

# Redescription of the Neotropical species *Trichodischia soror* Bigot, 1885 (Diptera: Tachinidae), with a new generic synonymy

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**Abstract.** *Trichodischia* Bigot, 1885 is a Neotropical genus with a confusing taxonomic history. This was initially composed of two species: *T. caerulea* Bigot, 1885 and *T. soror* Bigot, 1885. Later, the genus *Trichoraea* Cortés, 1974 was erected for *T. caerulea*. When reviewing the taxonomic history of both species, we discovered that both genera have been considered synonymous based on erroneous information and without a formal synonymy being proposed. Herein, we redescribed *T. soror*, provide images of adults and describe the male terminalia for the first time. In addition, by examining the type material, we propose *Trichoraea* as a junior synonym of *Trichodischia*, **syn. nov.**, confirm *T. caerulea* **comb. rest.** and *T. soror* as valid species and provide some comments about the taxonomy and host record of the genus.

**Keywords.** Dexiinae; Macquartiini; Taxonomy; *Trichoraea*; Voriini.

## INTRODUCTION

*Trichodischia* Bigot, 1885 is a Neotropical genus belonging to the tribe Voriini and subfamily Dexiinae (Tachinidae) (O'Hara *et al.*, 2020). This genus was originally composed of two species: *T. caerulea* Bigot, 1885 and *T. soror* Bigot, 1885; both species with a complex and confusing taxonomic history. Brauer (1898) was the first revisor redescribing both species and providing some taxonomic notes. Cortés (1944) synonymized both species, letting just *T. caerulea* as valid. Later, Cortés (1969) revalidated *T. soror* and provided a diagnostic key for both species; with the most conspicuous difference being the dark metallic blue color of scutum and abdomen in *T. caerulea*, whereas *T. soror* presents the scutum and abdomen brownish black. Lastly, Cortés (1974) changed his mind and considered *T. caerulea* as belonging to a distinct genus from *Trichodischia*, erecting the genus *Trichoraea* Cortés, 1974 for this species.

In the same way, the validity of the genus *Trichoraea* remained unclear. The matter began when Guimarães (1977) wrongly catalogued *Trichodischia caerulea* as a parasitoid

of *Spodoptera frugiperda*, relying on the work of Blanchard (1963). There is no way of knowing if this error was caused by some distraction when cataloging the name of the species or by ignorance of the work of Cortés (1974), who, in addition to creating the genus *Trichoraea*, also concluded that the specimen cited by Blanchard (1963) was actually *T. soror*. This error led more authors (*e.g.*, Henry, 1987; O'Hara *et al.*, 2020) to wrongly cited the species as *Trichodischia caerulea* instead of *Trichoraea caerulea*, and the genus *Trichoraea* was assumed as synonym of *Trichodischia* without any formal proposition of synonymy (*e.g.*, O'Hara & Henderson, 2020; O'Hara *et al.*, 2020). The systematic placement of *Trichodischia* also changed along the years; it was first classified in the tribe Macquartiini in Dexiidae (Dexiinae in part) by Townsend (1936), position roughly maintained by Guimarães (1971). However, in O'Hara *et al.* (2020), this genus was moved to Voriini, alongside most of the Neotropical genera of Macquartiini.

Herein, to clarify this confusion, we redescribe the type species of genus *Trichodischia*, *T. soror*, presenting for the first time a full description and illustration of the male terminalia. We also

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synonymized *Trichoraea* under *Trichodischia*, confirm *T. caerulea* **comb. rest.** and *T. soror* as valid species, and provide some comments about the taxonomy and host record of the genus.

## MATERIAL AND METHODS

The type material examined of *T. caerulea* (Lectotype) and *T. soror* (Holotype) is deposited at the Natural History Museum (NHMUK). The additional material used for the redescription of *T. soror* is deposited at the Diptera collection of the Museu de Zoologia da Universidade de São Paulo (MZSP) and at the Museu Nacional, Rio de Janeiro in Brazil (MNRJ). Morphological terminology follows Cumming & Wood (2017).

For the study of terminalia, the abdomen was dissected from the fourth segment. To digest tissues and clarify structures, the terminalia were placed in a 10% KOH solution and heated in boiling water for 10 minutes, neutralized in a 5% acetic acid solution and rinsed with distilled water. After examination, the dissected parts were placed in glycerin inside plastic microvials and pinned with their respective specimens.

Photographs of the pinned specimens and terminalia were taken using a Leica MC170 HD digital camera attached to a Leica MZ16 stereomicroscope, and the Leica LAS software version 4.12.0. The images were subsequently stacked with the software Helicon Focus 6.7.1, and then edited in Adobe Photoshop CC 2020. The plates were made with Adobe Illustrator CC 2019.

## RESULTS

### Taxonomy

#### Genus *Trichodischia* Bigot, 1885

*Trichodischia* Bigot, 1885: xlv.

**Type species:** *Trichodischia soror* Bigot, 1885, by subsequent designation of Townsend (1916: 9).

**References:** Townsend (1936: 16, key to Macquartiini genera); Townsend (1939: 68, generic diagnosis); Cortés (1944: 49, taxonomic notes); Cortés (1969: 97, taxonomic notes and revalidation of *T. soror*) Guimarães (1971: 100, catalogue); Cortés (1974: 35-38, discussion and key to genera of Dexiinae with males with modified hind femora); Guimarães (1977: 76, 89, host record); Henry (1987: 194, list); Evenhuis & Pont (2004: 60, list of genera described by Bigot); O'Hara & Henderson (2020: 76, world checklist of genera of Tachinidae); O'Hara *et al.* (2020: 176, world checklist of tachinids).

*Trichoraea* Cortés, 1974: 37. **Syn. nov.**

**Type species:** *Trichodischia caerulea* Bigot, 1885, by original designation.

**References:** Evenhuis & Pont (2004: 60, list of genera described by Bigot); O'Hara & Henderson (2020: 76, world checklist of genera of Tachinidae); O'Hara *et al.* (2020: 176, world checklist of tachinids).

## Diagnosis

*Trichodischia* differs from other Neotropical Voriini by the following combination of traits: eye setulose, male with strong orbital setae; parafacial with setulae throughout its whole extension; long prementum, equal to the head height; patch of long and hairs-like setulae on the midventral surface of the hind femur in males; tergites 3 and 4 with a pair of discal setae.

### On the taxonomic status of *T. caerulea* **comb. rest.** and *T. soror*

The confusing taxonomic history of this species, as aforementioned in the introduction, can be clarified herein. Following the generic diagnosis given below, both species share a considerable number of relevant traits that confirm them as belonging to *Trichodischia*. At the same time, *T. caerulea* **comb. rest.** and *T. soror* present several traits that provide evidence that both species are valid and differ from each other. The key provided by Cortés (1969) and the analysis of type material of both species by the second author provide the conclusive evidence for this claim. Hence, the following diagnostic key to species, a translation and adaptation of Cortés (1969) that contains the evidence discussed, is given:

- 1 Scutum and abdomen dark metallic blue, with slightly grayish pruinosity; male with proclinate orbital setae on the fronto-orbital plate; wing with vein  $R_{4+5}$  setulose at the base and up to the middle of the distance to the r-m; palpus dark brown ..... *T. caerulea* Bigot **comb. rest.**
- Scutum and abdomen brownish black, well covered with grayish pruinosity; male without proclinate orbital setae on fronto-orbital plate; wing with vein  $R_{4+5}$  setulose up to the r-m; palpus yellow to yellowish-brown ..... *T. soror* Bigot

### *Trichodischia caerulea* Bigot, 1885 **comb. rest.**

*Trichodischia caerulea* Bigot, 1885: xlv (description of female). Lectotype female (NHMUK), examined (in good condition).

**Type locality:** Argentina, Buenos Aires.

**References:** Brauer (1898: 498, redescription, taxonomic notes); Cortés (1944: 49, *T. caerulea* as senior synonymous of *T. soror*); Blanchard (1963: 186 [misidentified, see remarks], host record); Cortés (1969: 97, taxonomic notes; 98, in key); Guimarães (1971: 100, catalogue); Cortés (1974: 35, taxonomic notes; 37, discussion on host records); Guimarães (1977: 76, 106 [misidentified, see remarks], host catalogue); Henry (1987: 194, list); Virla *et al.* (1999: 10 [misidentified, see remarks], host notes); Molina-Ochoa *et al.* (2003: 269 [misidentified, see



remarks], host notes); Evenhuis & Pont (2004: 60, taxonomic note); O'Hara *et al.* (2020: 176, world checklist of tachinids).

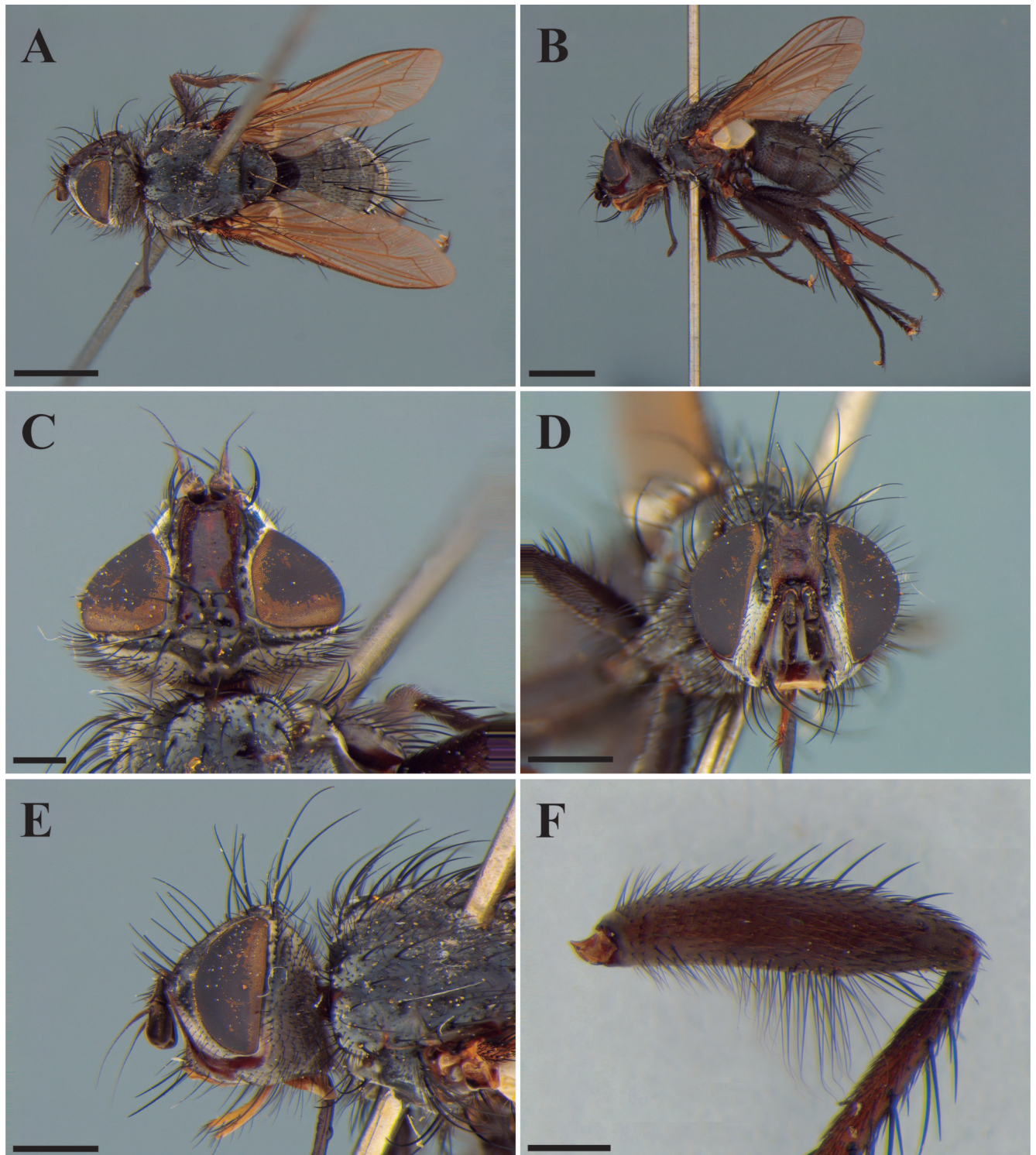
*Trichoraea caerulea* (Bigot, 1885).

**References:** Cortés (1974: 37, new combination and taxonomic notes).

***Trichodischia soror* Bigot, 1885  
(Figs. 1-3)**

*Trichodischia soror* Bigot, 1885: xlv (description of male). Holotype male (NHMUK), examined (in good condition).

**Type locality:** Argentina, Buenos Aires.

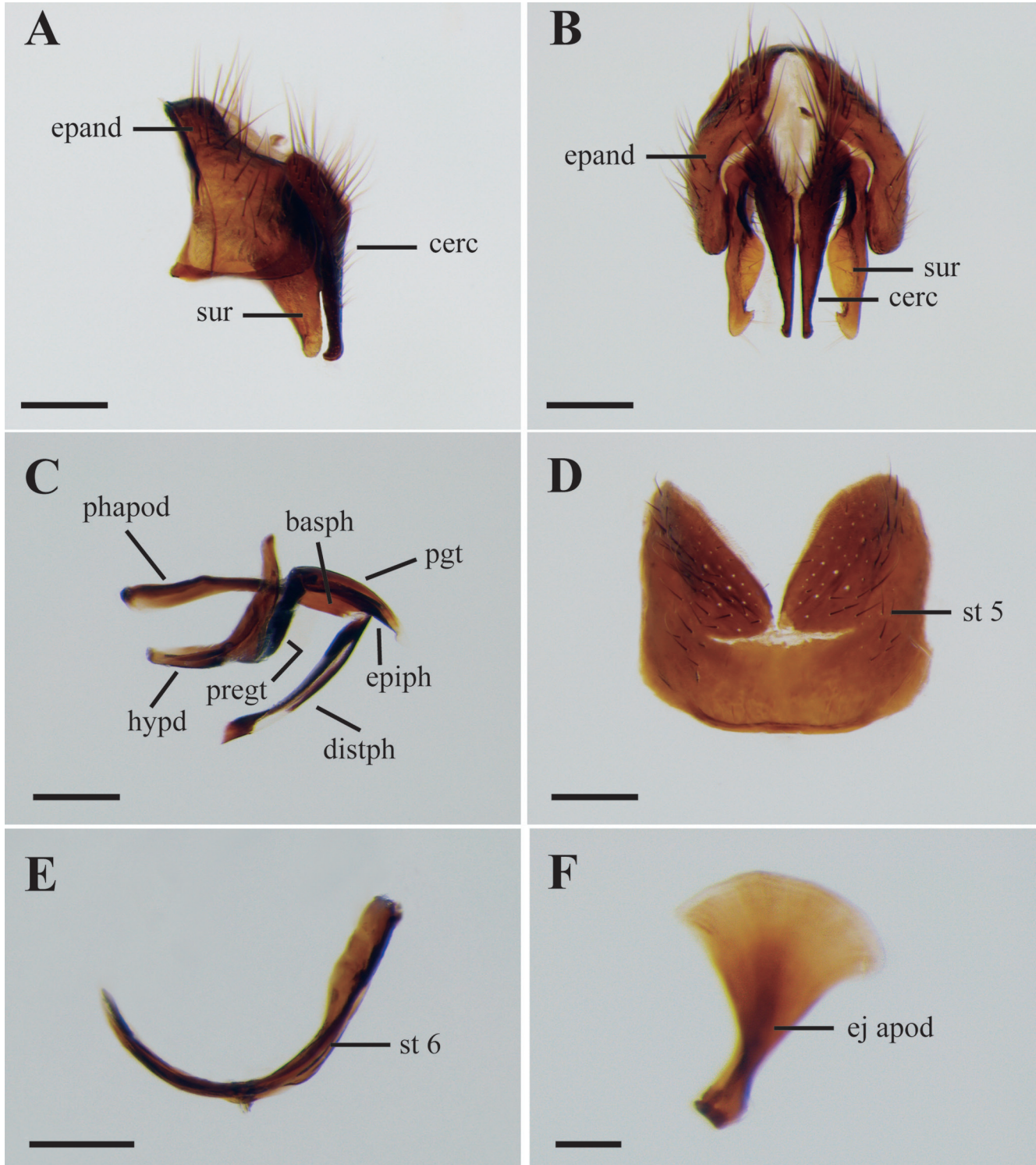


**Figure 1.** *Trichodischia soror* (♂, Osorno, Chile, MZSP). (A) Dorsal habitus. (B) Lateral habitus. (C) Head, dorsal view. (D) Head, frontal view. (E) Head, lateral view. (F) Hind femur with ventral patch of hairs-like setulae. Scale bars: A, B = 2 mm, C, F = 0.5 mm, D, E = 1 mm.



**References:** Brauer (1898: 499, redescription, taxonomic notes); Cortés (1944: 49, *T. soror* as junior synonym of *T. caerulea*); Parker (1953: 53, cited as *T. caerulea*, host record; 67, drawing of cephaloskeleton of first instar larva and puparium); Parker *et al.* (1953: 18, cited as *T. caerulea*, host record); Blanchard (1963: 186, cited as *T. caerulea*, host record); Cortés (1969: 97, taxonomic notes and revalidation of *T. soror*); Guimarães

(1971: 100, catalogue); Cortés (1974: 35, taxonomic notes; 37, discussion on host records); Guimarães (1977: 76, 106, cited as *T. caerulea*, host catalogue); Cortés (1980, 105, distributional records); Tschorsnig (1985: 100, description of male terminalia of Dexiinae); González (1992: 179, populations aspect of tachinids from the National reserve Rio Clarillo – Chile); Virla *et al.* (1999: 10, host notes); Molina-Ochoa *et al.*



**Figure 2.** Male terminalia of *Trichodischia soror*. (A) Epandrium, cerci and surstylus, lateral view. (B) Epandrium, cerci and surstylus, posterior view. (C) Hypandrium, phallapodeme, basiphallus, epiphallus, distiphallus, pregonite, and postgonite lateral view. (D) Sternite 5, ventral view. (E) Sternite 6, posterior view. (F) Ejaculatory apodeme. Scale bars: A-E = 0.25 mm, F = 0.1 mm. Abbreviations: basph = basiphallus; cerc = cercus; distph = distiphallus; ej apod = ejaculatory apodeme; epiph = epiphallus; epand = epandrium; hypd = hypandrium; pgt = postgonite; phapod = phallapodeme; pregt = pregonite; st = sternite; sur = surstylus.



(2003: 269, host notes); Evenhuis & Pont (2004: 60, taxonomic note); O'Hara *et al.* (2020: 176, world checklist of tachinids).

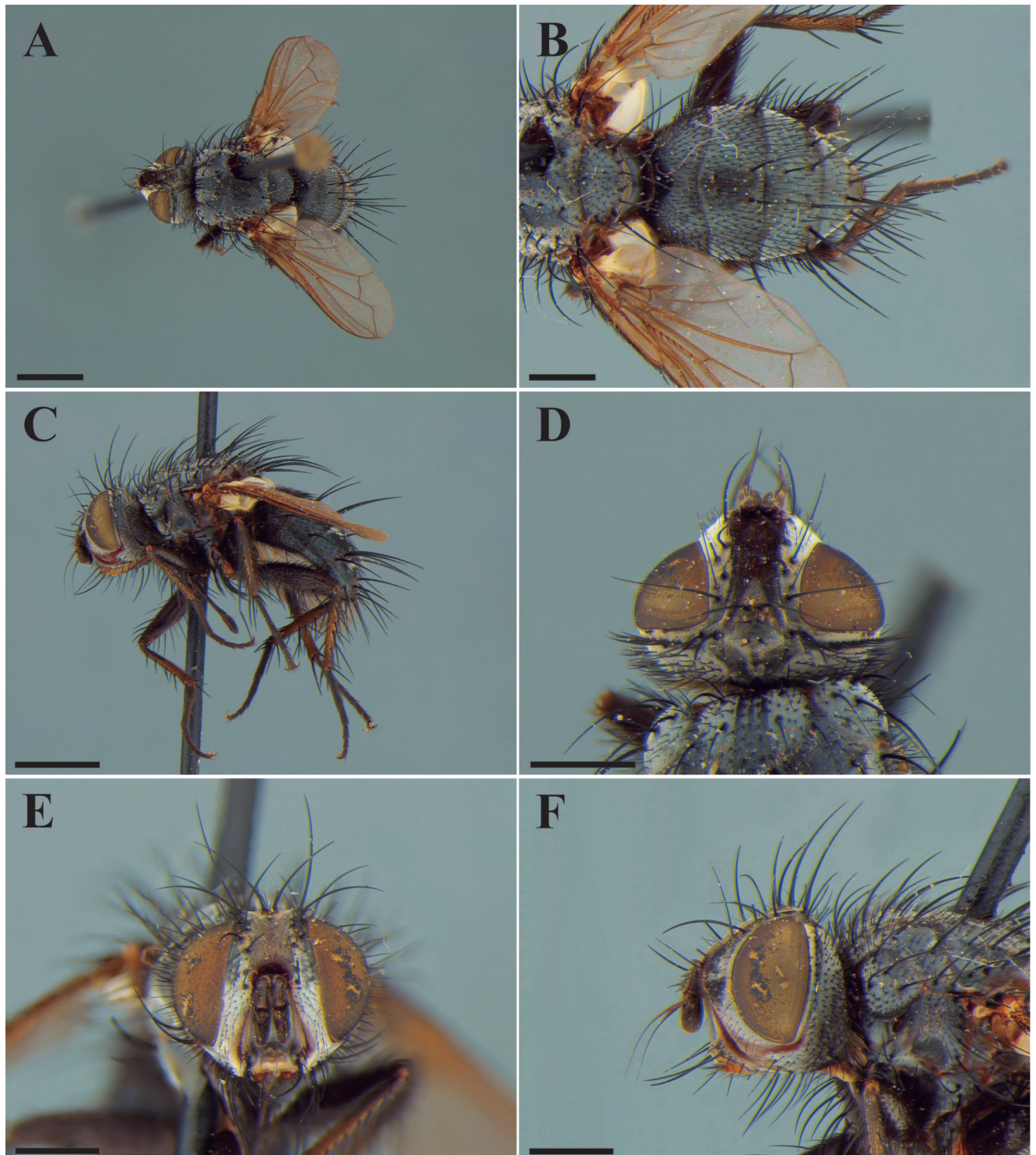
#### Additional material examined

**BRAZIL:** Santa Catarina: Nova Teutônia, 1 ♂ [dissected], ix.1967, F. Plaumann Leg. (MZSP); Nova Teutônia, 1 ♀ [dissected], x.1967, F. Plaumann Leg. (MZSP). **Chile:** Cautín: Villarica, 1 ♀, 18.xii.1966, Irwin Leg. (MZSP); Concepción:

Parque Botánico Hualpen, 1 ♂ [dissected], ii.1970, T. Cekalovic Leg. (MNRJ); Los Lagos: Osorno, 1 ♂, 24.xi.1968, R. Cortés Leg. (MZSP); Malleco: Angol, 1 ♀, xi.1972, T. Cekalovic Leg. (MZSP).

#### Distribution

**Argentina** (Buenos Aires), **Brazil** (Santa Catarina), **Chile** (Valparaíso, Cautín, Concepción, Los Lagos, and Malleco), **Uruguay** (Montevideo).



**Figure 3.** *Trichodischia soror* (♀, Villarica, Chile, MZSP). (A) Dorsal habitus. (B) Detail of abdomen in dorsal view. (C) Lateral habitus. (D) Head, dorsal view. (E) Head, frontal view. (F) Head, lateral view. Scale bars: A, C = 2 mm, B, D = 1 mm, E, F = 1 mm.

## Redescription of male

**Coloration (Fig. 1):** Body entirely dark brown to blackish, with gray pruinosity. Palpus yellow to yellowish-brown. Tibiae sometimes slightly yellowish. Wings sub-hyaline, slightly brown, with brown veins; tegula black and basicoxa brown. Calypters whitish.

**Head (Fig. 1C-E):** Dichoptic. Eyes hairy. Fronto-orbital plate setulose. Ocellar tubercle with a pair of strong latero-clinate ocellar setae. Row of 6-8 inclinate frontal setae, arising at level of pedicel. One latero-clinate orbital seta. Inner vertical setae erect. Outer vertical setae latero-clinate. A pair of postocellar setae. One paravertical seta. Postcranium globose, with black hairs. Parafacial setulose along its whole extension. Strong vibrissae surrounded by small setulae. Palpus slender and setulose, about half length of prementum. Lower facial margin straight, not visible in lateral view. Antenna inserted to level of middle of eyes; arista micro-pubescent and with basal third slightly thickened.

**Thorax (Fig. 1A-D):** Acrostichal setae 1+1, first and second pair absent. Dorsocentral setae 3+3. Intra-alar setae 1+3. Supra-alar setae 1+3. Postpronotal setae 4, three basal and one anterior. Notopleural setae 2. Postalar setae 2. Proepisternal seta 1, accompanied by 1-2 setulae. Proepimeral seta 1, accompanied by two setulae. Katepisternal setae 3. Anepisternal setae 5-6. Anepimeral seta 1, extending to the posterior margin of upper calypter. Meral setae 4-6. Prosternum bare. Scutellum scattered with setulae, with decussate apical scutellar setae, divergent subapical scutellar and lateral scutellar setae, and straight basal scutellar setae. **Wing:** A pair of costal spines, one short and other long. Vein C ending just before wing apex. Vein M<sub>1</sub> ending at wing margin, before the end of vein C. Bend of vein M rounded. Cell r<sub>4+5</sub> open, length of opening shorter than crossvein r-m. Crossvein dm-cu sinuose. Vein R<sub>4+5</sub> dorsally setose to crossvein r-m. **Legs:** Hind femur with a ventral patch of long and hairs-like setulae.

**Abdomen (Fig. 1A-B):** Globose. Mid dorsal depression of syntergite 1+2 extending to the middle of segment. Syntergite 1+2 with concave dorsal margin and one lateral marginal seta. Tergite 3 with one lateral marginal seta, a pair of median marginal setae, and a pair of discal setae. Tergite 4 with a pair of median discal setae, and a row of dorsolateral marginal setae. Tergite 5 with a row of dorsolateral discal setae, and a row of marginal setae. *Terminalia* (Fig. 2A-F). Sternite 5 with a transversal membranous band, lobes well developed and setulose, and sensilla trichodea absent. Sternite 6 asymmetrical. Tergite 6 undivided, posteriorly setulose, band-shaped gradually tapering sideways, attached to syntergosternite 7+8 by a narrow membrane. Syntergosternite 7+8 broad and setulose. Spiracle 6 both on the membrane, and spiracle 7 both on anterior margin of syntergosternite 7+8. Ejaculatory apodeme hand-fan shaped, with narrow basal plate and wide process. Epandrium setu-

lose, closed dorsally; posterior epandrial process small and moderately acute; anterior epandrial process triangle-shaped with posterior margin curved; lower lateral margin with developed lobe partially covering the surstylus. Hypandrium with long, up curved and arms not fused; hypandrial apodeme well developed, longer than width, and slightly bowl-shaped. Cerci not fused, tapering distally, with straight inner margins and oblique outer margins in posterior view; beak-shaped distal end in lateral view. Surstylus broad, subtriangular with rounded end in lateral view; medially widened and with hook-shaped distal end in posterior view. Phallopodeme slightly arched, extending a little beyond the hypandrial apodeme; phallic guide short. Basiphallus robust and tube-shaped, projecting into a claw-shaped epiphallus. Distiphallus with ventral sclerite longer than dorsal sclerite; ventral sclerite with distal end dorsally fused; membranous region connecting the distal ends of dorsal sclerite and ventral sclerite. Pregonites subrectangular in lateral view, not fused with each other, basal region slightly expanded and fused with medial plate of hypandrium. Postgonites not fused, narrow and claw-shaped, located dorsolaterally to basiphallus, extending almost until apex of distiphallus.

## Female (Figs. 3A-F)

Similar to male, but with a pair of proclinate orbital setae, and hind femur without the ventral patch of hairs-like setulae.

## Biology

*Trichodischia soror* has been recorded as a parasitoid of larvae of fall armyworm, *Spodoptera frugiperda* (Smith) (Lepidoptera: Noctuidae) (Parker, 1953; Parker *et al.*, 1953; Ashley, 1979; Blanchard 1963; Cortés, 1974; Virla *et al.*, 1999; Molina-Ochoa *et al.*, 2003).

## Remarks

As argued earlier, in his host-parasite catalogue, Guimarães (1977) uses the host record derived from Blanchard (1963), that recorded *T. caerulea* (sic) from *Spodoptera frugiperda*. This information was followed by some subsequent authors (e.g., Virla *et al.*, 1999; Molina-Ochoa *et al.*, 2003). However, these authors overlooked the observations of Cortés (1974) that concluded that the real *T. caerulea* was misidentified by Blanchard; in reality, he had a *T. soror* specimen. Hence, all these host records for *Trichodischia* are from *T. soror* only. Furthermore, Cortés (1974) believed that the species of *Trichodischia* treated as new by Parker (1953), and as *T. caerulea* by Parker *et al.* (1953), are in reality *T. soror*.

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## AUTHORS' CONTRIBUTIONS

**Deivys Alvarez-García:** Conceptualization, Investigation, Visualization, Writing – original draft, Writing – review & editing. **Marcelo Santis:** Investigation, Visualization, Writing – review & editing. All the authors actively participated in the discussion of the results, they reviewed and approved the final version of the paper.

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