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Two new species of *Riethia* Kieffer, 1917 from Chile and Ecuador (Chironomidae: Chironominae, Pseudochironomini)

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Abstract

Two new species of *Riethia* Kieffer, 1917, *R. chilensis* **sp. nov.** (Chile) and *R. ecuadoriensis* **sp. nov.** (Ecuador) are described and figured as adult males. The two species differ from the presumable closest relative, *R. truncatocaudata* (Edwards, 1931), by uniformly coloured legs, without bands, and stout curved hypopygial superior volsellae; they can be separated from all other *Riethia* by the shape and setation pattern of the inferior volsella. The two new species differ from each other in body colouration, including abdomen, and in the presence/absence of microtrichia on superior volsellae.

Key words: Pseudochironomini, *Riethia*, new species, Neotropical region, key

Introduction

The genus *Riethia* Kieffer, 1917 was erected based on the adults of two species from Australia (Kieffer 1917), with *Riethia stictoptera* Kieffer, 1917 accepted as type species (Ashe 1983). The Austro-Pacific species were recently revised by Cranston (2019), recognizing 14 species. So far seven species of *Riethia* have been recorded from the Neotropical region. Edwards (1931) described two species from Patagonia, *Pseudochironomus melanoides* Edwards, 1931 from Argentina and *P. truncatocaudatus* Edwards, 1931 from Chile, that are now placed in *Riethia.* Studying the type material, Trivinho-Strixino *et al.* (2009) redescribed *R. truncatocaudata* considering *R. melanoides* its junior synonym. Later, Neubern *et al.* (2011) described *Riethia manauara* Neubern, Trivinho-Strixino & Silva, 2011 from the Amazon in Brazil and Trivinho-Strixino & Shimabukuro (2018) described four more species from Brazil: *R. cauame* Trivinho-Strixino & Shimabukuro, 2018, *R. fazzari* Trivinho-Strixino & Shimabukuro, 2018, *R. galilei* Trivinho-Strixino & Shimabukuro, 2018, and *R. pantera* Trivinho-Strixino & Shimabukuro, 2018. Recently, Andersen & Sanz-laParra (2023) described *R. epleri* Andersen & Sanz-laParra, 2023 from Zurqui in Costa Rica.

The genus belongs to the tribe Pseudochironomini Sæther, 1977 within the subfamily Chironominae. The adult tribe's members are characterized by having a dark tibial comb on the foreleg, similar to the combs on mid- and hindleg tibiae, the pseudovolsella is generally present, while the pars ventralis is developed in some genera. So far, 10 Pseudochironomini genera have been described, including 4 extinct and 6 extant ones (Giłka *et al.* 2022, Zakrzewska *et al.* 2023), among which *Riethia* is the second most species-rich genus.

Below we describe two new species from Chile and Ecuador. Both are similar to *R. truncatocaudata* but have uniformly coloured legs vs yellowish-brown legs with proximal and distal brown bands on foreleg tibia, and tarsomeres 1–4 with distal brown bands in *R. truncatocaudata*. The two new species can also be separated from *R. truncatocaudata* on the shape of the superior volsella, that is curved, stout, with narrowly triangular apex projecting anteromedially, while the superior volsella in *R. truncatocaudata* appears to be more slender and apically pointed with fewer dorsal setae (cf. Trivinho-Strixino *et al.* 2009: fig. 4).

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Material and methods

The specimens of the new species are mounted on slides in Canada balsam according to the procedure outlined by Sæther (1969). Morphological terminology follows Sæther (1980). Measurements are given as ranges, followed by the mean. Colouration is based on the slide mounted specimens.

The material from southern Chile was collected by F. Reiss in 1969. During the field work, Reiss gave each locality a CR (Chile Reiss) number that is written on the slide labels. In his field journal Reiss wrote information on the different localities, and Martin Spies has kindly sent us this information. The type material is labeled CR11, which is "Hydrobiological station of the university in Valdivia on Lago Riñihue; adult catch in bushes on lakeshore and also above helocrenes and small streams immediately on the shoreline, 5.xi.1969" according to Reiss' field journal. The material from northern Ecuador was collected by K. Böttger in 1990, and proper locality information is written in black ink on the slide labels.

The holotypes and most paratypes are housed in the Zoologische Staatssamlung München, Germany (ZSM), remaining paratypes are in the Department of Natural History, University Museum of Bergen, Norway (ZMBN).

Systematics

Family: Chironomidae Newman, 1834

Subfamily: Chironominae Newman, 1834

Tribe: Pseudochironomini Sæther, 1977

Genus: *Riethia* Kieffer, 1917

***Riethia chilensis* sp. nov.**
https://zoobank.org/urn:lsid:zoobank.org:act:6FB58B1E-775B-4B10-8628-51E06C8D5675
(Figs 1A–C, 2A–C)

Type material. Holotype adult male (slide mounted under five coverslips), CHILE, Los Rios Region, Valdivia Province, Panguipulli, El Desague, Lago Riñihue, Limnological field station, 39.774388°S 72.453394°W, 115 m a.s.l., 5.xi.1969, leg. F. Reiss (ZSM). Paratypes, 58 adult males as holotype (ZSM, ZMBN).

Etymology. The epithet, *chilensis,* is used as an adjective and meaning "from Chile" in reference to the country of origin of the holotype.

Diagnostic characters. *Riethia chilensis* differs from its close relative, *R. truncatocaudata*, by uniformly coloured legs, without bands, and curved, stout superior volsellae without microtrichia dorsally. A light brown abdomen, with darker anterior bands on the tergites, and a superior volsella without microtrichia are the characters that separate *R. chilensis* from the second new species described here (see below). Both new species + *R. truncatocaudata* can be separated from all other *Riethia* by having the inferior volsella strongly bent dorsally, with apical part subtriangular and dorsally covered with broad, flattened, apically fringed setae. See also the diagnosis for the second species.

Description. Adult male (n = 5)

Body size and proportions. Total length 5.21–5.71, 5.44 mm. Wing length 3.03–3.23, 3.09 mm. Total length / wing length 1.70–1.88, 1.76. Wing length / length of profemur 2.30–2.47, 2.35.

Colouration. Head pale brown with brown pedicel; thorax brown with pale brown vitae, scutellum, and posterior part of preepisternum; legs brown without darker bands (Fig. 1B); abdominal tergites brown in anterior ¼, light brown in posterior ¾ (Fig. 1C). Wing hyaline (Fig. 1A).

Antenna. AR 1.78–2.04, 1.91. Terminal flagellomere 760–920, 846 µm long.

Head. Temporal setae 31–36, 34, bi- to tri-serial. Clypeus with 18–22, 20 setae. Tentorium 193–221, 205 µm long, 57–66, 61 µm wide. Stipes 199–221, 209 µm long, 12–16, 14 µm wide. Palpomere lengths (in µm): 52–64, 58; 92–104, 97; 164–200, 181; 228–252, 237; 256–332, 289. Third palpomere with 4–7, 5 sensilla clavata subapically, longest about 29 µm long.

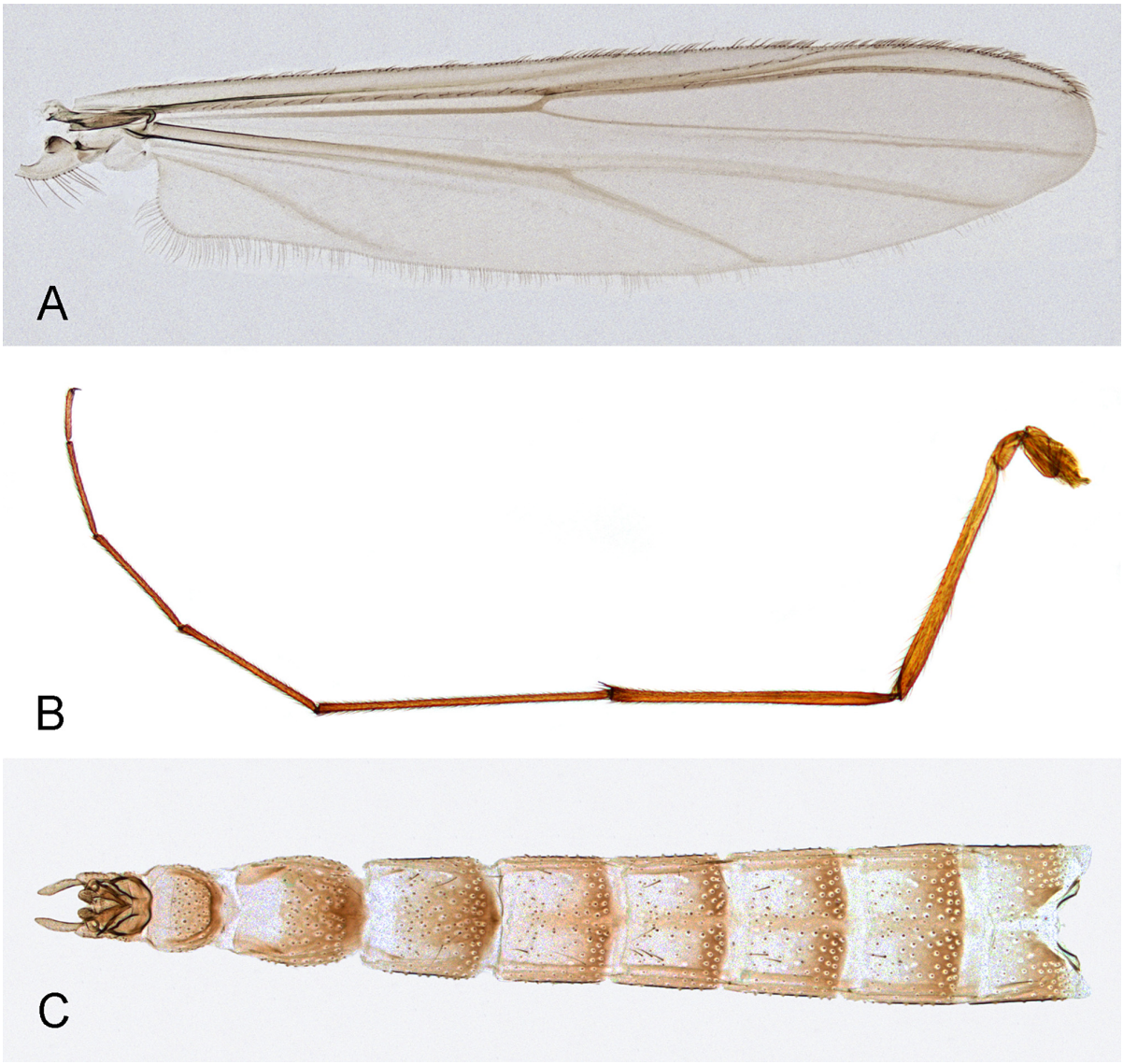

FIGURE 1. *Riethia chilensis* **sp. nov.**, male. **A**—wing; **B**—foreleg; **C**—abdomen.

Thorax. Antepronotum with 8–12, 9 ventrolateral setae. Acrostichals strong, 9–16, 12, in double row; dorsocentrals 11–17, 14 in single row; prealars 3–5, 4; supraalar 1. Scutellum with 14–16, 15 setae in partly double row.

Wing (Fig. 1A). VR 1.06–1.12, 1.08. Brachiolum with 3 setae; R with 23–31, 28; R_1 with 19–24, 21; R_{4+5} with 32–39, 36 setae; other veins and membrane bare. Squama with 10–15, 13 setae.

Legs. Spur of fore tibia 76–86, 81 µm long; spurs of mid tibia 58–69, 62 µm and 75–94, 82 µm long; spurs of hind tibia 72–88, 79 µm and 89–115, 99 µm long. Width at apex of fore tibia 75–94, 82 µm; of mid tibia 63–75, 69 µm; of hind tibia 72–79, 76 µm. Lengths and proportions of legs as in Table 1.

Hypopygium (Figs 2A–C). Tergite IX with straight posterior margin, with 17–27, 23 setae medially and 34–51, 42 setae in two to three rows along posterior margin. Laterosternite IX with 6–9, 8 setae. Phallapodeme 154–186, 166 µm long; with 41–58, 47 µm long, narrow, curved oral projection. Transverse sternapodeme straight, 69–97, 79 µm long, with comparatively long oral projections. Gonocoxite 242–275, 257 µm long. Superior volsella stout, curved, with long, narrowly triangular apex projecting anteromedially, 80–89, 86 µm long, 23–32, 26 µm wide medially, with 5 weak dorsal setae, without microtrichia. Inferior volsella strongly bent dorsally with bluntly subtriangular apical part, 54–69, 60 µm long, 37–44, 40 µm wide, with microtrichia, marginal setae, and 29–36, 32 broad flattened, apically fringed setae (Fig. $2A_1$) dorsally. Pseudovolsella consisting of low, bluntly triangular tubercle, with 2–3, 3 curved setae, longest seta 48–59, 55 µm long. Gonostylus 176–209, 194 µm long. HR 1.16–1.56, 1.33. HV 2.74–2.96, 2.80.

TABLE 1. Lengths (in µm) and proportions of legs of *Riethia chilensis* **sp. nov.**, male.

	p_1	p_2	p_3
fe	1318–1401, 1368	1483–1586, 1524	1607–1689, 1636
ti	1380–1504, 1450	1360–1483, 1413	1627–1730, 1685
ta_1	1380–1504, 1454	783–824, 803	1071–1144, 1108
ta_2	762–845, 816	412–453, 424	639–659, 643
ta_3	577–665, 618	309–350, 325	474–515, 499
ta_4	433–474, 461	227–268, 243	309–330, 313
ta_5	206–227, 222	134–155, 144	155–175, 165
LR	1.000–1.014, 1.003	0.542–0.591, 0.569	0.643–0.684, 0.658
BV	2.000–2.031, 2.014	3.218–3.345, 3.278	2.675–2.833, 2.743
SV	1.917–1.970, 1.938	3.538–3.821, 3.657	2.907–3.058, 2.997
BR	2.48–3.22, 2.86	2.74–3.45, 2.90	3.07–3.49, 3.29

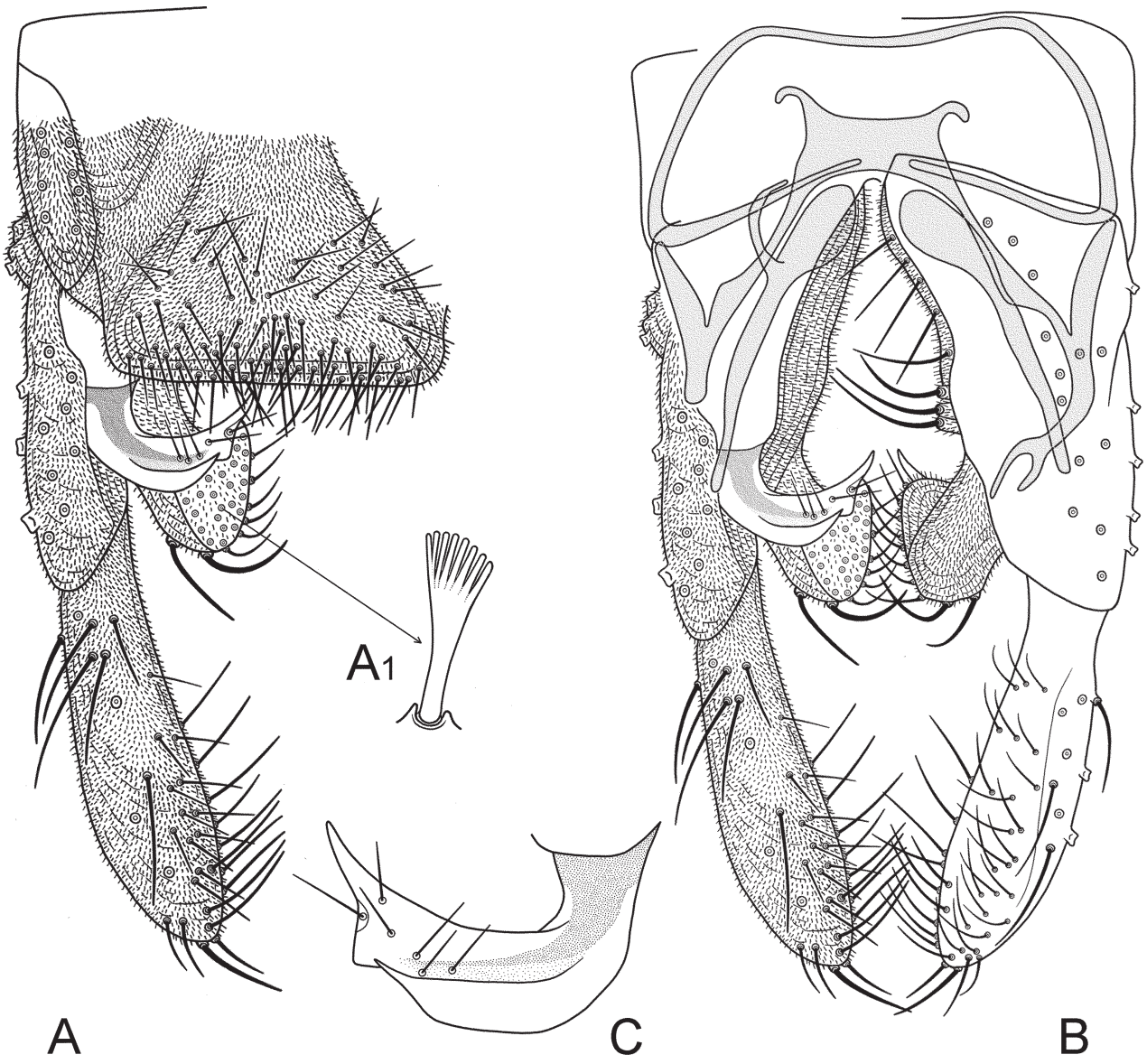

FIGURE 2. *Riethia chilensis* **sp. nov.**, male. **A**—hypopygium, dorsal view; drawn without broad, flattened, apically pectinate setae on inferior volsella; **A_1**—broad, flattened, apically pectinate setae (magnified × 4 relative to A); **B**—hypopygium with tergite IX removed, dorsal aspect to the left, ventral aspect to the right; **C**—superior volsella, dorsal view.

Female and immature stages unknown.

Distribution. The species was collected resting on bushes and other vegetation near a lakeshore in southern Chile.

Riethia ecuadoriensis sp. nov.

https://zoobank.org/urn:lsid:zoobank.org:act:58F17D34-5F7A-47E1-8954-6BBF2FBDA93B

(Figs 3A–C, 4A–C)

Type material. Holotype adult male (slide mounted under five coverslips), Ecuador, Carchi Province, Reserva ecológica El Ángel, Lagunas El Voladero, 0.691132°N 77.882543°W, 3.800 m a.s.l., 21.x.1990, leg. K. Böttger (ZSM). Paratypes, 21 adult males as holotype (ZSM, ZMBN).

Etymology. The epithet, *ecuadoriensis,* is used as an adjective and meaning "from Ecuador" in reference to the country of origin of the holotype.

Diagnostic characters. *Riethia ecuadoriensis* is a dark brown species, with uniformly coloured abdomen, without bands, except for subrectangular pale brown area on tergite VII, and with scattered microtrichia dorsally on the superior volsella. For other key characters see the diagnosis for *R. chilensis* given above.

Description. Adult male (n = 5)

Body size and proportions. Total length 5.42–5.87, 5.65 mm. Wing length 3.30–3.53, 3.39 mm. Total length / wing length 1.59–1.75, 1.67. Wing length / length of profemur 2.72–2.90, 2.79.

Colouration. Head light brown with dark brown pedicel; thorax and legs brown (Fig. 3B); abdomen brown, tergite VII with subrectangular pale brown area in posterior 1/3 flanked by brown lateral areas (Fig. 3C). Wing hyaline (Fig. 3A).

Antenna. AR 1.49–1.59, 1.54. Terminal flagellomere 817–850, 835 µm long.

Head. Temporal setae 16–19, 18, bi- to tri-serial. Clypeus with 15–20, 17 setae. Tentorium 195–230, 210 µm long, 59–68, 64 µm wide. Stipes 174–209, 197 µm long, 12–16, 15 µm wide. Palpomere lengths (in µm): 52–68, 61; 88–100, 92; 152–168, 158; 216–236, 226; 260–300, 285. Third palpomere with 5–7, 6 sensilla clavata subapically, longest about 28 µm long.

Thorax. Antepronotum with 1–4, 2 ventrolateral setae. Acrostichals weak, apparently 1–2, 2; dorsocentrals 8–12, 10 in single row; prealars 3; supraalar 1. Scutellum with 7–11, 9 setae in single row.

Wing (Fig. 3A). VR 0.99–1.04, 1.02. Brachiolum with 2–3, 3 setae; R with 19–25, 23; R_1 with 11–15, 13; R_{4+5} with 21–26, 24 setae; other veins and membrane bare. Squama with 14–17, 16 setae.

Legs. Spur of fore tibia 69–79, 74 µm long; spurs of mid tibia 64–79, 73 µm and 76–86, 81 µm long; spurs of hind tibia 75–86, 80 µm and 83–94, 89 µm long. Width at apex of fore tibia 58–68, 64 µm; of mid tibia 66–72, 70 µm; of hind tibia 70–79, 75 µm. Lengths and proportions of legs as in Table 2.

TABLE 2. Lengths (in µm) and proportions of legs of *Riethia ecuadoriensis* **sp. nov.**, male.

	p_1	p_2	p_3
fe	1174–1277, 1236	1339–1483, 1397	1421–1524, 1475
ti	1380–1442, 1401	1277–1380, 1335	1504–1607, 1566
ta_1	1401–1442, 1426	721–803, 766	1009–1071, 1051
ta_2	659–783, 737	412–474, 428	597–639, 622
ta_3	536–597, 573	288–350, 309	453–494, 478
ta_4	371–453, 420	227–247, 235	288–309, 305
ta_5	185–206, 198	144–165, 148	165–185, 169
LR	1.000–1.045, 1.018	0.565–0.582, 0.574	0.654–0.689, 0.671
BV	2.062–2.218, 2.110	2.900–3.231, 3.127	2.579–2.618, 2.599
SV	1.829–1.884, 1.850	3.462–3.658, 3.566	2.843–2.923, 2.894
BR	2.15–3.00, 2.60	2.50–3.26, 2.85	3.70–4.34, 3.99

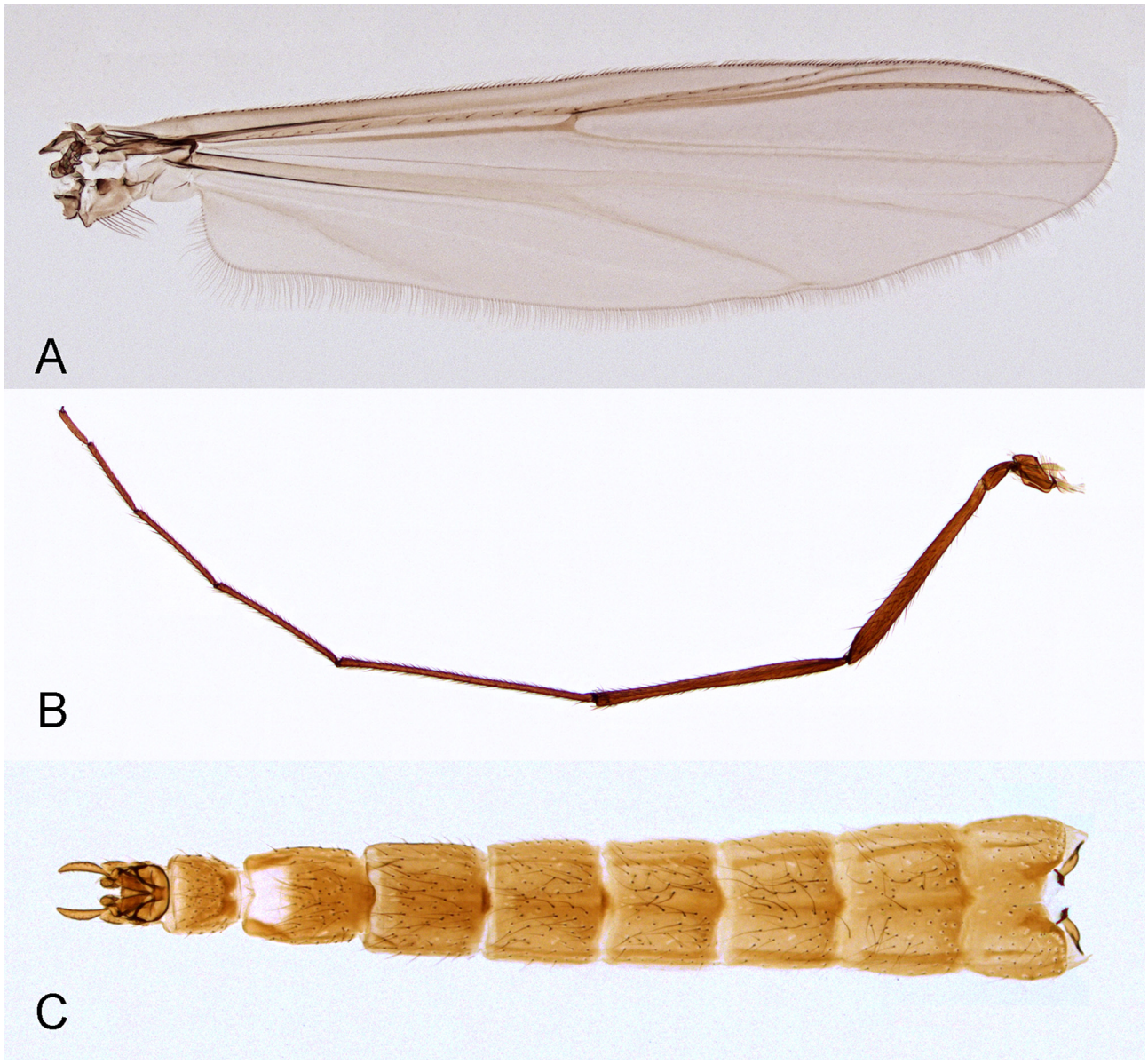

FIGURE 3. *Riethia ecuadoriensis* **sp. nov.**, male. **A**—wing; **B**—foreleg; **C**—abdomen.

Hypopygium (Figs 4A–C). Tergite IX with slightly convex posterior margin, with 48–63, 54 setae mainly in two to three rows along posterior margin. Laterosternite IX with 7–11, 9 setae. Phallapodeme 131–149, 140 µm long; with 35–51, 41 µm long, narrow, curved oral projection. Transverse sternapodeme straight, 51–68, 59 µm long, with weak oral projections. Gonocoxite 252–277, 259 µm long. Superior volsella stout, weakly curved, with narrowly triangular apex projecting medially to anteromedially, 76–83, 80 µm long, 32–37, 34 µm wide medially, with 6–7, 6 weak dorsal setae and scattered microtrichia. Inferior volsella strongly bent dorsally with bluntly subtriangular apical part, 58–66, 62 µm long, 41–46, 43 µm wide, with microtrichia, marginal setae, and 20–25, 22 broad flattened, apically fringed setae (Fig. $4A_1$) dorsally. Pseudovolsella consisting of bluntly triangular tubercle, with single, 52–58, 56 µm long, curved seta, with second curved setae at base. Gonostylus 200–212, 209 µm long. HR 1.19–1.35, 1.24. HV 2.41–2.81, 2.67.

Female and immature stages unknown.

Geographical distribution and bionomics. The species is known only from páramo grassland in the high Andes in northern Ecuador, where the males were resting on *Espeltia* sp. close to a lake.

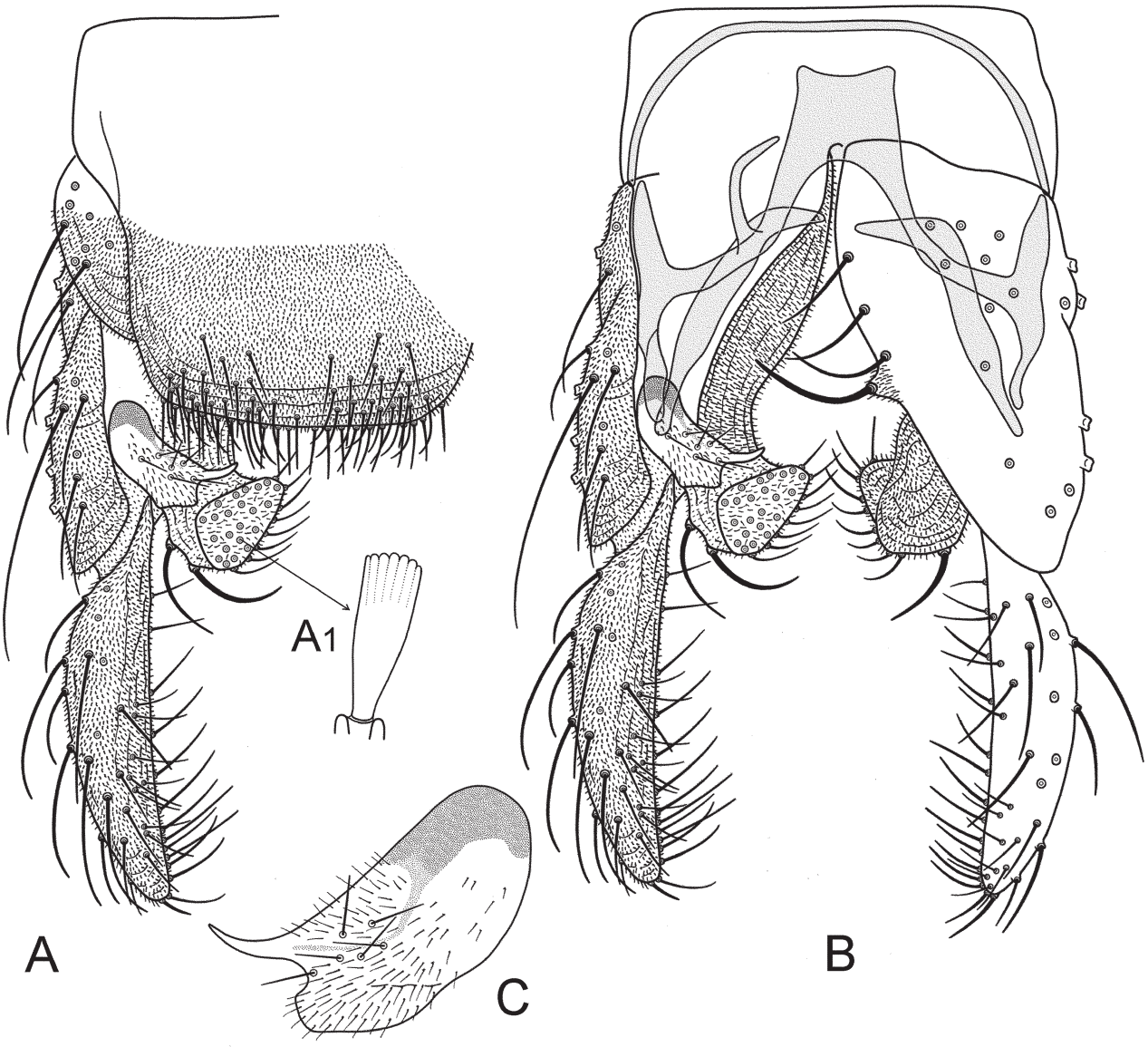

FIGURE 4. *Riethia ecuadoriensis* **sp. nov.**, male. **A**—hypopygium, dorsal view; drawn without broad, flattened, apically pectinate setae on inferior volsella; $\mathbf{A_1}$—broad, flattened, apically pectinate setae (magnified × 3.5 relative to A); **B**—hypopygium with tergite IX removed, dorsal aspect to the left, ventral aspect to the right; **C**—superior volsella, dorsal view.

Updated key to Neotropical males of *Riethia*

1. Posterior margin of tergite IX with caudal projections resembling an inverted U (Brazil) . . . . . *R. fazzari* Trivinho-Strixino & Shimabukuro, 2018
- Posterior margin of tergite IX straight or rounded, without caudal projections 2
2. Superior volsella short, hook-like; inferior volsella subtriangular, tapering to narrowly rounded apex; with few, scattered, flattened, apically pectinate dorsal setae and 2–3 marginal scales apically (Brazil) . . . . . *R. galilei* Trivinho-Strixino & Shimabukuro, 2018
- Superior volsella long, curved or with distal half straight, digitiform; inferior volsella not subtriangular and tapering to narrowly rounded apex, with or without flattened, apically pectinate dorsal setae and/or marginal scales 3
3. Inferior volsella strongly bent dorsally with apical part bluntly subtriangular with more than 20 broad flattened, apically pectinate setae covering dorsal surface, without marginal scales 4
- Inferior volsella not strongly bent dorsally, with marginal scales; without or with less than 20 broad flattened, apically pectinate setae 6
4. Legs with dark bands; superior volsella curved, digitiform, apically pointed with microtrichia and apparently 2 weak, dorsal

setae subapically (Argentina, Brazil, Chile) ..... *R. truncatocaudata* (Edwards, 1931)
- Legs without dark bands; superior volsella curved, stout, with long, narrowly triangular apex, with or without microtrichia, with 5–7 weak, dorsal setae 5
5. Abdomen brown, without dark bands; superior volsella with scattered microtrichia (Ecuador) ..... *R. ecuadoriensis* **sp. nov.**
- Abdomen light brown, tergites with darker brown oral bands; superior volsella without microtrichia (Chile) ..... *R. chilensis* **sp. nov.**
6. Superior volsella with distal half straight; inferior volsella with about 10 broad scales in double row along inner margin, without broad, flattened, apically pectinate setae (Costa Rica) ..... *R. epleri* Andersen & Sanz-laParra, 2023
- Superior volsella curved; inferior volsella with both marginal scales and broad, flattened, apically pectinate setae 7
7. Acrostichals absent; clypeus with less than 10 setae (Brazil) ..... *R. cauame* Trivinho-Strixino & Shimabukuro, 2018
- Acrostichals present; clypeus with more than 25 setae 8
8. Inferior volsella with 15 broad, flattened, apically pectinate setae dorsally and 3 broad marginal scales apically (Brazil) ..... *R. manauara* Neubern, Trivinho-Strixino & Silva, 2011
- Inferior volsella with 6 broad flattened, apically pectinate setae dorsally and 7 broad marginal scales apically (Brazil). ..... *R. pantera* Trivinho-Strixino & Shimabukuro, 2018

Discussion

Nearly all extant genera of Pseudochironomini occur in the Neotropical Region, and only *Madachironomus* Andersen, 2016 described from Madagascar is not found in the region (Andersen 2016). With last year's additions to the Neotropical fauna, the known geographical range has been increased for some of the genera. Although *Pseudochironomus* Malloch, 1915 has been recorded from Mexico and the Dominican Republic previously (Andersen *et al.* 2000, Silva *et al.* 2015), one species of the genus, *P. seipi* Andersen, 2023 has been described from southern Mexico and one species, *P. ruthae* Andersen & Baranov, 2023 from the Dominican Republic, and a new record of *Manoa pahayokeensis* Jacobsen & Perry, 2002 from the Dominican Republic has been given (Andersen 2023, Andersen *et al.* 2023). The description of *Riethia epleri* Andersen & Sanz-laParra, 2023 from Costa Rica (Andersen & Sanz-laParra 2023) and the two *Riethia* species described in this article extend the known range of this genus both northwards and up into the high Andes as *R. ecuadoriensis* was collected at nearly 4.000 m altitude in northern Ecuador. Fittkau and Reiss (1979) stated that the Pseudochironomini is disproportionately abundant in the region, estimating that the tribe makes up 11% of the Chironominae species in tropical South America. If this estimate is correct, there should still be many more species of Pseudochironomini to be described from the Neotropical Region.

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