slightly longer than third segment; PR 1.91-2.40 (2.11, n = 8); head width/mouthparts length 2.63-3.33 (2.88, n= 8). Mandible poorly developed, without teeth.

Thorax. Legs with hind tibial comb with 8-9 spines, prothoracic TR 3.33-4.20 (3.93, n = 8), mesothoracic TR 3.14-4.00 (3.66, n = 8), metathoracic TR 3.00-3.57 (3.29, n = 8); claws curved, not bifid at tip. Wing (Fig. 6C) with the same pattern of pigmented membrane, with many macrotrichiae on cells r_3, m_1; scarce on m_2, radial cells narrow, second four × longer than first; wing length 0.88-0.98 (0.93, n=8) mm; width 0.38-0.42 (0.40, n=8) mm; CR 0.65-0.74 (0.69, n = 8).

Abdomen (Fig. 6D). Tergites 1-6 pale brown with lateral patches darker, segment 7 uniformly yellowish brown, segments 8-10 dark brown. Sternite 7 rectangular. Sternite 8 without elongate cuticular extensions, posterior margin nearly straight. Sternite 9 (Fig. 6E; 9C) stout, truncate anteriorly, not joined medially. One spermatheca ovoid with short neck, sclerotized, measuring 0.070-0.090 (0.076, n=8) by 0.050-0.080 (0.061, n=8) mm. Cercus dark brown.

Remarks

Of the Neotropical species with distinctive pigmented wings, *Atrichopogon soriai* Rossi, Marino & Spinelli, n. sp. is the only one showing the hind leg paler than fore and midlegs.

The new species is similar to *A. maculipennis* on the basis of its distinct pattern of pigmentation of the wing, which possesses two transverse dark bands, one straddling r-m to CuA_2 and other covering the distal ⅓ of the wing. However, in *A. soriai* Rossi, Marino & Spinelli, n. sp. the dark spot on r-m is clearly separated from CuA_2 by a pale broad area.

The male of *Atrichopogon cavus* Felippe-Bauer, 2012 from Brazil is also similar to the male of *A. soriai* Rossi, Marino & Spinelli, n. sp., but the posterior margin of the tergite 9 reaches the apex of gonocoxites, and the female mandible of *A. cavus* is armed with 15 teeth.

By virtue of the general features of the male genitalia, *A. soriai* Rossi, Marino & Spinelli, n. sp. is similar to *Atrichopogon delecollei* Rossi, Marino & Spinelli, n. sp. from Peru. Differences between the two species may be found in the Remark paragraph under the latter species.

Atrichopogon (*Atrichopogon*) *delecollei*
Rossi, Marino & Spinelli, n. sp.
(Figs 7; 8D)

urn:lsid:zoobank.org:act:5DB181CA-FA83-49C8-A03D-2D18805429DB

Type material. — **Holotype. Peru** • ♂; Cuzco, Kirigueti; VII.2004, J. Williams; light trap; MLPA.

Etymology. — This species is named after Jean Claude Delècolle in recognition of his valuable contribution to ceratopogonid taxonomy.

Distribution. — *Atrichopogon delecollei* Rossi, Marino & Spinelli, n. sp. is known only from the type locality in Kirigueti (11°38'13"S, 73°07'07"W), at an elevation of 395 m.

Diagnosis. — Male: only extant species of *Atrichopogon* in the New World with pigmented wings with the thorax dark brown except ventral portion, most of pleura and legs light brown, abdominal segments 1-3 and 5-6 light brown with dark patches laterally, posterodorsal prong of aedeagal-parameral complex slender and notched apically. Female unknown.

Description

Male (*Figs 7; 8D*)

Head (Fig. 7A). Golden brown. Ommatidia (Fig. 7B) with interfacet spicules, broadly abutting medially for length of five ommatidia. Antenna with pedicel, flagellomeres 1-9 and basal half of 10 pale brown, distal half of 10, 11-13 slightly darker with plume setae well developed, flagellomeres 2-10 at least partially fused, flagellomere 9-10 with plume setae, 11-13 elongated, 10 slightly longer than 1-9; flagellomere 13 with apical nipple, not basally constricted; AR 1.44. Maxillary palpus (Fig. 7C) pale brown with third segment moderately elongated, swollen for basal 3/4, with deep sensory pit opening just beyond midlength; segments 4, 5 separate, broadly abutting; segment 5 conical; PR 2.30. Proboscis short, head width/mouthparts length 2.55.

Thorax (Fig. 7E). Dorsal portion and anepisternum dark brown, ventral portion and most of pleura light brown. Scutum with setae arising directly from surface, not in pits; with lateral suture. Paratergite with one stout seta. Anepisternum well developed, broadly bilobed posteriorly. Legs light brown with basal portion of mid and hind femora, coxae paler; hind tibia slightly expanded at apex; hind tibial spur thick, length longer than width of hind tibia at midlength; hind tibial comb with 6-8 spines; prothoracic TR 4.29, mesothoracic TR 4.25, metathoracic TR 3.50; claws curved, bifid at tip; empodia present. Wing (Fig. 7D) with two distinct dark patches in area of r-m and in cell r_3 posterior to apex of R_3; without macrotrichiae; both radial cells well formed, second nearly five × longer than first; wing length 1.06 mm; width 0.34 mm; CR 0.68. Halter whitish.

Abdomen (Fig. 7F). Segments light brown with lateral margins darker on segments 1-3 and 5-6, segments 7-8 amber brown. Genitalia (Fig. 8D) of moderate size, dark brown; segment 9 about equal in width to segment 8. Tergite 9 short, not extending to apex of gonocoxite, posterior margin rounded; sternite 9 narrow, posterior margin broadly concave with scattered row of 10 setae along margin of concavity, few setae on lateral margins.

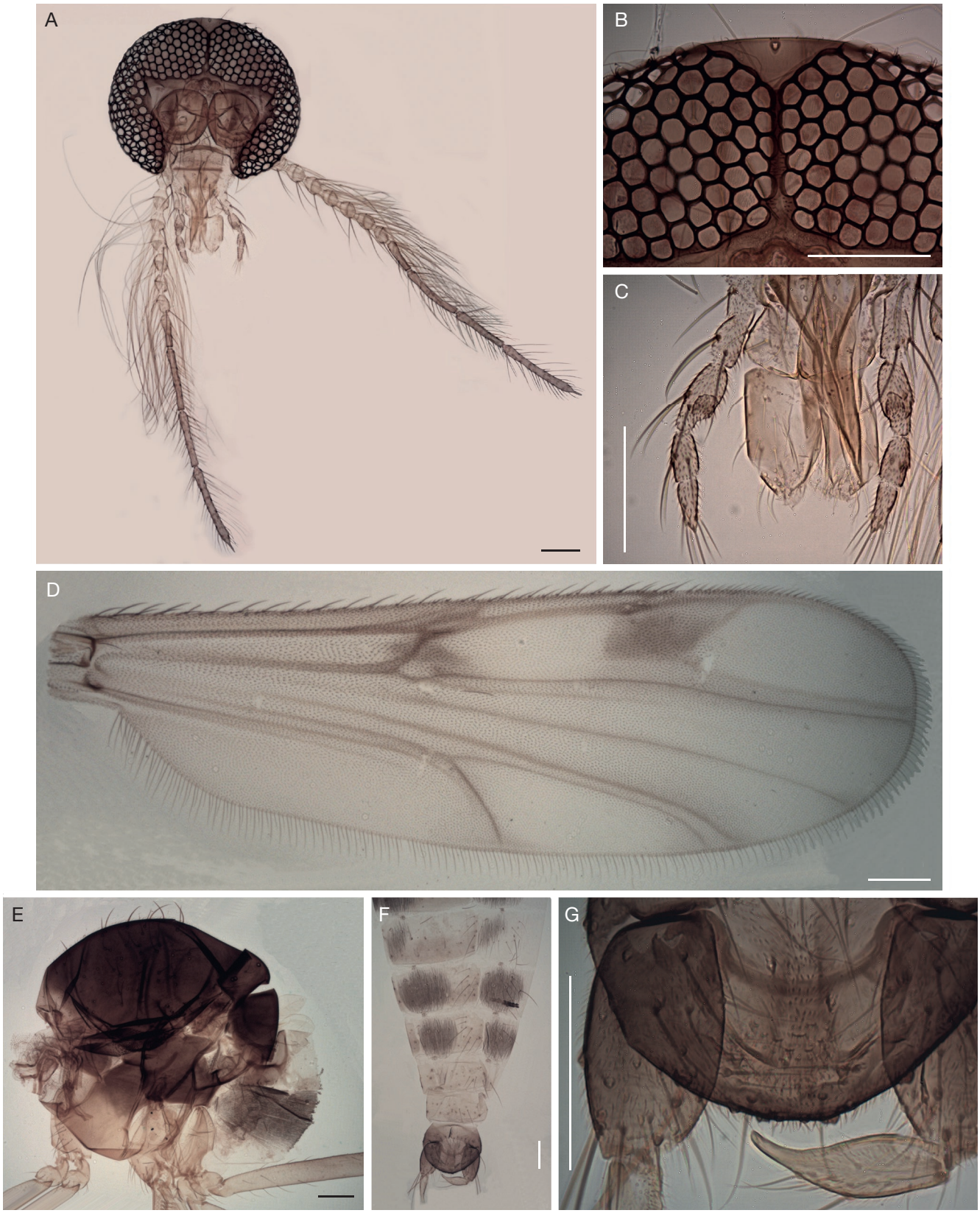

FIG. 7. — *Atrichopogon* (*Atrichopogon*) *delecollei* Rossi, Marino & Spinelli, n. sp. male: **A**, head; **B**, ommatidia; **C**, palpus; **D**, wing; **E**, thorax, lateral view; **F**, abdomen; **G**, aedeagal-parameral complex. Scale bars: 0.1 mm.

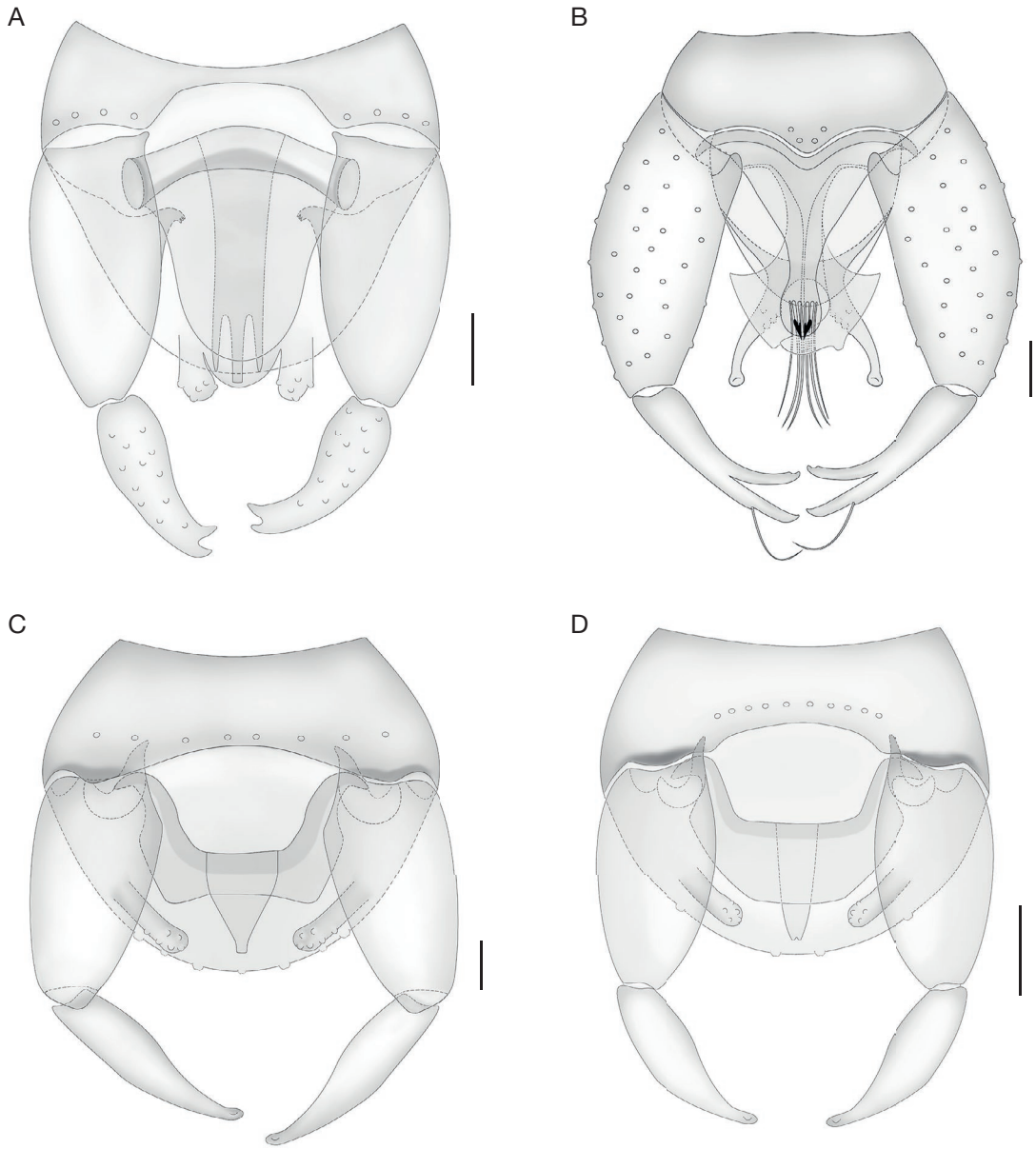

Fig. 8. — *Atrichopogon* Kieffer, 1906 male genitalia, ventral view; **A**, *Atrichopogon (Atrichopogon) tricuspis* Rossi, Marino & Spinelli, n. sp.; **B**, *Atrichopogon* (*Atrichopogon*) *trochantispina* Rossi, Marino & Spinelli, n. sp.; **C**, *Atrichopogon* (*Atrichopogon*) *soriai* Rossi, Marino & Spinelli, n. sp.; **D**, *Atrichopogon* (*Atrichopogon*) *delecollei* Rossi, Marino & Spinelli, n. sp. Scale bars: 0.05 mm.

Gonocoxite moderately stout, without medial lobe, 1.8 × longer than greatest breadth. Gonostylus paler, tapering from base, 0.8 length of gonocoxite, slightly curved, apex pointed. Aedeagal-parameral complex (Fig. 7G) broad with rounded posterolateral margins, rounded posteroventrally, posterodorsal prong slender, notched apically, lateral arms directed posterolaterally. Cercus elongate, ventral to tergite 9.

Female
Unknown.

Remarks
The male genitalia of this new species is similar to *Atrichopogon soriai* Rossi, Marino & Spinelli, n. sp. However, *A. soriai* Rossi, Marino & Spinelli, n. sp. shows a different pattern of wing pigmentation, with the ⅓ distal darker. Besides, in *A. soriai* Rossi, Marino & Spinelli, n. sp. the pedicel and flagellomere 1 and the fore and mid legs are distinctly darker, and the abdominal segment 1-7 are uniformly pale.

This species is also similar to *A. ornatipennis* Clastrier, 1987. Similitudes and differences between the species may be found in the key.

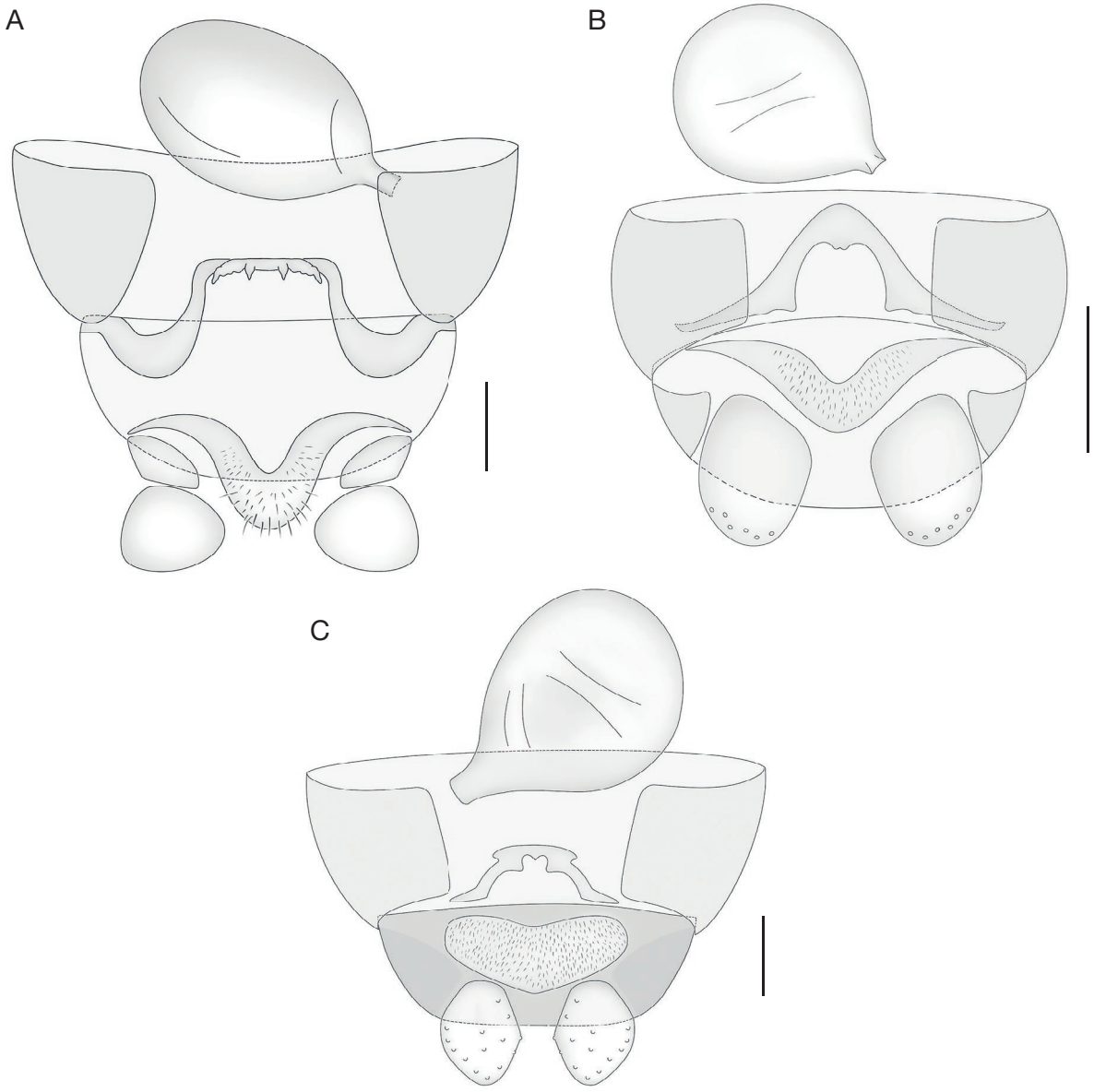

FIG. 9. — *Atrichopogon* Kieffer, 1906 female genitalia, ventral view; **A**, *Atrichopogon (Atrichopogon) tricuspis* Rossi, Marino & Spinelli, n. sp.; **B**, *Atrichopogon* (*Atrichopogon*) *trochantispina* Rossi, Marino & Spinelli, n. sp.; **C**, *Atrichopogon* (*Atrichopogon*) *soriai* Rossi, Marino & Spinelli, n. sp. Scale bars: 0.05 mm.

KEY TO THE ADULT *ATRICHOPOGON* KIEFFER, 1906 WITH PIGMENTED WINGS OF THE NEOTROPICAL REGION

The males of *A.* (*A.*) *nebulosus* Macfie, 1939 and *A.* (*A.*) *nubeculosus* Macfie, 1949 and the females of *A.* (*A.*) *ornatipennis* Clastrier, 1987, *A.* (*A.*) *pictipennis* Clastrier, 1979 and *A.* (*A.*) *delecollei* Rossi, Marino & Spinelli, n. sp. are unknown. Since the females of different species are very similar, it is highly recommended to make the sex association.

1. Wing with extensive dark spots, covering all apical margin of wing (Figs 5D; 6C) 2
— Wing with two dark spots, one over r-m and second in cell r_3 posterior to apex of R_3 (Figs 1E; 2C; 3D; 4C; 7D) 4

2. Distal 1/3 of wing dark with two elliptic pale spots, one subapically in r_3 and another extending from apical portion of m_1 to m_2; males with gonostylus gradually tapering and curved, with pointed apex .... *A.* (*A.*) *cavus* Felippe-Bauer, 2012
— Distal 1/3 of wing entirely dark (Figs 5D; 6C) 3

3. Hind leg paler than fore and midlegs (Fig. 5E); males with gonostylus slender, tapering from base, apex single (Figs 5F; 8C) ..... *A.* (*A.*) *soriai* Rossi, Marino & Spinelli, n. sp.
— Legs with similar coloration; males with gonostylus thick with two pointed apical prongs ..... *A.* (*A.*) *maculipennis* Clastrier, 1968

4. Males 5
— Females 18

5. Gonostylus tapering flattened and curved, apex spatulate or with flange (Figs 1G, 8A) 6
— Gonostylus double, forked or single, pointed at apex (Figs 3G; 5F; 7G; 8B; 8C; 8D) 7

6. Antenna without sexual secondary dimorphism (Fig. 1A); scutum without lateral suture (Fig. 1D) ..... *A.* (*A.*) *tricuspis* Rossi, Marino & Spinelli, n. sp.
— Antenna with plume setae (Fig. 3A); scutum with lateral suture (Fig. 7E) ..... *A.* (*A.*) *janseni* Pessoa & Farias, 2021

7. Gonostylus double or forked (Figs 3G; 8B) 8
— Gonostylus single, not forked (Figs 5F; 7G; 8C; 8D) 15

8. Gonostylus double, articulated at base 9
— Gonostylus forked, not articulated at base (Figs 3G; 8B) 10

9. Posterior margin of tergite 9 rounded, not surpassing apex of gonocoxite; sternite 9 with lateral group of scattered setae ..... *A.* (*A.*) *casali* Cavalieri & Chiossone, 1973
— Posterior margin of tergite 9 elongated as a setose finger-like process, greatly surpassing apex of gonocoxite; sternite 9 with transverse row of setae ..... *A.* (*A.*) *dactilus* Felippe-Bauer, 2012

10. Gonostylus forked near its base 11
— Gonostylus forked near midlength or close to the apex 12

11. Inner portion of gonostylus slender, strongly curved ..... *A.* (*A.*) *pictipennis* Clastrier, 1979
— Inner portion of gonostylus slender, nearly straight ..... *A.* (*A.*) *shawadawa* Felippe-Bauer, 2018

12. Gonostylus forked close to the apex, basal half swollen and inner prong sclerotized ..... *A.* (*A.*) *sergioluzi* Farias, Santos & Pessoa, 2021
— Gonostylus forked near midlength (Figs 3G; 8B) 13

13. Trochanter of hind leg bearing black spines (Fig. 3E) .. *A.* (*A.*) *trochantispina* Rossi, Marino & Spinelli, n. sp.
— Trochanter of hind leg without black spines 14

14. Inner portion of gonostylus elongate, curved apically, longer than outer portion .....*A.* (*A.*) *nukini* Felippe-Bauer, 2018
— Outer portion of gonostylus 4 × longer than inner portion .....*A.* (*A.*) *riopardensis* Farias, Pessoa & Paulino-Rosa, 2021

15. Posterior margin of tergite 9 with 1 or 2 small median lobes 16
— Posterior margin of tergite 9 rounded, without lobes..... 17

16. Posterior margin of tergite 9 bilobated ..... *A.* (*A.*) *bicuspis* Borkent & Picado, 2004
— Posterior margin of tergite 9 with a small median lobe ..... *A.* (*A.*) *clastrieri* Spinelli & Marino, 2007

17. Gonostylus thick; gonocoxal apodeme stout, directed laterally ..... *A.* (*A.*) *ornatipennis* Clastrier, 1987
— Gonostylus slender tapering from base; gonocoxal apodeme slender, directed anteriorly (Figs 7F; 8D) ..... *A.* (*A.*) *delecollei* Rossi, Marino & Spinelli, n. sp.

18. Abdominal tergites 1-6 or 1-3 and 5-6 with dark lateral patches (Fig. 5D) 19
— Abdominal tergites 1-6 without dark lateral patches (Figs 2D; 6D) 27

19. Abdominal tergites 1-6 with dark lateral patches 20
— Abdominal tergites 1-3 and 5-6 with dark lateral patches, tergite 4 without or with a smaller patch (Fig. 5D) 21

20. Flagellomeres 9-13 paler than flagellomeres 1-8; mandible without teeth ..... *A.* (*A.*) *janseni* Pessoa & Farias, 2021
— Flagellomeres uniformly brown; mandible with 20 teeth ..... *A.* (*A.*) *casali* Cavalieri & Chiossone, 1973

21. Trochanter of hind leg with black spines (Fig. 3E) ..... *A.* (*A.*) *trochantispina* Rossi, Marino & Spinelli, n. sp.
— Trochanter of hind leg without black spines 22

22. Palpus with segments 4 and 5 partially fused ..... *A.* (*A.*) *dactilus* Felippe-Bauer, 2012
— Palpus with segments 4 and 5 separated 23

23. Spermatheca large and elliptical, about as broad as long, with elongate and stout neck .....
..... *A.* (*A.*) *sergioluzi* Farias, Santos & Pessoa, 2021
— Spermatheca ovoid, longer than broad, with short neck 24

24. Mandible poorly developed, without teeth 25
— Mandible well developed, with teeth 26

25. Wing length longer than 1.13 mm ..... *A.* (*A.*) *shawadawa* Felippe-Bauer, 2018
— Wing length shorter than 1.10 mm ..... *A.* (*A.*) *nukini* Felippe-Bauer, 2018

26. Wing length longer than 1.14 mm; mandible with 21 teeth ..... *A.* (*A.*) *bicuspis* Borkent & Picado, 2004
— Wing length shorter than 0.90 mm; mandible with 24 teeth .....
..... *A.* (*A.*) *riopardensis* Farias, Pessoa & Paulino-Rosa, 2021

27. Posterior margin of scutum with pair of bunches of short setae, each on stout rounded base (Fig. 1D) 28
— Posterior margin of scutum without bunches of short setae 29

28. Spermatheca lightly sclerotized ..... *A.* (*A.*) *nubeculosus* Macfie, 1949
— Spermatheca heavily sclerotized, scutum without lateral suture (Fig. 2E, 9A) .....
..... *A.* (*A.*) *tricuspis* Rossi, Marino & Spinelli, n. sp.

29. Flagellomeres 9-13 darker than flagellomeres 1-8 ..... *A.* (*A.*) *nebulosus* Macfie, 1939
— Flagellomeres 9-13 paler than flagellomeres 1-8 ..... *A.* (*A.*) *clastrieri* Spinelli & Marino, 2007

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