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Zhuo CHEN, Charlotte HARTONG,
Hu LI & Wanzhi CAI

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Chryxus willemsei Chen, Hartong & Cai, n. sp., male, holotype, habitus.

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Descriptions of two new species of the enigmatic Neotropical tribe Chryxini (Hemiptera, Heteroptera, Reduviidae) and a key to genera and species with single membrane cell

Zhuo CHEN
State Key Laboratory of Agricultural and Forestry Biosecurity,
MARA Key Lab of Pest Monitoring and Green Management,
College of Plant Protection, China Agricultural University, Beijing 100193 (China)

Charlotte HARTONG
Department of Entomology, Naturalis Biodiversity Center, Darwinweg 2,
2333 CR, Leiden (The Netherlands)

Hu LI
Wanzhi CAI
State Key Laboratory of Agricultural and Forestry Biosecurity,
MARA Key Lab of Pest Monitoring and Green Management,
College of Plant Protection, China Agricultural University, Beijing 100193 (China)
caiwz@cau.edu.cn (Wanzhi Cai, corresponding author)

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ABSTRACT
The Chryxini Champion, 1898, previously recognized as a subfamily of the Reduviidae Latreille, 1807, is now placed in the Reduviinae Latreille, 1807 as a tribe to accommodate five genera and 18 species from the Neotropical Region. Many species of the Chryxini are rarely encountered in the field as well as in museum collections, and their systematics, morphology, and ecology are still poorly understood. In the present study, two new species of the Chryxini, *Chryxus willemsei* Chen, Hartong & Cai, n. sp. (from Commewijne, Suriname) and *Wygodzinskyella gilsantanai* Chen, Li & Cai, n. sp. (from Río Grande do Sul, Brazil), are described and illustrated. The *Chryxus* genus group is proposed to include *Chryxus* Champion, 1898, *Lentia* Wygodzinsky, 1946, *Petasolentia* Weirauch, 2012, and *Wygodzinskyella* Usinger, 1952; this genus group is characterized by the tuft of long setae on the mesopleuron and the single membrane cell on the hemelytron; other related morphological characters are also discussed. An identification key to the genera and species of the *Chryxus* group is provided. The Chryxini and *Chryxus* are newly recorded from Suriname.

KEY WORDS
Reduviinae,
Chryxus,
Wygodzinskyella,
morphology,
South America,
news species.

RÉSUMÉ
Description de deux nouvelles espèces de la tribu néotropicale énigmatique des Chryxini (Hemiptera, Heteroptera, Reduviidae) et clé des genres et espèces à cellule membranaire unique.
Les Chryxini Champion, 1898, précédemment reconnus comme une sous-famille des Reduviidae Latreille, 1807, sont désormais classés dans les Reduviinae Latreille, 1807 en tant que tribu regroupant cinq genres et 18 espèces de la région néotropicale. De nombreuses espèces de Chryxini sont rarement observées sur le terrain ou dans les collections muséales, et leur systématique, leur morphologie et leur écologie sont encore mal connues. Dans la présente étude, deux nouvelles espèces de Chryxini, *Chryxus willemsei* Chen, Hartong & Cai, n. sp. (de Commewijne, Suriname) et *Wygodzinskyella gilsantanai* Chen, Li & Cai, n. sp. (de Río Grande do Sul, Brésil), sont décrites et illustrées. Nous proposons le groupe de genres *Chrysus* pour réunir les genres *Chryxus* Champion, 1898, *Lentia* Wygodzinsky, 1946, *Petasolentia* Weirauch, 2012, et *Wygodzinskyella* Usinger, 1952 ; ce groupe est caractérisé par une touffe de longues soies sur le mésopleuron et la présence d'une seule cellule membranaire sur l'hémélytron ; d'autres caractères morphologiques connexes sont également discutés. Une clé d'identification des genres et des espèces du groupe *Chryxus* est fournie. Les Chryxini et *Chryxus* sont nouvellement signalés au Suriname.

MOTS CLÉS
Reduviinae,
Chryxus,
Wygodzinskyella,
morphologie,
Amérique du Sud,
espèces nouvelles.

INTRODUCTION

The assassin bug family Reduviidae Latreille, 1807 is a superdiverse group of terrestrial predatory insects, as evidenced by its species richness, morphology and ecology (Schuh & Weirauch 2020). The higher-level classification of the Reduviidae has been debated since the middle 19th century, and more than 30 subfamily-level taxa have been proposed under the family (Maldonado-Capriles 1990; Schuh & Weirauch 2020). Early studies on the higher-level phylogenetic relationships based on morphological characters well supported the monophyly and systematic relationships of some subfamilies, but the concept and taxonomic status of many others, including the nominotypical subfamily Reduviinae Latreille, 1807, have not been well resolved (Usinger 1943; Weirauch 2008; Weirauch *et al.* 2014). Recent implementation of molecular phylogenetic analyses has brought novel knowledge about the systematics and evolution of the Reduviidae, which has led to restructuring of the higher-level classification of the family into 19 subfamilies (Forthman & Weirauch 2017; Standring *et al.* 2023; Masonick *et al.* 2024).

The Chryxini Champion, 1898, originally described as a subfamily by Champion (1898), is currently placed as a tribe in the revised Reduviinae (Masonick *et al.* 2024). This group initially accommodated the then monotypic genus *Chryxus* Champion, 1898, and was subsequently expanded to include the also monotypic genera *Lentia* Wygodzinsky, 1946, *Wygodzinskyella* Usinger, 1952, and *Petasolentia* Weirauch, 2012 (Wygodzinsky 1946; Usinger 1952; Gil-Santana *et al.* 2007; Weirauch 2012). Gil-Santana *et al.* (2007) provided a taxonomic synopsis on the group (as 'Chryxinae'), and two new *Chryxus* species were added by Gil-Santana *et al.* (2007, 2022). Based on a phylogenetic analysis combining morphological and molecular data, Masonick *et al.* (2024) included *Leogorrus* Stål, 1859 (12 sp.) in the Chryxini. Therefore, the Chryxini currently consists of five genera and 18 species from the Neotropical Region. The Chryxini is characterized by the following combination of morphological character states: body size small to medium, typically with contrasting dark and light colour patterns; head ellipsoid, with short anteocular region strongly declined anterior to eyes in many species; ocellus absent or present; macrosculpturing of metapleuron flat or smooth; legs relatively slender and unarmed; mesotibia with or without fossula spongiosa; corium of hemelytron largely unsclerotized in most species (Masonick *et al.* 2024).

With the exception of *Leogorrus*, the other genera in the Chryxini are small-sized and rarely-collected taxa, and their five known species are represented by a small number of specimens from the museum collections; the information on their ecology is almost entirely lacking (Gil-Santana *et al.* 2007, 2022). Moreover, the validity of some genera, such as *Wygodzinskyella*, has been questioned (Forero 2004; Weirauch 2012). Further exploration of the potential diversity of the Chryxini, as well as further studies of its morphological diversity, will contribute to our understanding of the systematic position and relationships of the group. In the present study, we describe two remarkable new species of *Chryxus* and *Wygodzinskyella* based on newly discovered specimens from museum collections; we propose the *Chryxus* genus group to accommodate the four genera with single membrane cell, and discuss the morphological characters that may support the monophyly of the group; we provide an identification key to the genera and species of the *Chryxus* group.

MATERIAL AND METHODS

Material depository

Type specimens of the newly described species are deposited in the American Museum of Natural History, New York, USA (AMNH) and the Naturalis Biodiversity Center, Leiden, the Netherlands (RMNH). For comparative study, specimens of some Chryxini sp. preserved in the Muséum national d'Histoire naturelle, Paris, France (MNHN) and the Natural History Museum, London, UK (NHMUK) were also examined: *Chryxus tomentosus* Champion, 1898, Syntypes, Panama, 2♂, Chiriquí, David, G. C. Champion leg., NHMUK 013589268

and 013589269 (NHMUK); *Wygodzinskyella travassosi* (Lent & Wygodzinsky, 1944), Argentina, ♀, Misiones, San Ignacio, Lutecia, 1910, E. R. Wagner (MNHN).

Morphological study

External morphological characters of the specimens were examined under a Nikon SMZ745 stereoscopic microscope. Male genitalia were soaked in hot 20% potassium hydroxide (KOH) solution for approximately ten minutes to remove soft tissue, rinsed in distilled water, and dissected under a stereoscopic microscope. Dissected genitalia were placed in a plastic vial containing glycerol and, after examination, pinned under the corresponding specimen.

Photographs were taken using a Canon 7D Mark II digital camera with a Canon EF 100mm f/2.8L IS USM macro lens for habitus, and an Olympus BX51 microscope for dissected body parts. Original images were stacked using Helicon Focus 5.3; figure plates were assembled using Adobe Photoshop CC 2020; distribution map was modified from a map downloaded from the online version of SimpleMappr (Shorthouse 2010).

Measurements were obtained using a calibrated micrometer. Morphological terminology mainly follows Weirauch (2008) and Masonick *et al.* (2024).

Abbreviations

Institutions

AMNH	American Museum of Natural History, New York;
MNHN	Muséum national d'Histoire naturelle, Paris;
NHMUK	Natural History Museum, London;
RMNH	Naturalis Biodiversity Center, Leiden.

Morphology

An	anal vein;
Cu	cubitus;
M	media;
R	radius.

RESULTS

Family Reduviidae Latreille, 1807
Subfamily Reduviinae Latreille, 1807
Tribe Chryxini Champion, 1898

Genus *Chryxus* Champion, 1898

Chryxus Champion, 1898: 181. — Wygodzinsky 1946: 177 (discussion); 1949: 21 (catalogue, fauna of New World). — Usinger 1952: 56 (discussion). — Maldonado 1990: 21 (catalogue). — Schuh & Slater 1995: 156 (listed). — Forero 2004: 142 (discussion). — Gil-Santana *et al.* 2007: 78 (in key, key to species). — Weirauch 2012: 119 (in key). — Gil-Santana *et al.* 2015: 311 (in key); 2022: 161, 174 (redescription, distribution, in key, key to species, discussion). — Schuh & Weirauch 2020: 356 (listed). — Masonick *et al.* 2024: 26 (listed).

Type species. — *Chryxus tomentosus* Champion, 1898 (by monotypy).

Diagnosis. — Recognized within the Chryxini by the following combination of character states: body small-sized, 3-6 mm in length; head wider than long, strongly declined anteriorly; ocellus absent; corium of hemelytron with distinct venation; membrane of hemelytron with single central cell and single vein emitting from apex of cell; abdominal connexivum bicolorous.

Diversity and distribution. — *Chryxus* contained three species prior to this study, all distributed in the Neotropical Region (Gil-Santana *et al.* 2022). A new species is described herein, representing a new record of the genus from Suriname.

Chryxus willemsei Chen, Hartong & Cai, n. sp.
(Figs 1-3)

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Type material. — **Holotype. Suriname** • ♂; Commewijne District, Mapana Creek; 25.VIII.1961; J. P. Schulz leg.; RMNH. INS. 1629746.

Diagnosis. — Body length 4.5 mm, generally blackish brown (Fig. 1); median longitudinal sulcus on posterior pronotal lobe wide in anterior portion, gradually narrowed posteriorly (Fig. 2A); apex of scutellum curved upwards (Fig. 2B); meso- and metafemora whitish in basal third, yellowish to blackish brown in apical parts (Fig. 1A, C); hemelytron with corium decorated with one broad, oblique, whitish band from base to inner angle, membrane with three clear whitish patches (Fig. 2D); paramere with one large, peculiar, branched process on inner surface, with upper branch short, triangular, lower branch long, spine-like (Fig. 3C-E).

Etymology. — The specific epithet is dedicated to the Dutch entomologist Luc Willemse (RMNH) for his kind support to our study of the Reduviidae.

Distribution. — Suriname: Commewijne (Fig. 7).

Description

Male

Coloration. Generally blackish brown (Fig. 1). Head dark brown, slightly darkened along interocular sulcus; collum lighter (Fig. 2A). Antennal scape and pedicel yellowish brown; flagellomeres dark brown (Fig. 1). Labium brown (Fig. 2B, C). Median longitudinal sulcus on posterior lobe of pronotum tinged with reddish brown. Scutellum with basal part slightly lighter (Fig. 2A). Thoracic sterna dark brown. Legs yellowish brown; meso- and metatrochanters and basal third of femora whitish; metafemur blackish brown on apical half; meso- and metatibiae dark brown to blackish brown, with basal and apical parts slightly lighter (Fig. 1A, C). Hemelytron with corium decorated with broad, oblique, whitish band from base to inner angle, apical half dark brown on inner half; clavus slightly lighter at apex; membrane dark brown, with three whitish patches (Fig. 2D). Abdomen dark brown, ventrally with one pair of longitudinal blackish bands laterally (Figs 1C; 2E); connexivum with faint, narrow, pale yellowish spot at base of each segment.

Vestiture. Body surface smooth, slightly shiny, densely covered with suberect to erect, long and slender, whitish yellow setae, with setae on outer surfaces of tibiae, basal half of anterior margin of corium as well as apical portion of abdomen extremely long (Fig. 1). Head with ventral surface and collum glabrous. Antennal scape and pedicel with suberect

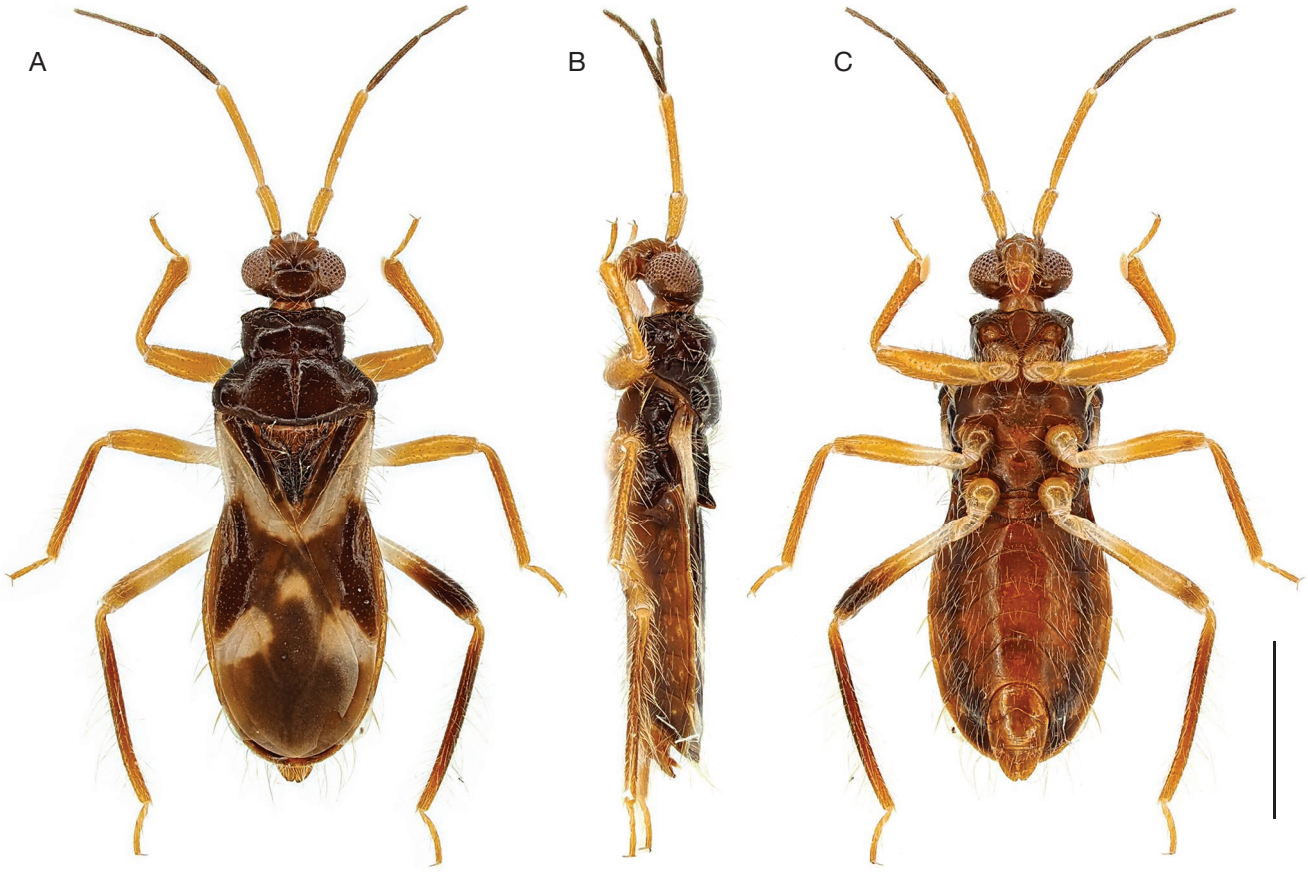

Fig. 1. — *Chryxus willemsei* Chen, Hartong & Cai, n. sp., male, holotype, habitus: **A**, dorsal view; **B**, lateral view; **C**, ventral view. Scale bar: 1.5 mm.

to erect, short, whitish pubescence, with pubescence as long as or slightly longer than diameter of segment; flagellomeres with decumbent to suberect, short, whitish pubescence. Visible labial segments II and III with sparse, erect, short setae. Thoracic pleura and sterna largely glabrous; mesopleuron with tuft of erect, long, whitish setae along midlength (Fig. 2B, C). Hemelytron with clavus and outer half of corium shiny, membrane and inner half of corium dull (Fig. 2D); corium with some erect, long, blackish setae along Cu. Abdomen with one cluster of conspicuous lateral setae at connexival intersegmental suture III-VII (Fig. 2D).

Structure. Head (Fig. 2A-C) transverse elliptical, width across eyes 1.8 times as broad as length along midline; anteocular region twice as long as postocular, strongly declined anteriorly, near vertical; anteclypeus weakly elevated; gena with one small, posterolaterally produced, setigerous process. Eye (Fig. 2A-C) large, reniform in lateral view, with posterior margin deeply concave; width across eyes 2.25 times as broad as interocular space. Antennal scape short and stout, 0.45 times as long as pedicel; pedicel slenderer, subequal to length of distiflagellomere; basiflagellomere slightly shorter than distiflagellomere. Labium (Fig. 2B, C) short and robust; visible segment I slightly shorter than visible segments II and III combined.

Pronotum (Fig. 2A, B) 0.7 times as long as width across humeral angles, clearly divided into anterior and posterior lobes by transverse sulcus; anterior lobe subrectangle, weakly inflated dorsally, with one shallow, median, longitudinal depression on posterior fourth, anterior margin finely concave at midlength, anterior angle slightly protruding laterally, lateral margins subparallel; posterior lobe subtrapezoid, 1.5 times as long as anterior lobe, flattened on disc, with deep, median, longitudinal sulcus gradually narrowed posteriorly, humeral angles rounded and finely inflated. Prosternum (Fig. 2C) with broad stridulitrum. Scutellum (Fig. 2A, B) 1.17 times as long as basal width, strongly wrinkled, with short ridges and small pits; lateral portions on basal half and midline on apical half distinctly elevated, forming Y-shaped ridge; apex rounded, clearly curved upwards (Fig. 2B). Fore leg short; femur finely thickened; tibia slightly shorter than femur, gradually widened towards apex, with fossula spongiosa about one-fourth as long as segment (Fig. 1A, C). Mesotibia slightly longer than femur. Metatibia 1.33 times as long as femur, weakly curved (Fig. 1A, C). Hemelytron nearly reaching apex of abdomen (Fig. 2D).

Abdomen elongate oval, 1.38 times as long as its maximum width, slightly flattened at midlength of ventral surface (Fig. 1C). Intersegmental sutures between sternites curved

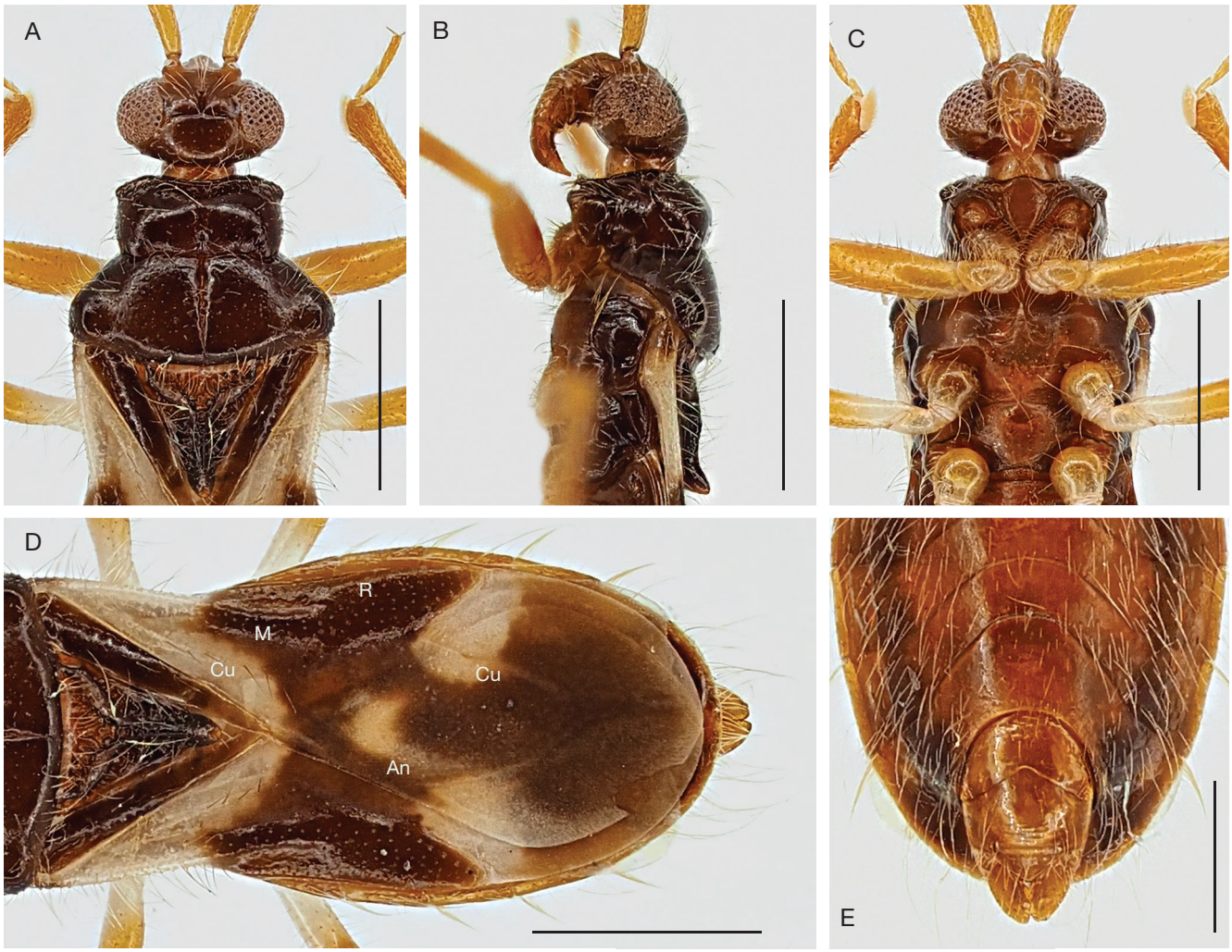

FIG. 2. — *Chryxus willemsei* Chen, Hartong & Cai, n. sp., male, holotype: **A**-**C**, anterior part of body; **D**, hemelytron; **E**, apex of abdomen. **A**, **D**, dorsal view; **B**, lateral view; **C**, **E** ventral view. Abbreviations: see Material and methods. Scale bars: A-D, 1 mm; E, 0.5 mm.

anteriorly at midlength (Figs 1C; 2E). Segment VIII broadly exposed, with posteromedial margin broadly concave as obtuse angle (Fig. 2E).

Male genitalia. Pygophore (Fig. 3A, B) suboval, with large anterior and posterior openings, lateral margins subparallel, ventral surface somewhat flattened; transverse bridge long and narrow; median process long, knife-like, curved upwards, finely curved in apical half, narrowed towards apex. Paramere (Fig. 3C-E) large, lobe-like, widest at midpoint, gradually narrowed towards apex, covered with short to long setae on apical two-thirds; inner surface with one large, peculiar, branched process, with upper branch short, triangular, apically blunt (Fig. 3C, D), lower branch long, spine-like, apically acute (Fig. 3D, E). Phallus (Fig. 3F-H) relatively small; articulatory apparatus well sclerotized, basal plate arms short and divergent, ponticulus basilaris short and wide; basal plate extension long, wide, curved; phallosoma oval, dorsal phallothecal sclerite finely sclerotized, struts fused to each other, enlarged at midlength and narrowed apically; endosoma largely membranous, with two series of weakly-sclerotized small spinus.

Female
Unknown.

Measurements [in mm, ♂ (n = 1)]. Length of body (to apex of abdomen) 4.50; length of head 0.50; length of anteocular region 0.20; length of postocular region 0.10; width across eyes 0.90; interocular space 0.40; length of antennal segments I-IV = 0.40, 0.90, 0.70, 0.90; length of visible labial segments I-III = 0.20, 0.15, 0.10; length of pronotum 1.00; length of anterior pronotal lobe 0.40; length of posterior pronotal lobe 0.60; width of anterior pronotal lobe 0.90; width of posterior pronotal lobe 1.40; median length of scutellum 0.70; basal width of scutellum 0.60; length of forefemur, tibia, tarsus = 1.00, 0.80, 0.40; length of mesofemur, tibia, tarsus = 0.90, 1.00, 0.40; length of metafemur, tibia, tarsus = 1.20, 1.60, 0.40; length of hemelytron 3.00; length of abdomen 2.20; maximum width of abdomen 1.60.

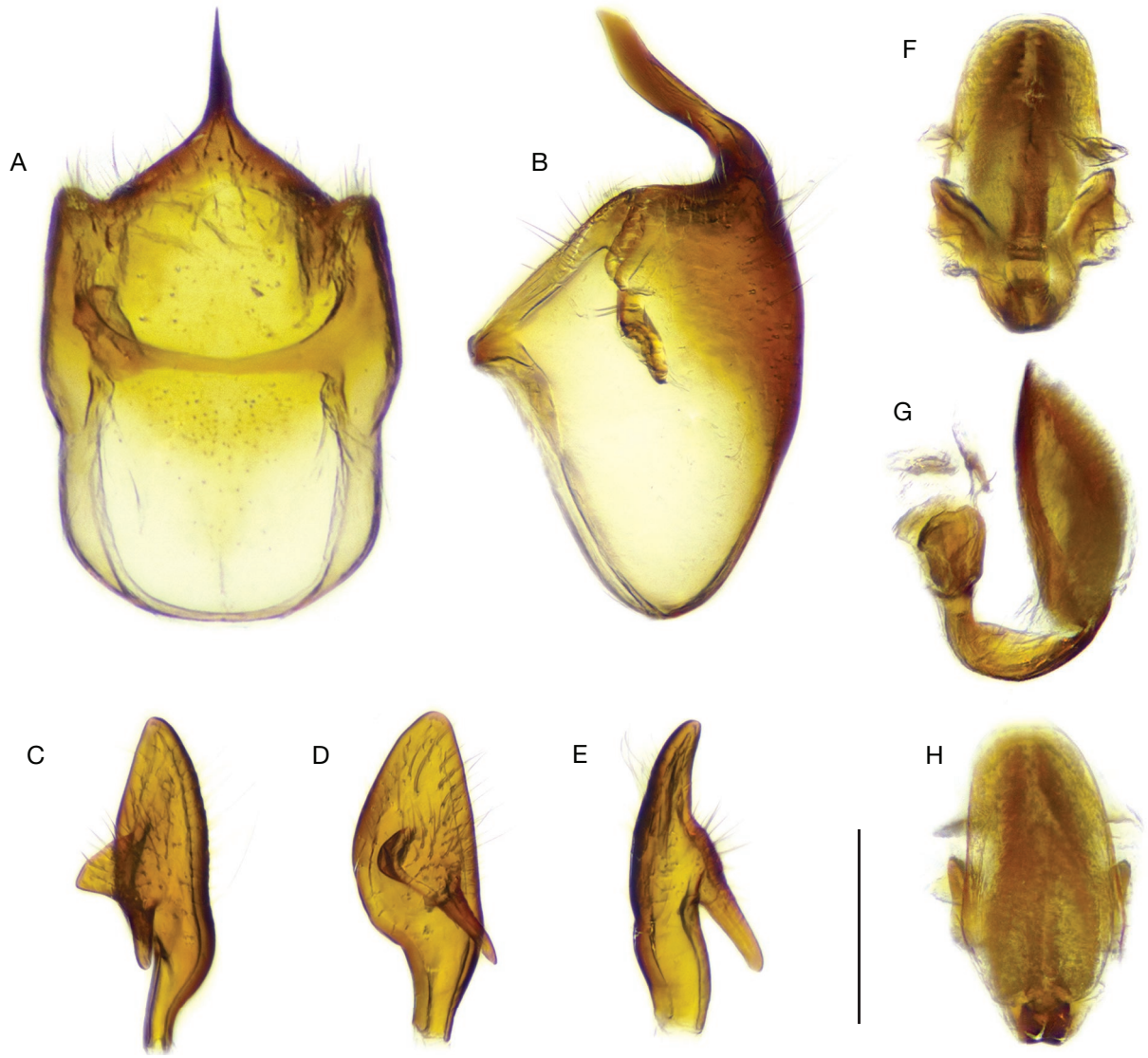

Fig. 3. — *Chryxus willemsei* Chen, Hartong & Cai, n. sp., male, holotype, genitalia: **A**, **B**, pygophore; **C**-**E**, paramere; **F**-**H**, phallus. **A**, **D**, **F**, dorsal view; **B**, **C**, **E**, **G**, lateral view; **H**, ventral view. Scale bar: 0.5 mm.

Remarks

The holotype of *Chryxus willemsei* Chen, Hartong & Cai, n. sp. was collected near Mapana Creek in the Commewijne District of Suriname. Comparing locations in Google Maps with original maps made by the collector J. P. Schulz (Centraal Bureau Luchtkaartering 1959; Schulz 1971) and other publications (Schulz 1960; Fernandes & van Doesburg 2000), a point 5°18'17.7"N, 54°50'59.6"W (5.2650308, -55.0279351 or 5.3, -55.0) was selected. An accuracy radius of 20 km from this point is recommended.

Comparative notes

Among the three known species of *Chryxus*, *Chryxus willemsei* Chen, Hartong & Cai, n. sp. is most similar to *C. garcetebarretti* Gil-Santana, Leavengood, Bérenger, Martins & Oliveira, 2022 (from Paraguay), but can be separated from the latter by the following morphological character states: antennal pedicel uniformly yellowish brown (vs pale brown with darkened apex in *C. garcetebarretti*); median longitudinal sulcus on posterior pronotal lobe wide at anterior portion, gradually narrowed posteriorly (vs uniformly narrow in *C. garcetebarretti*); apex of scutellum clearly curved upwards (vs horizontal in *C. garcetebarretti*); femora without median dark marking (vs femora largely darkened at midlength in *C. garcetebarretti*); membrane of hemelytron with three clear whitish patches (vs with two faint whitish patches in *C. garcetebarretti*). Since the male of *C. garcetebarretti* is currently undiscovered, the differences on the male genitalia between these two species remain unknown.

Chryxus willemsei Chen, Hartong & Cai, n. sp. also resembles *C. bahianus* Gil-Santana, Costa & Marques, 2007 (from Brazil), but it has a much larger body size, and the color patterns on legs and hemelytron are very different between these two species. The lateral margins of the abdomen are simple in shape in *C. willemsei* Chen, Hartong & Cai, n. sp., but

in *C. bahianus* the posterolateral angles of the segments II-V are distinctly prominent. Moreover, the paramere of this new species has one large, peculiar-shaped process on its inner surface, with one short and one long branches, while *C. bahianus* only has one small, subquadrate, lamelliform process at the same position.

Genus *Wygodzinskyella* Usinger, 1952

Wygodzinskyella Usinger, 1952: 56 (original description). — Maldonado 1990: 21 (catalogue). — Schuh & Slater 1995: 156 (listed). — Forero 2004: 142 (discussion). — Gil-Santana *et al.* 2007: 78, 81 (in key, listed). — Weirauch 2012: 119 (in key); Gil-Santana *et al.* 2015: 311 (in key). — Schuh & Weirauch 2020: 356 (listed). — Gil-Santana *et al.* 2022: 173 (discussion). — Masonick *et al.* 2024: 26 (listed).

TYPE SPECIES. — *Chryxus travassosi* Lent & Wygodzinsky, 1944 (by original designation).

DIAGNOSIS. — Recognized within the Chryxini by the following combination of character states: body medium-sized, 8-9 mm in length; head wider than long, strongly declined anteriorly; ocellus absent; corium of hemelytron with indistinct venation; membrane of hemelytron with single central cell and single vein emitting from apex of cell; abdominal connexivum concolorous.

DIVERSITY AND DISTRIBUTION. — *Wygodzinskyella* previously contained only its type species, *W. travassosi* (Lent & Wygodzinsky, 1944) from Argentina and Brazil. A new species is described herein from Brazil.

Wygodzinskyella gilsantanai Chen, Li & Cai, n. sp. (Figs 4-6)

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TYPE MATERIAL. — **Holotype**. **Brazil** • ♂; Río Grande do Sul, Guanabara, Represa Rio Grande; I.1972; M. Alvarenga and F. M. Oliveira leg.; AMNH.

DIAGNOSIS. — Body length about 8.8 mm, generally black (Fig. 4); pronotum with red anterior lobe and black posterior lobe (Fig. 5A, B); basal two-thirds to three-fourths of femora orange-coloured to reddish brown, tibiae and apical one-fourth to one-third of femora blackish brown (Fig. 4); hemelytron with basal half of corium orangish to reddish brown, apical half of corium blackish brown (Fig. 5D); median process of pygophore with subapical angular protrusion posteriorly (Fig. 6B); paramere with large, rhomboid, lamelliform process on inner surface (Fig. 6C-E).

ETYMOLOGY. — The specific epithet is dedicated to the Brazilian entomologist Hélcio R. Gil-Santana (Instituto Oswaldo Cruz, Rio de Janeiro, Brazil), for his outstanding contribution to the taxonomy of the Neotropical Reduviidae.

DISTRIBUTION. — Brazil: Río Grande do Sul (Fig. 7).

DESCRIPTION

Male

Coloration. Generally black (Fig. 4). Head with ventral surface, collum and gena red; anteclypeus blackish brown. Labium with visible segment I red, visible segments II and III orangish brown (Fig. 5B, C). Pronotum with anterior lobe, anterior margin and median longitudinal sulcus of posterior lobe red; ventral and posterior margins of posterior lobe narrowly orangish brown (Fig. 5A, B). Propleuron and sternum reddish brown (Fig. 5B, C). Scutellum orange, with basal portion dark reddish brown (Fig. 5A). Meso- and metapleura and sterna reddish brown, with blackish suffusion on pleura (Fig. 5B, C). Legs with coxae, trochanters and femora (except apical parts) orange to reddish brown (Fig. 1); tibia, tarsi and apical parts of femora blackish brown (Fig. 1); claws yellowish brown. Hemelytron with basal half of corium and apical half of clavus orangish brown to reddish brown; apical half of corium blackish brown; basal half of clavus dark brown; membrane greyish black, with whitish marginal area (Fig. 5D). Abdomen with connexivum and basal portion of ventral surface orangish brown to reddish brown (Fig. 1).

Vestiture. Body surface smooth, slightly shiny, densely covered with suberect to erect, long and slender, whitish yellow setae. Head with ventral surface and collum glabrous. Visible labial segments II and III with sparse, erect, short setae. Meso- and metapleura and sterna (except midlengths) glabrous; mesopleuron with tuft of erect, long, whitish setae along midlength (Fig. 5B, C). Hemelytron with membrane dull, finely wrinkled (Fig. 5D).

Structure. Head (Fig. 5A-C) transverse elliptical, width across eyes 1.6 times as broad as length along midline; anteocular region twice as long as postocular, strongly declined anteriorly, vertical; anteclypeus weakly elevated; gena short conical, slightly produced posteriorly. Eye (Fig. 5A-C) large, protruding laterally, reniform in lateral view, with posterior margin deeply concave; width across eyes 2.9 times as broad as interocular space. Antenna missing. Labium (Fig. 5B, C) short and robust; visible segment I slightly shorter than visible segments II and III combined.

Pronotum (Fig. 5A, B) 0.68 times as long as width across humeral angles, clearly divided into anterior and posterior lobes by transverse sulcus; anterior lobe short, slightly inflated dorsally, with shallow oblique furrows on both sides, and shallow, median, longitudinal sulcus on posterior half, anterior margin concave at midlength, anterior angle rounded, not prominent; posterior lobe subtrapezoid, 1.7 times as long as anterior lobe, disc finely inflated, with deep, median, longitudinal sulcus gradually narrowed posteriorly, humeral angles rounded and finely inflated. Prosternum with anterior margin produced anteriorly at midpoint, forming small process in lateral view (Fig. 5B). Scutellum (Fig. 5A, B) 1.25 times as long as basal width, slightly wrinkled, with short ridges and small pits; lateral portions on basal half and midline on apical half distinctly elevated, forming Y-shaped ridge; apex subacute, clearly curved upwards (Fig. 5B). Meso- and metasterna with narrow longitudinal ridge along midline (Fig. 5C). Fore leg short; femur finely thickened; tibia slightly longer than femur, gradually widened towards apex, with fossula spongiosa about one-fourth as long as segment (Fig. 1). Mesotibia slightly longer than femur. Metatibia 1.28 times as long as femur, straight. Hemelytron nearly reaching apex of abdomen (Fig. 5D).

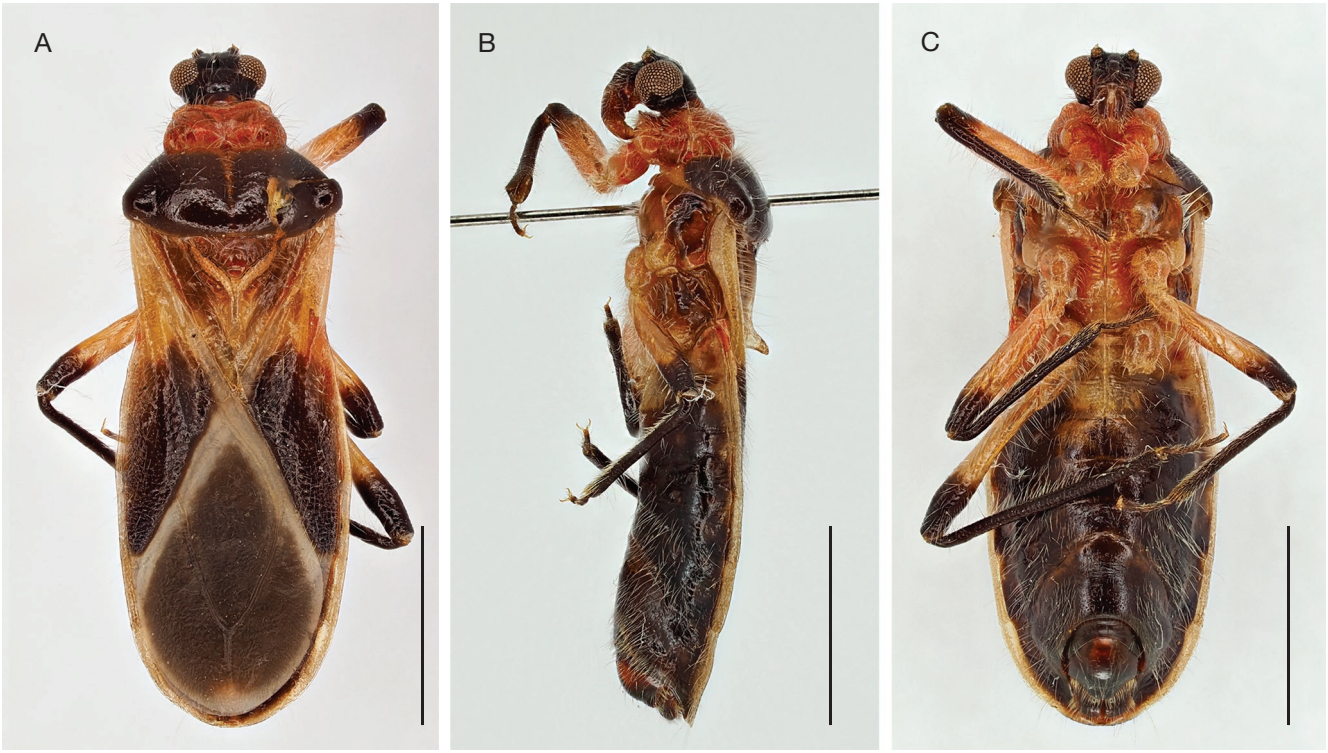

Fig. 4. — *Wygodzinskyella gilsantanai* Chen, Li & Cai, n. sp., male, holotype, habitus: **A**, dorsal view; **B**, lateral view; **C**, ventral view. Scale bars: 2.5 mm.

Abdomen elliptical, 1.77 times as long as its maximum width (Fig. 4). Intersegmental sutures between sternites curved anteriorly at midlength (Fig. 5C); sternites II and III with narrow longitudinal ridge along midline (Fig. 5C). Segment VIII broadly exposed, with posteromedial margin broadly concave as arc (Fig. 5E).

Male genitalia. Pygophore (Fig. 6A, B) suboctagonal, with large anterior and posterior openings, lateral margins distinctly constricted at midpoint, ventral surface rounded; transverse bridge long and narrow; median process long, knife-like, curved upwards, slightly widened at midlength, narrowed towards apex, with subapical angular protrusion posteriorly (Fig. 6B). Paramere (Fig. 6C-E) large, paddle-like, distinctly widened on apical three-fourths, covered with short to long setae on apical two-thirds; apical margin curved inwards, forming hook-like, apically acute process; inner surface with one large, rhomboid lamelliform process at midpoint. Phallus as shown in Fig. 6F-H; articulatory apparatus weakly sclerotized, basal plate arms slender and divergent, ponticulus basilaris short and narrow; basal plate extension narrow, nearly as long as basal plate arms; phallosoma elongate elliptical, dorsal phallothecal sclerite finely sclerotized, struts fused to each other, long and slender; endosoma largely membranous.

Female
Unknown.

Measurements [in mm, ♂ (n = 1)]. Length of body (to apex of abdomen) 8.75; length of head 0.80; length of anteocular region 0.20; length of postocular region 0.10; width across eyes 1.30; interocular space 0.45; length of antennal segments I-IV = ? (missing), ? (missing), ? (missing), ? (missing); length of visible labial segments I-III = 0.50, 0.30, 0.15; length of pronotum 1.90; length of anterior pronotal lobe 0.70; length of posterior pronotal lobe 1.20; width of anterior pronotal lobe 1.60; width of posterior pronotal lobe 2.80; median length of scutellum 1.50; basal width of scutellum 1.20; length of forefemur, tibia, tarsus = 2.00, 2.15, 0.70; length of mesofemur, tibia, tarsus = 2.10, 2.45, 0.70; length of metafemur, tibia, tarsus = 2.80, 3.60, 0.80; length of hemelytron 6.60; length of abdomen 5.50; maximum width of abdomen 3.10.

Remarks

The holotype of *Wygodzinskyella gilsantanai* Chen, Li & Cai, n. sp. was collected from the Río Grande do Sul state in Brazil. Using Google Maps a point 32°07'18.5"S, 52°12'58.6"W (-32.121805, -52.216284 or -32.1, -52.2) was selected based on another publication featuring specimens from the same collector (Dellapé *et al.* 2016). An accuracy radius of 20 km from this point is recommended. No further information about the location was available to the authors.

Comparative notes

Wygodzinskyella gilsantanai Chen, Li & Cai, n. sp. can be distinguished from its only known congener *W. travassosi* (from Argentina and Brazil) by the different color patterns first of all: pronotum with anterior lobe red, posterior lobe black except red median longitudinal sulcus (vs orange-

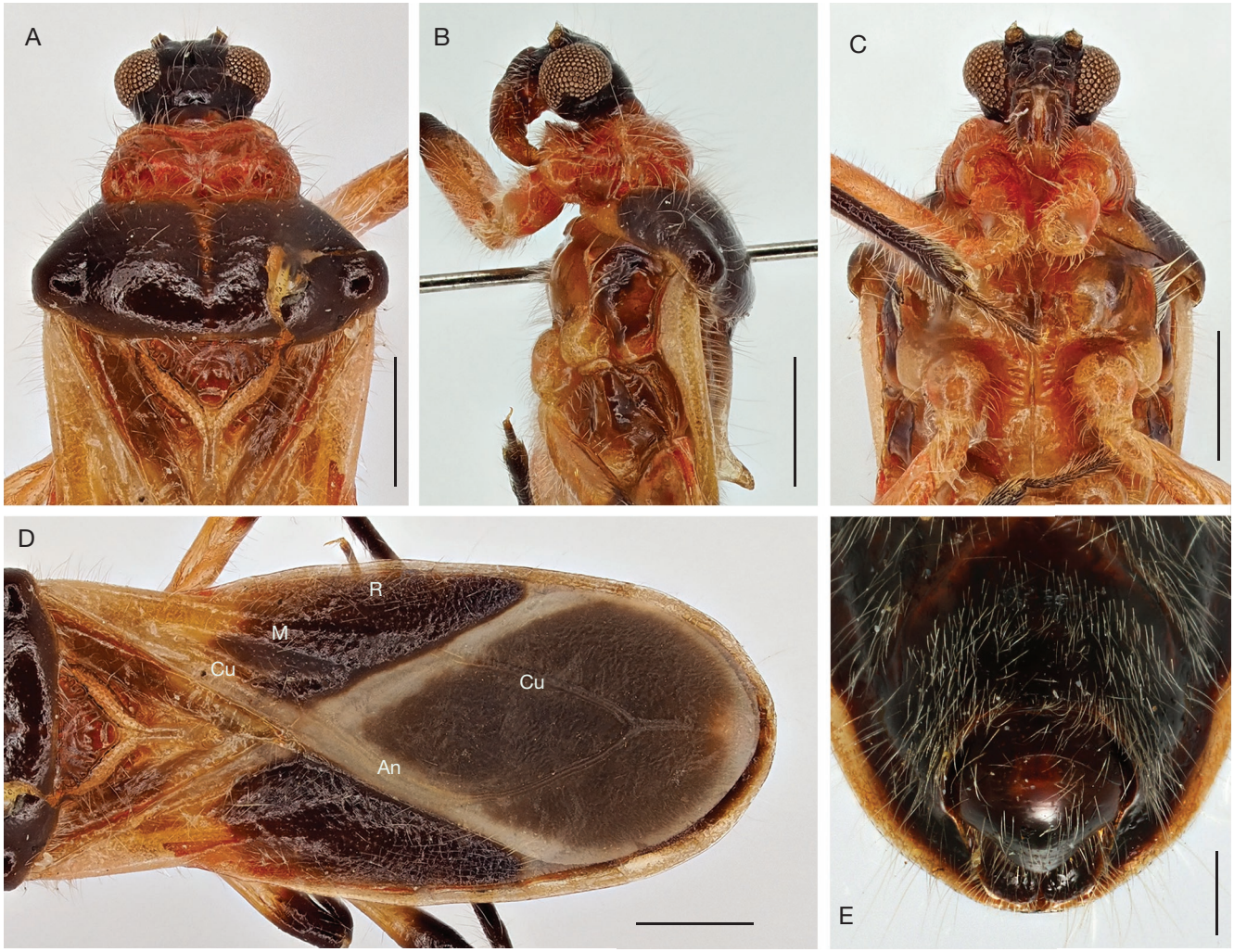

FIG. 5. — *Wygodzinskyella gilsantanai* Chen, Li & Cai, n. sp., male, holotype: **A**-**C** anterior part of body; **D**, hemelytron; **E**, apex of abdomen: **A**, **D**, dorsal view; **B**, lateral view; **C**, **E**, ventral view. Abbreviations: see Material and methods. Scale bars: A-D, 1 mm; E, 0.5 mm.

coloured, with disc of posterior lobe largely dark brown in *W. travassosi*); femora orange to reddish brown with apices blackish brown, tibiae uniformly blackish brown (vs legs blackish brown, with apices of femora and bases of tibiae orangish brown in *W. travassosi*); hemelytron with corium orangish to reddish brown in basal half, blackish brown in apical half (vs corium dark brown, with basal part orangish brown in *W. travassosi*). The eyes of *W. travassosi* are covered with many long erect pubescence arising between ommatidia, but the eyes of *W. gilsantanai* Chen, Li & Cai, n. sp. are almost glabrous. These two species can be further separated by the character states of the male genitalia: the posterior margin of the median process of the pygophore has a subapical angular protrusion in *W. gilsantanai* Chen, Li & Cai, n. sp., but in *W. travassosi* it lacks such modification; the paramere of *W. gilsantanai* Chen, Li & Cai, n. sp. has a large, rhomboid, lamelliform process at the midpoint of its inner surface, while in *W. travassosi* the process is smaller, triangular and acute at apex.

DISCUSSION

Of the five genera presently placed in the Chryxini, *Leogorrus* differs markedly in morphological characters from the other four genera, the latter may constitute a monophyletic group referred herein as the *Chryxus* genus group. There are a number of noteworthy morphological characters that probably support the monophyly of the *Chryxus* group, which are discussed below [the character states of *Leogorrus*, *Lentia* and *Petasolentia* are derived from Wygodzinsky (1946), Melo (2007) and Weirauch (2012)]:

1) The shape of the head is transversely elliptical in the *Chryxus* group, with the width much greater than the length, whereas in *Leogorrus* it is elongate oblong, with the length distinctly greater than the width; this character has been used to diagnose 'Chryxinae' (Schuh & Weirauch 2020); in addition, the gena of the head is simple in shape in *Leogorrus*, while in the *Chryxus* group it forms a short conical or denticle-like process.

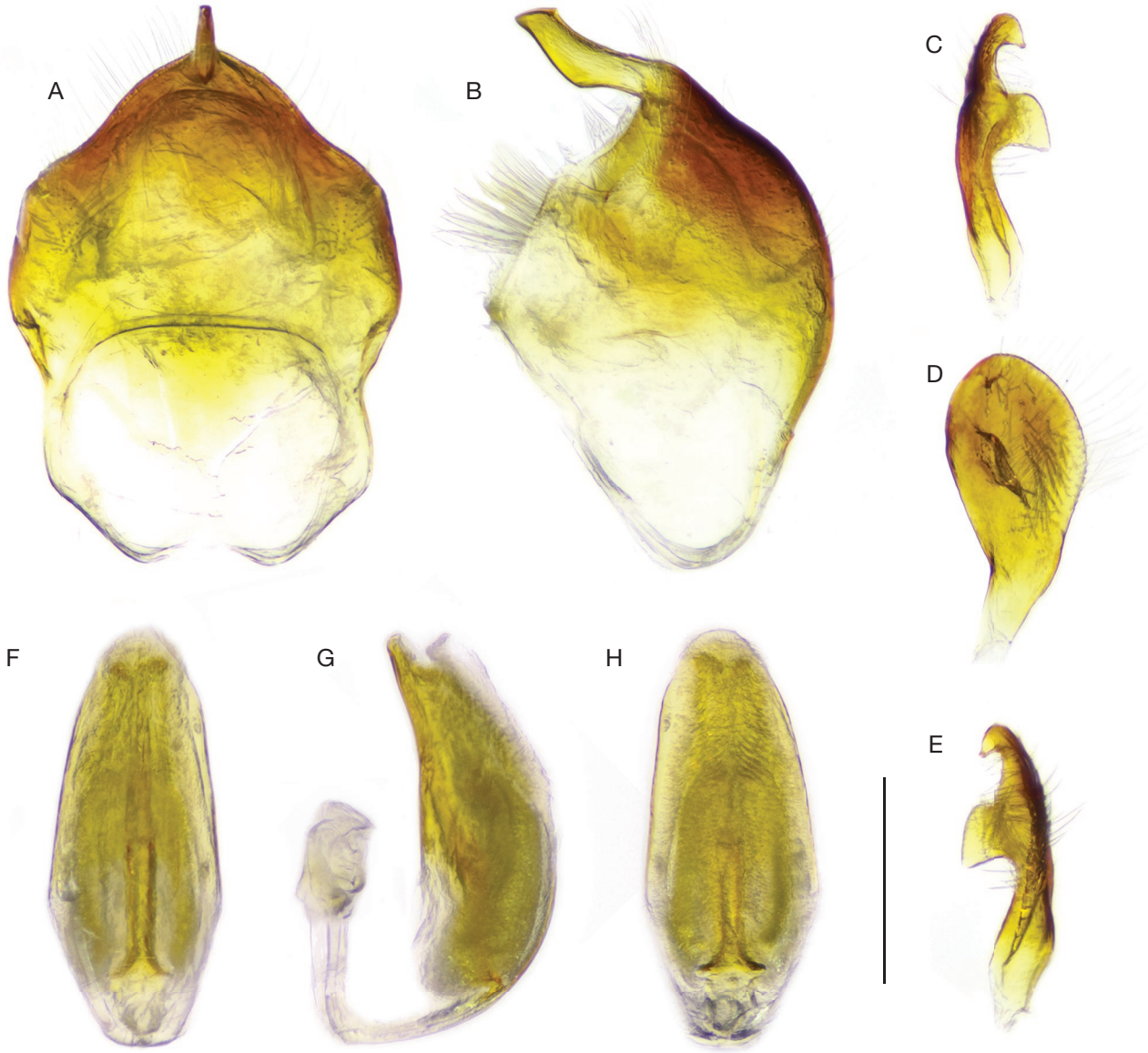

FIG. 6. — *Wygodzinskyella gilsantanai* Chen, Li & Cai, n. sp., male, holotype, genitalia: **A**, **B**, pygophore; **C**-**E**, paramere; **F**-**H**, phallus; **A**, **D**, **F**, dorsal view; **B**, **C**, **E**, **G**, lateral view; **H**, ventral view. Scale bar: 1 mm.

2) The labium appears short and stout in the *Chryxus* group, which is compatible with the shortened head; the visible labial segment I is clearly longer than the visible segment II, which differs from the condition in *Leogorrus*, where the visible segment I is as long as or even shorter than the second visible segment.

3) A longitudinally-arranged tuft of long, pale-colored setae arising on a low carina at the midlength of the mesopleuron was observed in the both sexes of all known species of the *Chryxus* group. Although the biological function of these setae remains unclear, the presence of such setae is rather unique in the Reduviidae.

4) All members of the *Chryxus* group have fossula spongiosa only on their foretibia, whereas *Leogorrus* has fossula spongiosa on both fore- and mesotibiae.

5) The hemelytral venation is special in the *Chryxus* group, especially the presence of only one central cell in the membrane, a character state that used to be the most important diagnostic character of the 'Chryxinae' (Schuh & Weirauch 2020).

Among the above character states, the presence of the tuft metapleural setae and the single membrane cell are considered here as synapomorphies supporting the monophyly of the *Chryxus* group. Furthermore, the morphology of the male paramere should also be paid attention: in the known males of the *Chryxus* group, the paramere is strongly expanded and flattened anterior to its base, and has a conspicuous process at the midpoint of the inner surface, which varies in shape from simple lamelliform to complex branched. Similar condition has never been observed in *Leogorrus*, the Pseudocetherini Villiers, 1963 (the sister-group of the Chryxini), or even other Redu-

FIG. 7. — Known distribution of species of the *Chryxus* group.

viinae species. However, *Lentia* and *Petasolentia* are described only from females, thus the morphology of their paramere is unknown. Whether the expanded paramere and the presence of the median process on the inner surface of the paramere are synapomorphies of the *Chryxus* group needs to be further studied.

Among the four genera in the *Chryxus* group, *Lentia* and *Petasolentia* were well established morphologically, but the taxonomic status of *Wygodzinskyella* has been questioned (Forero 2004; Weirauch 2012). *Wygodzinskyella* in its current concept can be distinguished from *Chryxus* primarily by its apparently larger body size, while other diagnostic character states, viz., the indistinct hemelytral venation and the unicolorous abdominal connexivum, are weak in the delimitation of genera. Since there is no enough evidence to confidently treat *Chryxus* and *Wygodzinskyella* as synonyms, we keep them as separate genera in this study. The genera and species of the *Chryxus* group can be separated using the key below.

The monophyly of the *Chryxus* group, the systematic relationships among its included genera, as well as the phylogenetic significance of the above-mentioned morphological characters remain to be evaluated in future phylogenetic studies with well taxon-sampling and molecular data.

KEY TO GENERA AND SPECIES OF *CHRYXUS* GROUP MODIFIED FROM GIL-SANTANA *ET AL.* (2022)

1. Body length 8.0-9.0 mm; veins on corium of hemelytron indistinct; abdominal connexivum unicolored [*Wygodzinskyella* Usinger, 1952] 2
— Body length 3.1-5.3 mm; veins on corium of hemelytron distinct, at least basally; abdominal connexivum bicolored 3

2. Pronotum with red anterior lobe and black posterior lobe; femora orangish to reddish brown, with apices blackish brown; tibiae uniformly blackish brown; paramere with large, rhomboid, lamelliform process at middle of inner surface ..... *W. gilsantanai* Chen, Li & Cai, n. sp.
— Pronotum orangish brown, with disc of posterior lobe dark brown; legs blackish brown, with apices of femora and bases of tibiae orangish brown; paramere with small, triangular, apically acute process at middle of inner surface ..... *W. travassosi* (Lent & Wygodzinsky, 1944)

3. Head with process on frons [*Petasolentia* Weirauch, 2012] ..... *P. goellnerae* Weirauch, 2012
— Head without process on frons 4

4 Ocellus present; gena produced into acute process; hemelytron with small costal cell [*Lentia* Wygodzinsky, 1946] ..... *L. corcovadensis* Wygodzinsky, 1946
— Ocellus absent; gena produced into small conical process; hemelytron without costal cell [*Chryxus* Champion, 1898] 5

5 Anterior lobe of pronotum with shallow oblique furrows, anterior angle largely prominent; abdominal connexivum pale with distal dark markings ..... *C. tomentosus* Champion, 1898
— Anterior lobe of pronotum smooth, without lateral furrows, anterior angle slightly prominent; abdominal connexivum reddish brown to dark brown with dark or pale markings, respectively 6

6 Transverse and median longitudinal sulci of pronotum uniformly narrow; apex of scutellum horizontal; femora largely darkened at midlength.... *C. garcetebarretti* Gil-Santana, Leavengood, Bérenger, Martins & Oliveira, 2022
— Transverse and basal half of median longitudinal sulci of pronotum widened; apex of scutellum curved upwards; femora different in colouration 7

7 Hemelytron with oblique whitish band from base to inner angle of corium, and three whitish patches on membrane; lateral margins of abdomen simple in shape; paramere with large, bifurcated process at middle of inner surface ..... *C. willemsei* Chen, Hartong & Cai, n. sp.
— Hemelytron with transverse whitish band near middle of corium, and two whitish patches on membrane; posterolateral angles of abdominal segments II-V distinctly prominent; paramere with small, subquadrate, lamelliform process at middle of inner surface ..... *C. bahianus* Gil-Santana, Costa & Marques, 2007

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Zhuo Chen: conception and design, material preparation, data collection, visualization, writing (original draft preparation), funding acquisition; Charlotte Hartong: material preparation, data collection, visualization, writing (original draft preparation); Hu Li: methodology, writing (reviewing and editing), project administration, funding acquisition; Wanzhi Cai: conception and design, supervision, writing (reviewing and editing), project administration, funding acquisition.

Competing interests
The authors declare no competing interests.

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