First description of the female and a new junior synonym of *Corythalia vervloeti* Soares & Camargo, 1948 (Araneae: Salticidae: Euophryini)

Primeira descrição da fêmea e um novo sinônimo júnior de *Corythalia vervloeti* Soares & Camargo, 1948 (Araneae: Salticidae: Euophryini)

Alexandre S. Michelotto[I] | Adalberto J. Santos[II]

[I]Universidade Federal de Minas Gerais. Pós-Graduação em Zoologia. Belo Horizonte, Minas Gerais, Brazil

[II]Universidade Federal de Minas Gerais. Departamento de Zoologia. Belo Horizonte, Minas Gerais, Brazil

Abstract: The female of *Corythalia vervloeti* Soares & Camargo, 1948 is described and illustrated for the first time. *Eustiromastix efferatus* Bauab-Vianna & Soares, 1978 is considered a junior synonym of *Corythalia vervloeti* based on the original description and illustrations of the former. New records expand the known distribution of the species throughout the Atlantic Forest, Pantanal, and the Brazilian and Ecuadorian Amazon. The position of *C. vervloeti* within the genus is discussed.

Keywords: Taxonomy. Neotropical region. Jumping spiders. *Eustiromastix*.

Resumo: A fêmea de *Corythalia vervloeti* Soares & Camargo, 1948 é descrita e ilustrada pela primeira vez. *Eustiromastix efferatus* Bauab-Vianna & Soares, 1978 é considerado um sinônimo júnior de *Corythalia vervloeti* com base na descrição e nas ilustrações originais. Novos registros expandem a distribuição conhecida da espécie pela Mata Atlântica, pelo Pantanal e pelas regiões amazônicas do Brasil e Equador. A posição de *C. vervloeti* dentro do gênero é discutida.

Palavras-chave: Taxonomia. Região neotropical. Papa-moscas. *Eustiromastix*.

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Corresponding author: Alexandre S. Michelotto. Universidade Federal de Minas Gerais. Av. Antônio Carlos. Belo Horizonte, MG, Brazil. CEP 31270-901 (alexandremichelotto@gmail.com).

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INTRODUCTION

The euophryine genus *Corythalia* C.L. Koch, 1850 is endemic to the Americas and has been the focus of a recent taxonomic revision, in which all South American species were redescribed and 20 new species were described for the region (Bayer et al., 2020). The genus currently includes 89 valid species, of which 46 are known only from either males or females (World Spider Catalog, 2024; Framenau et al., 2024). Finding and matching the unknown opposite sex for each of those species can be challenging, especially due to the lack of geographical, phenological or biological data (see Edwards, 2014).

Corythalia vervloeti Soares & Camargo, 1948 is a remarkable species within the genus, unique in having an extremely long embolus accommodated in a depressed portion of the tegulum (Bayer et al., 2020). The few published distribution records of the species show it is widely distributed from the Central Amazonia to southern Brazil (Bayer et al., 2020; Soares & Camargo, 1948). Surprisingly, despite its wide distribution, *C. vervloeti* is yet known only from the male. In this paper, we describe the female of the species for the first time, add new mapped distribution records, propose *Eustiromastix efferatus* Bauab-Vianna & Soares, 1978 as a new synonymy of the species and discuss its position within the genus.

MATERIAL AND METHODS

The examined material is deposited in the following collections (abbreviations and curators in parentheses): Centro de Coleções Taxonômicas, Universidade Federal de Minas Gerais, Belo Horizonte (UFMG, Adalberto J. Santos), Instituto Butantan, São Paulo (IBSP, Antonio D. Brescovit), Laboratório de Diversidade de Aracnídeos, Universidade Federal do Rio de Janeiro (UFRJ, Renner L. C. Baptista), Museu Paraense Emílio Goeldi, Belém (MPEG, Alexandre B. Bonaldo). For illustration of internal structures of female genitalia, soft tissues were digested in a pancreatin solution, following Álvarez-Padilla and Hormiga (2007), and examined immersed in clove oil. Male palp was expanded in warm latic acid for a few minutes, followed by immersion in de-ionized water until the full inflation of the haematodochae. Images were obtained with a Leica DFC500 digital camera attached to a Leica M205C stereomicroscope. Multifocal images were stacked from subimages using Helicon Focus version 8.0.2 (Helicon Soft, n. d.). The morphological terminology, leg spination pattern and measurements follows Bayer et al. (2020). All measurements are in millimeters and were taken using a linear micrometric reticle attached to the eyepiece of an Olympus SZ40 stereomicroscope, or from digital images using the software ImageJ (Schneider et al., 2012). Lists of examined material and descriptive characters were generated using Magalhães (2019) spreadsheets. Maps were produced using ArcGis version 10.2 (ESRI, 2013). Coordinates missing from specimen labels were inferred using Google Maps and are indicated in brackets instead of parentheses.

TAXONOMY

Family Salticidae Blackwall, 1841
Subfamily Salticinae Blackwall, 1841
Tribe Euophryini Simon, 1901
Genus *Corythalia* C.L. Koch, 1850
Corythalia vervloeti Soares & Camargo, 1948
(Figures 1, 2, 3, 4, 5B, 5D)

Corythalia vervloeti Soares & Camargo, 1948, p. 429, figures 12–14 (♂, description and illustration). ♂, Holotype from Brazil: Espírito Santo: Colatina: Rio São José, [19° 30' S, 40° 40' W], B.A.M. Soares coll. 14/IX/1942, deposited in Museu de Zoologia da Universidade de São Paulo (MZUSP E.454-C.1122), not examined. Bayer et al. (2020, p. 108, figures 52A–52B, 60G, 67I–67J, 70J) (description and illustration of ♂).

Eustiromastix efferatus Bauab-Vianna & Soares, 1978, p. 360, figures 7–12 (♂, description and illustration). ♂, Holotype from Brazil: Amazonas: Humaitá, [7° 29' S, 63° 1' W], Gasparini & Gogoy coll., 19/III/1976, originally

deposited in Departamento de Zoologia do IBBMA, UNESP, lost. syn. nov.

Material examined. BRAZIL. Acre: Rio Branco, Campus Embrapa (10° 1' 30.8" S, 67° 41' 35,9" W), M.S. Costa coll., IX/2013, 2 ♂ (UFMG 19622). Amazonas: Manaus, Reserva Florestal Adolpho Ducke, near the camping site (2° 55' 48.3" S, 59° 58' 26,5" W), A.A. Bustamante & D. Queiroga coll., 29/III/2023, 1 ♀ (UFMG 29983). Bahia: Ilhéus, CEPLAC, Reserva Zoobotânica (14° 46' 22,7" S, 39° 13' 13,8" W), G.H.F. Azevedo & A.J. Santos coll., 8– 9/XII/2010, 1 ♂ (UFMG 9474); Porto Seguro, RPPN Estação Vera Cruz [16° 27' 0" S, 39° 3' 52" W], J.P.S. Alves coll., 2005–2006, 1 ♀ (IBSP 62668); Salvador, Cabula, Campus do 19º Batalhão de Caçadores [12° 57' 1" S, 38° 23' 21" W], C.M. Pinto-Leite coll., 2005, 1 ♀ (IBSP 71589); Parque Joventino Silva [12° 59' 47" S, 38° 28' 25" W], M. Martins coll., 2012, 1 ♀ (IBSP 248246). Espírito Santo: Alegre, Instituto Federal do Espírito Santo, Distrito de Rive (20° 45' 16" S, 41° 27' 11" W), A.S. Michelotto & M.S. Amorim coll., 9/X/2019, 1 ♂ (UFMG 27817); Polo de Educação Ambiental da Mata Atlântica (PEAMA), IFES Campus de Alegre (20° 45' 45" S, 41° 27' 45.6" W), A.S. Michelotto coll., 31/X/2022, 1 ♂ (UFMG 29266); Linhares, Reserva Florestal da Companhia Vale do Rio Doce [19° 6' 17.6" S, 39° 52' 20.6" W], A.D. Brescovit et al. coll., 1 ♂ (IBSP 24395); Sooretama, REBIO Sooretama, trilha informativa [19° 0' 10.8" S, 40° 7' 35.4" W], D.T. Castro coll., 7/XI/2009, 1 ♀ (UFRJ 2238). Mato Grosso do Sul: Corumbá, Passo do Lontra (19° 30' S, 56° 55' W), J. Raizer coll., 1 ♂ (IBSP 239610). Minas Gerais: Marliéria, Parque Estadual do Rio Doce (19° 39' 30.7" S, 42° 34' 32,2" W), 1–8/VII/2003, 1 ♂ (UFMG 16491); 19–26/X/2000, 1 ♂ (UFMG 16490); (19° 39' 30.7" S, 42° 43' 32.2" W), VII– XI/2002, 2 ♀ (UFMG 16424); 2–9/XI/2000, 1 ♀ (UFMG 16421). Pará: Altamira, Novo Progresso (7° 7' 41" S, 55° 25' 31" W), J.O. Dias coll., 19/XI/2005, 1 ♂ (MPEG 4383); Belém, Mata da UFRA [1° 27' 23" S, 48° 26' 26" W], G. Nerino coll., 18/VIII/2006, 1 ♂ 1 im. (MPEG 4167). Rio de Janeiro: Cachoeiras de Macacu, Poço do Anil, Povoado de Guapiaçu (22° 29' 37.1" S, 42° 51' 45.6" W), V.S.R. Diniz & B.T. Faleiro coll., 22/IX/2015, 1 ♀ (UFMG 21021); Reserva Ecológica de Guapiaçu, P2, São José [22° 27' 13" S, 42° 46' 14.5" W], R.L.C. Baptista coll., 2/IX/2017, 1 ♀ (UFRJ 2194); Macaé, Restinga de Jurubatiba, Fazenda São Lázaro [22° 12' 12.6" S, 41° 30' 0.4" W], 27/III/2010, 1 ♀ (UFRJ 2241); Terminal Cabiúnas, mata da Odebei, P3 [22° 17' 0.6" S, 41° 43' 4.8" W], D.R. Pedroso coll., 14/VIII/2014, 1 ♂ (UFRJ 2243). Rondônia: Candeias do Jamari, Usina Hidrelétrica de Samuel, Rio Jamari [8° 45' 2.7" S, 63° 27' 18.7" W], Equipe IBSP coll., XII/1988, 1 ♀ (IBSP 6687). ECUADOR. Sucumbíos: Shushufindi, Cabañas Limoncocha (0° 22' 29.50" S, 76° 35' 37.3" W), A. Anker & P.H. Martins coll., 25-28/I/2018, 1 ♀ (UFMG 34485).

Diagnosis. Males can be distinguished from any other *Corythalia* species by the following combination of characters: an extremely long embolus that wraps around its own axis twice over a recessed tegular region, a broad and dorsally serrated retrolateral tibial apophysis, and a tegular lobe less than half the maximum width of the tegulum (cf. Bayer et al., 2020, figures 52A–52B). Females can be distinguished from any other *Corythalia* species by the following combination of characters: epigynal window forming an inverted heart shape of continuous margins. Copulatory openings located on the inner parts of the posterior margins of the epigynal window (Figures 1A, 1C). Secondary spermathecae reduced. Extremely long and complex connecting ducts, which loop around their own axis three times and ventrally meet the primary spermathecae (Figures 1B, 1D–1F), visible through cuticle (Figure 2G).

Description. Male. See Bayer et al. (2020).

Female (UFMG 16421). Total length 4.65, carapace length 2.12, maximal width 1.10, height 1.05; width of ocular rectangle 1.38, fovea length 0.13. Opisthosoma length 2.23, width 1.68. Eye diameters and interdistances: anterior median eye (AME) 0.40, anterior lateral eye (ALE) 0.25, posterior median eye (PME) 0.05, posterior lateral eye (PLE) 0.25, AME–AME 0.05, AME–ALE 0.05, PME–PME 1.18, PME–PLE 0.23, ALE–PLE 0.60, PLE–PLE 0.98. Clypeus height at

AME 0.13, at ALE 0.48. Spination: palp, no spines. Legs, femur I 0200, II 0100, III–IV 0600; patella I–II, III–IV 1010; tibia I–II 2002, III 2123, IV 2112; metatarsus I 3042, II 3021, III 3132, IV 4220. Measurement of palp and legs: palp 1.76 [0.60, 0.33, 0.28, 0.55]. Leg I 3.17 [1.03, 0.53, 0.63, 0.60, 0.38], II 3.17 [1.05, 0.53, 0.58, 0.63, 0.38], III 3.98 [1.25, 0.60, 0.78, 0.95, 0.40], IV 4.48 [1.35, 0.60, 0.95, 1.13, 0.45]. Leg formula: 432=1. Copulatory organs: epigynal field slightly wider than long, the connective ducts visible through cuticle (Figure 2G). Epigynal windows shaped like an inverted heart, continuous margins with a very thin septum, diverging anteriorly into a 'Y', the copulatory openings start in the inner part of the posterior margins of the windows (Figures 1A, 1C), copulatory ducts 2x longer than wide, secondary spermatheca conical, longer than wide, heads positioned postero-laterally, connective ducts (between primary and secondary spermathecae) starting in touch to the edge of anterior margins of the epigynal windows, rising upwards near to the limits of the epigynal field, running a half turn, descending to the posterior part of the septum of the windows, looping around their own axis two times, running a half turn, twisting into an S-shape, looping once more through the center (Figures 1E–1F) and finally ventrally meeting the primary spermatheca. Primary spermathecae 1.5x wider than the connective ducts, bean-shaped, longer than wide. Fertilisation ducts, visible arising centro-anteriorly, comma-shaped, bent ectally (Figure 1D). Coloration: *pars cephalica* of carapace black with greenish iridescent scales (Figure 2D), *pars thoracica* dark-brown, chelicerae dark brown. Labium and endites yellow. Palps yellow. Sternum brown.

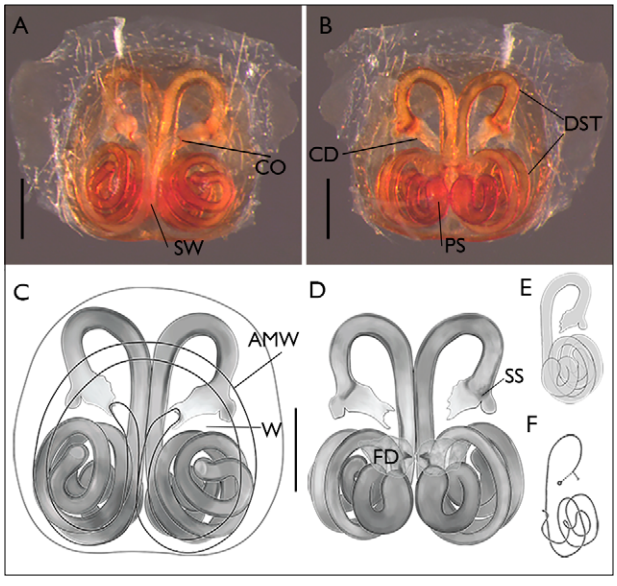

Figure 1. Female genitalia of *Corythalia vervloeti* Soares & Camargo, 1948 (UFMG 21021): A) epigyne (ventral view); B) vulva (dorsal view); C) epigyne (cleared, ventral view); D) vulva (same, dorsal view); E) same, with transparency; F) schematic course of internal duct system, the circle shows copulatory opening, the dashed line indicates copulatory duct, the bifurcation indicates the start of the connection to the secondary spermatheca, and the arrow points to the base of fertilisation duct. Abbreviations: W: epigynal window; AMW: anterior margin of epigynal window; SW: septum of the epigynal windows; CO: copulatory opening; CD: copulatory duct; PS: primary spermathecae; SS: secondary spermathecae; DST: connective duct between secondary spermathecae and primary spermathecae; FD: fertilisation ducts. C–E, Drawings by Leonardo Ferreira-Sousa. Scale bars: A–D: 0.2 mm.

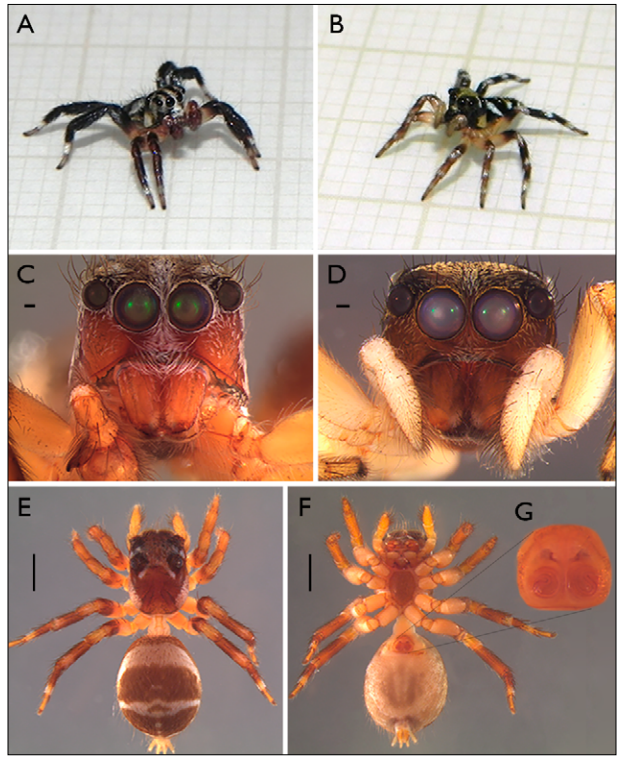

Figure 2. Habitus of *Corythalia vervloeti* Soares & Camargo, 1948: A) male on graph paper (UFMG 29266); B) female on graph paper (UFMG 29983); C) male frontal view (UFRJ 2243); D) female frontal view (UFMG 29983); E) female, dorsal view (UFMG 16424); F) same, ventral view; G) detail of undissected epigyne. Scale bars: C–D: 0.1 mm; E–F: 1 mm.

Legs predominantly yellow at coxae, trochanteres, metatarsi and femur (only anteriorly), the rest of the articles brown with whitish posterior tips. Opisthosoma brown, with 3 longitudinal white markings build of pigmentation and light scales, the medial form somewhat like a black chevron inside, ventrally grayish-yellow (Figures 2E–2F).

Natural history. Specimens were found in low shrub vegetation and in lianas more than 2 meters above the ground.

Synonymy note. *Eustiromastix efferatus* Bauab-Vianna & Soares, 1978 was misclassified within the Freyina and is indicated as a probable member of Euophryini, according to Edwards (2015). It is herein considered a junior synonym of *C. vervloeti* based on the published illustrations of the original description (Bauab-Vianna & Soares, 1978), which shows the extremely long embolus that wraps around its own axis twice over a recessed tegular region, a broad and dorsally serrated retrolateral tibial apophysis, and a proximal tegular lobe less than half the maximum width of the tegulum (Figures 3A–3B), in addition to the same white markings that adorn the carapace and opisthosoma (Figures 2A–2D; Bauab-Vianna & Soares, 1978, figures 7–12; Bayer et al., 2020, figures 52A–52B, 60G, 67I–67J, 70J). All these characters are all diagnostic of *C. vervloeti*, and are not seen in any other species of the genus.

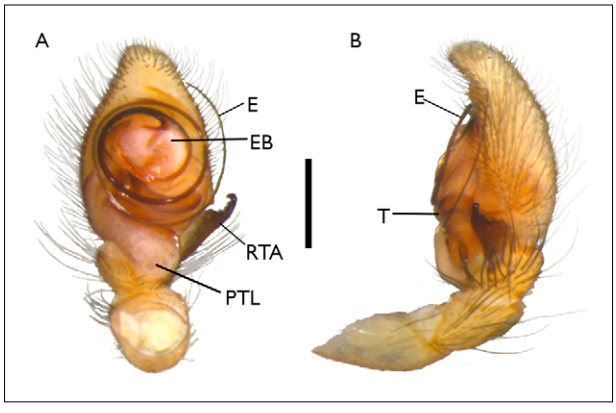

Figure 3. Male left palp of *Corythalia vervloeti* Soares & Camargo, 1948 (UFMG 29266): A) ventral view; B) retrolateral view. Abbreviations: E: embolus; EB: embolus base; T: tegulum; PTL: proximal tegular lobe; RTA: retrolateral tibial apophysis. Scale bars: A–B: 0.2 mm.

Remarks. The female was matched with the male based on records in the same locality and microhabitats. Furthermore, its extremely long connective ducts correspond well to the extremely long embolus of males (Figure 3), as well its somatic characters, colouration and markings (Figure 2).

Distribution. Known from Brazil, in the coastal and mountainous regions of the Atlantic Rainforest, from Bahia to Paraná, in the Pantanal of Mato Grosso do Sul, and in the Amazonian states of Acre, Amazonas, Pará, and Rondônia (Figure 4). It has also been recorded in the Amazon region of Ecuador, in Sucumbíos Province. Previously, the species was known only from Brazil, in the states of Amazonas, Espírito Santo, and Paraná (Bayer et al., 2020).

Comparative material. *Corythalia latipes* (C.L. Koch, 1846) (Figures 5A, 5C).

Material examined. BRAZIL. Bahia: Contendas do Sincorá, Floresta Nacional Contendas do Sincorá, Y.G. Santos coll., X–XI/2007–2008, 1 ♂ (IBSP 126792); Ibicoara, Parque Natural Municipal do Espalhado,

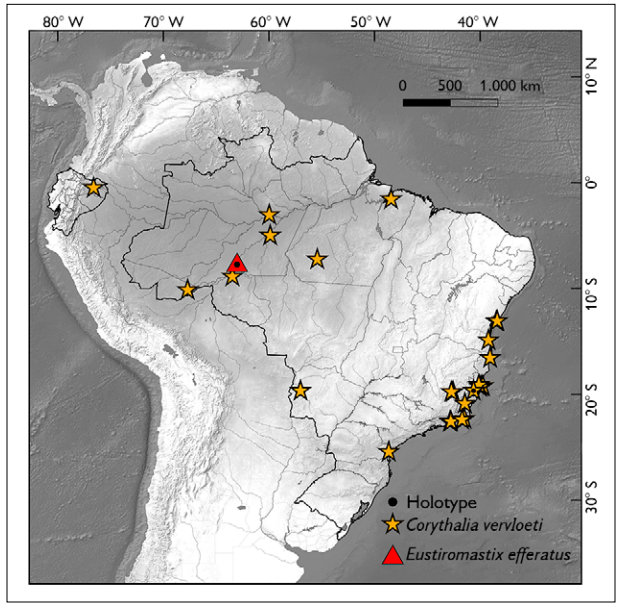

Figure 4. Distribution records of *Corythalia vervloeti* Soares & Camargo, 1948, including the type-locality of *Eustiromastix efferatus* Bauab-Vianna & Soares, 1978. Data based on material examined in this study, Bauab-Vianna & Soares (1978) and Bayer et al. (2020).

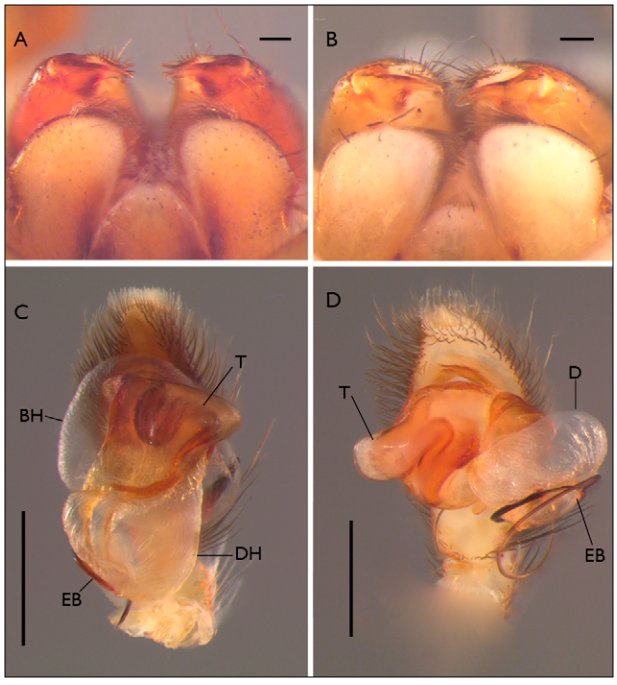

Figure 5. Diagnostic characters of *Corythalia* C.L. Koch, 1850: A) Chelicerae in resting position, ventral view of *C. latipes* (C.L. Koch, 1846) (IBSP 85549); B) same, *C. vervloeti* Soares & Camargo, 1948 (UFMG 29983); C) expanded male left palp of *C. latipes* in ventral view (UFMG 28386); D) same, *C. vervloeti* (UFMG 29266). Abbreviations: BH: basal haematodocha; DH: distal haematodocha; EB: embolus base; T: tegulum. Scale bars: A–B: 0.1 mm; C–D: 0.5 mm.

Serra do Espalhado, M.O. Silva coll., 6/X/2017, 1 ♂ (IBSP 213665); VI/2016, 1 ♂ (IBSP 213750); Ilhéus, Olivença, M.F. Dias coll., VIII/1998, 1 ♀ (IBSP 35916); 20/XII/2001, 1 ♂ (IBSP 57486); Jequié, L. Bocardo coll., VIII–I/2004–2005, 1 ♂ (IBSP 342901); Jussari, RPPN Serra do Teimoso, Cabruca Abandonada (15° 9' 18.67" S, 39° 31' 35.3" W), P.H. Martins et al. coll., 9/III/2022, 1 ♂ (UFMG 28386); Lafaiete Coutinho, J. Romão coll., VII/2006–2007, 1 ♂ (IBSP 140448); VII/2006–2008, 2 ♂ (IBSP 140449); VII/2006–2009, 1 ♂ (IBSP 140450); VII/2006–2010, 3 ♂ (IBSP 140453); VII/2006–2011, 1 ♀ (IBSP 140454); VII/2006–2012, 1 ♀ (IBSP 140455); VII/2006–2013, 1 ♂ (IBSP 140456); VII/2006–2014, 1 ♂ (IBSP 140457); Mata de São João, Fazenda Camurujipe, C. Machado coll., 2006, 1 ♀ (IBSP 85440), 1 ♂ (IBSP 85549); Praia Imbassaí; litoral norte, M. Peres et al. coll., I/2009, 1 ♀ (IBSP 153546); Milagres (12° 54.54' S, 39° 51.27' W), M.A. Ulysséa, A.M. Media & E.M. Campos coll., 12–16/VI/2010, 1 ♂ (IBSP 224386); Una, M.F. Dias coll., X/1999, 1 ♂ (IBSP 35868).

DISCUSSION

The position of *C. vervloeti* within the genus was considered very difficult to assess by Bayer et al. (2020), probably due to the lack of a female specimen. In a unique yet corresponding manner to the type species, *Corythalia latipes* (C.L. Koch, 1846), *C. vervloeti* also possesses short fangs that do not reach each other in resting position (Figures 5A–5B); males exhibit dark, long fringe setae on the metatarsi and tibiae of the third pair of legs (Figure 2A), an extremely long but coiled embolus, a proximal tegular lobe partially covering the palpal tibia, a ventral bump on the palpal tibia (Figure 3A; Bayer et al., 2020, figures 6A–6B, 52A–52B), and a well-developed distal haematodocha (Figures 5C–5D). The latter feature was corroborated as diagnostic of the genus in a more extensive, within-tribe comparative study by Zhang and Maddison (2015). The description of a female with epigynal windows separated by a longitudinal septum, (extremely) long and narrow ducts, and a primary spermatheca larger than the secondary one, leaves no doubt about its placement within the genus and clarifies its possible positioning. The initial course of the connective ducts and the shape of the epigynal windows (except for their discontinuity) resemble those of *C. luctuosa* Caporiacco, 1954 and *C. xanthopa* Crane, 1948. However, without an appropriate phylogenetic tree, it is impossible to determine whether these similarities indicate a closer relationship.

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AUTHORS' CONTRIBUTION

A. S. Michelotto contributed to formal analysis, conceptualization, data curation, writing (original draft, review and editing), investigation, methodology, resources, software and visualization; and A. J. Santos contributed to project administration, acquisition of funding, conceptualization, writing (original draft, review and editing), methodology, resources, supervision, validation and visualization.